

Towards a new adaptability in Slite

Envisioning post extraction futures for a company town

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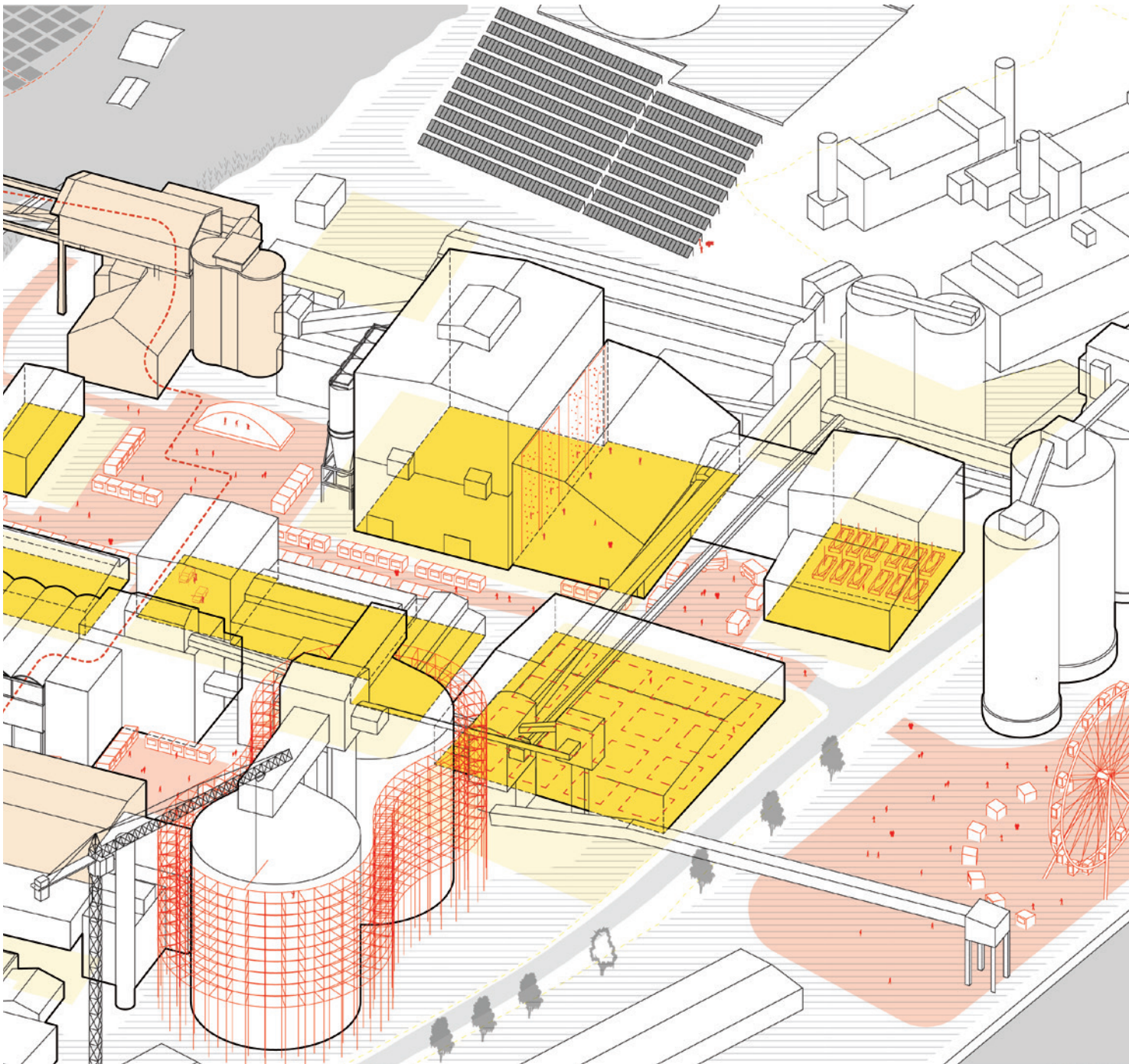
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Chalmers School of Architecture

Department of Architecture & Civil Engineering

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Examiner - Julia Fredriksson



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Student background

Education

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Bachelor in Architecture, Chalmers University of Technology	2016–2020
Studies at Faculty of Landscape and Society, NMBU Ås <i>Courses in Geology & Landscape architecture</i>	2017
Studies at department of art history, Uppsala university <i>Courses in sustainability & Urban history</i>	2016

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Internship, Krook & Tjäder <i>Oslo</i>	2018

Content

Student background	3
Table of Contents	4
Introduction	7
<i>Delimitations</i>	9
<i>Glossary</i>	10
Method	11
Background	12
<i>Context/Discourse</i>	12
<i>Theory</i>	13
<i>What has been done before?</i>	19
<i>References</i>	19
Situation	21
<i>Gotland & Slite</i>	21
<i>Demographics</i>	23
<i>Gotland, an island of highly altered landscapes</i>	25
<i>The cement company & permits</i>	29
<i>History</i>	31
<i>Mapping & Inventory</i>	41
<i>Current conditions</i>	49
<i>Initial design explorations</i>	51
Design exploration	53
<i>The adaptive futures of Slite</i>	53
<i>A method for change</i>	55
<i>Strategies & Implementation</i>	57
<i>Current & future situation</i>	73
Discussion	79
<i>Conclusion</i>	80
Bibliography	81

Abstract

By utilizing a theoretical framework focused on political, ecological and social processes of change this thesis seeks to offer new insights into *post-extraction* futures of *company towns*.

Through the case study of Slite, a company town on Gotland facing an uncertain future in the light of a pending permit decision, this thesis explores how the reading of specific conditions in company towns, through a lens centered on processes of change, can help inform architectural & planning practices. By doing so it seeks to explore how a new *adaptability* in the local context can be achieved by re-incorporating industrial sites into the *urban* fabric.

The theoretical framework, based in *urban political ecology*, offers a viewpoint that rejects a human-nature dichotomy, fostering an understanding of (r) urban processes as second nature, where underlying pre-conditions of the natural landscape are metabolized by the dominant species of our age, Humans, into (r)urban, social, economic, and spatial expressions.

Additionally, this thesis addresses the need for architectural & planning strategies that are transformative by nature, aligning with ecofeminist ideas of valuing what is left behind from extraction heavy industry as essential parts of future use through transformation.

By doing this, it articulates alternative strategies to challenges faced in places transitioning from extraction-based economies, while at the same time emphasizing a need for more complex views of existing cause and effect relationships, as current strategies, for example through utilizing simplified spatial imaginaries, often end up treating symptoms rather than causes.

A key finding is an understanding that *adaptability* present in industrial sites is a valuable factor, to be re-designed and developed in company towns, to allow for sustainable redevelopment and increased resilience in the local community.

The main methodology used is the presentation and analysis of speculative post-extraction scenarios based on the reading of Slite. These scenarios are centered on the re-incorporation of extraction and refinement sites of today into the *urban* fabric, valuing them as the foundation for post-extraction life and articulating practical strategies that can increase resilience, through a new *adaptability* in the built environment and urban fabric, in extension helping guide development in similar contexts.

Keywords: company towns, urban political ecology, post-extraction, urban, adaptability

Cement plant with worker's villas in the foreground.

Photo by Author



Introduction

The issue

Company towns across Sweden are facing challenges caused by the exit of industry due to changes in market demands, demographics, and evermore globalized economies (Kåks Röshammar, 2016; Sunnerfjell, 2023).

Slite is a good example of a company town in Sweden, towns historically based on activities such as the mining and refining of iron ore, production of glass or paper.

Even Though Slite has a long history, with first settlement dating back to around 2000 BCE and first industrial endeavors from the 1600's, the town is today heavily shaped by the fact that quarrying of limestone and refinement into cement became the main industry during the last 100 years, with the cement plant opening in 1919 (Ragnerstam, 2023; Öhrman, 1987).

Since the 1960's many company towns in Sweden have suffered due to a changing economic landscape and demands resulting in industry leaving, moving production to other countries. The impact of leaving industry is often severe as the foundation for livelihoods are strongly connected to one industrial entity. (Sunnerfjell, 2023).

Slite might be next in line due to an ongoing, highly debated, permit process for a renewal and extension extractions rights for limestone in the two quarries, *Västra brottet & File Hajdar* (Redin, 2022). A temporary permit, granted by

the Swedish government, is currently allowing for extraction until the end of 2026.

This permit is aimed at bridging the gap as a new permit allowing for an additional 20-30 years of extraction at the sites and an expansion of the extraction area to become around 200 hectares is being processed politically. (Redin, 2022; Heidelberg materials, 2022).

Although speculating on industry coming to an end in Slite at present would not be due changing market demands, but rather a shift in policy, towards disallowing the high impact on the natural landscape exerted by extraction and refining of limestone, as it starts jeopardizing basic needs for the local community, the outcome of leaving industry would in large be the same as in other company towns.

This shift would also be a shift in adaptability, where before the needs of the company, and in extension the needs of the building industry in Sweden in large, governed what permits were given and what impacts were allowed.

The current national, and local debate also points at a shift in rhetoric and mindset, which if not now, in the future could indicate a reevaluation of the needs of industry and community.

The debate surrounding these permit decisions is dominated by two standpoints, where on the one side there is the extraction industry in the form of Heidelberg Materials, backed by large parts of the Swedish building and concrete industry (Redin, 2022).

A companu town is a town or city where most of the people work for one company, which supports the whole economy of the area.

The proponents for a renewal of the permit argue that a failure to do so would not only jeopardize the 400 or so company employees in Slite, but in fact could challenge the base for upwards of 400 000 jobs in a building industry heavily reliant on cement, and in doing so also could slow down measures of climate adaptation (Nilsson, 2021; Wichmann, 2021). This comes from the fact that the plant in Slite is Sweden's only producer of some types of Cement and accounts for the majority of all cement used in Sweden (Redin, 2022; Nilsson, 2021).

On the other side of the debate, voices are being raised for the protection of nature and access to water being more important than further extraction at the sites in Slite. The background for this is that the quarries, especially the quarry of File Hajdar, are adjacent to highly sensitive biotopes and concerns of how the extraction of limestone affects both these areas as well as the groundwater in the area are being raised (Redin, 2022; Holmqvist & Widegren, 2022).

This side of the debate is also backed by scientists, which in contrast to the building industry argue that the closing of the extraction and refinement sites in Slite could act as a catalyst for changing the Swedish building industry's unsustainable relationship to concrete as a cheap, readily available building material (Wichmann, 2021; Göteborgs Universitet, 2021).

Even though most of the cement produced in Slite is used in Sweden, the plant is very much part of a global resource chain, this is visible in a number of ways with one prominent example being the imports of coal for the processes from South Africa & South America. This import also serves to showcase the uncertainty in evermore global resource chains, as the choice of South African and South American coal only came after Russian coal was sanctioned due to the invasion of Ukraine (Lundberg, 2022).

In the light of these issues, the exit of industry can seem a daunting subject and even discussing what comes next becomes impossible, the local interest organization, Slite intresseförening, provides a good example of this as they in their local development plan, spanning from 2022-2027 explicitly point out what they call, the issue of the cement plant, will not be discussed, while at the same time underlining the uncertain future of the plant as one of the largest risks for Slite going forward (Slite intresseförening, 2022).

In similar contexts tourism is often seen as a solution, where sustainable development especially in rural places such as Gotland is tied to the development of a sustainable tourism industry.

This means further leaning towards mass recreation to provide new livelihoods and is actively being promoted by both the EU and the UN (Schmudde, 2019; Kuzior et al., 2021).

This often comes with new challenges that are detrimental to the local community, where seasonal guests determine development in the local context, weakening ties in the local community and pushing locals away in the housing market (Hernández-Maskivker et al., 2021).

This is already the case in Slite, even before the exit of industry, as the town has a high influx of inhabitants during the summer with 30% of all real estate owned by private individuals on Gotland being owned by someone residing in a different region a number that rises to 73% when only including vacation homes (Sveds, 2024; SCB, 2020).

Purpose and Research questions

On this background the purpose of this master's thesis is to explore how a reading and analysis of a company town through a framework focused on political, ecological and social processes of change can provide insights that are valuable in informing future architectural & planning practices, focused on achieving a future adaptability by reintegrating industrial sites into the rural fabric.

The aim of the exploration is to articulate practical strategies by examining the specific case study, Slite, through speculative post-extraction scenarios. In doing so the goal is to contribute knowledge that can guide rural development in similar contexts.

Following the stated aim and purpose, two research questions frame the thesis:

How can reading and analysis of a company town through a theoretical framework focused on political, ecological and social processes of change inform architectural & planning approaches?

How can strategies be articulated, set on achieving a new adaptability through the re-incorporation of industrial sites into the rural fabric, with the specific case study of speculative post-extraction scenarios for Slite.

Design exploration

The main design exploration of this thesis seeks to visualize an alternate future for Slite, where a denial of an extended permit for the cement company ushers in a closure of the site by 2026.

By not focusing the design exploration on tourism driven transformation of the post-industrial sites, which in part can be seen as an equal to relying on one single industrial company, this thesis argues that other solutions are available that better suit the needs of the local community and that are less reliant on a heavily seasonal influx of visitors during the summer months.

In seeking an understanding of common practices of regional development in post-industrial contexts, a need for more complex viewpoints of both underlying conditions and challenges, and possible interventions, strategies and paths forwards has emerged.

To help guide this search for complexity this thesis has been informed by theoretical readings consisting of theory aimed at understanding specific conditions of Slite, with urban political ecology (Cornea, 2019; Gandy, 2022; Tzaninis et al. 2021) and radical ecofeminism (Plumwood, 2008) and concepts present in landscape architecture (Braae, 2015; Braae & Diedrich, 2012) and planning (Hajer & Reijndorp, 2001) being used for a large-scale reading of the context.

Theory on regional development (Anttiroiko, 2009; 2014; Björling & Rönnblom, 2023; Görmar & Harfst, 2019; Häyrynen & Semi, 2019; Karlsen & Dale, 2014; Pike et al., 2023) has also been important in understanding current practices, where similar contexts to Slite often are discussed in terms of being left behind places, after industry and investments leaves, which can be harmful as it reinforces narratives based on an urban/rural dichotomy of success and failure (Pike et al., 2023).

With this in mind this thesis argues that exit of industry can be and must be the start of something new and that architecture is a much-needed tool in projecting and envisioning new futures.

This projecting has been helped by reading on theory on speculative design (Björling & Dyrssen, 2016; Dunne & Raby, 2013).

Additionally this thesis attempts to raise awareness for the need to discuss responsibility, and what aspects to be included in end of life plans for industry, as current rationales are in large focused on what is considered the natural landscape and its restoration, omitting responsibility for intangible aspects in the local context.

By showcasing a new adaptability built on what is left behind by exiting industry, possible futures that relate to the industrial culture of Slite, whilst providing new conditions for livelihood and social interactions in the public domain, in a range of ways is presented.

By doing this the case study of Slite acts by showcasing the need to start proposing alternatives to the extraction heavy industry of today whether industry comes to an end in 2026 or 30 years from now, prompting a transition from being company town, towards being place in its own right and not a place perceived as left behind.

Delimitations

This thesis does not strive to provide completely accurate designs for the specific site, but rather general, designs, methods, strategies and approaches that translate to similar sites/situations.

It does not take into account the possibility for an extension of the extraction, and processing permit at the cement plant.

This thesis does not seek to provide design that answers the pressing water issue.

Does not lean on mass recreation as the main solution for challenges faced

Glossary

The cement plant

*The factory producing cement in Slite, regardless of timeperiod and ownership.
(Authors own definition).*

The cement company

*The company producing cement in Slite, regardless of timeperiod and ownership.
(Authors own definition).*

Company Town

A town or city where most of the people work for one company, which supports the whole economy of the area.

Extraction

the process of removing something, especially by force.

Public domain

public domain are spaces where exchange between differing social groups can, and does occur. (Hajer & Reijndorp, 2001).

Wasteland

A heterogeneous group of landscapes often derelict, neglected and abandoned, in need of remediation to be used. (Braae, 2015).

Rurban

An area sharing both rural and urban characteristics.

Urban political ecology

A conceptual approach that understands urbanization to be a political, economic, social, & ecological processes, one that often results in highly uneven & inequitable landscapes.

Definitions from Cambridge Dictionary & Oxford Languages & Bibliographies if not stated otherwise.



Cementplant and Truckroad connecting Västra brottet & File Hajdar

Photo by Author

Method

This thesis is focused on presenting a method for re-incorporating industrial sites into the urban fabric whilst re-imagining the adaptive qualities present in the industrial sites today.

By focusing on gaining an understanding what preconditions have shaped, and will shape the future of a post-extraction company town in Sweden It seeks to present alternate scenarios based on the new conditions created by the extraction heavy industry and company town logic on the local community.

The first phase of the thesis uses theory to understand the specific conditions that have shaped the history and current day of the specific case study, Slite, through the lens focused on political, ecological and social processes of change.

In parallel an inventory of the site is used to understand the context in unison with historical research to understand the emergence of Slite and the present underlying conditions of the company town.

To help guide the mapping, notions from; landscape architecture, centered on wasteland, from planning, centered on public domains and from regional development, centered on left spatial imaginaries & narratives are added providing a richer understanding of the present conditions of Slite.

The inventory includes site visits and informal interviews with stakeholders which are used for positioning the thesis and understanding the context.

During site visits the specific sites are analyzed, where applicable, using methodology centered around criteria developed by Jan Gehl (Gehl & Svarre, 2013) which are good for providing a quick and easy to grasp method for mapping public space.

In addition the larger areas have been analyzed using methods developed by Kevin Lynch (1960). The areas are mapped using *Paths, Edges, Districts, Nodes & Landmarks* (Lynch, 1960).

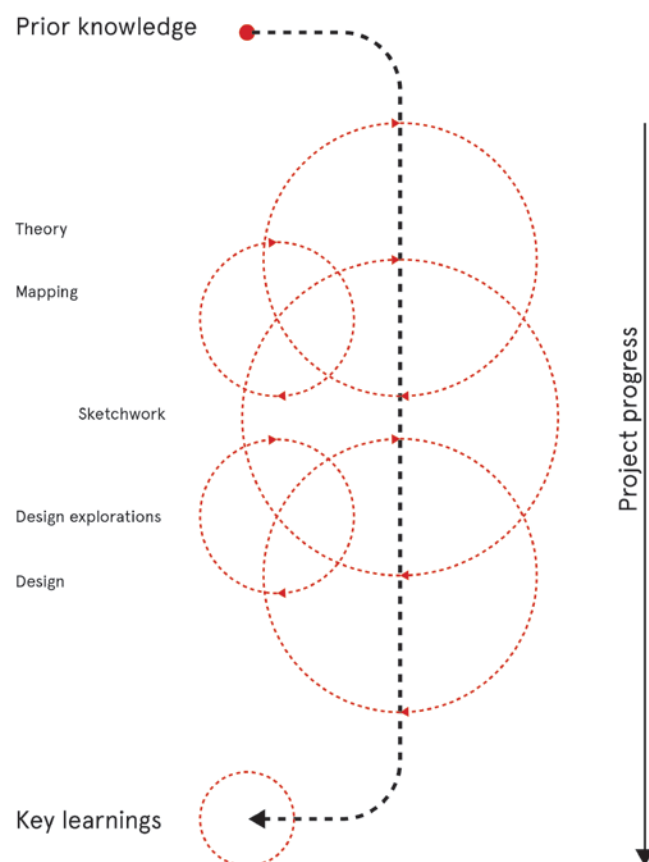
The inventory is used in the following phases as a base for understanding the site and for investigating possible future scenarios and the development of a method that strives to re-incorporate industrial sites into the urban fabric, aimed at re-imagining the inherent adaptability present in the sites.

Theory on speculative design helps guide design of these alternate futures, but also the understanding of how and why speculative design is an important tool for architecture and planning.

The project takes form in an iterative process where the different steps help inform decisions and direction of the project. This process is driven by analog and digital sketch work in a range of different scales.

By reflecting on the findings in the different phases the design part of this project becomes a product of an iterative design approach and should not be seen as a finished product, but rather the current understanding of this specific challenge, site and conditions.

In an attempt to derive general knowledge, applicable on similar contexts, in company towns built on extraction heavy industry facing uncertain futures, an analysis of the design explorations using the notions presented in the theory part



Background

Context/Discourse

This thesis has been informed by theory divided in two categories, the first part consisting of theory aimed at understanding specific conditions of Slite, with urban political ecology and radical ecofeminism being used for a large-scale reading of the context.

This has led to an understanding that the expressions of challenges present in company towns, and Slite, are local in form, but very much part of larger global trends, connected to places of extraction and refinement (Sassen, 2014).

The field of architecture often focuses on the urban and conditions present in the smaller scale without giving acknowledgement to regional conditions and systems of extraction and refinement that have given rise to it.

To understand the broader context can for example be important in analyzing the company town of Slite, today largely shaped by industrial quarrying and processing of lime- and marlstone into cement throughout the last 100 years.

In doing so a picture of a history much longer than merely a century of extraction emerges where the specific conditions of the land and communities are central to understanding the spatial, social & economic configurations of today.

Zooming in on the local context, the issue of dealing with large landscapes and spatial configurations left behind by industry is furthermore a central theme for this thesis, which is understood through concepts related to wasteland presented by Braae (2105).

Likewise understanding the public social spaces that make up Slite today are important and are analyzed using notions of public space & domain presented by Hajer & Reijndorp (2001)

In an effort to contextualize conditions present in company towns, similar examples and views on approaches for post-industrial urban- & regional development are analyzed.

This provides insights further adding complexity to the understanding of Slite, helping further guide the design proposal. The second part of the theory is used to help guide the design process and understand the value of speculative design to envision alternate futures.

Theory

Urban political ecology

Urban political ecology is described by Associate Professor in human geography, Natasha Cornea (2019) as a conceptual approach viewing urbanization as a process encompassing political, economic, social, and ecological aspects in what often becomes landscapes that are highly inequitable and uneven.

A core concept of Urban political ecology is that the urban cannot be seen as the opposite of nature but rather as a new form of nature, a second nature shaped by humans as the dominant species in the modern age (Cornea, 2019).

Urban political ecology is concerned with in what ways urbanization and cities affect and are affected by the world around it, in many scales, where the processes taking place outside of cities to build, maintain and support them are of special interest. These processes are understood as processes of metabolism where biophysical matter is transformed in ever more complex flows into commodities. Urban ecologists adhere to the notion where these processes cannot be seen in isolation and the tracing of flows of these processes is at the heart of the theory (Cornea, 2019).

A large part of understanding the notions of this framework stems from the reading of two books: *Expulsion: Brutality and Complexity in the Global Economy*, by American economist Saskia Sassen, which deals with connecting inequalities to an evermore globalized world economy. And from *Planetary Mine: Territories of Extraction under Late Capitalism*, by Chilean doctor in political geography Martín Arboleda which deals with landscapes of extraction and their resource chains. (Arboleda, 2020; Sassen, 2014).

With this as a viewpoint for understanding the company town of Slite the large-scale contexts of extraction, refinement & movement of material resources becomes visible and how these processes impact the natural landscape. The specific conditions of Gotland & Slite become clear preconditions to the spatial, social and economic configurations of today and allow an understanding of what new preconditions are present in Slite as it nears the end of extraction.

What distinguishes Urban political ecology from ecofeminism and marxist theories of urban geography is debated, but Gandy (2022) argues a realignment from the urban to the rural which is also well described by Tzaninis et al. (2021) as well as an extension on what cities to include in research from only the global south to include the north serves as two good examples.

Shadow places

The concept of Shadow places is built on similar notions as urban political ecology and was introduced by radical ecofeminist Val Plumwood (2008) in her article Shadow Places and the Politics of Dwelling.

Plumwood (2008) introduces an understanding of sites of extraction as shadow places, spaces left behind from extraction activities, where material resources are extracted to be shipped off and build new places in a different spatial context.

Plumwood argues that shadow places need to be better understood and set in context with the spaces they have helped create. In addition, Plumwood underlines the fact that places of extraction are often neglected as we as a society tend to focus on the places they have helped create. She also aligns Shadow places with perspectives on justice present in urban political ecology and the need to emphasize this in dealing with places of extraction.

With this thesis focusing on Slite and its relationship with its places of extraction, Shadow places becomes a meaningful way of viewing and understanding the quarries, cement plant and other spatial configurations emerging throughout history in unison with the extraction and refinement of material resources.

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Wasteland?

The extractions in Slite will leave behind a diverse amalgamation of wastelands and industrial buildings.

Danish landscape architect & professor Ellen Braae (2015) describes wastelands as a heterogeneous group of landscapes often derelict, neglected and abandoned. Further she adds they in a scientific sense are to be defined by being so damaged by development, industrial or other, the landscapes are unsuitable for beneficial use without treatment. Braae (2015) argues Post-industrial landscapes are not planned but rather are an amalgamate of expressions of prior needs of industry and must be viewed in this light, often perceived as diffuse or disordered. Additionally Braae (2015) argues one finds pre-industrial structures overlaid in a palimpsest with structures of industrial development.

She describes the process of dealing with these landscapes as an exploration of interplay between relics of industrialism and processes of nature, in doing so she aligns with key notions in urban political ecology.

"The sites of discontinued industry offer a unique opportunity to create a new kind of accessibility in the post-industrial urban landscape."

(Braae, 2015, p.89-90)

Further Brae (2015) points at an economy of means where careful (re)use of resources are important for design professions going forward.

She states, although the tearing down of industrial remnants to start anew often still is more economically viable than using what is already there, it is an expression of the unsustainable view of resources present in financial thinking of today and indicates a shift is needed in how we value what is ecologically sustainable. Away from the current view rewarding originality in design towards a thinking where truly ecological solutions does not have to resemble "pure and pristine nature".

Braae has also dealt with the reuse of harbor sites and argues they can help counteract homogenization of (r)urban spaces. Accompanied

by landscape architect and professor, Lisa Diedrich, Braae argues that transformation of harbor spaces follow similar patterns across the Western world, leading to an homogenization of urban spaces (Braae & Diedrich, 2012). Whereas now the value of harbor areas, and their functions, is often underplayed in processes of transformation and redevelopment leading to a decrease in adaptability as new programmes homogenize urban & rural landscapes, remnants of former industry merely kept as tokens of cultural heritage and sites developed through concepts that are alike spanning the western world. (Braae & Diedrich, 2012)

Braae & Diedrich (2012) argue that an increasingly site specific methodology for transforming these types of spaces is needed underlining the importance of a heuristic approach to transformation as a countermeasure to a homogenization of urban spaces where process of understanding the sites becomes an integral part of the development of Design work. Even though the article in large focuses on urban areas, parallels to rural contexts are easy to make.

As Braae & Diedrich (2012) argue that harbor areas, oftentimes serving as a nexus between city core and the water, imposes certain demands on the transformation of the sites, where dense mixed use areas with ample open spaces, are seen as a universal solution. This logic is in part true also for more peripheral contexts, in this a view that an inherent need to densify must be seen as less important for development emerges.

Public space ≠ Public Domain

Planners & professors Hajer & Reijndorp (2001) presents concepts of public space and domain seeking to understand how certain public spaces develop into public domain.

They argue the term public space refers to all spaces freely accessible for everyone and can describe both spaces owned by private and public entities, while at the same time specifying that not all publicly owned and accessible spaces are public domain by default.

They separate the concepts by arguing that spaces belonging to the public domain are inherently places of exchange. Where different views and opinions are put on display and allowed to be examined and sometimes altered. In addition, they describe these physical spaces where one's personal perception are confronted, as important for developing social intelligence and in extension as the antidote for stereotyping and stigmatization in society

Urban & Regional development in post-industrial contexts

The challenges faced in Slite as industry exits adhere to a pattern present in post-industrial towns. Finnish lecturers in philosophy Simo Häyrynen & Jussi Semi point out that as specific realities of towns differ, so do solutions to the challenges faced (Häyrynen & Semi, 2019).

To create a broader understanding of possible futures for Slite an analysis of towns such as Gothenburg, Kalmar, Uddebo & Detroit, as well as regions such as the Ruhr valley in Germany and the Rust belt region in the US, existing or transitioning towards a post-industrial state was conducted. The towns & regions range in size, geographical location and main industry shaping their history strategies being used in the post-industrial age and act as examples of similar contexts.

The reading of these towns & regions highlighted a set of common strategies used in post-industrial contexts, where presentation & appreciation of the cultural heritage is important, where events & inter-city competition to attract visitors, inhabitants & businesses, is sought with varying degrees of success and where collective solutions, especially in smaller scale examples are central.

These situations are well studied in theory on urban and rural development, but oftentimes this theory operates in a strict urban/rural dichotomy. Swedish architect and senior lecturer Nils Björling & professor in political science Malin Rönnblom indicate that this is especially visible in theories tied to inter-city competition and how local governments compete to acquire business development and in turn facilitate growth and development where notions presented by for example urban studies theorist Richard Florida have been highly influential during the early 2000's (Björling and Rönnblom, 2023).

A common notion in the theories, presented among others by Finnish lecturer in administrative sciences Ari-veikko Anttiroiko is that cities operate in a mode of attraction-oriented development with the main goal being absorption of external resources from a global flow of resources (Anttiroiko, 2014; Björling and Rönnblom, 2023; Florida, 2002; Häyrynen & Semi, 2019).

In a Swedish context a shift can be seen in the 1990's as regions started to compete against each other in similar attraction-oriented rationales as cities (Björling and Rönnblom, 2023). Anttiroiko (2014) argues that attraction orientation creates

a risk that governments become detached from the actual needs of local communities leading to an unfavorable development. This process is in large part characterized by a profiling of cities (Anttiroiko, 2009).

Because of increased cross-boundary flows of resources, urban governments have become increasingly concerned with their role in the global economy.

(Anttiroiko, 2014, p. 233)

Anttiroiko (2014) highlights that shared challenges in post-industrial towns stem from unique underlying conditions and that these should determine what strategies are viable going forward.

This is in line with the findings of the reading of post-industrial towns produced for me. Adding this viewpoint to the theoretical framework used, allows for understanding different approaches seen across a diverse set of post-industrial towns as quite similar in nature, aimed at providing development even though means to this end vary in nature.

Anttiroiko (2014) describes 8 different approaches to developing post-industrial cities: *The financial center, The high tech city, the knowledge city, the cultural city, the tourist city, the conference city, the logistics city, and the business service city.*

Placing Gotland in this theoretical context produces a view of a place operating in between concepts of the cultural, tourist and conference place. The ongoing work on a comprehensive plan for 2040 points at new efforts being made towards becoming a place of logistics (Region Gotland, 2021b).

On a regional level Stockholm for example ranked as #7 on rankings of global meeting cities in 2010 (Anttiroiko, 2014). Gotlands strategic location in close proximity to Stockholm could be advantageous in attracting larger meetings and other events.

Although the specific examples given by Anttiroiko (2014) are all global large scale cities and the fact smaller contexts are often overlooked (Häyrynen & Semi, 2019). Similar logics are present in smaller urban, and rural centers with the same specializations being present but more often of mixed character and less dependent on a large concentration of people.

British professor in geography Andy Pike showcases how, in the wake of the 2008 economic crisis, the term Left behind places became well used to describe these places, especially post-industrial places in the urban fringe or in rural areas, affected by economic downturn & globalization (Pike et al., 2023). The term has been criticized for oversimplifying challenges faced in these contexts, and Pike et al. (2023) argue it can lead to stigmatization and further division between urban and rural development.

Further Pike et al. (2023) argue that discourse, and terms used in a large degree shape spatial imaginaries and their perception, meaning terms such as Left behind places in part can be harmful as they can be conveyed as being in this state in perpetuity, forever left behind by productive places.

Pike et al. (2023) points at this being highly problematic as the state of being left behind is not to be seen as absolute, being shaped by a multitude of factors differing in cause, geography and temporality. Pike et al. (2023) also highlights the highly relational nature these imaginaries, as there can be no left behind places without places pulling ahead, it constitutes an dichotomy of success & failure, very much sprung from Florida's (2002) ideals of attract oriented development where the aim is evermore rapidly adapt to changes tied to changing technological, industrial and globalized processes.

“Left behind' conditions are not solely economic in cause, expression, or solution. A wider, albeit more complex, explanatory frame and range of potential responses are required.”

(Pike et al., 2023, p. 10)

This viewpoint is also adopted by Björling & Rönnblom (2023) who argue that city centric planning is based on, and forwards stereotypical visions of these places, further they introduce the term Rurban void as a means of describing places existing outside of a urban/rural dichotomy, often neglected by planners and policy makers.

Pike et al. (2023) proposes a more sensitive use of the term Left behind place can be useful in articulating challenges present in many places currently labeled as left behind, but that there is need to acknowledge the complexity of cause and effect relationships shaping them, and to be careful as the term is inherently relational in nature. In a similar way, Björling and Rönnblom (2023) argues

market ideals influence discourse and use of terms such as solutions are seen as the aim in political processes, where a consensus rationale has replaced conflict of interests in politics leading to a de-politicization of the public.

Regional development strategies often focus on a separation of exogenous and endogenous forces, from outside or inside the region shaping development. In later years a shift can be seen to focus further on endogenous forces, and how these can be developed in unison with a smaller degree of exogenous forces (Karlsen & Dale, 2014; Anttiroiko, 2014).

Further a notion of path dependence is a large part of these theories, it is presented by Norwegian professors in geography Asbjørn Karlsen & Britt Dale, where past decisions and events shape paths forward for a given region. This takes the form of assets, cultures and practices shaped by former industrial development having high value in decision making for the future (Karlsen & Dale, 2014).

Karlsen & Dale (2014) refer to professor in economy & geography Gernot Grabber (2009) who presents three kinds of lock-in effects in this path of dependence, functional, cognitive and political which are described as part of former close ties between, industry, politics and labor movements in industrial regions further emphasizing these effects.

By adapting the notions presented by Pike et al. (2023) the referral to similar contexts in terms of being left behind, can be seen as perpetuating these lock-in effects.

In Slite this can be seen in an unwillingness to change paths away from extraction heavy practices being explained by valuing the investments made in the cement plant, the culture of quarrying, a perceived regional dependence on the cement company and an overarching fear of being left behind.

A more hopeful viewpoint exists in the notion of path contingency, where local stakeholders inherit and build upon resources left behind by previous industrial endeavors, where new paths are latent in old ones (Karlsen & Dale, 2014).

Similarly, Austrian researcher in geography Franziska Görmär & Dr in geography Jörn Harfst introduce an understanding that a more holistic relationship to industrial culture is needed (Görmär & Harfst, 2019).

They describe industrial culture as the sum of development processes present in an industrial

Spatial imaginaries are concepts such as The west, The global north or Eurasia which are forms of textual representations of places, they reduce complexity by shaping identities through homogenization of space.
(Lawson et al., 2020)

The creative class is a notion first presented by urban studies theorist Richard Florida in his book, The rise of the creative class. from 2002.

It is used to describe what Florida (2002) sees as an emerging class of people engaged in knowledge based professions. Florida argues that global cities compete to attract the creative class, something that has been criticized as an oversimplification.

region where the long predominant industry gives rise to a specific set of conditions ranging in types, such as skills, traditions, attitudes, etc. In doing so Görmar & Harfst (2019) introduces a broader view of what can be considered industrial heritage that encompasses more intangible resources, which in Slite includes a strong business sense, well developed association life and inherent adaptability in the local community.

Common in the theory is a willingness to both find and craft narratives for development. Häyrynen and Semi (2019) describe this when presenting findings from the city of Kajaani, Finland, where there are three local narratives; The small town, the closure and a narrative of traction. Where the small town represents a uniqueness found in the local community, the closure deals with the catharsis that is a closure of the main industry and the traction narrative is about a need to keep, and attract new residents to the region.

A shift from favoring globalized city development can be seen in post-covid theories, especially in the aftermath of Russian invasion of Ukraine and other world events bringing up inflation and highlighting a fragility of global resource chains (Florida, 2021; Pike et al., 2023).

Florida et al. (2021) argue the global pandemic created interest in small-scale industry, providing goods for local supply chains, pointing specifically at healthcare goods, but acknowledging an extension to other supplies. Further they argue this will benefit small-medium sized urban centers as they are more suited in facilitating small scale industry.

Further they point at the remote working trend taking off during the pandemic, with online connectivity allowing the creative class to be flexible in where they live and conduct the majority of their work, whilst also pointing out the classic centers of work are still in high demand as remote work will continue to be paired with face to face meetings.

Pike et al. (2023) on the other hand argue many of the approaches for dealing with places identified as left behind in the post-covid era are to be interpreted as being focused on fixing symptoms of being left behind rather than the causes.

The need for speculative design

With this theoretical reading of the present day conditions the need for presenting alternatives becomes important, Björling and Dyrssen (2016) argue the formulation of alternatives gives a chance to disclose resources not visible in the present context.

This is in line with methodologies of speculative design, which professors of Design & Social Inquiry Anthony Dunne & Fiona Raby (2013) propose is much needed, not mainly to seek probable futures but rather to explore what futures are possible, and in doing so we might discover both what futures are preferable, worth working towards but also what futures we do not want and should actively work against (Dunne & Raby, 2013).

The methodology also allows for design work to unfold in a space that lies in between reality and the impossible, granting desirable levels of artistic freedom needed to be able to present scenarios of an uncertain future (Dunne & Raby, 2013).

The current divided community in Slite showcase the need for presenting alternate futures to be able to understand what can come next.

*“By formulating alternatives,
resources that are unrecognized in
the present context can be
disclosed”*

(Björling & Dyrssen, 2016)

Key takeaways

With urban political ecology serving as a viewpoint through which the other theories have been viewed and assessed, the key idea that human-nature dichotomy needs to be challenged and the concepts of metabolic flows being key ideas shaping the rest of this thesis. An understanding that they are closely tied to a need for creating complexity in understanding similar contexts to Slite that is often lacking, has guided this thesis.

