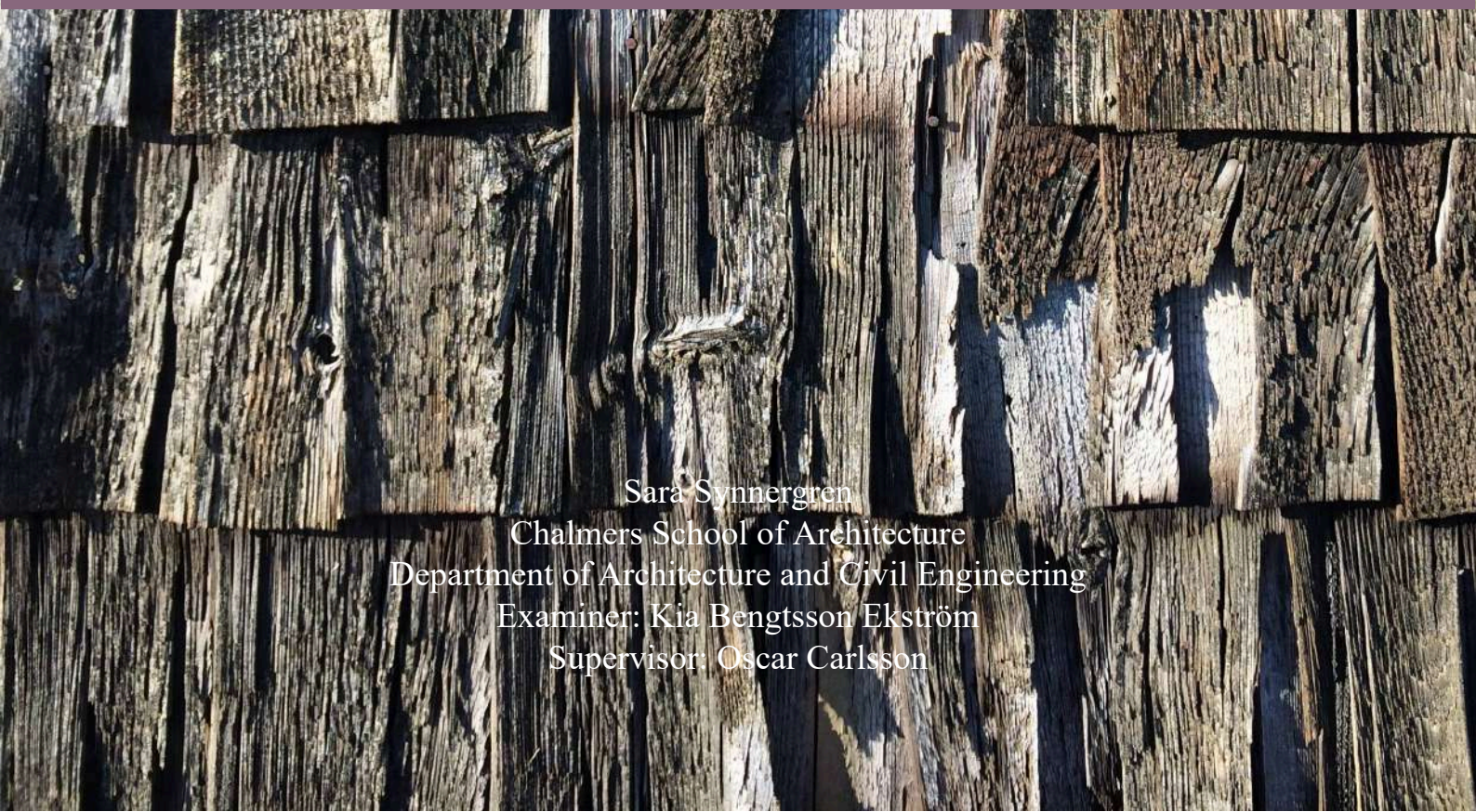
REMEMBER TO REUSE

How architectural heritage can make the countryside more attractive



Sara Synnergren
Chalmers School of Architecture
Department of Architecture and Civil Engineering
Examiner: Kia Bengtsson Ekström
Supervisor: Oscar Carlsson

REUSE TO REMEMBER
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How architectural heritage can make the countryside more attractive

Sara Synnergren

CHALMERS
UNIVERSITY OF TECHNOLOGY

Gothenburg, 2020

Chalmers School of Architecture
Department of Architecture and Civil Engineering
Master's program Architecture and Planning Beyond Sustainable Development (MPDSD)

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Figure 1: To preserve the structure of the Pilebo windmill is the most important part of the project (photographer Annie Hyrefeldt).

ABSTRACT

In today's architecture and planning, there is an increased interest in trying to catch the soul of a place and what makes the place unique. In smaller villages and in the countryside, it is even more important to preserve historical and cultural values. We are also in the middle of a climate change, and in order to minimize the effects that come with it, today's throwaway society needs to shift into one that reuse existing buildings instead replacing them with new ones. The aim with this thesis is to study the architectural heritage as a resource, to raise the importance of historical building techniques, historical and cultural values, and how transformation of architectural heritage buildings can make the countryside more attractive and useful. This has been executed in a 'research by design' method. Study visits, interviews, historical investigations, mapping, reference projects, sketching, and model building have been used to collect information. The outcome of the design part of the thesis is a transformation of the Pilebo windmill in Norra Kedum, 17 kilometres outside of Lidköping. The building's new function is a meeting place, both for visitors and locals, with a combination of a Naturum with a cafe, and a guest house for visiting tourists. The design is an application of the arguments and conclusions discussed in the theoretical part of the thesis. It meets the needs of another attraction along Vänerslingan in the expansion of the tourist route, but also the lack of accommodation in the municipality, at the same time as the building is preserved for future generations. Again, the Pilebo windmill has become the meeting place of Norra Kedum that it once was, but in a contemporary way. The new functions generate income that will finance the maintenance of the building, which means that the windmill will survive in a long-term perspective. The identity of the old function as a windmill is treated with respect in the unique octagonal shape of the rooms, but also in material choices and traditional building techniques of the addition. The conclusion of the project in a sustainability point of view is that transformation of architectural heritage is a way to reduce the building industry's negative impact on the environment by reusing existing buildings, at the same time as it strengthens the identity of a place.

Keywords: Architectural heritage, transformation, historical value, function follows form, sustainability, countryside, windmills

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STUDENT BACKGROUND

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Figure 2: A picture of me in the Pilebo windmill.

ACADEMIC BACKGROUND

2015-2018
Bachelor program Architecture and Engineering (AT) at Chalmers University of Technology

2018-2020
Master program Architecture and Design Beyond Sustainability (MPDSD) at Chalmers University of Technology

MASTER STUDIOS
Fall 2018 - ARK174
Design for a sustainable development in a local context

Spring 2019 - ARK626
Architectural heritage and transformation

Fall 2019 - ARK258
Matter space structures 3

PREVIOUS EXPERIENCE

Summer 2019
Internship at Vara Byggkonsult AB

SELECTION OF PROJECTS

Figure 3: Illustration of the prison and the prison garden, which is a result from the ARK174 studio.

Figure 4: Section of the hotel rooms and lobby, a result from the project in the ARK626 studio.

Figure 5: Screen shot from the movie made in the ARK258 studio.

INTRODUCTION

“
Den som kommer först
till kvarn får först mala.
”

A well-known Swedish
proverb meaning ”first
come, first served”.

PROBLEM STATEMENT

BACKGROUND

In today's architecture and planning, there is an increased interest in trying to catch the soul of a place and what makes the place unique. In smaller villages and in the countryside, it is even more important to keep the historical and cultural values. Still, when driving around in the countryside, we see barns, warehouses and other cultural heritage buildings in very poor conditions, and some of them will soon collapse because of lack of maintenance. We are also in the middle of a climate change, and in order to minimize the effects that come with it, we need to find solutions that reduce the emissions of greenhouse gases that are causing this change. One solution is to learn from traditional building techniques and knowledge, and to use existing buildings much more than we do today. Today's throwaway society needs to shift into one that reuse and preserve existing, healthy and functioning buildings instead of building new ones. The transition towards a sustainable building process is necessary, and architects have the ability and the responsibility to demand a movement that will generate realistic design strategies as a step towards a more sustainable building industry.

PURPOSE AND AIM

The aim of this thesis is to study the architectural heritage as a resource in architecture and how the architectural heritage in the countryside can be given new functions in order to develop an attractive and living countryside. The purpose of the thesis is to challenge the idea of what an architectural heritage building is, to raise the importance of historical building techniques, historical and cultural values, and to reuse and preserve buildings that are already standing instead of demolish them to build new ones, which are aspects that are not often considered in today's building industry. This thesis should give the reader arguments and inspiration how to use architectural heritage buildings in a new way and to question the unsustainable building industry that today mainly is driven by economical aspects. The goal of this thesis is to explore and showcase the qualities and potentials of our architectural heritage in a countryside context, and to emphasize the importance of preserving the history and cultural values that these buildings bring. This has been accomplished through a design proposal containing a transformation of an old windmill in Norra Kedum, 17 km outside of Lidköping.

THESIS QUESTIONS

MAIN THESIS QUESTION

How can architectural heritage contribute to develop a living and attractive countryside?

SUB THESIS QUESTIONS

- How can we preserve old building techniques and respect the cultural heritage in transformation projects?

- What can architects contribute with to attract more people to the Swedish countryside and to facilitate and ease transformations of the architectural heritage in Sweden?

- What aspects must be considered in a transformation of an architectural heritage building?

OBJECTIVES

- Preserve the history and building techniques of windmills

- Create a meeting place for all that is both visually and educationally beautiful

- Strengthen the identity and attractiveness of Norra Kedum

- Reduce the construction industry's negative impact on the environment

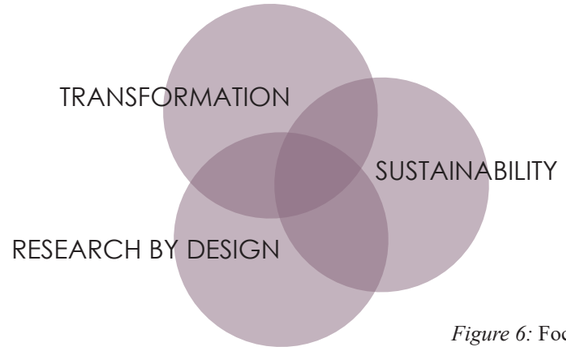


Figure 6: Focus areas of the thesis.

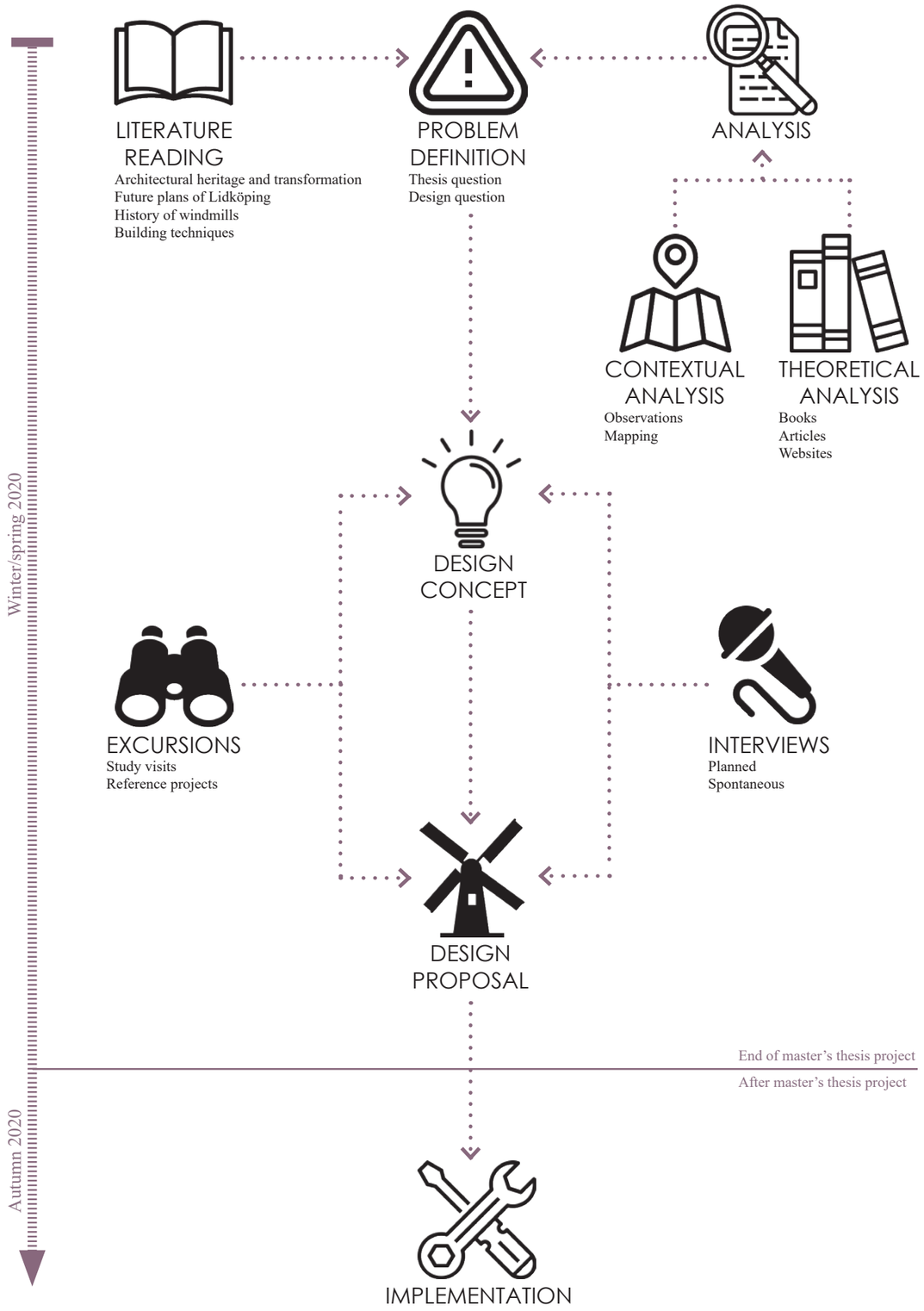


Figure 7: Methods and approaches used in the thesis.

METHODOLOGY

In the thesis, a 'research by design' method has been used, and the research part and the design proposal have been performed in parallel. Literature reading, historical investigations and mapping are methods that have been used to collect information required to define the thesis questions. Study visits, reference projects and interviews have been a large part of the thesis project and a tool to form the concept and the final design proposal of the thesis. Exiting is that the design project is a real project, and parts of the thesis will be done in reality, with implementation start during the autumn of 2020. Figure 7 shows the methods and approaches used in the thesis.

THEORY

The theoretical part of the thesis is mainly about understanding the history and significance of windmills, but also their function, construction and machinery, to have the ability to give the Pilebo windmill the respect it deserves during its transformation. A book worth highlighting is *Hättkvarnar i sydöstra Skåne* by Terje Granberg, which is like a Bible for windmill enthusiasts. When it comes to information about Pilebo windmill itself, there are only a few lines of text written about it in a book about Norra Kedum. Most of the information has been gathered through a large detective work of articles in the local newspaper, pictures and air-photos, interviews of neighbours and grandchildren of the millers, and mapping of the building.

DELIMITATIONS

The thesis takes the opportunity to dive deep into the windmill as a building in terms of history, appearance, construction, machinery and identity. The report focuses on investigating the architectural heritage in the countryside, but of course, most of the design strategies and approaches that this thesis presents can be applied in cities as well. A great focus has been put on how architectural heritage buildings can be used to enable them to live for a longer period in terms of maintenance and economy, since these buildings often have high maintenance costs. When it comes to the design proposal and the transformation of Pilebo windmill, focus has been on technical solutions, material choices, details, and the experience inside the building. The report does not focus on installing electricity, water and sewage system into the building, but assumes that this can be done during normal circumstances. Figure 8 shows the focus areas and delimitations of the thesis.

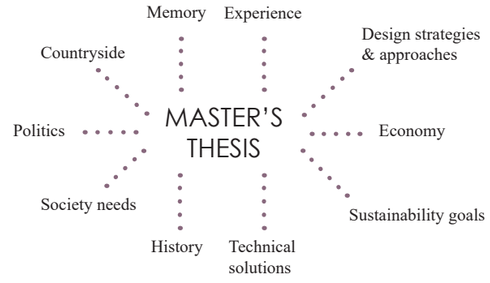


Figure 8: Focus areas and delimitations of the thesis.

READING INSTRUCTIONS

The thesis is divided in seven parts:

Introduction

In the first chapter, the author gives her background and starting point of the project, purpose and aim, thesis questions, methodology and delimitations.

Site

The second chapter introduces the context, the municipality of Lidköping, the village of Norra Kedum, and the Pilebo windmill. The focus is on tourism, as the design proposal touches this area.

Research

Chapter three deeply explores the windmill as a building and its history, construction and function. The sustainability point of view in transformation projects and why we tend to like old buildings are also discussed. Here, arguments and design strategies for the upcoming design proposal are addressed.

Process

In the fourth chapter, the author shows parts of her process, which include study trips, interviews, reference projects, facade studies, sketching and model building.

Design

This chapter presents the finished design proposal through drawings, illustrations, details, photos and 3D models. The proposal is an application of the arguments and conclusions made in the research chapter.

Conclusion

The last chapter evaluates the design proposal and concludes the master's thesis by a discussion and personal reflection.

Appendices

The appendices contains photos from the study trip to the Netherlands and study visits in Sweden, transcripts from all the interviews conducted during the project, and material from different site analysis.

SITE

“I look down over the farms;
In the fields of grain I see
The harvest that is to be;
And I fling to the air my arms,
For I know that it is all for me.”

Longfellow’s poem
Song of the Windmill

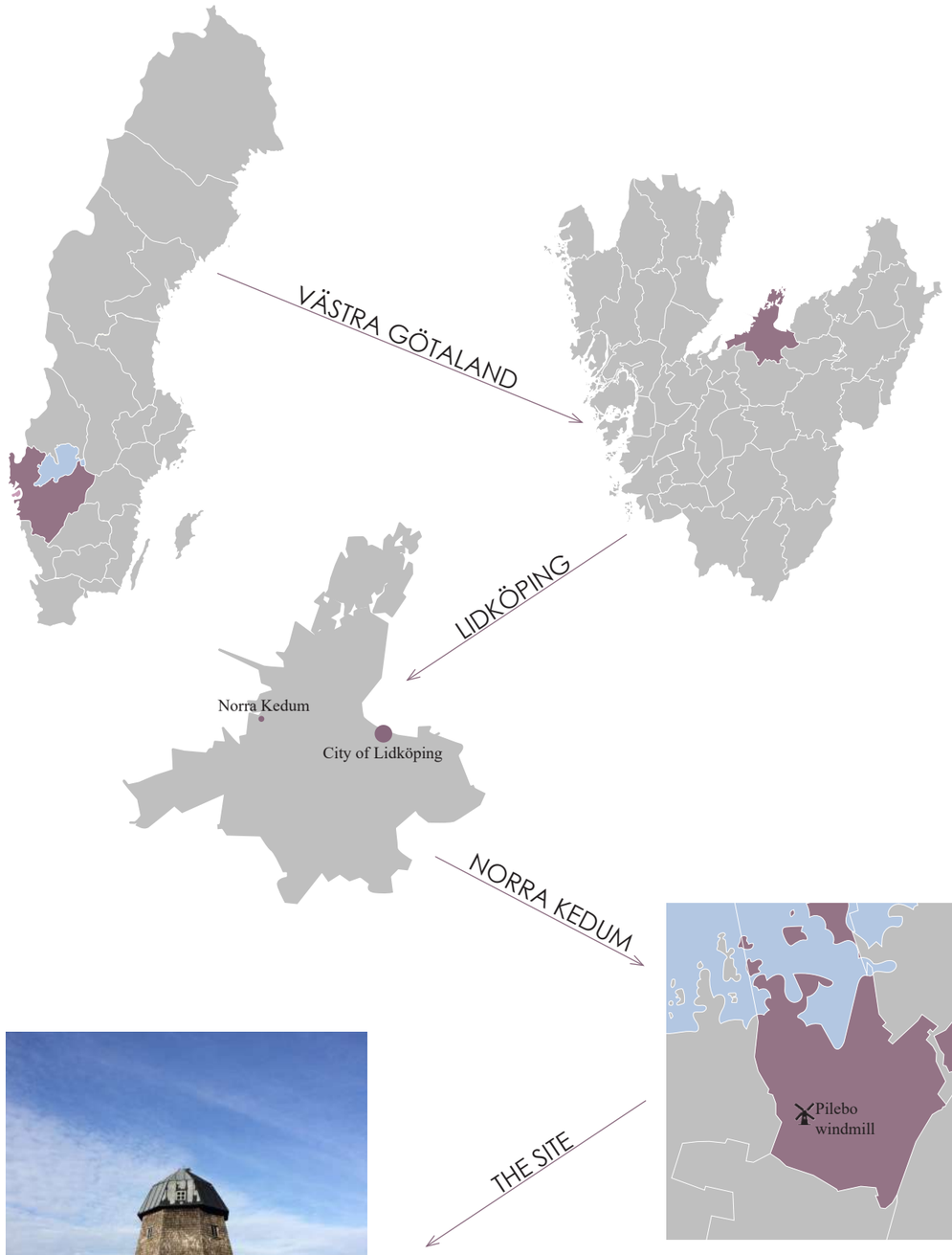


Figure 9: Location of Pilebo windmill in Norra Kedum.

LIDKÖPING

Lidköping is an idyllic town where the inhabitants live close to water and nature. Here, people like to meet, discuss and exchange thoughts. How else is it possible that a city with only 40,000 inhabitants has over 30 cafés? Lidköping is Sweden's 45th largest town. Due to the likelihood of confusion with Linköping, the municipality usually calls itself Lidköping by Vänern. The town is divided into two parts by the river of Lidan, where the old town is on the east side and the new town is on the west side of the river. In the square of the new town stands a statue of Magnus Gabriel De la Gardie, the founder of the new town (Welander, 2019).

HISTORY OF LIDKÖPING

Lidköping was founded in 1446 by the king of Sweden at that time, Kristoffer of Bayern, and thus became the first city by lake Vänern. In 1553, most of Lidköping burned down in a city fire. Gustav Vasa granted the city three years of tax exemption but ordered that Lidköping should not be rebuilt. He wanted the city to be moved to the place where Vänersborg later was built, but Lidköping was never moved. In 1615, Jacob De la Gardie became the Count of Läckö castle after his great success in the Russian war. He also got the right to build a city, which he never utilized. However, his son, Magnus Gabriel De la Gardie, decided to build a new town within the county. The west side of Lidan was the chosen location of this new city and was built in a strict geometric ground plan that De la Gardie had made himself (Welander, 2019). During the following centuries, Lidköping underwent a steady population growth, and in year 1900, the city had 5,452 inhabitants. In 1849, a devastating fire again destroyed almost the entire old town. The only remainings of the old town was a neighbourhood that today is called Limtorget. In 1874, Lidköping got its first railway, Lidköping – Skara – Stenstorps railway. In the end of the 1800s, the first major industries began to grow in Lidköping, including a raw sugar factory with refinery, two match factories, a brewery, and Lidköping's porcelain factory, which later became world known as Rörstrand (Welander, 2019).

TOURISM

The tourism in Lidköping is constantly increasing, both among Swedish and foreign tourists. Lidköping is a great place for tourism, with closeness to lake and nature, beautiful archipelagos, interesting historical and cultural attractions, and an idyllic city centre with nice restaurants and cafés. Some places in the municipality are busy during the summer season, yet there are plenty of possibilities to find quiet and undiscovered sides of the municipality. According to Carolina Hellström at Destination Läckö-Kinnekulle (personal communication, April 17th, 2020), the tourist office in Lidköping, the most popular areas to visit as a tourist are Rörstrand porcelain factory, Crono camping area, and the City Hall in Lidköping city centre. Outside of the city, Läckö castle and Spiken's fishing village at Kållandsö, located 25 km

north of the city, are the most popular tourist attractions. However, she can clearly see that the new trends are outdoor tourism, such as hiking, canoeing and cycling. One place to do that is at Hindens reef, 25 km west of the city, a 5 km long spearhead out in the lake formed during the inland ice age. The two biggest challenges that the municipality has are the limited accommodation available for visitors, and the lack of public transportation to many of the tourist attractions. Carolina Hellström tells that tourists can easily get to Lidköping in a sustainable way by train, but stress that if they want to go to Hindens reef for hiking, they need to rent a car because there is no bus. Lidköping is a seasonal city, and during the summers, the municipality has far too few hotel beds and other accommodation for tourists. Also, since Lidköping got its new event arena in 2009, the city now can hold big events. Melodifestivalen and Mia Skäringer are two examples of events held in the arena. Another yearly event in Lidköping is the Big Power meet, which is one of Sweden's largest meetings for American cars. During these events, it is almost impossible for visitors to find accommodation.

VISION OF LIDKÖPING

The comprehensive developmental plan from 2018 is an important tool for Lidköping in the work on the municipality's long-term development, and a strategic way to achieve the vision of the municipality, which is:

Lidköping - a welcoming and sustainable municipality

Based on this vision, the municipality has developed three main objectives that form the basis for the comprehensive plan:

1. Good quality of life, healthy environment and good service for all make more people move to Lidköping, and by 2030, the municipality has at least 45,000 inhabitants

2. By 2030, the municipality of Lidköping is a meeting place that has doubled its number visitors

3. By 2030, there are jobs within reach for anyone who wants to live in Lidköping, and good public transportation to be able to get to and from school and work (Lidköpings kommun, 2018, p. 4)

Figure 10: Air-photo of Lidköping city centre with the square and the City Hall. The river of Lidan separates the old town in the east from the new town in the west (Destination Läckö-Kinnekulle, 2020).

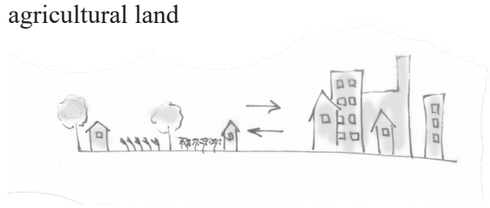
ACTION PLAN FOR RURAL DEVELOPMENT 2013-2018

The municipality's goal is to keep the countryside alive. According to the municipality's vision of Lidköping being a welcoming and sustainable municipality, the development can not only take place in the city. It should also be possible to live and work in rural areas in a way that is sustainable and with mutual benefit between the city and the countryside. Large parts of the municipality's rural areas are active agricultural land, and in order to secure the generation shift among farmers, new housing need to be added adjacent to existing farming units. Other business activities based in the countryside also need room for development. In addition to the comprehensive plan, the municipality of Lidköping has published a report called *Action Plan for Rural Development 2013-2018*. The program is an important basis for the long-term work on rural development. It contains descriptions of the countryside from twelve different aspects and suggestions of strategies for these focus areas (Lidköpings kommun, 2013, p. 4). Three of the focus areas are described in more detail as they are most related to this thesis.

Figure 11: Action plan for rural development 2013-2018.

COUNTRYSIDE AND CITY

- No border between city and countryside
- Highlight the values of the countryside
- A profile of local production
- Do not allow the city to contaminate the agricultural land



In the municipality of Lidköping, most of the countryside is within 15-25 minutes travel time from the city centre. With such short distances and with good communications, there will be a win-win situation both for the rural and urban environment, if the border between them is blurred out. The rural areas are to be managed in the same way as city districts with plans for densification, services and communications, while at the same time taking advantage of rural characteristics. The values of rural and urban areas must be visualized for the municipality's residents and for visitors. To profile the local production is important, both food and bio-energy. The countryside can also receive and end the cycle of non-contaminated rest products from the city (Lidköpings kommun, 2013, p. 16).

HOUSING

- Plan for denser and more varied buildings
- Still have a generous approach to rural construction
- Build more homes
- Plan for holiday villages for visitors

A living countryside is dependent on young adults and families with children being able to establish themselves there. The elderly should be able to sell their houses but still have the opportunity to stay in the villages if they want to. It is important to create a varied housing market in rural areas, with different forms of lease, which results in housing available for all target groups. To be able to build more homes in the countryside, more building sites of various size and use, both for construction companies and private individuals must be promoted. Also, local building initiatives utilizing existing buildings to build new housing should be supported to stimulate rural housing construction, for example to reuse well-maintained buildings for purposes other than they were built for, e.g. rebuild barns into apartments. More holiday villages are needed to meet the demand of accommodation for tourists visiting the municipality (Lidköpings kommun, 2013, p. 17).

TOURIST INDUSTRY

- Build more tourist accommodation
- Make the landscape more accessible
- Create and maintain new tourist attractions
- Take advantage of abandoned buildings

Development of the tourist industry is an opportunity for rural entrepreneurship. Tourists staying overnight and staying for several days are especially important. By increasing the range of accommodation options and services aimed for different types of visitors, the rural attractiveness is increased. It is important to create new tourist attractions of various kinds, both small and large, and to plan for more outdoor attractions, such as cycling, canoeing and hiking trails with parking spaces adjacent to the attractions. In the areas for rural development along the shoreline, so called LIS areas (landsbygdsutveckling i strandnära läge), holiday villages need to be built to meet the demand of tourist accommodation. Also, houses, barns and warehouses of various kinds that are left to decay reduce the attractiveness of the municipality. Take advantage of them and reuse abandoned buildings for purposes other than they were built for e.g. rebuild barns into Bed & Breakfast (Lidköpings kommun, 2013, p. 21).

NORRA KEDUM

Figure 12: Air-photo of Norra Kedum. The closeness to nature and water is something that many of the locals appreciate (author's photo).

Norra Kedum is located 17 kilometres west of Lidköping. The village has around 200 inhabitants and an area of 10 square kilometres, most of which is agricultural land. Today, here is quiet and peaceful, but in the past, the village had a school, a grocery shop, a dairy shop and a train station along the old railway between Lidköping to Tun that was removed in 1939 (Gustavsson, 1996, p. 25). The village is of medieval origin with a church dating from the 13th century. A small stream flows around the cemetery, which leads to a canal that eventually reaches lake Vänern. Norra Kedum has a rich history of ancient remains both from the Bronze Age and the Iron Age, for example Häbbarebacken with the grave of King Häbbe (Lidköpings hantverks- och sjöfartsmuseum, 1991, p. 106). Today, there are four medium-sized farms in the village and a number of smaller units with so-called moonlight farmers.

NORRA KEDUM'S CHURCH

The church was built in the 13th century and has been extended several times. During the Middle Ages, a wooden porch was built, and in the 1670s the church was extended to the east (Svenska kyrkan, 2017). In the early 1900s, there were discussions of demolishing the church and building a new one. But when the King of Sweden visited the church, he thought that it was too beautiful to tear down and instead the church was restored (Gustavsson, 1996, p. 107). The tower was built in the 1930s and the most important works inside the church are the roof paintings from 1744 by Lars Hasselbom (Lidköpings hantverks- och sjöfartsmuseum, 1989).

MARBOGÅRDEN

For several hundreds of years, Marbogården was a rectory to the pastorate of Norra Kedum. In the 1970s, an entrepreneur from Lidköping bought the farm and divided it into 64 small plots that were sold for summer cottages. The area was exploited and became a leisure village (Gustavsson, 1996, p. 53). New roads were constructed, and water, sewage system and electricity were installed. Lately, the area has started to developed more as an all year-round area (Marbogården Lidköping, 2020). Close to Marbogården, one can find the only beach of Norra Kedum, called Röllingen. It is a small and beautiful sandy beach with a jetty, but since there are no signs, it is tricky to find and therefore, mostly locals visit the beach.

VÄNERSLINGAN

Vänerslingan is a cultural route that was initiated as a leader project with the aim of creating better conditions for inhabitants and businesses along road 2559, which runs through Norra Kedum. The project went on between 2012-2014 and the result was a tourist route with various attractions and a sea-lane in the archipelago (Larsson, 2014). It all began with some entrepreneurs and craftsmen in the area starting to think about how to show this part of Lidköping, since all tourists mainly visit Kållandsö and Läckö castle. They also wanted a sea-lane so that visitors by boat also could visit the archipelago which is very shallow and rocky. The project was successful and generated a greater collaboration between residents as well as a tourist route and sea-lane that is still used extensively today. Vänerslingan has simply been a first step in making this part of the municipality more accessible and visible. Along Vänerslingan, there are many attractions and sights such as museums, churches, accommodations, basic camper areas, local shops, cafés, hiking trails and swimming places. Norra Kedum contributes with a camper area, canoe rental and hiking trails (personal communication with Liselotte Eliasson, April 14th, 2020).

Figure 13: Sign of Vänerslingan.

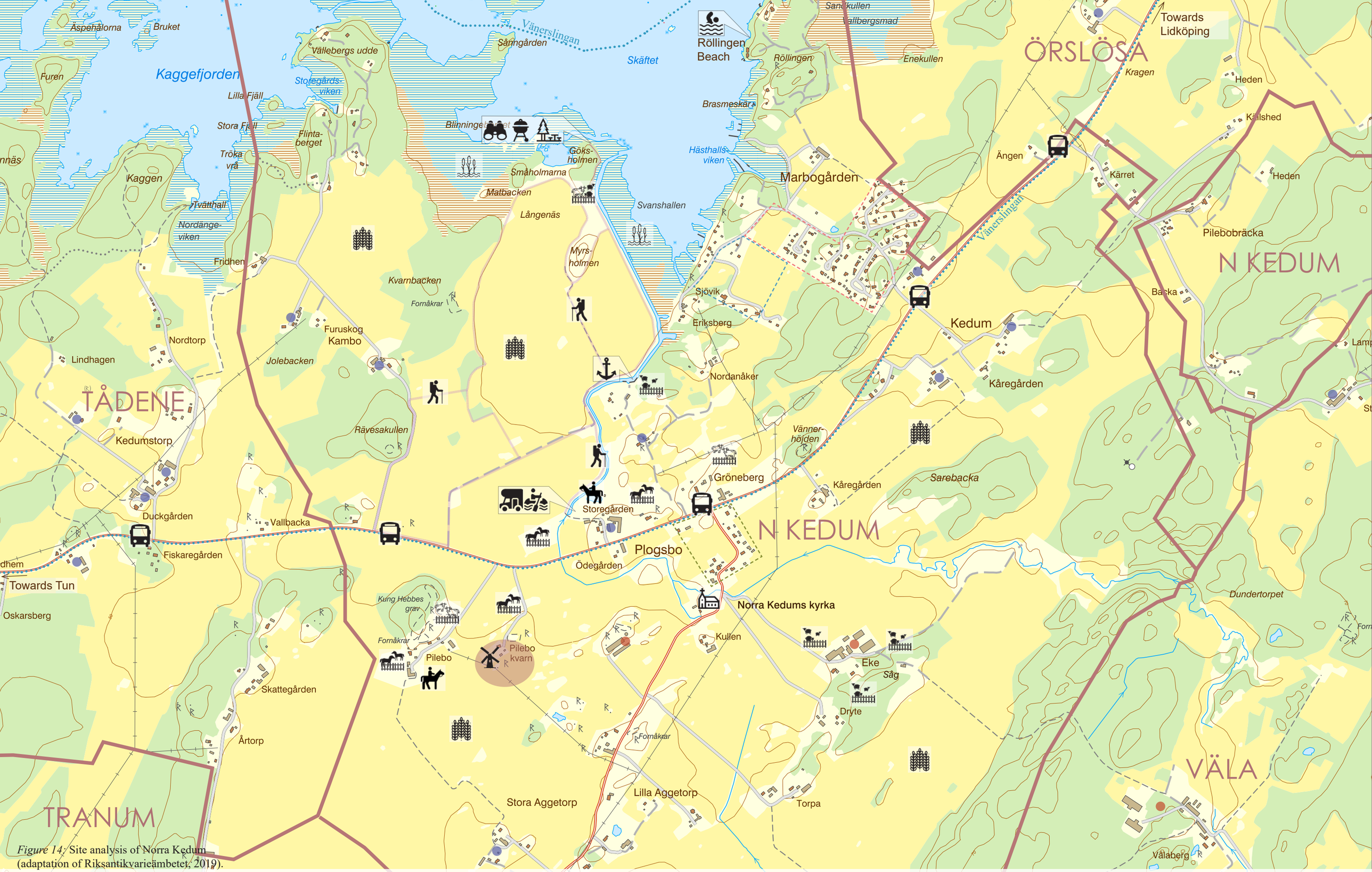


Figure 14: Site analysis of Norra Kedum (adaptation of Riksantikvarieämbetet, 2019).

- Parish border
- Public road
- Private road
- Dirt road
- Foot path
- Signposted hiking trail
- Vänerslingan tourist road
- Lake/stream
- Forest
- Agricultural land
- Open land/pastures
- Contour lines, vertical interval 5 metres
- Housing
- Economy buildings
- Registered agricultural, fishing or forestry occupation
- Agricultural occupation with more than 100 animals
- Sea-lane
- Shallow
- Marsh
- Reed
- Ancient monument
- Cultural heritage area
- Area with detail plan
- Area with certain regulations
- LIS-area
- Electricity transmission line
- Mast
- Chimney
- Church
- Bus station
- Camping spot
- Canoe rental
- Beach
- Harbour
- Viewpoint
- BBQ
- Picnic area
- Paddock
- Pasture with animals
- The Pilebo windmill

LOCAL ARCHITECTURE

Figure 15: Village of Norra Kedum.

Figure 16: Former rectory of Norra Kedum.

Figure 17: Kullabo.

Figure 18: Church of Norra Kedum.

Figure 19: Storegården.

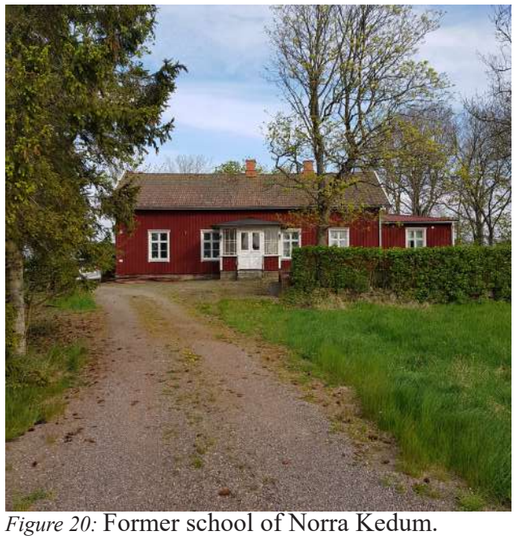


Figure 20: Former school of Norra Kedum.

Figure 21: Kåregården.

Figure 22: Marbogården.

THE PILEBO WINDMILL

HISTORY

A thunderstorm in 1882 set fire to a windmill at Aggetorp, 1 kilometre south of Pilebo, and the whole windmill burned down to the ground. The idea of building a new windmill was aroused by Johannes Andersson, Pilebo, who was one of the wealthiest men in the area. He hired the windmill builder Göthe from Stenhammar in Lidköping, to raise a new windmill on Pilebo's property (NLT, 1953). The large upright shaft was bought from Kinnekulle, and the three pairs of mill stones were taken from Lugnås' well-known mill stone quarry. Transporting the upright shaft from Kinnekulle was an adventure, when a couple of the biggest horse-drawn carriages were crushed under the heavy load. It was also considered a danger to pass the bridge by the square in Lidköping city centre, but the bridge made it better than the carriages. The Pilebo windmill was completed in 1884 and was at that time one of Skaraborg's largest windmills (Hg, 1993). The construction cost of the windmill was SEK 7,000. For 22 years, the Pilebo windmill was operated by Johannes Andersson, but in the beginning of 1900s, Johannes had difficulties finding labour as the labourers wanted to work in agriculture rather than in a windmill (NLT, 1953).

