

# Rematerializing Faxe Quarry -

A new view of the geological landscape

Lærke Wilhelmsen, s180359

Tutor: Nicholas Thomas Lee

Royal Danish Academy of Architecture,

Design and Conservation

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Fig 1 Transportation of lime in Faxe quarry >>



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# Thesis statement

The aim of this project is to connect the geological- and production-landscape of Faxø quarry, through storytelling with materials. This will be achieved by establishing a new visitor path with 3 follies. The focus will be to describe nature in new ways, to create debates and enhance our understanding of the impact we have on the landscape. Central to the project is the notion of material engagement, which will both guide the process and the design.

# Introduction

Lime deposits are scattered throughout the Danish landscape, appearing as white structures amidst the otherwise flat, brown, and green terrain that characterizes Denmark. Crinoid stems, Brachiopods, Gastropods, Shelled Mollusks, and Siliceous diatoms are left behind as fossils after a mass extinction. An event that took place 63 million years ago that still affects the landscape of today. (Naturstyrelsen, 2021)

At the site, Faxe Lime quarry, the landscape, and the city are formed by the many years of mining in the quarry. It is a perfect picture of the Anthropocene landscape, where humans form and affect the landscape. As Bruno Latour writes: the post-natural is a fact, even the geological system is influenced by humans. Nature is a type of object that humans can manipulate freely. (Dunker, 2020)

This thesis aims to connect the landscape of Faxe quarry, through storytelling with materials. A driver in the project will be material explorations, to understand the material and how the growing need for resources can take nature and social interests into account. By redescribing nature in new ways, we create debates and enhance our understanding of the impact we have on the landscape. There is a relational value between humans and nature.

## Faxe Quarry

The sound from the work in the limestone quarry is clear at the edge. There is a clear transition between the limestone and the surrounding landscape. Down in the quarry, the sounds of the large machines moving around the limestone are swallowed by the soft material. Here, the sound of trickling water and birds emerges. There is a rich nature here, falcons, hares, ducks, and salamanders roam free. The quarry appears as a big hole with a distinctive edge between soil and rock. The landscape seems almost strange, and exotic, compared to its surroundings. It is reminiscent of a mountain valley. Groundwater has surfaced where the landscape is deepest, creating crystal blue lakes. The earth and rocks surrounding you are white. Everything is big; the landscape is formed by and to the machines that excavate the limestone.

Faxe Quarry serves as a landmark for the area. The houses surrounding the quarry bear witness to the wealth that has come from the quarry. Despite its continued activity, the quarry also functions as a component of the Geological Museum, showcasing some of Denmark's most significant geological discoveries (Naturstyrelsen, 2021). There is an inherent conflict on the site between the important historical value of the lime and the economic benefits the quarry brings. It is the biggest man-made excavation in Denmark measuring 1 km x 1,5 km x 45 m. The quarry is active and therefore constantly expanding (Faxe Kalkburd | Gå På Opdagelse I Flere Millioner Års Naturhistorie, n.d.).

63 million years ago the site was covered by water, and the quarry grounds were the seabed. Small colony-forming bryophytes would live side by side with coral reefs and other small skeleton animals such as snails and starfish. It was also a space for larger animals like sharks