With this the concepts of shadow places, and the notions tied to wasteland and how humans view places left behind when industry leaves as derelict rather than places of new beginnings further influenced a new viewpoint where the new conditions created by industry must be seen as the starting point for what comes next.

This was further emphasized in Braae & Diedrich (2012) as they indicate careful transformation of harbor sites can serve to counteract homogenization in planning processes which led to an understanding that the industrial harbor of Slite is a new condition created by industry to be further developed in a future transformation.

By adhering to the notions of public domain, a better understanding of what spaces act as arenas for exchange became clear, and that they often transcend public-private boundaries being produced by the community using them.

In theory centered on urban and regional planning key concepts helped further understand the processes shaping places facing similar challenges as Slite. An incautious use of spatial imaginaries such as the term left behind places can harm future development by indicating a state of being forever left behind, especially as the field is heavily narrative driven.

With this, interventions aimed at helping local communities often end up addressing symptoms of underlying challenges by striving for providing solutions rather than addressing underlying inequalities and causes. This opens up a viewpoint that challenges the consensus driven development where conflict is important and addresses differing views, motifs and incentives for change.

Further the concepts of path dependency and -contingency in combination with a refined notion of industrial culture rather than industrial heritage again highlighted the need for seeking more complex viewpoints when dealing with similar contexts.

Finally the theories tied to speculative design not only highlighted and helped understand the need for formulating alternatives, but more so articulated the methodology is well suited for creating complex understandings of specific conditions in post-industrial contexts.

In the next part of the thesis other projects that have, or are currently dealing with Slite are presented.

Further architectural projects that have helped guide this thesis are presented, before continuing on to the specifics of Slite.

What has been done before?

In the research phase of this project, I came across two previous master's thesis works that present solutions for challenges faced in Slite.

These have been an inspiration for my work, as well as helped guide my work as to where to investigate further.

Landscape architects Näslund & Östlund (2014). Present ideas on how to turn the old quarries into experience-based landscapes focusing on biodiversity solutions where nature meets the industrial heritage landscape.

Architect Ahmed (2023) utilizes urban political ecology to read the extractions sites in Slite and presents a future for Slite centered on new innovative methods for cement production utilizing algae as the new input material instead of limestone. In addition, the project suggests that the sports associations that have a strong presence in Slite today are allowed to shape the future town also leaning on tourism as a key factor for future development.

In addition, a bachelor's thesis focusing on the emergence of the company town Slite written by Ragnerstam (2023) has helped clarify the emergence of the spatial form of Slite today.

Additionally, several local forces are working to develop Slite with Slite intresseförening & Slite utveckling as the most prominent ones today. They have developed a local development plan, and in doing so conducted interviews and produced a SWOT-analysis for the future of Slite towards 2027. (Slite intresseförening, 2022).

Region Gotland (2021a). has also published a mapping of sociotopes in Slite conducted by spacescape which highlights accessibility to sports & closeness to nature as being important for inhabitants in Slite whilst pointing out important spaces in and around Slite. Additionally, Region Gotland (2021b). is currently in the process of producing a new comprehensive plan for Gotland 2040, this is set to be finished in Q1 of 2024, the draft which has been up for political evaluation which has been useful.

References

By analyzing architectural projects in similar contexts, further insights in challenges, common practices and viewpoints useful for the projects was gained.

The projects described here all deal with post-extraction landscapes in different ways and with differing solutions. The common denominator between them is a respect for the cultural heritage that lies in such places and a want to emphasize this through transformative interventions. By extracting viewpoints, or approaches these projects have helped further develop the design part of this project.

Decomissioning, Svea Coalmine Svalbard

LPO Arkitekter 2018-2020

As a new mine opened in 2015 on Svalbard, the production in Svea Coal mine was put on hold and a 100-year history of coal production ended.

LPO architects were commissioned to plan the closing of the mine and its return to nature between 2018-2022. In addition to the design work architects Lilli Wickström & Ingvild Sæbu Vatn have contributed to the book Return to nature, (2023) which describes the process of working with the cultural and natural heritage that is the mine site.

This project has helped highlight the intricate nature of working with nature restoration whilst acknowledging the value of important cultural heritage. The special nature of Svalbard, and its governance also presents, both challenges and opportunities that are both universal and highly specific in nature.

A key factor in the project has been the understanding of the timeframes of natural processes and how to work, through architectural practices, to help enhance these to in the end, reincorporate the mine into an new "natural" landscape whilst keeping a bare minimum of manmade structures that make out important cultural heritage sites. The focus in community in the understanding of cultural heritage has been helpful for this thesis.

Masterplan, Zollverein Coal mine OMA 2001-2007

The two coal refineries at Zollverein Essen, were closed in the 1988 and 1993 respectively and in 2001 it was declared a world heritage site in part due to the masterplan for the area presented by OMA (OMA, 2023)

The masterplan focuses on creating accessibility at the industrial site by introducing new roads and opening the coal transporters to serve as walkways for the public. The project positions new functions in a band around the industrial buildings to allow the site to maintain its sense of scale.

The orange escalator serving as the entrance to the Ruhr museum has become an important image of transformation in the Ruhr area.

The strong focus on preserving, and enhancing the iconic structures, and spatial forms of the industrial sites of Zollverein, in combination with the introduction of new functions creating new dynamics in the place, has been helpful in positioning the design part of this thesis, where valuing not only the built structures but also their dependencies and spatial relationships become important.



*Svea mine
(LPO arkitekter, 2023)*



*Zollverein
Authors photo*

Masterplan, Bungenäs Skälsö Arkitekter 2019

Bungenäs on Gotland, some 30 km north of Slite is a site very much shaped by the limestone industry, quarrying and processing coming to an end in the 1960's. At this time Bungenäs was the largest limestone quarry on Gotland. (Skälsö Arkitekter, 2011a) later on the military used the peninsula before Skälsö arkitekter devised a zoning plan & design program from the site in the early 2010's

The plan incorporates the cultural heritage of the limestone industry and military into a highly valued recreational housing area, with bunker villas reaching price points of 50-million SEK.

This project has helped position my work in a way, by presenting an alternative transformation that has not given back to the local community.



*Zoning plan for bungenäs,
(Skälsö Arkitekter, 2011b)*

Situation

Gotland & Slite

Gotland

Gotland is Sweden's largest island, situated around 80 km of the east coast of mainland Sweden in the Baltic Sea, and some 120 km west of the Baltic countries, with Latvia being its closest neighbor to the east.

Due to its strategic location in the Baltic Sea, Gotland has a rich history, with different rules throughout history and a strong history of trade with Visby, the only city on the island, being an important trading city since at least the 900 CE with a strong position within the Hanseatic league in the Middle Ages (Britannica, T. Editors of Encyclopedia, 2014).

Today the main businesses on the island are agriculture and food production, with Gotlandic branded products being seen as exclusive and of high quality. Tourism also accounts for a large part of the income on the island with around 900 000 visitors annually, which in relation to the 61 000 permanent residents on the island make for an island characterized by an influx in temporary residents, especially in the summer months (Regionfakta, 2023).

The Gotlandic business environment is also characterized by an above average number of self-employed people with 16 % of inhabitants being business owners (Regionfakta, 2023).

Additionally extractive industry utilizing the sedimentary, calcareous bedrock consisting of lime- marl- and sandstone formed in a tropical sea some 430 million years ago, have been an important part of the income on the Island, especially in the northern part of the Island where soils are poorer compared to the southern part of the island (Göransson et al., 2022).

Today the main extractive industries are Nordkalk which operates at the site Storugns producing limestone and quicklime, SMA minerals operating in Stucks & Klinte producing crushed aggregates and limestone & Heidelberg Materials operating the cement plant in Slite with quarrying in Slite & File Hajdar (Göransson et al., 2022).

Slite

Slite is located on the northeastern part of Gotland some 35 kilometers from Visby, the town is situated in the inlet to *Vägumeviken*, a bay that stretches 7-8 km in from the Baltic sea. The inlet also houses the only real archipelago on Gotland with Asunden and Eneholmen being the biggest Islands.

The town is connected by bus service to Visby and Färösund and serves as a regional hub for the northeastern part of Gotland with health services, school, library etc.

In 2020 Slite had around 1450 inhabitants.

The town is heavily shaped by the extraction of Limestone and processing into cement at the cement plant operated by Heidelberg materials.

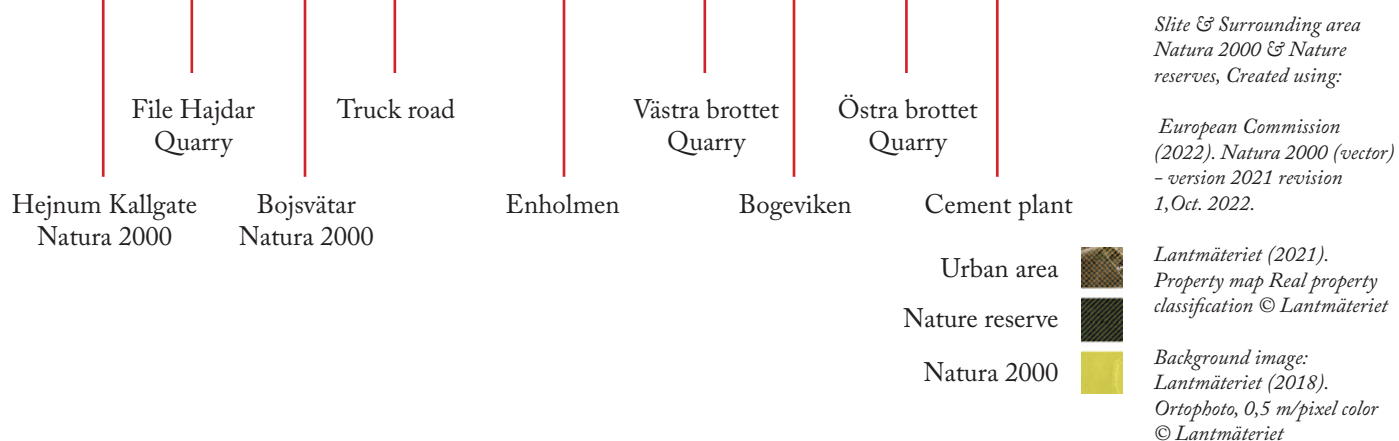
Slite is heavily reliant on the surrounding area to fill the job opportunities in town, and showcases a positive commuter index, with more people coming to Slite to work than going away. The commuting density of

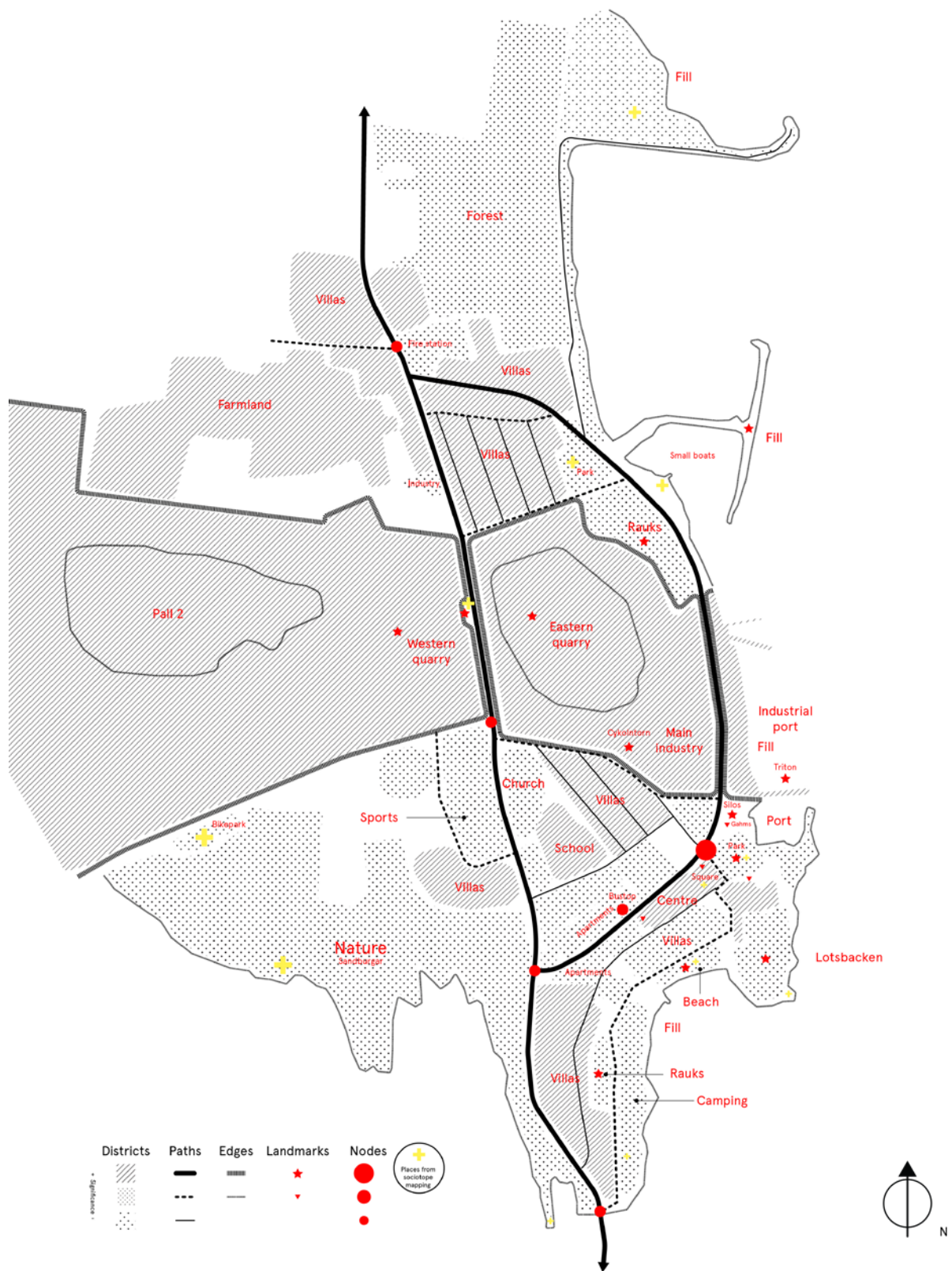
Surrounding
Natura 2000
Kallgate an

"Natura 2000 is a network of protected areas covering Europe's most valuable and threatened species and habitats. It is the largest coordinated network of protected areas in the world, extending across all 27 EU Member States, both on land and at sea. The sites within Natura 2000 are designated under the Birds and the Habitats Directives." (EEA, 2023)



Slite on Gotland





The spatial form of Slite is heavily impacted by the Cement plant and its industrial sites which act as a barrier separating the town into two parts connected only through two roads.

The southern part of this divided town houses the main center of Slite with a mix of functions, with school, municipal functions, shopping and residential areas. The northern part of town is more heavily dominated by residential areas before farmland and forestry define the edge of town.

Initial mapping of Slite using methodology developed by Lynch (1960), see p. 42.

Demographics

The population of Slite has throughout history been highly dependent on industrial endeavors in town. The number of inhabitants rose significantly at the end of the 19th century as limestone extraction rose and later transitioned into the cement industry of today (Öhrman, 1987).

The peak number of inhabitants was reached in the 1960's at around 1800 inhabitants and has since gone down to around 1450 permanent residents today (SCB, 2021).

It's important to highlight that this number showcases permanent residents not accounting for temporary summer residents, which have become a larger part of the demographics of Gotland, including Slite in the last years.

Although Gotland saw a significant rise in permanent residents in 2021 Hannfors (2022) argues in a rapport on the regional housing market of Gotland, that the increase in temporary residents that chose to register as permanent residence during the covid-pandemic skews this number and that one rather should talk about the line between permanent and temporary residence being blurred.

The increase in inhabitants during the summer months also presents challenges when it comes to other infrastructure needs as they need to expand significantly during these months whilst downsizing during the winter. This creates a need for seasonal adaptability.

Additionally Hannfors (2022) presents a number of demographic challenges tied to the housing market on Gotland such as a high number of young people being forced to live at home due to lack of affordable housing. Gotland also has an aging population with a disproportionate number of people above 40 years old and an almost 5 year higher average age compared to the rest of Sweden.

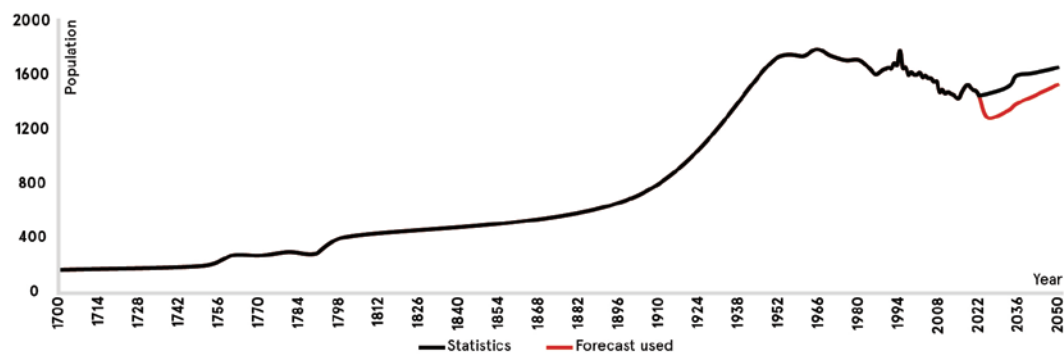
When looking at Sweden as a whole the average life expectancy is forecasted to increase by over 5 years towards 2070 leading to an aging population as a whole (SCB, 2023b).

The demographic forecast for 2032 presented by Region Gotland (n.d) points at a steady number of inhabitants in Slite at today's numbers whilst reinforcing the view of Hannfors (2022) with an increase in inhabitants older than 40 years old (Region Gotland, n.d).

In presenting speculative scenarios for a post-extraction future of Slite it becomes important to understand and stipulate future demographic scenarios based on these facts and forecasts.

The end of extraction and processing of limestone in Slite would certainly lead to a temporary decrease in inhabitants as the main job provider disappears but could provide a resurgence for the town of Slite as new conditions shape the future.

The speculative scenarios are therefore based on a dip in population of around 10% in 2025 with most of these people being of young working age. This leads to an enforced effect on the aging population. The need for adaptability due to seasonal variations in inhabitants persists as tourism is not likely to decrease.



*Inhabitants in Slite
1700 - 2050
Created using data from SCB
(2021) & Region Gotland
(n.d)*

Gotland, an island of highly altered landscapes

Viewing Gotland through Urban political ecology

When applying the lens of Urban political ecology in the viewing of the Gotlandic landscape, a picture of a natural landscape that has been highly altered by metabolic processes in the anthropocene, dominated by farmland, forestry and extraction sites emerges.

Quarrying of Limestone

The quarrying of limestone on Gotland dates back to the 4th century with sites of extraction matching favorable bedrock conditions where limestone & marlstone is abundant (Ahlberg & Udd, 2009).

The extraction of limestone has had severe impacts on the landscape of Gotland with large areas being quarried and later left abandoned as the resources were depleted or socioeconomic factors deemed the extraction to not be economically viable.

An increase in chloride levels in the freshwater supply common on Gotland can be linked to extractive activities on the island. As freshwater is extracted from the ground at a higher level than it naturally replenishes, the risk of saline fossil water, water that has been trapped below the freshwater supply for millions of years, entering the water supply increases (Eklund, 2018).

This risks permanently polluting the water supply at the specific site, which has become more common in later years (Eklund, 2018).

The limestone industry on Gotland is directly tied to this issue as the water being pumped out of quarries, often directly into the sea, equates to roughly 15% of all freshwaters being used on Gotland; this number is on par with all water consumed in private households on the island (Eklund, 2018).

Additionally this issue is forecasted to increase as the impacts of climate change are believed to decrease the accessibility of groundwater during the summer months by upwards of 30% by the end of the century due to changing precipitation patterns and increasing temperatures (Eklund, 2018).

Diking for farming & Forestry

The alteration of the landscape increased in scale by the end of the 1700's, when large scale diking started on Gotland, since then area of wetlands on the island has diminished from an estimated 16% of the total land area pre-industrialization to only 7% in 1996 (Martinsson, 1996).

The quarrying for mineral resources & groundwater outtake for farming during the dry season also continues to impact the remaining wetlands negatively (Martinsson, 1996). A prominent example of this extensive alteration of the wetlands ecosystems on Gotland is the Diking of Mästermyr in the early 1900's which changed what was a connected wetlands landscape spanning almost across southern Gotland east to west into farmland (Sjöstrand, 2023).

The alteration of these wetlands systems also has an self enforcing effect as the wetlands serve a crucial function in retaining and restoring groundwater supplies (Eklund, 2018).

The natura 2000 area Hejnum kallgate is a wetlands situated directly adjacent to the quarry in File Hajdar and is highly debated, as opponents of an extended permit suggests that further quarrying jeopardizes the groundwater levels and salinity of the water in the area (Länsstyrelsen Gotlands Län, n.d.).

Holmén (2017) suggests in a rapport produced by Golder Associates for the cement company that there will be a lowering of the groundwater level by upwards of 4.1 meters at the end of the dry period in July each year and that salinity in the municipal water supply will increase, but argues that neither of these aspects are to be seen as having significant impact in the area. This projected increase in salinity sits at the core of the ongoing debate on whether or not continued quarrying of limestone will impact the local community negatively.

Today 37% of Gotland's area is covered by active forests which grow at a rate that make them productive for forestry, while 6% of Gotland is covered in inactive low productive forests mostly in the typical Alvar areas (SCB, 2023a).

Alvar is an uncommon nature type, most found on Gotland & Öland consisting of limestone bedrock with little to no top soil. On Gotland the areas were historically used for grazing but this practice is becoming more uncommon as higher yielding pastures are used. (Länsstyrelsen Gotlands Län, n.d.)

Built environment and (r)urban sprawl

Throughout history favorable conditions have dictated where humans have settled and developed communities. Proximity, and access to water supplies to a high degree overlap where larger settlements on the Island exist today. Additionally arable land & natural harbors have also been of high importance.

As populations have grown, and as previously mentioned altered the natural landscape, water quality and supplies have been altered leading to parts of these settlements increasingly experiencing a lack of water during the dry season.

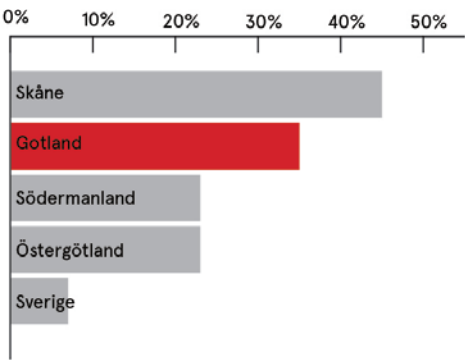
As settlements have, and continue to grow, in processes commonly known as (r)urban sprawl, the connection between arable land and settlement also becomes problematic as farmland is being developed on. Between 2016 and 2020 67% of the arable land being turned into non-arable land in Sweden was situated within 1km of an urban area (Ljungström & Svensson, 2021).

This is especially problematic as the process in all meaningful time spans is irreversible, leaving the areas out of play when it comes to food production (Slätmo, 2017). This process also leads to a fragmentation of the available farmland increasing pressure on farmers and limiting use as scale highly affects what crops are economically viable in current market rationales. (Brabec & Smith, 2002)

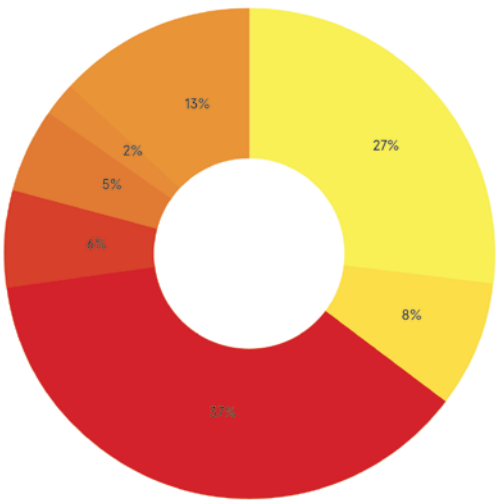
This can for example be seen in the fact that the amount of arable land being used for cereals in Sweden during 2022 was the lowest since the gathering of statistics started in 1865 (Olsson, 2022).

Today Gotland has the second highest percentage of farm- and grazing land in Sweden compared to land area amongst regions at 35%. Gotland also ranked high on the amount of built up areas, sharing a sixth place at 5%, part of this can be attributed to quarrying as the activity falls under this category (SCB, 2023a).

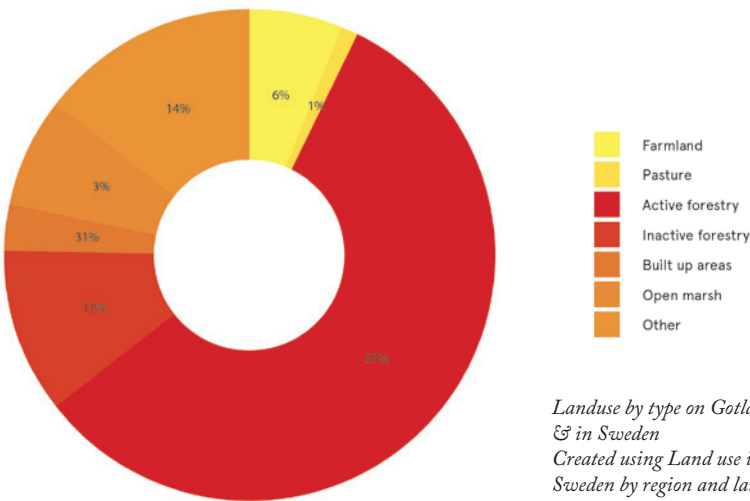
An important tool in creating an understanding of these conditions have been visualization through the use of GIS software and older maps to create images where overlaid information highlights the interdependence between certain conditions. Where a pattern of use and spatial form of communities and human intervention emerges, a selection of these visualizations are presented in the next pages.



Percentage of farmland per region
Created using Land use in Sweden by region and land use category. Every fifth year 2010 - 2020 (SCB, 2023a)



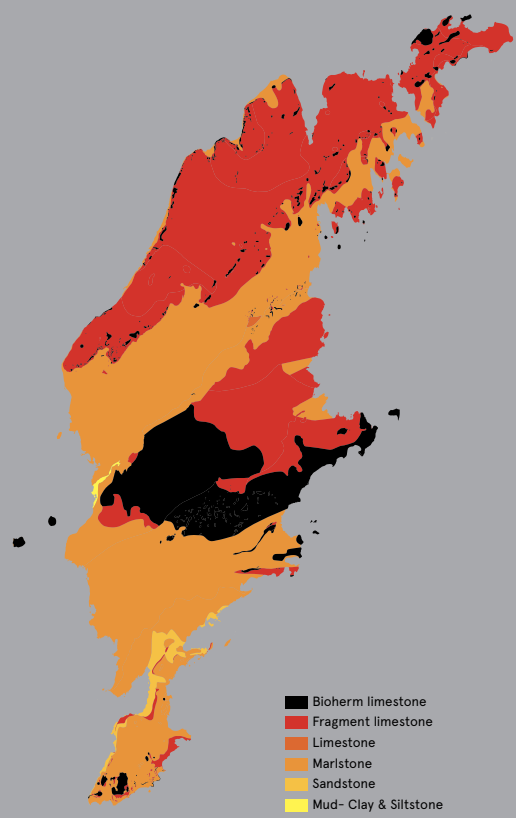
Landuse on Gotland



Landuse by type on Gotland & in Sweden
Created using Land use in Sweden by region and land use category. Every fifth year 2010 - 2020 (SCB, 2023a)

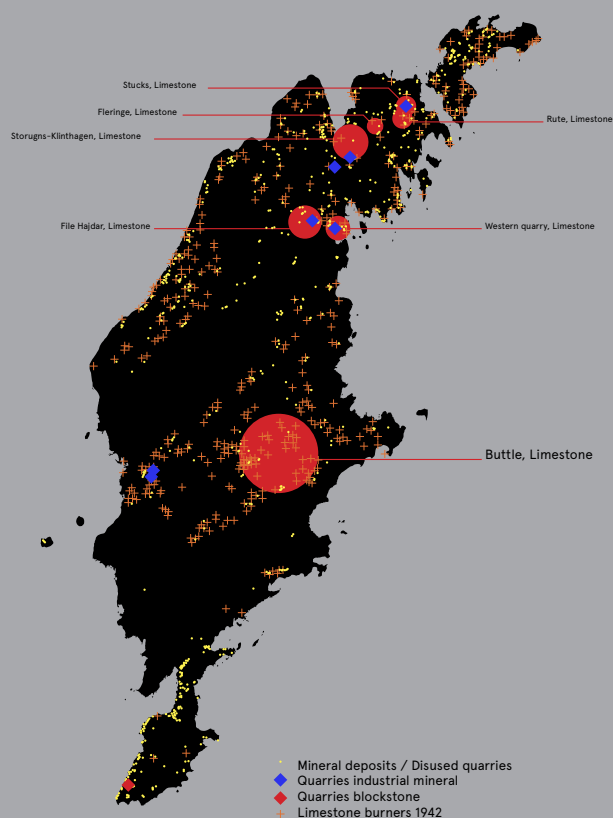
Landuse in Sweden

Bedrock



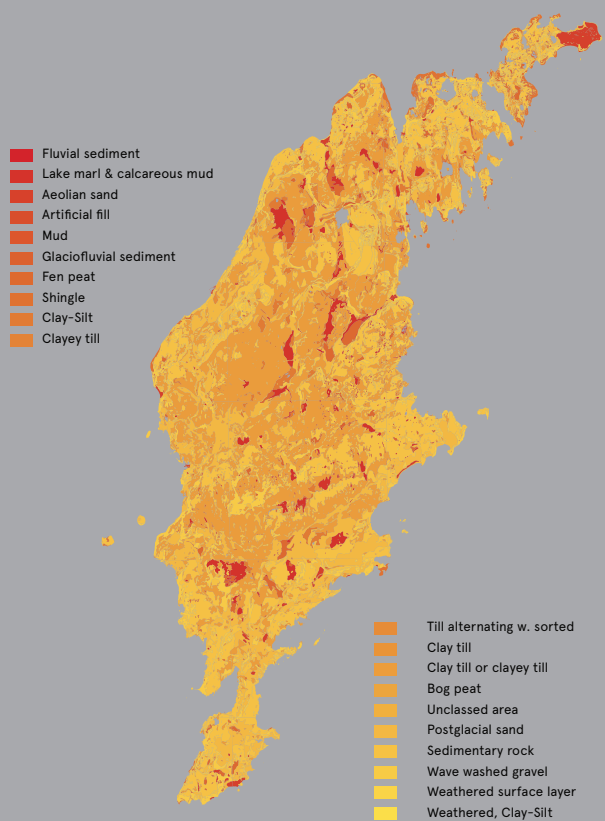
Map of bedrock, Created using:
SGU. (2024). GE.Bedrock 1:50 000 - 1:250 000 © SGU

Extraction sites



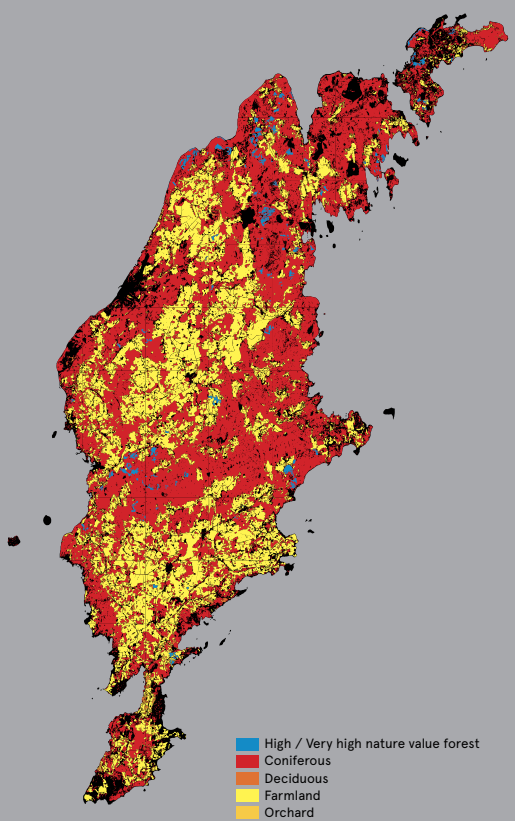
Map of extraction sites, Created using
SGU. (2022). MR.Mineral Resource © SGU

Soil types



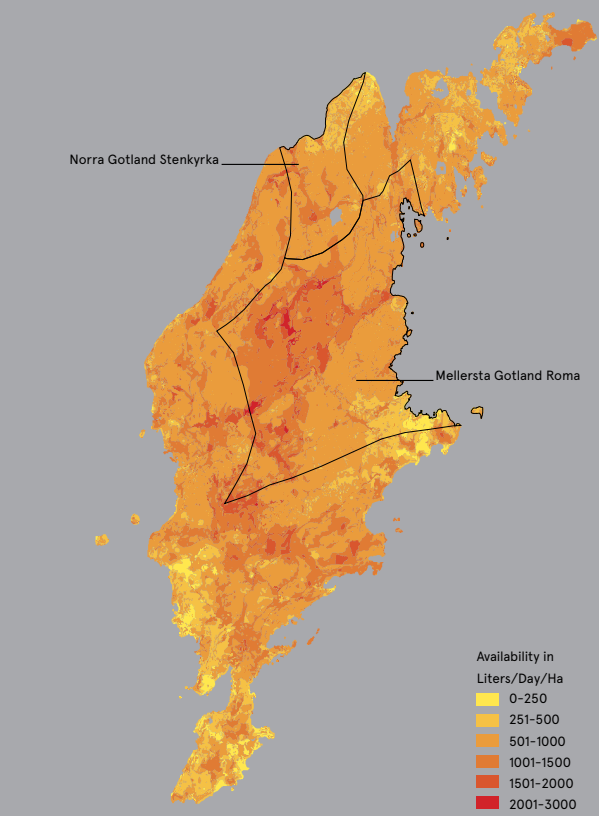
Map of Soiltypes, Created using:
SGU. (2023a) Surficial Geology © SGU

Landuse



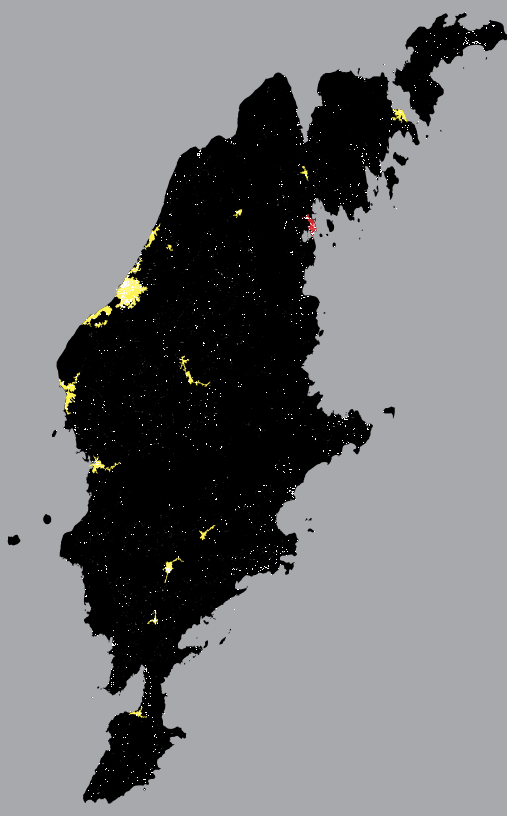
Map of Landuse, Created using:
Lantmäteriet. (2021). Land cover Download inspire © Lantmäteriet

Water availabiliy



Map of groundwater availability, Created using:
SGU. (2023b) Grundvattenförekomster (öppna data) © SGU

Built up areas



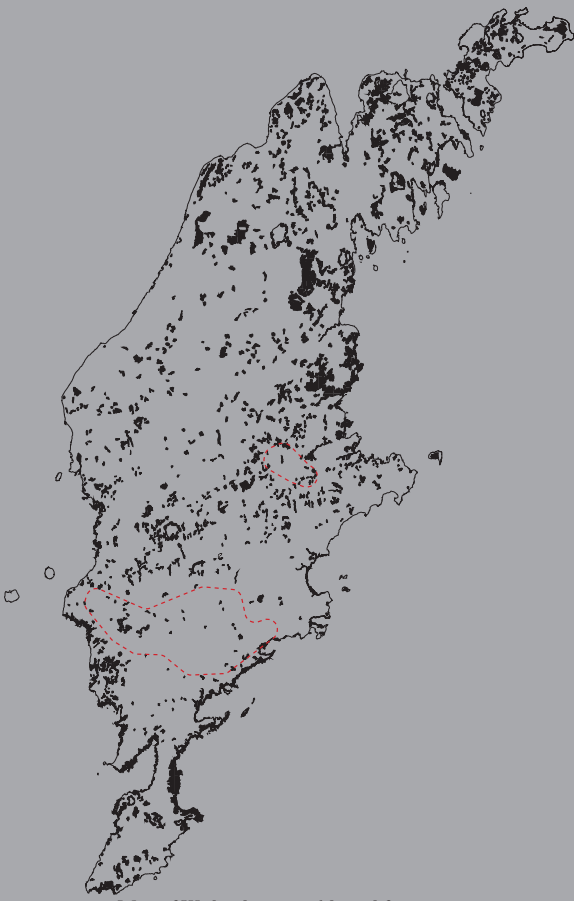
Map of built up areas, Created using:
Lantmäteriet. (2019). GSD-Fastighetskartan, vektor © Lantmäteriet

Wetlands 1700

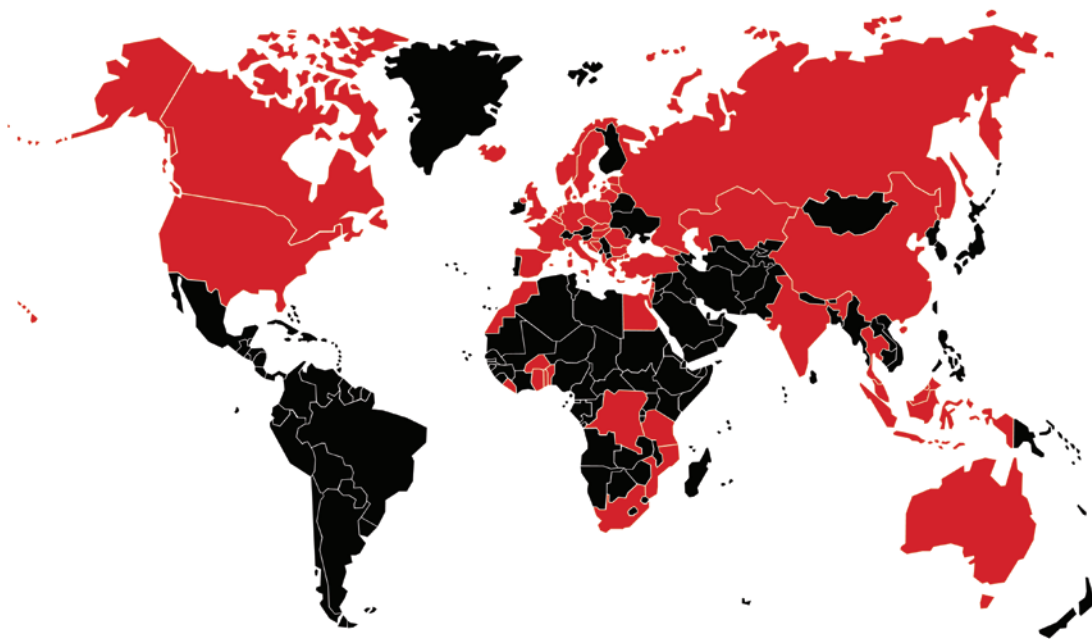


Map of Wetlands 1700, Adapted from:
Dahlqvist et al. 2017

Wetlands 1996



Map of Wetlands 1996, Adapted from:
Dahlqvist et al. 2017



Map of Heidelberg materials and subsidiaries across the globe.

