



The Wildcards

Transforming (post) oil landscapes

Diploma
by Kjell Hafnor
Spring 2017

The Wildcards

Transforming (post) oil landscapes

by Kjell Hafnor
Diploma, Spring 2017
15.05.2017

Supervisors:
Luis Callejas
Peter Hemmersam

AHO Oslo School of Architecture and Design,
Institute of Landscape and Urbanism.

All material including photographs and
maps, unless otherwise stated, is by the
author.

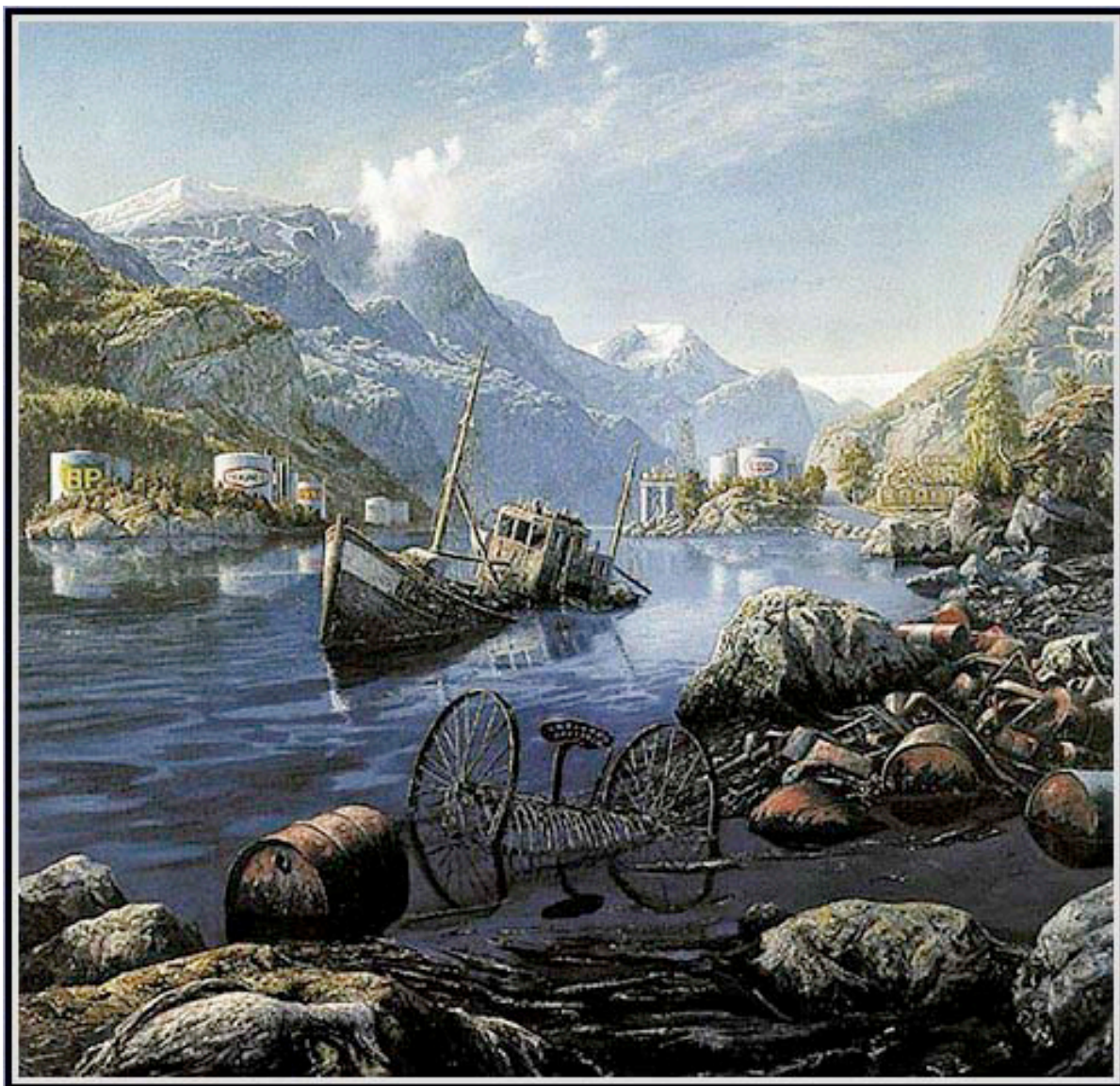
Introduction	4
The Norwegian oil landscape	5
Shipyards	6
Bases	12
Business districts	16
Refineries	20
National context	24
Global context	26
The Wildcard	30
The Hinterland	36
Grapes of the North	42
Reference projects	52
Reference list	56

The Wildcards Transforming (post) oil landscapes

The oil industry in Norway has changed the natural geography of the coastline during the last fifty years.