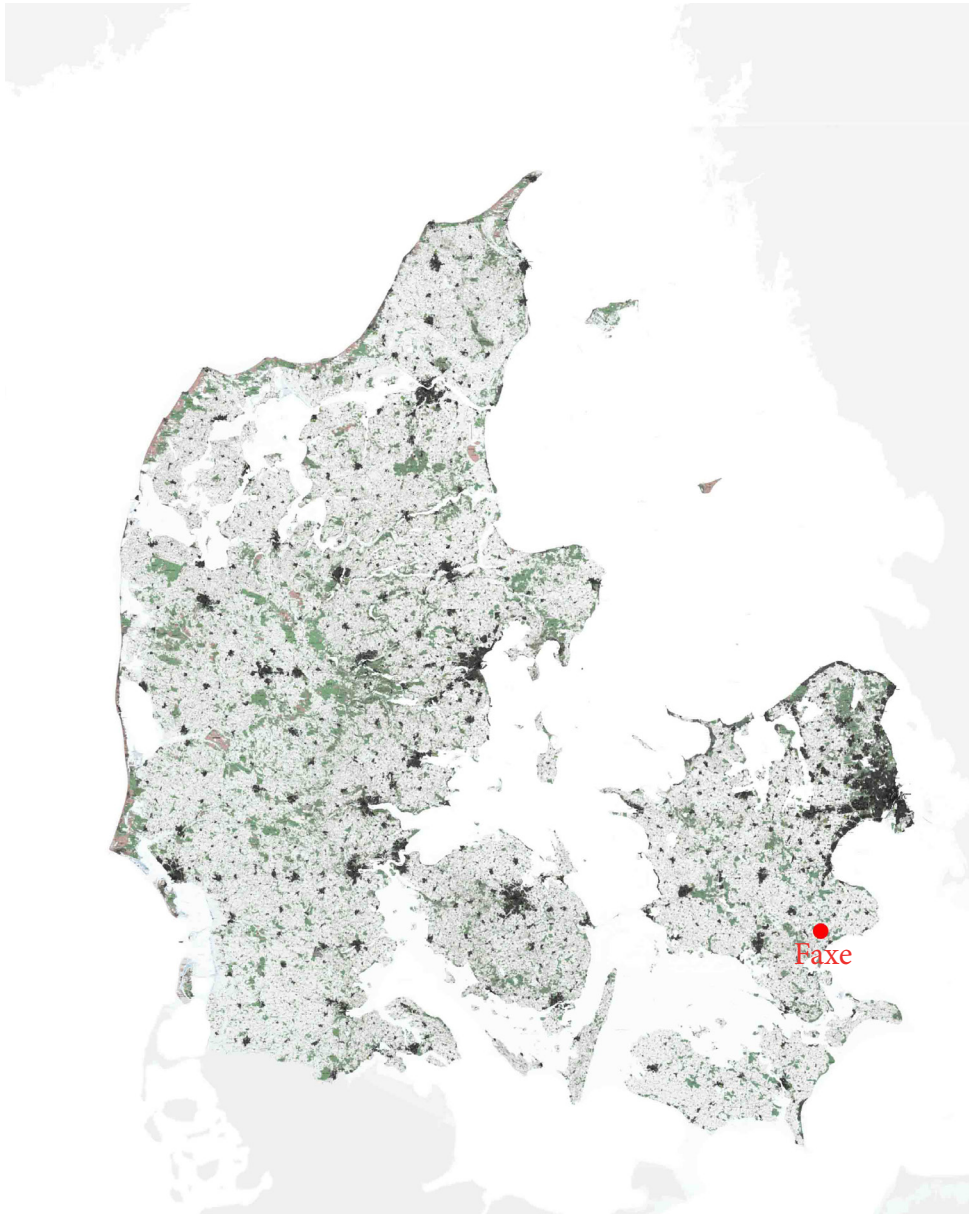


Fig 2 Map of Denmark, Faxe marked



Fig 3 Map of Faxø quarry, the red marks existing landscape-route

and crocodiles (Naturstyrelsen, 2021). The animals all died in a mass extinction, when a meteor hit Earth, causing a radical change in the ecosystem. This period before the meteor is called the Cretaceous, and it is the fossils from this time that have created the lime and the cold water fossils that can only be found here in Faxø (Historisk Atlas, n.d.).

There is a disconnect between the geological site and the excavation on the site. As a visitor, it is difficult to orientate yourself in the landscape. There is a small route that is recommended, but it does not reach the most important geological spots. So if you go with a hammer and chisel to search for fossils, you are on your own. I would at the same time recommend that you wear rubber boots and rain gear, the lime dissolves as soon as there is just a little moisture in the air, and being in Denmark, this happens quite often. The lime thickens into a “muddy” substance which is difficult to walk in, some places it is several centimeters deep. This is completely different in the summertime, where everything turns dry and dusty.

The work in the quarry happens all year round, and it is part of the fascination on site. But if you stick to the recommended route you will never get near the machines, and understand the work that happens here and how it affects this landscape of geological importance. This is why it is interesting to create a connection between these two. In this way the visitors can gain a greater material understanding and awareness of the impact we as humans, and consumers, have on this geological site.