The cement company & permits Heidelberg Materials

Heidelberg materials is a multinational company group that specializes in building materials.

They are the current owners of the cement plant in Slite, after acquiring the cement company, then called Cementsa from Scancem in 1999. (Heidelberg materials, 2024)

In 2016 Heidelberg materials including subsidiaries were present in 60 countries and operated around 3000 production sites, including over 150 cement plants, with a production capacity of around 200 million tonnes of cement. (Heidelberg materials, 2016)

In 2022, Heidelberg Materials Cement Sverige AB had a revenue bordering 3 billion SEK with an income of 500 million SEK, not including other ventures in Sweden owned by Heidelberg materials, which include: *Heidelberg Materials Precast Abetong AB*, *Heidelberg Materials Betong Sverige AB*, *Heidelberg Materials Precast Contiga AB*, *Heidelberg Materials Alternative Fuels & Heidelberg Materials Ballast Sverige AB*, which operate in a number of industries tied to materials.

The plant in Slite produces around 2.5 million tonnes of cement and together with the cement plant in Skövde, also owned by Heidelberg materials, produce upwards of 75% of all cement used in Sweden. (Heidelberg Materials, n.d-b)



- Heidelberg Materials Cement Sverige AB
- Heidelberg Materials Precast Abetong AB
- Heidelberg Materials Betong AB

Map of Heidelberg materials locations in Sweden



There are currently two permit processes ongoing tied to the cement plant in Slite.

The most debated is the one to renew and extend the extraction permit for *File Hajdar & Västra brottet* the process.

The process started in 2020 when the Land and Environment Court granted the cement company a 20-year extension of the permit for *File Hajdar & Västra brottet*. This permit was appealed in the Land and Environment court of appeal where it was revoked in July 2021, with the previous extraction permit ending in October 2021.

This decision in turn sparked a fear for a cement crisis in Sweden prompting the government to intervene and grant a temporary permit spanning 2022. In the same year the cement company applied for a shorter, 4-year permit aimed at bridging the gap for a new permit process to take place. This permit was granted at the end of 2022 and is the current permit for the quarries with an end date of 31st of december 2026.

In December 2023 the cement company submitted a new application for a 30-year extraction permit including an extension of the site in *File Hajdar* (Heidelberg materials, 2023; Redin, 2022).

In addition to this process, a process for an expansion of the cement plant, with an increase in production capacity to 3.2 mt from today's 2.5mt and foundations for a new CCS-plant are running in parallel.

The processes are separate but must be seen in unison as they very much impact each other. The goal for the cement company is to submit the application in the first half of 2024 with improvements being done and a fully functional CCS-plant being in use by 2030 (Heidelberg materials, n.d.-a).

The extension of the plant would include new functions being added to the industrial harbor and the total number of annual ships docked increasing by around 240 ships (Heidelberg materials, n.d.-a).

The extension of the cement plant has raised concerns about impacts on the town, especially as the plans include the closing of Storgatan, one of only two roads connecting the northern and southern part of the town (Fullman, 2023). Additionally concerns about the proposed expansion of the harbor areas and its impact on the marine environment, added risk of fires & chemical accidents and increased noise pollution are being raised (Leino, 2023).



CCS is short for Carbon Capture & Storage, referring to technology aimed at extracting carbon from industrial processes in order to compress it, transport it and ultimately store it deep underground. (Naturvårdsverket, n.d.)

History

The history of Slite

Slite and its surrounding area has a long history of human settlement, the landscape and its specific conditions, mainly tied to good harbor conditions, fertile land and abundant mineral resources have served as the base for inhabitants. These inhabitants have throughout history altered the natural landscape to suit needs and improve living conditions, creating a landscape today heavily shaped by metabolic processes of extraction.

The area surrounding Slite has been inhabited for upwards of 6000 years with remains of early settlements found in nearby *Lärbro* from 4000 BCE. As the sea level was considerably higher the only parts of Slite protruding out of the sea were the higher lying areas of *Solklint*, *Lännaberget* & *Lotsbacken*. As the sea level receded more and more land became available and settlements came closer to modern day Slite with the first remains from within the border of the town being from the bronze age around 2000 BCE. Archeological sites in the surrounding parishes point at Slite & *Bogeviken* being an important harbor and trade site from the bronze age onwards with far reaching trade networks, especially eastwards (Öhrman, 1983).

As settlements became more permanent agriculture increased in intensity and started to alter the landscape to better suit new needs, the remains from 200-500 CE overlaid the earliest available maps from the 1700's indicate the landscape structures created then became the foundation for the agrarian cultural landscape of today inland from Slite proper (Öhrman, 1983).

Around 500 CE there are indications some of the farms were abandoned, the cause is debated but it is described in the Guta saga recorded in the 13th century that the population grew too large and the land could not feed them all, therefore every third man was forced to leave to find new settlements (Öhrman, 1983). This abandonment can point at the soils not being fertile enough to support a growing population.

Around 400 CE, the quarrying of limestone started on Gotland, later developing with the construction of stone churches and burnt lime products starting around 1000 CE. Early exports of stone were made from the Island around 1100 CE (Ahlberg & Udd, 2009; Öhrman, 1987).

In the late 1300's the first signs of how global conflicts impact Slite become visible as the teutonic order captures Gotland and fortifies Slite. A time of unrest was followed by Danish

rule and there are indications Slite was used for shipbuilding by the Danes (Öhrman, 1983). The first written sources mention Slite as *Slijt* in the 1300's, with the name probably stemming from a large limestone formation in Latvia, *Slitare* (Öhrman, 1978).

In the 1620's the Danes founded The Gullandske kompani with the intention to exploit Gotlands vast natural resources starting a wave of early business investments into sawmills & quarries to export lumber, sand- & limestone to be used in construction in Denmark (Öhrman, 1987).

These investments marked the start for a larger scale of industries in Limestone, Forestry and Shipping in and around Slite with the first large scale limestone furnace used for exporting burnt limestone being built on *St. Olofsholm* by Gullandske kompani some 6 km east of Slite in 1621 followed by a furnace built in Slite at *Länna gård* in 1647 which was in use until 1880 (Öhrman, 1978;1987).

As the limestone industry in Slite took form, first with production of burnt lime and later on slaked lime and finally cement. The industry has been concentrated to a few families with increasingly bigger land ownership and impact on the landscape, commonly referred to as "kalkpatroner" or limestone merchants. According to Öhrman (1987) the main limestone merchants in Slite were; in the 1600's the Schröders, the 1700's Fries & Sturtzenbecker and during the 1800's Fähræus, Enequist & Nyström.

Another of the important names is Jacob Momma who in the 1600's leased Gotland and began work on strengthening business on the island, with interests in agriculture, fishing, limestone, export & import of goods. Momma took a special interest in Slite and worked on improving Slite harbor by erecting warehouses, *Slite Bodar* and had by 1666 centered his businesses to Slite, upsetting merchants in Visby. This also marks the first time city rights are discussed for Slite, with Momma being a proponent due the quality of the port (Öhrman, 1983).

Momma is most known for his shipyard located by *Länna gård* which in the 1670's was among the largest shipyards in Sweden with the abundant supply of oak trees serving as the base for its existence. The shipyard also constitutes the first part in Slites long history as a company town, with specialized Dutch shipbuilders immigrating and the shipyard providing free healthcare for workers. The shipyard had a short life time and quick

Cultural landscapes are landscapes more or less impacted by human activity, commonly group by use type, Agrarian, Urban & Industrial

fall, serving as an early example of an evermore globalized economy, where Momma's investments in northern Sweden failing impacted operations in Slite (Öhrman, 1983).

The history of Slite in the 1700's is shaped by an increase in industrial and mercantile activity in town with records showing a total of 83 Limestone furnaces & kilns on Gotland by 1733 and 4 furnaces in Slite by 1741 (Öhrman, 1987).

In addition changing geopolitical conditions see *Karlsvärds fortress* on *Enholmen* being built and upgraded several times, before finally being decommissioned by 1788 as not to fall into enemy hands. The fortification of *Enholmen* also rekindled the debate of granting Slite city rights with concerns about the availability of freshwater being raised & with proposals for cutting *Bogeviken* off from the Baltic sea by filling *Sju strömmar* to provide a freshwater lake (Öhrman, 1983). This debate reflects current discussions on freshwater availability well.

The 1800's were in large part shaped by further globalization with talks about making Slite a freeport in the Swedish parliament by 1823. Further and technological advancements with the introduction of the use of coal for firing limestone furnaces in Slite which started at 1860 at *Länna gård* & establishment of a 37km telephone line to Visby, the longest in Sweden at the time (Öhrman, 1983;1987).

In addition Portland cement was invented in 1842 and the first cement factory opened in Lomma, Skåne by 1873 followed by the second in Visby by the year 1885, the year also marking the peak of pre-cement limestone processing where a total of around 200 furnaces were operated on Gotland (Öhrman, 1983;1987, Ahlberg & Udd, 2009).

The 1800's yet again showed Slite's part in the geopolitical situation with the port being blocked during the Russian occupation of Gotland in 1808, refortification on *Enholmen* being started and abandoned in the 1850's and *Enholmen* being made defensible during the Bulgarian crisis of 1885 (Öhrman, 1983;1987).

Several companies were also founded in Slite during the 1800's with shipping company; Slite Skeppsrederi Aktiebolag and shipyard, Slite Varvsbolag being prominent. The shipping company disbanded by 1883 as it specialized in sailing cargo ships and the era of steamships was to begin (Öhrman, 1983).

By 1900 Slite was mostly owned by limestone merchant Ferdinand Nyström, owning & operating 3 furnaces, a farm, sawmill, shipping

company (10+ ships), shipyard, bathhouse, commercial garden, and extensive trade in grain, wood, and limestone which he had accumulated throughout the 1800's leading him to employ around 150 persons in Slite at the turn of the century (Öhrman, 1987).

Nyström has very much shaped the Slite of today as he prospected his properties in the start of the 1900's and incorporated shipping and limestone endeavors into one company in the early 1910's before in 1916/17 finally starting Slite cement & Kalk AB which in 1917 opened Sweden's fourth cement plant (Öhrman, 1979;1983;1987).

The building of the cement plant started an increase in moving to Slite leading to an influx in new people and ideas with several popular movements formed in Slite such as free churches, sports & labor movements being prominent throughout the 1900's. This led to the establishment of churches, sports facilities and *folkets park* and later *medborgarhus* (Öhrman, 1979;1983;1987).

The first half of the 1900's saw technological advancements increasing in speed with a train line connecting Slite to *Roma* by 1902, Electric power being provided by the new power plant constructed in unison with the Cement plant by 1917, air traffic connecting Slite to Stockholm & Danzig by the 1920's. The cement also underwent expansion with investments in new harbor facilities and improved and expanded quarrying and processing equipment. By 1947 Slite was the only remaining cement plant on Gotland.

In the later half of the 1900's the plant has undergone two large expansions one in the 1960's as a shift in method took place, and one in 1970's with the expansion into *Västra brottet* and continuous quarrying in *File Hajdar* starting in 1989. By 1999 the cement plant produced and exported 1.63Mt of cement with almost 50% going abroad to Florida and South America (Ahlberg & Udd, 2009).

These advancements have impacted both the natural landscape and the built environment of Slite, significantly inscribing itself in the long line of altering the natural landscape, as seen in the dumping of ballast during the 16 & 1700' and the poor fishing starting in the late 1800's onwards.

In large the expansion of industry in the Slite is the result of complex relationships between the landscape and human needs. The easy access to limestone in combination with the poor soil quality constituted the base, with the favorable harbor conditions making Slite an excellent place

(Cultural landscapes are landscapes more or less impacted by human activity, commonly group by use type, Agrarian, Urban & Industrial)

for exporting the resources. As limestone burning became evermore important the abundance of forests on northern Gotland cemented Slite's place as a port and gave rise to the first forms of industry with shipbuilding and limestone burning being prominent examples (Öhrman, 1979,1983,1987)

The favorable port conditions have also embedded Slite in the geopolitics of the Baltic sea, and the fact has been a factor that has shaped Slite, be it from the numerous trade routes during bronze, iron and viking ages towards the east, or the fortification of *Enholmen* in the 1700's due to Russian expansions, and subsequent refortification whenever unrest stirs in the Baltic sea.

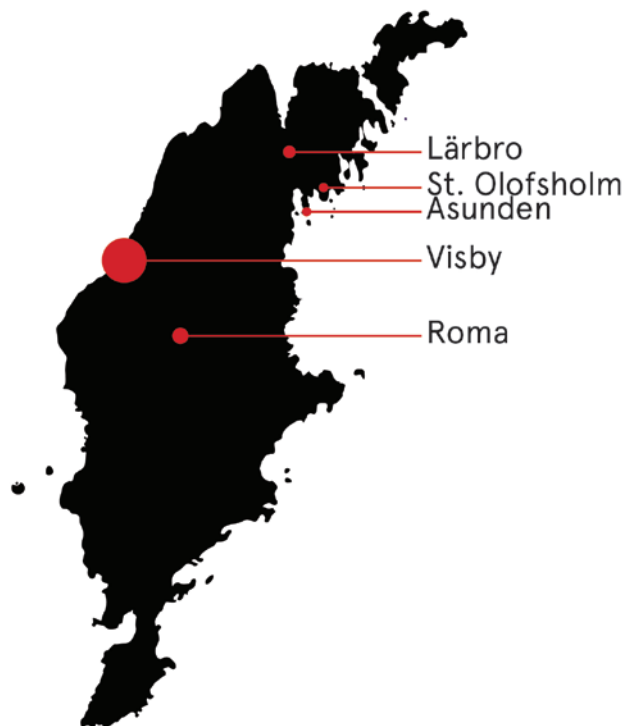
This has also been the case in more modern times as refugees from the Baltic states arrived in large numbers in the 1940's (Öhrman, 1983,1987). And works on debated Nordstream 1 gas pipeline granting *Apotekskajen* the nickname "Putin-Kajer" and Nordstream 2 not being allowed to use the harbor (Ihreskog, 2022).

Changing modes of transportation have impacted Slite throughout history from advancement in sailing and navigation during the viking ages allowing for trade routes to be established and the harbor settlement growing, steam power making transport by sailing ships obsolete at the start of the 1900's and road transport putting trains and local shipping routes out of service in the 1950's (Öhrman, 1979,1983,1987; Gotlandstäg, 2023).

Taking all this into account paints a picture of Slite, a town shaped by the specific nature of its geographical location that through history has developed through metabolic processes into a regional hub with an industrial and mercantile heritage with far reaching connections across the sea, that goes way beyond the current industrial focus on cement.

This development has also created a highly altered landscape that bears marks of millennia of human intervention in increasingly larger scales. Whatever comes next will be based on these new man-made natures and conditions.

From the vast landscapes created by quarrying limestone, the specialized harbor facilities, the built structure and its underlying structure of land ownership to a cultural heritage tied to a resourceful business mindset and strong association life that has come to be in unison with life at the cement plant.



Map of Gotland



*Länna quarry, around 1920
Unknown photographer
accessed through Othem-Boge
Hembygdsförening*

(Othem-Boge hembygdsförening, n.d.-a)



*Loading of cementsacks on a
ship, 1949
Unknown photographer
accessed through Othem-Boge
Hembygdsförening*

(Othem-Boge hembygdsförening, n.d.-b)

Timeline, early history

4500 BCE *Lännaberget*, *Solklint*, & *Slottsberget* are islands, water level 28m higher than current day.

4000 BCE Remains of first settlement in the area found in Lärbro 8 km north of Slite. Indicates the area around Slite has been inhabited for upwards of 6000 years.

2000 BCE Remains of bronze age settlements in Österby first settlements within modern day Slite situated along ancient shoreline.

1500 BCE Archeological sites in surrounding parishes indicate thriving bronze age culture with extensive trade routes eastwards towards the Baltics.

300–200 BCE More permanent settlements linked to agriculture start altering the landscape in a higher extent. The cultural landscapes formed coincide with maps from the 1700's indicating continuity in use for 2000 years.

400 Limestone quarrying for construction starts on Gotland.

500 Agricultural settlements in Slite area abandoned. Cause debated but records in the 13th century Guta saga state that the population grew too large for the land to feed them, therefore every third man was forced to leave to find new settlements.

900 – 1000 Remains found at modern day square indicate use as harbor & trading spot. Shoreline along modern day park. Pilgårdstenen describe *Bogeviken* & travels to Russia & Ukraine

1000 First churches on Gotland are built using burnt limestone products.

1000 Shoreline approx. 2m higher than today's levels, meaning the landbridge at *Sju strömmar* had yet not formed & a direct connection to the Baltic sea existed.

1100 Export of Limestone from Gotland across the Baltic sea.

1397 Victual Brothers rule Gotland, records of fortifications protecting Slite harbor.

1398 Victual rule overthrown by the Teutonic Order & fortifications destroyed.

1398 First mention of Slite, Slijt, in written sources could be connected to Slitere, a large limestone formation in Latvia.

1403 Queen Margaret I of Denmark recaptured all of Gotland except Visby. Fortifications are erected in harbors including on *Slottsbacken* & *Lotsbacken* in Slite to secure them.

1404 The teutonic order tries to recapture Slite, fails at first but later succeeds. The rest of Gotland follows.

1408 Gotland is handed over by the teutonic order to Queen Margaret I.

1500's Danish use Slite harbor for shipbuilding & repairs.

1500's *Lotsbacken* is used by shipspilots for the first time.

1574 Last stream at *Sju strömmar* was constructed.

1620's Danish found "Gullandske Compagni" to exploit natural resources on the island starting a wave of business investments in, sawmills & quarries to export sand- & limestone to be used in Danish construction.

1621 First large scale limestone furnace for exports of burnt limestone built on St. Olofsholm by Gullandske compagni 6 km east of Slite.

1647 Limestone furnace built at *N. Länna gård*, used until 1880.

1657 Laws set for fishing in *Sju strömmar* dividing fishing rights amongst the farms in Boge parish.

1650's Johan Schröder buys farms *Närs* & *Spillings* acquiring both limestone & forest resources.

1657 Works start on fortifying *Enholmen*, never finish.

1658 Limestone furnace *Lillugn* & windmill erected by Johan Schröder on *Lotsbacken*

1662–1664 *Lotsbacken* is temporarily refortified.

1662 Mårten Fries moves in to *Länna gård* building a large industry & agricultural business.

1666 Jacob Momma leases Gotland for 10 years working on strengthening business on the island. Takes interest in agriculture, fishing, limestone, export & import of goods.

1669 Works on improving Slite harbor by erecting warehouses, *Slite Bodar* rest of works never finish Momma upsets Visby merchants by concentrating his trade to Slite. First discussions on granting Slite city rights due to this expansion.

1670 Länna Shipyard is among Sweden's largest, on par with Wasa in Finland. Employed upwards of 75 people. Workforce consisting of local laborers & Dutch specialists.

1670 Johan Schröder sells his farms to Mårten fries further aggregating ownership of resources in the area.

1675 Last known ship launched at Länna shipyard as Momma's businesses crumbled due to failed investments in northern Swedish ore & wars disrupting European trade.

1678 Map shows Johan Schröders innovative fishing park, located at modern day *Badhusparken*.

1678 The Danish conquer Gotland.

1683 Limestone furnace built at *S. Länna gård*, used until 1870

1689 Maps indicate *Länna shipyard* is no longer in use.

1703 *Slite bodar* burn due to storing quicklime.

1703 Limestone furnace built on *N. Lotsbacken* in use until 1880.

1705 Ships dumping ballast in the inlet to Slite prompts the establishment of special dumping zones.

1710–1712 *Enholmen* is fortified due to an concern of Russian expansion, name changed to *Karlsvärd Fortress*.

1712 Movements in granting Slite city rights, concerns of freshwater availability raised. Proposals for cutting *Bogeviken* off from the Baltic sea by filling *Sju strömmar*.

1715 Slite harbor used as home port for several Swedish navy ships against Denmark & Russia.

1719 *Karlsvärd fortress* is upgraded after being useful in defending Slite against Russian attacks.

1733 Records show 36 limestone furnaces & 47 limestone kilns of older design in use on Gotland.

1738 *Karlsvärd fortress* upgraded again.

1730's Main buildings at *Länna gård* built.

1741 4 limestone furnaces in use in Slite, 2 at Länna & 2 at *Lotsbacken*.

1742 Gotland artillery battalion founded with *Karlsvärd fortress* being an important position.

1750 *Karlsvärd fortress* finally completed with 5 bastions.

1770's All work on *Karlsvärd fortress* suspended due to change in defense politics.

1775 Limestone furnace built on *Eneholmen* used until 1850.

1788 *Karlsvärd fortress* demolished due to being antiquated & not to fall into enemy hands.

Sources:

Ahlberg & Udd, 2009
Cementa AB, n.d, 2003
Cementa AB, 2003
Föreningen Gotlandståget, 2022
Heidelberg materials, 2023, 2024
Ihreskog, 2022
Leino, 2024
Lierud et al., 1981
Sillén, 2021
Slitebaden, 2024
Ragnerstam, 2023
Öhrman 1978, 1983, 1987

Timeline, recent history

1808 Russia invades Gotland, Swedish ships block Slite harbor.

1823 Proposal in Swedish parliament to make Slite a freeport to increase trade possibilities towards the east.

1831 Cholera station established on *Enholmen* as one of two in Sweden.

1832 First known case of Cholera in Sweden in the large epidemic of 1830's, sailor quarantined on *Enholmen*.

1835 Last use of furnaces built in 1600's at *Länna gård*.

1842 Portland Cement patented.

1850 –1925 Fishing in Bogevisken reported becoming poorer, suggested causes; lower oxygen replacement, changed streams due to building of railway & lower water levels due to ditching inland.

1850 Cholera once again arrives in Slite marking the start of the large epidemic of the 1850's.

1853 Works on new fortifications on *Enholmen* begin.

1858 Works terminated *Enholmen*.

1860 Limestone furnace fired by coal built at Länna gård, used until 1870.

1870's "Slite varvsbolag" founded later bought by Ferdinand Nyström restarts shipbuilding in the harbor.

1870 New limestone furnace still standing at *S. Länna gård* built, used until around 1932.

1873 Current Hotel building built by wholesaler Johan Axel Bachér as the old one is destroyed by fire.

1873 Lomma cement opens becoming the first cement plant in Sweden.

1874 "Slite Skeppsrederiaktiebolag" founded.

1875 Betel-Chapel, on storgatan 57 open built by the Baptist church.

1878 Visby – Hemse Railroad opens.

1883 "Slite Skeppsrederiaktiebolag" disbanded as the advent of steamships rock sailing-hipping industry.

1883 37 km long telephone line connect Slite with Visby, at the time the longest in Sweden.

1893 3 Phones in use in Slite.

1885 *Enholmen* is made defendable due to Bulgarian Crisis.

1885 Peak limestone processing using furnaces approx. 200 furnaces used on Gotland.

1885 Second cement factory in Sweden opens in Visby.

1890 Slite consists of 2 roads – Storgatan & Lännavägen.

1890's Warm bathhouse built by Ferdinand Nyström.

1892 Ferdinand Nyström buys limestone furnace at *Länna gård* & hotel building used as private residence & office.

1896 Last ship constructed at the new shipyard in Slite harbor.

1900 Slite mostly owned by limestone merchant Ferdinand Nyström, owning & operating 3 furnaces, a farm, sawmill, shipping company (10+ ships), shipyard, bathhouse, commercial garden, & extensive trade in grain, wood, & limestone with 150 employees.

1902 Slite–Roma railroad opens as new sugar factory needed access to the export harbor of Slite & the farms along the route to supply it with sugar beets.

1904 *Enholmen* is made defendable due to Russo–Japanese war

1907 Ferdinand Nyströms hires geologist to survey his properties. Findings indicate the area could support ample cement production for 70 years. The favorable

position close to port & further lime- & marlstone resources is highlighted.

1907 11 500 liters of unhydrated & hydrated lime produced & exported by Ferdinand Nyström from Slite.

1907 Stonemason later becoming Slite stenhuggeri opens.

1910 Shipping company "Rederiaktiebolaget Volo" is founded & starts the steamboat era in Slite connecting to Åbo, Slite, Copenhagen & Hull by 1911.

1912 "Aktiebolaget Ferdinand Nyströms Kalkbruk" founded incorporating shipping vessels & limestone burning into one endeavor.

1913 Limestone furnace built at *Länna gård* by Ferdinand Nyström, used until 1922.

1916 Slite cement och Kalk AB Company is founded incorporating Nyströms limestone company.

1917 Construction begins on the Cement plant, machines meant for export to Romania bought at a favorable price due to export restrictions from Germany due to ongoing WW1. Electric power plant built to supply construction site, surplus electricity used to electrify Slite. Workers union for heavy- & factory workers founded at the construction site for the new plant, marks the start of the labor movement in Slite.

1919 Slite IF founded as workers at the cement plant brings sports culture with them.

1919 Cement plant opens with one 70 m long rotary kiln, one raw mill & one cement mill. Capacity of 60 000 tonnes per year.

1919 Cement factory in Valleviken, Gotland opens.

1920's 63 residential buildings built in Slite due to influx of workforce at cement plant.

1920's Skånska cement force Fredinand Nyström to sign cartel contract prohibiting sale of more than 1/3 produced cement on Swedish market, results in increased export to South America.

1920's Air traffic connect Slite with Stockholm & Danzig.

1920 210 000 barrels of cement produced equaling to approx. 37 000 tonnes.

1920 15 shops in Slite.

1922 Football field, established by Slite IF directly north of the current entrance to Stationsgatan.

1922 Additional raw mill & cement mill installed.

1923 Works starts on Folkets park after donation from cement company of 5000 m2 plot just north of *Solklint*.

1924 Railroad company protests increasing car traffic Slite–Visby.

1927 Modernisation of coal handling & expansion of electric plant.

1929 Second rotor kiln installed at the cement plant.

1930's *Silopiren* constructed & the last shipments of limestone from Länna port are made.

1930's 18 Hole golf course opens on island *Asunden* operated by the cement company.

1931 Production of concrete tubes start.

1931 City plan for whole of Slite established.

1931 Skånska Cement AB becomes majority owner of the cement plant.

1933 130 people without jobs due to the great depression, workforce at the cement plant down to 125 from 264 in 1930.

1934 *Östervallen* is inaugurated where the modern day *Solklintsskolan* is situated, works by unemployed workers.

1935 *Enholmen fortress* is declared a building heritage site.

1935 Modernisation of kiln 1, extended to 95 m.

1936 New cement mill capacity of 4000 barrels a day.

1936 Slite becomes köping, market town.

1937 Quarry mechanized with drills, excavators, tractor- carts & crushers.

1938 Hotel park becomes open to the public.

1939 New rotary kiln 4, 115 m long increases capacity at the cement plant to 300 000 tonnes per year.

Late 1930's *Nårs* area is built up as a residential area.

1940's Icehockey rink established, more or less where Heidelberg arena stands today.

1940 New 176 m long cement quay opened, 200 employees at the cement plant.

1940 Visby cement factory closes.

1940 27 shops in Slite.

1941 Harry Brandelius fills *Folkets park* in Slite to the brim with 1100 attendees.

1943 Refugees fleeing the Baltics start arriving by boat, in total 25 000 refugees flee to Sweden, many of which arrive on Gotland & around Slite.

1945 Workshop tradeschool opens at the cement plant & becomes well recognized in Sweden for the close connection to all parts of the cement industry.

1946 42.5 m high sliding form cast concrete silo built, Europe's largest at the time, plant has 300 employees.

1947 Shipping company "Rederiaktiebolaget Slite"

1947 Valleviken cement factory closes leaving Slite as the lone survivor on Gotland.

1950 Kiln 5 in opens 128 m long.

1953 Last railbus use Slite-Roma railroad connection.

1953 434 employees one of the higher numbers in history of the cement plant.

1954 Ownership of Cement company changes to Skånska Cementaktiebolaget.

1954 Slitegården opens with cinema facilities & citizens house including library.

1955 Watertower built.

1960's Current school built just south of *Solklint*.

1960 All activity in people's park ends.

1960 Slite church built on land donated by the cement company in 1928.

1961 New rotary kiln 5, last kiln using old method constructed.

1962 New oil fired steam generator at the electric plant.

1964 Large shift in production method & expansion of cement plant, capacity of .85Mt per year & opening of kiln 6 also marks start of quarrying in *Västra brottet*.

1960's *Östra brottet* depleted.

1966 Rederiaktiebolaget Slite becomes one of 3 founding members of Viking line.

1966 Added steam generator at the electric plant.

1967 Shipyard fire.

1969 Ownership of cement company changes to AB Cementa.

1970 Large expansion with cyclone kiln 7 being built grants capacity of 1.2 Mt per year.

1973 Ownership of cement company changes to Industri AB Euroc.

1974 New electric plant open, old one demolished.

1974 The cement company applies for 50 year quarrying permit. Most of the future quarrying being moved to *File Hajdar*.

1975 The county grants a permit for at least 25 years for *File Hajdar*.

1976 Naturvårdsverket protests the permit given by the county & forwards the decision to the government which in the end grants 25 year permit & extension of cement production at the Slite plant.

1977 County grants extended permit for *Västra brottet* including the truckroad connecting the two extraction sites.

1978 Vattenfall & GEAB acquire all electric facilities on Gotland.

1979 New plant with kiln 8 opens, following investment of 700 M sek. Increased capacity from 1.2 Mt to 2.1 Mt of cement annually. At the time amounting to 2/3 of Swedish cement production requiring extraction of 1.25 M solid cubic meters of lime- & marlstone.

1979 Kiln 8 opens with 103m high cyclone tower.

1982 7 commercial fishing vessels with Slite as home port.

1982 Slite marknad starts in its current form.

1983 Start of quarrying in *File Hajdar*.

1986 383 employees at cement company.

1989 Continuous quarrying at *File Hajdar*.

1991 Kiln 6 taken out of use, marks the end of the old method of producing Cement.

1992 Ownership of cement company changes to Euroc AB.

1996 Ownership of cement company changes to Scancem AB.

1996 Gas turbines installed at the electric plant, used for reserve power.

1999 1.63 Mt of cement produced in Slite, around 50% Exported to West-Africa & Florida.

2009 165 000 tonnes of coal & petroleum coke used in Slite.

2010 Construction on Nordstream 1 begins, Slite used as harbor prompting investments in *Apotekskajen* granting it the nickname "Putin-kajen".

2020 Land & Environment Court grants Cement company a 20 year permit, the decision is appealed to the Land & Environment Court of Appeal

2021 Land & Environment Court of Appeal revokes the 20 year permit due to impact on water levels not being fully investigated.

2021 The cement company's permit expires in October

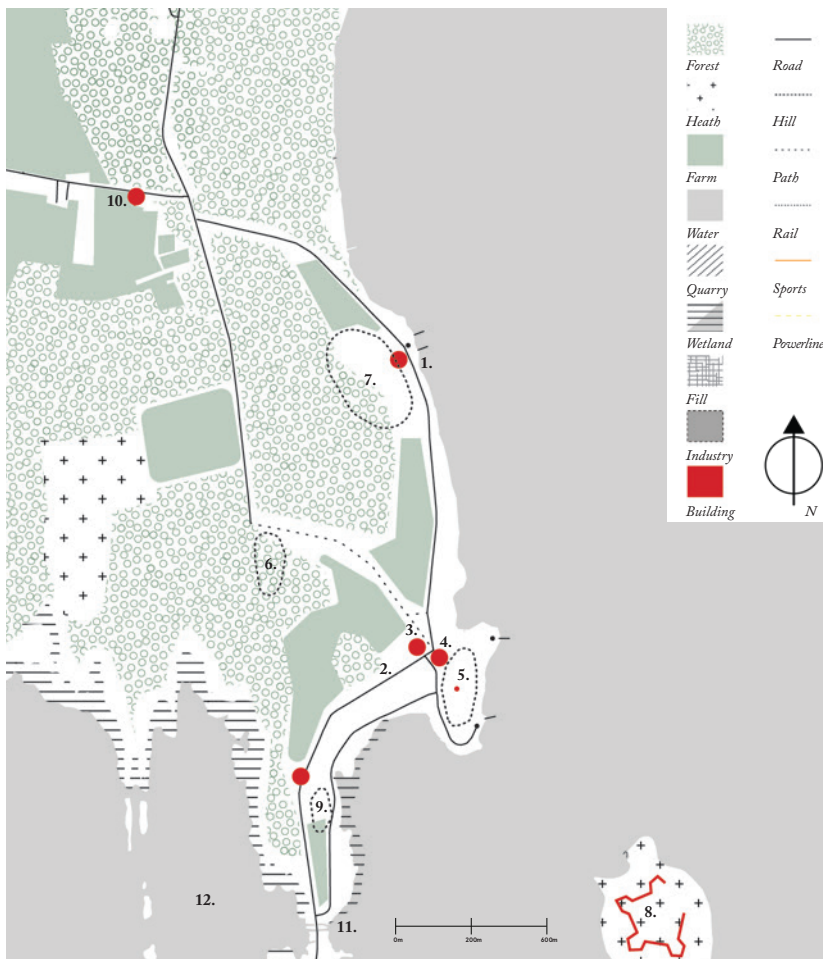
2021 The government grants a temporary extraction permit, aimed at protecting building industry in Sweden from forecasted cement shortage.

2022 The cement company applies for a short, 4 year permit to bridge operations, while preparing new application for extraction.

2022 4-year bridging permit approved by Land and Environment Court.

2023 The cement company applies for a 30 year extraction permit with the intent to mine 114 Mt of limestone.

2024 The county board wants more in depth investigations on the impact on water supplies and protection of endangered species.



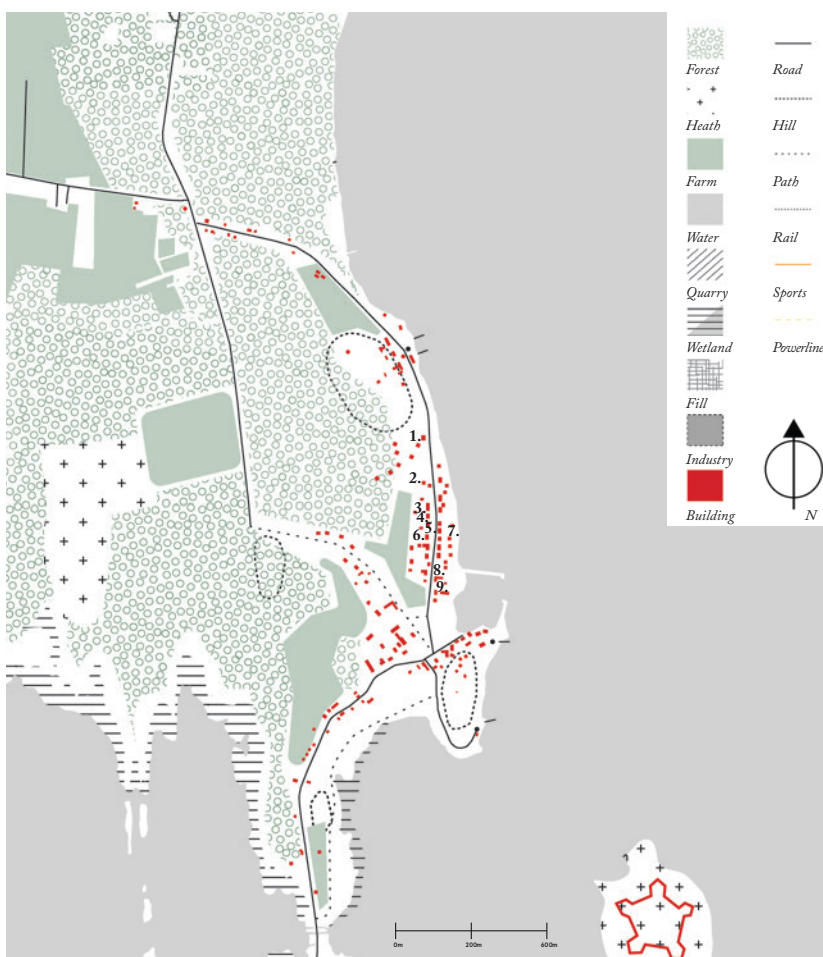
Slite in the 1700's

The harbor & Limestone industry was the center for the sparse settlement in Slite during the 1700's, all located along modern day *Storgatan*.