By the time this resource comes to an end the general environment will face transformations due to global warming and climate change. It will also cause these territories to be abandoned, leaving behind an abundance of artificial landscapes and unused areas.

This project explores and speculates scenarios where these future circumstances are seen as opportunities to activate the hinterland landscapes beyond the oil refineries and reuse the sites. By investigating local cultivation, national climate predictions and global shifts in edible landscapes, this project suggests an introduction of grape fields as a new tomorrow for the chosen coastlines.



Rolf Groven

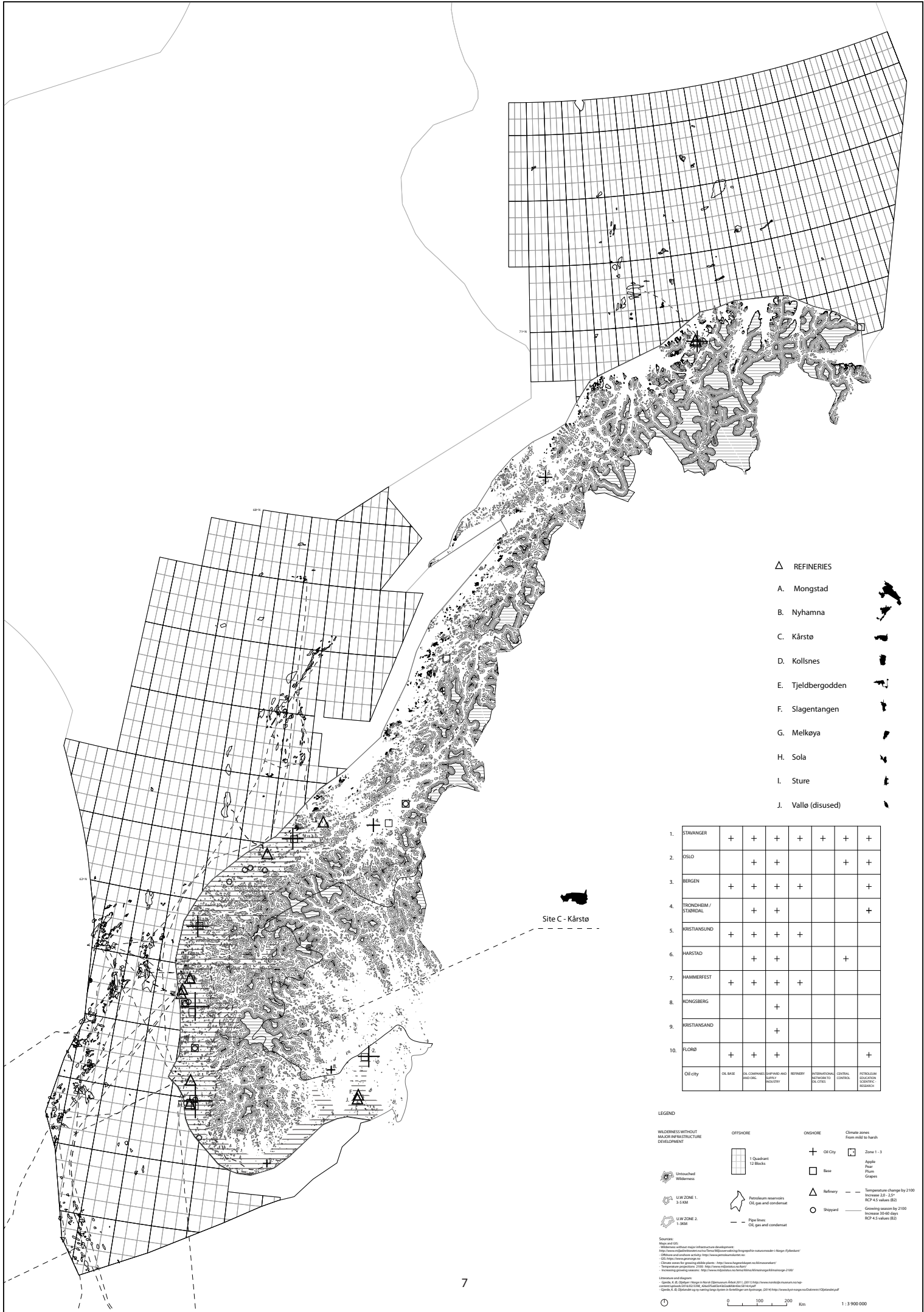
Oljemaleri (fritt etter Tideman og Gude) also called - Oljeferden i Hardanger
1975