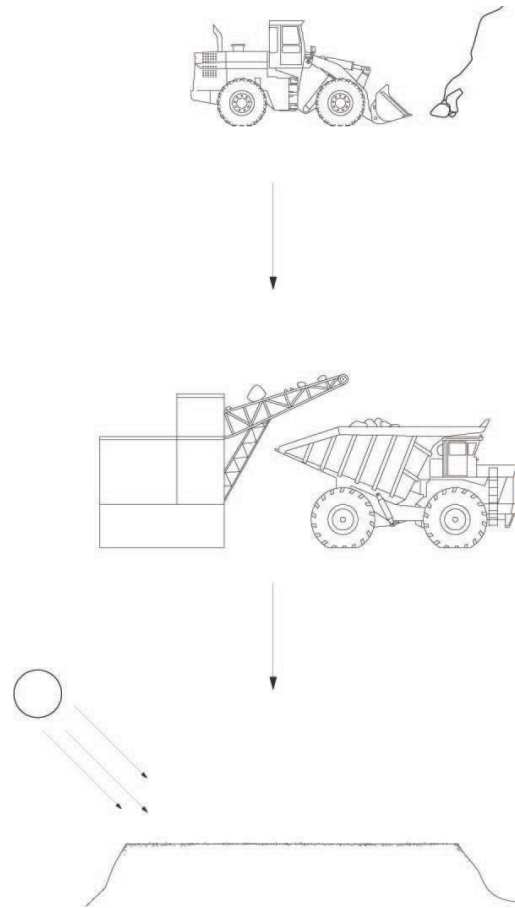


Fig 4 Production at the quarry. The limestone is broken on site. Afterwards it is sorted in quality and size, and lastly laid to dry in the sun (Naturstyrelsen, 2021)

Fig 5 limestone in the quarry landscape >>





# Evolution of the Quarry

The area in which Faxø Quarry is located, used to be a field with a white lime-hill. Locals would come and cut pieces of the lime, as building blocks. The lime was used for constructing houses and churches in the area, the material was kept local and mostly for private use. The blocks are found in buildings from as far back as the Middle Ages (Milán et al., 2023).

Owning the land where the lime is located, became very attractive, and in 1699 the area was split between 5 occupiers. This established the area, and with the production at the site came an expansion. The city grew with the increase in production, and railroad tracks were established from the quarry to the nearest harbor, Faxø Ladeplads, as well as to Copenhagen. The 5 occupiers were joined, with the help of C.F. Tietgen under the firm Faxø Lime - Quarry, in 1883 (Historisk Atlas, n.d.).

Working in the quarry was tuff. The lime was broken, by drilling dynamite into the cliffside, the broken lime would be carried by hand, and sorted, by size and quality (Milán et al., 2023).



Fig 6 Faxø quarry development over time >>

*“Sofie and I came to Faxe in 1921. I got work in the quarry. My quarry area was approx. 8 meters long. It corresponds to a rail length. When the lime had been broken down at a distance of 11 meters from the rails, they were moved closer to the lime wall. The lime was stored. There were ordinary stones, fertilizer lime, glassworks lime, as well as some other sorts. They were loaded into separate carts. There were rails in three levels.”* Lars Larsen, born 1895 (Milán et al., 2023)