Two farms at *Länna* owned by the limestone merchants Marcus & Poul Fries, the house owned by Johan Schröder located on the modern day square and *Strandriddegården* overlooking the harbor. In the harbor area several economy buildings belonging to *Strandriddegården* stood and there were some smaller ships pilot houses on *Lotsbacken*. The four functioning limestone furnaces were located 2 at *Länna gård* and 2 on *Lotsbacken* in close proximity to quarries and with quays directly adjacent. In addition *Närs* farm on *Othemsvägen* to the west probably dates back to this time (Öhrman, 1978,1983,1987).

1. Länna Gård
2. Storgatan
3. Johan Schröder
4. Strandriddegården
5. Lotsbacken
6. Solklint
7. Lännaberget
8. Enholmen
9. Slottsberget
10. Närs farm
11. Sju strömmar
12. Bogevisken

Map, Slite in the 1700's , created using: (Open-StreetMap Contributors, 2023) and historical information from Öhrman (1979,1983,1987).



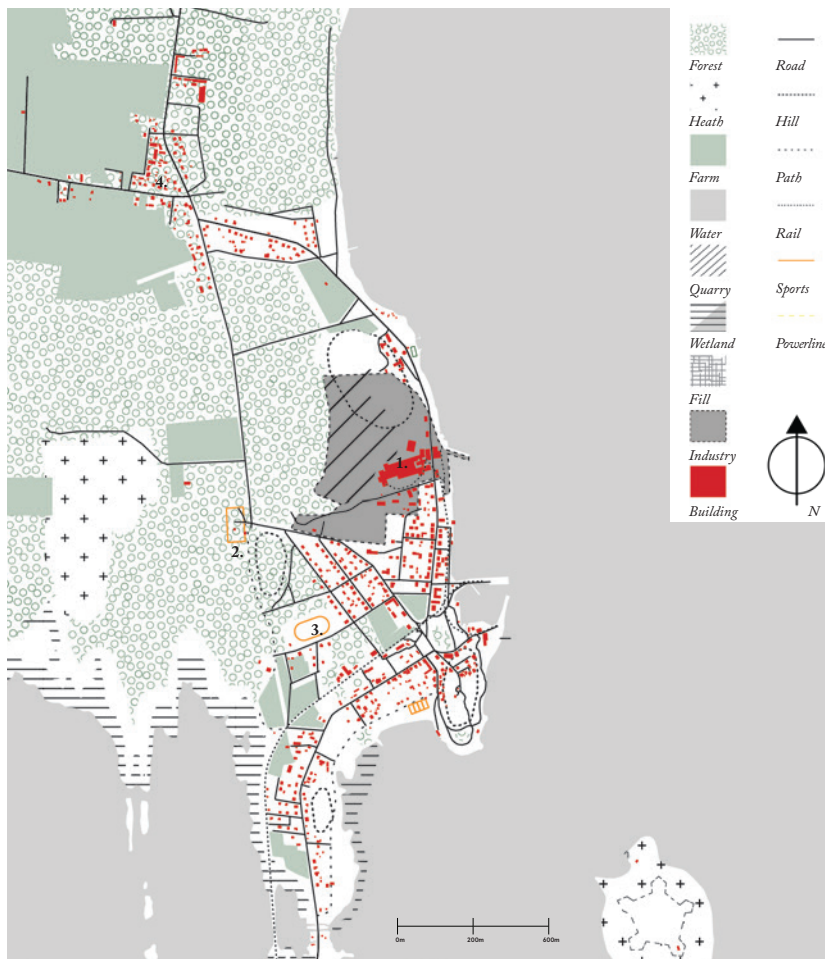
Slite around 1875

Slite continued to develop along Storgatan in and is described with around 70 buildings at 1870, the buildings were in large still residential but industries and shipping had started to attract merchants and amenities.

Recorded at the time are amongst others: *School, Carpenters, Tailor, Turner, Watchmaker, Telegraph, Merchants, & Inn*. By 1870 Slite had also gained both an *Apothecary* and *Provincial doctor* (Öhrman, 1983).

1. Carpenter Malmberg
2. Schoolbuilding
3. Tailor Öberg
4. Turner Södergren
5. Watchmaker Carlson
6. Shoemaker Lager
7. Telegraph
9. Inn

Map, Slite around 1875 created using: (OpenStreetMap Contributors, 2023) and historical information from Öhrman (1979,1983).



Slite around 1940

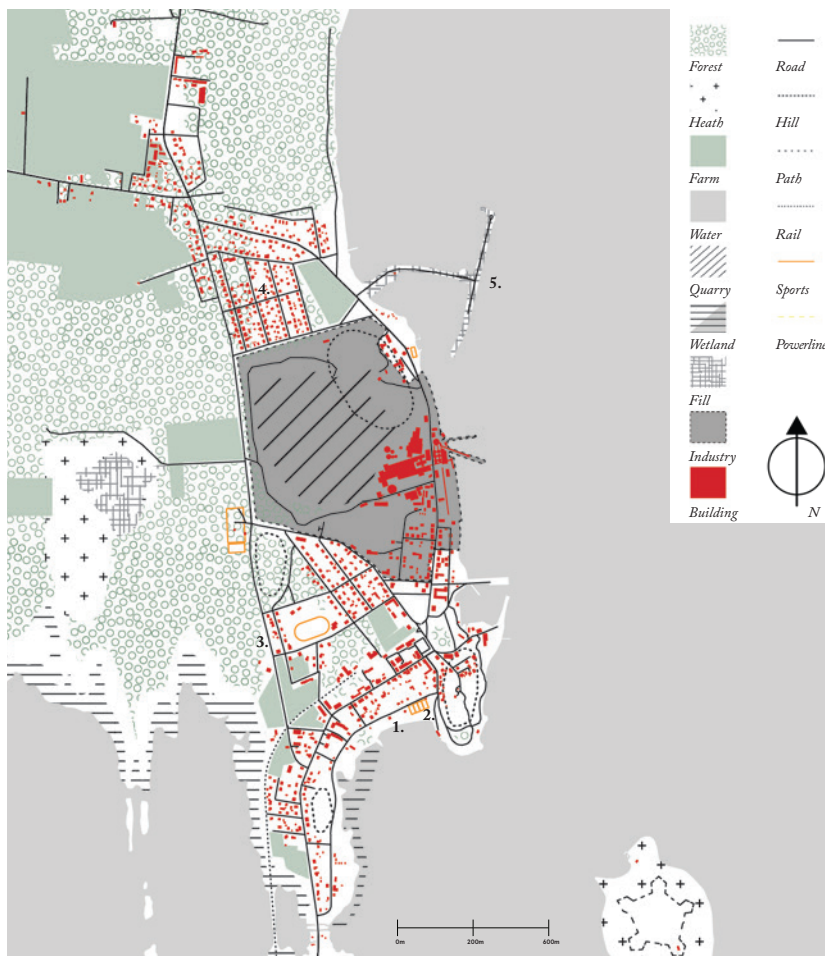
By 1940 the cement plant had started to expand, and the railroad was an integral part of the plant system, with connections directly to the plant and the harbor. Folkets park was also established and has its peak around this time.

Östervallen located south of *Solklint* is also visible in maps from the time, situated by the modern day school is located, this sports field was built by unemployed laborers during the downturn in the 1930's.

Expansion in the *Närs* area had started slightly by this time with the first workers houses being built.

Map, Slite around 1940
created using: (OpenStreet-
Map Contributors, 2023),
Historical aerial photos from
Lantmäteriet (2024) and
historical information from
Öhrman (1979,1983,1987)
and Ahlberg & Udd (2009)

1. Cement plant
2. Folkets park
3. Östervallen
4. Närs area



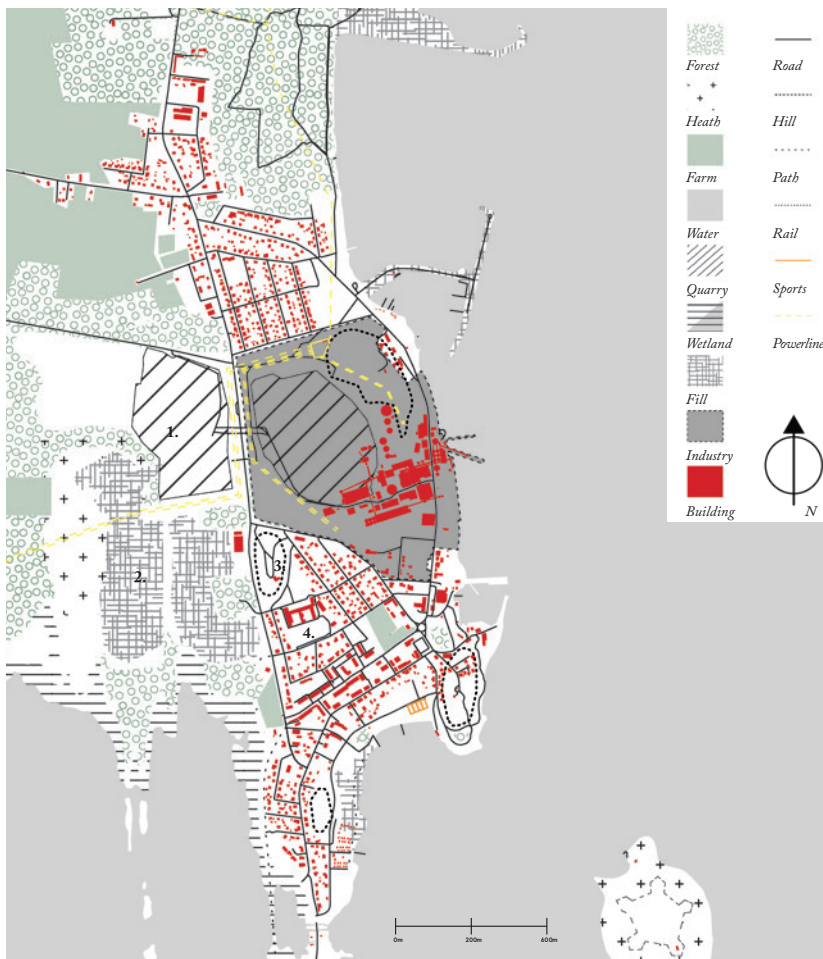
Slite in the late 50's

As the plant continued to expand it consumed more of the community and altered the landscape, increasingly dividing the town into two separate parts. By this time much of the residential areas south of the cement plant were still intact. The beach had by this time gotten more or less its current form with tennis courts adjacent to the Badhusparken.

The train line is still visible but an improved road network with road 147 points at a shift in transportation that fully developed during this time. The Residential areas in *Närs* and *Österby* are by this time well developed. Fills start changing the shoreline with the marina being visible for the first time.

Map, Slite in the late 50's
created using: (OpenStreet-
Map Contributors, 2023) ,
Historical aerial photos from
Lantmäteriet (2024) and
historical information from
Öhrman (1979,1983,1987)
and Ahlberg & Udd (2009)

1. Beach
2. Tennis court
3. Road 147
4. Österby
5. Marina



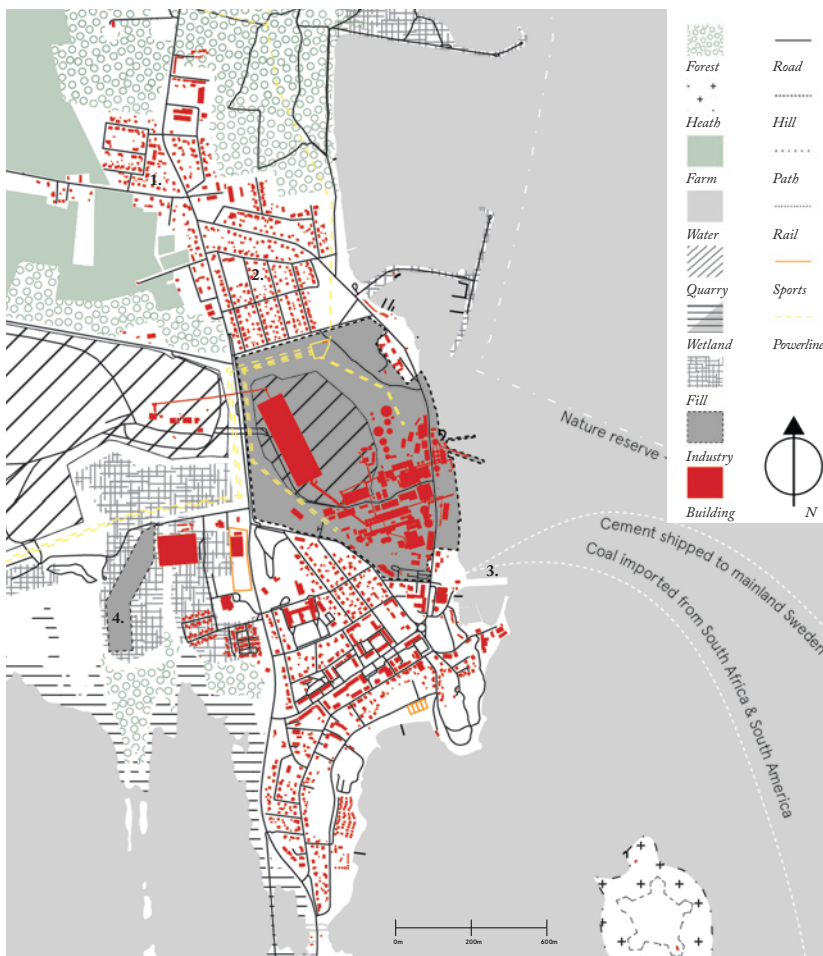
Slite around 1975

By 1975 expansion into *Västra brottet* had started, with large parts of the landscape to the south of the quarry being used as landfill and put topsoil from the quarry. This can also be seen in the large fill to the north of town forming a new peninsula in *Vägumeviken*.

By now several of the large housing projects being built in Slite were finished as well as the church and new school building by *Solklint*.

Map, Slite around 1975
created using: (OpenStreet-
Map Contributors, 2023),
Historical aerial photos from
Lantmäteriet (2024) and
historical information from
Öhrman (1979,1983,1987)
and Ahlberg & Udd (2009)

1. Västra brottet
2. Landfill
3. Church
4. School



Slite today

Today the *Västra brottet* has grown, and an additional extraction site in *File Hajdar* to the west has been added to the resources chain. the town of Slite has continued to grow predominantly in the *Närs/Österby* areas.

Improvements to the harbor area were made as it was used for the Nordstream 1 project in the 2010's granting *Apotekskajen* the new nickname "Putinkajen", the old storage site for the pipes used in the project is being considered for new industrial development but currently lies unused.

Map, Slite today created
using: (OpenStreetMap
Contributors, 2023), His-
torical aerial photos from
Lantmäteriet (2024) and
historical information from
Öhrman (1979,1983,1987)
and Ahlberg & Udd (2009)

1. Närs
2. Österby
3. Putinkajen
4. Storage site Nordstream 1

Slite seen from the camping
with the beach & cement
plant.

Photo by Author

Key takeaways

In early years of Slite most activity was centered on the favorable harbor conditions, mercantile functions and an emergence of industry centered on the extraction of limestone. The main road connecting Slite to the rest of Gotland was *Storgatan*, probably in use since the viking age, indicated by archeological findings along its route. Further findings indicate the spatial layout of settlements in the area in large coincidence with settlement up until the 1700's.

As Slite developed following a rise in industry and shipping in the 18th and 19th century, further settlement along *Storgatan* took place, with an increase in supporting functions for the emerging industries.

As the cement plant opened in 1919, a shift in development can be seen as the needs of the cement company, rather than the underlying natural conditions of Slite start to shape expansion, first with an increase in scale of quarrying in *Lännaberget*, but later also seen how housing for workers, railroad connections and new harbor facilities are developed.

By the mid 20th century, the cement plant had highly altered the spatial layout of Slite, as it following expansion, and restructuring of the cement plant started to expand into already existing parts of Slite and fills in, *Vägumeviken* and by *Bogeviken* were made to handle the large amount of topsoil being moved to access new stone deposits in *Västra brottet*. By this time the labor movement had also started to alter Slite, with *Folkets park* being established, sports & leisure facilities as well as healthcare, schools and other functions being developed.

Today the spatial layout of Slite is very much shaped by the expansion of the cement company during the last 100 years, yet the narrative often used today, that the cement industry more or less makes out the foundation for the town, has to be challenged.

With structures dating back to the first settlements in town visible, especially when looking at the network of streets coinciding with trade routes of old, older settlements, such as *Länna gård*, indicating availability of resources and harbor facilities indicating the importance of trade across the Baltic sea. Slite has been a place of commerce and industry for much longer than the last century and the underlying conditions have shaped expansion, with the cement plant developing due to and, on top of these conditions.



Mapping

Conversations

As part of my initial mapping of local and regional conditions in Slite a series of informal interviews was conducted.

Region Gotland was contacted to get a better understanding on how the process of the comprehensive plan for 2040 looks, and on what premises it is being developed.

To better understand the local business climate the local development company Slite Utveckling AB, which owns and operates an office building in the former head offices of GEAB on Storgatan directly adjacent to the cement plant, was also contacted.

Key takeaways from conversation with planning strategist Anders Lindblom

- The comprehensive plan being produced is based on the scenario that Heidelberg will continue its operations, this condition is set politically on the premise that Heidelberg can uphold the current quality for drinking water in the area.
- The comprehensive plan does not rely on a specific growth scenario for Slite, but is used to appoint areas for possible expansion on a regional level, with slite being a regional hub for housing. A more detailed scenario will be presented in the region's housing supply program that will follow the comprehensive plan.
- There are two separate processes, one for a new and extended extraction permit, and one for a new detailed plan for an expansion of the cement plant increasing cement production from 2.75 mt per year to 3.2mt and preparing for the planned CCS facility.
- The CCS facility will in turn increase the number of ships docking in Slite by approx. 240 per year
- There is a decision on the regional level that all cargo handling at Visby port is set to be distributed to Klintehman and Slite. In addition the harbor in Slite is set to be expanded to facilitate building of offshore wind turbines and to handle import of hydrogen for the CCS-plant

Key takeaways from conversation with CEO Mait Juhlin

- There is a certain business spirit in Slite, in part because the soils in the area have been too poor to provide sufficient harvest, leading to side businesses being necessary to provide the main income for inhabitants, but also because of the many subcontractors that have formed around the cement plant with Gisab & Emab being prominent examples. There is an above average amount of companies per person in Slite compared to a national level.
- The focus on the number of jobs Heidelberg provides misses the point that there is a high supply of highly skilled laborers in Slite, currently employed in the quarries and the plant including the many subcontractors. This is an asset that is not directly tied to Heidelberg but rather an effect of their current presence in town.
- There are many empty commercial spaces in Slite today of which many are owned by the municipality. The interest organizations have experienced a reluctance to let these spaces to smaller businesses and an inability to adjust rents to reflect the ability of businesses that are available in the region with the kitchen at Kilåkern as an example.

GEAB is the local gotlandic electricity company with roots back to the first electric generators at the Cement plant

Inventory of Slite

Summary of mapping

To gain understanding of the different spatial forms in the rurban fabric of Slite, an extensive mapping took place. The mapping was split into two ways of viewing the town. Firstly by recognizing systems of dependent functions, and mapping them in ecologies, for example the center of town with its commerce; secondly by zooming in on specific sites of interest in town, which are part of these ecologies, such as the beach, harbor or town square.

To guide this mapping, methodology developed by Kevin Lynch (1960) was used to map larger spatial relationships present in town, and its surroundings. The method was chosen, both due familiarity, having used it in previous projects, but mostly due to it providing valuable ways of mapping these relationships on a city or town level. It maps using 5 elements: *Paths, Edges, Districts, Nodes and Landmarks*.

The mapping of the specific sites of the ecologies was further guided by methodology developed by Jan Gehl & Birgitte Svarre (Svarre & Gehl, 2013) also because of its familiarity, but mostly due to its value in providing a quick and intuitive way of mapping public space. The method uses 12 quality criteria, divided into 3 categories: *Protection, Comfort and Delight*, in creating an overview of strengths and weaknesses of the mapped space.

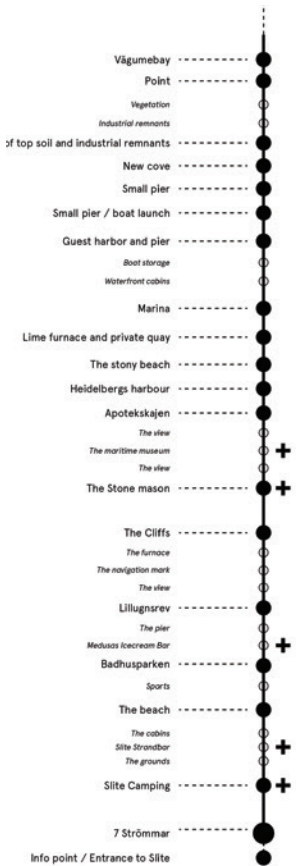
The mapping served as an opportunity to spend time on site, in Slite mapping existing conditions present in, and around town. This was done in an attempt to unearth spatial relationships present in the rurban fabric.

A main takeaway was a sense of a split town. With Slite beautifully situated by the inlet of *Vägumeviken*, with an archipelago and a downtown beach, but currently dominated by heavy industry and the spatial implications it brings. Seen both in specific sites in its vicinity but more so in the rurban fabric of the town.

For example in the ever-present silhouette of the industrial buildings, appearing behind the townscape. And in the large parts of town being closed off to the public, effectively splitting the town in two with the quarries extending this split, some 9 kilometers inland with few connections bridging it.

A split can also be seen between the two main industries in town, during the visit in January most businesses along Storgatan were closed and a feeling of hibernation was prominent, This points at the second industry at the core of Slite, mass

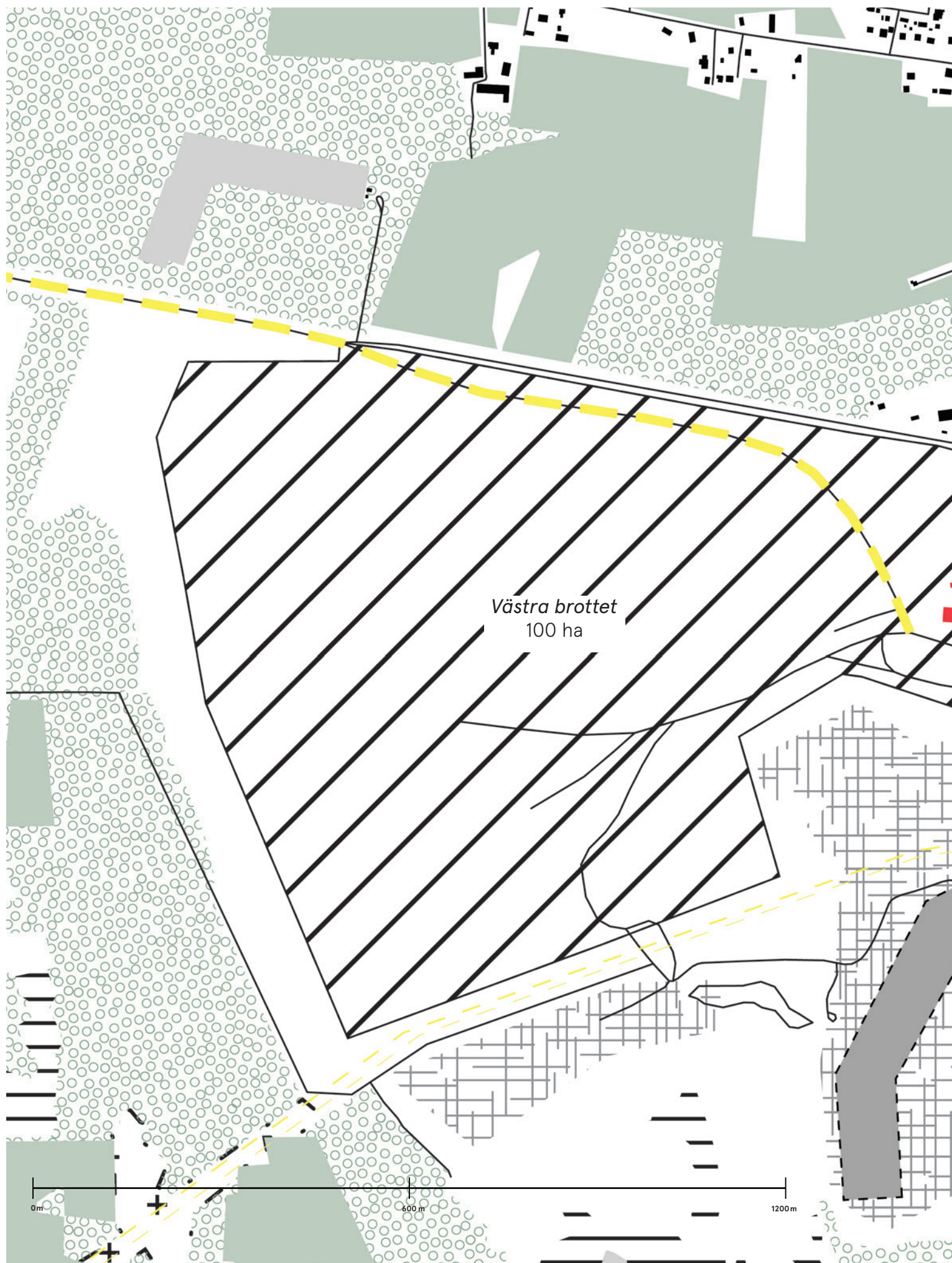
recreation in the form of seasonal tourism. An industry in large operating on the same conditions as the cement plant, the natural landscape of Gotland, but with completely different processes of metabolizing this into a commodity, recreation rather than extraction.



Example of mapping of Shoreline ecology, focusing on areas, features, public/commercial spaces created through a walk along the whole ecology.











How it's made

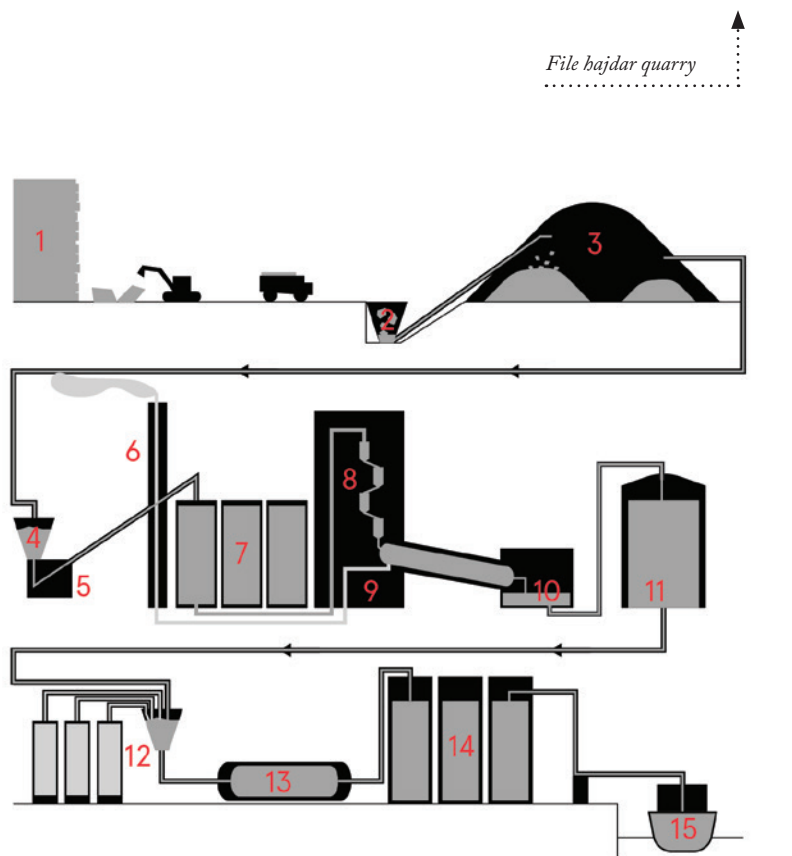
Process

The cement plant in Slite uses a process with many steps, in large it consists of quarrying, crushing and blending the stone material, before heating it up to produce calcium oxide which is further heated to in a process of sintering to produce clinkers.

The clinker is allowed to cool down and mixed with a number of additives depending on the desired material properties of the finished cement. The mixture is milled to produce cement that is ready for shipping.

80% of the cement produced in Slite is meant for the Swedish market while the last 20% ends up in the Baltics and Denmark.

Limestone > 80% CaCO_3
 Marlstone < 80% CaCO_3
 CaCO_3 = Calcium carbonate



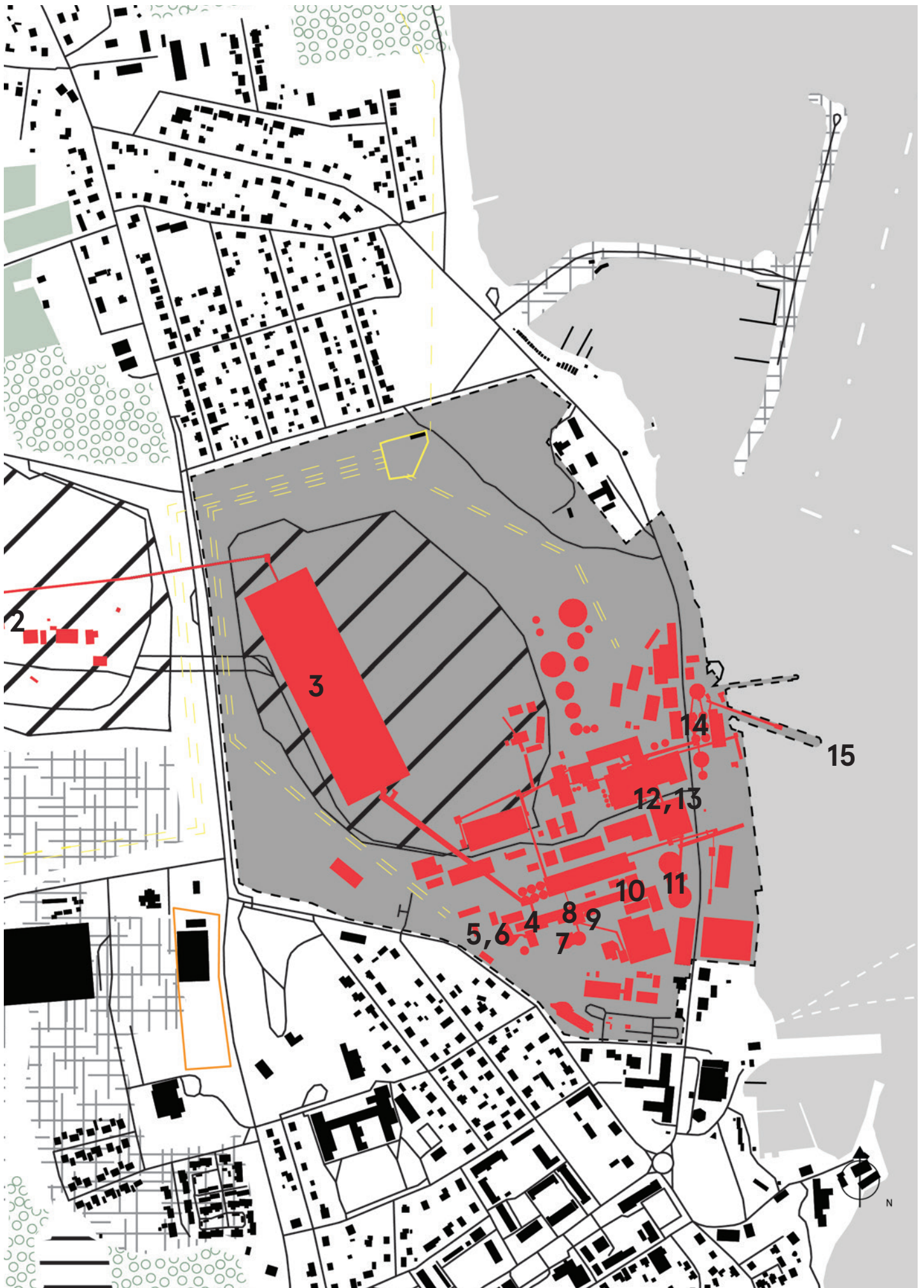
1. Quarrying
2. Crushing
3. Storage & blending in leveling inventory
4. Raw mill
5. Electric filtering
6. Sulfur scrubbing of fluegases
7. Storage in raw meal silos
8. Cyclone preheating & Calcination
9. By-pass & electro filtering
10. Cooling of Clinker
11. Storage in Clinker silos
12. Additions, Anhydrite, gypsum, limestone & blast-furnace slag
13. Cement milling & filtering
14. Storage in cement silos
15. Shipping

4. The excess heat is used for district heating

6. This step is done using limestone & produces gypsum used later in the process

8. in this step the raw meal is split into calcium oxide and large amounts of carbon dioxide

Spatial layout of cement process in use today



Current conditions

When looking at the current conditions of Slite three main categories of understanding have been used. The physical conditions, Current ecologies and public domains.

Physical conditions

The history of Slite has through metabolic processes given rise to the current conditions that impact what possible futures can be achieved. These new conditions must be seen, not merely as shadow places in the notion of Plumwood (2008) to be valued and remembered, but rather as the given starting points for what comes next.

By adapting this viewpoint, understanding what underlying conditions govern the future becomes important.

Altered landscape

The state of the natural landscape is a direct result of industrial expansion, especially in the last 100 years as the cement company has employed evermore large scale extractive practices negatively impacting the landscape and environment. With the large quarries and the fills in *Vägumeviken* being especially problematic.

Land ownership

Further, land ownership and parcel sizes is a condition that has been directly affected by the emergence of industry throughout the last 400 years, with increasingly large parcels being aggregated and ownership being concentrated, from limestone merchants acquiring farms and limestone deposits, to the extreme situation today where the cement company is in possession of vast areas of land in the Slite area with the plot Österby 1:229, stretching almost 10km inland including both the cement plant and all of the quarries.

Spatial layout

This also ties in with the spatial layout of Slite today being heavily shaped by the needs of the cement company in the last 100 years leading to current conditions of the town in large being split in two by the large industrial sites and the shoreline largely being occupied by harbor facilities with around 50% being tied to the cement plant.

Industrial sites

Looking closer at the industrial sites, and especially the cement plant a space heavily influenced by the adaptive reasoning industry operates in becomes clear. The spatial layout of the site is shaped by emerging needs of the

cement company, new technologies, methods and economic rationales deciding what buildings to keep, which ones to transform and what to demolish. This means the site is a mix of buildings and functions spanning the entire life of the cement plant. When viewing these buildings and spatial configurations as potentials for the future, the industrial buildings and the harbor stand out as especially adaptable for future transformations.

Ecologies & intangible conditions

Looking past the physical impact, the current ecologies and other intangible conditions of Slite are important to better understand the state of the community today.

The ecologies revolve around three revenue sources and are host to a number of intangible conditions including a business mindset and some of the public domains of Slite.

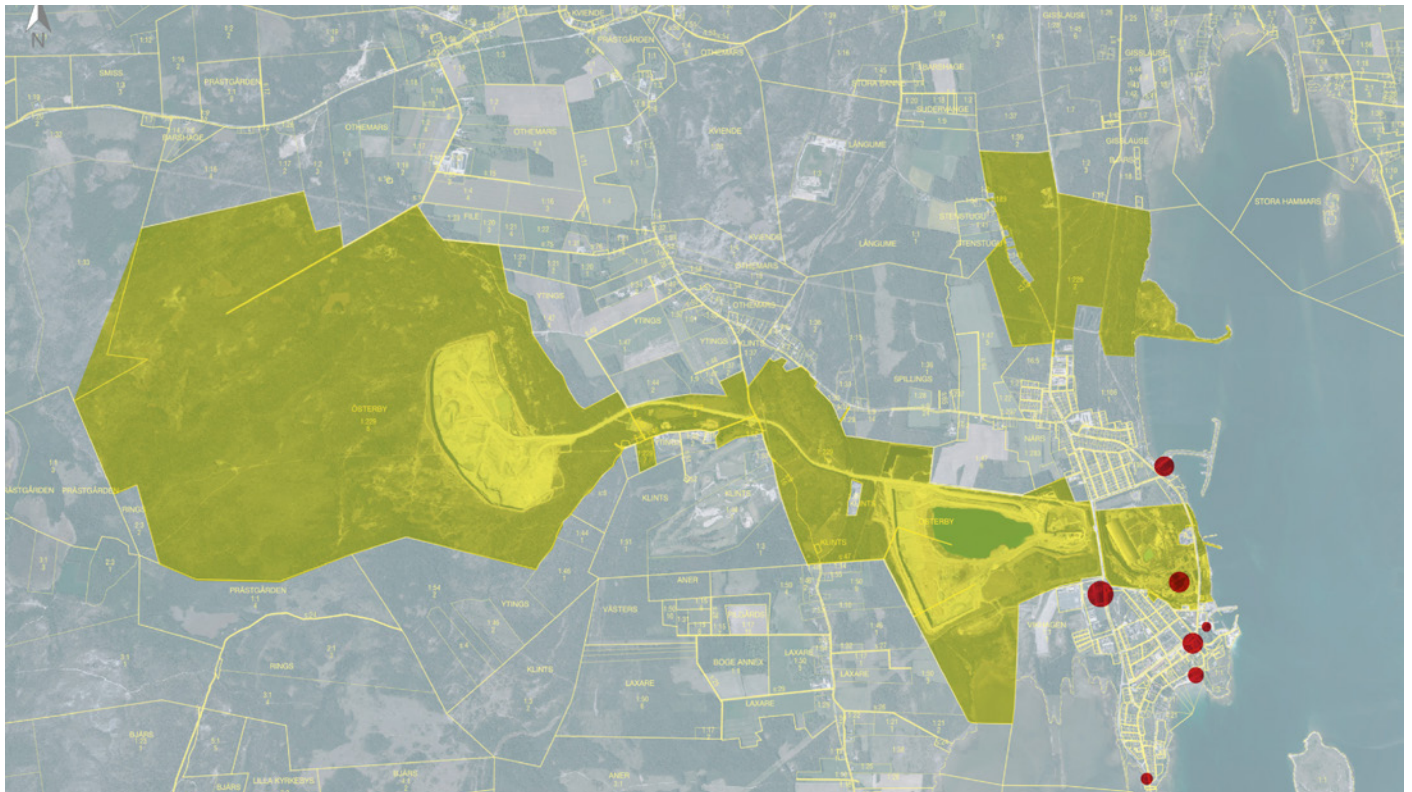
The cement plant & business mindset

The cement plant has given rise to a diverse business life as the cement company operates with many subcontractors. In a consultation document from 2017 the cement company states they buy services from local businesses in the range of 170 million SEK and in doing so provide the base for some 430 job opportunities (Cementa AB, 2017).