In 1906, the Pilebo windmill was sold to Verner Johansson from Söne to a sum of SEK 3,375. Verner had previously helped his father with grinding and knew the business (NLT, 1953). In an interview with Bosse Larsson (personal communication, February 19th, 2020), the grandchild of Verner Johansson, Bosse describes Verner as extremely kind, humble and generous. He loved when his grandchildren visited him, and he was a playful and funny old man. As a miller, he was social and service minded, and since the Pilebo windmill was one of the main meeting places of Norra Kedum, he met many farmers for sure got to hear some gossip and news. Verner and his wife Ellen got six children. Anna-Lena Broberg, who was the closest neighbour to the family of Verner, tells in an interview that Verner and Ellen had two daughters in Anna-Lena's age that she played with as a child (personal

Figure 23: Photo of the millers resident and the Pilebo windmill in the background. The photo is taken somewhere between 1925 and 1953 (photo of Bosse Larsson).

communication, February 24th, 2020). They often played in the windmill and ran up and down the stairs. Their families had a good relationship. Anna-Lena's family went to grind their grain in the windmill and Ellen came to them to mangle her laundry. Sometimes, Verner bought milk from Anna-Lena's father. She agrees that Verner was playful. Instead of taking the stairs, Verner took some flour on his hands and slid down the railing of the stairs, and it went really fast.

Verner had a good economy and he early could afford to buy a car. When grinding at the Pilebo windmill, Verner took a certain amount of grain as a payment. This grain was ground and sold or used by Ellen in the kitchen. The grinding could of course also be paid in cash (Gustavsson, 1996, p. 66). Even though the Pilebo windmill was placed on a windy site, there were also long periods without any wind when the windmill could not be used. When it then blew up again, there was no time to lose and Verner worked day and night to make sure that all farmers would get their flour on time. The Pilebo windmill operated with wind power until 1925, when the wings were taken down and electric power was installed for the operation. The wings were sold to Västerplana, Kinnekulle. With the electric power came a new era for the windmill. Electricity was expensive, but instead Verner got a better organization of the work in the windmill and he could give a better service to the farmers. During the best year of the Pilebo windmill, around 130 sacks were ground per day, and the highest net income was SEK 14,000, made during its first year as an electric

Figure 24: Photo of Verner Johansson with family and friends in front of the Pilebo windmill (photo of Bosse Larsson).

mill. The Pilebo windmill was active during both world wars. At that time, four times as much flour as usual was ground in the windmill. The state tax or grinding fee that came after the war was a difficult step for all millers (Hg, 1993). In the 1950s, more and more farmers in Norra Kedum began to buy small electric mills to their farms, which made it even more difficult for the millers to survive. In 1954, when Verner and the Pilebo windmill both turned 70 years old, Verner stopped the business that he had conducted for half a century. Verner put the windmill on advertisement and got the interior sold (NLT, 1953). In 1958, the Pilebo windmill was bought by Kurt and Anna-Lena Broberg, and used as a garage and warehouse for fertilizer. In 2015, Jane and Tommy Synnergren, the parents of the author, bought the Pilebo farm, and the windmill came with the farm.

THE PILEBO WINDMILL TODAY

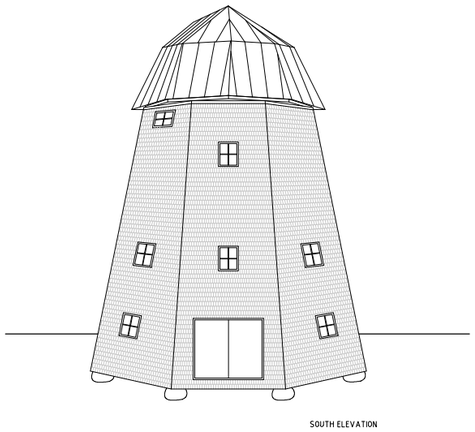
Today, the Pilebo windmill remains in a poor condition, but still upright and with an imaginative memory. The building has a diameter of 9 meters and a height of 12 meters, divided in four floors. The facade of the windmill tower is covered with wooden shingles and the cap is covered with sheet metal. The windows are 650x800 mm with simple window glazing bars. Inside, huge beams support the construction, and crosses between the eight vertical logs work as stabilizer. The fact that all the interior and the three pairs of grinding stones are gone means that the building does not have the same cultural value as if it was intact. However, this also provides an opportunity to utilize it for something else and give it a new function, but still preserve the history of windmills, the building techniques and our cultural heritage.

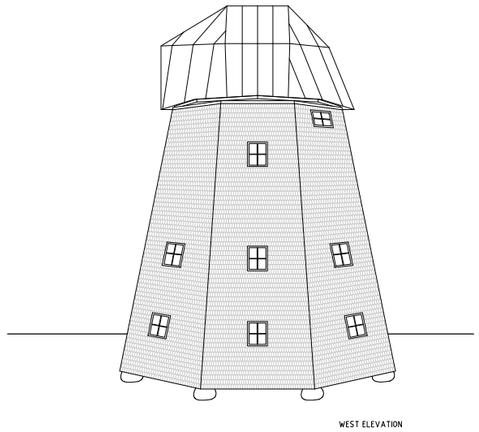
ALBUM-METHOD

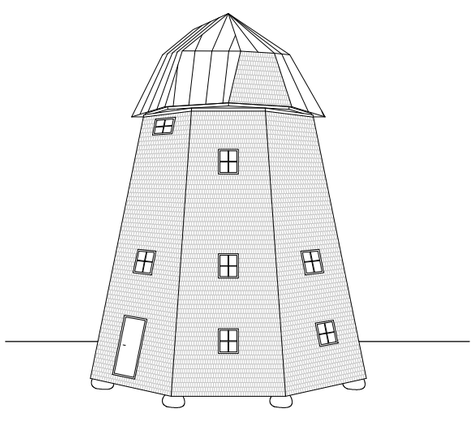
The album-method is a format that can be used to document a variety of architectural features of a building or space. Sometimes, architecture is complex, and it can be difficult to maintain many layers of significance at one glance. The format, consisting of 3x3 selected photographs in one field, is an attempt to frame the work's various characteristics and field of properties. The photos are vertically organized in relation to the three scales: landscape, still life and portrait. Horizontally, the images describe the tectonic joints of the building: skin, meat and bone. Together, the nine pictures form a new, coherent look of the work.

Figure 25: Album describing the Pilebo windmill.

DRAWINGS OF EXISTING BUILDING







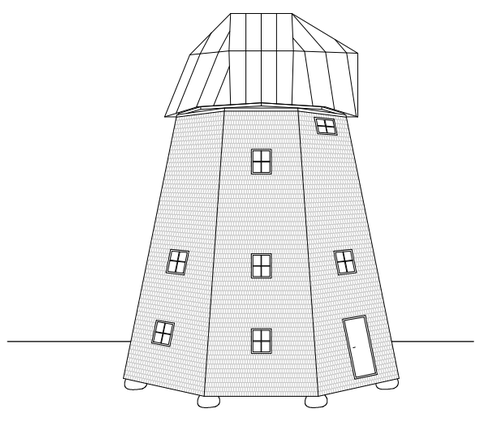


Figure 26: Existing elevations of the Pilebo windmill, scale 1:200.

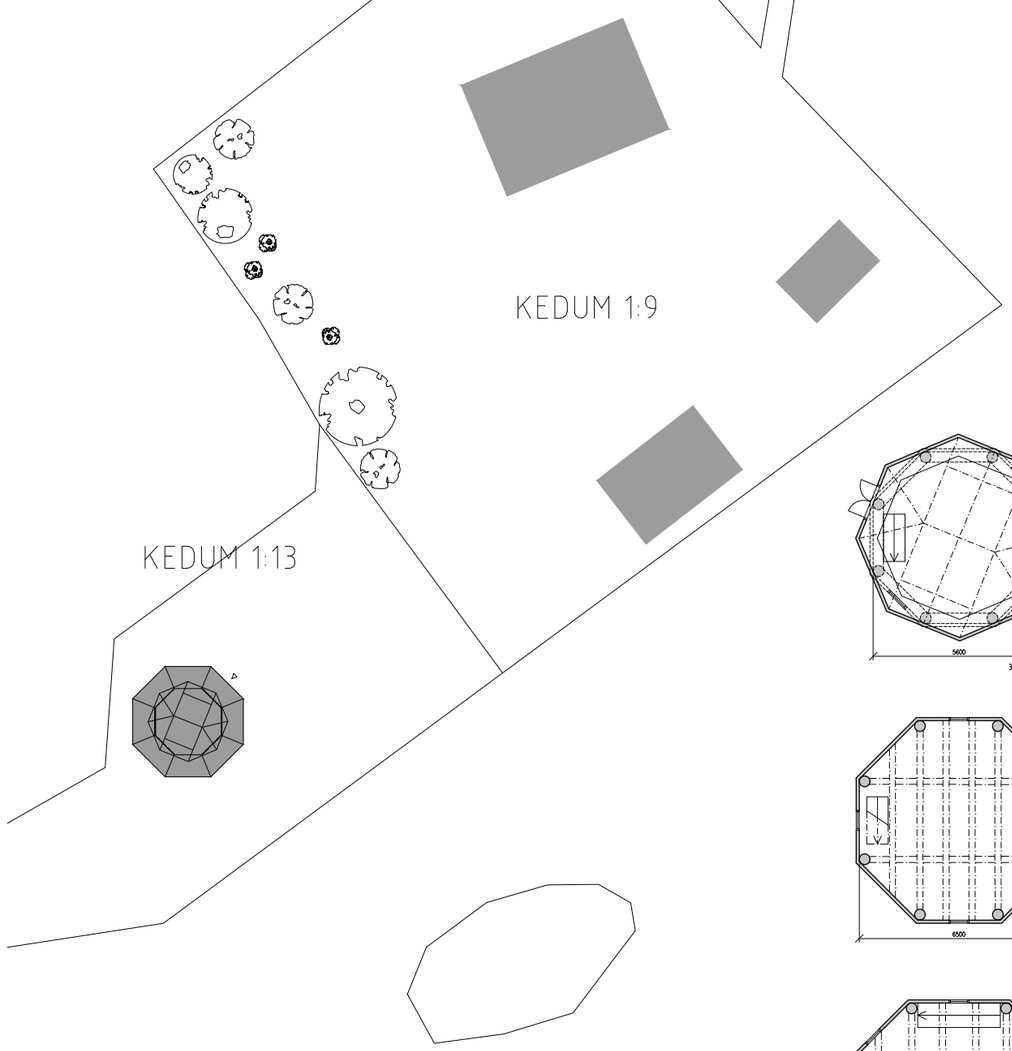


Figure 27: Existing site plan of the Pilebo windmill, scale 1:500.

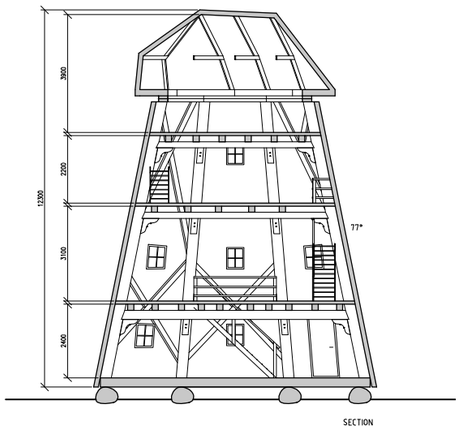


Figure 28: Existing section of the Pilebo windmill, scale 1:200.

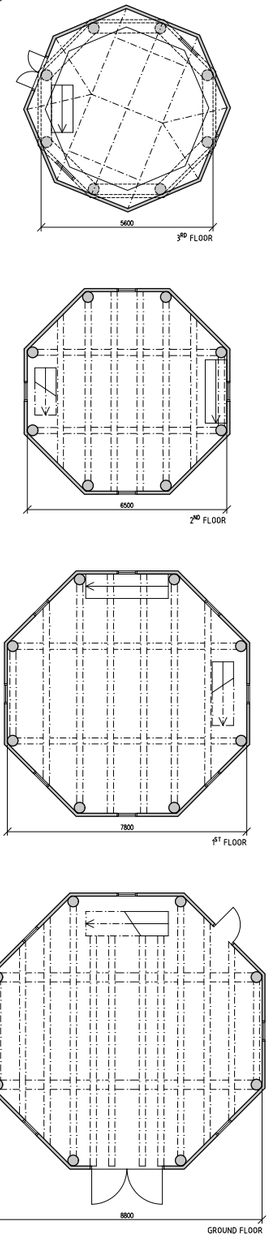


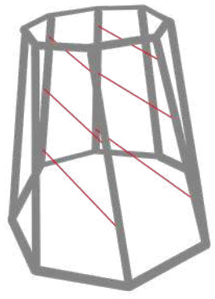
Figure 29: Existing floor plan of the Pilebo windmill, scale 1:200.

STRUCTURE

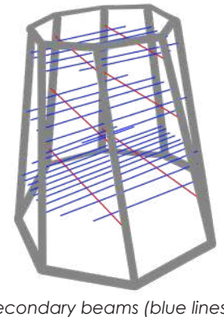
The structure of the windmill tower is completely visible and easy to read and understand. Eight huge, vertical logs with diameter of almost 400 mm and an angle of 77° are held together with an octagon shaped sill plate and capping plate (grey colour). There are two primary beams on each floor (red colour). The primary beams supporting the 1st floor are 300x300 millimetres and the primary beams supporting the 2nd and 3rd floor are 200x200 millimetres. The number of secondary beams is different depending on the floor (blue colour). 12 secondary beams support the 1st floor, and 6 secondary beams each support the 2nd and 3rd floor. Finally, the construction is stabilized by crosses in between the vertical logs in two different layers. The lower crosses are slightly smaller than the upper ones and go from ground floor to 1st floor, while the upper crosses go from 1st floor and all the way up to the 3rd floor. Some of the eight sides of the octagon are missing crosses. The lower layer is missing two crosses on the sides with doors, and the upper layer is missing three crosses. There is no explanation to why the upper layer does not have crosses on all sides, but most probably some of them have been removed due to rot. Another explanation is that stabilizers on all sides are not necessary.

3D-model of the structure

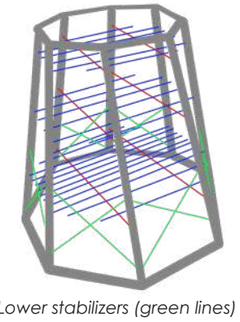
Vertical logs, sill plate and capping plate



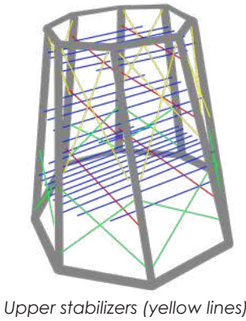
Primary beams (red lines)



Secondary beams (blue lines)



Lower stabilizers (green lines)



Upper stabilizers (yellow lines)

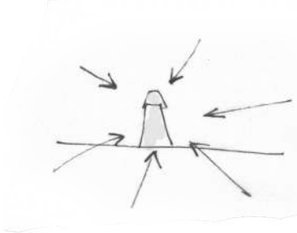
Figure 30: Diagram of the structure of Pilebo windmill.

QUALITIES

The following diagrams on the next two pages describe some of the qualities that the Pilebo windmill contains and expresses. These are some of the arguments and reasons why the windmill should be preserved and not be left to decay. Several of the qualities are discussed more in detail in the research chapter.

SITUATIONAL

Preservation of the historical contour of the countryside

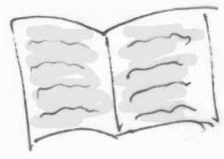


The location in the open landscape makes it visible from all directions

A landmark of Norra Kedum and a new attraction and meeting place for visitors and locals

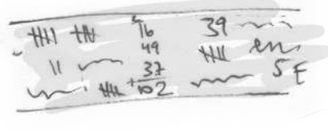
Possibilities of producing its own electricity because of the windy location

HISTORICAL



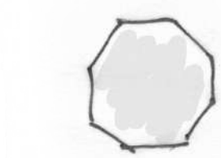
Preservation of windmill's building technology and Pilebo's history of nearly 150 years

An understanding and impressiveness of man-power and that these buildings were built without advanced tools

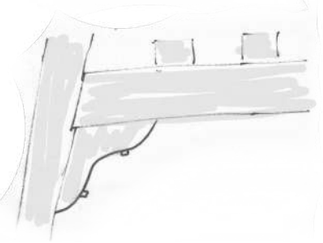


All the numbers, text and notes on the structure made by the millers

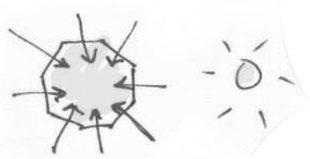
SPATIAL



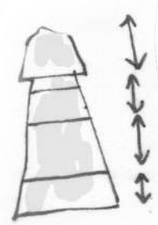
The octagon shape



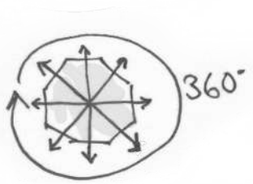
The visible structure



Light from all directions



The difference in ceiling height on the different floors gives the visitor a surprising experience



360° view because of the characteristic shape

MATERIAL

The characteristic facade of wooden shingles

The stair railings are so soft that you don't want to let them go when you are up on the next floor

The beautiful patina of the big doors with its pattern of rust

The small characteristic windows

The well-worn footsteps of the stairs after the thousands of times the millers have run up and down the windmill

The untreated wooden structure has got a beautiful grey patina

RESEARCH

> If the global population reaches 9.6 billion by 2050, the equivalent of almost three planets will be required to sustain current lifestyles

(United Nations, 2015)

HISTORY OF WINDMILLS

The earliest known references to windmills are in Persia 644 A.D. These windmills were a horizontal mill type with wings radiating from a vertical axis (Encyklopedia Britannica, 2020). Around 900 years ago, medieval Europe started to develop the first real factories in human history, entirely powered by renewable energy. They consisted of a building, a power source, machinery, and employees. Thousands of windmills and waterwheels were built and transformed the society radically. It was an industrial revolution. Watermills were more important and numerous than windmills. However, not all regions were suited for watermills, like Spain, the Netherlands, and parts of England, where the water flow was not big enough, or like Scandinavia, Russia, and parts of Germany, where rivers generally froze during the winters (De Decker, 2008). At its peak, the total amount of windmills in Europe was estimated to 500,000 (Carlquist et al, 2019, p.24). The most common use of the windmills was for grinding, but the Dutch were innovative and also used windmills to saw timber, make oil, paint, spices, tobacco, cement, paper, and for drainage of the huge embankments (Hills, 1994, p. 165).

WINDMILLS IN SWEDEN

In the beginning of the Middle Ages, wind power was used more and more for grinding in Sweden, and windmills ground both flour and animal feed. During the 19th century, Sweden's population increased by 2.5 million people, mainly because of reduced child mortality and longer life among the inhabitants due to peace, vaccine, and potatoes. The population growth led to an increased demand of grain products, both flour and animal feed. The agricultural land doubled, and agriculture developed efficiently during this time. Skåne became the landscape of the smock mills. For several decades, the growth of windmills in Skåne was one windmill per year. In Västergötland, post mills dominated the landscape, although some smock mills appeared here as well (Granberg, 2008, chapter 3, p. 4).

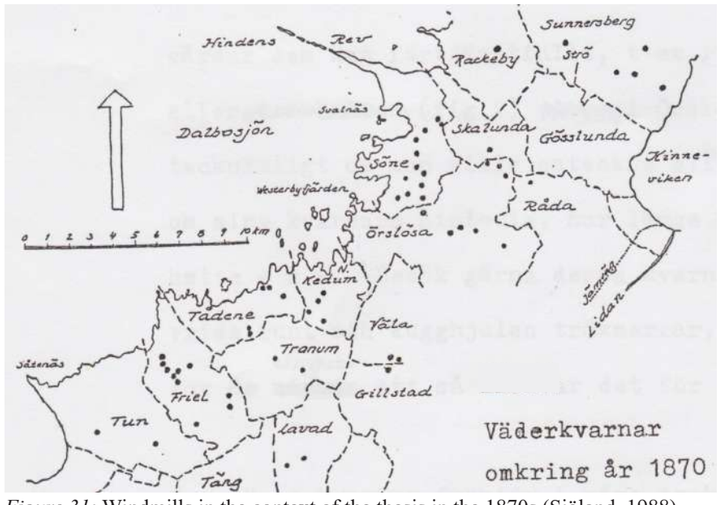


Figure 31: Windmills in the context of the thesis in the 1870s (Sjöland, 1988).

Figure 32: Post mills at Öland, Sweden (Hills, 1994, p. 84).

VÄSTERGÖTLAND

Figure 31 shows a map of Norra Kedum and the surrounding villages in the 1870s. Each dot on the map is a windmill, and in this area, almost 60 windmills can be counted. Here, in the open terrain, it was worthwhile to build windmills where the wind blew heavily and often. This part was also at a competitive distance from the water-powered mills further east. Imagine this pleasant sight with all these wings rotating only by the power of the wind. Unfortunately, only a few of these windmills remain today, and have been taken care of by local associations (Sjöland, 1988, p. 1).

POST MILLS

The post mill was constructed like it was suspended on a stump, which means on a fixed vertical axis. The entire windmill had to be rotated around this axis to get in the right wind direction, which limited the size and weight of the post mills. These types were narrow and cramped, and the weight had to be evenly distributed around the axis (Ek, 1962, p. 13). During the 20th century, when oil engines began to be installed in windmills, this was not possible in the post mills due to lack of space and fire danger. The post mills normally had one pair of mill stones, and thus, a low capacity since it was impossible to use the same stone pairs for both flour and animal feed (Granberg, 2008 chapter 3, p. 3).

TOWER MILLS

In the beginning of the 15th century, a second type of windmill appeared, called the tower mill. The tower mill was later improved by the Dutch. Here, only the top of the building, the so called cap and the wings rotated, and the tower of the mill remained fixed. Tower mills were never common in Sweden but were the dominant mill

Figure 33: Tower mills at Mykonos, Greece (Travel Notes, 2020).

type around the Mediterranean, and could be constructed from stone or brick, thus they were more sturdily built (Carlquist et al, 2019, p.22).

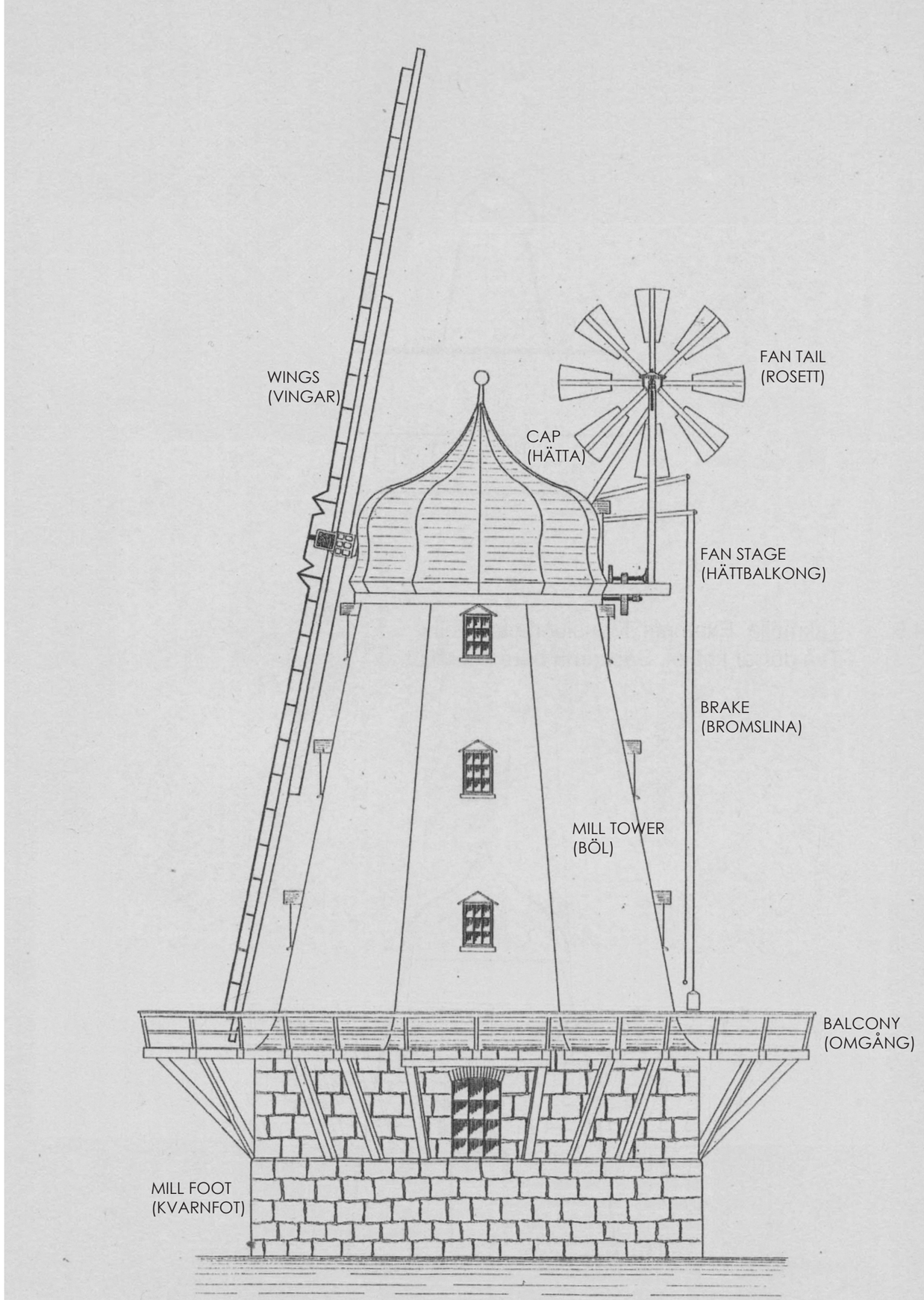
SMOCK MILLS

In 1863, a privilege policy which forbid the construction of too many new windmills, to benefit the nobility and to some extent also the church, was liquidated in Sweden. A large expansion of smock mills took place in Sweden, and instead of one windmill per year, the number went up to two new windmills per year. The smock mill represented the new technology of that time, and was an improved version of the tower mill. Here only the cap was rotatable so that the wings could be placed against the wind. The mill tower itself was permanently attached to its foundation and could be stable and spaciously built to support the cap and the large force from the wind. Such a windmill had room for three pairs of mill stones, and a peeling machine. There was a significant increase in capacity compared to the post mills, and many smock mills had different types of stone pairs for animal feed, flour, and sift. In the large mills, you could drive through the windmill with a horse and carriage. In this way, the handling of sacks with a lift directly from the carriage was improved. Also, a vital innovation in the smock mills was the break wheel that transferred the power to the various stones. By these interventions, the development of the windmill had advanced from the small and ungainly post mill to the spacious, stable, high-tech smock mill that was like a small industry (Granberg, 2008, chapter 3, p. 6).

Figure 34: Smock mill for drainage in Abcoude, the Netherlands (author's photo).

DECLINE OF WINDMILLS

Windmills lost their significance when human found more secure and reliable sources of power (Jansson, 1977, p. 2). During the first half of the 20th century, the decline of windmills was apparent. Newer industrial mills offered flour of better quality, bakeries expanded and distributed their products in rural areas, and the electrification in the 1920-30s meant a possibility for a permanent operation that was independent of the weather. The expansion of electricity supply in the countryside meant that more farmers were getting their own small electric powered mills. The last phase for windmills was during the Second World War, when there was a certain rise in home bakery. After that, the millers grew old and stopped maintaining their windmills. The decay continued, and soon only the foundation remained, that often was used for a new house (Granberg, 2008, chapter 3, p. 9).



THE STRUCTURE OF SMOCK MILLS

CLASSIFICATION

Based on the design of the mill foot, the smock mill can be classified into the following types:

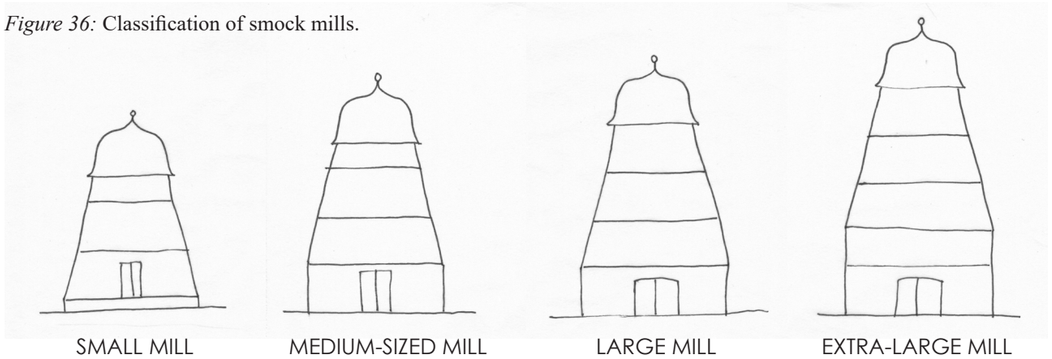
- small mill
- medium-sized mill
- large mill
- extra-large mill

The smock mills have the functions distributed in at least 3 floors, meal floor, stone floor and bin floor. The designs of the mill foot and the mill tower determine how the floor plan in the mill is distributed (Granberg, 2008, chapter 4, p. 2).

MILL FOOT

The mill foot, the foundation on which the tower rests, can vary in height from only a meter above the ground for a small mill, to a two-story high structure with a gate as in an extra-large mill. An extra-large mill and a large mill have two gates in the mill foot so that the horses and carriages can go right through the windmill to unload and load sacks. A medium-sized windmill has doors in the mill foot where sacks can be taken in on a sack barrow trolley. A small mill has doors in the mill body and the sacks must be carried in and out. A medium-sized mill and a small mill always have two doors, usually one on the east side and one on the west side so that the miller always can enter the windmill if the wind blows straight on one door (Granberg, 2008, chapter 4, p. 3). The mill foot is often built of stone that has been taken from a quarry nearby. On larger and more expensive mills, windows, doors, and gates in the mill foot are decorated with bricks (Granberg, 2008, chapter 5, p. 3).

Figure 36: Classification of smock mills.



BALCONY

In order to mount the sails, the miller must be able to access the wings quickly, and then climb up the wing for mounting. On a small windmill, where the wings go all the way down to the ground, the miller can climb straight up. On a larger mill, a wooden balcony usually is built in the same level as the bottom of the mill tower. The balcony is supported by oblique planks that meet the lower part of the mill foot. The fence around the balcony is traditionally sloping outwards to give more space for the wings (Granberg, 2008, chapter 4, p. 4).

MILL TOWER

PROPORTIONS

The mill tower on smock mills always has eight equal sides built of wood. The shape varies slightly, but the following propositions for a section of the smock mill, that can be seen in the diagram, appear to have been a guidance for many windmill builders in the construction of the mill tower (Granberg, 2008, chapter 4, p. 4).

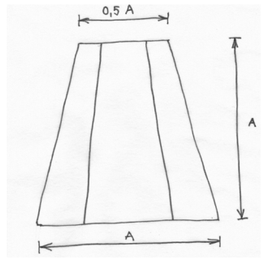


Figure 37: Proportions of a smock mill.

DISPOSITION OF FLOORS

A large windmill has a mill foot of sufficient height to run through with a horse and carriage. If the windmill had a backup power source, this engine was most often placed in the mill foot. The first floor is called meal floor (sv. broloft). From this floor, the miller controls the grinding process. Here the sacks are filled with flour and a grain crusher and sift is often placed on this floor. On second floor, the stone floor (sv. maleloft), all the pairs of mill stones are placed, together with the great spur wheel. The stone floor is usually the one with the highest ceiling height. Third floor is called the bin floor (sv. förlagsloft). Here, lots of sacks are stored, both sacks with grains that are waiting to be ground, and sacks with flour that are waiting to be picked up by its farmer. On this floor, the grain is poured into bins that are connected with the mill stones on the floor below. In a small windmill that does not have a mill foot, there is no possibility for horses to go through the windmill. Instead, the sacks must be carried into and out from the windmill. Except from the lack of mill foot, the rest of the floors are distributed in the same way as in a large mill, but with the meal floor starting on ground floor. There are also other variants on how the floors are disposed. On smaller windmills, the ceiling height of the bin floor can be quite low, and is then called cap floor (Granberg, 2008, chapter 6, p. 2).

CONSTRUCTION ASPECTS

The mill tower is constructed with a rigid frame with stabilizing crosses between the vertical logs so that the machinery inside the windmill does not get disturbed when rotating the cap. The figure below shows estimated loads on the various floors in a large mill. Because of the large loads, the mill tower is well-dimensioned and made of high-quality wood. Usually, pine wood was used for upright logs, crosses, and beams, but windmills standing on larger mansions and castles could have frames build of oak. Since the wind often came from the west or southwest, the structure became uneven after a while, causing deformations on the tower's west and southwest sides. Then, the miller had to make adjustments by placing wooden wedges between the vertical logs and the octagon laying on top of these logs. Due to the windmill builder's big margins and well-dimensioned structures, modernization of the windmills has later been possible, even though it was not the plan from the beginning. Heavy equipment such as a grain crusher, a rolling mill, and an engine for backup power have increased the loads even more. There is no information about windmill towers that have collapsed in Sweden. What we can read about are caps and wings that have blown off the tower if the miller failed to turn the wings against the wind (Granberg, 2008, chapter 6, p. 4).

FLOOR	OBJECT	NUMBER OF ITEMS	WEIGHT	TOTAL WEIGHT
MEAL FLOOR	Peeling machine	1	1,500 kg	1,500 kg
	Sacks	15	100 kg	1,500 kg
STONE FLOOR	Pair of mill stones	3	3,000 kg	9,000 kg
	Sacks	20	100 kg	2,000 kg
	Wallower/main shaft/great spur wheel	1	2,000 kg	2,000 kg
BIN FLOOR	Sacks	300	100 kg	30,000 kg
OCTAGON	Wind shaft/brake wheel/brake	1	2,000 kg	2,000 kg
	Beams/breast beam	1	1,000 kg	1,000 kg
	Wings	1	1,500 kg	1,500 kg
TOTAL WEIGHT				**50,500 kg**

Figure 38: Estimated calculation of loads in a windmill (adaptation from Granberg, 2008, chapter 6, p. 3).

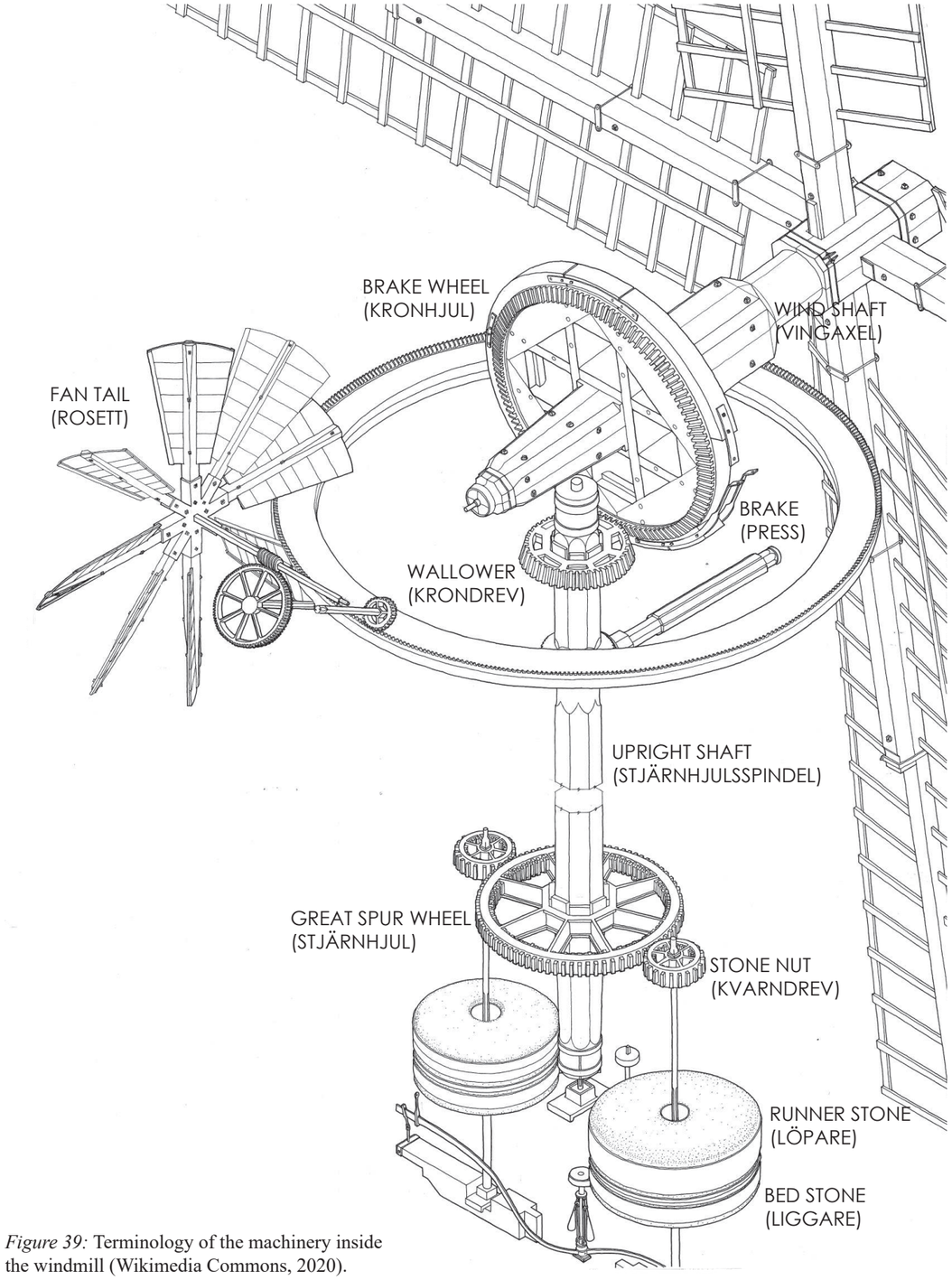


Figure 39: Terminology of the machinery inside the windmill (Wikimedia Commons, 2020).

WINDOWS

Normally, there are four windows on each floor in a smock mill. The windows have two functions. One function is to bring light into the windmill so the miller can take notes of weights and other important information in his book, but more importantly, the miller had to be able to look out and see if the weather was about to change, or if any customers were on their way to the windmill. The stabilizing crosses in the frame of the mill tower determined the height of the window's placement and limit their size. Traditionally, windmills have small rectangular wooden windows with window glazing bars, where the number of squares varies between four and twelve (Granberg, 2008, chapter 4, p. 5).

CAP

SHAPE OF THE CAP

The cap is the roof of the windmill, and the minimum requirement is that the wing shaft and the brake wheel can fit here. There must also be space for the miller to maintain the components in the cap, such as turn or replace the cogs on the wheels. In the Netherlands, the completely dominant shape of the cap is the so called boat cap. This cap has the same shape as an upside-down boat, where a quarter of the length is cut off and replaced with a vertical wall for the wind shaft (Granberg, 2008, chapter 4, p. 6). In the southern part of Sweden, the onion-shaped cupola cap is the most common. These are slightly flatter on top so that it becomes easier to stand on the cap when it must be maintained or repaired. The cap usually has a window at the back. The design of the cap must be strong enough to support the weight of the wings, sometimes with wet sails, the wind shaft, and the brake wheel. If the windmill has a tail pole for rotating the cap, even more loads are carried by the cap. Finally, the more difficult forces to calculate come from the wind. Therefore, the load-bearing structure of the cap is very robust. But since the cap must be able to be rotated by one single person, the cover of the cap, which only has a weather-protecting function, has a light-weight construction (Granberg, 2008, chapter 7, p. 2).

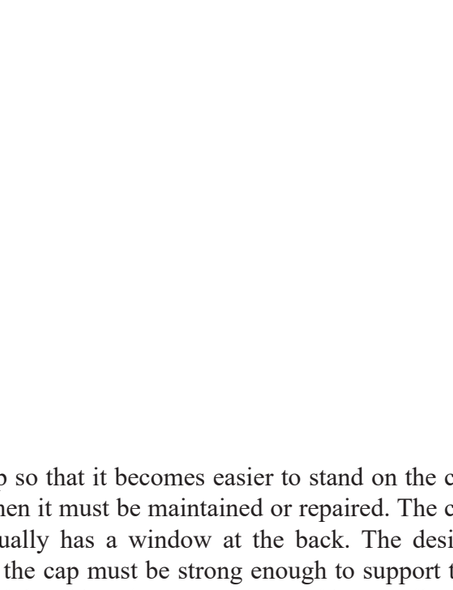


Figure 40: Boat cap and cupola cap.