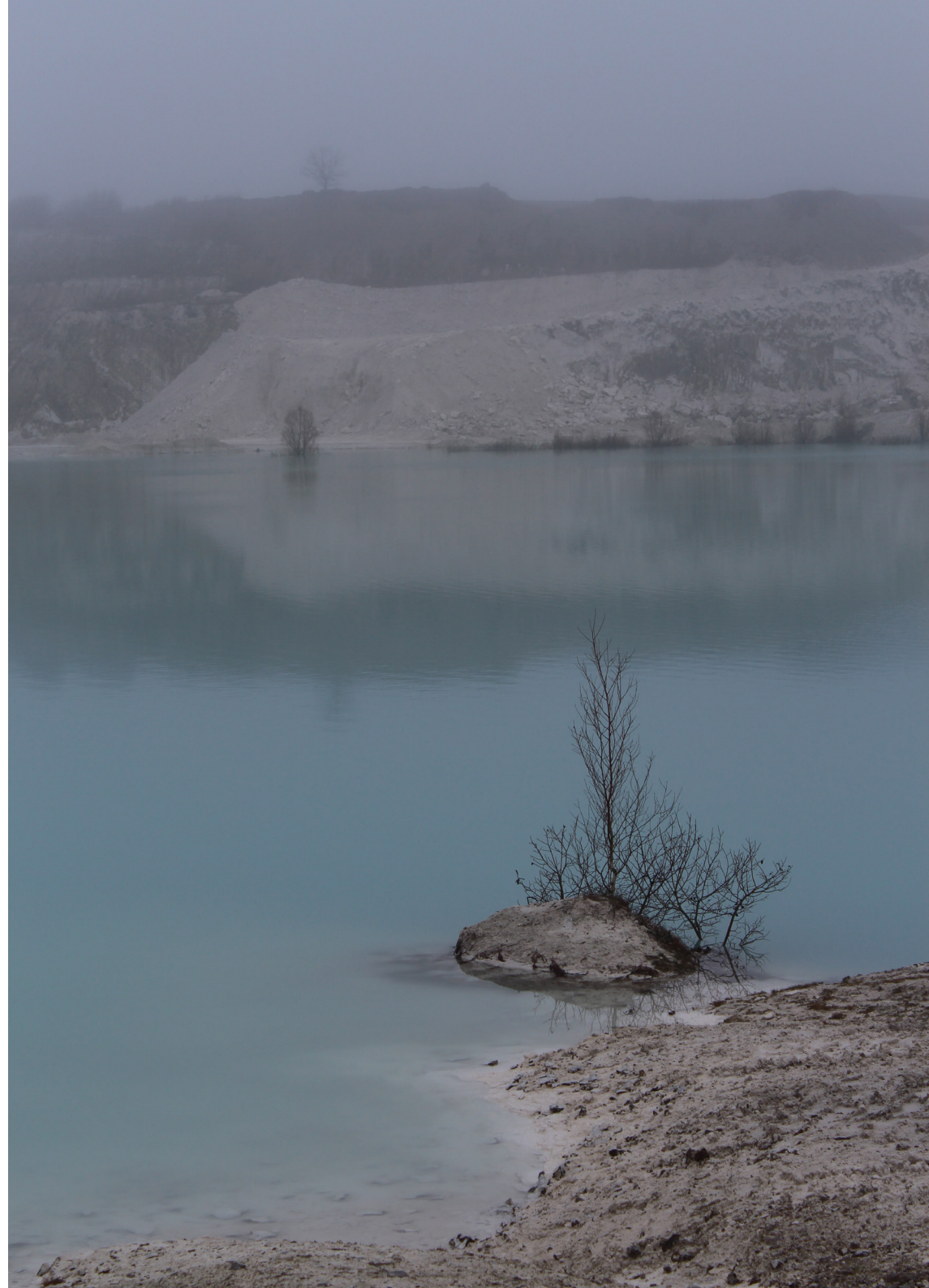
*“It was hard work. It helped a little when you got the hang of it. When you had ‘shot’ a side down, you had to break the largest pieces apart with a big hammer. It was tough. A special rock breaker hammer was used, with a thin shaft, to get better impact from the hammer. If you hit it wrong, the shaft broke, and it cost 2,25 kr back then.”* Thorkild Larsen (Milán et al., 2023)

The quarry occupied 300 people, at its most, but the hand-powered excavation was slowly changed for mechanical equipment (Milán et al., 2023).

Fig 7 View over quarry landscape >>



Fig 8 Quarry lake >>



### **1 - Limestone - CaCO<sub>3</sub>**

Naturally occurring lime. The lime is harvested, and dried before use. (LIME: Everything You Need to Know to Get Started – Critical Concrete, n.d.)

### **2 - Calcium Oxide/Lime - CaCO<sub>3</sub>+ heat = CaO + CO<sub>2</sub>**

Produced by burning limestone, to release CO<sub>2</sub>. This type of lime is also called quicklime. It is wary, corrosive, and reacts with water. It is used in a series of different industries; such as flux in steel, for chemical production, to stabilize soil, and to stabilize the pH value in water. (LIME: Everything You Need to Know to Get Started – Critical Concrete, n.d.)

### **3 - Slaked/ hydrated lime -**



Produced by adding water to Calcium Oxide, either as a powder or paste. It is used in mortars, plasters, and renders, to stabilize soil and asphalt (LIME: Everything You Need to Know to Get Started – Critical Concrete, n.d.)

### **4 - Hydraulic lime and Natural hydraulic lime**

Produced by burning limestone containing clay and pozzolan material. The product stiffens when water is added. Often used in restoration work, in mortars, and plasters. Can be set under cold and wet conditions. (LIME: Everything You Need to Know to Get Started – Critical Concrete, n.d.)