The Oil Landscape

The oil landscapes in Norway are built up of shipyards, bases, business areas and refineries in proximity to the "Oil Cities".

They serve as economical generators.

Due to the unrenovable resource and short-term future, the legion of artificial oil landscapes ought to be imagined ready for indeterminate futures. The project studies how these territories can readapt to circumstances of global warming and transform into productive landscapes.



△ REFINERIES

- A. Mongstad
- B. Nyhamna
- C. Kårstø
- D. Kollsnes
- E. Tjeldbergodden
- F. Slagentangen
- G. Melkøya
- H. Sola
- I. Sture
- J. Valø (disused)



1.	STAVANGER	+	+	+	+	+	+	+
2.	OSLO		+	+			+	+
3.	BERGEN	+	+	+	+			+
4.	TRONDHEIM / STJØRDAL		+	+				+
5.	KRISTIANSUND	+	+	+	+			
6.	HÅRSTAD		+	+			+	
7.	HAMMERFEST	+	+	+	+			
8.	WINGSBERG			+				
9.	KRISTIANEAND				+			
10.	FLØRD	+	+	+				+
	Oil city	Oil field	Oil terminal	Offshore	Refinery	Offshore	Refinery	Offshore

LEGEND

WILDERNESS WITHOUT MAJOR INFRASTRUCTURE DEVELOPMENT

Uninhabited wilderness

1/2 ZONE 1, 3-5 KM

1/2 ZONE 2, 1-3 KM

OFFSHORE

1 Quadrant, 12 Blocks

Petroleum reservoirs

Pipe lines

ONSHORE

Oil City

Base

Refinery

Skidpad

Climate zones

From mild to harsh

Zone 1 - 3

Alpine

Pearl

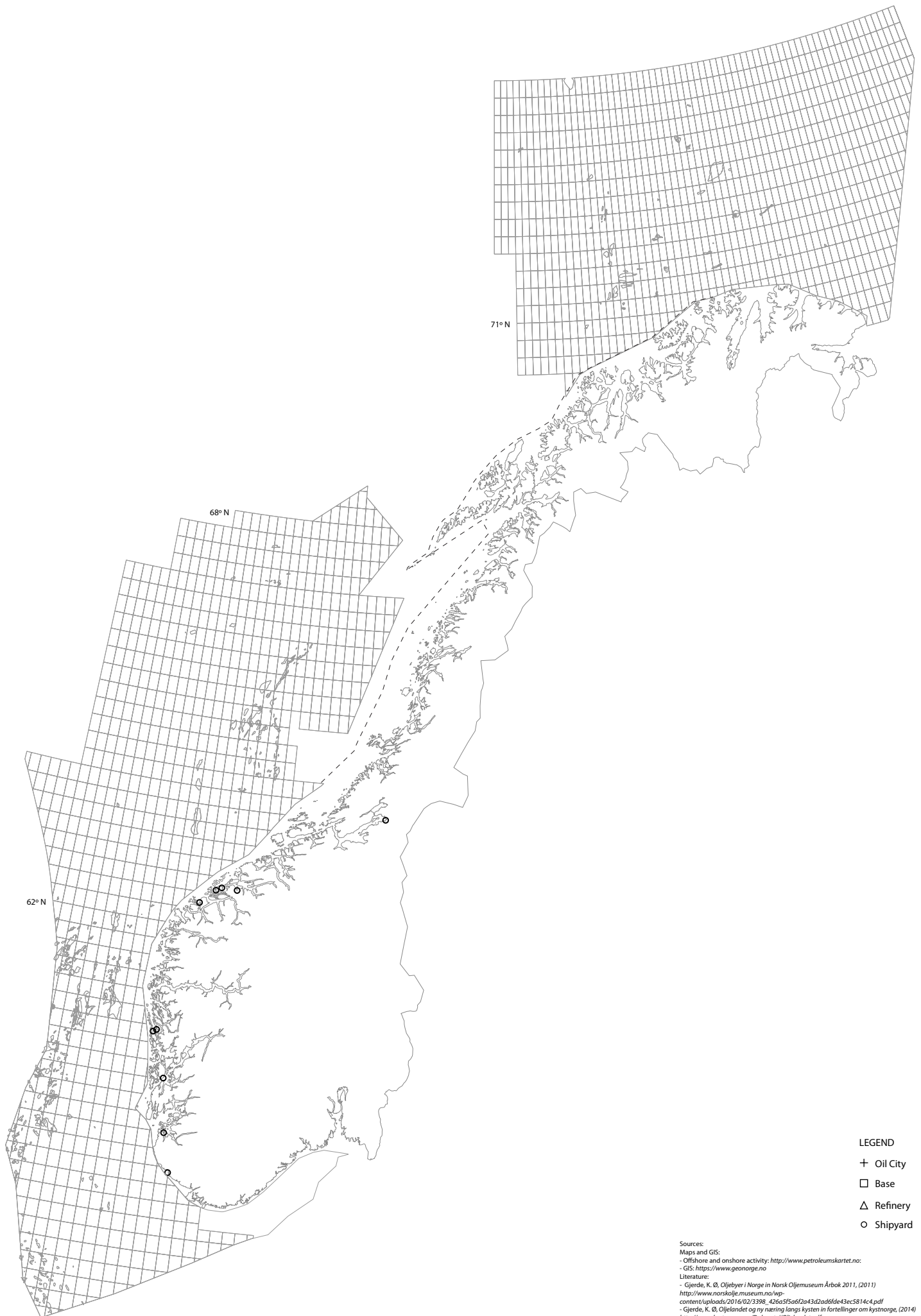