COMPONENTS INSIDE THE CAP

The breast beam is a strong oak beam in the very front of the cap. In the front, it has a circular shape, to match the shape of the cap. The function of the breast beam is to minimize the loads on the wind shaft that acts on its weakest point, called the neck. The thrust block is also made of oak and is partially recessed into the breast beam. It is needed at larger windmills to give the wind shaft the right slope. The weather house is a wooden box covered with roofing felt in the front of the cap, and protects parts of the wind shaft outside the cap. Inside the weather house, a trill of wood is mounted onto the wind shaft and has an effective function as a weather barrier. The water that penetrates the gap between the wind shaft and the weather house follows the shaft up to the rotating trill, where it is thrown out by the centrifugal force (Granberg, 2008, chapter 7, p. 2).

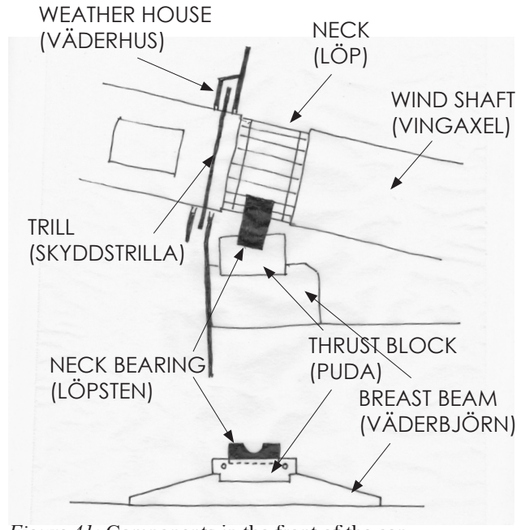


Figure 41: Components in the front of the cap.

TO ROTATE THE CAP

On the first smock mills that were built, the cap rested on a slide on the octagon. This means that the cap slides on this octagon when it is turned against the wind. On smaller windmills, the contact surfaces can be wood against wood or wood against iron, and on larger windmills the surfaces are iron against iron. In order to always keep the centre of the cap in the same place, that is in practice, the hole for the upright shaft, the cap is guided by wood that slid, or wheels that rolled, against the circular inner edge of the octagon. Lubricating the slide is important and this was initially done with sheep grease. The rotation is done by a tail pole, which is a multi-legged and rigid structure that extends from the cap and down to the ground or balcony, where the force to turn the cap should be applied. The design of the tail pole depends on the size of the windmill but also on windmill building traditions in the area. At the bottom of the tail pole is a capstan wheel, a special type of winch. When the cap is to be turned, a chain is fastened in rings that are anchored in the rock or in large buried stones around the windmill. During the 19th century, more and more iron factories were established, which began to manufacture various cast iron components for windmills. Of particular importance was the intervention of rotating the cap on cast iron segments with cogs and

grooves for small wheels, called roulette. This way of rotating the cap is called wreath-turning (sv. kransvridning), as the cast iron segment with cogs looks like a wreath. A windmill with wreath-turning can be rotated in three different ways, external turning from the stage outside the cap, internal turning, where the turning device is inside the cap, and self-turning, where a fan tail automatically turn the wings against the wind. This is the last step in the technical development of the cap's rotation. The fan tail is sitting high up behind the cap and is perpendicular to the wings. When the wind blows straight toward the wings, the fan tail stands still, and as the wind changes direction, the fan tail begins to work and get the wings straight against the wind. The worst thing that could happen to a miller, apart from fire, was that the cap tipped off or blew off the mill tower in a heavy storm. This could happen if the wind came from behind and the miller did not manage to turn the wings against the wind quickly enough. The wreath-turned windmills were more sensitive than windmills with tail poles, where the tail poles became a type of counterweight to the wings. To prevent the cap from falling of the mill tower, locking devices in form of wheels or hooks that run under the octagon has been mounted (Granberg, 2008, chapter 8, p. 2).

Figure 42: Tail pole, Riddaregården (author's photo).

WINGS

While most parts of the windmill are well protected in the cap and the mill tower, the wings of the windmill are exposed to all weathers. They must work independently of the wind variations, withstand the force of storms without collapsing, and work just as well in summer heat as in winter cold. A windmill can be right-turned or left-turned. If the wings rotate clockwise, when seen from behind, the windmill is right-turned, and when the wings rotate counter-clockwise it is left-turned. Most windmills are right turned. It does not matter which way the wings rotate. The important thing is that the grooves in the millstones are placed in the right direction. The material of the wings had high demands on good quality. Oak is strong and durable but expensive and heavy. Larch has a good resistance against rot. Most wings have a combination of pine, oak, and larch on their different parts. It is not common for wings to be impregnated. The old windmill builders thought that the timber was of such good quality that it was not needed. They said that good wood gets dry just as fast as it gets wet (Granberg, 2008, chapter 9, p. 2).

DIMENSION OF THE WINGS

The size of the wings is indicated in cubits, where 1 cubit = 0.5938 meters. The size of the wings is also used as a measurement of the size of the windmill itself. Smaller windmills usually have wings of 10-14 cubits, and larger ones usually have wings of 16-20 cubits. An estimation of the size of a wing can be made by using the following formula:

CUBITS = 1.4 + 0.67 x NUMBER OF SAIL BARS

In this way, you can calculate the wing size of old windmills by looking at photos of mills that do not exist today. (Granberg, 2008, chapter 9, p. 10).

THE TWISTING OF THE WINGS

The curve that is formed by the tips of the sail bars is called the twisting of the wing. A correct twist is required for the wing to utilize the maximum energy from the wind, and the sail must be in contact with the sail bars when the wing passes the mill tower. Otherwise, there may be turbulence that will cause fluttering sails. The total angle between inner and outer sail bar slightly differs between different windmill builders, but usually the angle is between 20-30 degrees, where the angle between the inner sail bar and the plane of rotation is between -6 to -10 degrees, and between the outer sail bar and the plane of rotation is the angle +15 to +20 degrees. The positive numbers point out from the windmill and against the wind, and the negative numbers point with the wind and against the windmill (Granberg, 2008, chapter 9, p. 5).

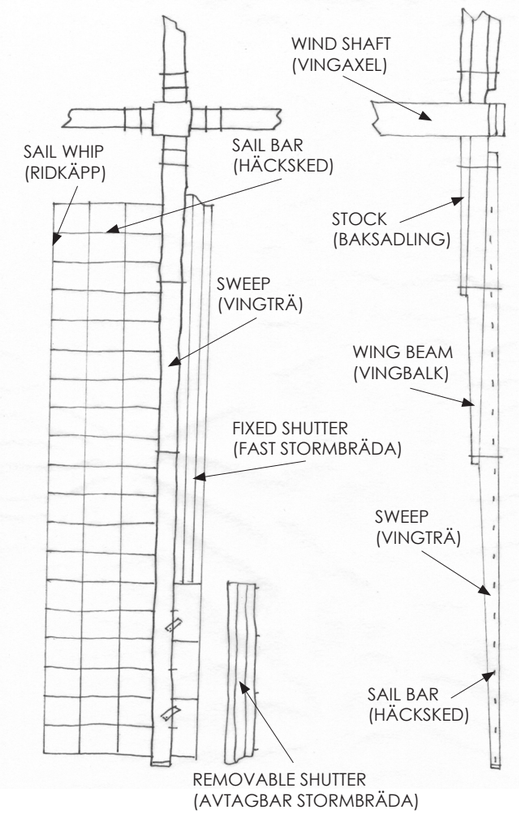


Figure 43: Front and side view of a wing.

SAILS

The sail is stretched out on the wing to capture the force of the wind. In the 19th century, the sails were made of home-woven linen cloth. The miller's wife wove linen cloth on her own loom. From the 1920s, fabric for sails could be bought from weavers. On the edge of the sail, loops are sewn which are used to attach the sail to the wing. The sail can have a rectangular shape or be slightly oblique at the top, to easily be rolled up against the side. Both types were equally common, and the fact that an oblique sail leave a bigger part without coverage does not matter, since the wind power around the centre of the wing is negligible. Often, the millers had white sails during the summer and brown sails during the winter. The winter sails were impregnated to prevent ice, made from herring liquor, brown tar, and sheep grease.

Figure 44: The twist of a wing made for Borg's windmill in Stora Mellby (Carlquist et al, 2019, p. 30).

MACHINERY

Most of the space in the windmill is occupied by gears and shafts. The transfer of power between the wings and the runner stone takes place via the following main elements that are shown in the diagram to the right. Most components are made of wood, and therefore large dimensions are required. The wings of the windmill usually have a speed between 16-20 rpm. This gives the runner stone a speed of 140-180 rpm. In addition to the speed, several other factors influence the grinding process, such as the diameter of the stone, the number of grooves in the stones, and the type of grain. The wind shaft must stand both great climatic and mechanical stresses. The shaft is about 5 meters long for a medium-sized mill, is measures 600-700 mm in a rectangular shape, and has a slope of 12-15 degrees, which is about the same angle as the mill tower's angle. Tilting the shaft reduced the load on the front part of the shaft. On the wind shaft, the brake wheel is attached, which can have a diameter of more than two meters. The brake wheel has two tasks. First, it transmits the power of the wings' rotation to the wallower. Second, it works together with the brake shoe as the brake of the wings. A large brake wheel creates a bigger friction surface towards the brake shoe, at the same time as the heat generation is reduced. The wallower has the greatest stress in the whole transmission chain due to its small dimension. Initially, wallowers were made entirely in oak, but during the early 1900s, parts of the wallower began to be manufactured in cast iron. The upright shaft is a vertical wooden

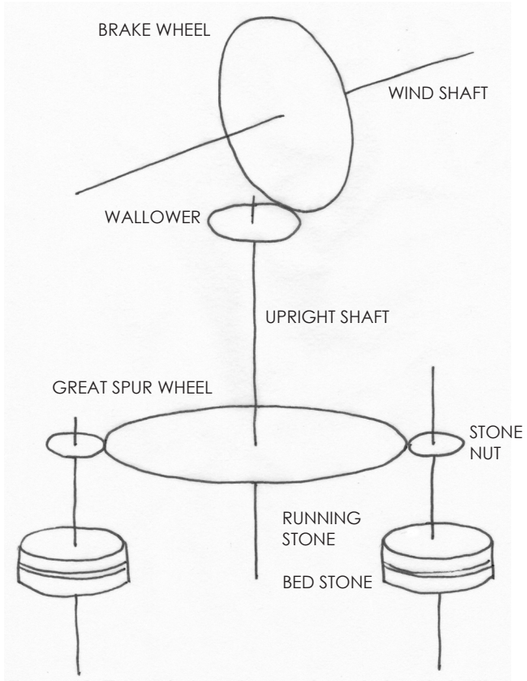


Figure 45: Transmission of power through the windmill.

shaft in the centre of the mill tower and goes from the wallower and down to the stone floor. This shaft runs the great spur wheel. The great spur wheel dominates the space on the stone floor and measures almost 3 meters in diameter in some windmills. It is basically constructed in the same way as the brake wheel. The difference is that the cogs are radially oriented. Around the great spur wheel, smaller stone nuts are connected which, via vertical axes, drive a pair of mill stones each. The stone nuts are usually made of cast iron (Granberg, 2008, chapter 11, p. 3).

MILL STONES

The mill stone assembly consists of the lower fixed bed stone and the upper rotating running stone. The grain is put in the central hole of the running stones and then thrown out between the stone surfaces due to the centrifugal force. There, it is grained into animal feed or flour. The grooves in the stones are between 5-12 millimetres deep and go from the central hole to the edge of the mill stone. The grooves have two functions, they bring out the grain between the stones, and they bring cold air in between the stones. The radial transport of grain through the grooves and out towards the periphery is enhanced by the air flow from the central hole. The grooves can be both straight or curved clockwise or counter-clockwise depending on if the wings on the windmill are right-turned or left-turned. In right-turned windmills, the grooves are curved clockwise, which is most common. The grinding ability of the mill stones is based on the grooves on the running stone and the bed stone forming an angle with each other, just like scissors. With straight grooves, the cutting angle decreases further towards the periphery. If the grooves are kept bent, the cutting angle can be kept unchanged or increase. If the cutting angle increases towards the periphery, the mill stones' ability to throw out the grain also increases, while the cutting capacity decreases. If the cutting angle towards the periphery decreases, the ejection of grain also decreases while the cutting capacity increases (Granberg, 2008, chapter 14, p. 2).

THE LIFE AS A MILLER

TO BECOME A MILLER

The miller's career started with learning the work in either his father's windmill or in another windmill in the area. It was also common to go away for a few years to practice elsewhere and gain some new experience. Thereafter, the miller was either given a windmill in inheritance, acquisition, or could rent a windmill in the area. In the early 1900s, renting a windmill was around SEK 500 per year (Granberg, 2008, chapter 15, p. 2).

TO STUDY THE WEATHER

As a miller, you had to understand the weather. The miller's dwelling was often located close to the windmill, and on the way to the windmill, the miller felt the wind direction, saw how the sky looked like and decided how to turn the cap and how many sails that to put up (Granberg, 2008, chapter 15, p. 6). The wind differed between day and night and varied with the seasons. The east wind was the best and safest wind, but mostly the wind came from the west or south west. During winter, the wind was more stable than in the summer and therefore it was better to grind during the winter. A snowstorm was no obstacle for an experienced miller. Thunderstorms were dangerous in two ways. First, there could be completely unprepared strong wind shifts that broke the wings. Second, the lightning could hit the windmill so that it burned to the ground. There were also long periods without any wind at all, and the windmill could stand still for weeks. Many farmers became impatient and wanted to have the grain ground. When it then blew up again, the miller could run the windmill day and night for weeks, because then there were urgent times. If one of the mill stone pairs became hot, the miller just changed pair so that the other allowed to cool. The stones became hot if they worked too long. During unfavourable weather conditions with rain and falling temperatures, ice formation on the wings consequently generated a great load on the wings. If it became too much ice, the miller had to remove the ice with an axe (Granberg, 2008, chapter 15, p. 2).

LOCATION OF THE MILL

The location of the windmill was of great importance for its capacity and ability to exploit the winds. The best location was in a low terrain and in an open landscape. Forests, buildings, or a location on a high hill could interfere with air flow. In some cases, the problems became too big, and it was not uncommon that the miller moved his windmill (Granberg, 2008, chapter 15, p. 2).

A MEETING PLACE

After loading, the farmers gladly stayed for a while to have the opportunity to exchange big and small news with others who visited the windmill at the same time. The windmill was a meeting place and a centre of news. There was always someone who knew something new.

INSIDE THE WINDMILL

When the miller started a grinding process, he hit 150 kg in the bin which then gradually passed between the mill stones. The miller had a lot to keep in mind at the same time. He never walked, he ran. Inside the mill, he ran up and down the stairs to make sure everything that was running without any problems. When the stairs became too worn, the miller turned the stairs up-side-down so that it could be used a longer time. The miller was always in motion. He poured new grain, changed the sacks where the ready flour was poured, he checked of the wind, expedited customers, checked the grinding process, weight the sacks, lifted the sacks, marked the sacks, and again kept an eye on the weather (Granberg, 2008, chapter 16, p. 7). Sometimes, if the grooves in the stones were not deep enough and if the grain were damp, the stones could stick together, and were not possible to move at all. The mill stone assembly then had to be demolished, the running stone had to be lifted up so that the stones could be cleaned (Granberg, 2008, chapter 15, p. 6). As a miller, it was important to be concentrated all the time, to avoid that accidents happened. Working hours from 7am until midnight were common. The time before Christmas was a stressful time in the windmill. Then all the farmers wanted flour for their Christmas baking. In a small windmill with wings of 14 cubits, a miller could grind about 4,000-5,000 kg (40-50 sacks) of animal feed, or about 3,000-3.500 kg (30-35 sacks) during a normal workday with good wind (Granberg, 2008, chapter 17, p. 6). The farmers came to the mill at least once every two weeks. On the 15th of each month they received money for the milk from the dairy. Then they visited the shop and the windmill. The miller preferably wanted the farmers to come once a week, as it made it easier to plan the work (Granberg, 2008, chapter 16, p. 2). In ordinary cases, the grain was ground in the order that the farmers left it in the windmill. Whoever comes first to the mill gets the grain ground firs, as it is called. The farmers drove to the windmill with horse and carriage. Many horses were afraid to get close to the windmill, and it was not the rotating wings that they were most afraid of, but the shadows that they created. Sometimes, the miller had to stop the windmill for the horse to dare to come closer. New sacks of grain were lifted in the windmill and new sacks of flour and animal feed were loaded on the carriage (Granberg, 2008, chapter 16, p. 2).

Figure 46: A stair has been turned upside-down and can be used for many more years (Granberg, 2008, chapter 6, p. 12).

SACKS AND GRINDING BOOK

A farmer usually came with 5-6 sacks per week. The weight of a sack was normally around 100 kg, but there were sacks that could weigh up to 175 kg. The sacks were made of linen and were often of very good quality and lasted a lifetime. The sacks were marked with the customer's initials, so that the miller would keep track of which sacks that belonged to which farmer. Important information about the grinding, such as the weight of the sacks, was noted in the miller's grinding book, so that he kept track of what the farmer should pay (Granberg, 2008, chapter 16, p. 4).

PAYMENT

As a payment for the work, the miller often took a certain quantity of the grain. Customs could be used by the miller himself or be sold. For the miller, this type of payment could be an advantage since then was sure to get paid. For the farmer, it could also be an advantage if he did not have enough cash. Customs were most commonly between 4-6 kg per 100 kg of grain. Flour was most expensive because it had to be ground twice (Granberg, 2008, chapter 16, p. 5.

SOCIAL SITUATION

In most cases, the financial situation of the miller was good, and thus also his social position. It happened that the miller was hired for various trust assignments in the area. The miller was considered to be more social and experienced than people in general because of his work of socializing with customers. In addition, he was familiar with the farmers economic conditions and therefore suitable for the various assignments. Moreover, if he was fair and service-minded to his customers, confidence in him increased. The miller always needed to have a good relationship with the farmers. Although it was natural for a farmer to drive to the nearest windmill, there was still some competition between the millers. Even if a miller had a lot to grind, it was rare that he referred the farmers to another windmill. He wanted to keep his customers for himself (Granberg, 2008, chapter 19, p. 2).

WHEN THE WINDMILL STOOD STILL

If the windmill run on a Sunday, the miller could be in a bad mood with the priest of the village. The priest could not prevent the miller from working on a regular Sunday, although some priests tried. The miller was careful to stop the windmill for burials, Christmas Day and New Year's Day, and on the four praying Sundays the windmill would stand still (Granberg, 2008, chapter 19, p. 5).

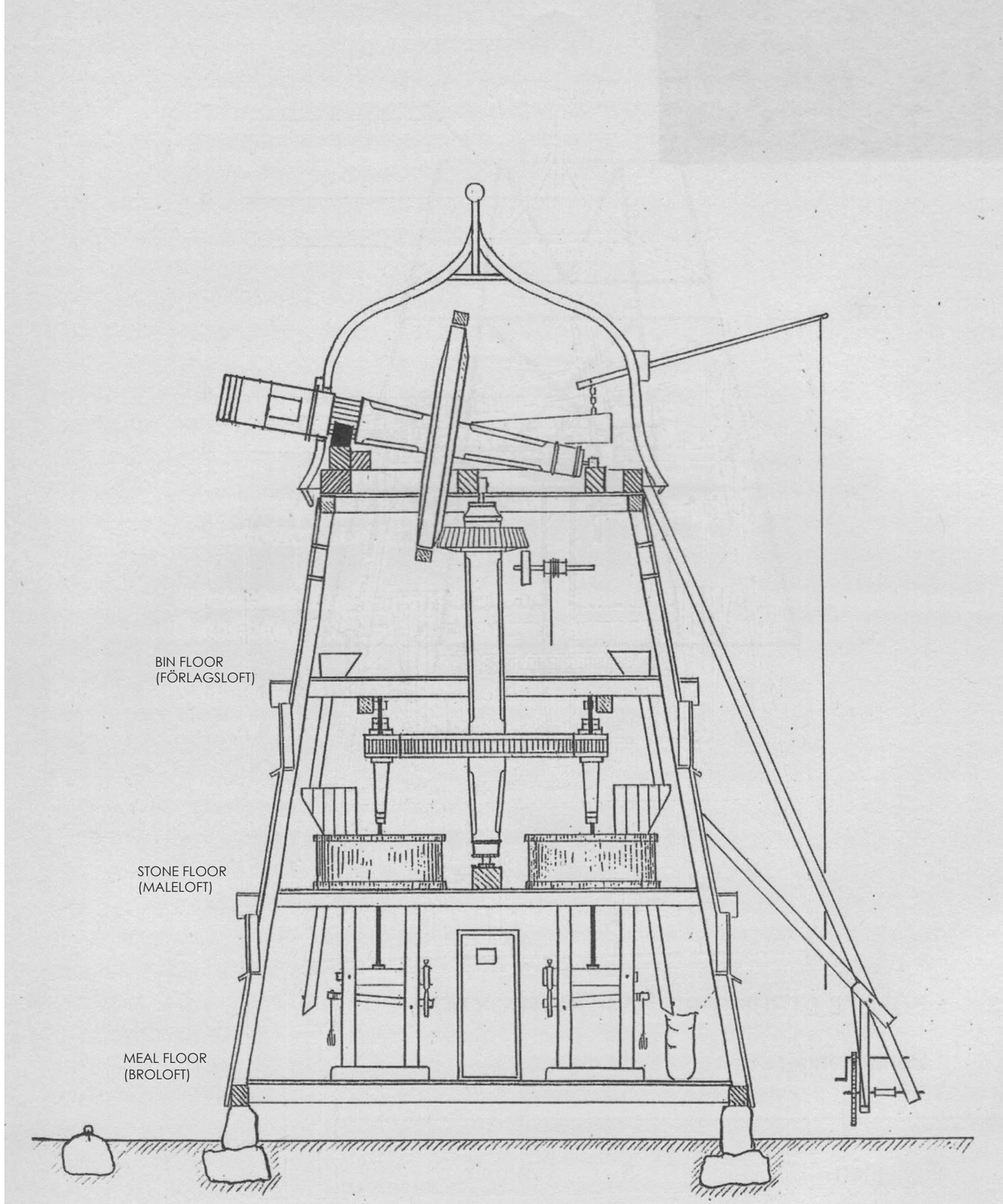


Figure 47: Section of a small smock mill (Granberg, 2008, chapter 6, p. 12).

THE RURAL LIDKÖPING

HISTORICAL CONTOUR OF THE LANDSCAPE

The landscape of Västergötland looks different today compared to the summer of 1742, when Pehr Kalm, an associate Professor from Åbo, travelled back and forth through Västergötland. He writes in his diary: “Windmills were found at most farms, from Flo and all the way up to Lidköping” (Carlquist et al, 2019, p. 24). What he saw in front of him were hundreds hollow-post mills, which was the dominating windmill type in this area. What today are the municipalities of Vänersborg, Grästorp and Lidköping had an abundance of these types of windmills. Today, very few of them remain. The post mills have completely disappeared from the landscape, except for those taken care of by local associations. However, in Lidköping, you can still find a handful of smock mills, such as the Pilebo windmill in Norra Kedum, which is the very last windmill in the area of a couple of square kilometres, that in the past had more than 30 windmills (Tengeland, 1963).

RURAL DEVELOPMENT OF LIDKÖPING

In 2015, approximately 12,200 people lived in rural areas outside of Lidköping. About 30% of these people lived in smaller villages, and the rest in the countryside. The number of jobs was about 3,000. The population increase between 2011 and 2015 has predominantly happened in the city of Lidköping. In the villages around the city, there has been a decrease in the population, while the population in the countryside has slightly increased. For rural development to evolve in a positive way, basic services such as preschools, schools and elderly care must be available. Infrastructure such as road networks, public transport, water and wastewater supply, electricity networks, and broadband are also important (Lidköping municipality, 2013, p. 5). A living countryside relies on young adults and families with children that can establish themselves there. Unfortunately, the housing market on the countryside is to some extent stagnated. Some explanations to this are that there is no varied housing market, with different forms of lease and different categories of accommodation. Banks are also restrictive in lending money for housing construction in rural areas. Finally, elderly want to stay in their homes as long as possible, which affects the generational change in the housing market (Lidköping municipality, 2013, p. 6). In a smaller municipality like Lidköping, the city and the countryside are dependent of each other. When one part grows and develops, it is also positive for the other part. The countryside has many functions in our society. It produces food, energy, water and building materials. The countryside can receive uncontaminated waste products that can return to the natural circular system. The countryside is a place for inhabitants and provides room for a larger population in the municipality. The rural villages also provide opportunities for a location of companies and infrastructure, and with good communications, these are the places where the city can expand. The countryside is also an important place for recreation and tourist industry, a base for biodiversity, and it has an important educational significance for our cultural history. In the municipality of Lidköping, most of the countryside is within 15-25 minutes travel time from the city centre. With such short distances and with good communications, the countryside can be seen like neighbourhoods of the city. Both countryside and city would gain a lot by blurring the boundary between them (Lidköping municipality, 2013, p. 16).

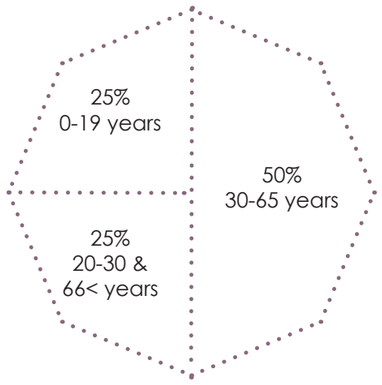


Figure 48: Age distribution in rural Lidköping.

TOURISM

The countryside can be seen as a brand that needs care and to be marketed. A good environment with a variety of visitor destinations and attractions of different characteristics, restaurants and cafés attract visitors. The rural attractiveness increases if it is made available and accessible to visitors. Highlighted hiking and bicycle trails increase the value of attraction, even shorter hiking trails of 3-5 km are attractive both for tourists and for the residents in the area, outdoor swimming along the shores of lake Vänern, and local museums can be found in several places in the countryside of Lidköping. Both watermills and windmills are possible to visit, and old, abandoned industrial environments are destinations that have gained increased interest. Tourists and local visitors are opportunities of income for businesses in the countryside. Tourists staying overnight are especially valuable. Offering accommodation extends the time the tourists stay in the area (Lidköping municipality, 2013, p. 14). According to both Carolina Hellström, destination developer at Destination Läckö-Kinnekulle, and Malin Olsson Lundqvist, rural developer at Lidköping municipality, there is a huge lack of overnight beds throughout the whole municipality. The demand for accommodation is biggest on Kållandsö where 400,000 tourists come every year. The lack of beds means that there are no opportunities for spontaneous accommodation if visitors wish to stay for another night. Today, about 25 private cottages are rented out to tourists in the municipality. They could be many more together with Bed & Breakfasts and camper areas. This applies not only to Kållandsö, but to the entire countryside in the municipality (Lidköping municipality, 2013, p.14).

REUSE INSTEAD OF DEMOLITION

WASTE IN SWEDEN

Demolition of building structures produces enormous amounts of materials that in most countries result in huge amounts of waste and a high demand of material for the new buildings replacing the old ones. Most parts of the demolition material usually become landfill. In general, more careful consideration of the priorities for disposal of materials from demolition and construction operations needs to be put into place to minimize both material production and the waste from demolition in building industry. According to the EU's Waste Statistics Directive, the entire EU generates approximately 2.5 billion tonnes of waste each year. In Sweden, 142 million tonnes of waste were generated in 2016. Most of the generated waste, 77% (110 million tonnes) consisted of waste from the mining industry. Except for mining waste, about 1/3 of the waste produced in Sweden is generated by the construction and building sector, according to the Swedish Environmental Protection Agency. Construction and demolition waste are waste from construction, renovation, rebuilding and demolition of buildings. The municipalities are not responsible for collecting or handling such waste. Businesses are responsible for managing their own non-household waste and some businesses have their own landfill sites at their disposal (Avfall Sverige AB, 2018, p. 44).

THE DELFT LADDER

In the Netherlands, the production of construction and demolition waste is about 15 million tonnes per year, which is an enormous amount for a small country like the Netherlands. In 1980 the Dutch government published an order for waste treatment called the Ladder of Lansink. This

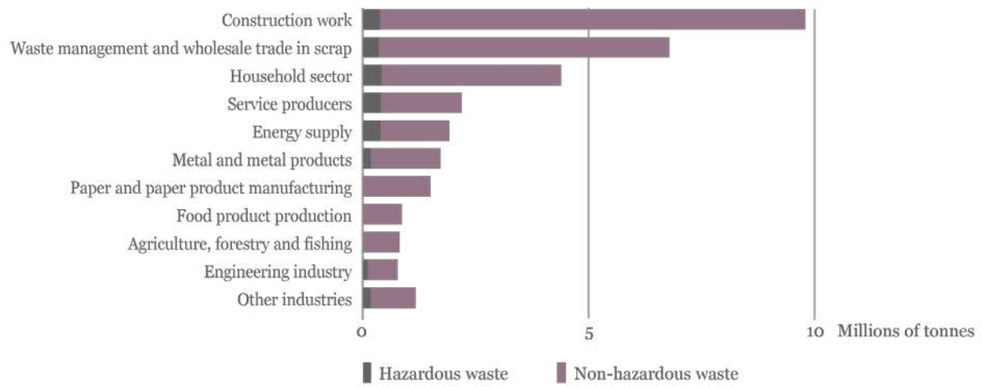


Figure 49: Sweden's waste distribution in 2016 (adaptation of Avfall Sverige AB, 2018, p. 44).

order was a fixed top-down approach, prevention, element reuse, material reuse, useful application, incineration with energy recovery, incineration, and landfill. But since 1980, more waste treatment options has been developed, and the Ladder of Lansink has been extended to new order that is not a fixed top-down order, but a more flexible order. This new tool is called the Delft Ladder, and three new options have been added. The new hierarchy is shown in figure 50. The Delft ladder serves as guidance for how waste should be treated to have the most beneficial effect for natural systems and to generate an as sustainable building industry as possible (Kowalczyk, 2000, p. 96). The second level in the ladder, construction reuse, is the focus of this thesis.

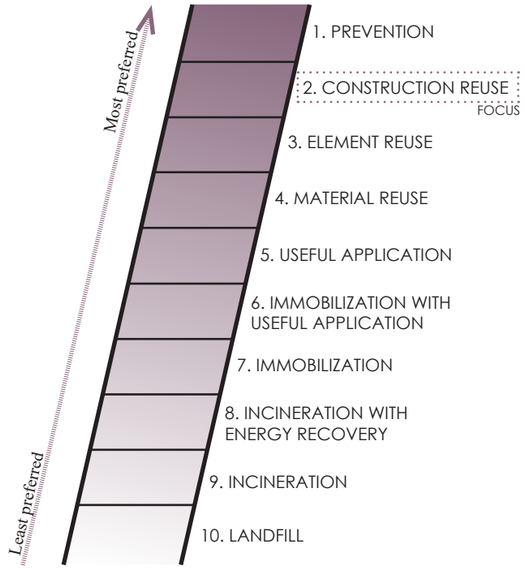


Figure 50: Adaptation of the Delft ladder.

CASE STUDY

In the Netherlands, a report with the aim of finding strategies for new economic carriers for unused windmills was published in 2011. A case study was made on the Jan van Arkel windmill, located outside the village of Arkel in the southern part of the Netherlands. Jan van Arkel is a relatively spacious windmill close to an industrial area, which offers many good opportunities for a new economic carrier. The windmill's original function was a grinding mill. It has a total of seven floors where the bottom three floors are suitable for other uses than as a windmill. The miller's residence used to be in this space. The top four floors contain the interior machinery of the windmill. The windmill is temporarily shut down because of damage to the wings. The windmill is located along the Merwede canal on the border of an industrial area and is relatively easy accessed from the A15 highway. The following new functions were discussed in the report:

- craft workshop
- studio/gallery
- office
- bed and breakfast
- housing

The conclusion of the case study is that a combination of a housing in the lower part of the windmill with an adjacent office space is the most attractive form of using the Jan van Arkel and will generate the highest rental value. The

windmill itself would be a museum with annual happenings and event. It remains as a monument and is completely separated from the housing and the adjacent workspace (Tromp & Wimmers, 2011, p. 37). In this thesis, a similar calculation has been made for the Pilebo windmill and its new potential functions. Since the windmills are different both in terms of location and purpose, the calculations are adapted to the Pilebo windmill's prerequisites.

ESTIMATED COSTS RENOVATION/TRANSFORMATION (VAT included)

Infrastructure (road, parking, water, sewage, electricity)	SEK 330,000	
Carpentering (2 people, 4 months)	SEK 1,200,000	
Facade (sheet metal shingles)	SEK 260,000	
20 windows	SEK 45,000	
Scaffolding	SEK 100,000	
Electricity/plumbing	SEK 500,000	
Kitchens/toilet/bathroom	SEK 300,000	
Total cost	SEK 2,600,000	

ESTIMATED COST FOR NEW WINGS (VAT included)

4 wings	SEK 290,000	
Wind shaft (made of oak)	SEK 190,000	(An engine/generator is installed to drive the wings or vice versa, to generate power from the wind)
Brake wheel (modern transmission)	SEK 125,000	
Turning device	SEK 140,000	
Other costs	SEK 40,000	
Total cost	SEK 785,000	

ESTIMATED INCOME AND FIXED COSTS PER YEAR

Income tourist accommodation (SEK 1500/night, 4 months)	SEK 180,000
Income cafe rents	SEK 20,000
Interest (2% of SEK 3,000,000)	SEK -60,000
Fixed costs (heat, electricity, insurance, maintenance costs)	SEK -60,000
Total profit	SEK 80,000

Figure 51: Estimated calculations of the Pilebo windmill transformation costs and profit.

WHY WE LIKE OLD BUILDINGS

BUILDINGS AND TIME

Time is a topic that all buildings tell us about, and they want to remind us of the time that has passed, and about the people who have lived in the house. All architects want their buildings to tell stories. But what should they say? The modernist movement of architects especially wanted their buildings to talk about the future, and to make promises of technology, democracy, and science. Today, most of us probably agree on that sustainability is an important topic (Adelswärd, 2018, p. 45). Adelswärd (2018) means that getting into an old building is an act of presence that is in some way always bodily. But it can also be associated with another kind of presence, the presence of memory. A feeling of being here and there, both now and then, can be aroused, and the presence of now is enhanced by the time of the building.

Figure 52: Calculations and notes on a beam in the Pilebo windmill (photographer Annie Hyrefeldt).

READING AN OLD BUILDING

When entering an old timber framed building, there is much to take in. The arrangement and the size of the different components in the structure, the marks from the tools that have made the wood from a log to timber, the type of wood that has been used, how the components are jointed together, and how it has been modified over time with new structures and replacement of components. An overwhelming feeling hits the visitor and the fascination of the impressive structures makes you want to stay and explore the building from every angle. Even in the simplest buildings, there is always something to explore. Every mark from the carpenter's axe can be seen on the hand-hewn log and the marks make the unique fingerprint of the structure (Sobon, 2019, p. 124). If more people knew how much effort and time it takes to make one single timber component, there would certainly be other ways of thinking in the society and we will start to value existing buildings in another way than we do today. In most modern buildings, the structure is hidden be-hind walls and ceiling with flat surfaces. Designers can trick our minds with ceilings that look like they are floating, windows that wrap around the corners and wide-open spaces with no visible support. The occupants of the building do not have a clue what type of structure the building is made of.

Even though many people live in such buildings, they are usually happier when they can see the bones of a building. They can see a pillar where there should be a pillar and a beam where there should be a beam. They can be sure that the structure is there to protect them. No brain likes to be tricked, and a timber structure is as honest as something can get (Sobon, 2019, p. 245).

CONNECTION TO NATURE

In nature, nothing is static, and things are always changing. The trees are growing, flowers bloom and wither, the weather and the seasons change, and people grow older. The same goes with buildings. Over time, the wooden frame turns grey and the façade gets more and more frayed and worn by the weather. (Sobon, 2019, p. 153). In this way, we get a connection to the building, and a feeling that it has a soul just like us. When building with materials that were once alive, we are connected to the natural world. We are made from nature and when we are surrounded by it, we feel good (Sobon, 2019, p. 245). Mattias Hallgren (personal communication, February 11, 2020) claims that humans have always had nature as a role model, and nature is not sharp and accurate. It is soft and skewed and not perfectly shaped, just like an old building. That is why we like them.

MEMORIES BY THE SENSES

In most descriptions about the impressions a building makes on our memory, what it tells and what significance it has, the interpretation of the eyes takes precedence (Adelswärd, 2018, p. 110). But the memory of a building is so much more than just the sight of the eyes, it is embedded in the whole body, the hands, the ears, and the nose. Adelswärd (2018) argues that the memory of an old building is especially when using senses like touch, hearing and scent, and that the building speaks to us through a multi-sensory experience. This means that we feel more in old buildings compared to new ones, as they give us this enhanced experience with several layers. In the Pilebo windmill, we smell the old wood. We drag our hand along the huge logs and feel every mark from the axe that made them into timber. Here and there, the movement of the hand is stopped by a rusty nail that previously has been used as a hanger, maybe for hanging tools or sacks. While walking up the stairs we feel the unevenness of the steps under the feet after all the thousands of times that the miller has run up and down the windmill. The railing is so worn and smooth that we do not want to let it go once you are up on the next floor. The higher up we get, we can clearly hear how the wind grabs the building. There is constantly a buzzing sound through the building. The sound of nature and building are woven together.

TRANSFORMATION OF THE ARCHITECTURAL HERITAGE

PREVENT RURAL DECAY

Buildings have the right to be treated with respect. It is not about turning the building into something that it does not want to be, or about giving it a complete beauty surgery. It is rather about giving the building a careful preservation so that it can remain at its place and be a part of an understandable context. For many buildings in the countryside, the journey towards total decay or deletion has already started, or even reached its end. Most people who see an old, abandoned building in decay feel that they are witnessing something sad and disrespectful (Adelswärd, 2018, p. 134). To see the total decay of a small cottage in the woods that throughout the 19th and the first half of the 20th century has been a warm and protecting home for a growing family, or a barn with an impressive timber construction that housed animals, machines and tools to run a whole farm, or, in our case, a windmill that provided flour and animal feed for the rural farmers and has been a meeting place and central point in the area, is just heart breaking. By transforming an architectural heritage building in a respectful way and give it a new function that what is once was aimed for will prevent the building from decay and make it survive for a longer time.

Figure 53: An old brickyard in Edsvära in decay (author's photo).

DESIGN WITH THE EXISTING

Usually, when approaching a building from the outside, some of the information on the building can give a clue of what the inside can look like, such as position in the landscape, overall shape and proportions, roof height, position of chimney, doors and windows, and choices of material. However, many buildings have been modified during their lifetime. They can have been moved from another site, have gotten parts removed or added, and changed appearance in one or another way. The surprise when entering a building where the inside does

not match the outside is getting more and more common (Sobon, 2019, p. 124). Some buildings make themselves visible from long distances. At many older castles and mansions, there was a point of being seen from far away. You could early see if someone approached the property, to have time to prepare for an important meeting or dinner. The miller in the windmill could see when a customer was approaching, although the wind was the main reason for the location of the building in an open area. But through the years, our way of approaching a building has changed. The road leading to the building can have a curve and move through a plantation, to make the building be a surprise when the visitor arrives (Adelswärd, 2018, p. 78). For a windmill, it is difficult to surprise the visitor by its exterior, as it is often seen from several kilometres. However, the surprising moment may occur as you enter the building, when you realise that the experience is quite different from what you expected from the outside. Transformation of existing buildings is a necessary step in the transition towards a sustainable society. The society changes faster than buildings, and to not completely lose our building history, we must be creative and let the buildings move along with us, instead of replacing them with new ones. While designing in an existing building, the building adds another layer to the experience of building, the layer of time and history, that is impossible to create in a new building. The windmill of Pilebo has already undergone many transformations and we simply continue its history of transformation.