# Lime

Lime is seen as a sustainable material, It has a lower carbon footprint than concrete whilst at the same time containing some of the same qualities. It is often used in building materials as a binder both in biomaterials and conventional materials (LIME: Everything You Need to Know to Get Started – Critical Concrete, n.d.). Lime is regenerative, meaning it reabsorbs carbon dioxide. Raw limestone is burned to produce lime, and CO<sub>2</sub> is released in the process. Lime is activated with water creating hydrated lime, the water will over time evaporate whilst the lime will absorb carbon dioxide, and thereby slowly turn back to limestone. (LIME: Everything You Need to Know to Get Started – Critical Concrete, n.d.)

Even though the material is regenerative, virgin limestone is a finite resource. There is a big occurrence of lime in the subterranean Danish landscape. It was formed over millions of years through a natural process, and can not regenerate in the lifespan of a human (LIME: Everything You Need to Know to Get Started – Critical Concrete, n.d.). The sustainability of the material is therefore varying. If the material is bound with others like in the production of steel, concrete, rubber, glass, mortar, paint, glue, paper, and sugar where the lime is discarded in such a way that the material can not be reharvested, it loses the regenerative aspects (Naturstyrelsen, 2021).

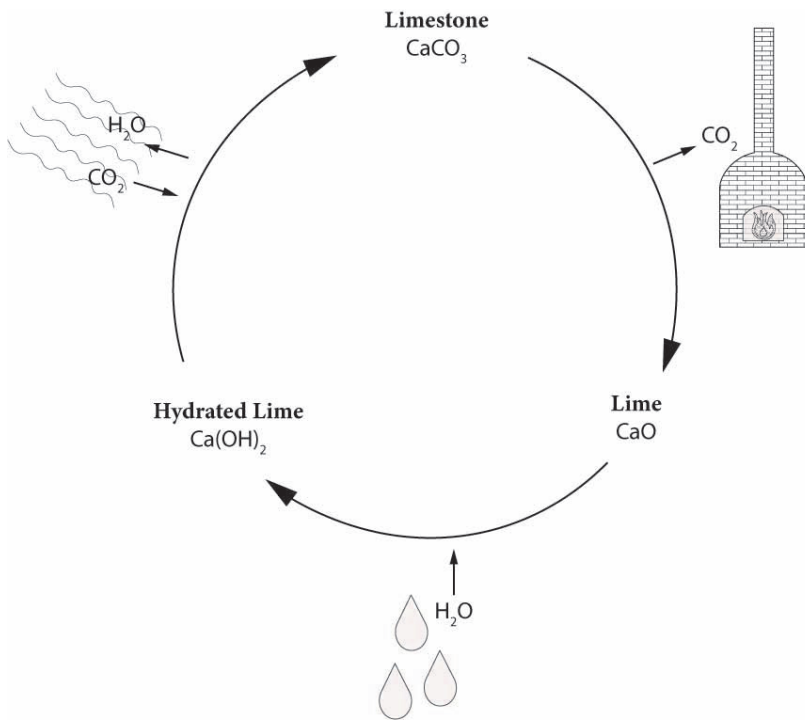


Fig 10 Regenerative circle of lime, referenced from Critical Concrete

# Materiality

The question is how do you add to this landscape, creating value for its visitors? In the book *Genius Loci: Towards a Phenomenology of Architecture*, Christian Norberg-Schulz, defines Genius Loci - as the spirit of a place (Norberg-Schulz, 1979). The architect's role is to visualize the genius loci to create meaningful places. A practice that is based on the locality and the use of local materials becomes imperative, for its ability to evoke a sense of place and activate human senses (Norberg-Schulz, 1979).

Adding to the landscape adds to the environmental character of the space (Norberg-Schulz, 1979). This project will focus on emphasizing the quarry's materiality and tactility, grounded in a phenomenological understanding. The aim is to create a relationship with the materiality and the visitor by shaping elements in a scale that is related to the human body, forming the interior in the landscape, and from the landscape. This will in practice look like a visitor's pathway with 3 interventions on the way, highlighting a specific landscape quality. It could be framing a specific view, highlighting a point of geological importance, or creating an experience, with limes materiality. The landscape in the quarry is shaped for the machine, this project will focus on the visitor experience, in the landscape, and the scale of the project will therefore highlight the difference between the users.