Pharm

Grapes

Source: Maps and data: Norwegian Geotechnical Institute (NGI) and Norwegian Mapping Authority (Kartverket).
Offshore and onshore activity: Norwegian Mapping Authority (Kartverket).
Climate zones for growing crops: Norwegian Mapping Authority (Kartverket).
Temperature projections: Norwegian Mapping Authority (Kartverket).
Increasing growing seasons: Norwegian Mapping Authority (Kartverket).
Uninhabited wilderness: Norwegian Mapping Authority (Kartverket).
Climate zones for growing crops: Norwegian Mapping Authority (Kartverket).
Temperature projections: Norwegian Mapping Authority (Kartverket).
Increasing growing seasons: Norwegian Mapping Authority (Kartverket).
Uninhabited wilderness: Norwegian Mapping Authority (Kartverket).



Shipyard



LEGEND

- + Oil City
- Base
- △ Refinery
- Shipyard

Sources:
 Maps and GIS:
 - Offshore and onshore activity: <http://www.petroleumskartet.no>
 - GIS: <https://www.geonorge.no>
 Literature:
 - Gjerde, K. Ø, *Oljebyer i Norge* in Norsk Oljemuseum Årbok 2011, (2011) http://www.norskoljemuseum.no/wp-content/uploads/2016/02/3398_426a5f5a6f2a43d2ad6de43ec5814c4.pdf
 - Gjerde, K. Ø, *Oljelandet og ny næring langs kysten* in fortellinger om kystnorge, (2014) <http://www.kyst-norge.no/Dokmntr/Oljelandet.pdf>