FUNCTION FOLLOWS FORM

When you ask a child who grew up in Sweden to draw a house, he or she will most probably draw what we call a cottage, a rectangular shape with roof, chimney, windows and door, surrounded by trees and flowers. This cottage seems to be the basic form of what a house should look like for us in northern Europe, although the child is born and raised in a high-rise building in a big city. There are probably few who draw a house that looks like Elsa Beskow's hat house (Adelswärd, 2018, p.98). But apparently the hat seems to work just as good as a house, at least in the fairy tale. My point is that a building can work just as good with another function than it was meant for from the beginning. If we let the function follows form, the result can be an innovative and exciting architecture.

Figure 54: Function follows form in the hat house designed by Elsa Beskow (Bukowskis, 2020).

RELEVANCE FOR SUSTAINABILITY

The sustainable development goals that were decided upon in the Agenda 2030, cover different areas of sustainable development that are necessary for the future survival of our planet. The agenda consists of 17 goals with 169 targets that the United Nations wants to achieve by 2030 (United Nations, 2015). In this thesis, goal number 12 is the most relevant to discuss.

Ensure sustainable consumption and production patterns

Today, material consumption of natural resources is increasing, particularly in Asia. Several countries are also addressing challenges regarding air, water, and soil pollution. Sustainable consumption and production are about promoting resource and energy efficiency, sustainable infrastructure, and providing access to basic services, green and decent jobs, and a better quality of life for all. The goal aims at "doing more and better with less" (United Nations, 2015). In 12.5, one of the targets to goal number 12, we find reduce of waste, recycling, and reuse, where transformation of already existing buildings plays an important role. By transforming architectural heritage buildings, we reuse existing buildings instead of building new ones. In this way, waste and production of new building are reduced at the same time. Another aspect of the environmental sustainability is the wooden architectural heritage buildings. Many of the heritage buildings in the countryside, such as the Pilebo windmill, are made of timber. Wood is a storage of carbon, and growing trees need carbon dioxide and give oxygen. When the trees for these structures were cut, the carbon stored in them stayed in the wood, and it will be locked up in the timber structure as long as the timber is not burned up (Sobon, 2019, p. 245). Regarding social sustainability, preservation of the cultural heritage and existing buildings is important both for a place and for the people living there. The architectural heritage is often what makes a place unique, that strengthens the identity of a place and is something that the inhabitants are proud of and can gather around, which also strengthens the community. By preserving our cultural heritage we learn from mistakes already made in history, means Sandra Wall, residential antiquary at Vänermuseet (personal communication, February 21st, 2020). By studying the cultural heritage of our ancestors, we can learn about their history and social perspectives. Also, according to Mattias Hallgren (personal communication February 11, 2020), there is almost no written information about historical building techniques. The architectural heritage is like a physical library. A knowledge that is still standing after several hundreds of years means that the building techniques and material choices have obviously worked. This knowledge cannot be lost.

Figure 55: 1st floor in the Pilebo windmill (photographer Annie Hyrefeldt).

PROCESS

STUDY VISITS

Figure 56: Map of Europe showing that Sweden and the Netherlands were visited for study trips during the thesis.

As part of the master's thesis, I had the great honour of receiving a scholarship from Sven Steen's research and scholarship fund, to make a study trip to the Netherlands. Today, there are more than one thousand windmills left in the Netherlands, making the country a Mecca for windmill lovers. Some windmills are still used for grinding and drainage, but several of the windmills have also been transformed into restaurants, guest houses, housing, and museums, and have thus been preserved. The study trip to the Netherlands took place between 10th-14th of March 2020, and the purpose of the trip was:

- to gain knowledge about the history, structure, machinery, and function of windmills
- to get inspiration of new possible functions for the Pilebo windmill
- to contribute with ideas on how to work with old and new materials together when transforming an architectural heritage building
- to get inspiration how to keep historical and cultural values in a heritage building when giving it a new function
- to create a contact network for possible future research projects in the area

All to develop an as good and thorough master's thesis project as possible, which hopefully will inspire others to take advantage of architectural heritage buildings instead of letting them to decay. Appendix I contains photos of some of the windmills that were visited during the trip to the Netherlands. Appendix II contains photos from study visits that were made in Sweden. Several, both intact and transformed windmills have been visited in the western part of Sweden. Unfortunately, due to the Corona pandemic, some of the trips were cancelled, but hopefully, there will be another opportunity to visit them at a later time point.

INTERVIEWS

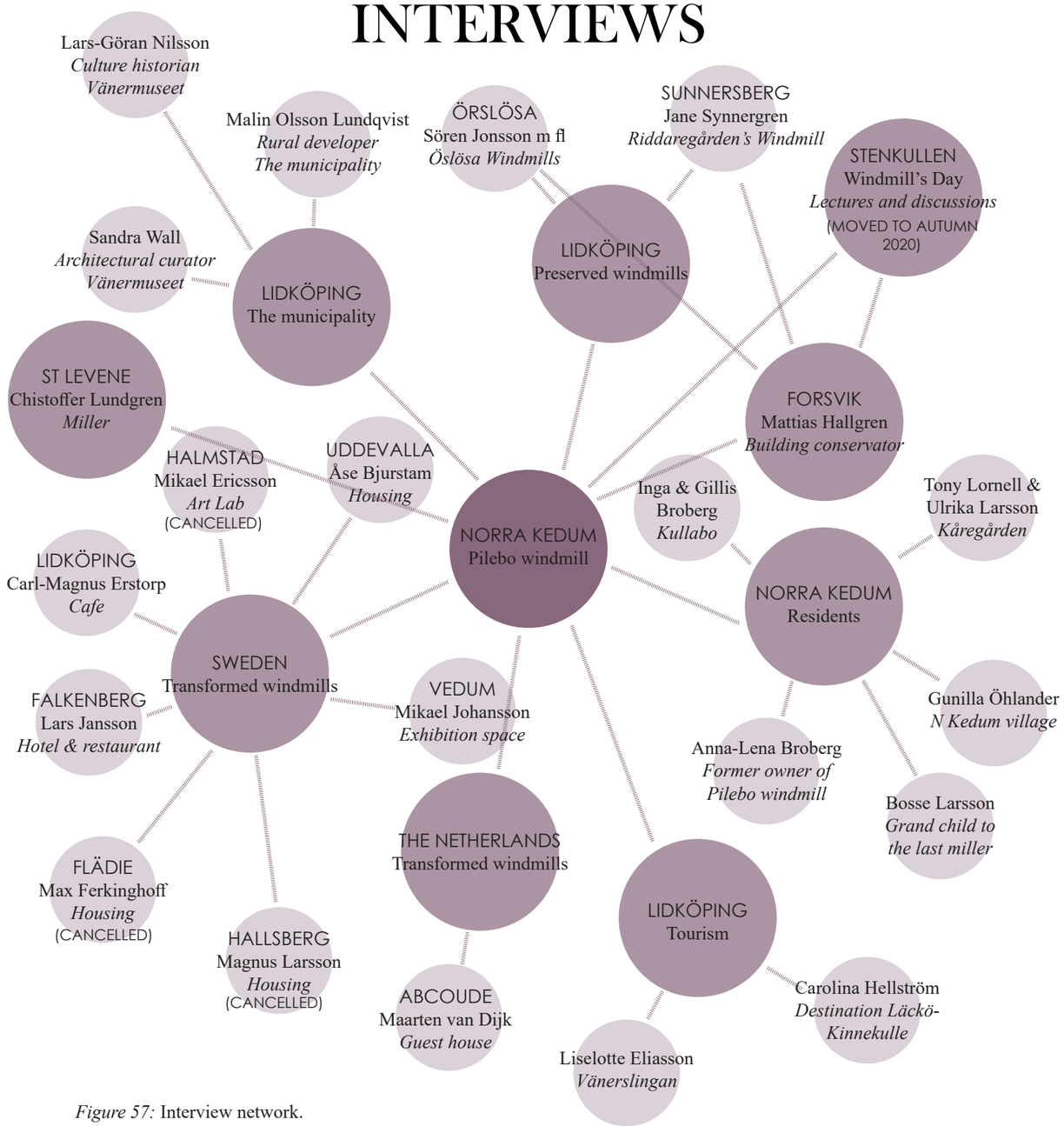


Figure 57: Interview network.

3D-MODEL SKETCHING

During the project, a method called 3D-model sketching was used. A basic wooden sketch model in scale 1:20 was built and provided with floors made of cardboard and walls of sketch paper. Then, octagon-shaped pieces of sketch paper in the same sizes as the different floors were used for sketching. The pieces of paper could then be placed inside the sketch model to easier get an overview of the building's entire floor plan. By always having the 3D model in front of the sketch paper, the work with the floor plan was facilitated, and the sketching was made according to the building's existing prerequisites and a form follows structure approach. On the sides where stabilising crosses are lacking, there was a possibility to be more free in the sketching process, and explore e.g. possible additions.

Figure 58: Sketch model in scale 1:20.

Figure 59: Octagon-shaped pieces of sketch paper.

Figure 60: Sketching inside the model.

FACADE STUDIES

Figure 61: Facade model of wooden shingles.

WOODEN SHINGLES
Dimensions per piece: 500x150 mm
Approximate material cost for Pilebo windmill: SEK 175,000 + VAT
+ the original facade material
+ renewable material
+ living material that changes over time
- hard to find good manufacturers of wooden shingles nowadays
- short life cycle (15-40 years)
- expensive assembly cost
(Hälsinge takspån, 2019)

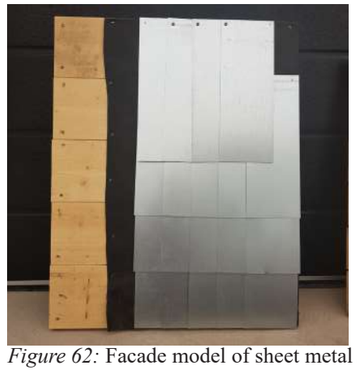


Figure 62: Facade model of sheet metal shingles.

GALVANIZED SHEET METAL SHINGLES
Steel sheet with a thin layer of zinc.
Dimensions per piece: 450x150 mm
Approximate material cost for Pilebo windmill: SEK 190,000 + VAT
+ durable material
+ long life cycle
+ can be recycled as many times as possible without losing its positive qualities
+ flexible in design and size
- not the original facade material
- gives a sharp and edgy expression
(Plannja AB, 2020)

Figure 63: Facade model of Isola Tyri.

ISOLA TYRI
Impregnated fibreglass coated with special asphalt on both sides.
Dimensions per piece: 1000x333 mm
Approximate material cost for Pilebo windmill: SEK 280,000 + VAT
+ easy to apply on big areas, no nails needed
+ variation and a soft impression of the facade
- not the original facade material
- a new material that has not been tried during a longer period (durability of the glue)
- not a renewable and sustainable material
(Isola AB, 2019)

PRESENTATION MODEL BUILDING

Figure 64: Building the frame.

Figure 65: The presentation model is in scale 1:10.

Figure 66: Painting the frame to make it look old.

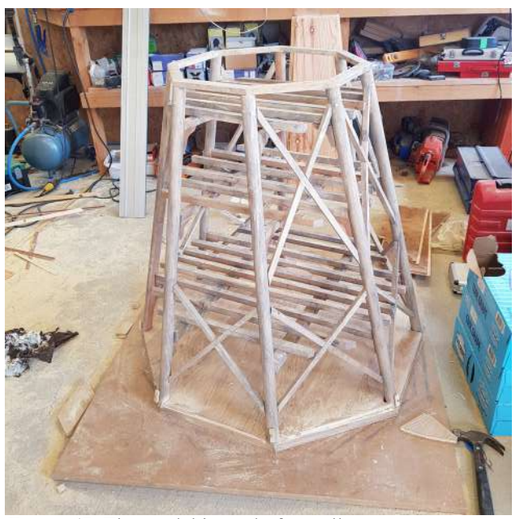


Figure 67: The model is ready for walls.

Figure 68: The walls can be taken on and off depending on which view you like.

Figure 69: Mounting small locks so that no light comes in at the wrong place.

Figure 70: Painting the floors.

Figure 71: Placing furniture in the model.

REFERENCE PROJECT

All photos are reproduced from Airbnb (April 22, 2020)

OLD SMOCK MILL

Old Smock Mill, located in the countryside outside of Kent in Great Britain, is a gorgeous four storey windmill that has been carefully restored. The windmill has a brick wall in combination with a white wooden tower which stands out in the landscape. Massive original beams span each floor, and the rooms have been carefully designed to keep the atmosphere of the old windmill, but with modern facilities. Everything is designed to unwind you from the moment you walk in. The 1st floor has a 2.5 metres wide balcony of oak, that encircles the whole windmill, with teak tables and chairs. In the garden, there are sunbeds with cushions for relaxing (Airbnb, 2020).

KITCHEN AND LIVING ROOM

A well-equipped kitchen without upper cupboards and only the lower cabinets follows the wall and enhances the octagon shape of the windmill.

The small details and material choices are well thought through. Here, a simple box for hot and cold water by the sink fits very well into this atmosphere.

BEDROOM

There are almost no furniture or details on the walls. Only the most important furniture is needed. A chest of drawers with a lamp stands next to the bed.

A beautiful old copper basin sink gives a more luxurious feeling, and unique system for hanging clothes makes no impact on the structure.

BATHROOM

The bathroom on the top floor has both a walk-in shower, and a bathtub by the window so that you have a great view of the countryside of Kent.

Again, a minimal impact is made on the structure and the walls. Here, a small make-up mirror by the basin is enough.

OVERALL IMPRESSION

This photo shows, in my opinion, that *less is more*. An old glass bottle with flowers from the garden on the wooden frame is the feeling that I am taking with me into the transformation of the

Pilebo windmill. The respect of the old structure and the untreated wood of the frame is another important quality that will inspire the design of Pilebo windmill.

DESIGN

> The scariest dragons and the fiercest giants usually turn out to be no more than windmills
>
> from Don Quixote

FROM RESEARCH TO DESIGN

WHY SHOULD WE DO A TRANSFORMATION OF THE PILEBO WINDMILL?

- It is the last windmill left in the area that once had more than 30 windmills. The history of the area and the historical contour of the landscape are preserved.

- The building is empty, which means that it has a lower cultural value than if it would have been intact. There is an opportunity to make something else out of it and give it a new function.

- The building techniques of windmills are preserved, and it will continue as a standing library for future generations.

- It creates another attraction along Vänerslingan and an opportunity to show this part of Lidköping.

- It enhances the attractiveness of Norra Kedum and becomes a landmark of the village.

-It becomes a meeting place for the inhabitants of Norra Kedum and strengthens the community.

- It contributes to solve the municipality's problem regarding lack of tourist accommodation.

- It becomes a role model and an example of the interest in the rural development plan to reuse existing buildings for housing and accommodation, and inspires others to do the same instead of letting the architectural heritage decay.

- By combining an architectural heritage building with a business, the maintenance costs will be covered, and the building will live longer.

- The story of transformation of the Pilebo windmill continues, from windmill to electric mill, to storage, to a Naturum and guest house.

PROGRAM

Ground floor - Naturum/café (60,8 m^2,
- kitchen + addition 9 m^2)
- indoor serving
- exhibition
- toilet (addition)
- staircase to 1st floor (addition)

1st floor - Accommodation (47,8 m^2,
- kitchen + addition 10,5 m^2)
- living room
- bathroom (addition)

2nd floor - Accommodation (33,2 m^2)
- bedroom

3rd floor - Machinery (24,6 m^2)
- machinery

Outdoor spaces
- outdoor serving
- parking
- start of walking tracks

Figure 72: Less is more (Airbnb, 2020).

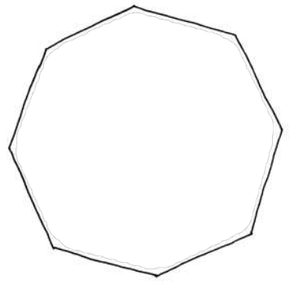


Figure 73: Octagon shape.

Figure 74: Beauty & education (photographer Annie Hyrefeldt).

CONCEPTS

Less is more
- let the building speak for itself
- minimal furniture and decoration
- untreated structure

Original shape
- no interior walls
- 360° view
- light from all directions

Beauty & education
- visible structure
- add from the outside
- preserve the patina of the structure

THE VILLAGE PERSPECTIVE

Today, the existing hiking tracks in Norra Kedum start at Storegården, but there is a lack of parking places at the farm and no information or marketing about the tracks. The tracks are mostly used by the guests at the camper area and by the inhabitants of Norra Kedum. The hiking trails are very appreciated, and the goal is that more people will discover them, for example as a day tour by the citizens of Lidköping. We know that hiking and other outdoor activities is the new trend within tourism in Lidköping. The hiking trails at both Hindens Reef and Källstorp are sometimes full of people, and there can be a long queue along the trails. To reduce the pressure on these two places, the hiking trails in Norra Kedum are expanded and better marketed. The three existing trails on the northern side of the main road are extended with two trails south of the road. One of the new tracks passes through Häbbarebacken, a beautiful pasture with several ancient monuments, such as the grave of King Häbbe. The second trail goes through the village of Norra Kedum with the church from the 13th century and the old school. The two trails are then connected with the existing ones that go along the canal and all the way out to lake Vänern. The Pilebo windmill is the new starting point for the hiking trails and a natural and central point for the tourism in Norra Kedum. Inside the windmill, you can read information about Norra Kedum, its plants and wildlife, and what you can see along the hiking trails while walking. There will of course also be information about the history of the Pilebo windmill, and about building techniques and functions of windmills. After the hike, there is an opportunity to have a cup of coffee in the windmill cafe. The Pilebo windmill is again the meeting place of Norra Kedum where the inhabitants can gather and exchange news, just like the farmers did in the past. The Naturum can be used as a community centre for the residents, who today use Tådene community centre in the neighbour village for gatherings and meetings. Also, the Naturum can be rented out for smaller parties and activities. On the upper floors of the windmill, a tourist accommodation is rented out to visitors of Lidköping who want to have a unique living experience in a beautiful building with proximity to nature and water.

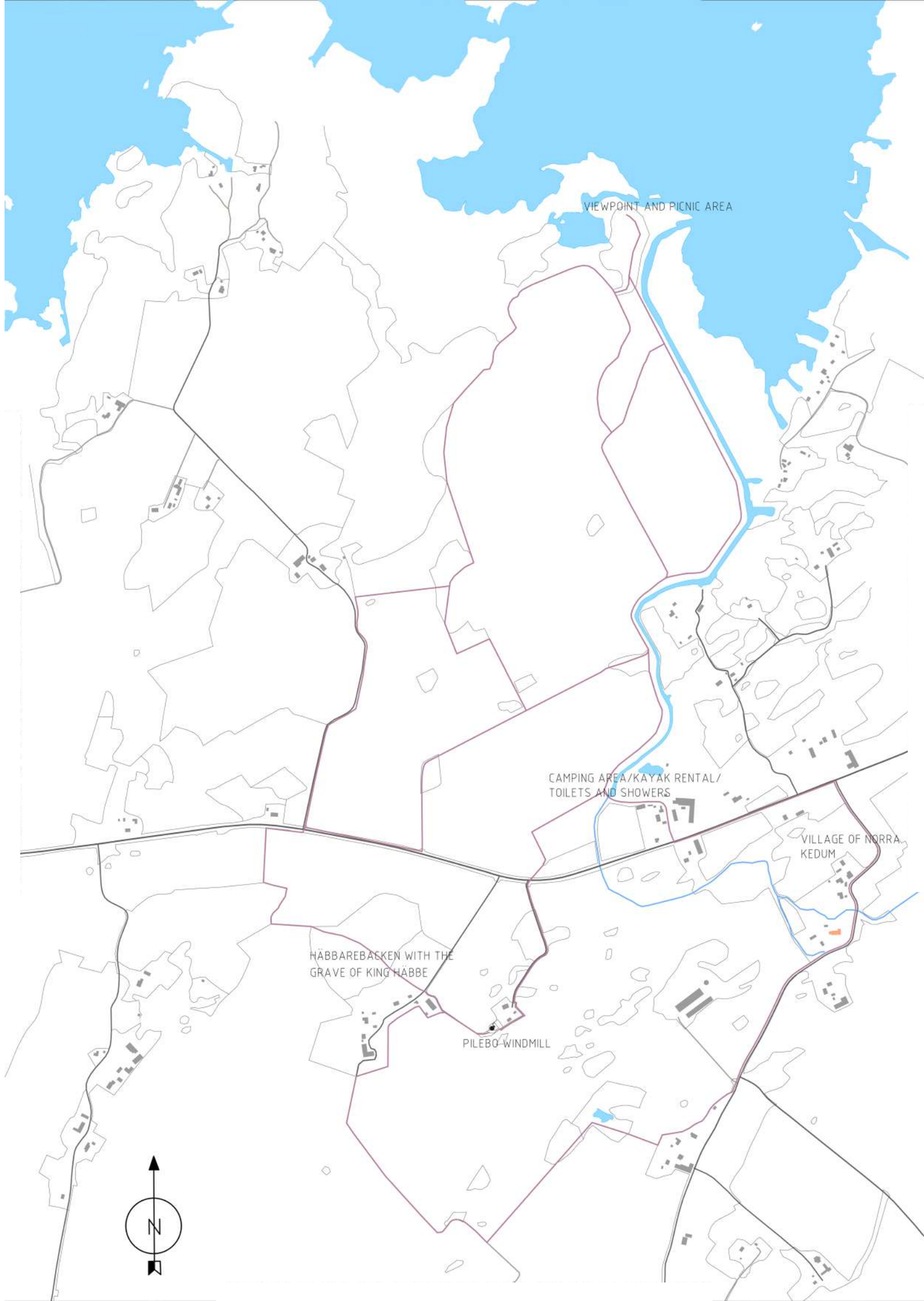


Figure 75: Site plan of Norra Kedum with existing and new hiking trails. Scale 1:10,000.

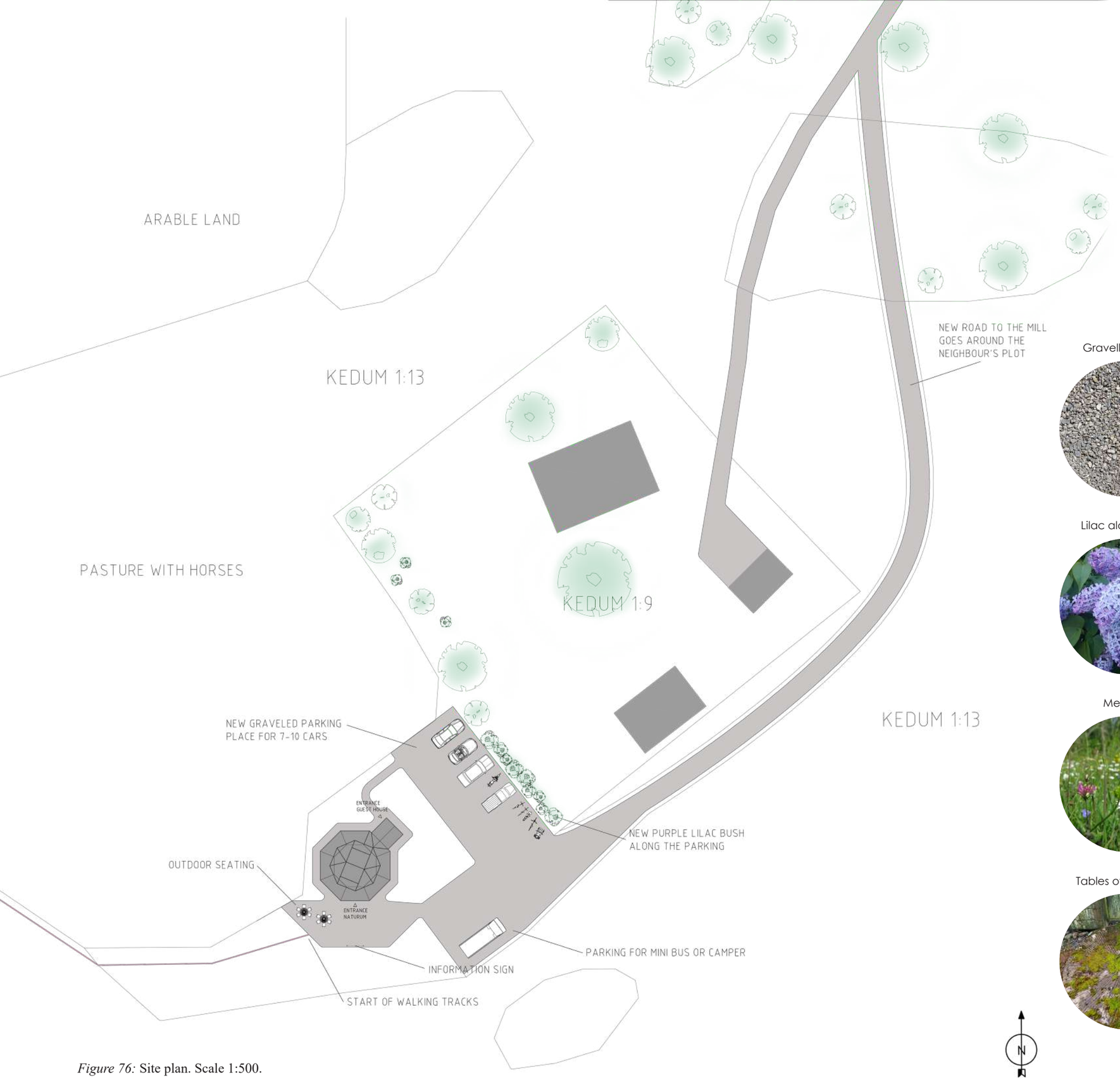


Figure 76: Site plan. Scale 1:500.

THE SITE

Gravelled road

Lilac along parking

Meadow

Tables of mill stones

As there is no existing road to the Pilebo windmill today, a new gravelled road is made on the east side of the property Kedum 1: 9. A part of arable land is taken to make the road and at the same time, a gravelled parking for 7-10 cars is made. Along the parking, a purple lilac bush is planted, that frames the area to the north east, creates a clear direction towards the windmill, and gives the neighbour some privacy. The parking is designed so that a smaller bus or camper can turn around and park along the field. Gravel is also placed all around the windmill, since the windmill does not have any front side or back side, as the wings can be set in any angle. However, a larger gravelled area is made on the south side of the windmill where the entrance to the Naturum, the outdoor serving of the cafe, and the start of the hiking trails are located. This area follows the octagon shape of the windmill to create a feeling of entirety on the spot. Apart from the lilac bush, there is no other plantation on the site to not disturb the wind. On the non-gravelled areas, a meadow grows in its natural form. It is not cut by a lawnmower, since this area is for the pollinators needed for the agricultural land.

THE NATURUM

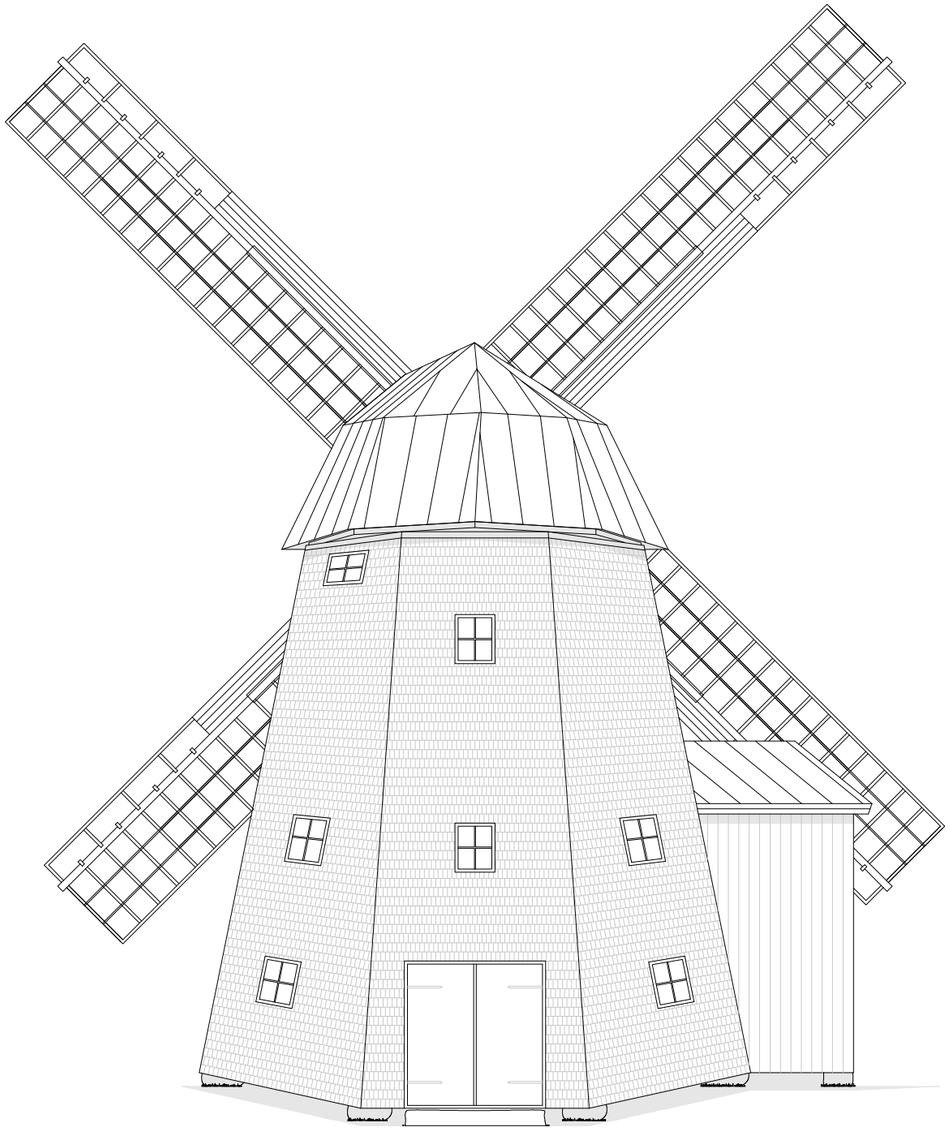


Figure 77: South elevation. Scale 1:100.

A NEW DURABLE FACADE

On the south elevation, the entrance to the Naturum is located. The existing doors with their beautiful patina of rust are preserved, and a new facade of galvanized sheet metal shingles covers the windmill tower. The shingles have the same proportions as the previous wooden shingles, but in a much more durable material that will preserve the structure in a long-term perspective. The wooden frame is the most important element in the project, and to preserve it for future generations, the insulation board is placed on the outside of the existing horizontal tongue and groove, to not hide the structure and to minimize the impact on the wooden frame. The inspiration of the facade comes from Skåne, where many windmills have a with standing seem sheet metal facade. But instead of standing seems, this facade takes on the shape of the original wooden shingles of the Pilebo windmill in a contemporary way.

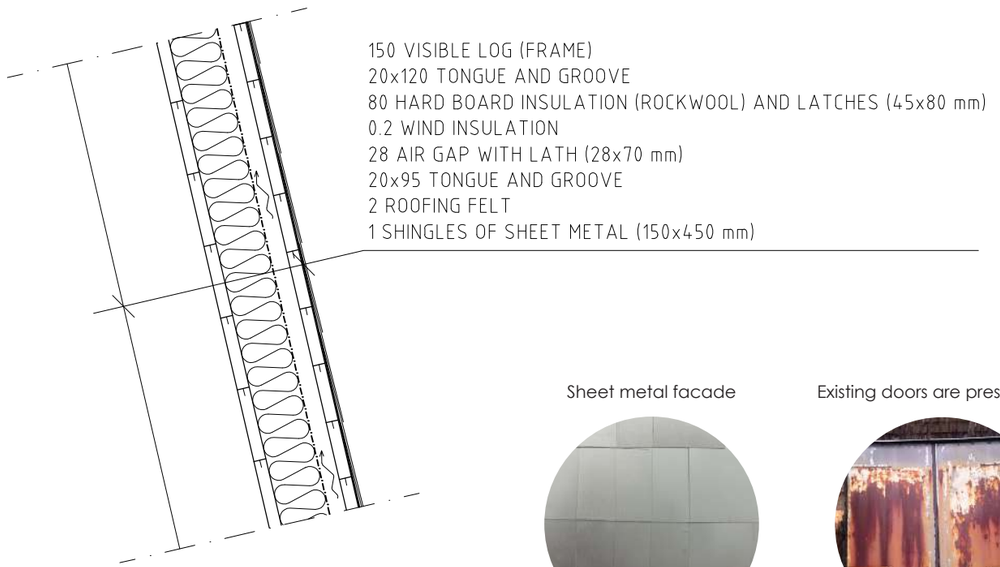


Figure 78: Detail of the wall. Scale 1:10.

Sheet metal facade

Existing doors are preserved

Figure 79: Model photo of the Naturum on ground floor.

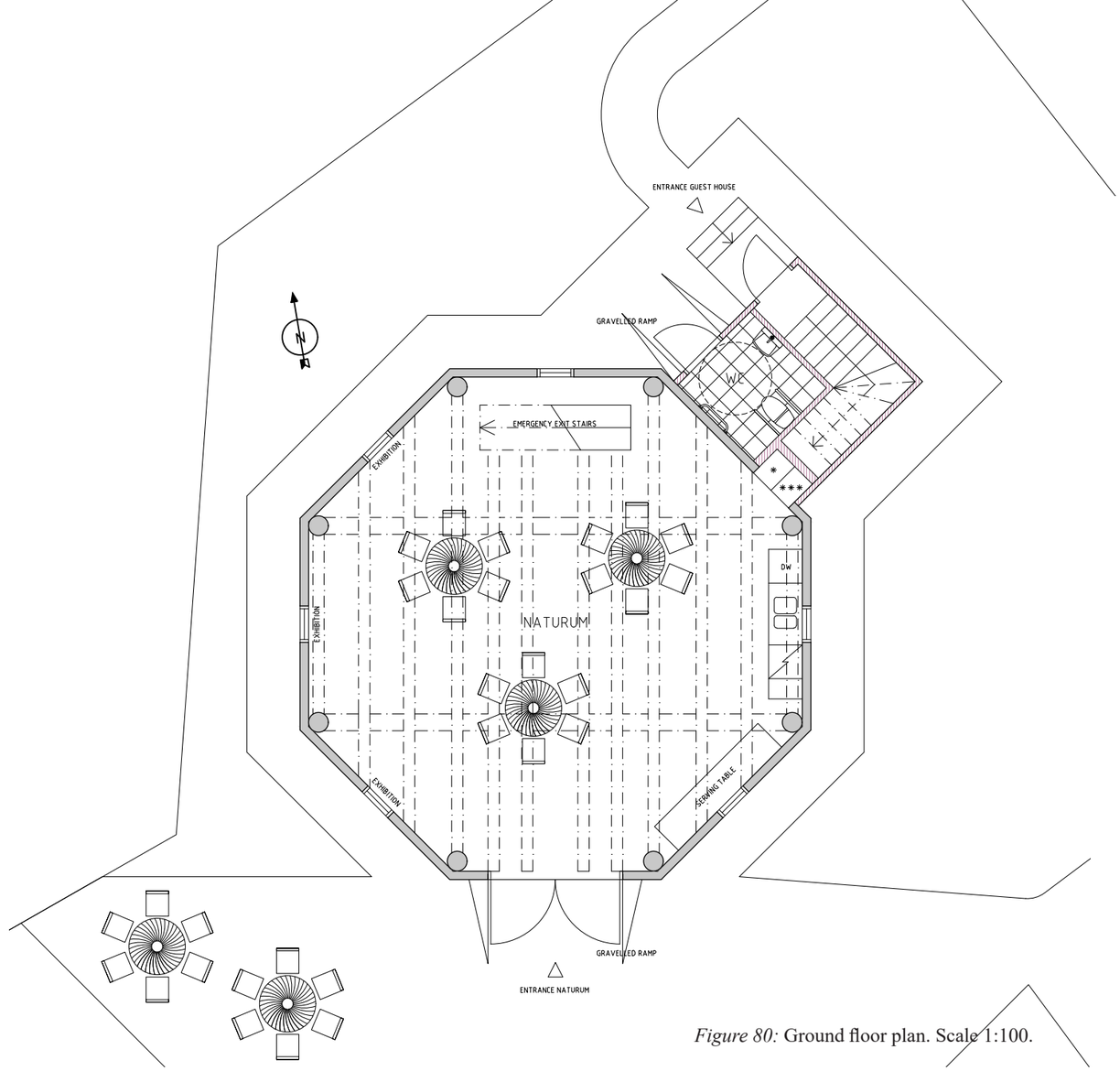


Figure 80: Ground floor plan. Scale 1:100.

INSIDE THE NATURUM

When entering the Naturum, the place for the table where the miller used to have his miller's book has become a cafe, and the three millstones are now serving as cafe tables in the characteristic triangular shape that millstones are placed in windmills. Along the walls to the left, an exhibition can be visited, and to the right, a small kitchen with only low cabinets and no upper cupboards is placed along the wall in between the cross that stabilizes the east side of the windmill. Refrigerator and freezer are placed in the addition to not let their height disturb the space. In the addition, a toilet can be used even if the Naturum is closed, and a staircase leads up to the guest house on 1st floor. The huge timber beams dominates the space and the atmosphere on ground floor and the low ceiling height makes it possible to touch the structure, to feel every mark from the axe that made the logs into timber, and to try to translate the notes and calculations of that the millers have written on the structure. The white wooden panel on the walls and the oiled wooden planks on the floor creates a contrast of new and old and enhances the untreated wooden structure even more. The existing doors with their dramatic patina of rust are reused and preserved. The stairs leading up to the 1st floor, which now is used as an emergency exit, is also kept in the same place.

Figure 81: The place for the table with the miller's book has become a serving table of the cafe.

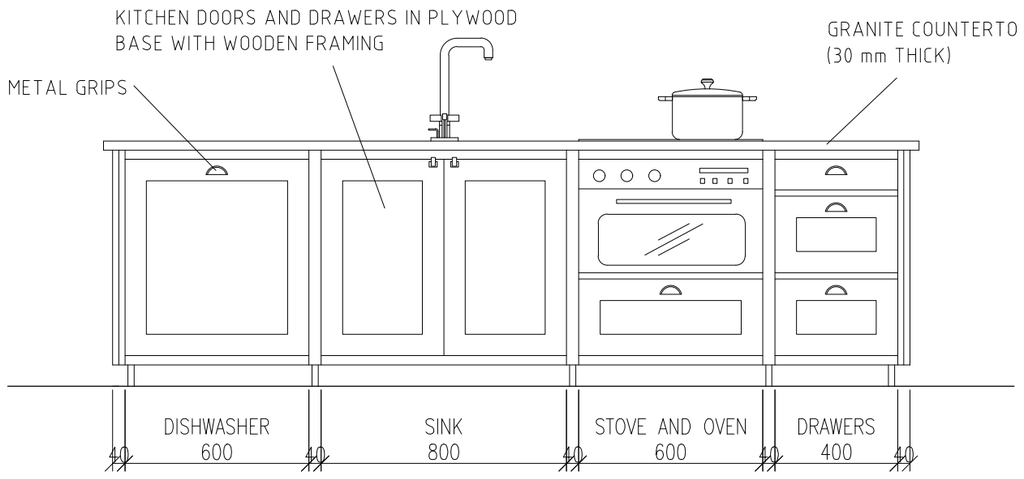


Figure 82: Kitchen front elevation, ground floor. Scale 1:20.

Figure 83: The only fixed furniture on ground floor is the small kitchen placed along the wall in between the stabilizing cross, with a rustic and industrial look and with horizontal wooden planks on the sides that meet the wall.