Some notable examples are EmAB specializing in electric- and machining work and Gisab specializing in industrial service. This dependency on subcontractors a relatively new phenomena both in Slite with EmAB being founded in 1990 and Gisab in 1995, and globally as Arboleda (2020) describes an influx in subcontracted work in the global mining industry at the same time, with only around 10% of the mining workforce in Chile being directly employed by mining companies by 2012.

This phenomenon can be viewed either as highly risk filled, as the cement company does not have an obligation towards subcontracted workers in the case of a closure of the cement plant, or as an asset for the town where the diversification, and small scale of local businesses in these subcontracted companies creates resilience in the job market. In conversation with the CEO of the local development company the latter viewpoint was heavily emphasized.

This ecology is spatially tied to the Industrial site and industrial harbor with far reaching connections to mainland Sweden & Denmark in the form of cement exports and to South America



and Africa due to imports of raw materials used in the cement process (Lundberg, 2022). The local part of the subcontractors like EmAB and Gisab being situated in proximity along road 147.

The tourism sector , a seasonal ecology

The second largest industry in Slite is tied to tourism and his ecology brings with it conditions that are highly seasonal with the camping and hotel being centers for culture and leisure in the summer season attracting both visitors, and locals to both work and enjoy the facilities but being closed in the off-season, leaving large parts of the town feeling unused.

The harbor & international connections

The harbor serves as a third ecology that has become less important than the other two main ecologies in recent years as a decrease in fishing and local shipping is seen. The harbor also houses the stone masons which also has been in operation for around a hundred years, the coastguard and a small fleet of fishing vessels still in use, the last number pointing at 7 operating vessels registered in Slite. The harbor still serves as an international connection with shipping connecting Slite to the rest of the world.

Public domains

Town centre

The main functions of Slite are still placed along *Storgatan* & *Stationsgatan* and the extension of the square, and the opening of Systembolaget has cemented this as an important public domain in town.

The beach and parks

The main recreational areas in town are the parks, with *Badhusparken* and the beach being well used, especially in the summer although the increase in tourists can hinder from accessing the space for locals.

The cement plant

The cement plant serves as a semi public domain, as it is not open to the general public but serves a large role in the local community with many interfaces between people.

The associations

Viewing association life as public domains is important to understanding life in Slite, in similar fashion to life at the cement plant it serves as a sort of semi-public domain.

Polarized debate

Summarized the current conditions of Slite are divided, both in a physical way by the impacts of industry, which in the last 100 years have become increasingly aggressive in its extractions and alteration of natural conditions, but also in intangible ways such as the lack of vision stemming from a highly polarized public debate, where the future of the cement company is not to be discussed as it is to problematic.

And where local stakeholders, such as the interest organization and the region avoid addressing issues tied to further extractions, and where the cement company can't envision being denied a renewed permit.

*Map of Österby 1:229 &
Current public domains
Created using*

*Lantmäteriet (2021).
Property map Real property
classification © Lantmäteriet*

*Background image:
Lantmäteriet (2018). Orto-
photo, 0,5 m/pixel color
© Lantmäteriet*

Initial design explorations

As part of the process initial concepts have been drafted through design explorations, these explorations were aimed at developing an understanding of the site and its context.

The explorations helped unearth potentials and challenges present in the sites through visualizing new uses for the sites. By doing this an understanding of the sheer scale of the industrial sites became more apparent in addition to an understanding of not being “able” to fill all space with programs.

Some first sketches included large scale plans for the quarries and their connection to the rest of the city, but as the project developed the focus shifted to further zooming in on the built environment of the industrial site and the spatial relationships present in these sites as they both have a more manageable extent in terms of design and visualization, but also as they house a large potential for future use in close proximity to the already existing town.

The explorations were conducted in various forms of sketching with both analog and digital techniques. This includes quantitative explorations such as, how many parked cars can fit in the central square of the industrial site, how many square meters of floor space is available along main routes in the site etc., and more qualitative, explorative techniques centered on introducing new functions, to test new spatial relationships.

By utilizing the theoretical framework previously presented in unison with the explorative sketchwork a deeper understanding of the sites and their relationship to Slite, and each other was shaped through this process.

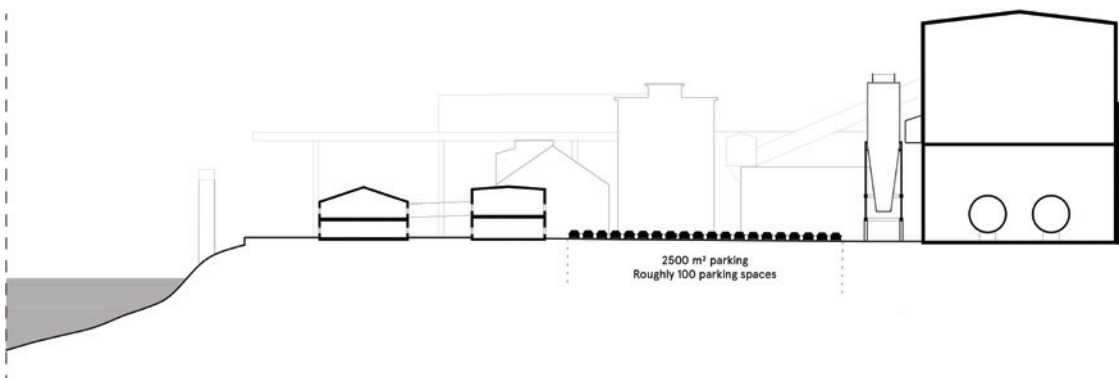
This “what if” methodology also translates into the design part of the project as it is highlighted as the main methodology for presenting alternative future scenarios.



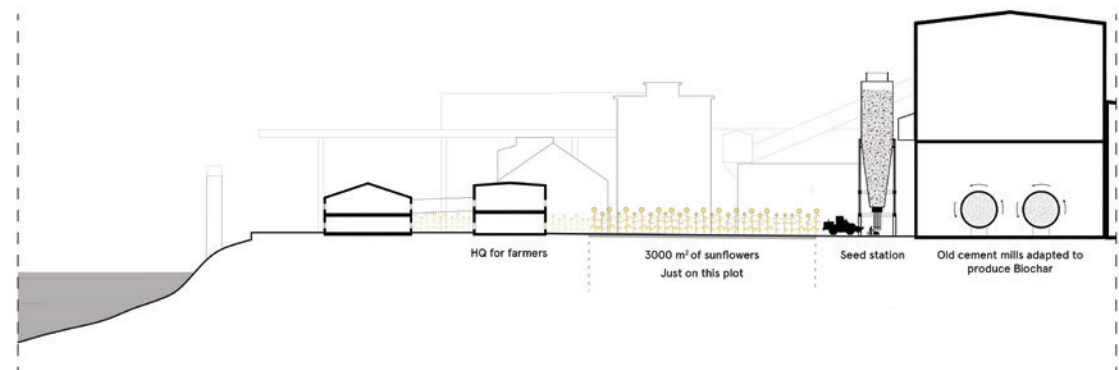
What if all space except the quarries was turned into a residential area? Created using: Lantmäteriet (2024). Ortofoto RGB 0.25/0.50 m latest © Lantmäteriet



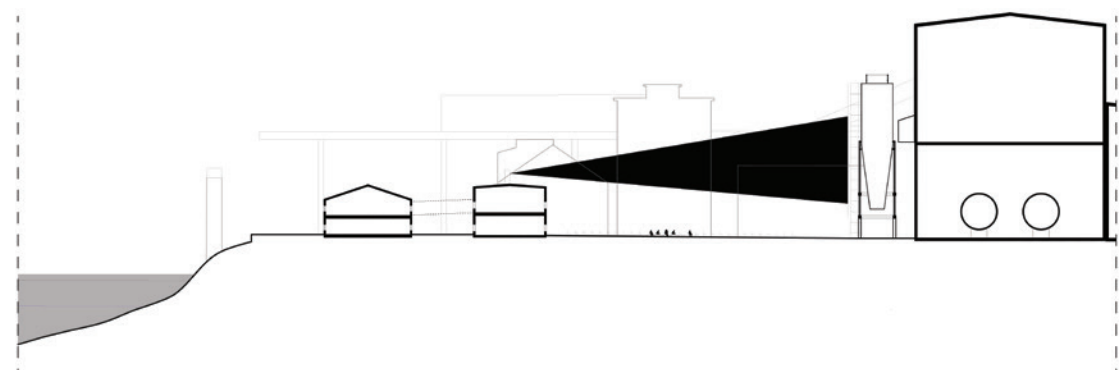
*What if the quarries became the new harbor?
Created using: Lantmäteriet (2024). Ortofoto RGB 0.25/0.50 m latest © Lantmäteriet*



What if the central space was used for parking?



What if all surfaces needed to be cleaned using phytoremediation?



What if the central space was used for cinema viewings?

Design exploration

The adaptive ecologies of Slite

The next part of this thesis focuses on the presentation of a method for change, aimed at projecting alternate futures for Slite, the method is focused on utilizing, and transforming the industrial remains to facilitate a new adaptivity in town

The method is viable for a range of future uses and scenarios, in this thesis all based on the closing of the cement plant in 2026. This would be due to the cement company not receiving the necessary new permits to continue extraction and refinement at the sites in Slite.

The method consists of 5 steps: *1. Deconstruction, 2. Remediation, 3. Readaptation, 4. Rehabilitation* aiming at *5. A new state of adaptability*.

The futures are focused on the site of the Cement plant, including the industrial harbor, and the connection between the sports sites of today and the new conditions that the filling of the quarries, *Östra and Västra brottet* will introduce.

To support this method a set of strategies are then articulated that are aimed at facilitating the transition of Slite towards a new adaptive reasoning, where new and old ecologies in town are transformed. The strategies are focused on remediating the site *using natural processes, providing access* for a diverse set of users from the local community, *creating new spatial relationships* to facilitate new use, *valuing temporary use* as a process for change, *re-imagining working infrastructure* to fit new needs, *using transformation to meet new needs & guide development, showcasing & curating industrial culture* and *working with local stakeholders*.

One main scenario is presented for Slite, but the site-specific interventions must be seen as possibilities, articulated from the strategies, that can be assembled in a mix & match fashion some more or less codependent on each other, ranging in feasibility, timeframe and scope.

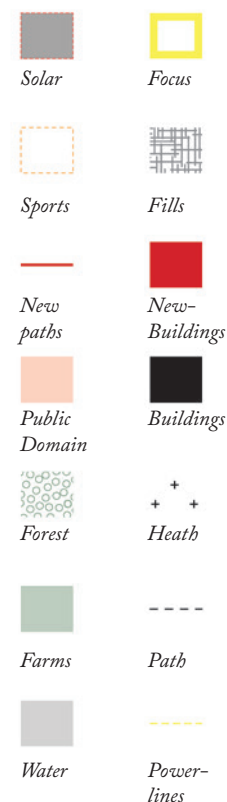
With this said the future of Slite, in the light of a closing cement plant, can be divided into musts;

such as protection and the facilitation of access to the rich cultural heritage of the industrial sites, the remediation of the industrial sites to remove harmful substances and deconstruction of hazardous structures to allow for better and safe access to the sites for the public. These strategies should be set in motion as soon as possible.

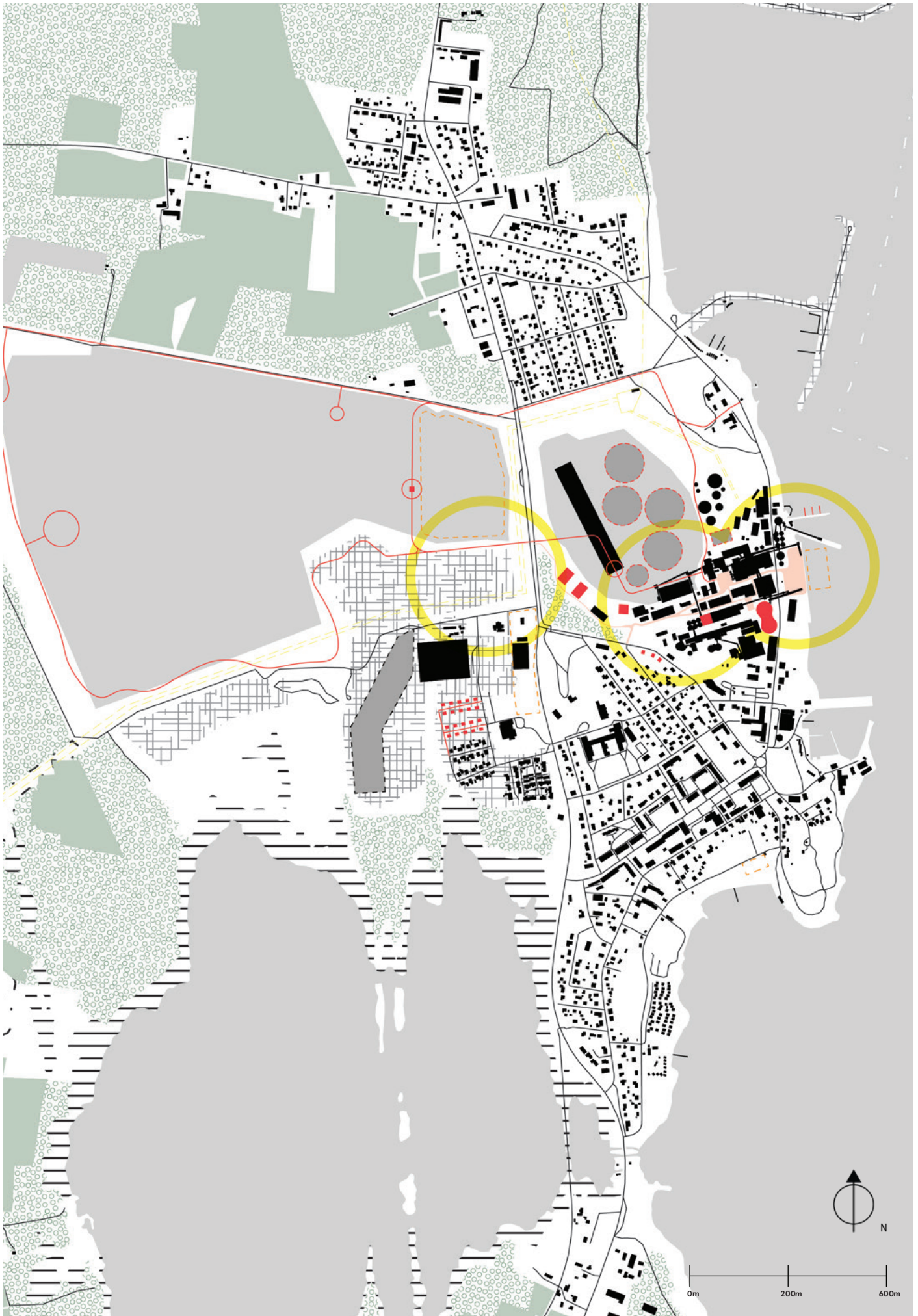
To work towards a new adaptability on the former industrial sites there is also a need to facilitate new use of the sites, this can be seen as a second step that is dependent on the musts of the first step. For Slite this would be focused on: facilitating the use of the inherently adaptable industrial buildings through inviting small-scale businesses, industrial and others to use the built environment, adapting already standing structures through transformation to handle demographic challenges and strengthening the already existing associations culture tied to sports. These are to be seen as key steps in creating new adaptive uses of the industrial sites that the strategies are aimed at achieving.

In addition, range of possible smaller interventions, or possible uses that tie in to these goals for an increased adaptability, for the future of Slite are presented as parts of the whole, which includes using new conditions in proximity to the former industrial sites for development, such as along Skolgatan currently too noise polluted to be viable as housing, using the industrial sites to produce power, seeing the transformation as a possibility for education by re-establishing a trade school etc. In combination the method based on the set of strategies can facilitate a transition of the existing ecologies and local community in Slite towards a new state of adaptability that is better suited to face current and future challenges.

To summarize, the presentation of these alternate future scenarios is also to be seen as the part of this project that is transferable to other similar contexts, where other site-specific conditions will give rise to other futures with other interventions based on the same method and set of strategies.



Map of Slite with focus areas and new interventions.



A method for change



Current state

The cement plant is in use and functioning under the adaptive reasoning inherent in large industry where the connection between needs and execution is short, new technological and economic advancements dictate how the spatial form of the plant develops.



Deconstruction

As industry leaves certain buildings and structures will have to be deconstructed. Either because they are in such poor condition that they are dangerous or because they are too hard to adapt to new requirements. Additionally machines present have high value, either for further use or for scrap material.



Remediation

The industrial site will have to undergo remediation to remove toxins and other dangerous substances that have accumulated through a century of use on the site. This can be done by removal of topsoil or phytoremediation through planting of sunflowers who absorb toxins.



Readaptation

New use requires adaptation of the built environment to fit new needs and wants. This includes splitting the large industrial plot into manageable plots. And adapting policies that strive to make unused space available for the general public and businesses.



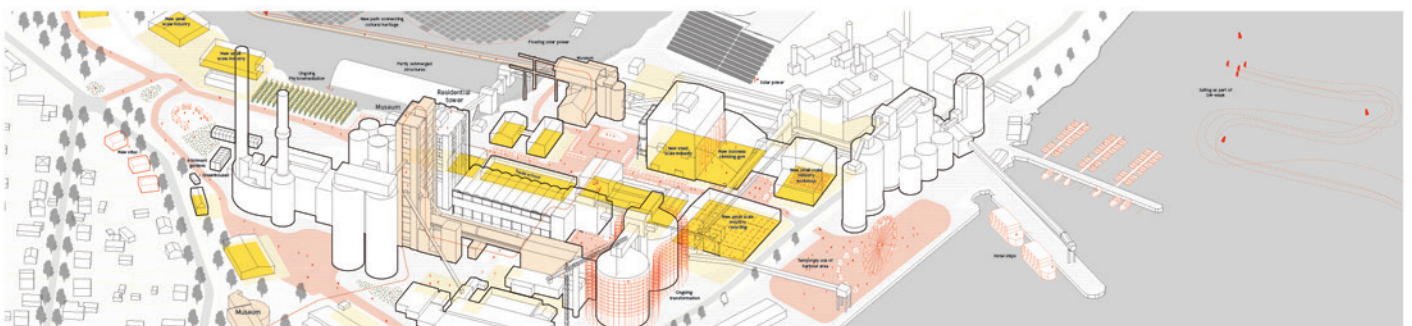
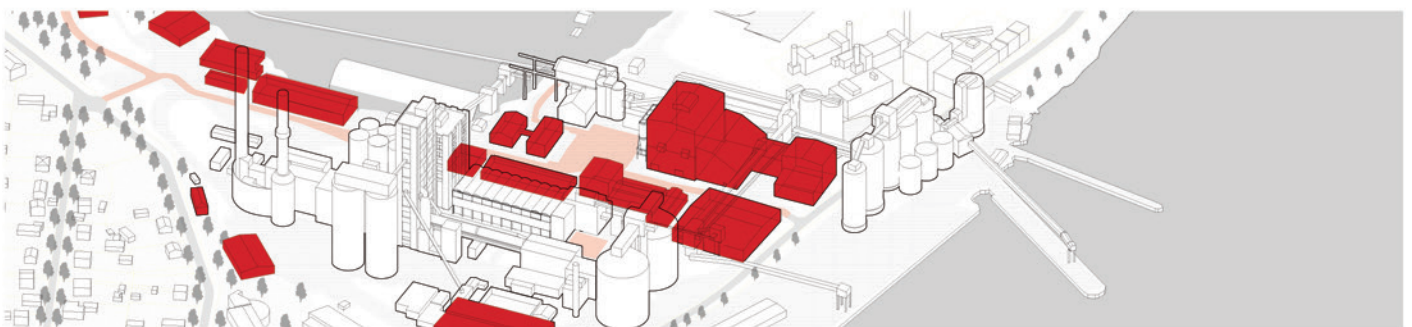
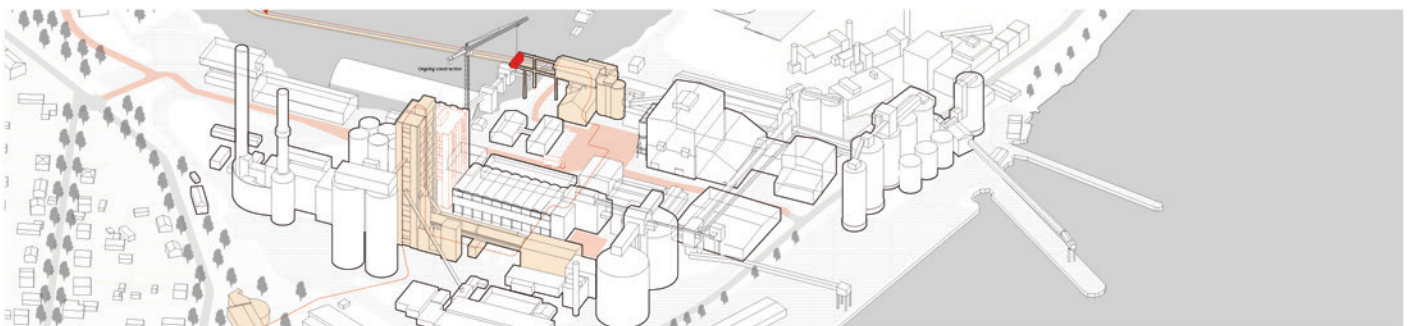
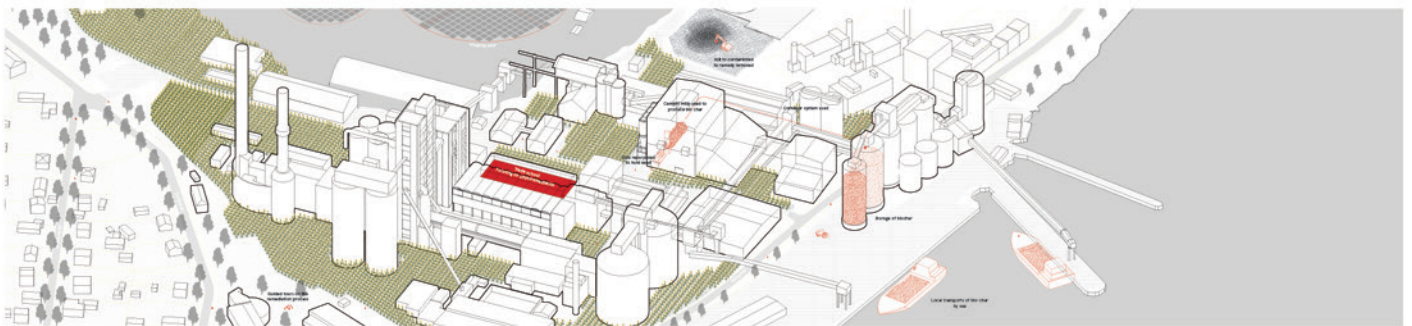
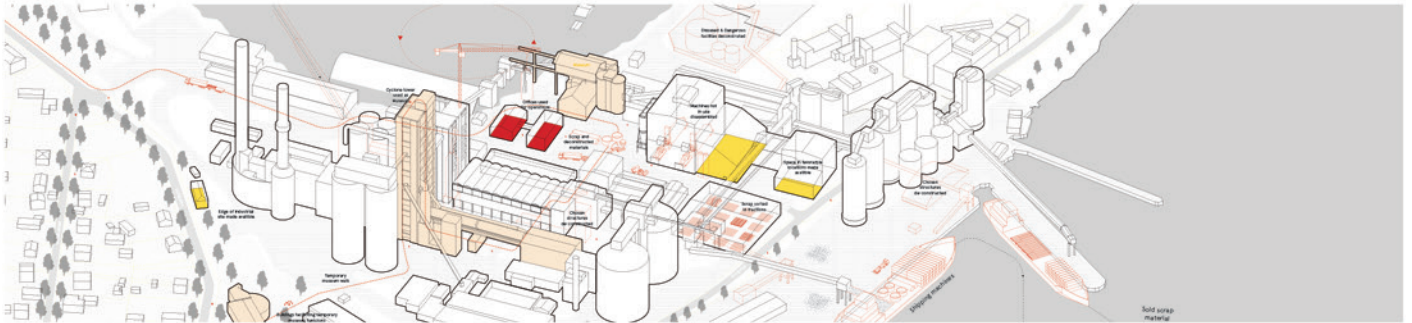
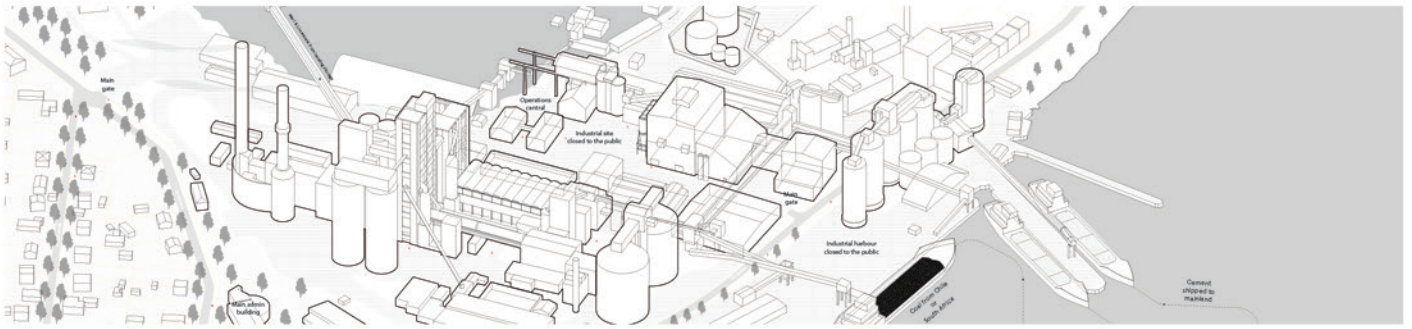
Rehabilitation

New functions move in, temporarily or permanent. As some functions become obsolete the process will sometimes have to revert to stage 1 or 3 where adaptation or deconstruction is needed.



New state of adaptability

This new state of adaptability provides a critical resilience in the built environment and ensures the community of Slite has the capability to adapt to changes, in the present and in the future.



Strategies & Implementation

In this part of the thesis the 8 strategies formulated, and adapted throughout the design are presented.

The strategies are aimed at remediating the site using natural processes, providing access for a diverse set of users from the local community, creating new spatial relationships to facilitate new use, valuing temporary use as a process for change, re-imagining working infrastructure to fit new needs, using transformation to meet new needs & guide development, showcasing & curating industrial culture and working with local stakeholders. The strategies are in extension all aimed at continuing the adaptive reasoning present in the sites today, and to be facilitators for this developing into a new form of adaptability that better suit future needs of the local community and are being showcased with example projects across the focus area in Slite.

Using natural processes

As Braae (2015) points out, incorporating, and helping natural processes in transformation projects of industrial sites is a useful method. not only for dealing with landscapes too large to re-incorporate into the rurban fabric directly ,but also as natural processes can help remediate the sites themselves.

One of the first steps of making the industrial site accessible and in extension adaptable for the future is cleaning the site of contaminants built up throughout the lifespan of the cement plant. For example due to the extensive use of coal, oil and other material resources for firing kilns.

By utilizing natural means, such as planting, harvesting, and processing of sunflowers into biochar, toxins can be removed from the soil of the site. The biochar can be processed, contaminants extracted and turned into fertilizer (Kaonda & Chileshe, 2023; Zhou et al., 2020). By cleaning soils on site through natural processes dumping of masses can be avoided and the soil in large left untouched.

In addition to planting of biomass crops, photovoltaics can be introduced, both in the quarry-lakes and on available surfaces across the industrial site. The combined practice is an emerging method that has proven useful in providing double revenue streams during remediation (Li et al., 2023).

In addition this could help alleviate the stress on the local energy supply chain, as the main source of district heating in Slite currently is produced from waste heat in the Cement plant.

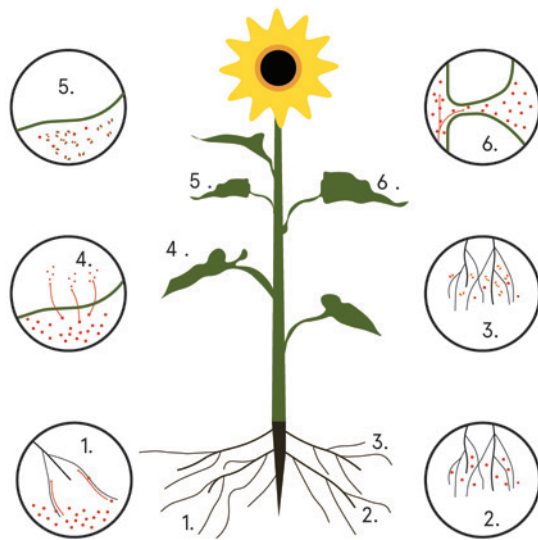


Illustration of processes in phytoremediation in sunflowers

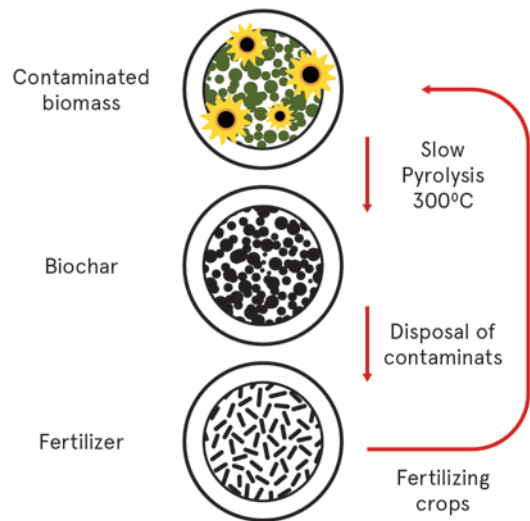
Source: (Greipsson, 2011)

Processes of phytoremediation in Sunflowers

1. Rhizofiltration, roots absorb contaminants from soil & groundwater
2. Phytostabilization, roots immobilize contaminants in soil
3. Rhizodegradation, microbes in roots fragment contaminants
4. Phytovolatilization, contaminants modified & evaporated by leaves
5. Phytodegradation, enzymes fragment contaminants & produces plant fibers.
6. Phytoextraction, contaminants stored in leaves & stem

Turning biomass into biochar

The biomass produced by sunflowers at the site is then turned into biochar through pyrolysis and can be used to fertilize future crops of sunflowers.

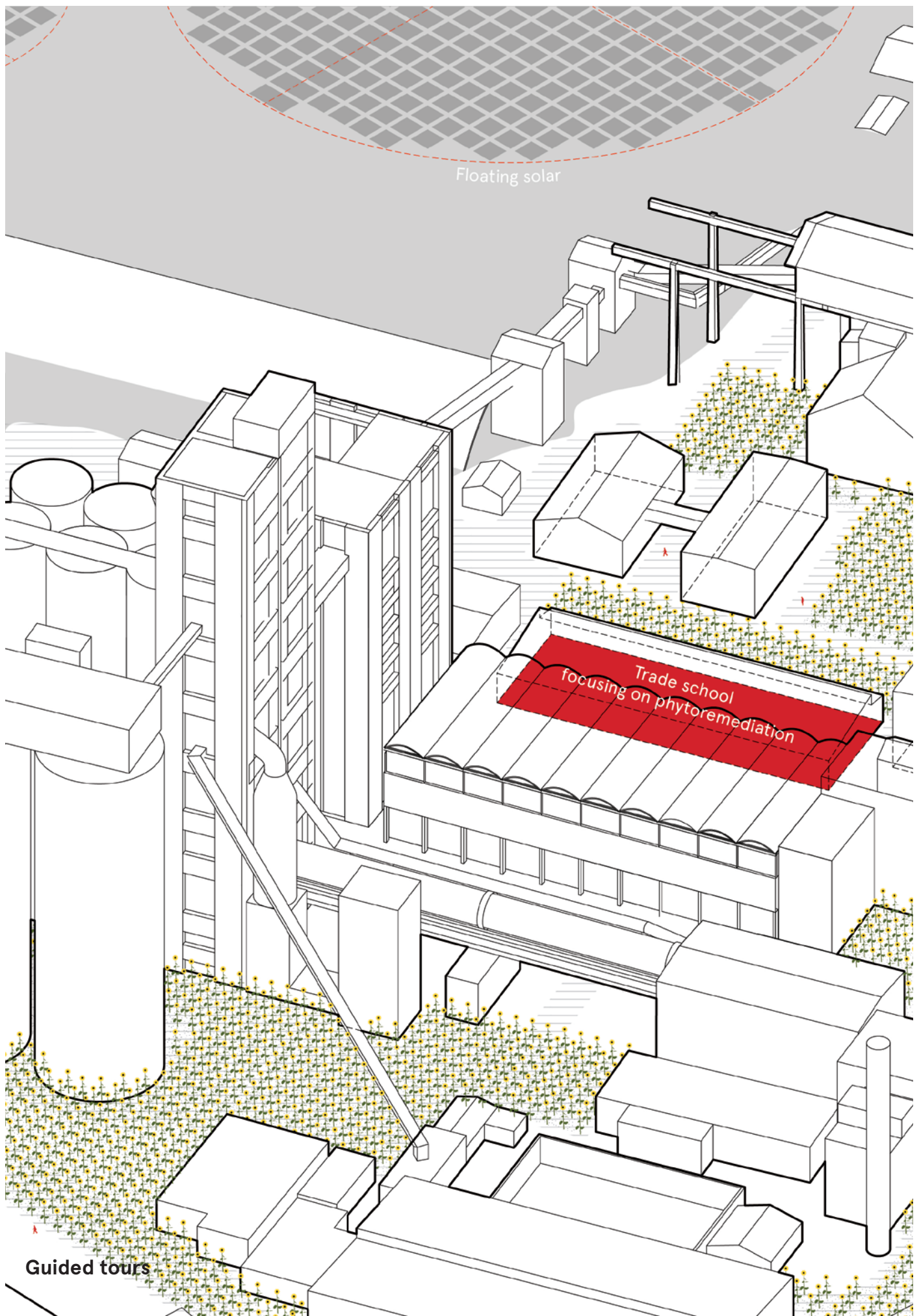


Possible timeline

- 1919 Cement plant founded
- 1928 First masses dumped in Vägumeviken
- 1946 Start for burning of oil
- 1950's 50 000 tonnes of fill masses dumped in Vägumeviken
- 1960's 65 000 tonnes of fill masses & filter dust dumped in Vägumeviken
- 1970's Continuation of dumping
- 2025 Plan for remediation formulated
- 2026 First test of Phytoremediation
- 2027 Evaluation of first results
- 2028 Floating solar power
- 2030 Remediation of large areas completed
- 2032 New remediation as new needs arise
- 2035

Illustration of processes of producing biochar

Source: (Zhou et al., 2020)



Providing access

A main component of a successful transformation & re-integration of the industrial sites into the urban fabric will be to provide access to the buildings on site.

This can, and should be done in a number of different ways to allow for a diverse group of users from the local community to take ownership, and in extension shape the future of the sites.

Building on the fact that the cement plant today exists as a semi-public domain in the notions of Hajer & Reijndorp (2001) new public and semi-public domains can arise. By not only focusing on fully public domains, open to everyone all the time, new spatial & temporal relationships in the sites are created and the local community that is permitted to access different parts of the building mass, depending on need and interest can get a new sense of ownership towards the specific parts of the site.

Examples of this could be, a climbing gym being accessible 24/7 for members of the local climbing club, a museum being maintained and accessed by the local historical association in union with Gotland museum, a trade school having access to workshop areas, which could be locals and companies with certain interests and needs.

By striving for accessibility for a broad spectrum of users, especially in mixed user groups, new and interesting networks in the local community can be allowed to develop on site perpetuating the importance of the site in the local context, but building upon a new set of adaptive rules.



Accessibility through membership, facilitated by local stakeholders

Local associations can gain access to buildings through a shared key system, physical or digital, allowing larger parts of the local community to gain access to the built environment of the site. In doing so a stronger sense of ownership towards the site can be developed which in turn can help guide further development as uses can be tested.

Accessibility through institutional solutions

By inviting new institutions to become stakeholders in the transformation, new user groups can access the sites. Additionally this can serve as a foundation for sharing resources, a trade school focused on the transformation of the site could provide an arena for cross-generational sharing of spaces. A workshop in use by the trade school or a local business during the daytime can be shared with older inhabitants during the rest of the day.