Rosenberg Verft, Hundvåg

Nearest city: Stavanger
Shipyard

58°59'10.63"N 5°43'30.40"Ø



Kvernberget
Nearest city: Levanger
Shipyards/Boat
60°47'12.60"N 11°27'0.37"E



St. Langton
Nearest city: Ålesund
Shipyards
62°35'4.88"N 6°55'49.85"E



Høyanger
Nearest city: Bergen
Shipyards
60°26'36.12"N 5°6'5.10"E



Agdenes
Nearest city: Bergen
Shipyards/Boat
60°24'38.65"N 5°0'22.07"E



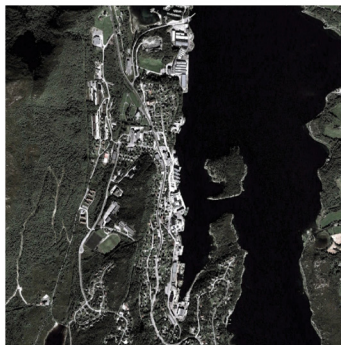
Ulstein Verk
Nearest city: Ulsteinvik
Shipyards
62°20'26.34"N 5°40'15.33"E



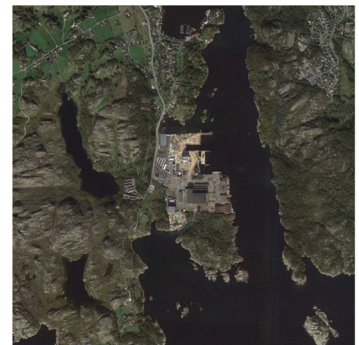
Stord
Nearest city: Stord
Shipyards/Boat
60°37'3.62"N 4°51'25.40"E



Vard
Nearest city: Ålesund
Shipyards
62°32'54.94"N 6°16'27.66"E



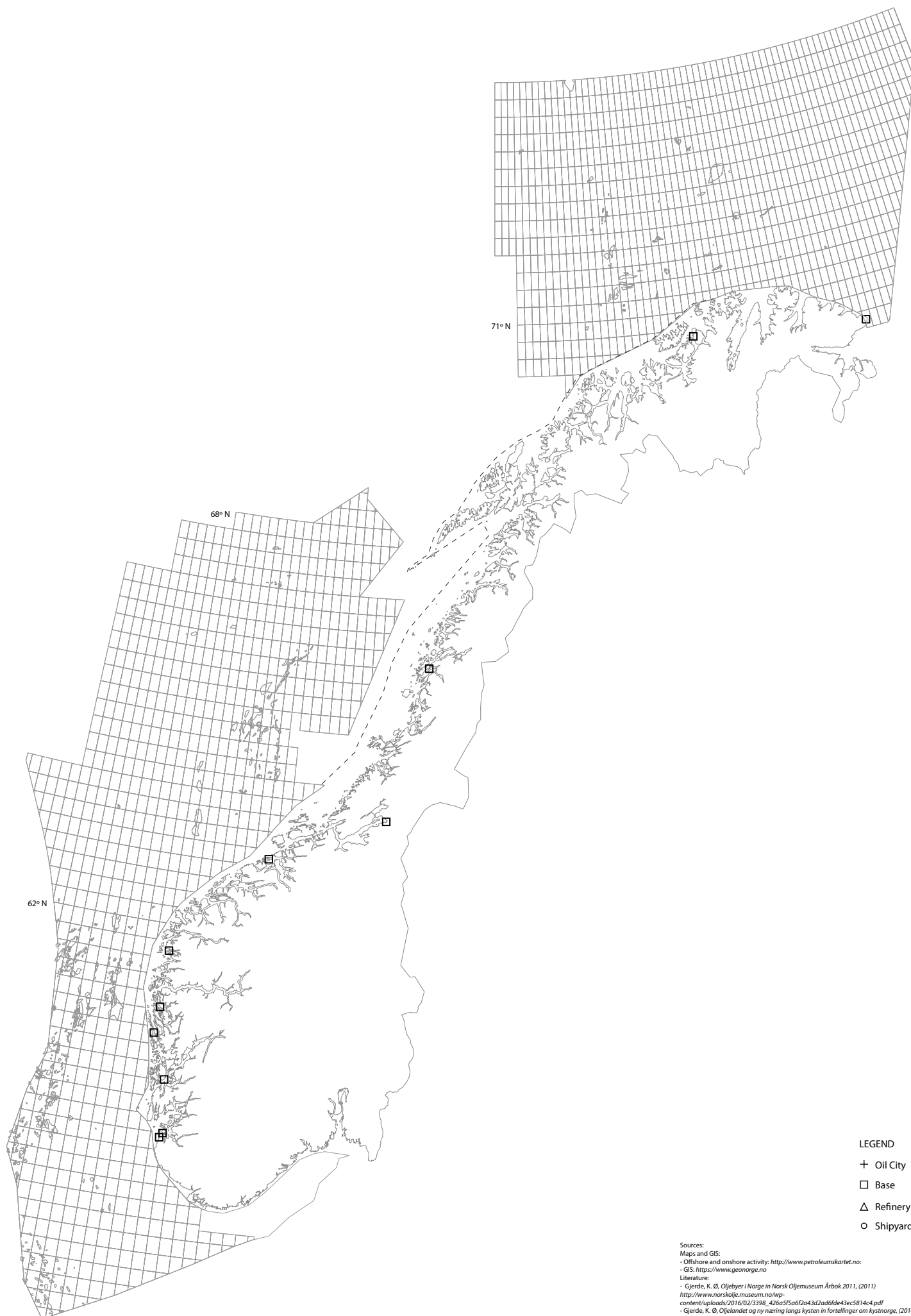
St. Brattvåg
Nearest city: Ålesund
Shipyards
62°35'35.85"N 6°26'46.83"E