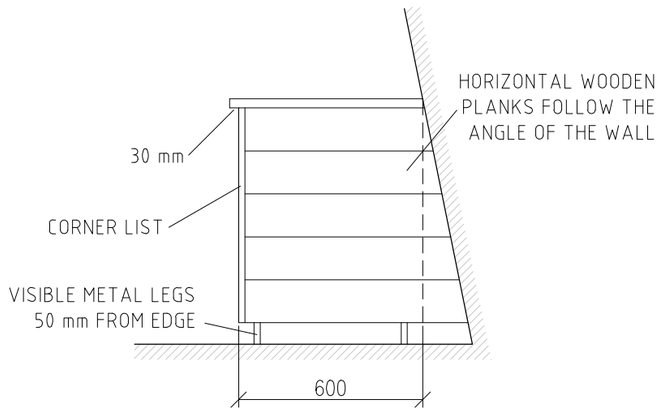


Figure 84: Kitchen side elevation, ground floor. Scale 1:20.

Rustic wooden kitchen

Wooden planks on the sides of the kitchen

Figure 85: In the exhibition area along the walls to the left of the entrance, information about Norra Kedum, about windmills and what can be seen along the tracks while walking, is found.

Figure 86: All three stairs in the windmill are preserved and kept in the same place as in the existing building.

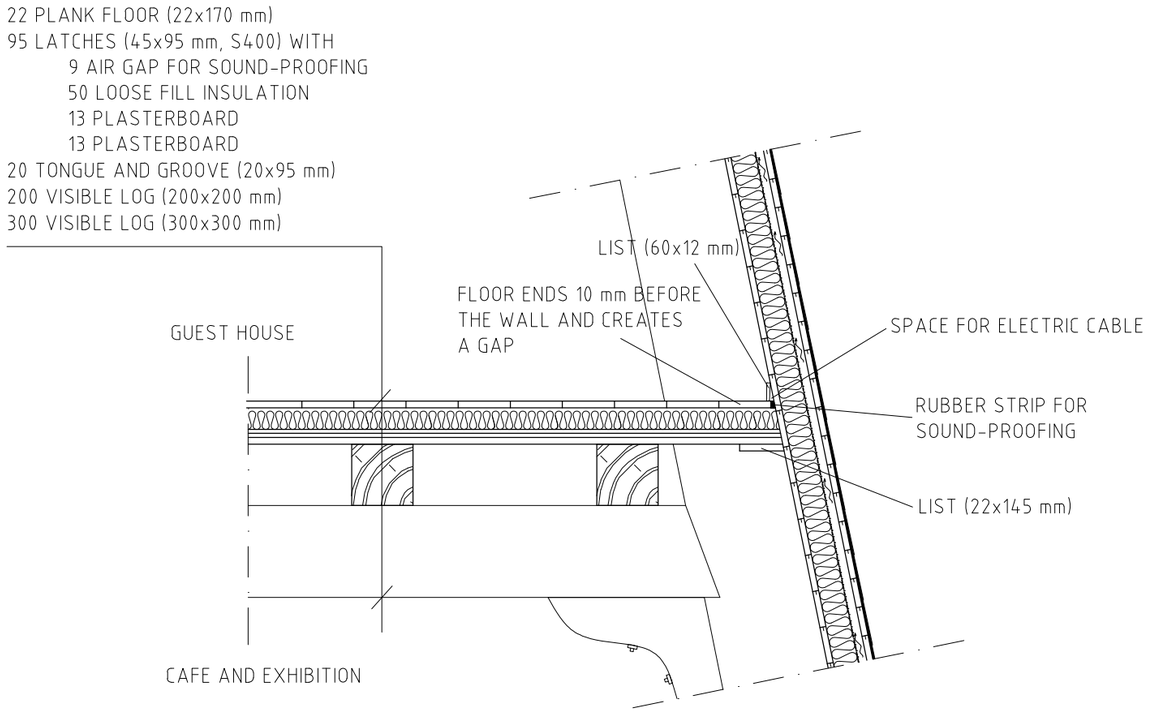


Figure 87: The sound insulation between the Naturum and the guest house is solved with double plaster boards, loose fill insulation and an air gap of almost a centimetre, together with a rubber strip between the floor and the wall, hidden behind the list. Scale 1:20.

THE GUEST HOUSE

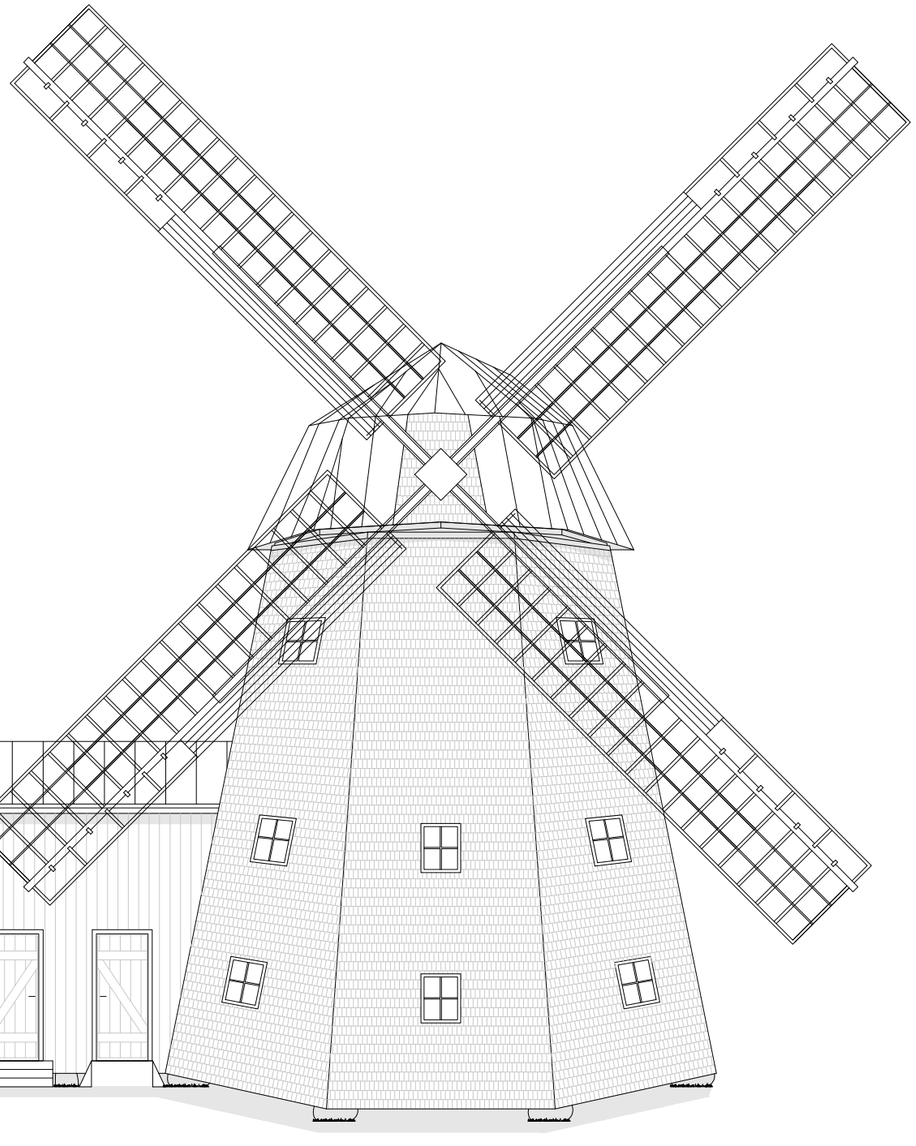


Figure 88: North west elevation. Scale 1:100.

ENTRANCE THROUGH THE ADDITION

The inspiration of the addition comes from a former extension of the Pilebo windmill that was built when the windmill was electrified, see figure 89. Here, the generator was located. The new addition houses a staircase up to the guest house on 1st floor, as well as a toilet for visitors of the Naturum, and a bathroom of the guest house. In this way, the octagon shape of the windmill is consistent through the whole main building, since no walls are added. The addition is not stealing the attention from the windmill, but acts as a support in harmony with it. Inside the addition, an atmosphere of a shed or barn is present. The walls consist of a glass facade with grey wooden panels on each side. Between the panels, gaps let light pass through that creates a beautiful play between light rays and shadows. The wooden facade creates a soft complement to the hard sheet metal facade. Inside, the wall towards the windmill is covered with sheet metal shingles, to make the windmill present at all times.

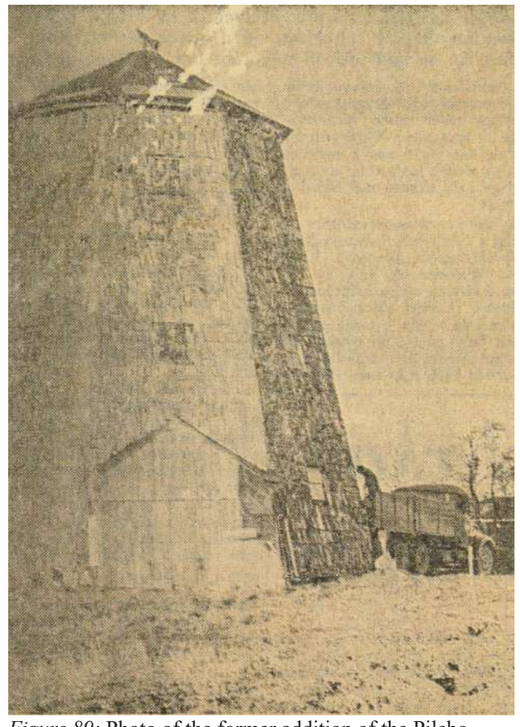


Figure 89: Photo of the former addition of the Pilebo windmill (Tengeland, 1963).

Wooden panel treated with iron(II)sulphate

Gaps between the panels like in a barn

Sheet metal on the wall towards the windmill

Wooden stairs and wooden railing

Figure 90: The home of Gert Wingårdh (Skoog, 2015).

TRANSPARENT WALLS

The walls of the addition consist of a glass facade with wooden panels on each side, to get an addition with the atmosphere of a barn, but with the same comfort as in an insulated building. Ten millimetres wide gaps between the panels let light pass through, and give the addition the feeling of a light, simple shed. The walls of the addition are inspired of the home of Gert Wingårdh, where the same principle is used. Inside the addition, the wall towards the windmill covered with sheet metal shingles, to enhance the contrast between soft and hard, light and heavy, and to give the windmill itself a coherent expression.

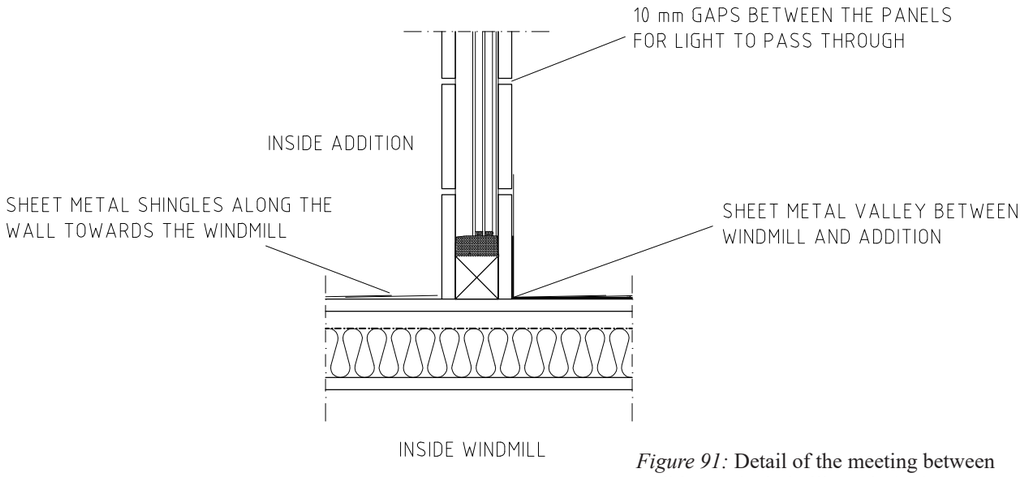


Figure 91: Detail of the meeting between addition and windmill. Scale 1:10.

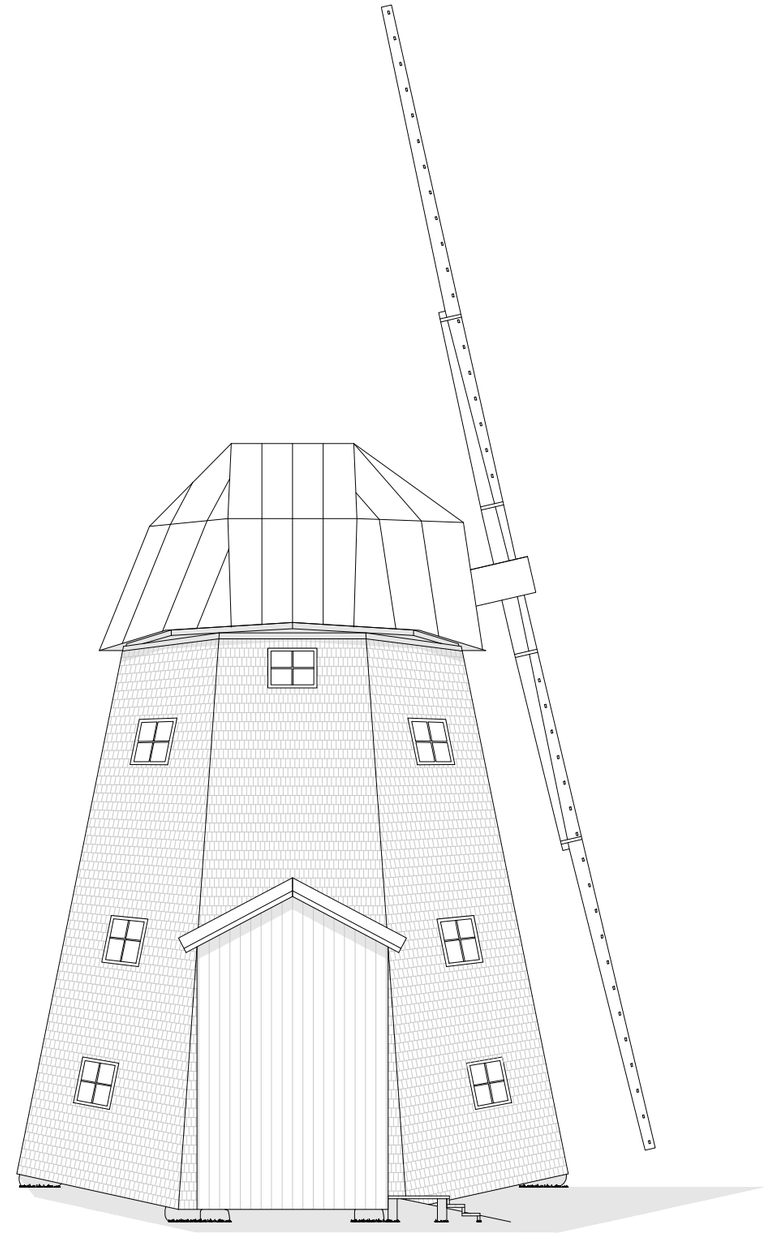


Figure 92: North east elevation. Scale 1:100.

Figure 93: Model photo of the kitchen and living room in the guest house on 1st floor.

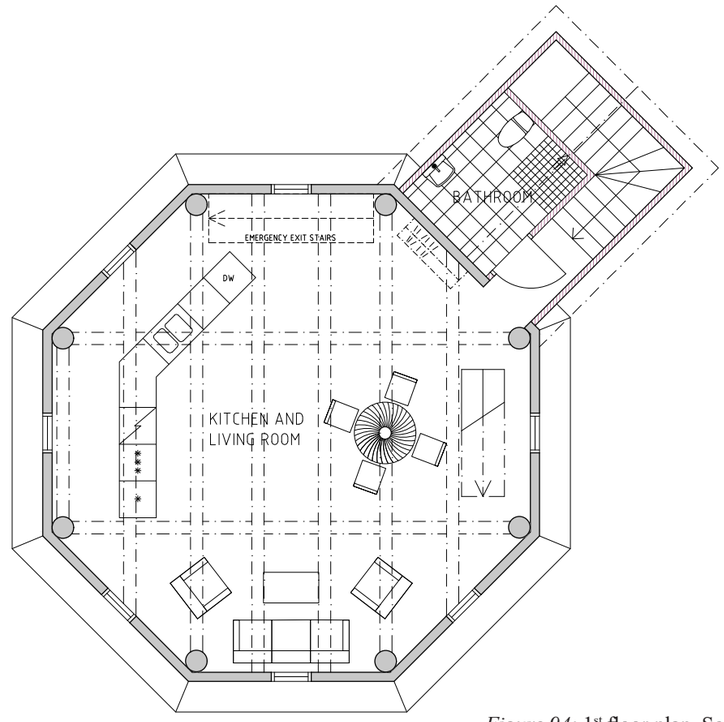


Figure 94: 1st floor plan. Scale 1:100.

INSIDE THE GUEST HOUSE

The entrance to the guest house is through the addition on the north east side of the building. The transition from the narrow staircase to the guest house's main level is an overwhelming experience. The room has a ceiling height of 3.1 meters and windows on all eight sides. Despite the small windows, the room is light and spacious, and the 360° view over the landscape adds something extra special to the experience. A fully equipped kitchen in form of a kitchen island follows the shape of the windmill, an old mill stone serves as a dining table, and a relaxing sofa bed, if more than two guests book the accommodation, is all you need in this room. The bathroom is accessed from the addition to minimize the impact on the original structure. A stay in the Pilebo windmill is a unique experience. Surrounded by 150 years of history and with the proximity to nature and water makes it possible to take long walks in the beautiful landscape, to paddle around in the archipelago, and have a cup of coffee together with the locals, and to learn about windmill's history, construction, function and significance of this area.

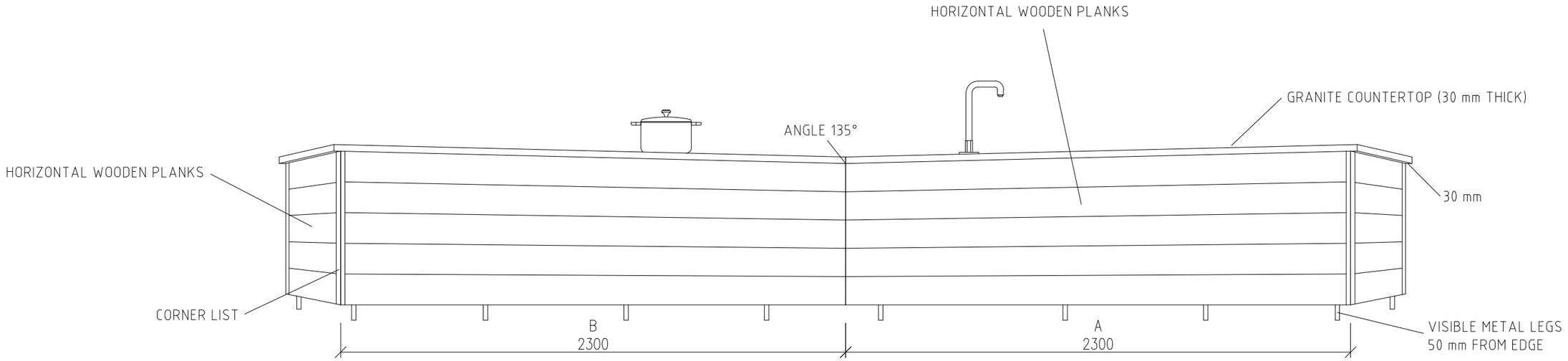
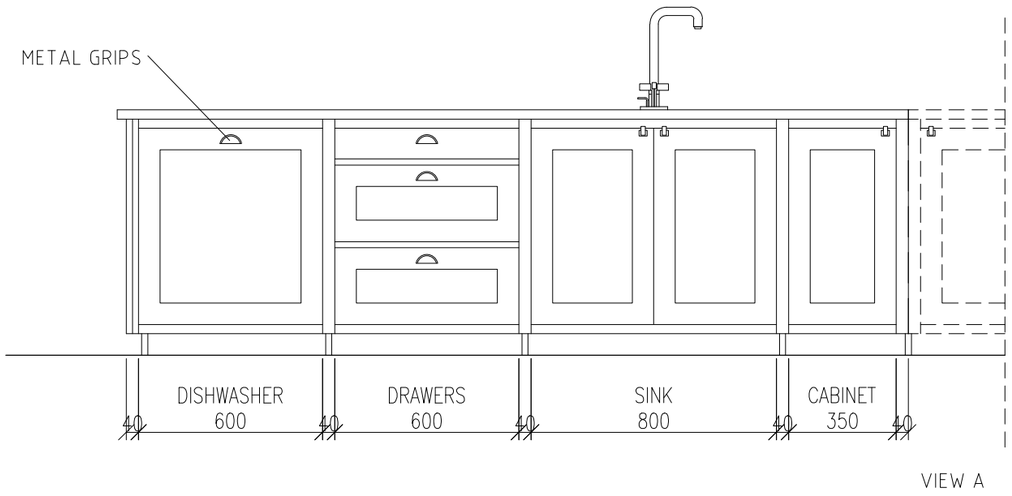


Figure 95: Perspective of the backside of the kitchen in the guest house on 1st floor.



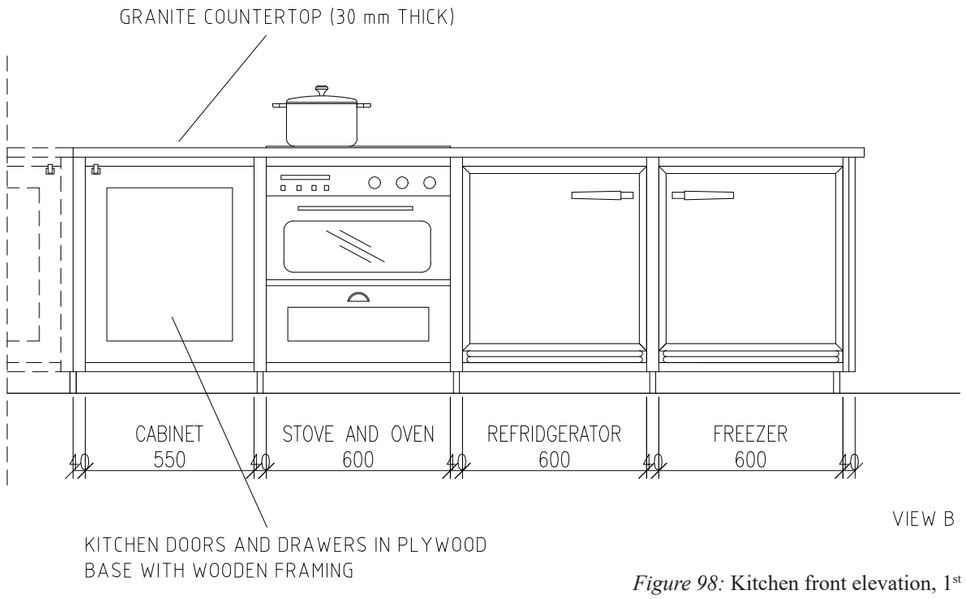


Figure 98: Kitchen front elevation, 1st floor. Scale 1:20.

Figure 96: Kitchen island in the guest house on 1st floor.

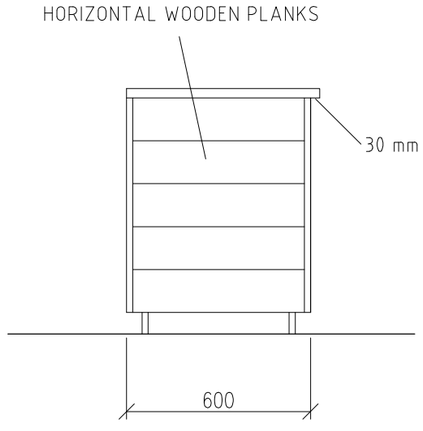


Figure 97: Kitchen side elevation, 1st floor. Scale 1:20.

THE KITCHEN ISLAND

In order not to disturb the structure of the building, the only fixed interior on 1st floor is the kitchen that only consists of a kitchen island, and which shape follows the walls of the windmill. Here, you have a nice view of the room while cooking. The kitchen has a rustic and industrial look and the sides of the kitchen island are covered with horizontal wooden planks with the same expression as the kitchen on the floor below.

Horizontal wooden planks on the sides

Rustic wooden kitchen

Figure 99: The generous ceiling height of 3.1 metres and windows on all eight sides adds another layer to the experience.

Figure 100: A dining table of an old mill stone and a relaxing area with armchairs and a sofa bed if more than two guests are booking the accommodation.

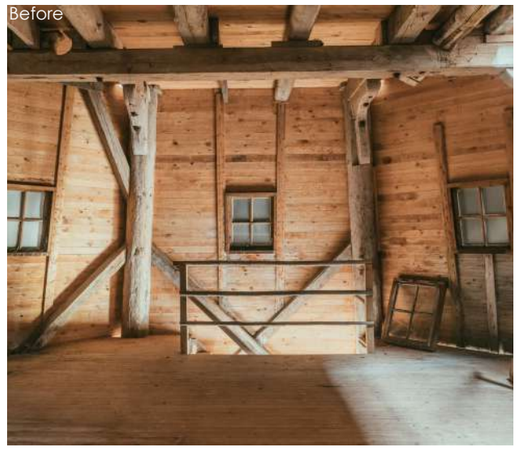
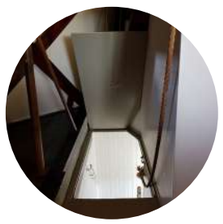


Figure 101: The existing stairs can be reached through a hatch in the floor as a second emergency exit.

TWO EMERGENCY EXITS

To separate the Naturum from the guest house, a hatch in the floor has been installed. The hatch is covered with the same wooden planks as the rest of the floor and is almost invisible. If an evacuation is required, there are two possible escape routes from the guest house, one through the addition and one through the hatch down to the Naturum. When entering the guest house, a hanging device for jackets and coats is attached to the beams in the ceiling to minimize the impact on the structure.

Floor hatch is integrated in the floor as an emergency exit



Hanging closet for minimal impact on the structure

Figure 102: The bedroom of the guest house on 2nd floor.

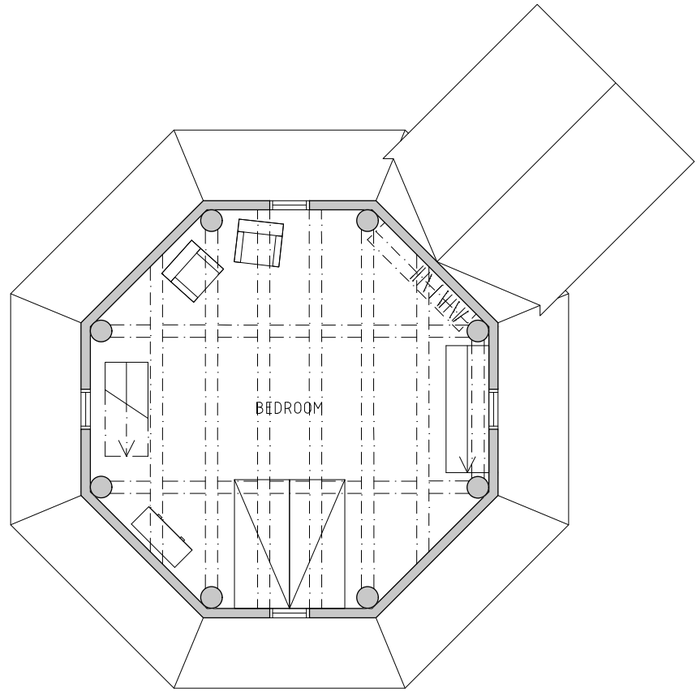


Figure 103: 2nd floor plan. Scale 1:100.

BEDROOM WITH A VIEW OF THE LAKE

The 2nd floor consists of the bedroom with a double bed, two armchairs for relaxation, and a hanging closet. The visible structure is there to protect you while sleeping, and when waking up in the morning, a fantastic view all the way to lake Vänern welcomes you. The low ceiling height of 2.3 meters and the four windows make this room more intimate than the living room downstairs. All windows in the building are roof windows sewn together with the façade with double seems, and hooks between the roofing felt and the sheet metal shingles prevent the penetration of water. In the bedroom, one of the stabilizing crosses has gotten parts of the wood removed to make room for the window, which makes the structure weaker, see figure 108 on the cross behind the stairs. This has been solved by a horizontal piece of wood on top of this part, screwed down through the cross. It strengthens the construction at the same time as it becomes a beautiful detail in form of a window sill. Here, I put my glass bottle with the hand-picked flower bouquet.

Figure 104: The bed is placed against a wall without a stabilizing cross. Only the most important furniture is needed. Here, a chest of drawers for a bed light and personal items next to the bed.

Figure 105: Before bedtime it is possible to sit down and read a book, or just take in the building in the Laminos.

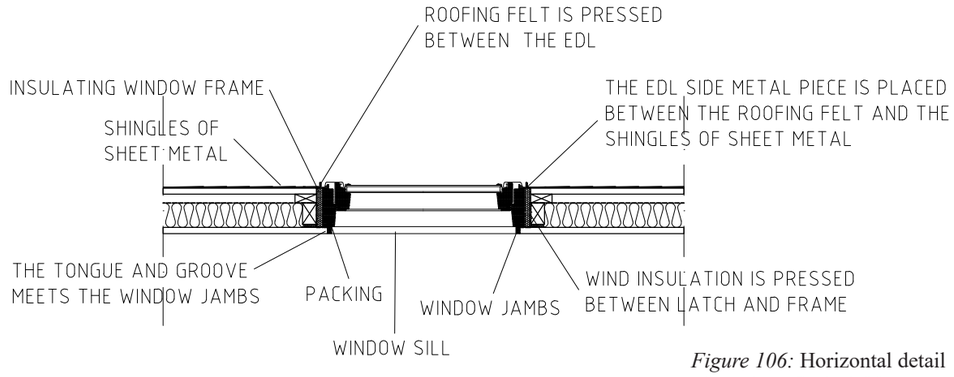


Figure 106: Horizontal detail of window. Scale 1:20.

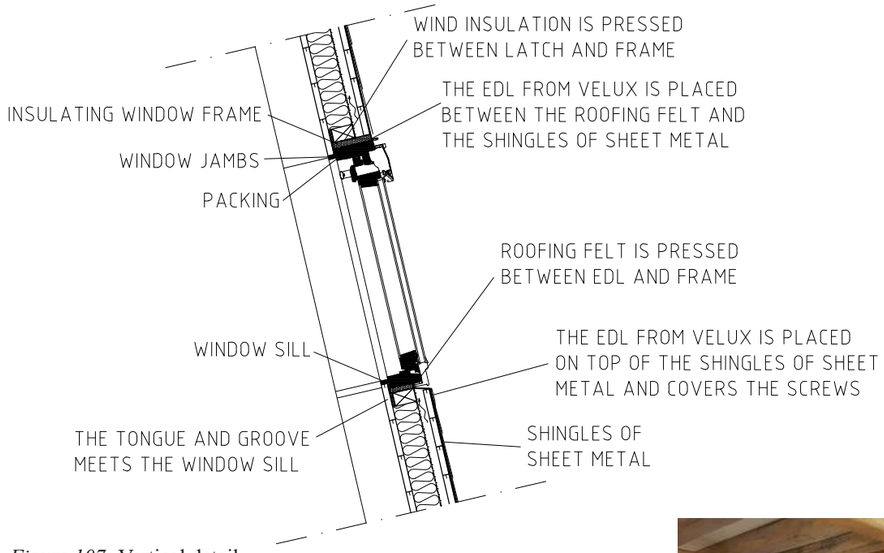


Figure 107: Vertical detail of window. Scale 1:20.

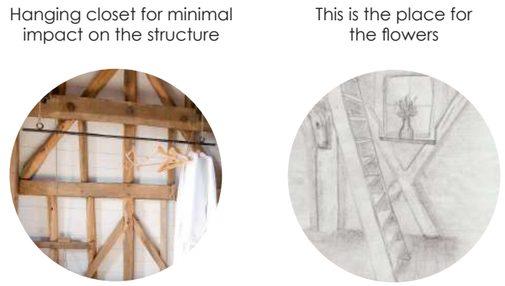


Figure 108: The stabilizing cross behind the stairs is strengthened by a window sill.

THE MACHINERY ROOM

Figure 109: Existing photos and model photos of the machinery room on 3rd floor.

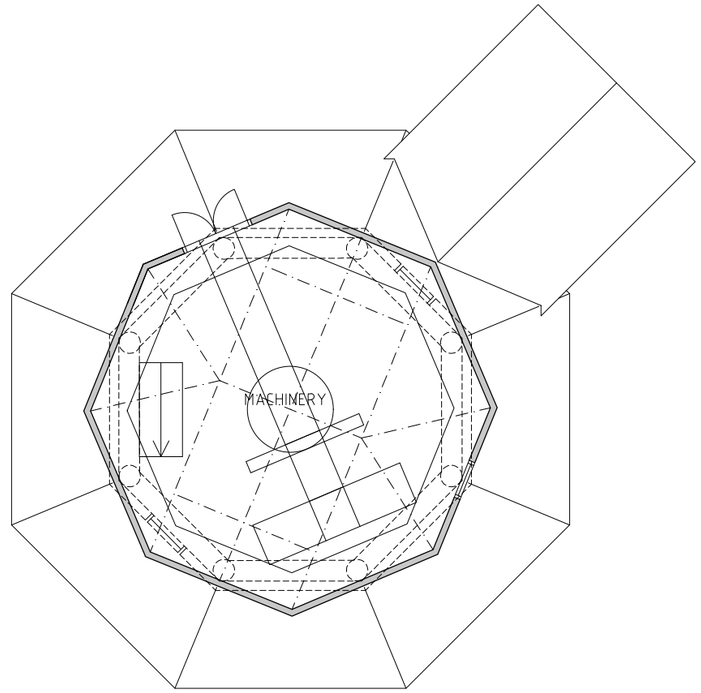


Figure 110: 3rd floor plan. Scale 1:100.

THE ENGINE OF THE BUILDING

The 3rd floor, the cap, is dominated by the wind shaft and the machinery needed to operate the wings in a modern way. A generator is installed to run the wings if there is no wind, but can also work in the opposite direction, where the wings can generate electricity by the power of the wind. The floor of the cap is insulated, and a floor hatch stops the heat from the bedroom to pass through the cap. Otherwise, the cap is uninsulated as it is only a space for the machinery. Eventually, a reused building that again does what it was built to do, to produce its own power. This is a big step towards sustainability.

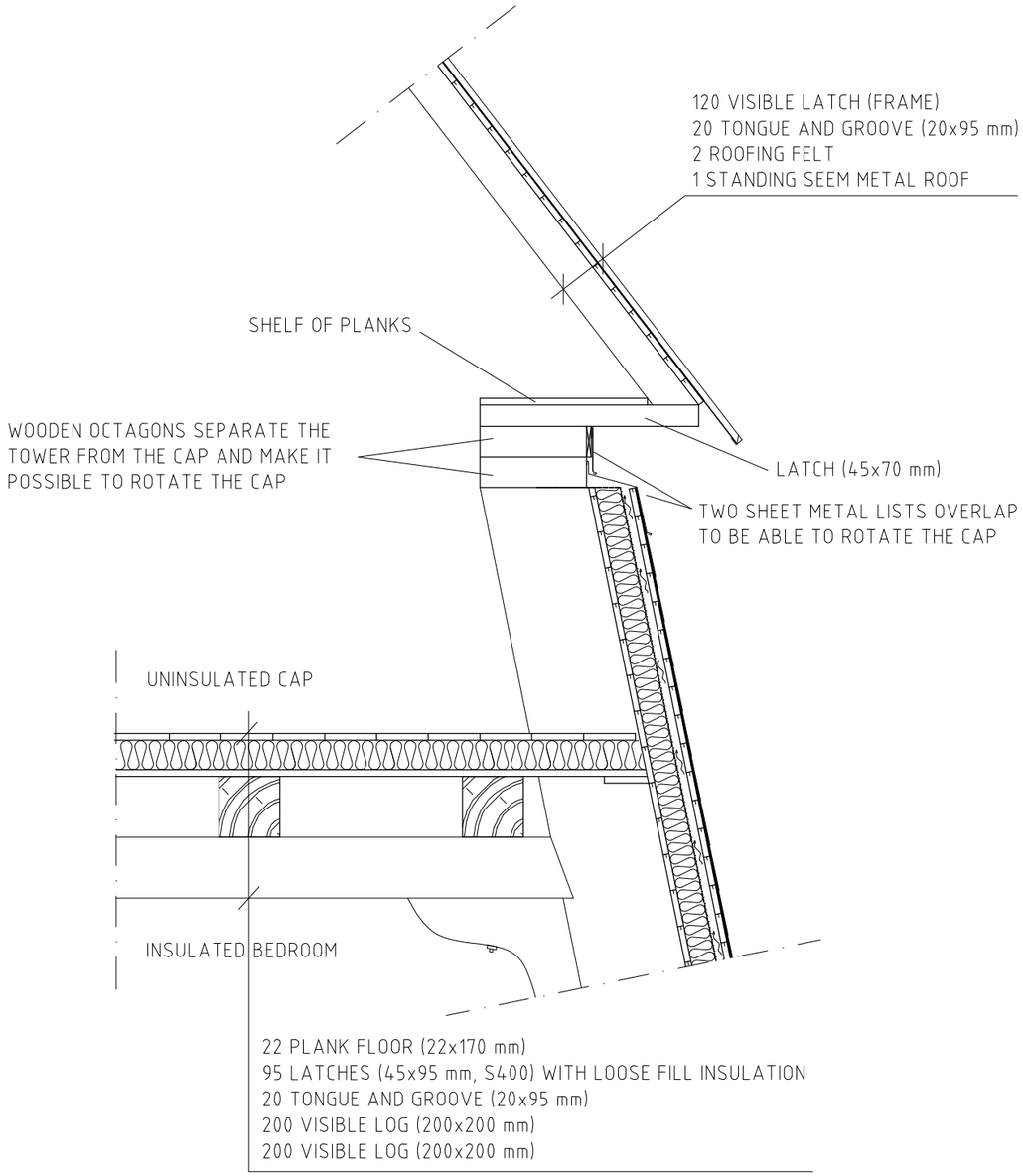


Figure 111: Detail of the cap. Scale 1:20.

CONCLUSION

CONCLUSION

In this thesis, the great potential of transformation of our architectural heritage has been thoroughly investigated and discussed, to contribute to the broader discussion of building preservation and the importance of the identity of a site. A proposal that is well aligned to the arguments in the results of the research has also been designed. A summary of the discussion of each thesis questions is concluded below.

How can architectural heritage contribute to develop a living and attractive countryside?

To create a vibrant countryside, a variety of housing opportunities, meeting places and services such as schools and public transport, as well as attractive destinations for visitors, are required. Often it is the architectural heritage that makes a place unique and something that the inhabitants in an area are proud of. Instead of leaving it to decay, transformation of heritage buildings offer great possibilities to attract new groups of people to the countryside, such as young adults and families. Heritage buildings can also create new meeting places for locals, and thus strengthen the community in a rural area. Transformation of architectural heritage buildings can also create new destinations and accommodation for tourists and visitors, which contributes to more job opportunities in the countryside, and thus more people moving there. By maintaining our heritage buildings and protecting them from decay, we will contribute to a more pleasant scenery for people travelling around in the countryside and increase the attractiveness of the area, at the same time as important history and knowledge about old building techniques are preserved.

How can we preserve old building techniques and respect the cultural heritage in transformation projects?

In a transformation project, thorough historical investigations and careful mapping through analysis and interviews is of key importance to identify and preserve the soul of the building. To have a mindset that *less is more* and let the building speak by itself and tell its story is to respect the structure. The aspect of buildings and time, and to involve all the senses in the design, contributes to another layer that strengthens the project.

What can architects contribute with to attract more people to the Swedish countryside and to facilitate and ease transformations of the architectural heritage in Sweden?

By creating role models of transformation projects and contribute with their expertise of integrating novel ideas into existing buildings in a modern way, architects can inspire others to use their architectural heritage and prevent it from decay. In this way, more transformation projects will be implemented, and thus more heritage buildings will be preserved. For a project to succeed, the architect must involve the locals in the area. If the inhabitants are not on the same track, the mission of creating a living countryside is difficult to fulfil. They are the ones who should be proud of their heritage and thus inspire others to take advantage and responsibility of theirs.