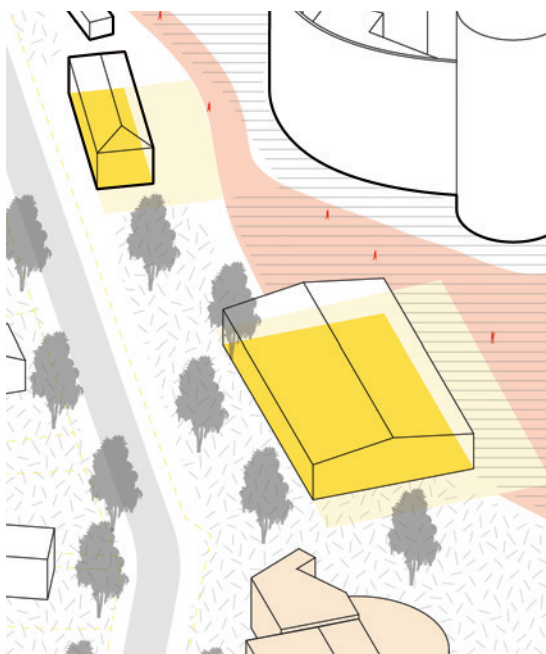
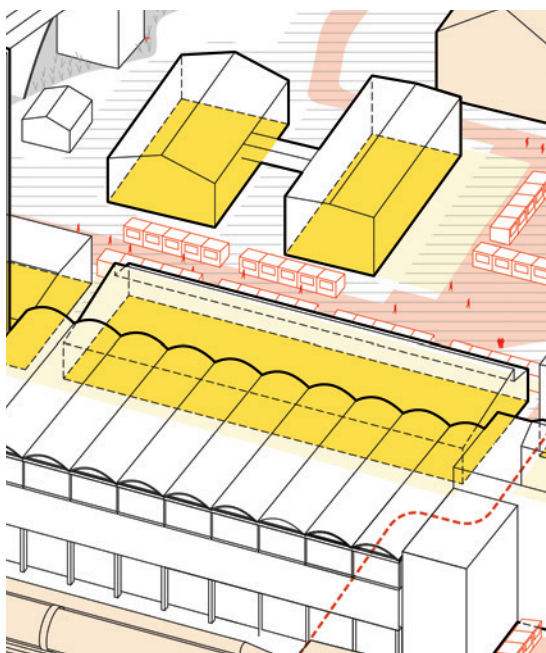
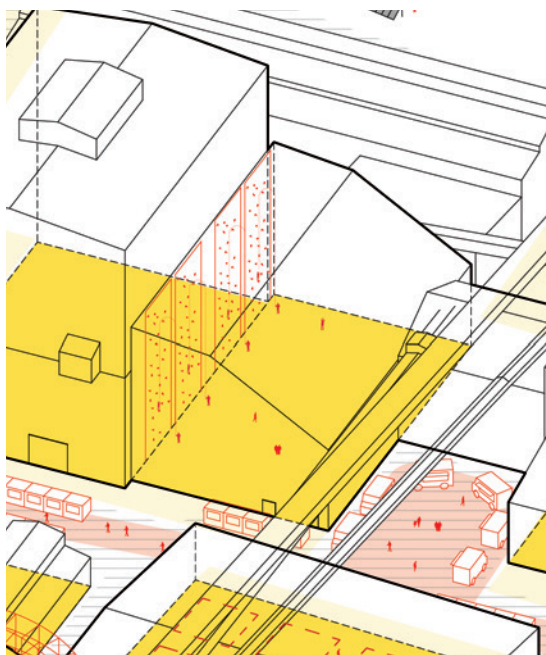
Possible timeline



Accessibility through diversifying ownership

Policy aimed at keeping spaces occupied becomes a crucial tool for further development, this includes both distributing ownership through sales of certain parts of the sites, and robust frameworks for facilitating long- and short term renting of spaces in the sites.

By valuing the fact that a space is occupied on par with the monetary revenue it can bring for owners through policy the sites can come to use for a larger portion of the local community.



Creating new spatial relationships

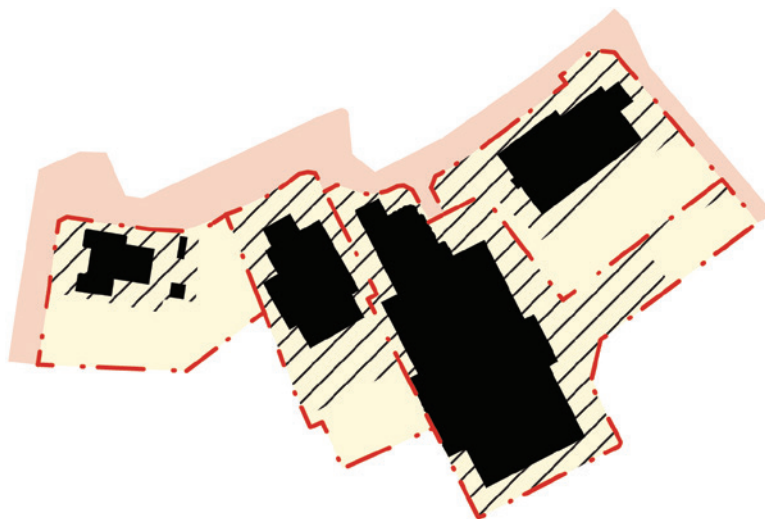
To facilitate new use of the sites and allow access for the local community, new spatial relationships are needed.

A key finding in the mapping of current conditions in Slite today, is the strong sense of business present, with many sub-contractors to the cement company and businesses in tourism. To continue to build upon this, it becomes important to facilitate new actors to move into the highly adaptable industrial building mass.

This can be done by both implementing policy aimed at filling the buildings with new endeavors and by allowing new owners to take over responsibility for selected parts of the site through a careful redistribution into smaller plots and properties in contrast to the vast plot size of today.

When looking at the example of Gnosjö, a town known in Sweden for its small, and medium scale, production industry and strong business sense. The space around industrial buildings becomes as important as the buildings themselves, allowing buildings to grow, store goods and erect temporary structures.

By dividing the large plot of Österby 1:229 into smaller manageable plots with ample space outside the buildings to create good conditions for small-scale industry, whilst maintaining public ownership and accessibility to main parts of the site adaptability in use can be achieved. The division will have to take into account, future use, spatial form of site & buildings, cultural heritage value etc.



Example of division of space in Gnosjö industrial plots.

Learning from Gnosjö

Gnosjö in Sweden is often used as a reference for small scale business spirit, with Gnosjöandan. In Gnosjö and the surrounding area metalworking in industrial scale has been the base for a broad range of manufacturing businesses.

The area that makes up the Gnosjö industrial region, consists of four municipalities in western Småland and at the turn of the 21th century had 85 000 inhabitants and upwards of 1500 manufacturing firms (Johannisson & Dahlstrand, 2009).

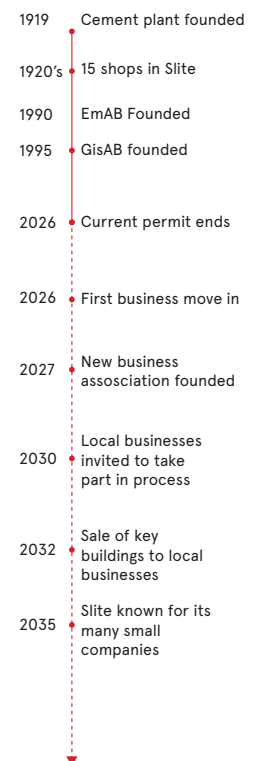
This has impacted the spatial form of the community with a large number of industrial buildings erected adjacent to residential areas.

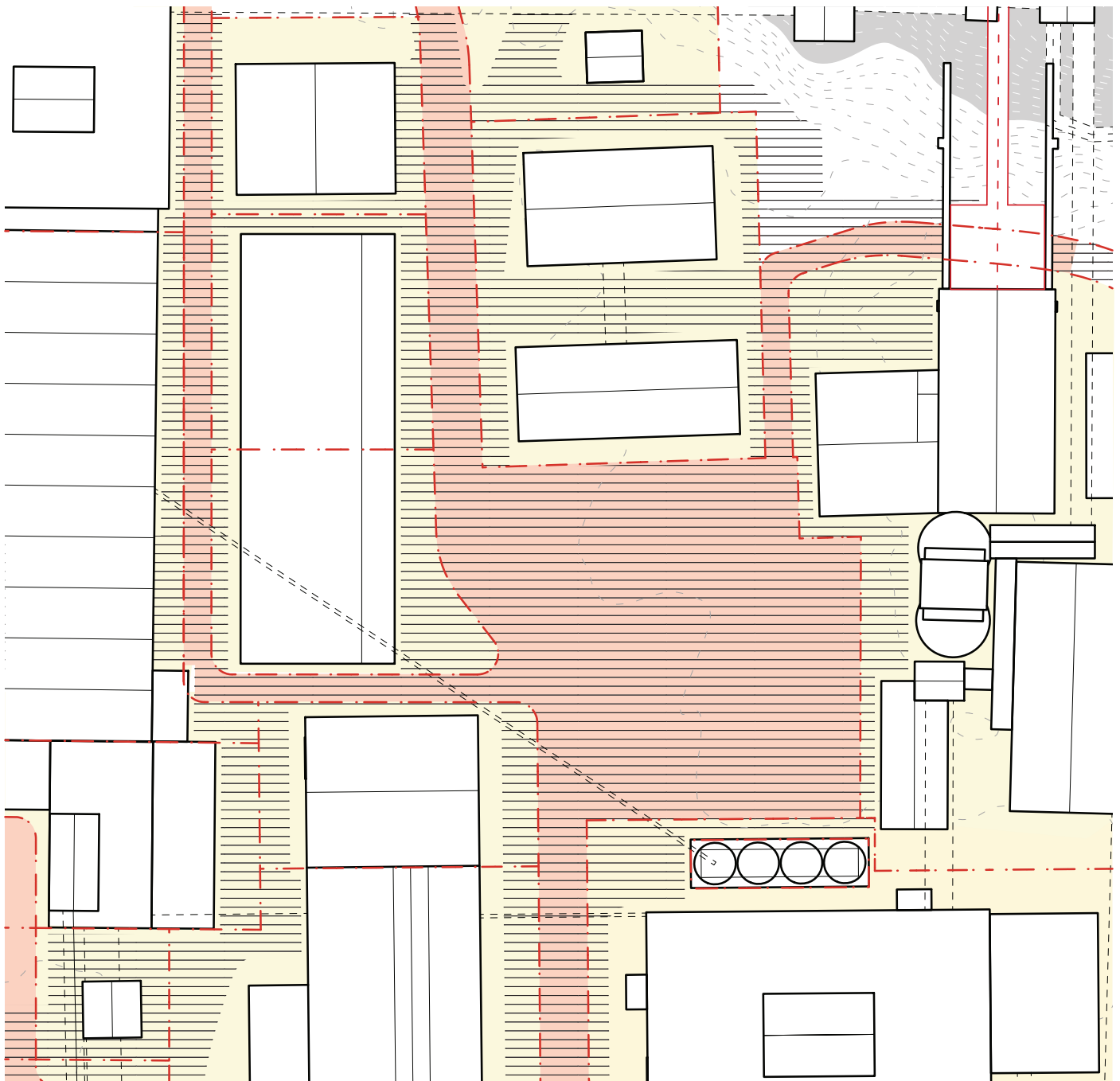
A notable characteristic of the spatial form is the industrial plots sizes, where area outside of the buildings in large is as important as the buildings themselves.

An additional key factor to the success of Gnosjö seems to be the fact that business does not directly equal competition in the region.

Rather it is built upon a spirit of common entrepreneurship, where the collective of the local community as a whole is seen as the basis for conducting business. The businessworld intertwines with all other sectors of the local community (Johannisson & Dahlstrand, 2009).

Possible timeline



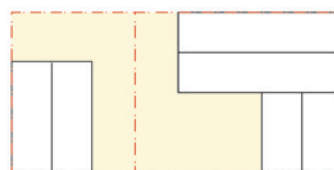


New layout of plots & public domain

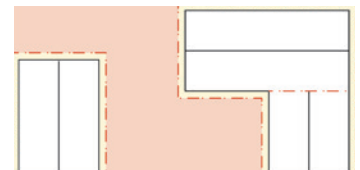
Exploration of possible plots



Plots according to buildings, new use and to allow for establishment of new public domain



Plots stretching to the centerline inbetween buildings



Plots according to buildings whilst making the rest of the site part of the public domain.

Valuing temporary use

A large part of the inherent adaptability of the industrial site is its ability to exist in flux. Where needs that are short term in their nature, such as the large maintenance stop conducted every year in the cement plant, dictate how the space is used. This adaptivity is useful, especially in dealing with the open spaces throughout the site, where the spatial relationships to surrounding buildings, and activities govern what use is permissible in the future.

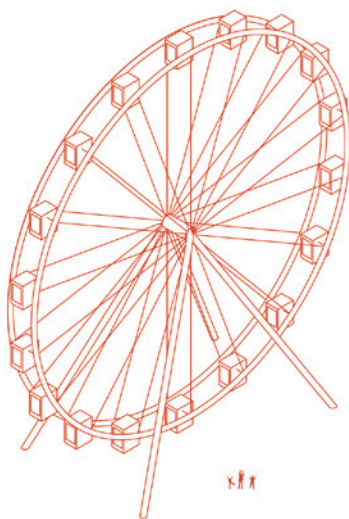
This includes using the main “square” in the site for storing of materials, parking when needed, the main part of the yearly market or for other cultural events.

As need arises, buildings that border the square can be used to house functions relating to the temporary events taking place.

This capacity also translates to the differing needs throughout the year, as the influx of inhabitants & visitors in the summer months create needs not present in the low season.

Part of the site can be used for storage for businesses operating on a seasonal basis such as sports facilities in the quarries, the camping area or other tourism based businesses.

In addition, temporary use is a good method to test future use and to implement untested policy & design approaches as stakes are lower than working in a permanent solution mindset, where ideas need to be cemented.



Ferris wheel at Slite marknad?

Slite marknad

By utilizing the industrial site for already existing temporary events such as the annual market a new, transformed identity for the space can be born, this is also a good space for showcasing local businesses operating in and around the site.

Sm-week

Events of various kinds can use the adaptive reasoning of the site, focusing on attracting a larger sports event to the site can prove successful in shaping a new image of what Slite is after the exit of industry.

Storage

In the winter time, which makes out the low season for many activities, the site can be used for storage of seasonal goods, such as boats from the marina, with adjacent buildings being used for maintenance.

Sale of goods

Temporary sale of goods, for example christmas trees, local farmers markets or food trucks can populate parts of the site throughout the year.

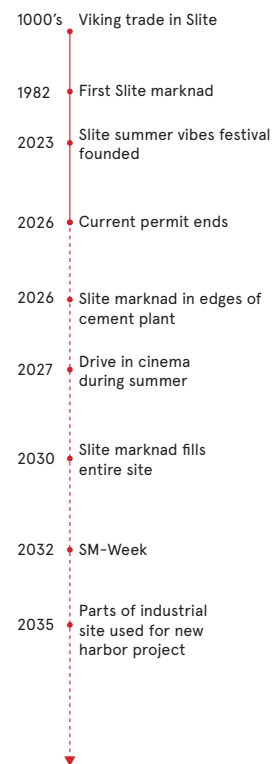
Youth culture

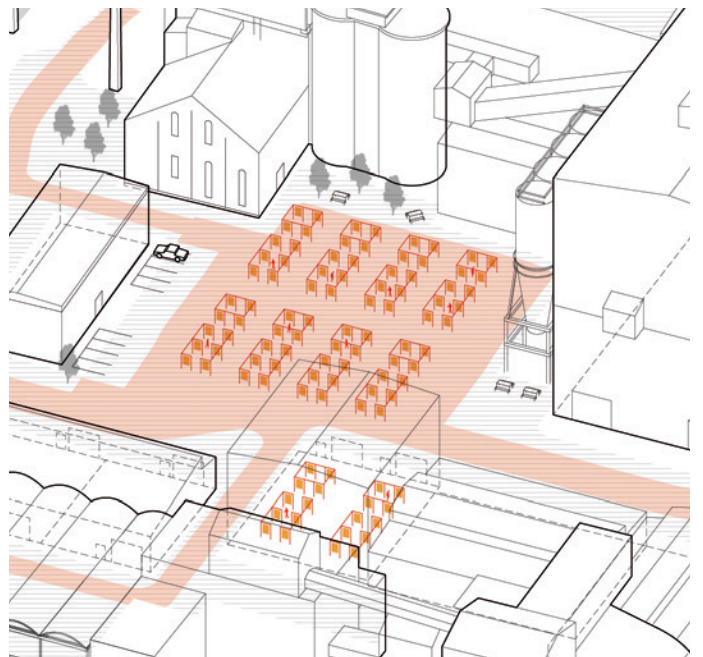
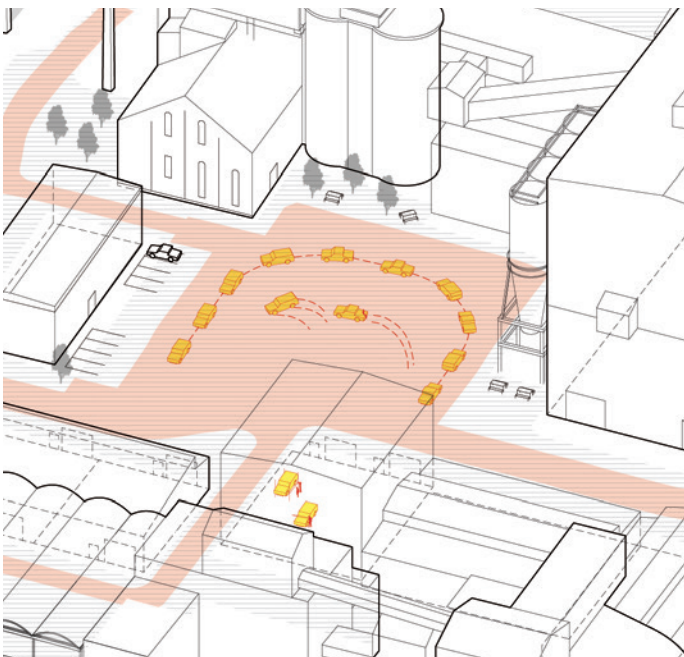
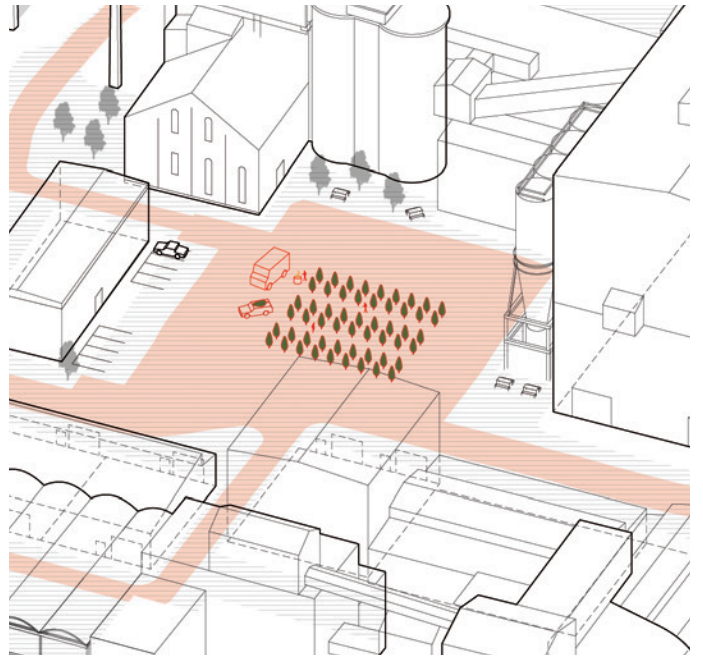
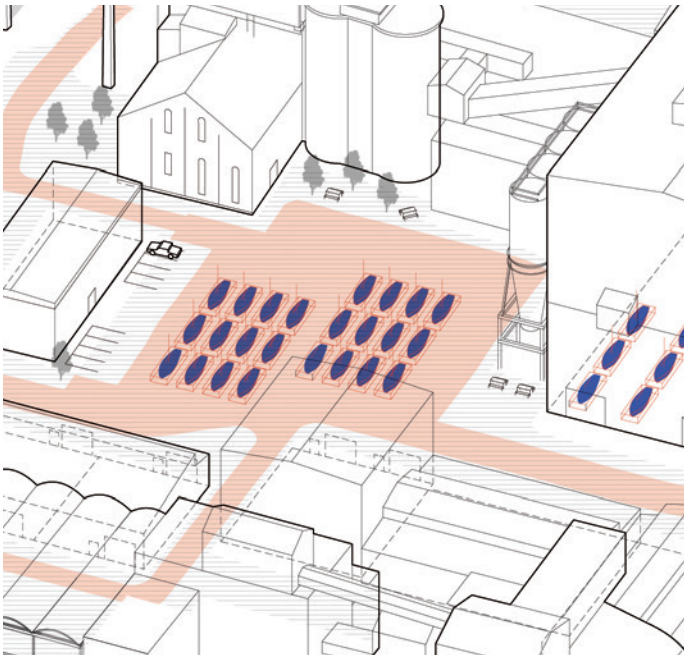
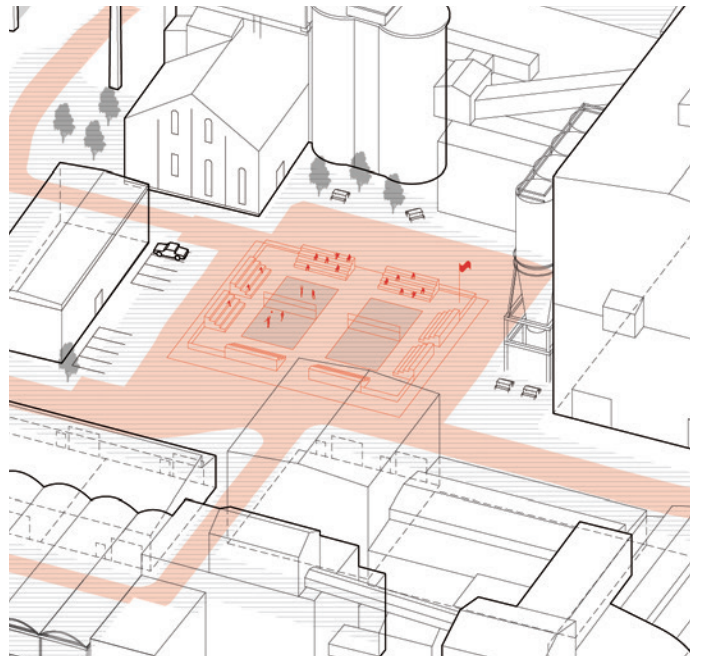
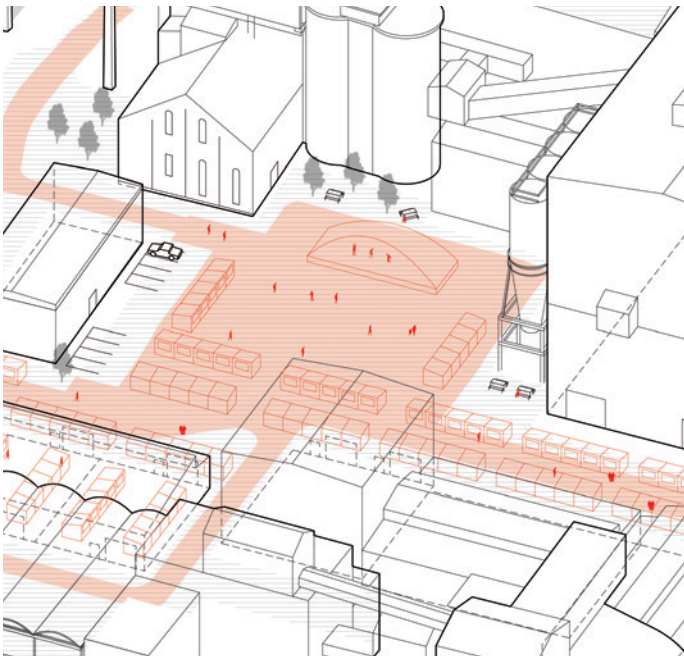
Activating local youth culture through inviting Epa's to use secluded but well connected parts of the site can prove meaningful, by establishing a workshop, catered towards Epa's, youth can be allowed to gain ownership in the site.

Artistic interventions

Inviting local- and global artists to re-interpret the site has been proven as effective tools in similar situations. An exhibition focused on presenting the vast amount of photos of concrete shipped in sacks can be a starting point for future artistic explorations that deal with the industrial culture of Slite and the surrounding region.

Possible timeline





Re-imagining working infrastructure

To help support these new functions, user groups and businesses a focus on improving and adapting already existing infrastructure is needed.

The harbor is at the very core of Slite's being, by recognizing this and further developing it to fit new needs greater adaptability can be achieved, not only for the industrial site but for Slite, and the surrounding area.

A shift from a closed industrial harbor, towards a harbor that can handle a more diverse set of needs is fitting for the new context and its adaptive use of the site.

Braae and Diedrich (2012) point to the fact that harbor renewals, if done right, can be useful in counteracting homogenization in development, as the characteristics of the harbor sites are enhanced rather than demolished and erased.

Parts of the harbor can be used to provide a marina closer to the town center, and the new functions in the industrial sites.

Local shipping routes, by sea and by air can be re-introduced to move traffic from the road network.

In doing this, it is important to keep parts of the harbor within the mode it currently operates, as harbor facilities are heavily regulated and in need of special attention when it comes to security and safety measures.

New short delivery routes

New short delivery routes for goods can be reestablished and provide alternatives to road transport on the island, alleviating high pressure on the network, especially during the summer. This can be done both by ship and by the emerging practice of using drones for smaller parcels. By placing the drone dock on the end of the pier, noise pollution can be avoided.

Already existing infrastructure such as silos and conveyors can be transformed to fit new needs of these functions.

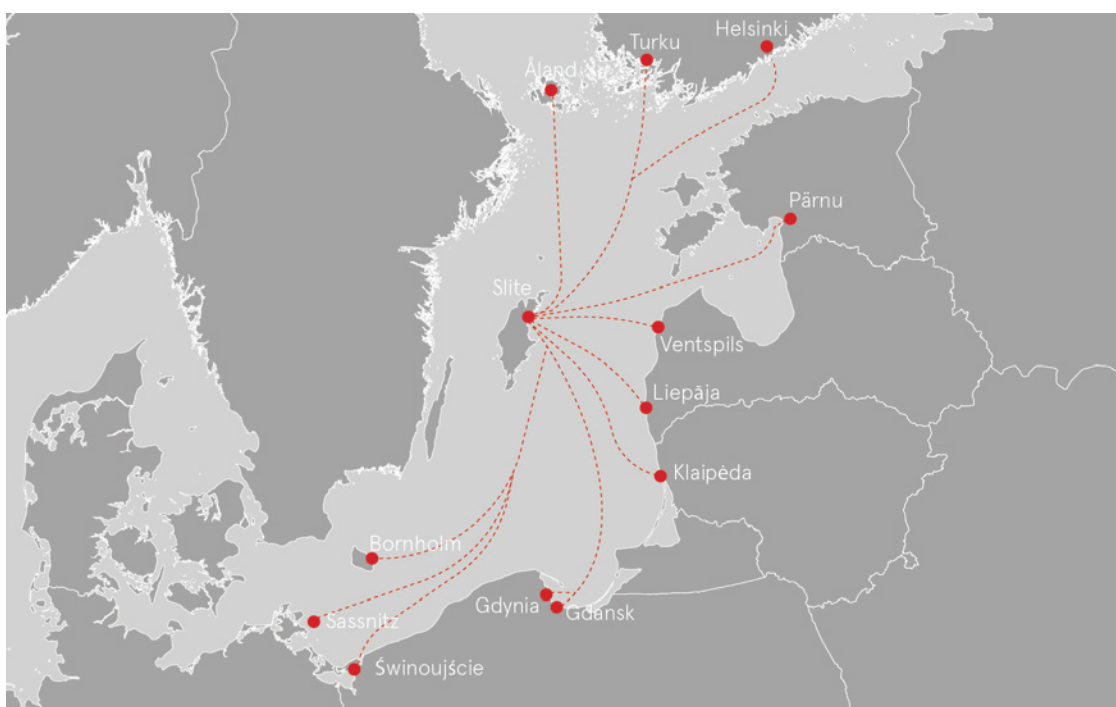
Marina

An additional marina can help house new boats exploring the islands that make Gotlands only archipelago, and help move users closer to the transformed industrial site. A rental boat service could also be established to allow access to the archipelago.

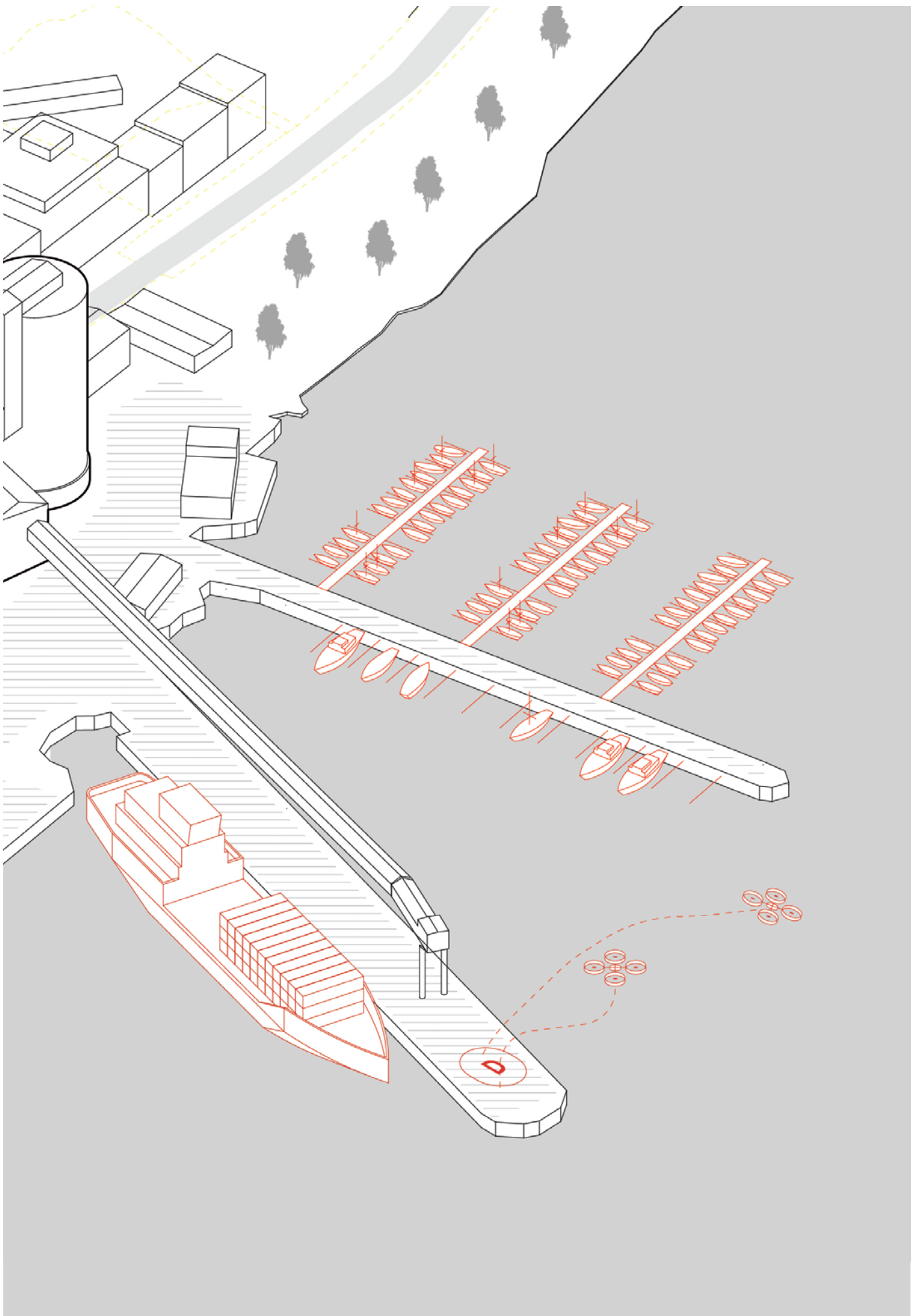
New passenger traffic

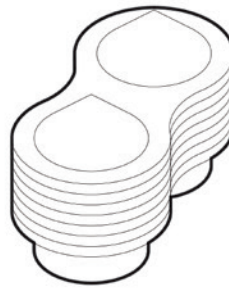
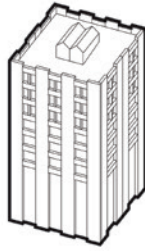
Adapting the industrial harbor to facilitate passenger routes eastwards can provide renewed connections, ferries have trafficked routes to Finland and the baltics throughout history. Depending on the size of ships the current piers will have to be adapted, but current piers are large enough to house the older ferry's in use that could take upwards of 700 passengers.

Possible timeline



Possible new connections across the Baltic Sea





Repurposing existing structures to house new needs becomes an essential part of creating a new adaptive future in Slite.

Exploration of possible host structures on site.

1. Highest cyclone tower on kiln line 7
2. Lower cyclone tower on kiln line 6
3. Clinker silos

Using transformation to meet new needs & guide development

By using transformation of buildings on site, challenges present in the local community can be met while at the same time guiding the development of the site by introducing both new user groups but also new conditions. This can be done by determining a set of key projects to be developed early on in the transformation process, guiding the transformation of the site in a preferred direction.

For example by introducing housing projects into the spatial layout of the site, new conditions are added to the already existing ones, by policy on noise pollution, the need for green space etc. are introduced. This tool is powerful as it, in a rather small scale and through precise investments can help steer the entire future of the sites.

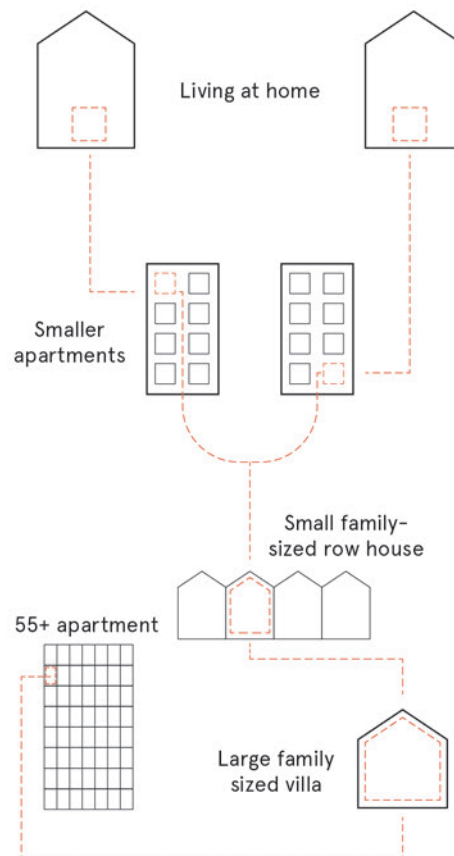
This process can be repeated to adapt to new needs as they arise, granting the industrial site a position as a resource in the local community while at the same time as working on counteracting homogenization of the built environment in Slite, and continue the heritage of adaptive reasoning shaping the spatial form of the city.

A current challenge in Slite is the aging demographic, by evaluating the already built structures on the site, and adapting them to help alleviate stress on the local housing market this challenge can be met. By transforming the lower of the cyclone towers, a new residential tower housing an assisted living facility, providing housing for inhabitants 55+ can be achieved. In doing so gaps can be created in the moving chain allowing younger residents to move into existing villas, row houses and family sized apartments in town.

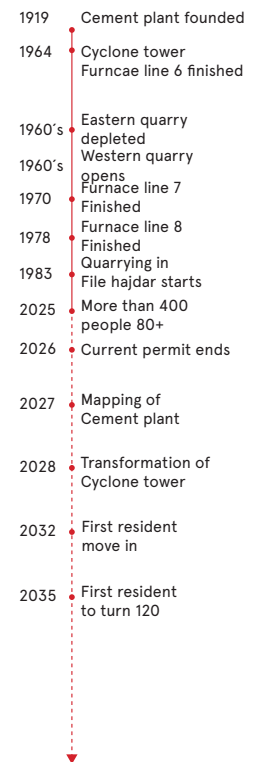
The tower will have excellent views of both the industrial site in transformation, the quarry lakes, and the bay with archipelago. As many older inhabitants in Slite are closely tied to the cement plant it seems fitting to allow them to populate the Industrial site of old.

The location will also create a new dynamic on site by not only populating from the edge inwards but rather starting at the core of the site. The proximity to the current nursing home of Kilåkern will also allow for the sharing of functions with this facility.

Other key projects that can benefit from this transformation logic is a new trade-school and a cultural heritage museum.



Possible timeline



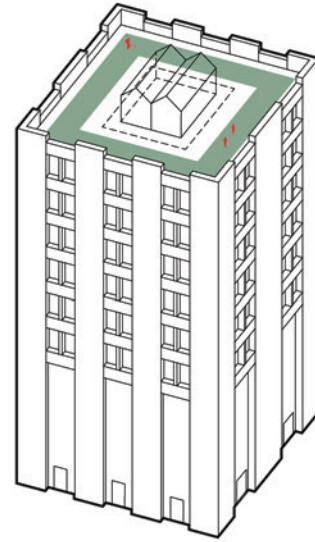
Example of moving chain:

Older couple moves into 55+ apartment, leaving villa open for a family, leaving a row house open for a small family, leaving two apartments open for youth leaving home.

Assisted living facility

By introducing an assisted living facility into the urban fabric of the industrial site, new specific conditions are created, noise pollution will have to be monitored and minimized, hazardous materials will have to be stored in specific locations and green space will have to be provided to meet needs of the inhabitants. This will create new dynamics in the spaces that can, and should be capitalized upon.

The facility can be established in the cyclone tower on kiln line 6.



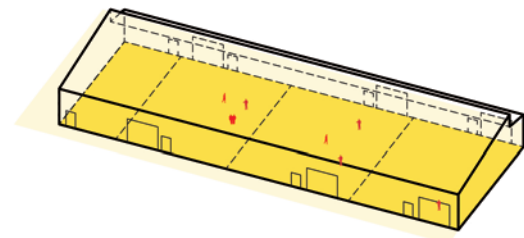
Trade school

Re-vitalizing the idea of a trade school can help cement Slite as an arena for learning about adaptive reasoning and transformative processes.