Aln
Nearest city: Egersund
Shipyards
58°25'27.60"N 5°59'3.49"E



Base





Vardø Barents Base

Nearest city: Vardø
Base

70°22'18.98"N 31° 6'14.85"Ø



Nordnes, Risør
Nearest city: Sola
Base
58°55'50.16"N 5°35'25.66"E



Polabasen
Nearest city: Hammerfest
Base
70°38'2.12"N 23°39'35.58"E



Kværner Stord
Nearest city: Stord
Base
59°45'52.64"N 5°29'48.07"E



Nordnes, Duvvika
Nearest city: Stavanger
Base
58°59'51.32"N 5°40'0.03"E



Fjordbasen
Nearest city: Florø
Base
61°36'35.02"N 5°44'6.17"E



Mongstad basen, Lindås
Nearest city: Bergen
Base
60°47'25.61"N 5°47'8.27"E



Ågotnes, Sotra
Nearest city: Bergen
Base
60°24'38.65"N 5°02'22.07"E



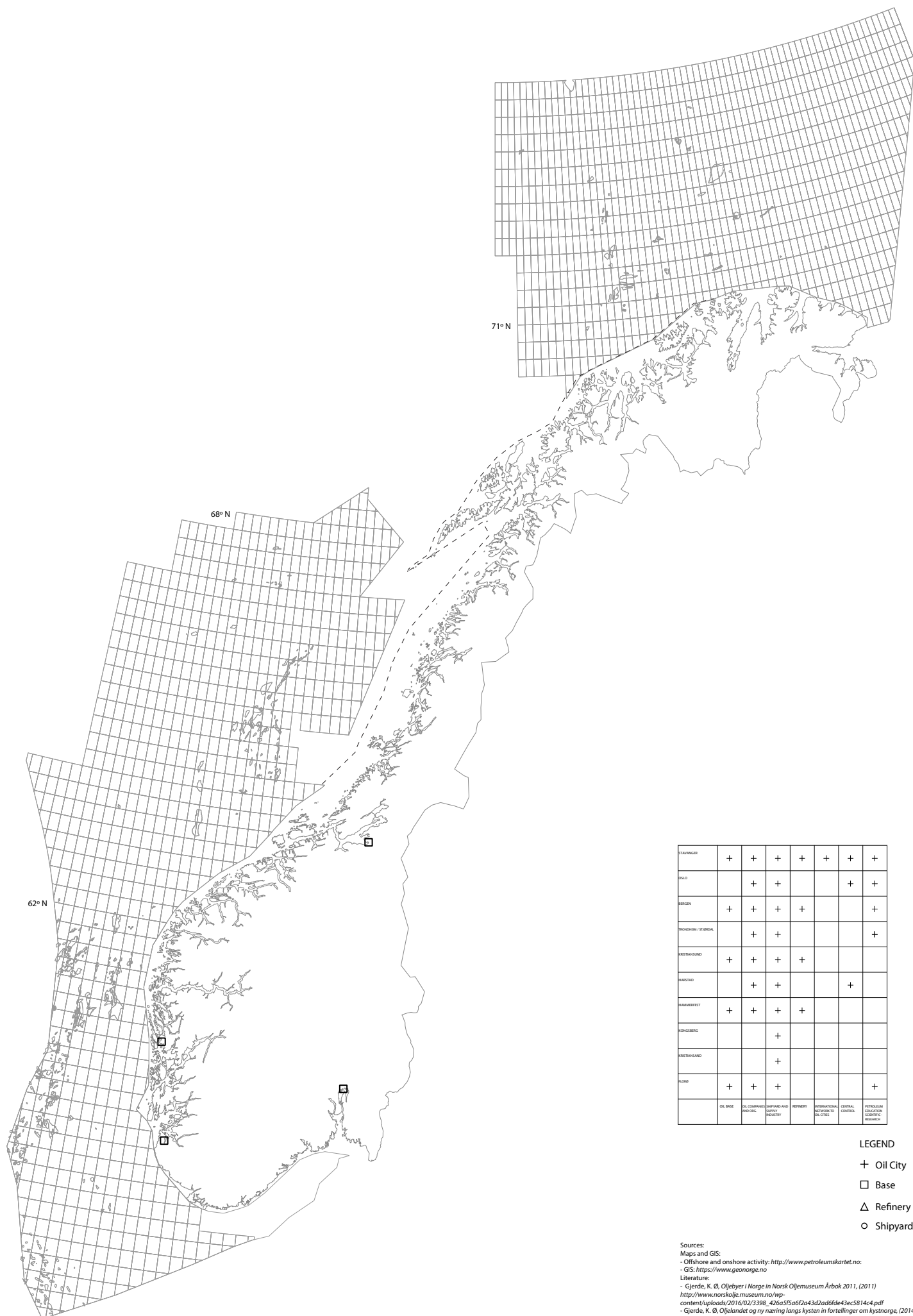
Vestbasen
Nearest city: Kristiansund
Base
63°02'16.7"N 7°40'35.73"E