What aspects must be considered in a transformation of an architectural heritage building?

Besides the regulatory aspects that may limit what you are allowed to do with a heritage building, an important but less exciting aspect is the finance. A heritage building is expensive to maintain and financial support is difficult to obtain, especially for private actors as the project then is considered to be made for private gain and not to preserve the architectural heritage. It is important with a long-term vision and a plan for the development of the entire area, to put the building in a wider context and learn how the building can contribute to the overall vision over a longer period. The economical challenges requires that we are creative entrepreneurs regarding function, flexibility, and business opportunities. By combining a heritage building with an income-generating business, the costs for maintenance and renovations can be at least partially covered, and the building itself will be preserved for future generations.

Figure 112: Pilebo windmill (photographer Annie Hyrefeldt)

PERSONAL REFLECTION

This master's thesis project has been an opportunity for me to immerse myself in a field that I am very passionate about and something that will be a big part of my future career as an architect. The fact that I have chosen to focus on the countryside in this thesis is because it is where I was born and raised and it is also where I will have most of my projects and clients in the future. I also believe that the countryside is incredibly important for the entire community to function, and we must work on increasing its attractiveness in order for people to want to live, work and spend their time in the countryside. To preserve our history, old building techniques and cultural heritage for future generations is, in my opinion, our responsibility, and I believe that we can learn a lot from buildings that still stand in good conditions after several hundreds of years. In some cases, transformation is an opportunity for preservation. A well thought through design and an old way of working can still be the best way forward. As discussed in the thesis, I believe that we feel better in, and get a stronger connection to old buildings compared to new ones. An old timber frame, like the one in the Pilebo windmill, is not just a structure. It is a tradition that goes back hundreds of years in history. Human has always had a relationship to wood, and it is obvious that this is still in our genes when sitting around a fire, looking at it for hours. Wood has been used for keeping ourselves warm and sheltered, for cooking, to put fences around our fields, to build furniture, wagons, and boats. It has much more values than Dollars, Euros or Swedish krones. However, we need to convince the big construction companies and the building industry to understand this and reuse existing buildings instead of demolishing them and building new ones. This will benefit both the environment, the society, and the identity of the place. This thesis has given me an opportunity to dig into my own history and made me understand why and how I have got some of my values. I grew up in the miller's resident next to Riddaregården's windmill in Sunnersberg, Lidköping municipality. As a child, lots of hours were spent playing in and exploring the windmill. When I was two years old, I even broke my leg in the windmill, as I fell from its entrance down on the stone acting as a step to enter the windmill. To grow up right next to a windmill has made me into a windmill enthusiast. Riddaregårdens's windmill underwent a major renovation that was completed in 2017, and to see the wings rotate again, only by the power of the wind, is a special feeling. What is most exciting about this master's thesis is that it is a real project and the transformation of the Pilebo windmill will happen in reality. The Pilebo windmill has given me the opportunity to make a great effort to the architectural heritage of Norra Kedum, but with different prerequisites and opportunities as if it would have been an intact windmill. The Pilebo windmill must be preserved, and it will. This thesis project has come to an end, but in fact, for me it is just the beginning.

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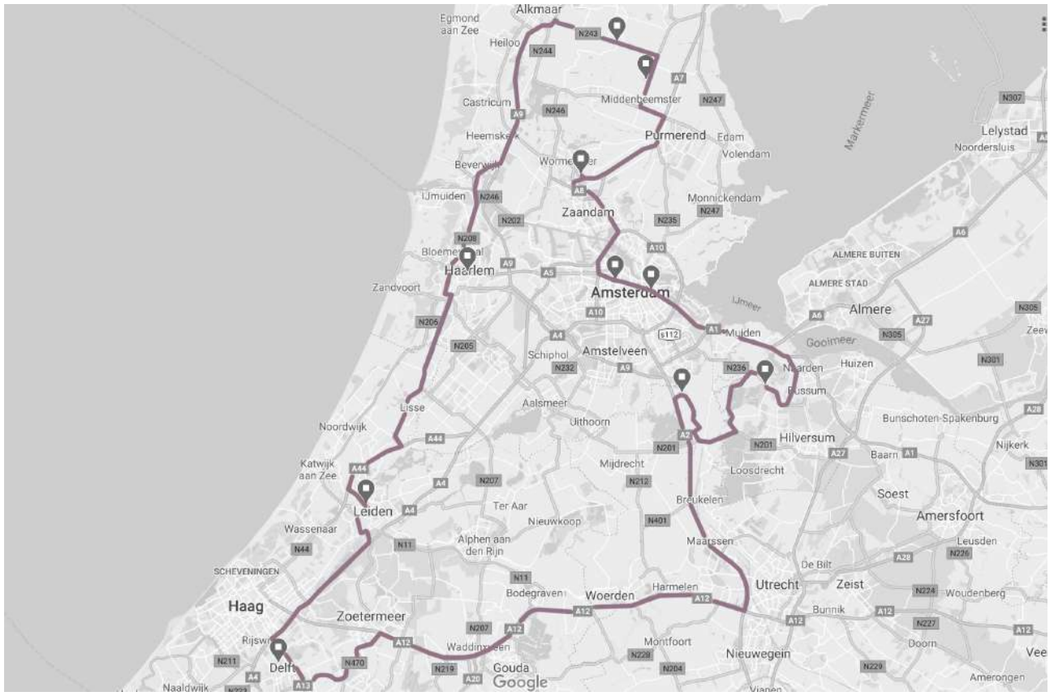
APPENDICES

APPENDIX I

STUDY TRIP TO THE NETHERLANDS

All photos are the author's own photos



Route map of the study trip to the Netherlands.

MOLEN DE OTTER AMSTERDAM

Function: Sawmill in the city centre of Amsterdam

Construction year: 1638

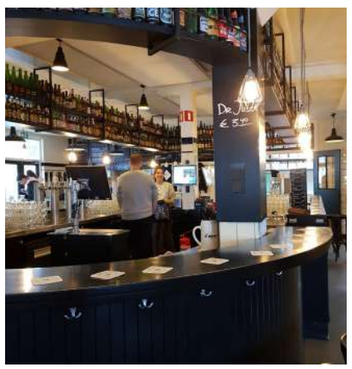
Information:
In the 17th century, the area surrounding the Kostverlorenvaart waterway, was well-known as a windmill district. The mills here were primarily sawmills, and there were at least 49 of them. De Otter is the only one remaining and is the oldest post mill in the Netherlands. This area was an ideal place for windmills. The windmills could not only catch plenty of wind, but the wide waterways and meant that receiving and delivering the wood was also easy. Large orders for shipbuilding and construction of housing came into the city by boat, while small orders came by horse. Due to the increase of steam powered sawmills, the windmills finally became superfluous in the second half of the 19th century. Today, due to the high buildings around the windmill, the wings catch very little wind, and the windmill remains still. In 1994, De Otter was restored, but it is not open to the public (I amsterdam, 2020).

MOLEN DE GOOYER AMSTERDAM

Function: Closed windmill next to brewery and pub

Construction year: 1725

Information:
De Gooyer was first build in the 16th century and has been destroyed and rebuilt. In 1814, the wooden frame was placed on top of the stone walls, as it needed to catch more wind when the city of Amsterdam grew higher around it. In the past, De Gooyer functioned as a corn mill, and it continued to do that until the middle of the 20th century. Today, De Gooyer is a municipal property, and unfortunately not open to the public. Next to the windmill, a brewery and pub offers a beer and a place on the terrace to admire the biggest wooden windmill of the Netherlands. The idea of a brewery inside of the windmill is appealing, but in reality, the brewery and the windmill are two separate entities (Brouwerij'tij, 2020).



GEIN ZUID 14
ABCOUDE

Function: Guest house possible to rent at Airbnb

Construction year: 1874

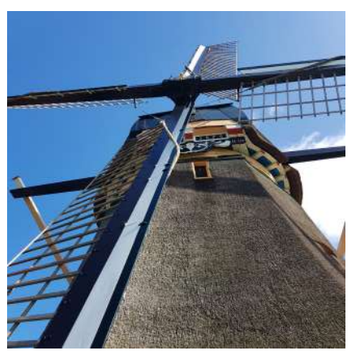
Information:
This windmill was the only transformed windmill visited during the study trip. The windmill was built in 1874 and the wings drive a water wheel which is used for drainage of the embankment. Maarten, the miller, rents the mill from a windmill foundation that owns 23 windmills. As an old sailor, he can here practice his interest in wind, but in another way than on the sea, and in the future he also want to live in the windmill himself.

He started the renovation of the windmill in 2013, to be able to rent it out to tourists. He took a time off from work for 9 months to work in the mill, and did most renovation himself. Since he rent the mill, the foundation paid the exterior part of the renovation and Maarten himself paid the renovation that was done on the inside.

Today, this windmill is a popular guest house for at least six guests, with three bedrooms, kitchen, living room, toilet, and bathroom, and an amazing view of the countryside of Abcoude. Abcoude is a small, beautiful village with a little more than 8,000 inhabitants, with closeness to water and nature, a lot of history and cute brick buildings. If guests want to visit Amsterdam, the city is only 45 minutes away by bicycle (personal communication, March 12, 2020). My personal impression of the visit was:

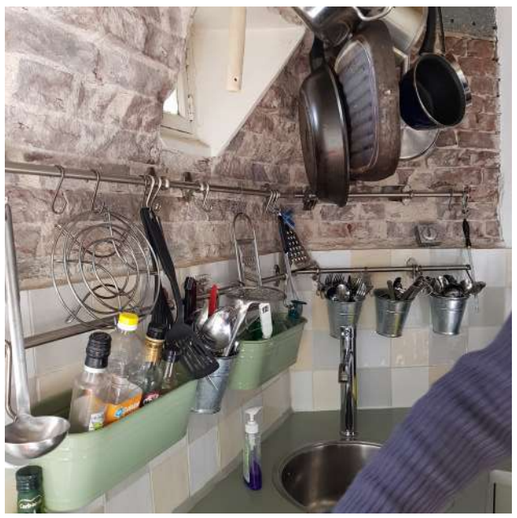
+ The area of Abcoude
+ The views of the landscape
+ The good condition of the windmill
+ The magic sound of the rotating wings
+ Maarten's good service as a host
+ The size of the building
+ The visible structure
+ The original floors
+ The small different sitting areas
+ The smart floor hatch
+ The machinery

- Weird location of the toilet forced you to take a big step
- Too dark oil have been used on the structure, should have been left untreated instead
- Too many details in the rooms that are not needed, for example a chandelier
- Bathroom had a black and white chess pattern on both walls and floor that did not match the atmosphere
- The loose furniture could have been more natural and well-thought through
- The kitchen was too small and not very well-planned because he had to choose between dishwasher and oven, since he did not fit both



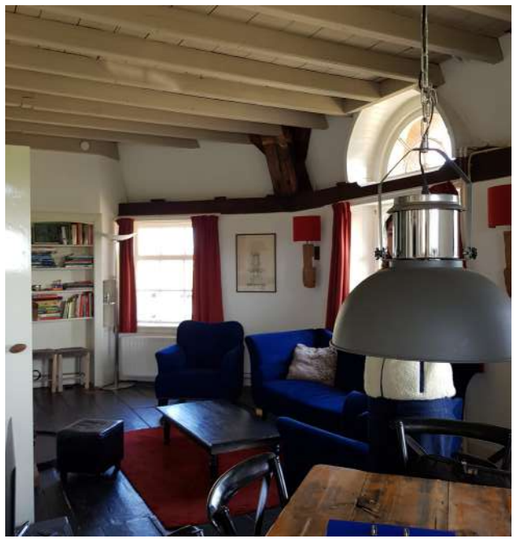








MOLEN DE HOLLANDIA ANKEVEEN

Function: Restaurant

Construction year: 1642

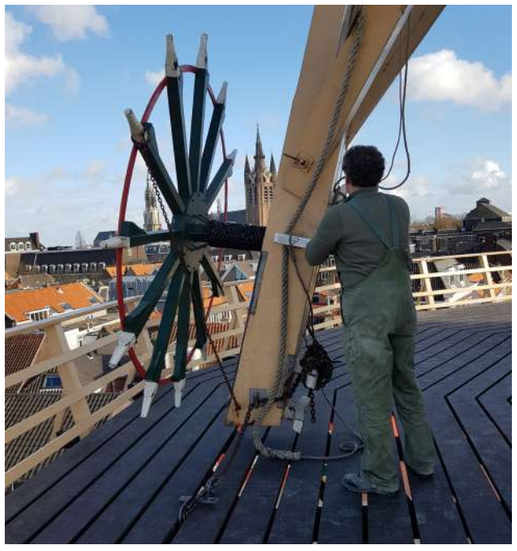
Information:
The sheriff of Weesp announced in 1526 that people in the countryside and residents of Ankeveen were allowed to put water mills on a piece of land between two specific lakes in the area without any money being charged. Furthermore, they could choose millers themselves, who had to watch and clean the waterways as often as they needed. Anyone who destroyed a farm, or a dam could receive a fine of 3 guilders, of which 1/3 went to the miller, 1/3 to the court and 1/3 the offender. In 1538 there was already a water mill in this area, but in 1642, the existing windmill was built at this site. The mill was at the head of the system that runs parallel to the Dutch End. Today, the site is a restaurant with a nice view of the water and the windmill and is a popular place for weddings and parties (Molen Database, 2017).

MOLEN DE ROOS DELFT

Function: Active windmill for grinding with its own shop

Construction year: 1679

Information:
Molen De Roos Delft is the only remaining windmill of the 18 windmills that run in Delft. It is an icon of the town where you can experience craft, technology, history, and culture. Every week, the windmill grinds organic grain into flour by the power of the wind. The windmill is located where the city wall used to be and was built in 1679. From the 1500s there had already been a wooden windmill in the same place. At first, Molen De Roos Delft was also made of wood but has eventually been converted into a stone one. This has given the mill a special shape. The lover part is hexagonal, and the upper part is round. In 1728, a warehouse was built in a semicircle around the windmill, but since the 1760s and until today, the windmill has looked the same. In 2012, the entire windmill complex was jacked up a meter, to be able to build the railway tunnel that today goes under the windmill. A few months later, the whole complex was lowered again onto the roof of the tunnel. The whole complex has a weigh of 1100 tons (Delftse Molen, 2020).



MOLEN DE ADRIAAN HARLEM

Function: Active windmill for grinding and a museum

Construction year: 1778

Information:
In 1778, the city of Haarlem gave the businessman Adriaan de Boois permission to build a windmill close to the centre of town. He placed his windmill on the foundations of the old wall that had surrounded the city. In this way the windmill was located high above the surrounding buildings to be able to catch as much wind as possible, when crushing stones for producing a special cement, that was De Boois business. Twenty years later, the windmill was sold to a tobacco merchant, who used it for grinding tobacco for more than 60 years. In 1865 De Adriaan windmill was transformed into a grain mill, and it was also rebuilt so that it could be powered both by wind and steam. From that day, only grain has been milled in De Adriaan.

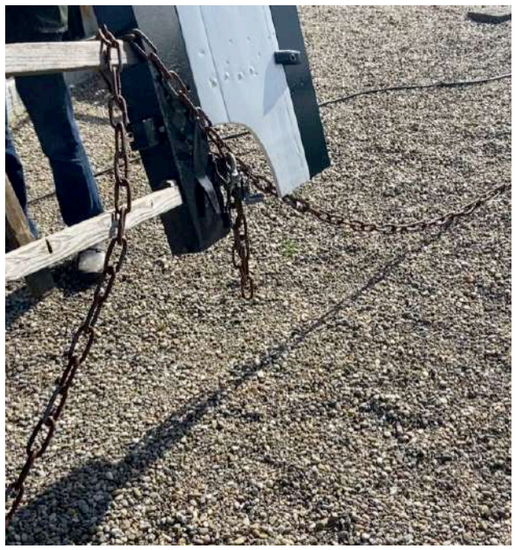
In 1925, when grinding business was moved to factories, the association The Dutch Windmill bought De Adriaan to preserve it and to keep it running. A couple of years later, April 23rd, 1932, De Adriaan was on fire. The reason of the fire was never definitively determined. But the day after the fire, the people of Haarlem began organizing a fundraiser to rebuild De Adriaan. The costs for rebuilding the windmill was 2 million € and it took 70 years before the new windmill was officially opened. Today, the windmill is both a museum and a grain mill mainly for demonstration (Molen De Adriaan, 2019).

MOLEN DE NACHTEGAAL MIDDENBEEMSTER

Function: Museum

Construction year: 1669

Information:
As early as 1614, a standard grinding mill was built in the southeast part of Middenbeemster but was later moved to the north west. After this mill was blown down in 1660, De Nachtegaal was built on its current location in 1669. The Nachtegaal was first used for drainage but was extensively rebuilt after De Beemster had dried, and later used for grinding corn. The wheel of De Nachtegaal is converted from a water mill. A major restoration was made in 1972-73, after which grinding was again carried out on a small scale. In the beginning of the 21st century, the windmill was again in a very bad condition and only functioned as a showroom for the owner's furniture company. In 2006, it was decided to move the windmill some distance, so that the current owner could use the site for his furniture company and the windmill itself could function as a flour mill again. In 2013, the windmill was restored in its new location with and is today capable of grinding (Molen Database, 2019).



SCHERMER MOLENS
SCHERMER

Function: Museums

Construction year: 1633

Information:
In 1633, a construction of a double three-stage mill corridor on the former De Bosch peninsula, on the west side of the Schermer started. These pumped the water, from the inner basin in three steps to the Schermerringvaart and were later connected to the upper mills built across the peninsula. Before, here used to be six mills in this section of the Schermer, two lower, two middle and two upper mills. Today, only three of them remains and can be visited as a museum (Museummolen, 2018).

ZAANSE SCHANS
ZAANSTAD

Function: Windmill park with museums and shops

Information:
During the 17th century, more than 600 windmills were constructed in the area around the Zaanse Schans, and the Zaan-region was one of the first important industrial areas with windmills producing linseed oil, spices, paint, snuff, mustard, paper, and many other products. Many of the characteristic houses in the village of Zaanse Schans are now museums, gift shops or workshops while others are still used as private residences. Some of the remaining windmills in the area are also open to the public. The Zaanse Schans windmill park attracts nearly a million visitors per year and is one of most popular tourist attractions in the Netherlands. The park consists of 13 windmills, all owned by De Zaansche Molen Association and each windmill has its own miller (De Zaansche Molen, 2018).

THE PINK - Oil mill
Construction year: 1620
Miller: André Koopal

THE STORK - Oil mill
Construction year: 1622
Miller: Matthijs Ero

THE CAT - Paint mill
Construction year: 1646
Miller: Robbert Kempenaar

THE PALE DEATH - Flour mill
Construction year: 1656
Miller: Acting Paul Buurmans

THE VIEWFINDER - Oil mill
Construction year: 1672
Miller: Ruud Nieuwhof

THE SCHOOLMASTER - Paper mill
Construction year: 1692
Miller: Arie Butterman

THE PIED HEN - Oil mill
Construction year: 1693
Miller: Fulco Roll

THE PRINSENHOF - Peel mill
Construction year: 1722
Miller: Bart Nieuwenhuijs

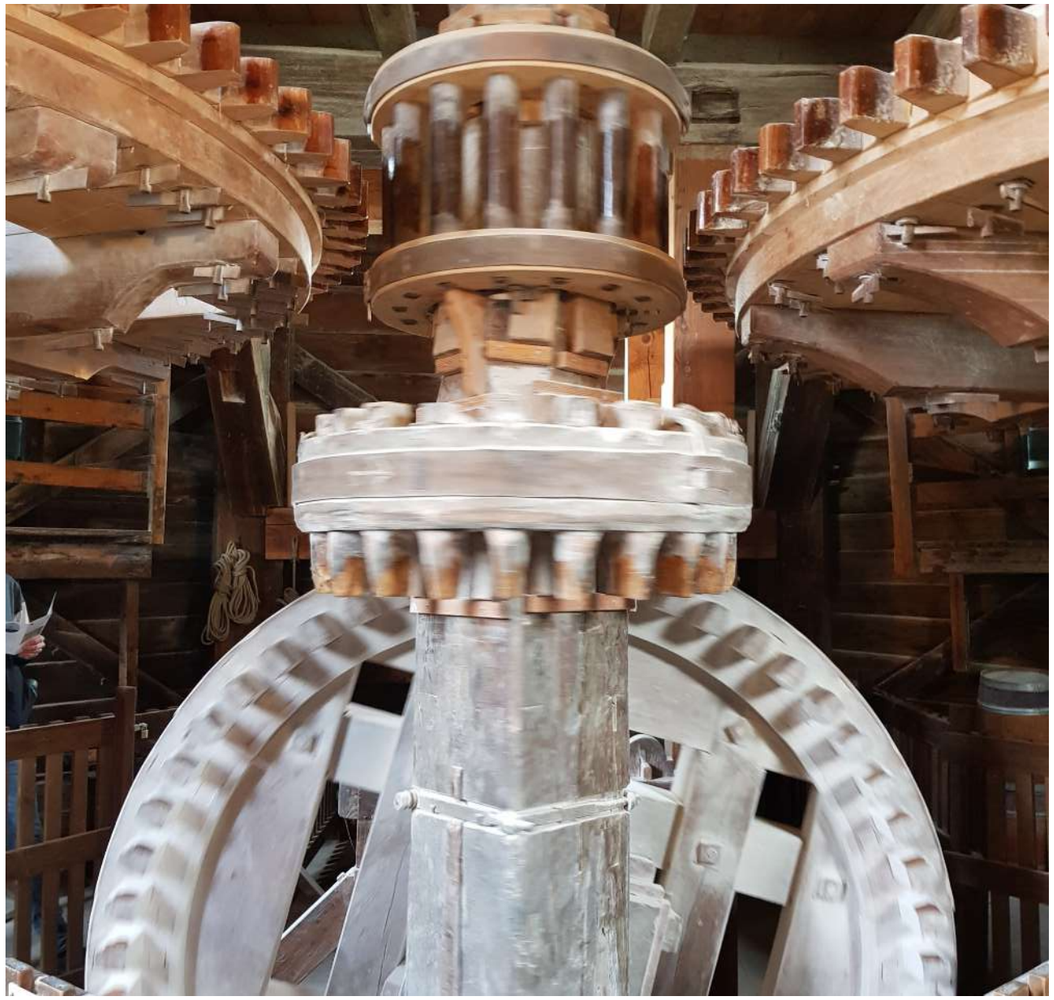
THE HUISMAN - Spice grinder
Construction year: 1786
Miller: Sjors van Leeuwen

THE SLEEVE - Flour and peeling mill
Construction year: 1866
Miller: Simon van der Meer

THE CROWNED POELENBURG -Paltrok sawmill
Construction year: 1866/67
Miller: Martin Sheep

THE YOUNG DIRK - Paper and grinding mill
Construction year: 1908
Miller: Abel van Loenen

THE YOUNG SHEEP - Wood sawmill
Construction year: 2007
Miller: Tim Doeves



LIST OF REFERENCES TO APPENDIX I

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APPENDIX II

STUDY VISITS IN SWEDEN

If not stated otherwise, all photos are the author's own photos

KAFFEKVARNEN'S CAFE IN STENHAMMAR

RIDDAREGÅRDEN'S WINDMILL

ÖRSLÖSA WINDMILLS

LEVENE MILL


Exterior picture of Levene mill.


Each woven sack has a weight of 110 kg.


The sack is lifted using this chain.


The two rolling mills are from 1926 and 1927.


The machines has two pairs of corrugated steel rolls.


At first, the grains are crushed which make them look like this.


The flour is sifted repeatedly four times, to produce finer particles.


The pipes and interior in the mill are made of wood.

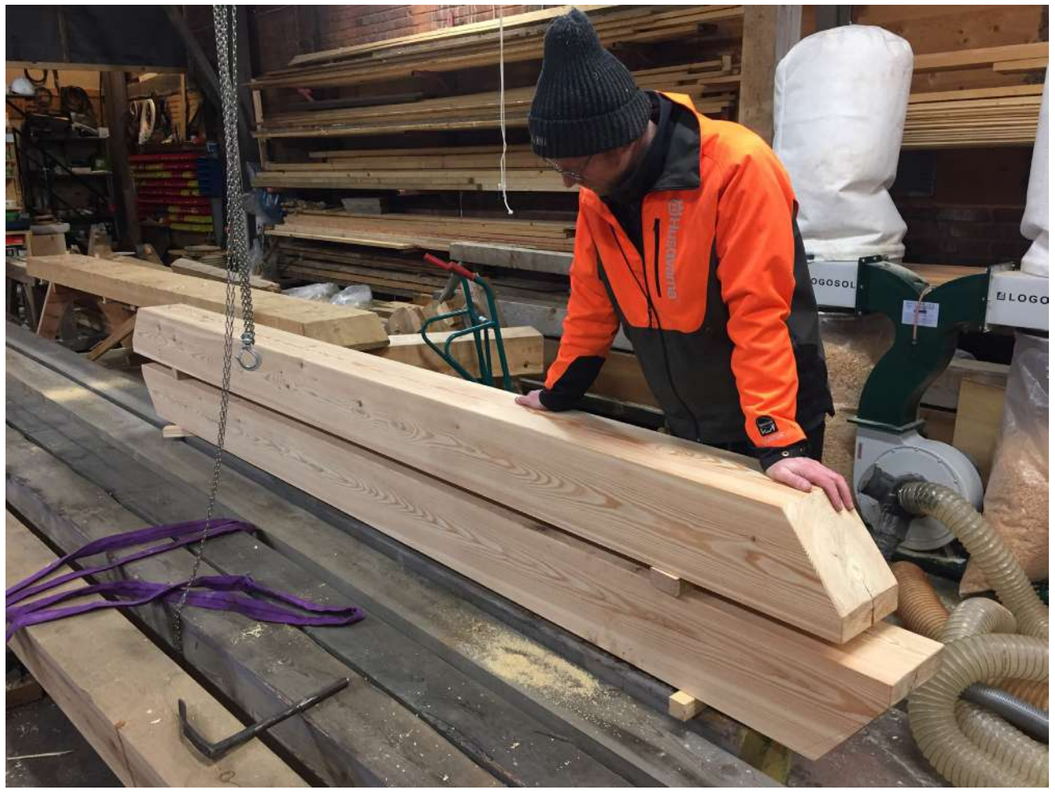

Here, the flour is ready to be put in bags.

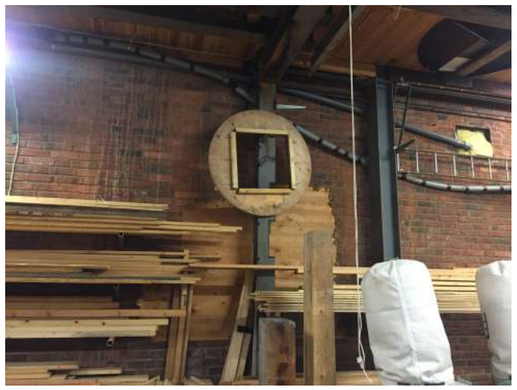

The flour is put in paper bags of 5 kg for supermarkets and 25 kg for bakeries.


The weight of the 5 kg bags is double checked on this old fashion scale.


And the weight of the 25 kg bags is double checked on this even older scale.

WORKSHOP OF HALLGREN HANTVERK





VEDUM KÖK & BAD EXHIBITION

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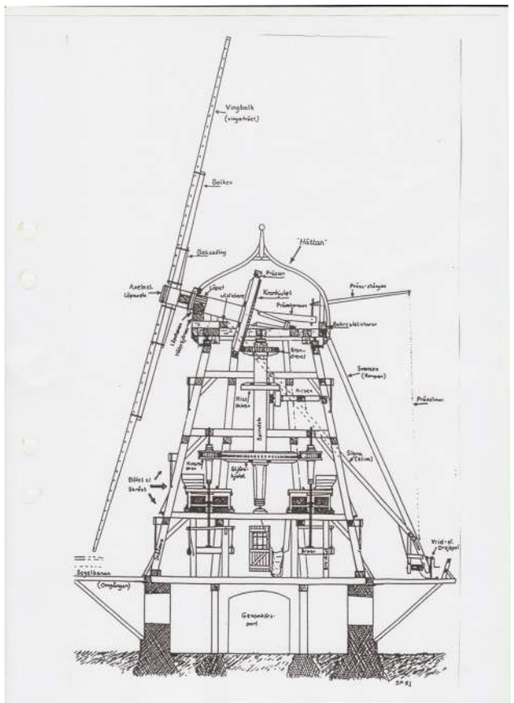
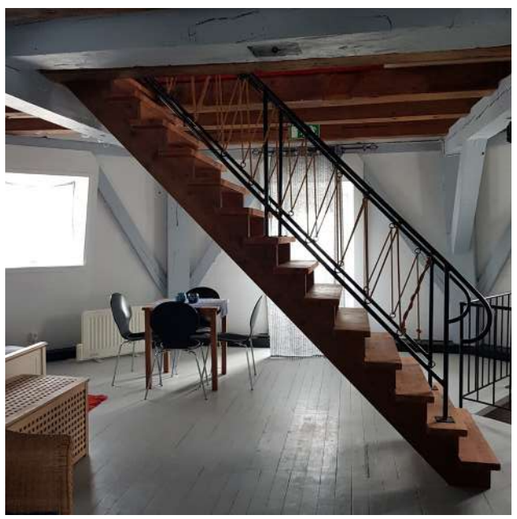


KVARNEN OLOFSBO HOTEL & RESTAURANT



SUMMER HOUSE IN UDDEVALLA

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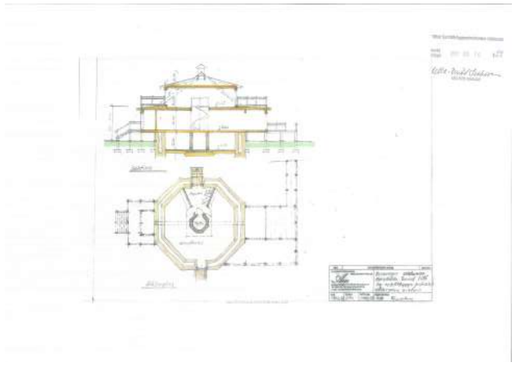
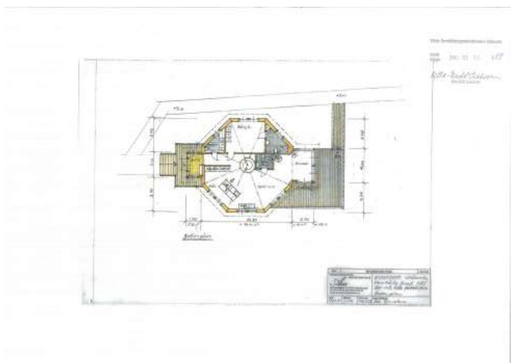
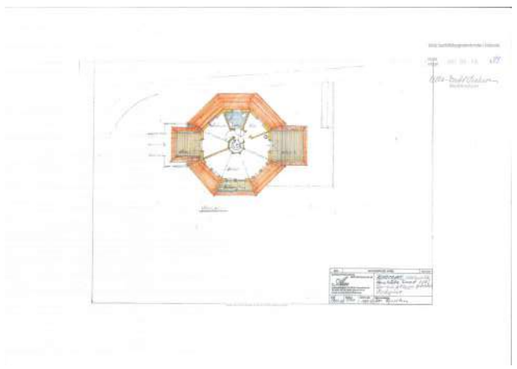
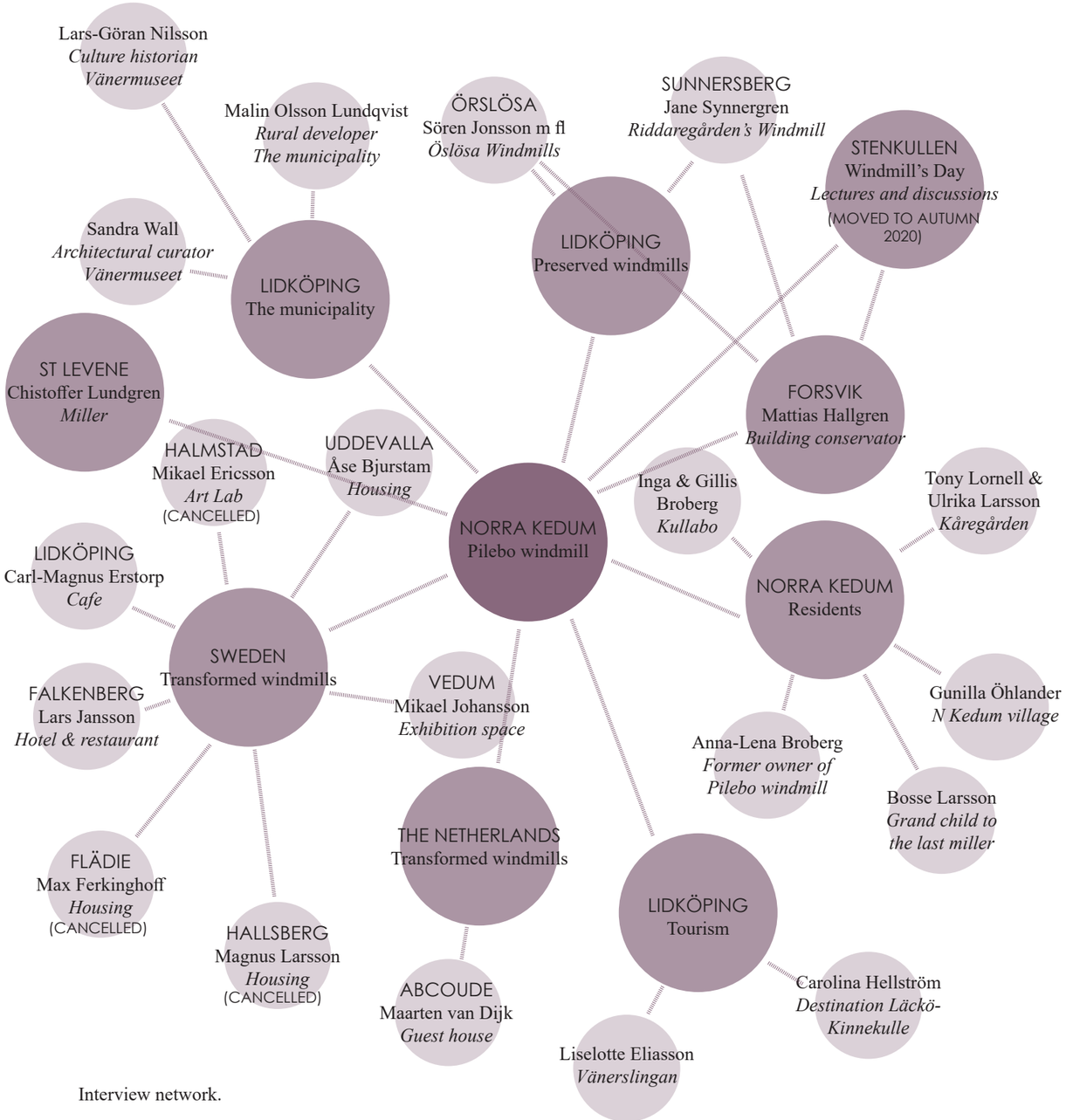






APPENDIX III

INTERVIEWS



Interview network.

INTERVIEW

Interviewees	Lennart Pettersson, Sören Jonsson, Maud Jansson and Jarl Nordberg
Title/association/company	Örlösa folklore society
Date of interview	04/02/2020
Place of interview	Örslösa windmills

Which years were the windmills built?

The exact years is unknown for both of them but the smock mill is from the 1880s and the post mill is even older. The mills were moved to the place where they are standing today, and in the past there was also a third windmill at this spot. This one was also a smock mill.

Were the windmills electrified?

No, they were not, but the smock mill had a kerosene engine that was used if there was no wind.

When did the business stop at Örslösa windmills?

The last miller was called Axel and he stopped the business in the 1920s.

What is the biggest difference between the two windmills?

The post mill is an older type of windmill wich is smaller and much more simple than the smock mill. The smock mill has a structure that makes it possible to rotate the hat towards the wind.

Who owns the windmills today?

The windmills are owned by the local folklore society of Örslösa. The association was founded in 1960, and today, the association has 119 members.

Are there any activities arranged for members and the local society at the windmills?

Yes, there is a program for the whole year which includes for example the windmill day during Ascension Day, an outdoor worship, a trip during the summer, and a museum race.

Who pays for renovations and maintanence?

The member fee is 50 SEK per year, which obviously don't cover almost any costs. All the working hours are done ideally by the members of the association, and then they get financial contribution from Studiefrämjandet.

When was the last big renovation, and what was made then?

The last renovation took place in 2009, where the facade of wooden shingles on the smock mill was changed.

When is the next big renovation planned, and what will be done?

The next big renovation on the smock mill will be done during the summer 2020, if there is money. The horizontal shaft that the wings are attached to will be changed, and we wings will be renovated. The approximate cost for this renovation is 400 000 SEK.

What historical significance have the mills have had for Örslösa?

They have been the icon buildings and the profile of Örslösa, just like the Eiffel tower is in Paris.

Why do we have to preserve the windmills of Örslösa for coming generations?

The windmills tell an important history of Örslösa, and they are also located on a beautiful spot, that is a perfect meeting place for the locals. One important thing though, is that the mills need to be in the condition that the wings can rotate. When the windmills are in action, people that are passing by get so much more interested and find the time to stop by and spend some time at the mills, compared to when they are still.

What function would you like to see in the Pilebo windmill?

Some kind of housing would be interesting.

INTERVIEW

Interviewees	Inga and Gillis Broberg
Title/association/company	Inhabitants of Norra Kedum
Date of interview	04/02/2020
Place of interview	Kullabo, Norra Kedum

How is it like to live in Norra Kedum?

It is pleasant to live here. We especially like the proximity to nature and the lake. The community has also always been strong. In the past, everyone knew everyone, and during weddings or funerals, the whole village was there.

When did you move to Norra Kedum?

Gillis Broberg moved to Norra Kedum in 1947, when his father bought the farm Storegården. Inga Broberg moved here a couple of years later when she met Gillis and married him.

What unique values do you consider that Norra Kedum offers?

Except for the proximity to water and nature, we have ancient monuments, such as the grave of King Hebbe, and a church from the 13th century. The church was supposed to be demolished. The new drawings were ready. But during a visit by the Swedish king, he thought that the church was too valuable and decided that it should be expanded instead.

What is the best thing about Norra Kedum?

Gillis remembers something that he is especially proud of. In 1974-75, Gillis and Inga made a large embankment of an 45 hectare big swamp. The land was not fully utilized, and Gillis and Inga dug a new route for the canal of Norra Kedum and by the masses, a wall was made around the land. The soil was drained and two pumps were installed to pump out water 24 hours a day, 365 days a year, so that the soil could be cultivable. At that time, this was a big achievement, and Gillis was awarded a medal by the Swedish Royal Patriotic Society in 1981. Today, the soil is still cultivated, and often with better harvests than other fields due to the moist soil.

How is Norra Kedum experienced by someone who does not live here?

As a typical rural village, quiet but beautiful.

What can be improved in Norra Kedum?

In the past, there was a school, a shop, a dairy and a post office in this village. More services would be good. We also don't want Norra Kedum to be too crowded.

How is the cohesion between Norra Kedums residents?

We have for example the pensioners' association and the folklore society. The folklore society "Byalaget" are responsible for the jetty on the Röllingen beach, the Christmas tree in the village, and they have plans of making a book about Norra Kedum.

Is there any collaboration between Norra Kedum and other nearby villages?

The biggest collaboration can been seen within the church. For many years, Norra Kedum, Tådene, Tranum and Lavad have been a pastorate. Norra Kedum, Tranum and Tådene also share the same rural estate building for meetings and parties. What is a bit comical is that the building is called Tådene Bygdegård, but is located in Tranum. Same goes with the old train station, which was called Tådene train station but was located in Tranum.

Which is the biggest difference in Norra Kedum today compared to when you moved here?

The biggest difference is the holiday village called Marbobården, with all the summer cottages that has been built since the 1970s.