Slite was well known for its trade-school opening in 1945, with close ties to the cement plant and integration of real-life working experience in the learning process highlighted as success factors.

The trade school can be re-established in stages of remediation focusing on phytoremediation & solar voltaics operating in a similar fashion as the school of old, with close ties to the sites it is remediating. In addition this can create new synergies as the trade school re-introduces a workshop that can be utilized by the general public or local businesses.

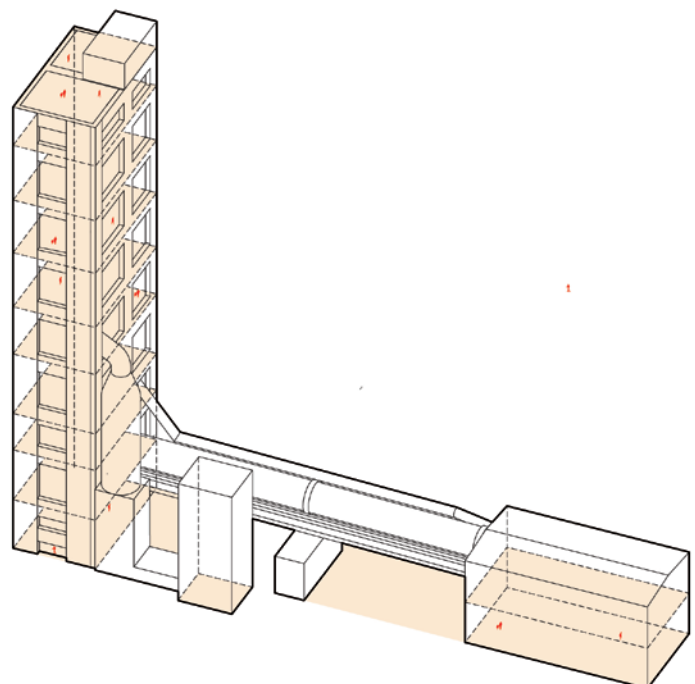
The trade school can be established in low buildings facing the square, helping populate the space.

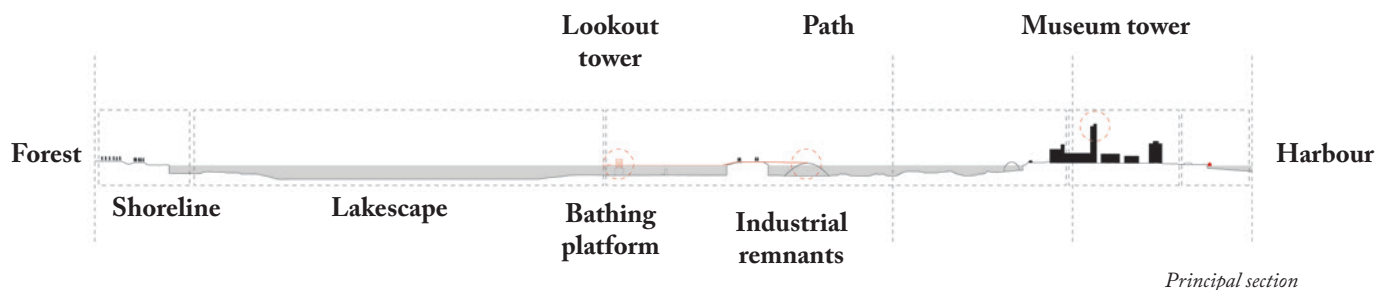


Museum

To emphasize and showcase the importance of Slite and the cement factory throughout history a museum dedicated to the industrial past of Slite will be a large part of the transformation. This can also serve as an important part, not only for the industrial heritage of the site but also as a hub for the industrial culture of the region, with quarrying of lime- marl- and sandstone being a prominent industrial endeavor on the northern part of Gotland throughout the last 1000 years.

The museum can be established in the highest, most prominent building on site, the cyclone tower on kiln line 7.





Showcasing & curating the industrial culture

The socio-cultural values present in the industrial site are of high importance when communicating not only Slite's industrial heritage but also the industrial culture as presented by Görmär and Harfst (2019), not only in the age of cement but reaching further back as a place of extractions tied to the limestone industry.

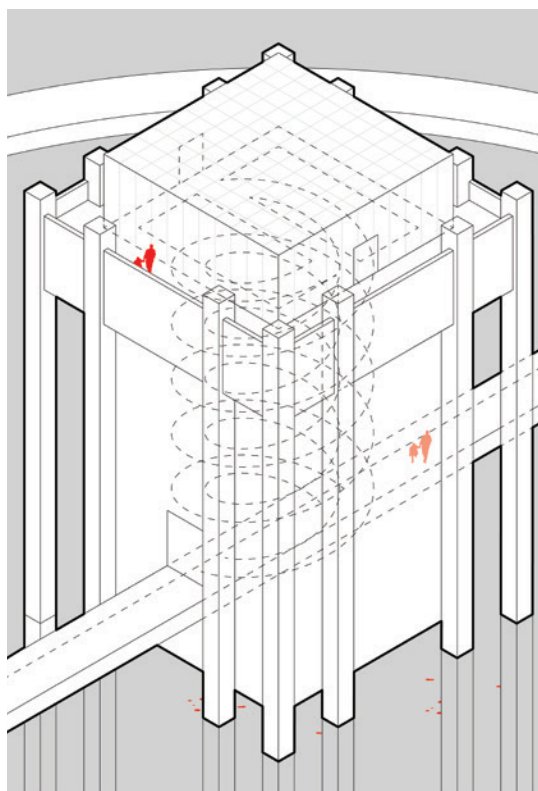
By building on the already existing spatial expressions and tying the site at the cement plant and *Östra brottet* to *Västra brottet* with a path, the sheer scale of the industrial complex can be highlighted. The path will take visitors, through the cement plant site of today, into the highest cyclone tower, some 103 meters above sea level, which will be adapted into a museum across its entire height. Further it will connect to some of the oldest parts of the industrial site, including the buildings that housed the first cement kiln on site before connecting to the quarries

If we are to truly value the labor conducted in the quarry, in line with what Braae (2015) discusses where the history is embedded in the everyday lives of the people that once worked in the quarry, and the site of extraction that took place and the places it helped build in the notion of *Shadows Places* presented by Val Plumwood (2008), The filling of them with water erases much of the visible traces of these processes. It in some extent gives back to nature, but it takes away the sense of scale present in the current, highly altered landscape.

By allowing the existing structures to remain intact below the water, a spatial relationship between the surface and the vast depth of the quarries can be achieved, in addition creating a

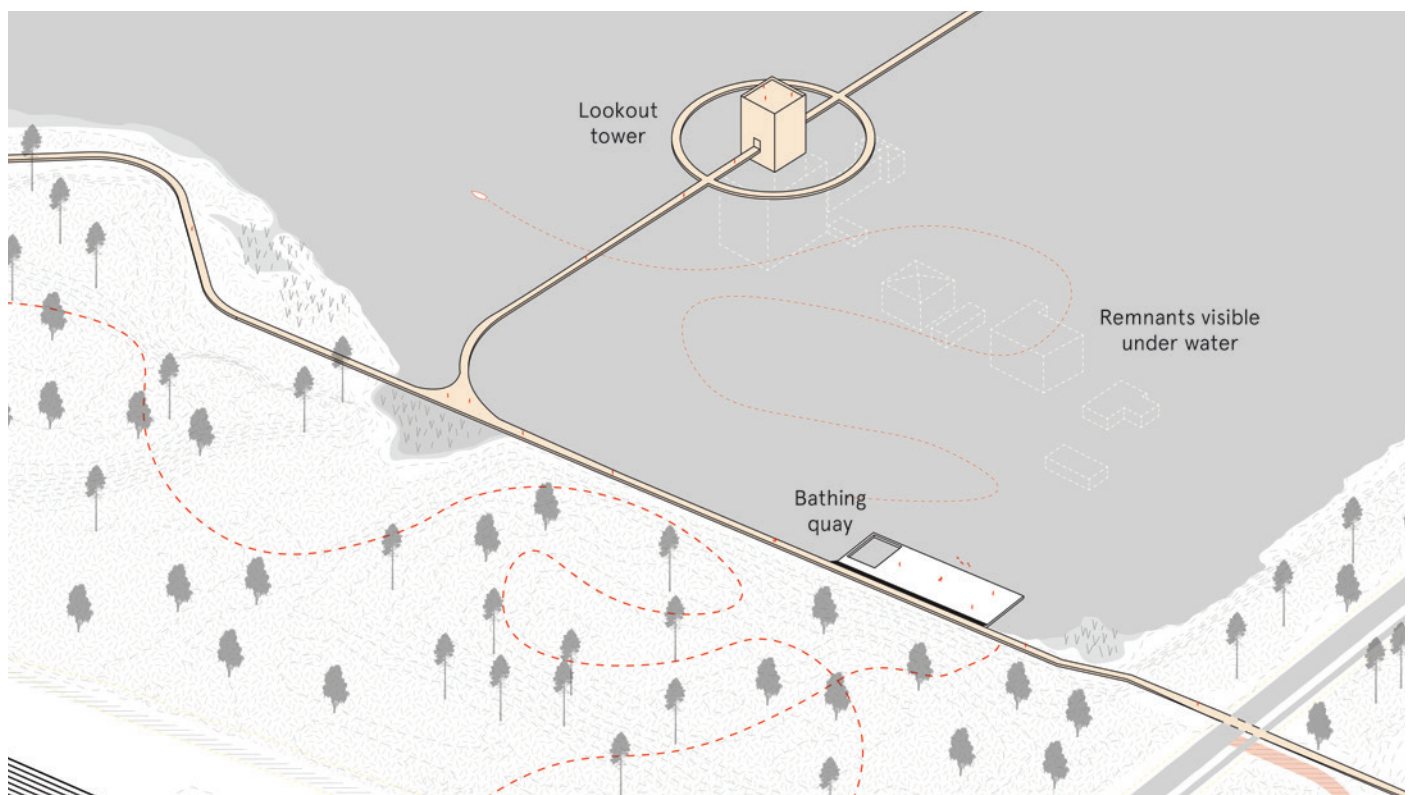
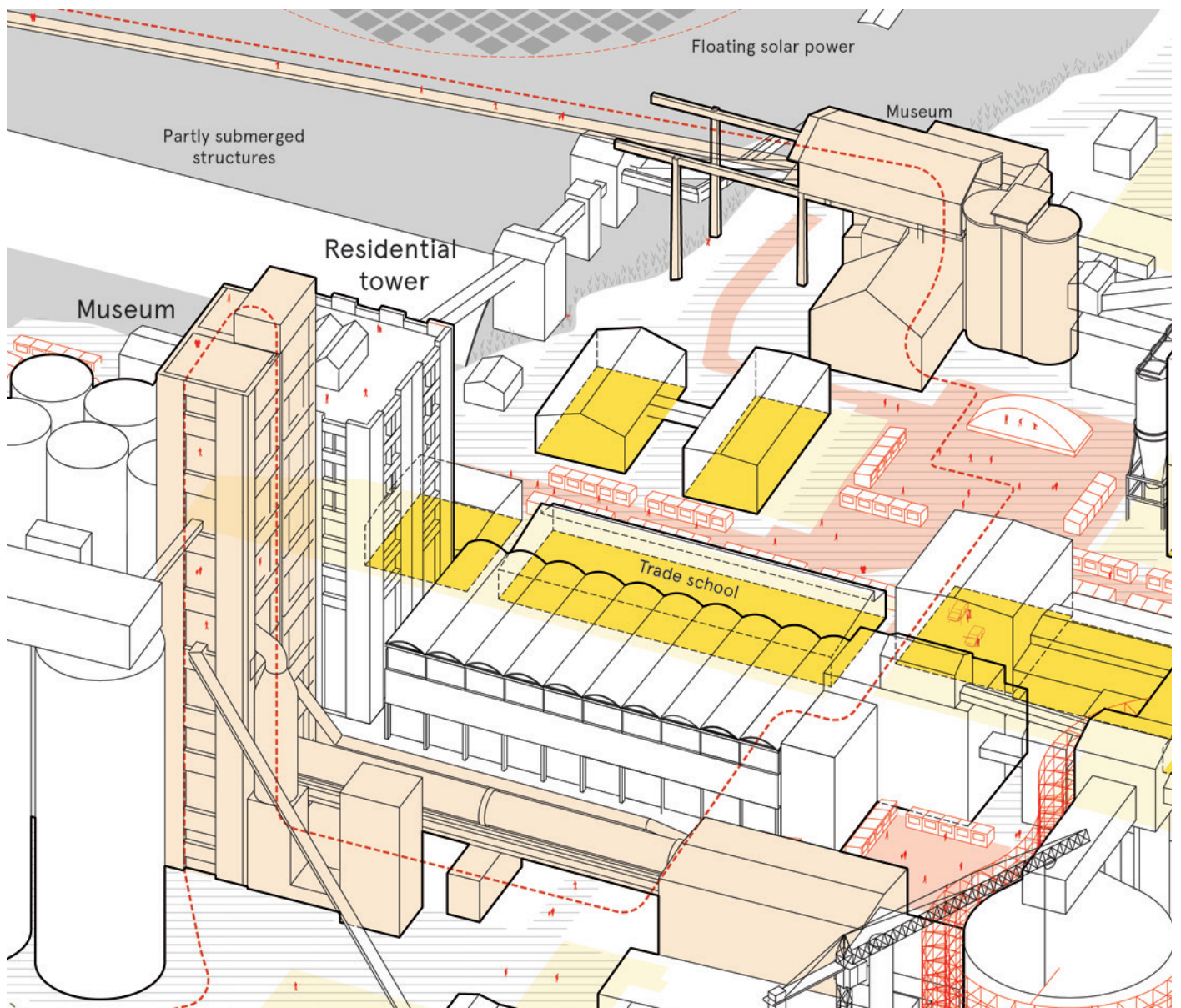
spatial configuration that allows for experiencing the immense scale of the place becomes important in telling the story of the industrial heritage. The path connecting the spaces can be highlighted with a lookout tower, placed on the location of the crusher in *Västra brottet*, that stretches as far above the waterline as the quarry is deep, allowing visitors to feel the scale of the place, and to peer into the depths to view the remaining structures intact below the water.

The lookout tower and path stretching across the water and alongside the quarry edges can also house recreational functions such as a bathing quay, seating and spaces for bonfires and fishing spots. In creating a path sensitive areas of the quarry sites can be protected by guiding visitors around or above them.



Possible timeline

- 1919 Cement plant founded
- 1964 Cyclone tower
Furnace line 6 finished
- 1960's *Östra brottet*
depleted
Västra brottet
opens
- 1960's Furnace line 7
Finished
- 1970 Furnace line 8
Finished
- 1978 Quarrying in
Fåle hajdar starts
- 1983 More than 400
people 80+
- 2025 Current permit ends
- 2026 Local history organization
arranges historic walks
- 2027 Museum opens in
the oldest buildings
- 2030 Historic path opens
- 2032 Cyclone tower opens as
concrete heritage museum
- 2035



Working with existing local stakeholder & proposing new ones

To create local commitment and anchoring, the use of stakeholders present in the local community is important and building on the already strong association life present in Slite becomes a key strategy.

By doing this many of the spaces that become available as industry exits can be both programmed and refined through collaborative measures.

The rekindling of the people's park, which from the 1920's to 1950's played an important role in gathering and connecting people in Slite (Öhrman, 1987) can act as a way of strengthening the local community in the absence of the cement company. Naturvårdsverket (2023) Highlights that immediate access to nature and activities are increasingly important for people when choosing where to live, and they propose that municipalities map, maintain and inform about nature and activities in proximity to inhabitants. In addition, they highlight the importance of promoting membership in nonprofit organizations.

The park sits along road 147 at the intersection with Skolgatan, directly adjacent to the barrier that is *Västra brottet*. The park is currently derelict with the only part reminiscent of its former glory being the entrance built in the 1950's.

The park and the associations tied to it developed over time which is visible in the range of sports facilities already present in its vicinity, with Heidelberg materials arena Ice rink, artificial football pitch and Solklintshallen's multi purpose indoor arena.

The current facilities are currently somewhat disconnected from the rest of Slite, and from each other. By incorporating *Västra brottet*, and its banks into a sports plan for Slite the possibility to add new sports functions opens up, especially tied to water sports.

This will in extension encourage new use of the quarries and could be facilitated through the establishment of facilities for recreational use of the old quarry, with rentals and loans of equipment and will also allow Slite to market itself as a destination on Gotland fit for hosting larger cultural and sports events.

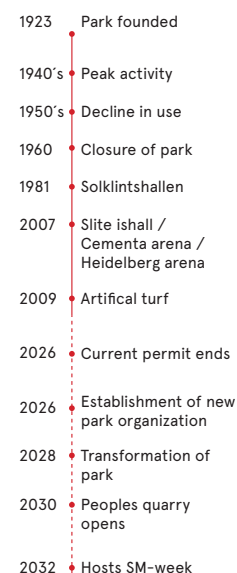
A goal for Slite could be to be chosen to host the SM-week which could help motivate investments in new facilities such as a swimming arena, an improved hostel and other facilities at the site of the old peoples park. The SM-week would host events across all the transformed industrial sites in Slite, with sailing in the harbor, wakeboard & swimming in the quarries and MTB & motorcross in the forest to the west of town.

By being responsive to new needs and wants in the local community, and viewing what is left behind by industry as resources, new stakeholders in the form of associations can be helped as they emerge by allowing both access and ownership to these spaces in an adaptive reasoning.

SLITE INTRESSEFÖRENING



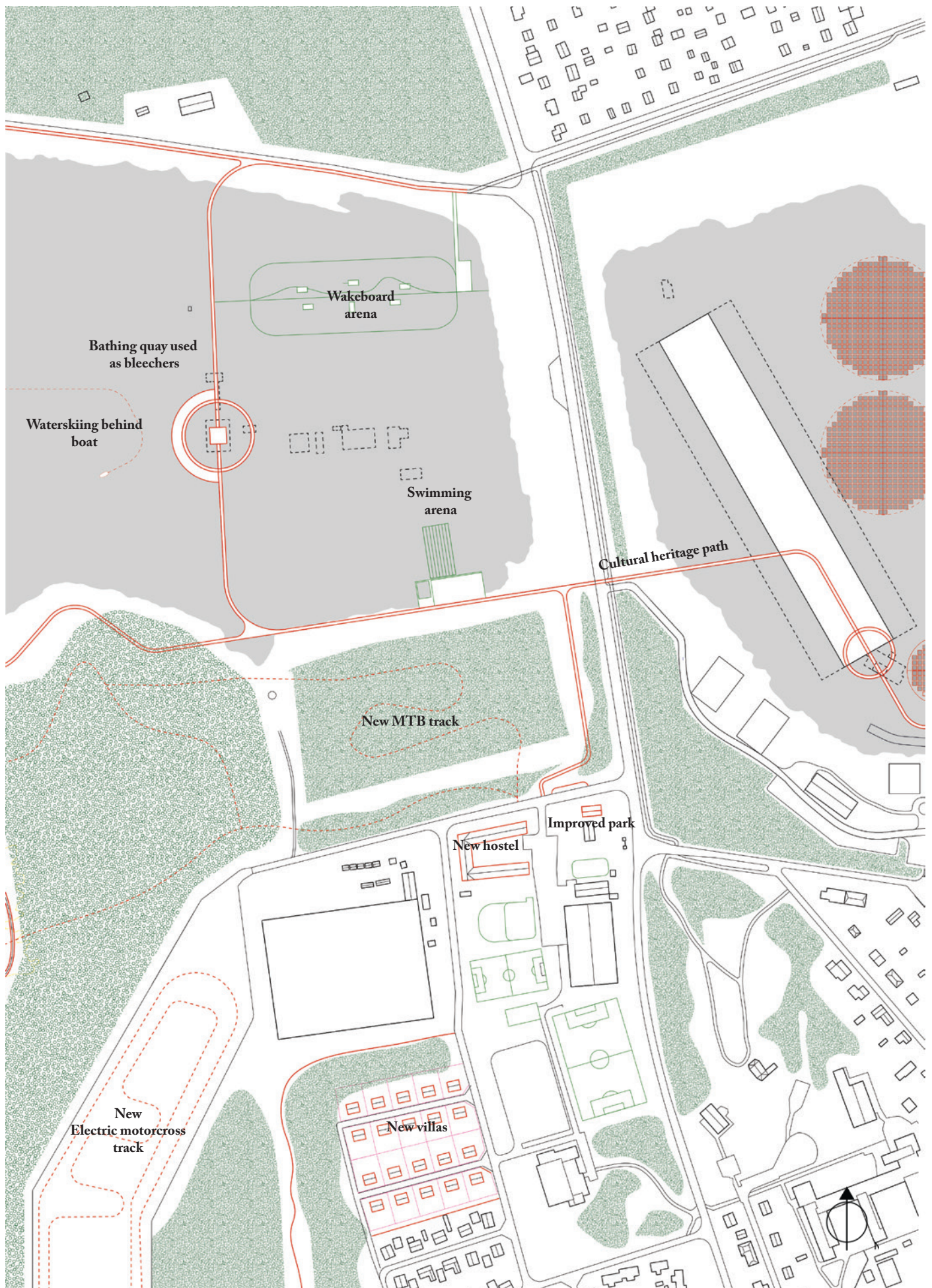
Possible timeline



Possible associations as stakeholders

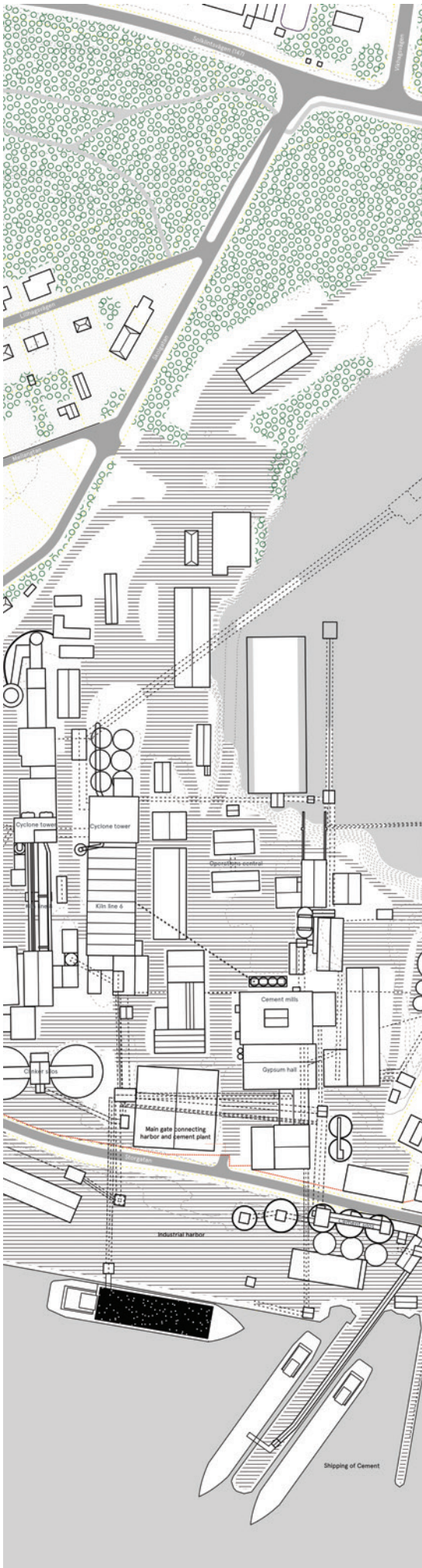
Slite intresseförening
IK Graip
Norra Gotlands MHF Ungdom
Gotland SportsAcademy
Slite båtklubb
Norra Gotlands Brukshundklubb
Slite Rotaryklubb

The already existing interest organization could continue to serve as an interface between local associations in the future.



Map of future sports arena

1:6000 (a4)



Current situation

The cement plant currently acts as a barrier, with the quarries dividing the town in two with its southern border running along Skolgatan where several older workers' houses have been left uninhabited due to noise and pollution.

The cement plant's main industrial site is currently a world of its own, cut off from the rest of Slite, and only accessible to a small number of people. It houses a diverse range of buildings that have come to fill very specific needs or have been adapted to fit new needs as the industrial methods have changed during the course of the last 100 years.

The oldest standing buildings date back to the opening of the plant in 1919.

The main gate connecting the site with the harbor sits at the end of an axis that cuts through the site and past the operations central and a large open space, connecting the inside of the cement plant to Skolgatan and Storgatan.

The industrial harbor adjacent to the cement plant is currently completely off-limits to the general public. It is connected to the cement plant industrial site via a number of conveyors, moving material resources, to and from ships.

The harbor houses a number of silos for storing cement and low buildings for other materials used in the processes in the cement plant.

- Public domain*
- Museum*
- Outside industry*
- New Use*
- Sunflowers*
- Trees*
- Hard surface*
- Water*
- Road*



Future situation

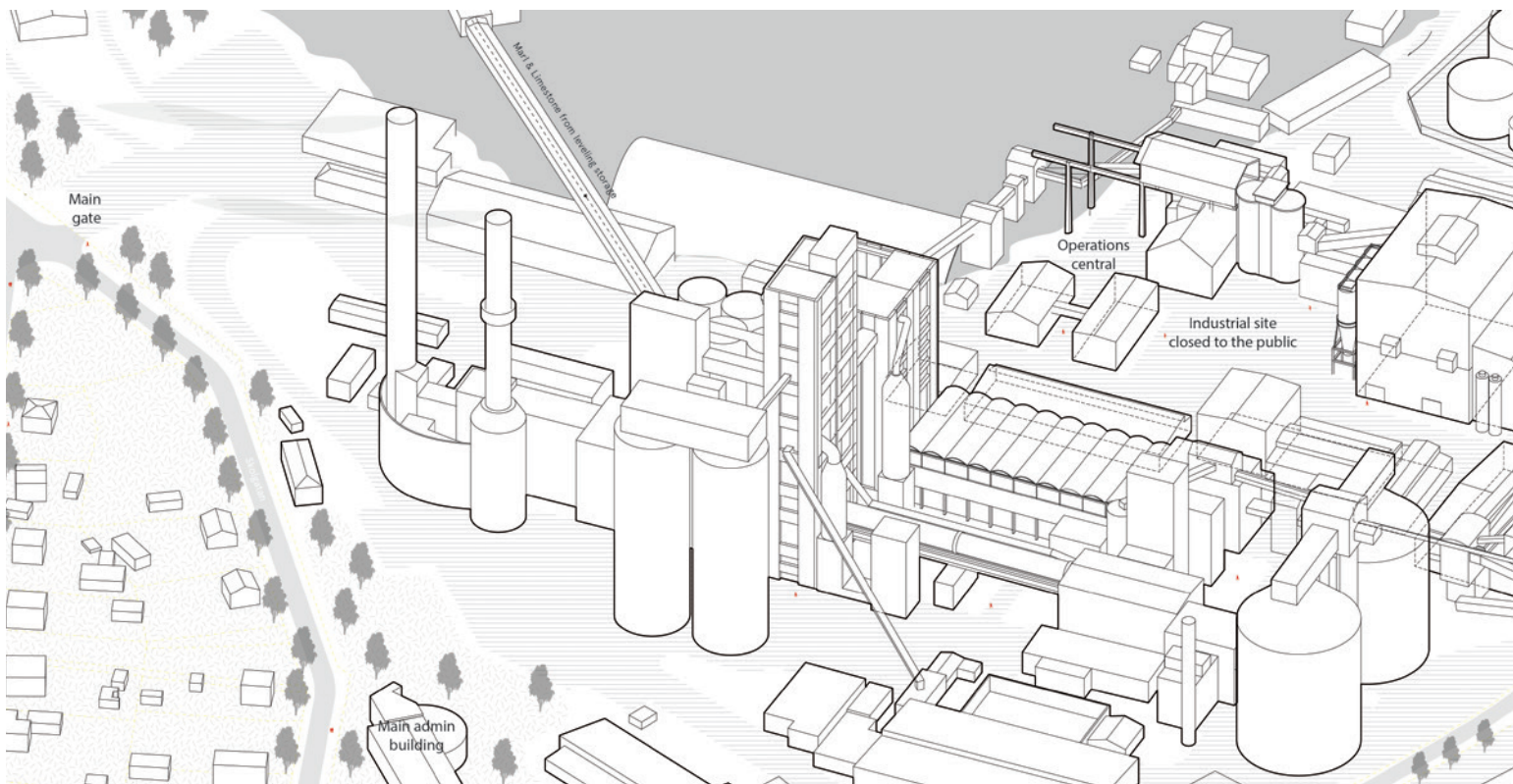
Through connecting the current industrial site to the rest of Slite, and in extension the urban fabric of its surroundings, a new dynamic between the existing built environment in town and the spatial layout of the former plant is achieved.

Both the new path connecting the industrial heritage sites and the new connection along the road running through the site, will allow for the public spaces in the old cement plant to become public domain in a range of ways.

As use changes the gates open up and allow the general public to enter the formerly closed off site. There is a need to differentiate what is public domain, and what is still industrial sites tied to the new industrial businesses that populate the buildings. This will allow for the coexisting of industrial and social interactions, as the needs of both community and industry is taken into account.

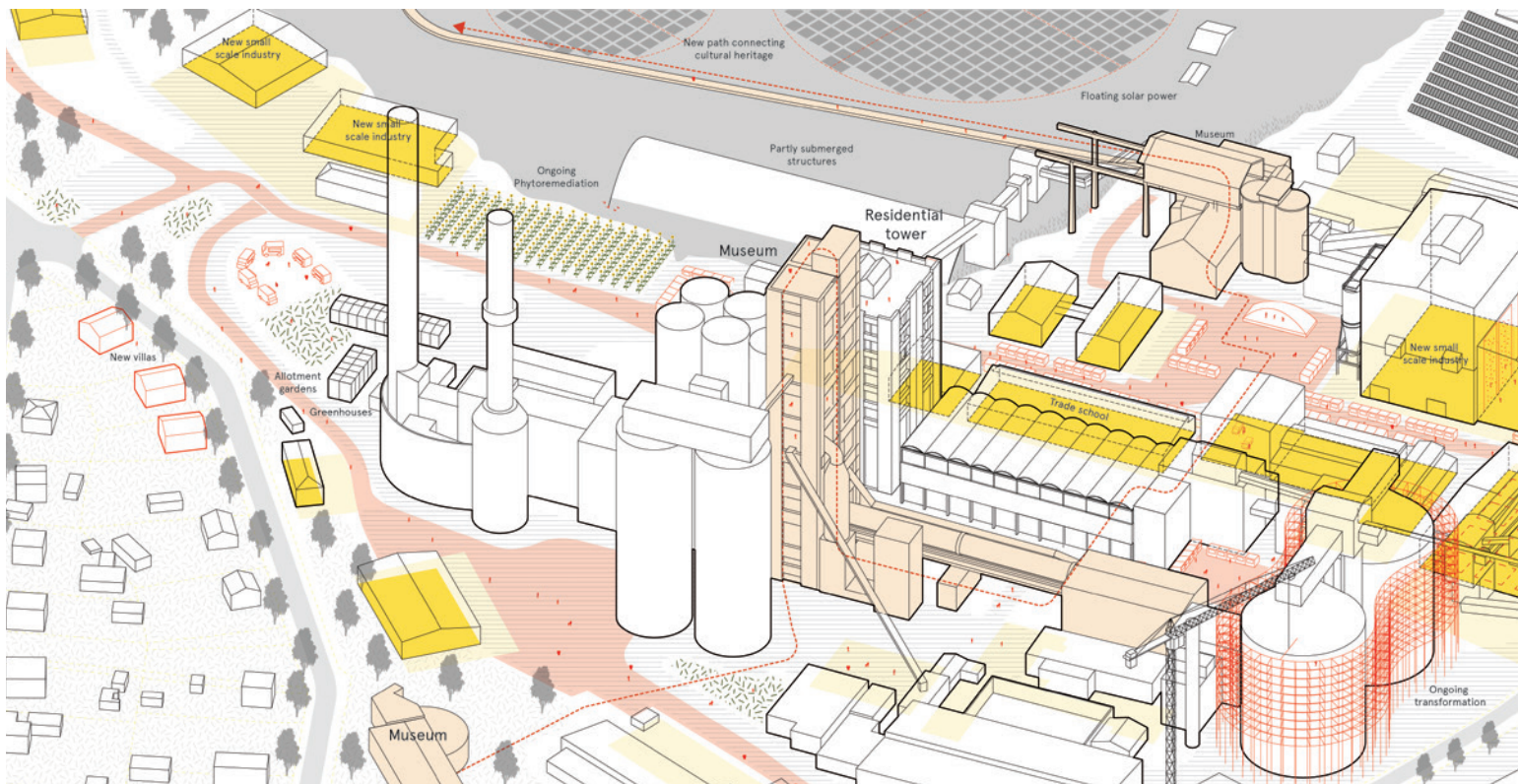
The future for the harbor is more diverse in its use. During the first phases of transformation of the industrial sites it will continue to be integral in the shipping of goods on, and off site and in large be inaccessible to the general public. As use in the industrial site changes the use of the harbor does as well, with new short shipping routes connecting to small harbors around the island, and possibly extending across the baltic sea, and when needed the harbor opens up to serve as an extended public domain that can host events, here showcased hosting the annual Slite market.

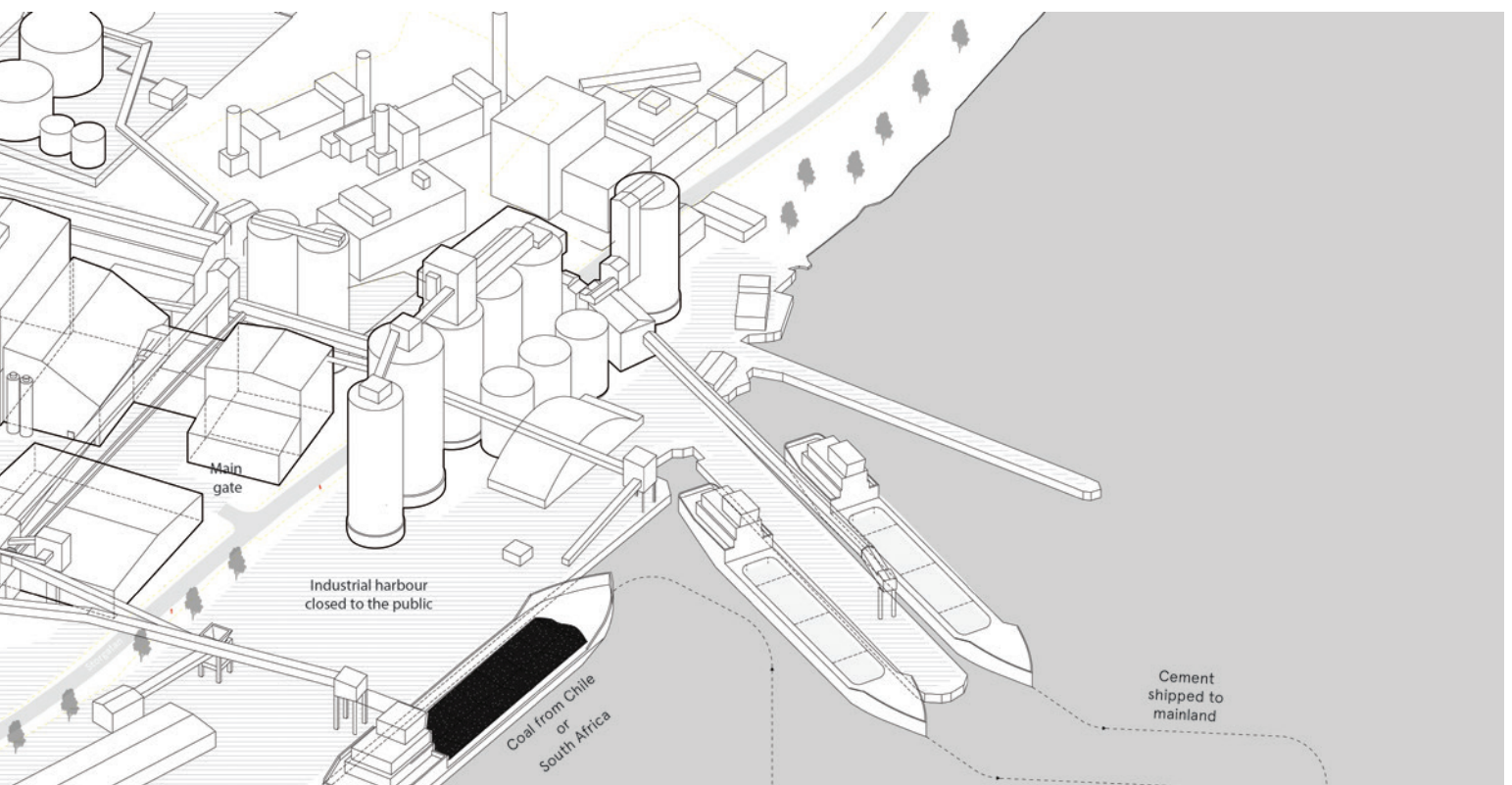




Current situation

The current ecologies in Slite are heavily dependent on the cement company as they control large parts of the town. The needs of the company have been allowed to dictate how the spatial form of Slite has developed throughout the 20th century.