Fig 11 View over quarry landscape >>



Fig 12 Production in Faxe Quarry, with photographer >>



# Method

This project will consist of two methods; registrations, and material experimentation. I will work with the two techniques concurrently throughout the semester. The methods will inform the final design.

## **Registrations**

The registrations will be presented in the form of mappings and an atlas. The goal is to end up with an ideographic mapping of the site (Dansk Byplan laboratorium, 2015), by working with three different approaches; A positivistic approach, where I will map the geological and historical data from the site. A phenomenological approach to understanding the subjective experience. This is done by working in the landscape and mapping the sensory experience, with a starting point in the mapping techniques from the book *Terra Forma, A Book of Speculative Maps*. Lastly, a constructivist approach to visualize the conflicts that lie in a site that excavates raw materials, and to understand the development of the site.

## **Experimentation**

The material investigation will delve into the properties of lime. This process will be represented by material samples, design samples, sketch models, and photo documentation of the process. The aim is to gain an understanding of lime's characteristics, ultimately informing the final design.

A starting point for the investigations will be to look at the porosity of lime. Can I cut elements from solid lime? Is it modifiable? Another technique I wish to explore is casting in the context. To do so I need to develop a technique that can represent the site, without necessarily casting directly on site.

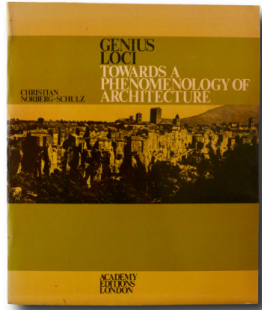
My inquiries extend beyond lime sourced in Faxø quarry.

What happens if you juxtapose or mix naturally occurring lime found in seashells and bones with limestone? It is also interesting to look at the regenerative aspects of the material, and how this can affect the design over time.

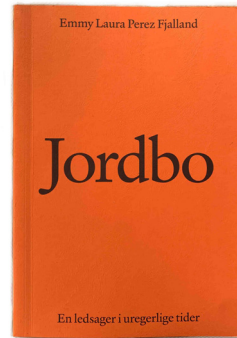
The investigation will allow for an organic and unpredictable development of the project. Acknowledging that the outcome may evolve, rather than being predetermined.



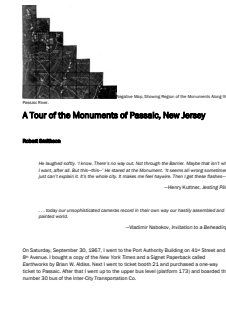
# Bibliografi



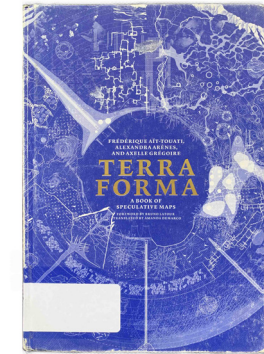
Genius Loci, Towards a phenomenology of Architecture (1979)  
Christian Norberg-Schulz



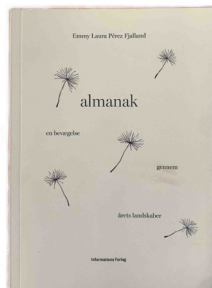
Jordbo, En ledsager i uregerlige tider (2021)  
Emmy Laura Perez Fjalland



A Tour of the Monuments of Passaic, New Jersey (1967)  
Robert Smithson



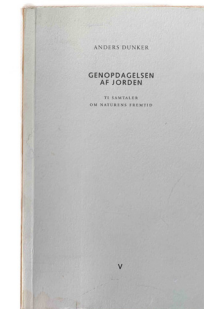
Terra Forma, A Book of Speculative Maps (2019)  
Frederique Ait-Touati, Alexandra Arenes