How do you think Norra Kedum will look like in 20-30 years?

We believe that tourism has increased due to climate change. Another thing, that we don't wish for, is that we think that there will be bigger and fewer farms.

What has the Pilebo windmill meant for Norra Kedum, and how will a renovation of it affect the village?

Gillis remembers it as a meeting place where farmers went to grind grain for animal feed before they had their own small mills. A cultural heritage building in a good condition will of course have a positive affect on Norra Kedum.

What function would you like to see in the Pilebo windmill?

A public building that both locals and tourists can use. Maybe with serving, for example a cafe.

INTERVIEW

Interviewee	Christoffer Lundgren
Title/association/company	Miller at Levene Kvarn
Date of interview	22/11/2019
Place of interview	St Levene, municipality of Vara

How is it like to work as a miller today?

The best, but also the most challenging, thing about being a miller is that grinding is a whole science. All harvests are different which makes each grinding unique, and every day at work is interesting and fun.

When was the mill of Levene built?

The mill was built in 1924 and today, Christoffer is the fourth miller running the business together with his dad.

How would you describe the interior in Levene Kvarn?

This is not a modern mill. All the pipes and the interior are made by wood and the two milling machines are from 1926 and 1927.

What is the biggest difference between Levene Kvarn and a modern mill?

In Levene Kvarn, the milling is a slow process, since it is not a modern mill. Therefore, the temperature stays low during the milling process. This means that the bacteria don't die, which makes the bread ferment better during baking. At large milling factories such as the Kungsörnen, milling takes place much faster, which contributes to a high temperature that kills the bacteria. This means that additives is needed for the bread to ferment.

Where do you harvest the grain?

Half of the grains comes from our own farm in Järpås and the rest comes from two other farms in the area. When the wheat is ready to be harvested, the straw bends due to the weight of the kernels. This is a clear sign that it is time to harvest the wheat.

How many kilos of grain do you mill every day at Levene Kvarn?

Every day, 440 kilos of wheat is milled in the mill in Levene Kvarn.

How many kilos of wheat does it take to make 1 kilo of flour?

To make 1 kg of the finest flour, you need 1,3 kg of wheat, which means a utilization of 65-70% of the grain. To make one batch of this type of flour takes us about six hours. To make 1 kg of wholemeal flour, you need 1 kg of wheat, since you use 100% of the grain and to make one batch of this type of flour takes us about four hours.

Who are your customers?

Levene Kvarn is a local mill, and we produce our own flour for nearby bakeries, patisseries and supermarkets. We deliver for example to ICA Vara, the three biggest cafes and bakeries in Vara; Nordpolen, Nybakat and Esti. We have also a few customers in other cities like for example Lidköping, Trollhättan, Vårgårda, Alingsås, and Ystad. Also, local farmers come for cleaning and grazing of their grains, to sow them again and to avoid buying seeds and instead use their own grain.

How does the milling process work?

The milling machines are rolling mills, and each machine consists of two pairs of corrugated steel rolls where the grain is milled to flour during a process. First, the wheat passes through rolls that break the wheat and separate it into bran as well as pieces of seed white. Then it is sifted repeatedly, about four times, to produce finer and finer particles until the bran is completely separated from the seed white. The seed white provides many different types of flour and grains. The entire kernel is not milled down at once, but the different layers of the kernel are peeled off a little at a time. In this way you get a careful handling of the kernel, and the inner kernel is left to the finest flour.

What happens to the rest products?

The shells from the grain seeds are used for feed products to animals. In Levene, we also sell the rest products to a company in Säffle that makes Bokashi, which is kitchen composting and a simple and smart way to recycle food waste and convert it into soil and fertilizer without chemicals.

INTERVIEW

Interviewee	Mattias Hallgren
Profession	Carpenter & crafts researcher
Date of interview	11/02/2020
Place of interview	Forsvik

Why did you become a carpenter and crafts researcher?

I grew up in my fathers garage, and then studied industrial technology, which gave me a broad knowledge base. When I then started my first job at the liquor factory in Lidköping, I was the one who knew a little about most, things instead of knowing a lot about few things. This was good, because I was the one who had the best control of the factory and I could have a dialogue with all the different professions. In 1998, I started studying at DaCapo in Mariestad, and even there, they gained a broad knowledge base. We learned everything from knot timbering, knocking sheet metal, mixing paint and masonry, to architectural history and cultural preservation.

How is it to work as a carpenter and crafts researcher?

It is so much more than just carpentering. You need to have a more process-technical thinking and do consequence analysis. I often ask myself why, how and what, to find out what is causing the problem instead of just solving the problem for the moment. On each job I do, I also write a craft documentation and give to the customer, which not so many other craftsmen do. This contains photos and text from the process and the aim is to share knowledge and inform the clients what have been done, to not let the same problem happen again. The job as a researcher also involves participating in certain projects, such as writing books or articles, giving lectures and sharing knowledge.

What qualities are needed in your job?

You need to be curious, humble and have a lot of patience. It is also good, as I have mentioned before, to know a little about many different things, so that you can start to be broad, and then narrow off when you find what you are most interested in. Another important quality is to be able to work cross-disciplinary.

Who are your customers?

I have chosen to work mostly with churches and small agrarian industries, which means that my customers are the Swedish church, folklore society associations, municipalities, museums, Länsstyrelsen and Fastighetsverket. At the moment, I also have a collaboration with White Architects, where I have an internal education about wood.

What is the biggest challenge in your job?

To become rich! ;) To be the entrepreneur that sometimes is needed. It is a challenge to be accepted as craftsmen to attend seminars and to hold lectures. In the past, craftsmen were not allowed to attend to these events, and they were only for office people, such as architects, engineers, etc. Not until now, craftsmen are also starting to be invited to these events. When it comes to carpentering, some building and details are so skewed and crooked that you almost need to be drunk to be able to do it in the same way as it has been done before.

What is the biggest challenge among the customers that hire you?

The biggest challenge for my clients is a lack of knowledge and a lack of time. They do not have the knowledge to understand the project 100% and they do not have the time to get into the work and create an interest in what is to be done. With more knowledge, interest and time, the projects had become so much more successful and many problems could even have been prevented so that they did not arise again.

Why is it important to preserve the cultural heritage?

The cultural heritage is like a physical library. A knowledge that is still standing. And if it is still standing after several hundreds of years, the building techniques, materials and solutions have obviously worked. This knowledge can not be lost.

What is your opinion regarding transformation of cultural heritage?

I think that everything has its own time. The most important is the silhouette in the landscape, and that you are careful when choosing materials and building techniques during the transformation.

What qualities can a cultural heritage building contribute with in a new function?

A soul, and a feeling of that it is built by people. Human has always had nature as a role model, and nature is not sharp and accurate. It is soft and skewed. That is why we like old buildings.

INTERVIEW

Interviewee	Bosse Larsson
Title/association/company	Grand child of the last miller of Pilebo
Date of interview	19/02/2020
Place of interview	Stora Höga, municipality of Stenungsund

How was it like to be the grandchild of a miller?

When I was two years old, me and my family moved from Storeberg, 5 kilometres from Norra Kedum, to Gothenburg. As a city boy, I loved to visit my grandparents, and to be the grandchild of a miller was unusual, educative, and extremely fun.

How did Verner end up in Norra Kedum and Pilebo?

I am not sure how my grandfather ended up in Norra Kedum. From the beginning, I think he came from Örslösa, 8 kilometres away, and I can not remember that his father or some other relative was a miller.

Describe Verners family situation?

Verner was born in 1884. He and his wife Ellen, got six children, of which one girl died at a young age. They got also 11 grandchildren, of which Bosse was one of them. Verner and Ellen had a couple of chicken and pigs, and he went to his neighbour, who had cows, to get milk. Ellen died in 1951 and when she was gone, Verner had a servant girl, who helped him in his home, until he died in 1954. Verner and Ellen have a millstone on their gravestone.

How was Verner as a person and a grandfather?

He was extremely kind, humble and generous. He liked when he was visited by his grandchildren and he was playful and fun. As we turned years, he sent money as a gift. In the mill he slid down the railing instead of taking the stairs. When he got old we took him on excursions, which he liked very much. As a miller, he was social and a spider in the net. He met many of the farmers in the countryside and was sure to hear some gossip and funny stories.

How was life as a miller in Pilebo windmill?

As Bosse understands, his grandfather had a good life as a miller. He had a good economy, since he could afford to buy a car early, and he sent money to his grandchildren on our birthdays. When the farmers came to grind, he got paid in cash, but also in customs. Bosse knows this because grandmother went to the mill to get flour for baking.

How would you describe the interior of the windmill when it was in action?

When you came into the windmill, my grandfather had a desk to the left of the door, where he wrote notes and kept track of which farmers that would come and how much they ground when they left. The windmill had three pairs of millstones, both on ground floor and first floor. Outside the windmill, there were three small buildings that are gone today, a shed that had room for the farmers' horses, a building adjacent to the mill that housed the oil engine, and a third building with various tools and a kitchen sofa, where farmers who had went a long way could rest while Verner milled their grain.

Did you help your grandfather in the windmill when visiting?

No, mostly, the mill took care of itself, and grandfather hoisted the sacks up through the ceiling. But, when I was 11 years old, and my grandfather sold the interior of the windmill, I helped him to tear it down.

What was the best thing about the Pilebo windmill as a child?

The best thing was to run along the road and meet the farmers and the horses, jump up on the carriage and get a ride back to the mill. It was also a lot of fun to visit the neighbour farmer Valle, who sat on a chair and sang to his cows.

What has the Pilebo windmill meant for Norra Kedum?

The windmill was important for the farmers in the neighbourhood so that they did not have to go too far to get their flour milled. It was also a meeting place where farmers could small talk and gossip while they were waiting for their flour.

What function would you like to see in the Pilebo windmill?

A cafe would be nice, maybe in combination with art, and information about Norra Kedum.

INTERVIEW

Interviewee	Anna-Lena Broberg
Title/association/company	Former owner of Pilebo windmill
Date of interview	24/02/2020
Place of interview	Lidköping

What was it like growing up next to the Pilebo mill?

It was very good. The last miller, Verner Johansson, had two daughters in my and my sister's age, that we played with and had a lot of fun. My family was the closest neighbour to the windmill and we went there to mill our grain. Verner's wife Ellen came to us to mangle her laundry, and sometimes, Verner bought milk from my father.

What did the mill look like when you were a child?

When I was born, the mill had no wings left. They were taken down in the 1920s. I remember that the windmill had an extension with some type of engine or transformer inside. The mill stones were on the first floor and maybe also on the second floor. When Verner stopped the business, he sold all the interior and tools to get as much money as possible from the windmill.

What do you know about the previous millers?

There have only been two millers, my mother's grandfather Johannes Andersson, was the one who built the Pilebo windmill in 1884. Verner Johansson took it over in 1906 and operated it until 1953. When Verner bought the windmill, it had been standing still for half a year. Johannes had trouble finding labourer and farm-workers who wanted to work in the windmill. They wanted to be farmers instead. Johannes couldn't run the windmill himself and that's why he sold it to Verner Johansson.

How was Verner as a person?

Verner was a fun and playful old man. We often played in the windmill and ran up and down the stairs. Instead of taking the stairs, Verner took some flour on his hands and slid down the railing of the stairs, and it went so fast. Our family never had a car, but one of Verner's sons, Hjalmar, bought a car early. I am not sure if he paid it all by himself, or if Verner helped him financially. However, we got to go with him in the car back and forward to Storeberg, and Hjalmar always told us how fast we drove. Verner also had a grandson who had severe asthma. Sometimes they had to go away for a while so that he could breathe some fresh sea air.

How did the windmill end up in your possession?

In 1958, me and my husband Kurt Broberg took over the Pilebo farm, my childhood home. The windmill then belonged to the farm.

What did you use the mill for?

We used it as a storehouse for bags of grain before we took them to the city, and later on also as storage for fertilizer. We used it as a garage, storage for wooden fence posts for pastures, and we also had our boat there during the winters.

When was the last major renovation of the windmill and what was done?

I don't remember what year it was renovated but it was after 1963. There was an article in the newspaper in 1963 and that is before the renovation. It was a huge renovation. We renovated the facade and gave it a new facade of wooden shingles, we changed windows, laid new floors on all levels, and replaced the big old wooden doors to new ones of steel. Finally, we renovated the roof, where we gave it another shape and a put a sheet metal roof. My uncle John had donated money for the renovation. He was a bachelor, and because his grandfather had built the windmill, he wanted it preserved. A company called Sjöholms Plåtslageri helped us with the renovation.

INTERVIEW

Interviewee	Malin Olsson Lundqvist
Title/association/company	Rural developer at Lidköping municipality
Date of interview	25/02/2020
Place of interview	Lidköping (interview over phone)

What is your most important task as a municipality when it comes to the countryside?

The most important task is to maintain the same service as in the city, even in rural areas, such as schools, roads, and health care. What we see in the municipality right now is a lack of good housing in the countryside, especially for young people and for elderly. In my role as a rural developer, it is important to stimulate rural development. I come up with ideas and I guide people, companies and associations where they can look for support and financial contributions.

Why is it important to preserve the cultural heritage in the municipality?

From my point of view as a rural developer, cultural heritage is an important part of the business activity in the countryside, and it attracts visitors and tourists to the countryside. It generates a visitor industry, and stimulates the social spirit. An example of this is Resville, where they have made a nature and culture trail.

What is the municipality of Lidköping doing to preserve the cultural heritage in the countryside?

The municipality does not work much with the cultural heritage itself. We have different areas of responsibility, and when it comes to the cultural heritage, Vänermuseet, our museum, is responsible for that part. Right now, they are developing a new cultural environment plan for the municipality of Lidköping. The municipality also has a special rural budget where you can apply for money to various rural projects.

What challenges do you see as a private owner of a cultural building?

It must be financial challenges. A major challenge that we have is that cultural buildings must be maintained. It is expensive for a private owner to maintain a cultural building.

What is the municipality's point of view regarding transformation instead of restoration of the cultural heritage?

The municipality looks favourably at the transformation of the cultural heritage. Again, a major challenge that we have is that cultural buildings must be maintained. A new function of a cultural heritage building with some type of income will generate money to maintain and preserve the building. This increases the chance that the building will live longer.

What new function, that can benefit the municipality, do you see in Pilebo windmill?

Along the tourist route Vänerslingan, there are not enough cafés. As long as I can remember we have one in Närebo, which is the starting point of the route. Therefore, I think that some type of serving can attract many visitors to the windmill. Right now, we also have plans for a new project that will expand Vänerslingan from Lidköping to Mariestad in one direction and from Lidköping to Vänersnäs in Vänersborg in the other direction.

Apart from any financial constraints, what would be your dream function in a transformation of the Pilebo windmill?

Then I would say housing. Nowadays, it is popular to live in a different and unique home, and I think people would pay a lot to live in a windmill. Also, good housing is something that is lacking in the countryside.

INTERVIEW

Interviewee	Mikael Johansson
Title/association/company	Site manager at Vedum Kök & Bad AB
Date of interview	17/03/2020
Place of interview	Vedum, municipality of Vara

What is it like to have your workplace in a windmill?

It is special and fun. Many people talk about this place. We usually say that half the kitchen is already sold when the customer gets out of the car in the parking lot. The windmill is a symbol of the village and of the company. Previously, the mill was included on promotional material, but for a while it disappeared when everything should be minimalistic and clean. When we celebrated our 100th anniversary last year, it came back and we now have it on catalogues and other material.

How did you come to the conclusion that you would make a showroom in the windmill?

It was one of the partners at the time, Anders Lindberg, who cycled past the mill a beautiful summer evening after a barbecue party. He stopped in front of the windmill and then decided that he would do something with it. In 1988, Vedum Kök & Bad bought the mill, and a year later it was renovated and ready for inauguration.

What historical significance has the windmill had for Vedum?

The windmill was in use all the way until 1963, and it has been a meeting place for the villagers of Vedum for a long time. At Vedum Kök & Bad, we have had customers who were here and milled flour when they were children. A couple of decades later, they come back to the same windmill, but to buy kitchens. We call that to tie the sack together. The windmill is also a landmark for Vedum, and together with Vedum Kök & Bad, it is one of the oldest companies in the village.

What can the windmill contribute to your kitchen and bath industry?

It has a high market value and provides good advertising for Vedum Kök & Bad. It is visually beautiful to look at, and it gives the customer a nice feeling when they come to the exhibition. It is also in a good condition which gives a sense of quality. If we take that good care of a windmill, then we do take care of our kitchens as well.

What qualities can a cultural building contribute to a new function?

The cultural building can contribute with the history and a storytelling. We are situated in our own history. This gives the customer a sense that Vedum Kök & Bad is an old and reliable company, and we will remain for many more years.

What are the disadvantages of having a new business in a cultural building?

It is a great expense to maintain a cultural heritage building. The wooden shingles must be tarred about every fourth year. That procedure gives a strong smells, so we want to do it during a closed period, and there are not many such possibilities during the year. Since we have an extension to the windmill, we have placed the elevator and in that part, and we have all the facilities we need.

What new function do you see in Pilebo windmill?

I see some kind of studio or atelier, where you can have exhibitions and painting courses. Or it could be some kind of simple overnight stay so that it can be kept as rough as possible, maybe some history related to the overnight stay.

INTERVIEW

Interviewee	Lars Jansson
Title/association/company	Owner of Kvarnens Pensionat & Restaurang
Date of interview	16/03/2020
Place of interview	Olofsbo, municipality of Falkenberg

When was the windmill transformed into a guest house?

We bought this place about 20 years ago because we were interested in having a restaurant business during the summers. At that time, the windmill was already transformed into housing, and me and my family lived in the windmill ourselves for about two years. But we thought that it was too hard with all the stairs, so we decided to renovate the windmill and rent it out to tourists. Today, we have 14 rooms in total; one room in the windmill and 13 normal rooms in cottages, and a restaurant for breakfast and dinner.

Is it possible to run the windmill today?

No, the sails were destroyed during the storm Gudrun and some mechanical parts were taken away during the first renovation. Our goal is to renovate the sails and to change the roof in the nearest future, but it is no longer possible to run the windmill.

Have you received any grants for the renovation of the windmill?

No, since it is me and my partner Karin who own the windmill privately, we have not received a single cent for the renovation. But still, everyone wants it to be preserved and kept.

What qualities does a cultural building have with a new function?

It is a door opener and you become more popular among the authorities if the see that you take care of the cultural heritage. Also, most tourists who come here will be what we call windmill fanatics. They love the building and they almost get a little bit crazy when they see it. That is very nice to see.

What are the disadvantages of a new activity in a cultural building?

As I said before, it is not fun to walk all the stairs if you are going to live in it permanently. When it comes to renting it out to tourists, there are certain rules that need to be looked up. We can only have maximum two overnight guests at the same time in the windmill due to evacuation reasons, and we also must have a special fire alarm.

What new function do you see in Pilebo windmill?

I think you should invest in a bed and breakfast and not in a restaurant. There is a lot of work to do with a restaurant that requires many visits by the environment and health board, and a lot of staff. My advice is to skip a restaurant and invest in tourist accommodation.

INTERVIEW

Interviewees	Åse Bjurstam & Anders Tånghed
Title/association/company	Owner of a windmill transformed into housing
Date of interview	23/02/2020
Place of interview	Forshälla Sund, municipality of Uddevalla

What do you know about the history of your windmill?

We know that it was built in the early 1900's, but when there was no wind on this side, it was dismantled and sold. At this place, there was also a sawmill, and a railway and a cable car went between the water and the mill to transport material. The windmill was owned by the large mansion Sunds Herrgård, which is located not so far away from here. In the 1930s, two apartments were made on the foundation of the windmill, and in the 1960s, the municipality took the ownership of the building and rented out the apartments.

How did you come to buy the windmill?

The aunt of Åse's father was the owner of Sunds Herrgård. She donated a plot to Åse's father in Forshälla Sund. Åse spent many summer holidays on this site. In 2016, we had the opportunity to buy the building, and we took it.

In what condition was the windmill when you bought it?

The windmill was in pretty poor condition. Since it had been rented out for so many years, and the tenants would be responsible for maintenance, the maintenance was not done very continuously. We hired an architect who helped us with drawings and building permits. We added one floor to the building and furnished the basement.

What has been the best thing about the project?

This project has been our house dream. We love the location of the building, and that it is so close to the water. It is exciting with the octagonal shape of the building. It has a unique expression. It has a fantastic foundation. Even if we had some experience from before, we have learned a lot during the project.

What challenges have you faced in the project?

The octagonal shape has been a challenge, how to furnish in the best way with an unusual shape. The kitchen was a big challenge. I don't know how many sketches I did before we were satisfied, Åse says. All the angles and the shape of the building required a lot of problem solving. In the beginning, we also had some problems with the architect, who did not listen to our wishes, but designed what he wanted.

What response have you received from others during the project?

We have almost only received a positive response, which feels great. People have come and talked and would like to follow the project, especially elderly in the area who know how the building looked like in the past. All of them say that our building looks beautiful. There has also been an article about our project in the local newspaper.

What qualities does the windmill itself contribute to the new function?

A unique accommodation with a 360 degree view. All angles make the building charming and the spiral staircase further enhances the octagonal shape.

What advice do you have for others who want to transform a cultural building?

Be prepared and read a lot before starting. We had some experience before we started this project since we renovated our current home, which is also an old building. There is so much to think about when recreating lists, profiles, etc. Another advice is to speed slowly. It is the journey that is fun, exciting and developing, so there is no idea to stress. Also, be sure to choose the right carpenter who is familiar with old building techniques.

INTERVIEW

Interviewees	Sandra Wall & Lars Göran Nilsson
Title/association/company	Cultural historian and residential antiquary at Vänermuseet
Date of interview	21/02/2020
Place of interview	Lidköping

What is your most important task as residential antiquarian and cultural historian?

Our most important tasks is to convey and refer, to contribute with knowledge, to connect different people or companies with each other, and to give advice where to apply for grants. Sandra is also currently working on a new cultural environment program for the municipality of Lidköping.

What is the condition of the cultural heritage in the municipality of Lidköping?

In the municipality, we look at areas rather than at specific objects. Therefore, it is difficult to say how certain specific cultural buildings are doing. Lidköping is a low, small town with Magnus Gabriel de la Gardie as its pride. Almost the entire inner city is an area of national interest, but despite this, a lot is being demolished. This is mostly due to lack of knowledge.

Are there any statistics about the cultural heritage in the municipality of Lidköping?

When it comes to just windmills, there is some type of inventory and documentation that you will get. Something that would be exciting is to look at patterns of how the windmills were placed, and thus find the different wind directions in the municipality.

Why is it important to preserve the cultural heritage?

The most important reason why we should preserve our cultural heritage is because we should not make the same mistakes that we have already made in history. We need to know our history. The cultural heritage makes it easier for us to learn and understand. Why was it like this? The cultural heritage also gives us an identity. If it disappears, everything will soon look the same and you will no longer know if you are in Värnamo or Västerås, when visiting a city. This already starts to happen in cities. By studying the cultural heritage of others, we can learn about their history and social perspectives. The cultural heritage also carries an entire building history that will be lost if it is not preserved.

What challenges do you see in private individuals who own and are responsible for a cultural heritage building?

The biggest challenge must be the financial part. A cultural building is expensive to maintain.

What is your opinion about transformation of the cultural heritage instead of just restoration?

We do not mind transformation of cultural heritage. We think that architectural heritage buildings should be used. We do not want to lock anyone in or block anyone's visions, and if needed, we are happy to participate in dialogues about how the transformation can be done.

What qualities can the cultural building itself contribute to the new function?

A social perspective and an explanation of why this particular building stands at this particular location.

INTERVIEW

Interviewee	Carolina Hellström
Title/association/company	Destination developer at Destination Läckö-Kinnekulle (the tourist information)
Date of interview	17/04/2020
Place of interview	Lidköping

What is your most important task at Destination Läckö-Kinnekulle?

Our most important task is to market Lidköping. We do this through magazines, advertisements, articles, social media, our website, and various events. When it comes to events in Lidköping, there are three different focus areas; food, nature and culture. Each event must touch at least one of these focus areas. Destination Läckö-Kinnekulle does not support for example a soccer tournament.

How is the tourism business in the municipality of Lidköping?

It is good. It is constantly increasing, but if we compare to, for example, the Stockholm archipelago, the west coast or Skåne, Lidköping still has few tourists. When it comes to foreign tourists, we notice a clear increase in Lidköping, mainly, Visit Sweden focuses on the marketing of foreign tourists. They highlight Sweden as simple, genuine and easy-going country.

What are the most popular parts of the municipality with tourists?

The most popular areas to visit are Läckö Castle, Spiken's fishing village, Rörstrand porcelain factory, Krono camping area, the City Hall and Hindens rev.

What trends do you see emerging in the municipality when it comes to tourist destinations?

We clearly see that the new trends are outdoor tourism, such as hiking, canoeing and cycling. We also see that more and more private actors that build simple camping areas, called Ställplatser, on their land. We also see a trend that tourists want more specific tips rather than general advice. They want us to tell them that they should go that specific walking route, stop at that specific restaurant and eat that specific dish. I personally think this is because people have less time today and they want the holiday to be a simple and nice time where they don't have to think so much.

What challenges does the Lidköping municipality have when it comes to tourism?

We have far too few hotel beds. When we have big events such as Melodifestivalen, Mia Skäringer or Big Power Meet, it is almost impossible for visitors to find somewhere to sleep. Another challenge is also the lack of public transportation. People can easily get to Lidköping by train, but if they want to go to Hindens rev for hiking, it is not possible because there is no bus. Then they have to rent a car. We have a major challenge when it comes to sustainable transportation for tourists in the municipality. Lastly, we are a seasonal municipality and many of our companies make all their money in 2-3 months, which is not sustainable. We try to do everything we can to extend the season both before and after the summer.

What does Destination Läckö-Kinnekulle do to attract more tourists to the countryside?

We support various rural projects in something that we call visitor destination development. For example, we have been involved in a project in Resville outside Lidköping where we made hiking trails and information signs which have become very popular.

How important is the combination of tourism and cultural heritage?

The cultural heritage is very important for the tourist business. Many tourists want to visit the cultural heritage, and in Lidköping, two of our most popular sights are cultural heritage buildings, Läckö Castle and Rörstrand factory. The cultural heritage is often what makes the city or municipality unique. We also clearly notice that tourists want to live near or even inside a cultural heritage building.

What is your opinion regarding transformation of the cultural heritage so that it can be used more in tourism?

I see it as a necessity for the cultural heritage to be displayed. A more accessible heritage means that more people can visit it.

What new function do you see in the Pilebo windmill that will benefit the tourism of Norra Kedum?

I definitely see a tourist accommodation in the windmill. Partly, because of the lack of accommodation in the municipality, but also because I think it would be incredibly popular, especially among foreign tourists. There, they will have a unique stay and experience the unknown and hidden. I think they would pay well for staying a night in the windmill.

INTERVIEW

Interviewee	Gunilla Öhlander
Title/association/company	Inhabitant of Norra Kedum
Date of interview	19/04/2020
Place of interview	Interview over telephone

How did you end up in Norra Kedum?

Me and my husband Anders moved here in 1976. We saw an ad with a house for rent. We then lived in Drömsta'n in Lidköping and Anders was studying. I had never lived in the countryside but I loved the countryside and I had spent a lot of time there since my aunt lived in the countryside and had pigs. We found an ad in Norra Kedum with a small house on Inga and Gillis Broberg's farm, Storegården. We understood that Norra Kedum was located 8 kilometres from Örslösa, we did not understand that Örslösa was located 8 kilometres from Lidköping. We drove further and further out in the countryside, and finally we arrived, and Inga and Gillis were very nice and helpful. We loved the place and stayed in that cottage for 1.5 years, before we bought our own place. We helped each other with babysitting and the kids always had some friends to play with on the farm and in the village.

What unique values do you think Norra Kedum has?

The best thing about Norra Kedum is the lake. For us, who have a boat, the lake is very important. I also see a value in the community and the atmosphere in the village. We were so well taken care of when we moved here.

How is Norra Kedum experienced by someone who does not live here?

Most people that I know have a positive attitude to Norra Kedum and think that it is beautiful here. But my mother, for example, could never imagine living so far from town.

What is the biggest difference in Norra Kedum today compared to when you moved here?

When we moved here there were children in every house and in the whole village. We always had kids here. Today, there is no life at all and now only adults live in the village.

How do you think Norra Kedum looks like in 20 years?

I hope and believe that more and more young people will move out in the countryside. I would like a family with children to live in our house after us. I have a feeling that there will be a trend to live in the countryside and that many people, who have been away from the countryside for a while, will move back. Norra Kedum needs some new life. I also hope for more tourists, but not too many. There must be a balance. I also hope that people do not start building houses by the lake, so that you can still be able to walk along the water.

What is your relation to the Pilebo windmill?

I think the windmill is a very nice building, but I have never been inside. It has not happened naturally that you had gone inside because it has always been privately owned.

In what way do you think a renovation and transformation of the Pilebo windmill would affect Norra Kedum?

I think it can be a good advertisement for Norra Kedum and a kind of attraction and reason for people to visit the village. The fact that it is visible from the road and is also a nice, and a well-constructed, and beautiful building means that people will notice it and hopefully stop by.

What new function do you see in the Pilebo windmill?

I see some kind of exhibition, or a café, or a museum. A place where you can get some information about the windmill. The most important thing is that it is not left to decay.

INTERVIEW

Interviewee	Jane Synnergren
Title/association/company	Chairman of Riddaregården's windmill association
Date of interview	02/03/2020
Place of interview	Norra Kedum

What can you tell about the Riddaregården windmill and its history?

The mill was built in 1880 at Holma farm in Sunnersberg's parish. After 19 years, in 1899, it was moved a few kilometres to a place called the Kvarnbacken. In 1920 it was time for a 3rd relocation of the windmill when the miller's wife wanted to move home to her childhood home. The miller, Johannes Jansson, took the windmill with him and today the windmill still stands at Riddaregården and we do not have any plans of moving it again.

When did business in Riddaregården's windmill stop?

The windmill business went on until 1960. From 1960 until the end of the 1970s, the mill was still usable but was only used to grind flour for the miller's own use. In 1961, an association was established with the task was to preserve the windmill for future generations. After a major renovation in 2010-2017, the windmill is again in possible to run.

Was it run by the same miller?

Johannes Jansson was the miller who built the windmill and moved with him twice when he himself moved to new places. When Johannes was no longer able to run the mill, his son Anton Jansson took it over, but he milled mostly for house needs.

Who owns or is responsible for the windmill nowadays?

The windmill is owned by The Association of the Conservation of Riddaregården's windmill.

Who pays for renovations etc.?

For every renovation, we work hard and are applying for funds and financial support in various foundations and from the county administrative board (Länsstyrelsen).

When was the last major renovation and what was done then?

We have completed a very extensive renovation where the entire windmill was completely renovated. The logs in the floors that were damaged were replaced, some of the planks also had to be replaced. Large parts of the capping plate on which the hat rests on had to be replaced due to rot. The windows were renovated, and the windmill got a new façade of wooden shingles, both on the walls and the hat. New wings were manufactured and a new shaft that the wings are attached to had to be manufactured and mounted. The mechanics were checked, and we mounted a brake on the windmill and made sails so that it today is possible to run the windmill.

What role and significance has the Riddaregården windmill had for Sunnersberg historically?

When the windmill was in use, it was a natural meeting place for the rural farmers.

What is the significance of the windmill today?

It creates community in the countryside as we together try to preserve it for future generations and save it from decay.

Are there any public activities organized at the windmill?

We keep the windmill open for visitors all year round. There are special arrangements by the windmill on the day of the folk museums. Every year, we are visited by school classes in grade 4 and they get a guided tour of the windmill as part of their history course. And annually, a BBQ evening by the windmill is organized.

What new function do you see in the Pilebo windmill?

It would be great if it could get a new function that could finance the maintenance and prevent it from decay. This requires a business generating any kind of revenue to maintain the windmill on a continuous basis. It is an expensive building to maintain and the angled walls of windmills are generally more prone to rot than ordinary houses that have vertical walls where the water does not penetrate in the same way. Maybe a tourist accommodation is an alternative, or a café. I would love to see a museum, or an information site for the history of Norra Kedum. But then a financial support from the municipality or county council is required since that type of activity does not generate any revenue that can cover the maintenance cost of the windmill. Another idea might be to create a unique party venue for weddings and similar activities.

INTERVIEW

Interviewees	Tony Lornell & Ulrika Larsson
Title/association/company	Inhabitants of Norra Kedum
Date of interview	19/04/2020
Place of interview	Interview over telephone

How did you end up in Norra Kedum?

Tony came to Norra Kedum in 1980 as a foster child to Inga and Gillis Broberg. Of course, as a 15-year-old boy, he wondered why people wanted to live so far from town. But after a couple of years when he was 16-17 years old, he noticed that Norra Kedum was not so bad anyway. Still, he moved from village as he got older, but there was a farm called Kåregården which he thought was beautiful. He said to himself that ”I move back to Norra Kedum if that ever will be for sale”. 15 years later it was, and today, Tony and Ulrika live in Norra Kedum and Kåregården.

What is the best thing about Norra Kedum? What unique values do you think Norra Kedum has?

The best thing about Northern Kedum is the tranquillity and proximity to the lake. Even if you do not go out on the lake every day, at least you can do it and that is a luxurious feeling. This is also a more central part of the municipality if you compare to Kållandsö for example. It feels like we are in the middle of everything. We are close to different cities even if we live in the countryside. Another good thing is that we live on a beautiful farm, and that we have a connection to Storegården.

How is Norra Kedum experienced by someone who does not live here?

Our friends think that Norra Kedum is in the middle of nowhere. It is small and nobody knows about it. We cannot explain to people that we live in Norra Kedum, but we must say that we live between Örslösa and Såtenäs or between Lidköping and Såtenäs.

What could be improved in Norra Kedum?

There could be more life and social life in the village. Today, there are neighbours that we hardly say hello to. Both of us are active in the community centre, and we try to gather people for breakfasts for example, but few are coming. And those who come are always the same people. The social life can be improved and also, a more practical improvement is that more lights are needed in Marbogården.

How is the fellowship between Norra Kedums residents?

Right now, it is not so good. In the past you could go home to your neighbours without asking in advance. Today, it feels like you must wait to get an invitation card before you can visit someone. Today, we are less social face to face, but maybe more social with other ways, like Facebook etc.

What is the biggest difference here today compared to 40 years ago?

Tony answers that when he came to Norra Kedum, there were more children and youths in the village. They were at least 10 youths in his age. They had fun, drove their mopeds, gathered in the bus shed and socialized. We did not have mobile phones. Today, people meet online and through digital platforms.

How do you think Norra Kedum will look like in 20 years?

We think that in 20 years, it probably has not changed so much. If you think about what has happened during the last 20 years, about three houses have been built and we have got a camper area. But in 50 years, the village has probably been merged with Örslösa and this area is almost like a new Sjölunda. Regarding tourism, we will probably have more tourists than today, especially in campers. People want to discover more of Sweden as it will be bad to travel abroad.

What is your relation to Pilebo mill?

Ulrika has never been to the windmill, but she thinks it is a cool building. Tony has been there once in a while and would love to see it preserved, and try to get it completely original.

How will a transformation of the Pilebo windmill affect Norra Kedum?

It depends on how you renovate it. Do you want a modern renovation with a big balcony at the top, or do you want to renovate it back to its original function. No matter which, everything is better than now. But the most important thing is to be ambitious and careful during the design to give the building the respect it deserves.

What future function do you see in the Pilebo windmill?

Tony wants to renovate it to its original function. To find out where the stones were sold and bring them back to Norra Kedum again. Ulrika would like it to be housing and live there herself.

INTERVIEW

Interviewee	Liselotte Eliasson
Title/association/company	Chairman at Vänerslingan
Date of interview	14/04/2020
Place of interview	Interview over telephone

How was the idea of Vänerslingan born and how did it all start?

It all began with some entrepreneurs and craftsmen in the area starting to think about how to show this part of Lidköping as well, since all the tourists go to Kållandsö and Läckö castle. They also talked about wanting a fairway in the archipelago outside so that everyone by boat also could visit our archipelago. As a visitor you can hardly get through our archipelago because it is so shallow and rocky. Therefore, in 2012, a leader project was started which was named Vänerslingan. The aim of the project was thus to create better conditions for inhabitants and businesses along the road 2559. The project run between the years 2012-2014, and the result was, among other things, a tourist route with various attractions along it, and a fairway.

What are the qualities of Vänerslingan?

During the project, the collaboration between the companies worked well and at the end of the project Vänerslingan had over 60 involved companies. Today, most companies have grown and can market themselves with their own Facebook-pages and they are no longer dependent of Vänerslingan. The project was successful and that the qualities we got were a greater collaboration between the residents, a tourist route, and the fairway that is still used extensively today. We have simply begun to make this part of the municipality visible.

Which are the most popular parts of Vänerslingan among tourists?

Today the tourist route goes between the resting place ”Viggen” in Grästorp municipality and the Örslösa roundabout in Lidköping. On this route, there are many attractions such as museums, churches, accommodation, camper areas, shops, places to eat, hiking trails and beaches. But I would say that the most popular parts are the hiking trails at Källstorp, the camper areas, Närebo restaurant, and the fairway.

What support do you get from the tourist office and the municipality to attract more tourists to Vänerslingan?

During the project, we of course received financial support, but today, as the project is completed, we no longer receive any support from the municipality. What we have noticed is that, as a private person, it is easier to get a grant, if you have a collaboration with an association. That is why we still want Vänerslingan to be an active association. But what Lidköping municipality needs to improve is to have a plan for different projects when they are completed, and a kind of follow-up. Even though the project is completed, the attractions remain. The hiking trails at Källstorp are more popular than ever, and who pays the maintenance of parking place and wooden walkways when the hiking trails themselves do not generate any income.

How important is the link between tourism and cultural heritage?

It is very important. We have many popular attractions in form of associations, museums, churches, and nature experiences along Vänerslingan, which are frequently visited. The important thing is that they must be clearly marked with signs.

What is your point of view regarding transformation of the cultural heritage so that it can be used more in tourism?

I think transformation of the cultural heritage is a great idea if it allows us to preserve our history. It is important that we can show our history to the younger generation through photos and information and it would be horrible if, in your case, the building if left to decay.

What new function do you see in Pilebo windmill that can benefit Vänerslingan and increase its attractiveness?

I see many different functions. People do not like to buy things but they love to have a “fika”. So, I had made some type of cafe or restaurant with a specialty, such as a waffle house. Or why not a party room to rent out.

INTERVIEW

Interviewee	Maarten van Dijk
Title/association/company	Owner of a windmill used for tourist accommodation
Date of interview	12/03/2020
Place of interview	Abcoude, The Netherlands

How come that you bought the windmill?

I do not own the windmill, but I rent it from a windmill foundation that owns 23 windmills. It is an organization that maintains the windmills so that they will be preserved. I decided to rent the windmill because a have a big interest in wind. Before, I have been a sailor and travelled around the world. Here, I can practice my interest in wind, but in another way. Another reason to why I decided to rent it was because I want to live in it myself in the future.

What can you tell about the windmill?

It was built in 1874. It has pillars that go 25 meters down in the ground to withstand the forces. The wings drive a water wheel which is used for drainage of the embankment. Everything here is artificial land and in the past, windmills were used for drainage to keep the water level in this area lower than the sea level. Today, we have pumps for this, and the windmills work just for fun. The facade of the windmill is completely restored according to traditional colours and patterns of this region. This is especially visible on the window shutters in red, white, and green colours and with the yellow details on the wood. The facade is made of reed. The wheels inside the windmill are made of a kind of wood called palm tree, which has very strong properties. It takes me about 20 minutes to prepare the windmill before I can run it. There are many safety devices that must be loosened. I make sure that the machinery is smeared with pig fat and I must be very careful with the safety outside the windmill. I block the passage so that no one can walk nearby and injure themselves. This particular windmill is also featured in several of Piet Mondrian's artwork. Some of his paintings is shown at the Rijksmuseum in Amsterdam. Mondrian liked this place and has painted several paintings of the windmill. I have some books with his artwork in the windmill so that my guests can look at his works.