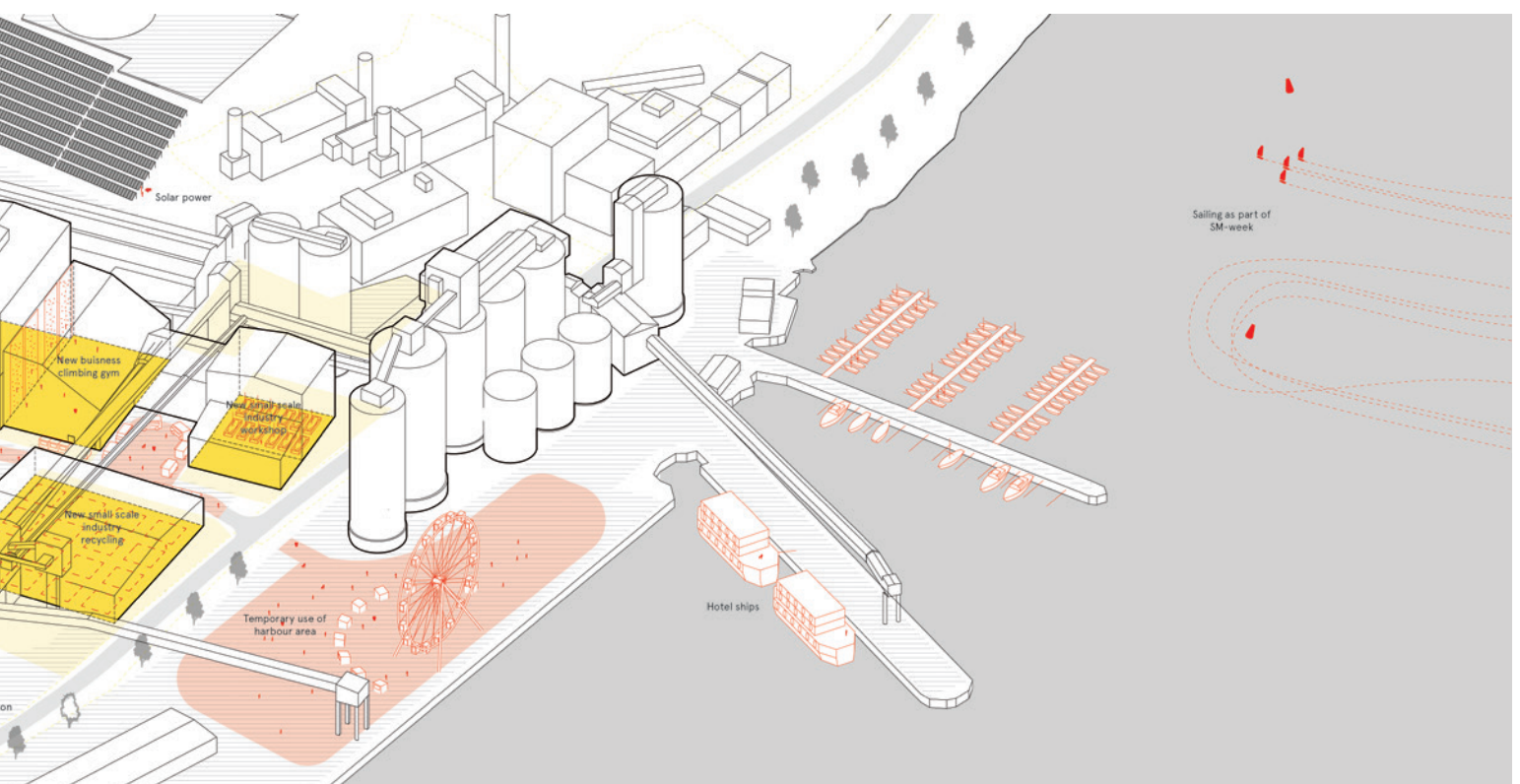


Future situation

The future ecologies of Slite, are better related to each other and in a larger sense co-dependent rather than dependent on one singular business entity. The public realm is allowed to enter the former industrial site through the readily accessible public domain that stretches through the site and is utilized for events and happenings in Slite, here visualized with Slite market and

SM-week.

The spatial layout of the industrial site has allowed a network of businesses in a range of scales to establish and the proximity to both, Slite as a town and the harbor facilities has fostered new business-relationships.



Discussion

Through exploring means for analyzing underlying conditions that have shaped a company town, this thesis seeks to articulate a need for understanding cause and effect relationships, rejecting a human-nature dichotomy. It also suggests that this framework is useful for achieving a needed complexity in both site knowledge, and in suggested interventions and development strategies.

Leaning on notions present in theory on urban political ecology, eco-feminism and regional development, this thesis has highlighted that current strategies used in urban and rural development often fail to take into account the complexity of conditions present in similar contexts. It also points at speculative design methods as being meaningful methods in working with uncertain futures and complex situations as the methods are inherently iterative by nature and can help further create complexity in knowledge.

In developing this thesis, the case study of Slite has served as an example of similar contexts, company towns facing uncertain futures.

In Slite the uncertain future is produced by the dominant industry in town, limestone quarrying and processing into cement, being questioned, an ongoing permit process for extension and renewal of quarrying and processing is also highlighting a highly polarized debate in the local community. The debate sets natural resources, such as water, biodiversity and access to the landscape against a multinational for profit business with narratives centered on industry providing livelihoods, attracting investments to the region and in large serving as the foundation for the local community.

Looking at Slite through the theoretical lens encompassing political, economic, social, and ecological aspects led to an understanding that the town is shaped by underlying conditions that outdate even the earliest industrial endeavors in the region, even though they span much longer than the some 100 years the cement plant has been in use and the heavy impact it has had on the rural context in that time.

Adding complexity

This insight further highlighted the need to create complexity in understanding these underlying conditions to more accurately access similar contexts, and in extension articulate future scenarios fit for the same. This was in large part done by overlaying mappings of existing conditions, to be able to see codependencies that oftentimes go overlooked. Such as relating Slite as a place of

commerce to its favorable harbor conditions, or the farmlands of Gotland to diked wetlands.

This insight came from the use of an iterative process of speculative design, underlining it as an helpful tool for developing said complexity, where this thesis in large has been shaped through formulating possible future uses for sites currently operating in the industrial ecology in Slite. Through formulating these alternatives, new questions arose and guided further investigations into history, social relations in town, local stakeholders, etc.

As questions on how society relates to sites of extraction, concepts of shadow places and Wasteland became helpful in understanding cause and effect relationships between extraction and alteration of, not only the natural landscape but also the built environment and how the local community in Slite has been shaped by metabolic processes over thousands of years. This also extends to an understanding of urban-rural relationships and how the current process of (r)urbanization creates places that are perceived as left behind, as the main focus continues to be on the urban norm.

This prompted a new understanding of the physical spaces in Slite, but also the timeframe intangible conditions in Slite exists in, including the current ecologies in the local context. Where for example places of commerce in the rural fabric in large overlap places used for trade for at least the last 1000 years.

This finding alone could be argued to negate the narrative of the Cement company being the foundation of Slite, again highlighting a need for more complex context analysis.

Re-politicizing debate

In further understanding the processes of change that act on and shape Slite, and similar contexts, theory on regional development became important, where emerging theory points at similar findings, as it in dealing with what is often referred to as left behind places highlights the incautious, or uncomplex use of spatial imaginaries as being problematic potentially perpetuating an image of being forever left behind in the event of main industry leaving a town or region.

This is seen in the real fear present in the local community in Slite, and in extension on Gotland as a whole, that the cement company is not allowed to continue its operations, despite the fact that it is thought to jeopardize such important factors as the water supply in the region.

Further a search for a “solution” is often the goal for regional development even though theory indicates that this is conducted on simplified views of the underlying issues, leading to the “solution” fixing symptoms rather than the cause and in extension leading to a de-politicization of the public debate.

In the case of Slite this can be seen in the complete trust enacted by many actors in the cement company to renew and expand operations, portraying it as the solution for Slite and Gotland as a whole.

A strategy useful for architecture and planning emerging from this is the need to re-politicize the public debate through formulating alternatives to the narratives being presented, and in doing so highlighting who is crafting the existing narratives and their incentives.

In doing this, the temporary use of space can serve as a useful tool in exploring what future use fits new needs, and how it can build upon the new conditions present in the local context, as it allows for testing programmes without the need to cement it as the solution for the future.

Demanding responsibility

In line with this need to understand what incentives are behind the current narrative, a disparity in responsibility in regards to what is considered the natural landscape and the local community emerged.

With the cement company responsible for restoring the landscape in the extent possible to a before state but not having any real responsibility for restoring or transitioning the local community, or any other intangible aspects in the local context, to a state that fits what comes after industry.

With a re-politicized view of the future, a possibility, and need for addressing this arises, as rather than saying the cement company can't be allowed to continue, the question of on what terms they can be allowed to continue emerges.

Could the scale of the operations be smaller? Allowing for continued use of the sites for a longer time period, highlighting the need for a more sustainable attitude for the use of cement in the building industry? Could new demands on end of life plans include the local community and the built environment of Slite?

Untangling the debate

In doing so the presenting of alternative future scenarios becomes a powerful tool to employ, as

it allows for presenting an array of uses and to see these in a number of combinations, allowing for a re-instigation of debate, which often times can have become stuck as in the case of Slite in a polarized state. This can be seen as a tool for re-aligning local viewpoints from a state of path dependence towards one of path contingency, where the new conditions created by industry are seen as assets to be built upon and transformed.

The adaptive reasoning as an asset

Some of the main conditions created in Slite, and in similar contexts, is the spatial layout of the industrial sites, which include a range of large scale spaces intertwined in the urban fabric of the town, but currently only being accessible, and operating in the industrial ecology.

Explorations, and analysis of reference projects pointed at the adaptive nature of these spaces, stemming from inherently adaptive industry, being of high value for future development.

This quality allows for testing and prototyping new use and policy which in of itself represents a high level of adaptability in both the built environment and the larger spatial relationships present in the sites.

As working with futures always involves a high level of uncertainty, the adaptive reasoning in the built environment and the spatial relationships present in company towns is favorable as it is built to handle uncertainties. Therefore the inherent adaptability in company towns has a high value and should be the base for future development. The industrial past of Slite has not only granted it adaptability, but also cemented many parts of its path forward, in many ways diminishing adaptability, as the natural landscape is highly altered, the spatial layout of the town is shaped by the expansion of industry, etc.

With this said it is important to highlight that existing in complete adaptability is not feasible, nor desirable as it leaves the local community in a state of not knowing what comes next. Therefore the adaptability must be seen as an asset, which can, and shall be developed by the local community. Where future projects will decide what parts of, both the built environment, the spatial relationships and other intangible aspects will be altered, which can decrease its adaptability in some ways, whilst increasing it in others.

Industrial culture

The industrial site is in large part of many everyday lives in Slite and its surroundings, this quality is important to both highlight and further develop as large scale industry leaves, by employing the

strong association life present in the community the large landscapes left behind can be transformed, enhanced and re-incorporated into new and existing ecologies in Slite.

In the transformation, a re-alignment from viewing what is left behind by existing industry as merely industrial heritage, towards a view of industrial culture becomes necessary as this includes the community & the intangible aspects present, such as the high level of small businesses or the aforementioned association life. This view needs to both focus on the industry that has impacted Slite the most in later years, whilst acknowledging the underlying conditions that predate it.

In the case of Slite the sheer extent of extractions that have taken place in, comparatively such a small place is a factor that can be underlined in presenting this industrial culture. By tying spaces used in the industry together and honoring both the labor, and the resources extracted.

Architects and planners have a powerful tool in projecting to steer development

As year round livelihoods are of high importance in a context such as Slite, there is a real fear of becoming a left behind place in the wake of exiting industry, especially as there is increasing pressure from tourism & mass recreation on the local community.

This thesis suggests that a focus on facilitating the local, small- and middle scale businesses in the industrial sites is a strategy for achieving increased resilience in the community. As it allows for diversifying livelihoods in town and not merely replacing the main industry from being extractive to one focused on mass recreation.

By basing this on the already existing adaptive rationale of the industrial site, where new needs dictate development, and by using the already existing as assets, Slite can emerge better suited to meet future challenges.

A tool for steering development in a preferred direction, and to provoke decision making is to both project alternate futures, but also to lock in certain projects, that in themselves create new conditions by introducing new spatial relationships. In this project this can be seen in the introduction of residential programmes into the industrial site introducing new conditions in the form of legislature tied to living spaces, with noise regulation etc.

This extends to an understanding of what infrastructure has been, and will continue to be valuable for the future of the local community.

In Slite the industrial harbor houses a large amount of potential for the future, by focusing on developing it further in combination with other well functioning infrastructure fitting future needs a transformation project can be strengthened further. This would not only allow for connections to other regions through shipping, but also it can also help counteract homogenization of the built environment, by not erasing the past but rather transforming it.

Discussing ownership

To facilitate this new use, a first thought could be that the industrial sites change ownership and become governed by the local community, or by the municipality. But this has proven problematic, as there are already municipality owned premises in town that are not rented out, due to fear of right of possession from tenants.

This suggests that strategies tied to splitting existing plots into smaller more manageable sizes are preferable in current political and governing rationales as this would allow the municipality to not deal with the burden of being responsible as a landlord.

This thesis suggests that this can be done in a fashion that allows for ownership of in between spaces in the spatial layout of the industrial sites, and that this could be preferable in that it creates an opportunity to establish a new public domain, based on the already existing semi-public domain the cement plant makes out. By involving local stakeholders early in the processes, current and future needs can be anticipated and taken into account in this development.

Architects and planners can use this method to shape their own views, and to articulate strategies for alternate futures.

In large part, the process used in this thesis, and its outcomes, suggests the role of the architect or planner, in similar scenarios becoming one of gathering information and creating complexity in understanding. Firstly to help shape their own views, but also to curate this information into possible future scenarios aimed at communicating to the public, to help articulate challenges, highlight alternate narratives, create foundation for informed debate and to politicize decision making when choosing strategies.

Next steps

All of the strategies presented in this thesis are dependent on investments to be feasible, to allow for transformation of the sites. How this is funded is an interesting next step in exploring possible futures for Slite, and similar contexts, where questions such as extended responsibility of the cement company to include intangible aspects of the local context becomes important.

By presenting the work in this project as it now has reached a level of realism that can be communicated, and received from a broader audience could be a good next step in seeking ways to include the general public in further steps of the process.

Depending on the aims for a project based in this mapping & design, further investigations centered on key stakeholders and relationships in the local community would be a valuable way forward and the material produced in a project of the same scope as this thesis would provide a solid base for communicating and presenting current and possible future conditions for such a context.

Conclusion

To conclude, a complexity in understanding places of extraction is needed, as they are connected often through long metabolic processes and flows to the spaces they help build.

This understanding needs to reject a range of dichotomies, such as human-nature, center-periphery, urban-rural and one of extraction-use to be able to articulate how underlying conditions interact in complex cause & effect relationships.

This is a role fit for architects and planners, who can adapt the role of analyzing, projecting and curating information in order to present alternate future scenarios for such contexts.

By articulating alternatives a re-politicization of regional development can be achieved as existing narratives are challenged. These new futures also allow for projecting what is left behind by industry as valuable resources in future development to benefit the local community in the context of the town leaving extraction heavy industries behind.

Bibliography

Text

- Ahmed, S. F. (2023). *Post-Extraction Mine-Scape. Alternate Production and Recreation Protocol for Slite*. [Master's Thesis]. KTH.
- Anttiroiko, A. (2009). Urban response to global intercity competition. *Globalisation: Challenges to Research and Governance.*, 257–279. https://www.academia.edu/2898452/Urban_Response_to_Global_Intercity_Competition
- Anttiroiko, A. (2014). City branding as a response to global intercity competition. *Growth and Change*, 46(2), 233–252. <https://doi.org/10.1111/grow.12085>
- Arboleda, M. (2020). *Planetary Mine: Territories of Extraction under Late Capitalism*. Verso Books.
- Björling, N., & Dyrssen, C. (2016). *Urban Ecologies and Key Projects: Interconnected Approaches to Unlock Fragile Local-Regional Landscapes*.
- Braae, E. (2015). *Beauty redeemed: Recycling Post-industrial Landscapes*. Birkhäuser.
- Braae, E., & Diedrich, L. (2012). Site specificity in contemporary large-scale harbour transformation projects. *Journal of Landscape Architecture*, 7(1), 20–33. <https://doi.org/10.1080/18626033.2012.693778>
- Brabec, E., & Smith, C. (2002). Agricultural land fragmentation: the spatial effects of three land protection strategies in the eastern United States. *Landscape and Urban Planning*, 58(2–4), 255–268. [https://doi.org/10.1016/s0169-2046\(01\)00225-0](https://doi.org/10.1016/s0169-2046(01)00225-0)
- Cementa AB. (n.d.). *Miljöredovisning 99*.
- Cementa AB. (2003). *Lite om Slite: och lite om cementtillverkning*.
- Cementa AB. (2017). *Samrådsunderlag inför ansökan om tillstånd för fortsatt täktverksamhet samt för vattenbortledning m.m. i Slite, Region Gotland*. <https://www.cement.heidelbergmaterials.se/sites/default/files/assets/document/samradsunderlag.pdf>
- Cornea, N. (2019). Urban Political Ecology. In *Oxford Bibliographies*. <https://doi.org/10.1093/obo/9780199874002-0203>
- Dahlqvist, P., Thorsbrink, M., Holgersson, B., Nisell, J., Maxe, L., & Gustafsson, M. (2017). *Vätmarker och grundvattenbildning: om möjligheten till ökad kapacitet vid grundvattentäkter på Gotland* (2017:01). SGU. <https://www.sgu.se/globalassets/vagledning2/vatmarksatgarder/sgu-2017---vatmarker-och-grundvattenbildning---om-mojligheten-till-okad-kapacitet-vid-grundvattentakter-pa-gotland.pdf>
- Dunne, A., & Raby, F. (2013). *Speculative everything: Design, Fiction, and Social Dreaming*. MIT Press.
- EEA. (2023). *The Natura 2000 protected areas network*. European Environment Agency. <https://www.eea.europa.eu/themes/biodiversity/natura-2000>
- Eklund, F. (2018). *Regional vattenförsörjningsplan för Gotlands län*. Länsstyrelsen i Gotlands län. <https://www.lansstyrelsen.se/gotland/miljo-och-vatten/vatten--och-avloppsforsorjning/regional-vattenforsorjningsplan.html>
- Florida, R. (2002). *The Rise of the Creative Class: And how It's transforming Work, Leisure, Community and Everyday Life*. Basic Books.
- Florida, R., Rodríguez-Pose, A., & Storper, M. (2021). Critical Commentary: Cities in a post-COVID world. *Urban Studies*, 60(8), 1509–1531. <https://doi.org/10.1177/00420980211018072>
- Fullman, C. (2023). Cementföretaget vill stänga av Storgatan: "Utsatt väg". *P4 Gotland | Sveriges Radio*. <https://sverigesradio.se/artikel/cementforetaget-vill-stanga-av-storgatan-sakerhetsrisk>
- Föreningen Gotlanståget. (2022). *Slite – Roma Järnväg (SLRJ) 1902 – 1953*. <https://forening.gotlandstagnet.se/slrj/>
- Gandy, M. (2022). Urban political ecology: a critical reconfiguration. *Progress in Human Geography*, 46(1), 21–43. <https://doi.org/10.1177/03091325211040553>
- Gehl, J., & Svarre, B. (2013). *How to study public life*. Island Press.
- Grabber, G. (2009). Yet another turn? The Evolutionary Project in Economic Geography on JSTOR. *Economic Geography*, 2(85). <https://www.jstor.org/stable/40377291>
- Greipsson, S. (2011). Phytoremediation. *Nature Education Knowledge*, 3(10), 7. <https://www.nature.com/scitable/knowledge/library/phytoremediation-17359669/>
- Göransson, M., Erlström, M., Lundqvist, L., Taromi Sandström, O., Johansson, M., Åkerhammar, P., & Norlin, L. (2022). *Förekomsten av och tillgången till, kalksten, klinker och cement inom Sverige och exportproducerande länder*. SGU.
- Görmar, F., & Harfst, J. (2019). Path renewal or path dependence? The role of industrial culture in regional restructuring. *Urban Science*, 3(4), 106. <https://doi.org/10.3390/urbansci3040106>
- Göteborgs universitet. (2021). *Tre frågor till Malin Dahlström, forskare i cementhistoria*. Göteborgs Universitet. <https://www.gu.se/nyheter/tre-fragor-till-malin-dahlstrom-forskare-i-cementhistoria>
- Hajer, M. A., & Reijndorp, A. (2001). *In search of new public domain: Analysis and Strategy*. Nai010 Publishers.
- Hannfors, V. (2022). *Regional bostadsmarknadsanalys – Gotlands län 2022*. Länsstyrelsen i Gotlands län. <https://www.lansstyrelsen.se/gotland/om-oss/vara-tjanster/publikationer/2022/regional-bostadsmarknadsanalys-gotlands-lan-2022.html>
- Heidelberg materials. (n.d.-a). *Fabrikstillstånd slite CCS*. Slite CCS. <https://www.sliteccs.se/sv/fabrikstillstand>

- Heidelberg materials. (n.d.-b). *Slite*. Heidelberg Materials Cement Sverige. <https://www.cement.heidelbergmaterials.se/sv/slite>
- Heidelberg materials. (2016). *HeidelbergCement completes acquisition of 45% stake in Italcementi*. Heidelberg Materials. <https://www.heidelbergmaterials.com/en/pr-01-07-2016>
- Heidelberg materials. (2023). *Täktansökan Slite*. Heidelberg Materials Cement Sverige. <https://www.cement.heidelbergmaterials.se/sv/taktansokanslite>
- Heidelberg materials. (2024). *Cement i 150 år*. Heidelberg Materials Cement Sverige. <https://www.cement.heidelbergmaterials.se/sv/cement-i-150-ar>
- Hernández-Maskivker, G., Fornells, A., Teixidó-Navarro, F., & Pulido, J. C. R. (2021). Exploring mass tourism impacts on locals: A comparative analysis between Barcelona and Sevilla. *European Journal of Tourism Research*, 29, 2908. <https://doi.org/10.54055/ejtr.v29i.2427>
- Holmén, J. (2017). *CEMENTA, SLITE, GRUNDVATTENMODELL – 2017. Fall 2041D*. Golder Associates. https://www.cement.heidelbergmaterials.se/sites/default/files/assets/document/bb/ed/4._grundvattenmodell.pdf
- Holmqvist, T., & Widegren, P. (2022). *Domstolen: Cementas kalkbrytning på Gotland får fortsätta*. SVT Nyheter. <https://www.svt.se/nyheter/lokalt/ost/ja-eller-nej-till-cementas-kalkbrytning-idag-kommer-svaret>
- Håkansson, L.-M., & Ahlgren, A. (1954). *De brinnande ugnarna i Slite*. Slite cement och kalk aktiebolag.
- Häyrynen, S., & Semi, J. (2019). Revitalizing the successful past in the North: Narratives of change in the peripheral Post-Industrial city of Kajaani, Finland. *Urban Science*, 3(4), 110. <https://doi.org/10.3390/urbansci3040110>
- Ihreskog, M. (2022). *När Slite blev del i världspolitik*. Helagotland.se. <https://helagotland.se/nyheter/gotland/ostersjon/artikel/tio-ar-sedan-nord-stream-lamnade-slite-idag-ar-varlden-mer-osaker-vi-var-manga-som-var-naiva/jo3pk6yj>
- Johannisson, B., & Dahlstrand, Å. L. (2009). Bridging the Functional and Territorial Rationales—Proposing an integrating framework for regional dynamics. *European Planning Studies*, 17(8), 1117–1133. <https://doi.org/10.1080/09654310902980989>
- Juhlin, M. (2014). Sockerlådor i Närs. *Slite Tidningen*, 3.
- Kaonda, M. K. M., & Chileshe, K. (2023). Assessment of Sunflower (*Helianthus annuus* L.) for Phytoremediation of Heavy Metal Polluted Mine Tailings—A Case Study of Nampundwe Mine Tailings Dam, Zambia. *Journal of Environmental Protection*, 14(07), 481–492. <https://doi.org/10.4236/jep.2023.147028>
- Karlsen, A., & Dale, B. (2014). From regional restructuring to regional renewal: Cases from Norway. *Norsk Geografisk Tidsskrift*, 68(2), 71–79. <https://doi.org/10.1080/00291951.2014.894567>
- Kuzior, A., Lyulyov, O., Pimonenko, T., Kwiliński, A., & Krawczyk, D. (2021). Post-Industrial tourism as a driver of sustainable development. *Sustainability*, 13(15), 8145. <https://doi.org/10.3390/su13158145>
- Kåks Röshammar, C. (2016). Finns det någon framtid för bruksorten? *Arbetet*. <https://arbetet.se/2016/12/07/finns-det-nagon-framtid-for-bruksorten/>
- Lawson, K., Bavaj, R., & Struck, B. (2020). *A guide to Spatial History: areas, aspects, and avenues of research*. <https://spatialhistory.net/guide/index.html>
- Leino, P. (2023). Oron i Slite: Hur mycket kommer fabriken att bullra? *Helagotland.se*. <https://helagotland.se/nyheter/slite/artikel/oron-i-slite-hur-mycket-kommer-fabriken-att-bullra/17eegmwj>
- Leino, P. (2024). Svaret på Heidelbergers ansökan: Måste kompletteras. *Helagotland.se*. <https://helagotland.se/nyheter/gotland/artikel/svaret-pa-heidelbergers-ansokan-maste-kompletteras-/r5v9591j>
- Li, Z., Sun, X., Zhou, J., Wu, L., Bi, D., Zhao, J., Zhu, R., & Christie, P. (2023). Sustainable phytoextraction of metal-polluted agricultural land used for commercial photovoltaic power generation. *Journal of Cleaner Production*, 391, 136093. <https://doi.org/10.1016/j.jclepro.2023.136093>
- Lierud, B., Schander, C.-O., & Seggeros, H. (1981). *Cementa Slite: övergripande planering av bolagets framtida täktverksamhet*. Cementa Slite.
- Ljungström, V., & Svensson, Å. (2021). *Exploatering av jordbruksmark 2016–2020*. <https://webbutiken.jordbruksverket.se/sv/artiklar/ra218.html>
- Lundberg, E. (2022). Cementa slutar använda ryskt kol i sin produktion. *Helagotland.se*. <https://helagotland.se/nyheter/slite/artikel/cementa-slutar-anvanda-ryskt-kol-koper-fran-sydafrika-och-sydamerika-i-stallet-till-hogsta-priset-sedan-1800-talet/lwgmxxvr>
- Länsstyrelsen Gotlands Län. (n.d.). *Alvarmark*. <https://www.lansstyrelsen.se/gotland/djur/hotade-arter/hotade-djur-och-vaxter/alvarmark.html>
- Länsstyrelsen i Gotlands Län. (n.d.). *Hejnum Kallgate*. Länsstyrelsen Gotlands Län. <https://www.lansstyrelsen.se/gotland/besoksmal/naturreservat/hejnum-kallgate.html>
- Naturvårdsverket. (n.d.). *Koldioxidavskiljning och lagring (CCS)*. <https://www.naturvardsverket.se/om-miljoarbetet/miljoarbete-i-eu/koldioxidavskiljning-och-lagring/>
- Nilsson, E. (2021). Cementa får fortsätta bryta kalk – men framtiden är osäker. *Seko Tidningen*. <https://sekotidningen.se/reportage/cementa-far-fortsatta-bryta-kalk-men-framtiden-ar-osaker/>
- Nyberg, K. (2017). *Utredning av de vattenrättsliga förhållandena i Vägumvik, Slite, Gotland* (2017:12). Länsstyrelsen i Gotlands Län. <https://www.lansstyrelsen.se/gotland/om-oss/vara-tjanster/publikationer/2017/utredning-av-de-vattenrattsliga-forhallandena-i-vagumvik-slite-gotland-201712.html>

- Näslund, S., & Östberg, S. (2014). *Slite upplevelselandskap* [Master's Thesis]. SLU.
- Olsson, Y. (2022). *Jordbruksmarkens användning 2022. Slutlig statistik*. Jordbruksverket. <https://jordbruksverket.se/om-jordbruksverket/jordbruksverkets-officiella-statistik/jordbruksverkets-statistikrapporter/statistik/2022-10-20-jordbruksmarkens-anvandning-2022.-slutlig-statistik>
- Pauliuk, S., & Hertwich, E. G. (2015). Socioeconomic metabolism as paradigm for studying the biophysical basis of human societies. *Ecological Economics*, 119, 83–93. <https://doi.org/10.1016/j.ecolecon.2015.08.012>
- Pike, A., Béal, V., Cauchi-Duval, N., Franklin, R., Kinossian, N., Lang, T., Leibert, T., MacKinnon, D., Rosseau, M., Royer, J., Servillo, L., Tomaney, J., & Velthuis, S. (2023). 'Left behind places': a geographical etymology. *Regional Studies*, 1–13. <https://doi.org/10.1080/00343404.2023.2167972>
- Plumwood, V. (2008). Shadow Places and the Politics of Dwelling. *Australian Humanities Review*, 44. <https://australianhumanitiesreview.org/2008/03/01/shadow-places-and-the-politics-of-dwelling/>
- Ragnerstam, C. (2023). *Slites bebyggelseutveckling 1930–1990 en studie av en gotländsk bruksort ur et samhälls- och arkitekturhistoriskt perspektiv* [Bachelor's Thesis]. UU.
- Region Gotland. (n.d.). *Delområdesprognos 2021–2032 Region Gotland*.
- Region Gotland. (2019). *Nuläge och utmaningar: Nulägesanalys och kunskapsunderlag för ny regional utvecklings- strategi för Gotland* (RS 2018/1237). https://rus.gotland.se/wp-content/uploads/2019/10/Nul%C3%A4ge-och-utmaningar_oktober-2019.pdf
- Region Gotland. (2021a). *Översiktsplan för Gotland 2040: SAMRÅDSFÖRSLAG*. Regionstyrelseförvaltningen / Samhällsbyggnadsförvaltningen. <https://www.gotland.se/oversiktsplan2040>
- Region Gotland. (2021b). *Sociotopkartering i Slite*. https://gotland.se/18.6825df1718ad68691c25cca/1696447089373/Sociotopkartering_Slite_210602.pdf
- Regionfakta. (2023). *Gotlands län - Regionfakta*. <https://www.regionfakta.com/Gotland-lan/>
- Reuters. (2022). *Swedish court grants cement-maker Cementa quarrying permit in key ruling*. <https://www.reuters.com/markets/europe/swedish-court-grants-cement-maker-cementa-quarrying-permit-key-ruling-2022-12-13/>
- Sassen, S. (2014). *Expulsions*. Harvard University Press.
- SCB. (2020). *Hundratusentals svenskar äger fritidshus i andra kommuner*. <https://www.scb.se/hitta-statistik/redaktionellt/hundratusentals-svenskar-ager-fritidshus-i-andra-kommuner/>
- Schmudde, U. (2019). SUSTAINABLE CITY DEVELOPMENT BY TOURISM OVER CROSS-SECTORAL INDUSTRIES: a CASE STUDY IN CENTRAL SWEDEN. *Ecology and the Environment*. <https://doi.org/10.2495/sc190461>
- Sjöstrand, E. (2023). *Mästermyr – När Gotland hade vatten*. Wessmans Musikförlag AB.
- Skälsö Arkitekter. (2011a). *Gestaltningssprogram tillhörande detaljplan för Bunge Biskops 1:23*. Region Gotland. <http://kartor.gotland.se/Detaljplan/09-P-219.pdf>
- Slätmo, E. (2017). Preservation of agricultural land as an issue of societal importance. *Rural Landscapes*, <https://doi.org/10.16993/rl.39>
- Slite intresseförening. (2022). *Lokal Utvecklingsplan för Slite 2022–2027*. <https://slite.nu/lokal-utvecklingsplan/>
- Slitebaden. (2024). *Slitebaden Hotell*. <https://slitebaden.com/>
- Sunnerfjell, J. (2023). *Un-Learning to labour?: Activating the Unemployed in a Former Industrial Community*. Arkiv förlag.
- Sveds, Å. (2024). *Ekonomi skulle blomstra om gotlänningarna ägde hela ön*. [helagotland.se. https://helagotland.se/nyheter/gotland/artikel/tre-av-tio-av-privata-fastighetsagare-bor-inte-pa-on/r9w1k0zj](https://helagotland.se/nyheter/gotland/artikel/tre-av-tio-av-privata-fastighetsagare-bor-inte-pa-on/r9w1k0zj)
- Swyngedouw, E., & Heynen, N. C. (2003). Urban Political Ecology, Justice and the Politics of Scale. *Antipode*, 35(5), 898–918. <https://doi.org/10.1111/j.1467-8330.2003.00364.x>
- The Editors of Encyclopaedia Britannica. (2024). Gotland. In *Encyclopedia Britannica*. <https://www.britannica.com/place/Gotland>
- Tzaninis, Y., Mandler, T., Kaika, M., & Keil, R. (2021). Moving urban political ecology beyond the 'urbanization of nature.' *Progress in Human Geography*, 45(2), 229–252. <https://doi.org/10.1177/0309132520903350>
- United Nations. (2022). *Take action for the sustainable development goals – United Nations Sustainable Development*. United Nations Sustainable Development. <https://www.un.org/sustainabledevelopment/sustainable-development-goals/>
- Wichmann, S. (2021). *Forskare: Stopp för kalkbrytning kan snabba på ny grönare betong*. [Nyteknik. https://www.nyteknik.se/nyheter/forskare-stopp-for-kalkbrytning-kan-snabba-pa-ny-gronare-betong/631293](https://www.nyteknik.se/nyheter/forskare-stopp-for-kalkbrytning-kan-snabba-pa-ny-gronare-betong/631293)
- Zhou, J., Chen, L., Peng, L., Luo, S., & Zeng, Q. (2020). Phytoremediation of heavy metals under an oil crop rotation and treatment of biochar from contaminated biomass for safe use. *Chemosphere*, 247, 125856. <https://doi.org/10.1016/j.chemosphere.2020.125856>
- Öhrman, R. (1979). *Slite – På den tiden*. Press Grafica
- Öhrman, R. (1983). *Slite – Förr i tiden*. Press Grafica
- Öhrman, R. (1987). *Slite: I brytningstid*. Forshaga : Press

Datasets

SCB. (2021). *Population and land area within localities, by locality. Every fifth year 1960–2020* [Dataset]. In *Statistical database*. https://www.statistikdatabasen.scb.se/pxweb/en/ssd/START_MI_MI0810_MI0810A/LandarealTatortN/

SCB. (2023a). *Land use in Sweden by region and land use category. Every fifth year 2010 – 2020* [Dataset]. In *Statistical database*. https://www.statistikdatabasen.scb.se/pxweb/en/ssd/START_MI_MI0803_MI0803A/MarkanvN/

SCB. (2023b). *Life expectancy at birth and age 65 by sex 1970–2022 and projection 2023–2070* [dataset]. <https://www.scb.se/en/finding-statistics/statistics-by-subject-area/population/population-projections/population-projections/pong/tables-and-graphs/life-expectancy-at-birth-and-age-65-by-sex-and-projection/>

SGU. (2022). *MR.Mineral Resource* [Dataset]. <https://www.sgu.se/produkter-och-tjanster/geologiska-data/data-enligt-inspire/framtagna-inspiredata/mr.mineralresurser/>

SGU. (2023a). *GE.Surficial Geology 1:25 000 – 1:100 000* [Dataset]. <https://www.geodata.se/geodataportalen/srv/swe/catalog.search#/metadata/e6ceace0-db46-4c79-90d3-3858e3db1a3c>

SGU. (2023b). *Grundvattenförekomster(öppnaddata)* [Dataset]. <https://www.sgu.se/produkter-och-tjanster/geologiska-data/oppna-data/grundvatten-oppna-data/grundvattenforekomster/>

SGU. (2024). *GE.Bedrock 1:50 000 – 1:250 000* [Dataset] <https://www.geodata.se/geodataportalen/GetMetaDataById?id=45a1e47f-17e9-4799-ab3a-fd771b7a131c>

Lantmäteriet. (2019). *GSD-Fastighetskartan, vektor* [Dataset]. <https://www.lantmateriet.se/sv/geodata/vara-produkter/produktlista/fastighetsindelning-nedladdning-vektor/>

Lantmäteriet. (2021). *Land cover Download Inspire* [Dataset]. <https://www.lantmateriet.se/en/geodata/geodata-products/product-list/land-cover-download-inspire/#anchor-1>

European commission. (2022). *Natura 2000 (Vector) - Version 2021 revision 1, Oct. 2022*. [Dataset]. <https://sdi.eea.europa.eu/catalogue/fise/api/records/b1777027-6c85-4d19-bdf2-5840184d6e13>

OpenStreetMap Contributors. (2023). *Planetdump* [Data file from 2023]. <https://www.openstreetmap.org/>

Images

LPO arkitekter. (2023). *Svea mine* [Image]. <https://www.lpo.no/prosjekter/avslutningsplan-for-svea-gruver>

Lantmäteriet. (2021). *Property map Real property classification* [Image]. <https://minkarta.lantmateriet.se/>

Lantmäteriet. (2018). *Ortophoto, 0,5 m/pixel color (2018)* [Image]. <https://minkarta.lantmateriet.se/>

Lantmäteriet. (2024). *Ortofoto RGB 0.25/0.50 m latest* [Image]. <https://minkarta.lantmateriet.se/>

Othem-Boge hembygdsförening. (n.d.-a). *Loading of cementsacks on a ship, 1949* [Image]. <https://www.hembygd.se/othem-boge>. <https://www.hembygd.se/othem-boge>

Othem-Boge hembygdsförening. (n.d.-b). *Länna quarry, around 1920* [Image]. <https://www.hembygd.se/othem-boge>. <https://www.hembygd.se/othem-boge>

Skälsö Arkitekter. (2011b). *Zoning plan Bungenäs*. <https://skalso.se/bungenas/>. <https://skalso.se/bungenas/>

Rikets Allmänna Kartverk, (1941). *Ekonomiska kartan, Slite* [Map]. Generalstaben Litografiska Anstalt.

How can reading and analysis of a company town through a theoretical framework focused on political, ecological and social processes of change inform architectural & planning approaches?

How can strategies be articulated, set on achieving a new adaptability through the re-incorporation of industrial sites into the urban fabric, with the specific case study of speculative post-extraction scenarios for Slite.