Almanak (2023)  
Emmy Laura Perez Fjalland



Love your monsters (2011)  
Bruno Latour



Genopdagelsen af Jorden (2020)  
Anders Dunker

Fig 15 Litteratur of Interest

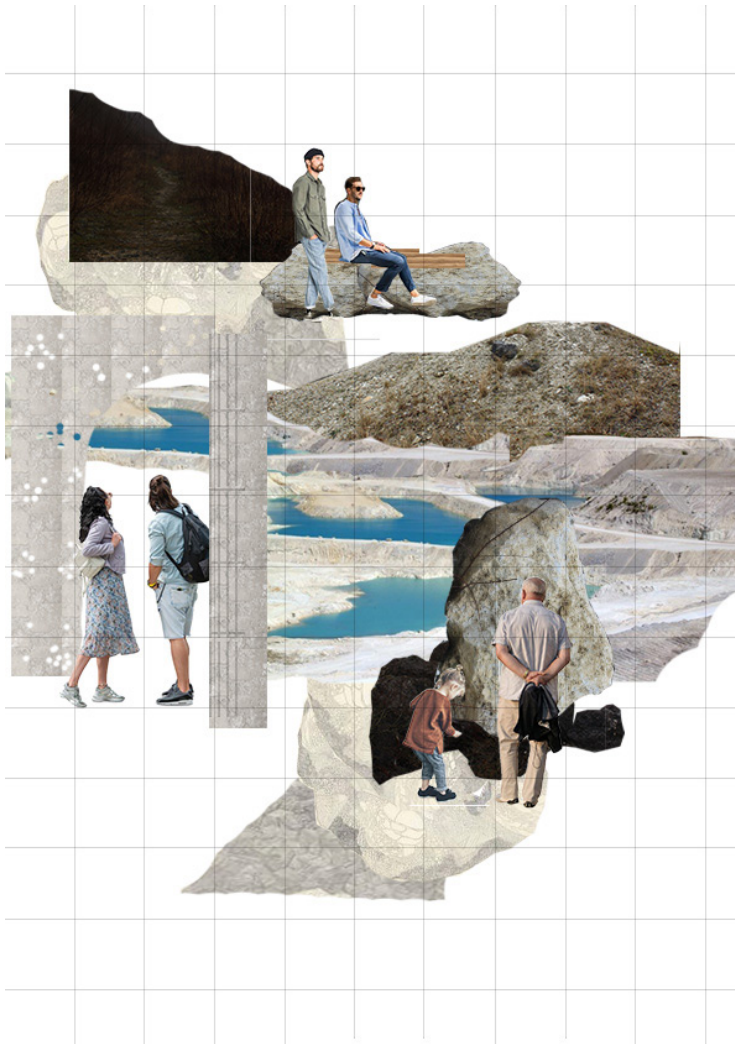
# Project Framing

The project aims to transform the existing infrastructure at Faxe quarry, by highlighting the landscape with 3 pavilions. The pavilions will heighten the visitor's orientation on-site, and act as interior intervention in the landscape.

I will also look at an expansion of the existing infrastructure in the quarry, to ensure accessibility to a broader user group.

The intention is to heighten the visitor's sensory experience of the quarry and its materiality. To combine the understanding of the quarry's value as a geological site, and a production site. While also supporting tourism in the landscape so that the site becomes an attractive destination.

The project will reflect UN-Goal no. 12 "*Ensure sustainable consumption and production patterns*", by targeting points 12.8 and 12. b (Goal 12 | Department of Economic and Social Affairs, n.d.). This in specifically means that the project will create relevant information and awareness for our consumption patterns of nature. The project will look into sustainable tourism by transforming a local attraction that promotes local culture and production.



<< Fig 16 Sketch collage of the quarry landscape

# Deliverables

## 23.02.24 - Crit 01

### *Program and position*

- Program
- Initial sketch collages
- 3D Landscape model

## 21.03.24 - Crit 02

### *Mapping and Experimentation*

- Site Atlas
  - The positivistic
  - The phenomenological
  - The constructivist
- Initial Material experimentation
- Initial sketch collages, with material experiments
- Site plan 1:5000
- Site Plan 1:100
- Section 1:100

## 18.04.24 - Crit 03

### *Design proposal*

- Theoretical report
  - (5 pages)
- Material Atlas
- Transformation strategy
- Material test 1:1
- Plan 1:100/1:200, with concept
- Section 1:100/1:200, with concept

## 23.05.24 - Final Hand-In

- Site Atlas
- Material Atlas
- Written report
- Semester progress
  
- Landscape fragments 1:100
- Model fragments 1:20
- Material test 1:1
  
- Site plan 1:5000
- Plan 1:100/1:200
- Section 1:100/200
- Main drawing, isometric
- 3 visualisation

*This list is provisional*

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