How come that you bought the windmill?

How much does it cost you to rent the windmill? I pay 1,000 €/month. Normally, a mill is between 400–500 €/month to rent, but I pay more because I use it for tourist accommodation and make money on it. This is something you negotiate with the association so that both parties are satisfied.

What does it take to run a windmill in Holland?

You must have a miller education to run a windmill in Holland. My daughter is actually doing the course right now since she has decided to be a miller. The course runs 2 days/week for 2 years.

When and how did you transform the windmill into accommodation?

I started the renovation of the windmill in 2013. I took a time off from work for 9 months and worked in the mill. I did most things myself. I oiled the logs, put up a thin insulation before putting white boards on the walls. The kitchen was already there because the windmill had a miller's residence in the past, but it was renovated. Toilet and bathroom were installed. Since I rent the mill, the foundation paid the exterior part of the renovation and I paid the renovation that was done on the inside.

How much is a night in the windmill?

In low season I charge 250 €/night and in high season I can get 450 €/night. My guests must always stay at least 2 nights. There is no idea to rent out just for one night, then all the money goes to cleaning the windmill.

What plans do you have for the windmill in the future?

My goal is to live in the windmill myself when I get older.

What advices can you give to someone like me that will hopefully have a windmill to rent out in the future?

First, comfortable beds are appreciated, so spend money on good quality beds. Arrange bicycles and maybe even a car by the windmill that guests can rent. But most importantly, consider putting wings on the windmill again. I am sure it would gain a lot to get wings on it. On the one hand, you can have it up and running when guests arrive. The guests can learn how to run a windmill and get a whole experience instead of just accommodation. Also, think about what you have in the area and what you can suggest the guests to do during their stay. The service outside of the accommodation itself is also important.

APPENDIX IV
SITE ANALYSIS

STRENGTHS

- Proximity to nature (green and blue structures)
- Vänern (ecosystem services, tourism, shipping, fresh water)
- Rich cultural heritage
- Fertile soil for agriculture
- Tourism along Vänerslingan tourist road
- Good access to public transport for being in the countryside, thanks to the military base F7 Såtenäs
- Affordable housing compared to larger cities
- Generous building volume
- 135 years of history
- Identity
- Patina
- Visible timber structure
- Human scale
- Traditional building techniques and materials

WEAKNESSES

- Car dependency
- Lack of meeting places
- Limited access to services in the countryside
- Aging population
- Migration to bigger cities
- Season based community
- Unbalanced housing market
- Building is in a bad condition
- Building has no access to water, electricity, sewage system, ventilation or insulation
- Rainwater leaking into the building
- Mould
- Needs to take action now or it will be too late
- Expensive to renovate a cultural heritage building
- Difficulties to get financial help because the building is privately owned

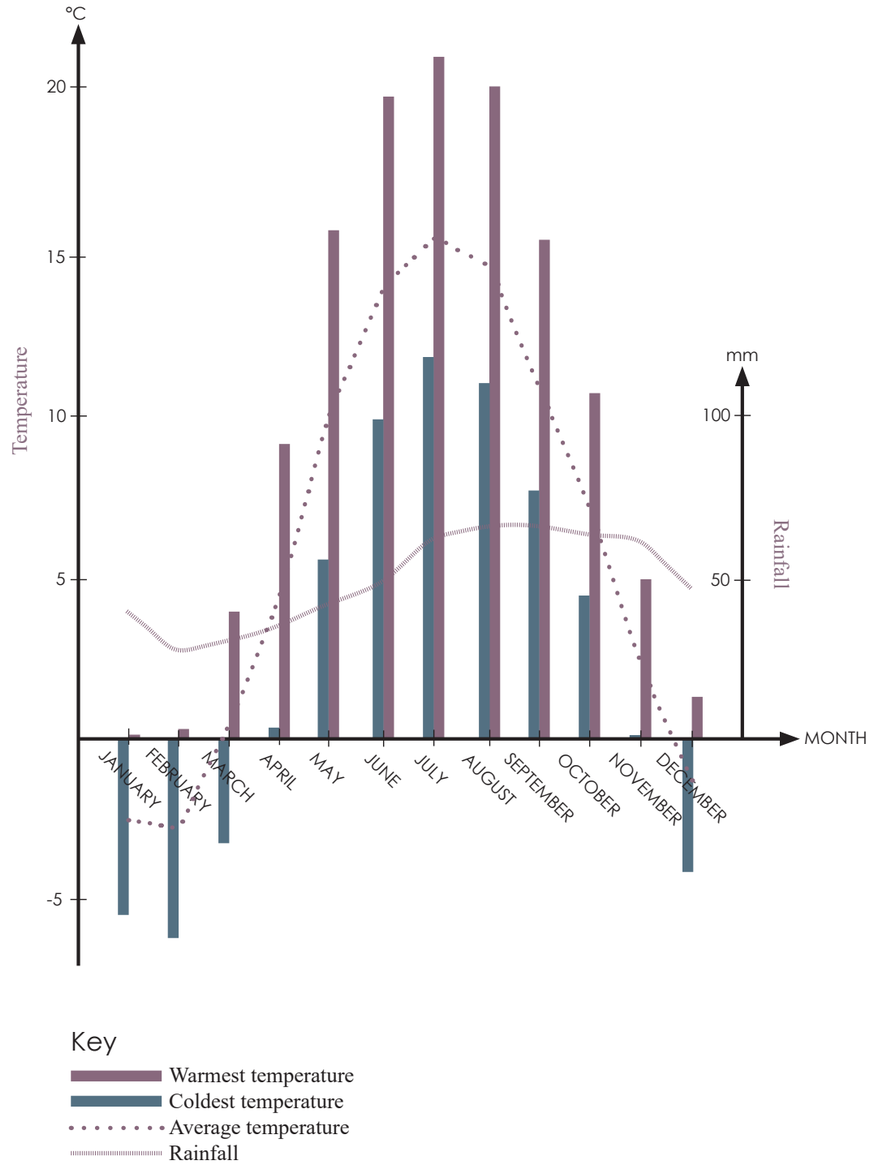
OPPORTUNITIES

- Trends in circular thinking and green economies (DIY, local production, eco-tourism, self sufficiency, ruralization, knowledge)
- Prolonged agriculture growing due to warmer climate
- Growing trend of tourism and counter-trend of ”stay cation”
- Potential to become a new tourist attraction
- Digitalization (work, study and shop from a distance)
- Migration
- Dedicated owners of the windmill
- Possible role model for transformation
- New attraction for public or private use
- Wind in design or production
- Self sufficient in energy

THREATS

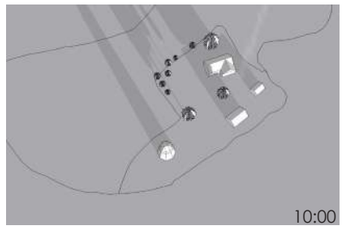
- Effects due to climate changes:
  - increased occurrence of extreme weather conditions
  - crop failure
  - decreased tourism
- Tourists choose to visit Läckö castle and Spiken fishing village instead
- Climate change denial in power positions is slowing down sustainable development
- Depopulation due to urbanization
- Consumerism
- No small scale businesses
- Loss of local specificity and historical knowledge
- Loss of services
- Loss of historical and cultural values during transformation
- Expensive maintenance of the building

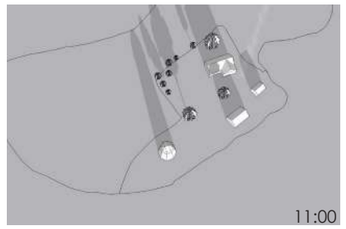
SWOT-analysis of Norra Kedum and the Pilebo windmill.

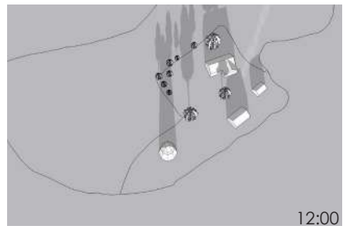


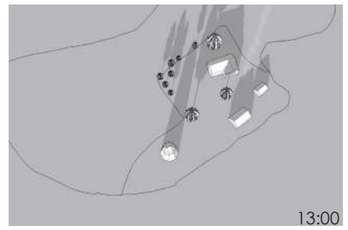
Climate diagram of Lidköping.

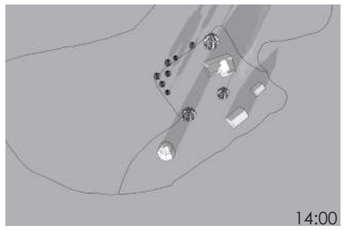
January 15th











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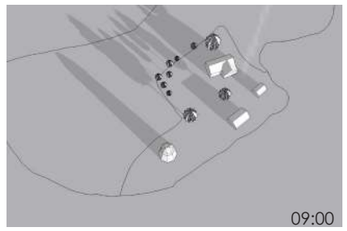

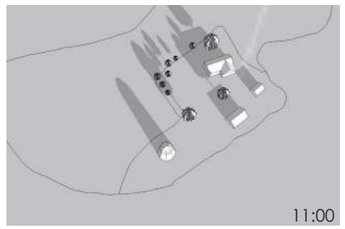

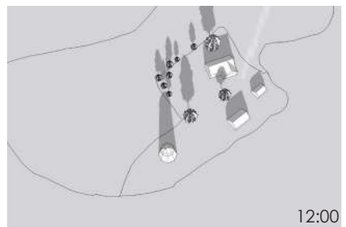

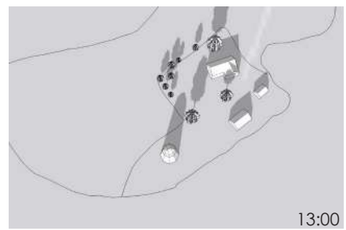

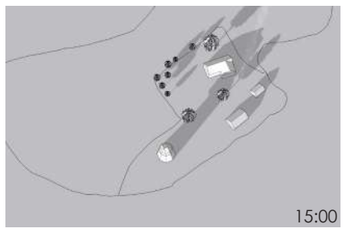

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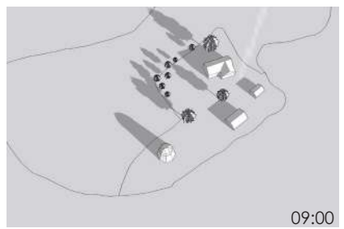

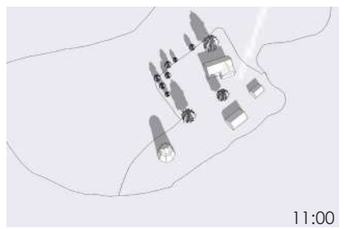

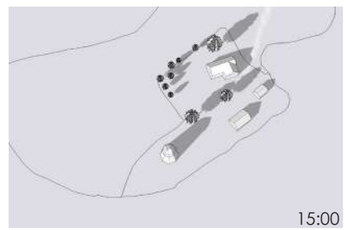

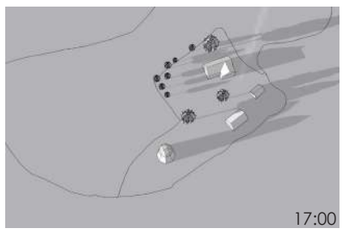

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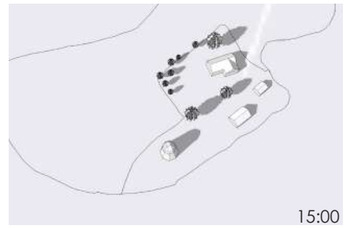
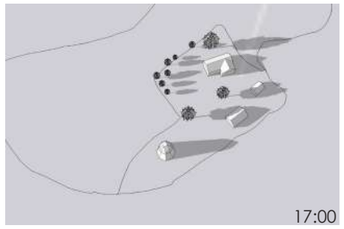




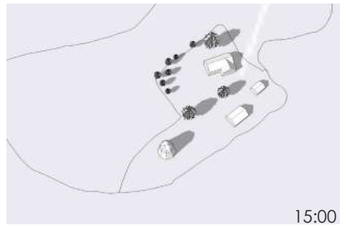
May 15th

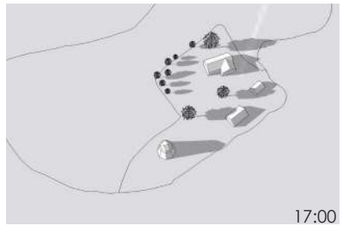
June 15th

Shadow analysis of Pilebo windmill.

July 15th

August 15th





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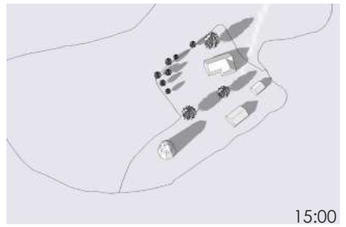

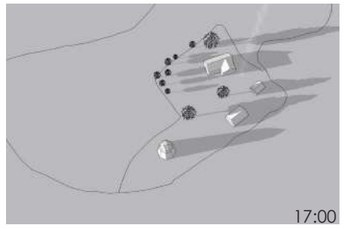

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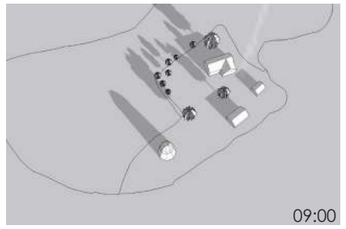

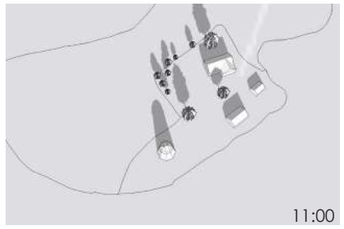

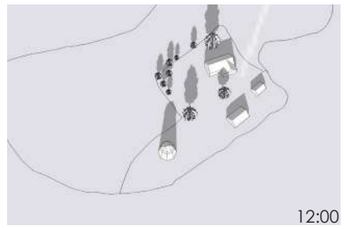

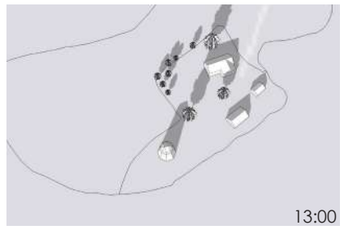

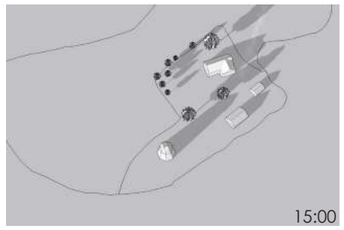

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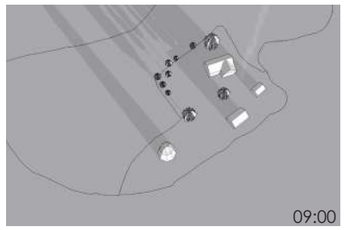
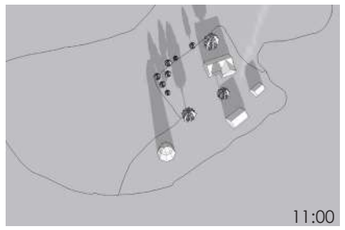
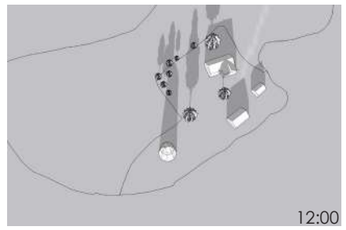
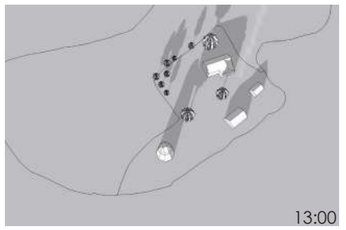
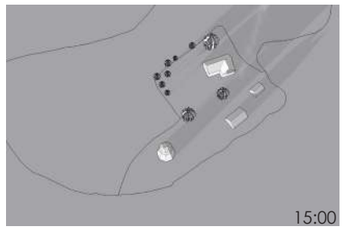


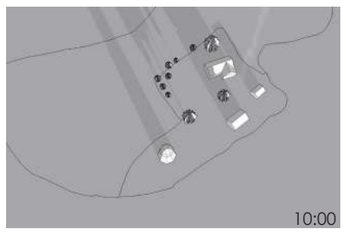


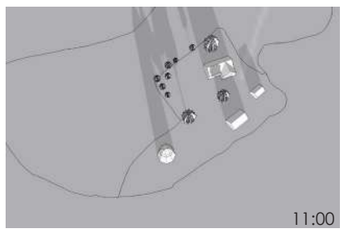


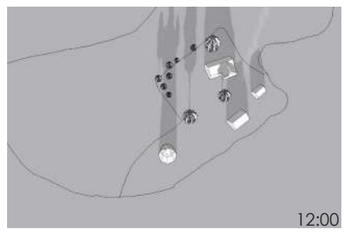


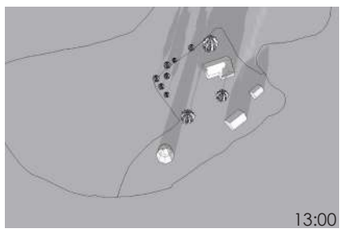


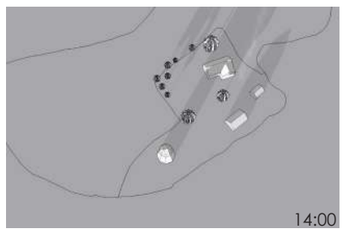
December 15th





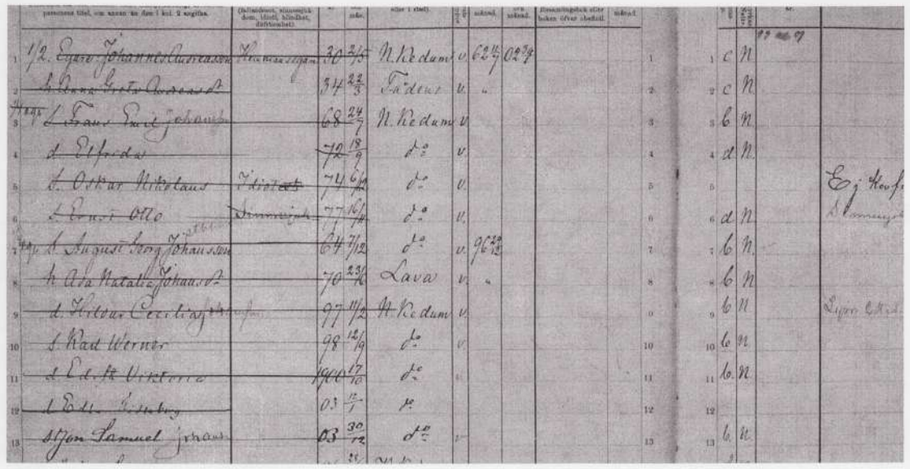




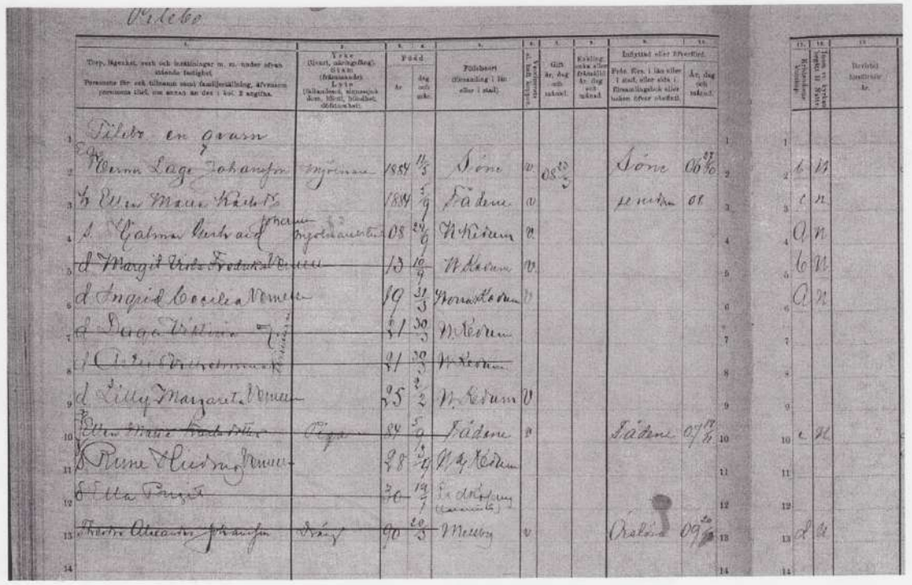


Shadow analysis of Pilebo windmill.

Norra Kedum (R) AIIa:1 (1899-1935) Bild 1110 / Sida 99 (AID: v243535.b1110.s99, NAD: SE/GLA/13395 [Källa: ArkivDigital AD AB]



Norra Kedum (R) AIIa:1 (1899-1935) Bild 1130 / Sida 101 (AID: v243535.b1130.s101, NAD: SE/GLA/13395 [Källa: ArkivDigital AD AB]



Excerpts from the church books of Norra Kedum with information about the different millers.

Air-photo from 1958 (AB Stockholms Aero Råkopior 1601-3200 (o) F:2400 (1958) Bild 9 (AID: v888953.b9)).

Photo from 1988 received from Vänermuseet.

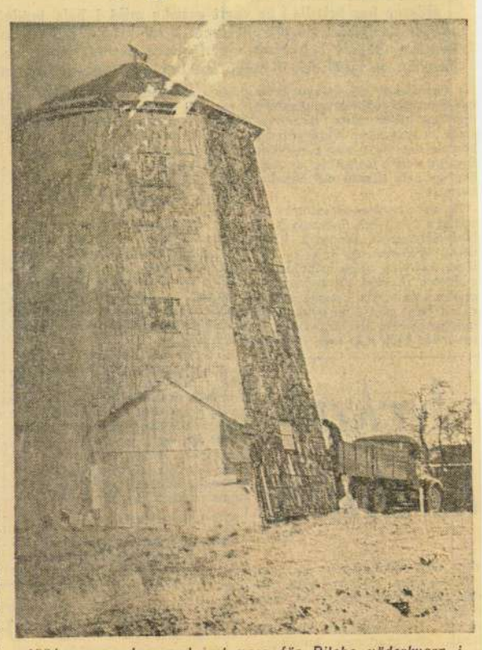
Photos of Verner Johansson and his belongings received from Bosse Larsson, the grand child of Verner Johansson.

TIDNINGSKLIPP realnr: Industrianläggningar - 348 (-256)
Nyfnr 1991:48 tidning: SKLT datum: 31/10 -63 blad:

Väderkvarnen i N. Kedum är Tådenebygdens sista

Landskapet 1963 är ett helt annat än det som mötte Abo-docenten Pehr Kalm, när han sommaren 1742 reste fram och åter genom Västergötland. Bl a saknas täckning för hans kända yttrande i dagboken: "Väderkvarnar hade de vid de fleste gårdar allt ifrån Flo socken och ända till Lidköping". Vad han såg var framför allt dessa mängder av de specifikt västgötska "holkkvarnarna" med deras kvarnhus och karakteristiska smala överbyggnad. Åse och Kållands härader hade ett överflöd av dem.

Nu finns det mycket få rester kvar av det en gång så rika beståndet av väderkvarnar. Holkkvarnarna är helt försvunna ur landskapsbilden, om man undantar dem som tagits om hand av hembygdsföreningarna, t ex i Grästorp och Rackeby. Men någon enstaka av de s k kjortelkvarnarna av holländsk modell finns kvar. Så är fallet i Pilebo i Norra Kedum, där hela Tådenebygdens sista väderkvarn ännu pryder landskapsbilden, fastän vingarna sedan länge är borta och spånbeklädnaden gränat och flagnat.



1884 uppges byggnadsåret vara för Pilebo väderkvarn i Norra Kedum. Nu är den ensam kvar av sina många samtida och föregångare i bygden.

KVARNEN BYGGD 1884 OCH NEDLAGD 1954

På en fri och öppen plats mitt i Pilebo marker står den stora holländaren som ett minnesmärke över en faren epok. Fastigheten som den står på heter numera "Pilebo kvarn" och bebos av WALENTIN GUSTAFSSON, som kan berätta om kvarnen och dess öden. Det pampiga byggnadsverket uppfördes av fru Gustafssons farfar Johannes Andersson, och det torde ha varit 1884. Det är 80 år sedan. Men bara 70 år blev dess livslängd som gående kvarn. 1954 dog den siste mjölnaren, Verner Johansson, och sedan dess har kvarnen inte varit i gång. De sista 30 åren drevs den elektriskt, och vingarna togs ner när driften lades om på 20-talet.

IMPONERANDE RUIN I FYRA VÅNINGAR

Nu står kvarnen kvar som ett i sitt stympade skick ändå ståtligt och fantasieggande minne. Byggnaden är imponerande nog när man kommer intill den, ett tiotal meter i diameter nedtill och med fyra hela våningar. Väldiga bjälkar bär upp konstruktionen. Numera är de tre paren stenar borttagna, vilket ju är skada, om man skall se till byggnadens kulturhistoriska värde. Men en verklig funktion har den gamla kvarnen ännu: den tjänar som magasin för diverse skrymmande saker, som alltid finns på en bondgård.

När vi nyligen [illegible] nen, höll ägaren till Pilebo KURT BROBERG på med att lasta in det kommande årets behov av konstgödsel. En lastbil hade backat intill den gamla holländaren, och på en brygga kärrade man in massor av superfosfat- och salpetersäckar.

Naturligtvis är det en angenäm känsla att ha en så fin sak som en gammal väderkvarn på markerna. Men skall man underhålla den, kostar den pengar, även om man har en viss praktisk nytta av en sådan byggnad. Vi tror emellertid att de generationer som nu har med N Kedums enda väderkvarn att göra har förståelse för den kulturhistoriska sidan av saken.

FRIELS BY HAR HAFT 30 VÄDERKVARNAR

Själv minns Walentin åtskilliga gamla väderkvarnar i bygden. De fanns här och där, bl a i Tranum.

Beskrivningen till gamla Ekonomiska kartan uppger att det omkring 1880 fanns 5 väderkvarnar, en i vardera Aggetorp, Kambo och Pilegården och 2 i Storegården. Tranum hade 8, en i vardera Berg och Skärteberg och 3 i vardera Rättaregården och Damsgården. I Tådene fanns det 2 väderkvarnar, på Storebergs mark. Det blir 15 på de tre små socknarna. Samtidigt hade Lavads socken 5 väderkvarnar. Säkerligen var beståndet som mest åtskilligt större. Några decennier tidigare hade den då oskiftade Friels by mer än 30 väderkvarnar.

Te

70-årig mjölnare i Kedum jämngammal med kvarnen

De båda 70-årsjubilarerna i N. Kedum, Pilebo kvarn och dess ägare, mjölnaren Verner Johansson

Att kunna fira sitt eget och samtidigt sitt företags jubileum och därtill ett siffermässigt likvärdigt jubileum, får väl anses som ett intressant sammanträffande. Detta händer i dagarna mjölnaren Verner Johansson i Norra Kedum, som förutom att han själv uppnår sin 70:e födelsedag nu på tisdag även kan celebrera sitt företags, Pilebo kvarn, 70-årsminne av dess tillblivelse våren 1884.

Såväl kvarnen som ägaren befinner sig i (nästan) bästa vigör och i full verksamhet. Hr Johansson aviserar ock inför högtidsdagen, att förändringar är att vänta både vad gäller kvarnen och ägaren. Själv tänker hr Johansson nu dra sig tillbaka från den verksamhet han bedrivit i nära ett halvt sekel. Åldern tar ut sin rätt, menar han, och även om hr Johansson fått ha en god hälsa genom alla åren, så börjar nog ålderskrämporna nu att göra sig gällande. Dessutom anser han det välbetänkt att som "friherre" få njuta sin återstående levnad.

KVARN TILL SALU.

Men skall kvarnen säljas. Den har redan annonserats ut till salu, och en del spekulanter har anmält sig. Genom lite omändringar skulle Pilebo kvarn göra en ypperlig tjänst som bygdekvarn, anser hr Johansson. Visserligen har jordbrukarnas allt talrikare hemkvarnar hårt trängt de enskilda kvarnföretagen, men det har å andra sidan gått upp för jordbrukarna, att med lejd arbetskraft blir hemmalningen dyrare än på bygdekvarnen.

JOHANNES BYGGDE NY KVARN.

Pilebo kvarn var på sin tid en av Skaraborgs läns största väderkvarnar. Som väderkvarn drevs den till år 1925, då vingarna plockades ned och elkraften togs i bruk för driften. Pilebo kvarn hade en föregångare vid Aggetorp i N. Kedum. Ett häftigt åskväder år 1882 satte emellertid eld i den gamla kvarnen, som brann ned till grunden. Tanken på att uppföra en ny kvarn väcktes av Johannes Andersson i Pilebo, en av socknen förmögnaste karlar. Han uppdrog åt kvarnmästare Göthe i Stenhammar, Gösslunda, att uppföra en ny kvarn på Pilebos ägor. Virket till den nya kvarnens förmögnaste karlar. Han stora kvarnaxeln inköptes från Kinnekulle. Kvarnstenarna togs från Lugnås.

Forts. å sid. 10

Articles from the local newspaper.

TIDNINGSKLIPP realnr: Industribyggnader - 348
Ny.f.nr 1991: 48 tidning: SKLT datum: 28/1 - 63 blad: 2/2

Ragnar Ljunggren fann 1918 detta motiv i Persgården i Friel. På den ålderdomliga holkkvarnen är det timrade kvarnhuset tillbyggt med enklare skjul i båda ändar. Foto: Nordiska Museet.

NLT 13 mars 1972

Det gamla Lidköping

Kvarngatan i Lidköping har fått namn efter en kvarn. Så här såg den kvarnen ut på 1890-talet.

Articles from the local newspaper.

TIDNINGSKLIPP Ny.f.nr:1991:4

Industribyggnader - 348

28/1 - 63 blad: 1/4

30-talet holkkvarnar i Friels by kring 1830

SKLT 28/1 - 63

I den kartillustrerade serie i Lantmäteristyrelsens arkiv i Stockholm, som går under benämningen geometriska jordeböckerna påträffade vi för några år sedan en karta över frälsejorden "Quarnnegård" i Tengene, dvs. kärnan till det nuvarande Marieberg. Kartan kan dateras till tiden omkring år 1640 och är sålunda en urkund som går förhållandevis långt tillbaka i tiden. Sockencentrum med kyrka, prästgård och bro över Nossan återges ganska detaljerat, liksom Kvarngårdens ägor och vidare läget av de fyra hemmanen i Tengenedstorps by: Storegården, Olof Månsgården, Frugården och Plan.

Vid studiet av teckenförklaringen befanns de två vid Nossan strandmarkerade kvarnbyggnaderna representera var sin typ av vattenkvarn. Ungefär vid det nuvarande kvarnkomplexets mitt låg i åkanten ett hus som inrymde "Footqvarn" med två paar stenar", och lite längre uppströms, någonstans mellan nuvarande kvarnen och f. d. mejeriet, står en annan kvarnbyggnad: Julqvarn eller Sihteqvarn, ett paar stenar. En Sågeqvarn finns på västsidan av ån. Att sedan Kvarngårdens manbyggnad stod ungefär mitt på det nuvarande "sockentorget", att en byggnad med beteckningen Kläckaregården står ungefär vid nuvarande västra kyrkogårdsporten och att kvarnegendomens "fäägård" finns där de två nya bostadshusen uppförts under 1962, gör ytterligare kartan till ett berättande dokument.

FOTKVARN OCH HJULKVARN

En intressant detalj i allt det här var det om "fotkvarn" och "hjulkvarn". Vad var skillnaden ? Vi gick vidare och bläddrade i en avhandling av Roger Wadström med titeln Svenska kvarnstenar, en intressant filologisk utredning, där många rent etnologiska spörsmål kom i betraktande. Där befanns det att en fotkvarn är en vattenkvarn där drivhjulet sitter horisontalt och direkt på den vertikala axel som driver kvarnhjulet, medan den mera komplicerade hjulkvarnen har ett vertikalt hjul och via den liggande axeln och en kugghjulsväxel driver den övre kvarnstenen. I princip är utväxlingen densamma i en väderkvarn.

Nu finns det möjligheter att lätt förkovra sina kunskaper i det intressanta ämnet väder- och vattenkvarnar. Kvarnen spelade en betydande roll tidigare och är sålunda ett väsentligt inslag i bilden av bygden och dess liv. Nu är bilden annorlunda. Väderkvarnen är i det närmaste försvunnen, finns egentligen bara som museibyggnad, och de många små vattenkvarnarna vid bäckar och åar är borta. Också de större bygdekvarnarna har i många fall spelat ut sin roll.

Den antydda kunskapskällan är en gradualavhandling som nyligen ventilerades i Lund. Doktoranden var Sven B. Ek, och hans avhandling, med titeln Väderkvarnar och vattenmöllor, ingår i den utomordentliga sviten Nordiska Museets handlingar. Det är en stor sak på över 300 kvartosidor, väl illustrerade. Priset är förstås högt, 45 kr., men vilket bibliotek som helst kan ju förhjälpa en till möjlighet att ta del av det rika stoffet.

VÄDERKVARNARNA

Vad gäller väderkvarnarnas tre huvudtyper, går Ek fram med delvis ny terminologi, i det han kallar den enkla stolpkvarnen, där hela kvarnbyggnaden är vridbar, med den levande termen stubbamölla. Den stora holländaren eller kjortelkvarnen får heta hättkvarn efter den vridbara lilla överdelen, hättan. Den i Västergötland särskilt vanliga holkkvarnen behåller denna benämning. Den har påträffats här och var i Europa, men har ett av sina mest utpräglade utbredningsområden kring Vänern och särskilt i nordvästra Västergötland. I Kålland, Ase, Viste och Bjärke är man väl bekant med holkkvarnen, som huvudsakligen var en husbehovskvarn, på 1700-talet enligt Kalm befintlig vid de flesta gårdar mellan exempelvis Lidköping och Flo. På den karta som uppgjordes när Friels by skiftades på 1830-talet finner man inte mindre än ett 30-tal holkkvarnar i en lång rad tvärsöver landsvägen och anknuten till gårdarnas gruppering. Holkkvarnen är i varje fall en mycket gammal typ och hör samman med träbyggnadskulturen. I Sverige nämns väderkvarnar redan i flera av de medeltida landskapslagarna.

400 TULLKVARNAR I SKARABORG 1825

I Västgötland fanns mängder av vattenkvarnar förr i tiden. År 1825 tex hade Skaraborgs län 400 tullkvarnar och Älvsborgs 521 vilket innebär en betydligt större täthet än för landet i övrigt. Ändå hade området vid ungefär samma tid långt över 2.000 husbehovskvarnar. Den gamla fotkvarnen, även kallad skvaltan, undanträngdes under 1800-talet nästan helt av hjulkvarnen. I stort sett hade kvarnarna enskilda ägare. Överhuvud taget ägnar författaren stor uppmärksamhet åt kvarnarnas ägandeförhållanden och rättshistoriska ställning, vilket gör avhandlingen till också en samhällsvetenskaplig urkund. Sist kompletteras den med tysk sammanfattning och en oerhört omfattande litteraturförteckning, där bl a åtskilliga västgötska forskare lämnar sina bidrag (märkligt dock ej Linnar Linnarsson).

FOLKE TENGELAND.

Forts.

Ur tidningen 7 maj 1953. Pilebo kvarn

70-årig mjölnare i Kedum
jämngammal med kvarnen.
Pilebo kvarn tillblivelse våren 1884.
Som väderkvarn drevs den till år 1925.
Då vingarna plockades ned och elkraften
togs i bruk

En kvarn fanns på Aggetorp. Till år 1882
då ett åskväder satte eld på den och brann
ner till grunden
Tanken på att uppföra en ny kvarn på Pilebo
väcktes utav Johannes Andersson en ukon
socknens förmögnaste karlar.
Den stora kvarnaxeln inköptes från
Kinnekulle Kvarnstenarna från Lugnås
Tuppföraren beläpte sig kvarnen på 7.000 kr
Den drevs sedan i Johannes R. regi i man
hade svårt med arbetskraft då vingarna
jobbade nästan i jordmån.
År 1906 köptes kvarnen av Verner Johansson
Han köpte den för 3 375 kr. drev den som
väderkvarn till 1923 då vingarna plockades
bort och såldes till Västerplana

Januari 1993.

Genom kikaren

Alltjämt finns det gamla väderkvarnar kvar, vilka utgör ett pittoreskt inslag i landskapsbilden. Men det är numera sällan, som man ser några kvarnar på vilka vingarna snurrar. De som bevarats, är mest museala byggnader.

Pilebo kvarn i Norra Kedum uppfördes 1884 och var på sin tid en av Skaraborgs största. Kvarnen finns kvar än i dag, men den saknar vingar och är följaktligen inte i bruk. Men den var användningsbar till 1954, berättar dess ägare i dag, som är Kurt Broberg. Nämnda år fyllde den dåvarande mjölnaren Verner Johansson 70 år och då tyckte han att både han och kvarnen, vilka var jämnåriga, hade tjänat ut.

Som väderkvarn drevs kvarnen tills år 1925, då vingarna plockades ned och elkraft togs i bruk för driften. Pilebo kvarn hade en föregångare vid Aggetorp i N Kedum. Ett kraftigt åskväder år 1882 satte dock eld på kvarnen, som helt brann ned. Tanken på att uppföra en ny kvarn väcktes av Johannes Andersson i Pilebo, en av socknens förmögnaste män. Han uppdrog åt kvarnmästare Göthe i Stenhammar att bygga en kvarn på Pilebos ägor.

□

Kvarnaxeln köptes från Kinnekulle och kvarnstenarna från Lugnås välkända kvarnstensbrott. Att frakta den stora kvarnaxeln från Kinnekulle var en äventyrlig historia. Ett par av de största hästdragna vagnarna i bygden krossades under den tunga lasten. Denna ansågs utgöra en fara för Torgbron i Lidköping. Men bron höll dessbättre. Kvarnen kostade 7 000 kr att uppföra. Den drevs sedan i Johannes Anderssons regi.

År 1906 inköptes kvarnen av hr Johansson, sedan driften legat nere ett halvår. Johansson, som var född och uppväxt på Frälsegården i Söne, hade hjälpt sin far med malning. Han köpte nu kvarnen för 3 375 kr och drev den, som nämnts, först som väderkvarn till 1925 då vingarna såldes till Västerplana. I stället byggde Johansson en transformator och fick därmed elkraft som drivmedel.

En kvarnägare kunde förr tjäna pengar, då vinden var gynnsam. Men det fanns långa tider, då kvarnen stod stilla på grund av stiltje. När det sedan blåste upp fick man utnyttja tiden såväl dag som natt. Med elkraften kom en ny tid. Den var dyr men det gick att få en bättre organisation av arbetet och en smidigare betjäning av kunderna. Under kvarnens bästa år maldes ca 130 säckar om dagen. Den högsta nettoinkomsten gav kvarnen första året den var eldriven, nämligen 14 000 kr.

□

Pilebo kvar var i verksamhet under två världskrig och man malde fyra gånger så mycket då som annars. Ett hårt slag för bygdekvarnarna var dock den statliga skatten eller förmalningsavgiften, som kom efter kriget.

Väderkvarnar har varit i bruk i vårt land ända sedan 1200-talet. I Sverige fanns kvarnar främst i bygder vilka saknade vattenkraft. Kvarnarna var av två typer och äldst av dem var "stubbamöllan", där hela kvarnhuset kunde vridas runt mot vindriktningen. På "hättkvarnen" däremot var det bara en hätta i kvarnhusets topp, som kunde vridas.

I våra bygder finns kvarnar alltjämt kvar på Kålland, bland annat en med vingar och allt, som man kan se på vid sidan om vägen till Läckö. Den restaurerades på sin tid genom Nils Ivarssons, Fröslunda försorg.

Väderkvarnar är även kända från litteraturen, främst från Cervantes, Don Quijote, där hjälten tog väderkvarnar för jättar som han red till storms mot.

F Hg

Articles from the local newspaper.

SITE ANALYSIS MOVIE OF PILEBO WINDMILL

https://youtu.be/XqgWnvGb6e4