Kværner Vordal
Nearest city: Levanger
Base
63°47'12.60"N 11°27'0.37"E



Business district



LEGEND

+ Oil City

□ Base

△ Refinery

○ Shipyard

Sources:

Maps and GIS:

- Offshore and onshore activity: <http://www.petroleumskartet.no>
- GIS: <https://www.geonorge.no>

Literature:

- Gjerde, K. Ø, *Oljebyer i Norge in Norsk Oljemuseum Årbok 2011, (2011)* http://www.norskoljemuseum.no/wp-content/uploads/2016/02/3398_426a5f5a6f2a43d2ad6de43ec5814c4.pdf
- Gjerde, K. Ø, *Oljelandet og ny næring langs kysten in fortellinger om kystnorge, (2014)* <http://www.kyst-norge.no/Dokument/Oljelandet.pdf>

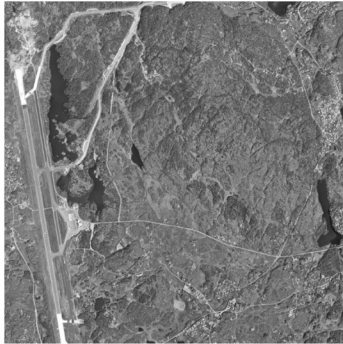




Location: Stjørdal
 Nearest big city: Trondheim
 1964
 63°28'38.05"N 10°53'24.45"E



Location: Stjørdal
 Nearest big city: Trondheim
 Business district
 63°28'38.05"N 10°53'24.45"E



Location: Sandvika/Kokstad
Nearest city: Bergen
Year: 1970
60°17'44.27"N 5°15'12.20"E



Location: Sandvika/Kokstad
Nearest city: Bergen
Business district
60°17'44.27"N 5°15'12.20"E



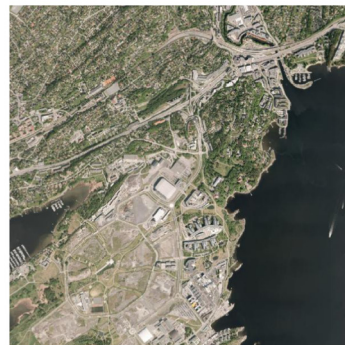
Location: Foss
Nearest city: Stavanger / Sandnes
Year: 1970
58°53'31.02"N 5°44'2.91"E



Location: Foss
Nearest city: Stavanger / Sandnes
Business district
58°53'31.02"N 5°44'2.91"E



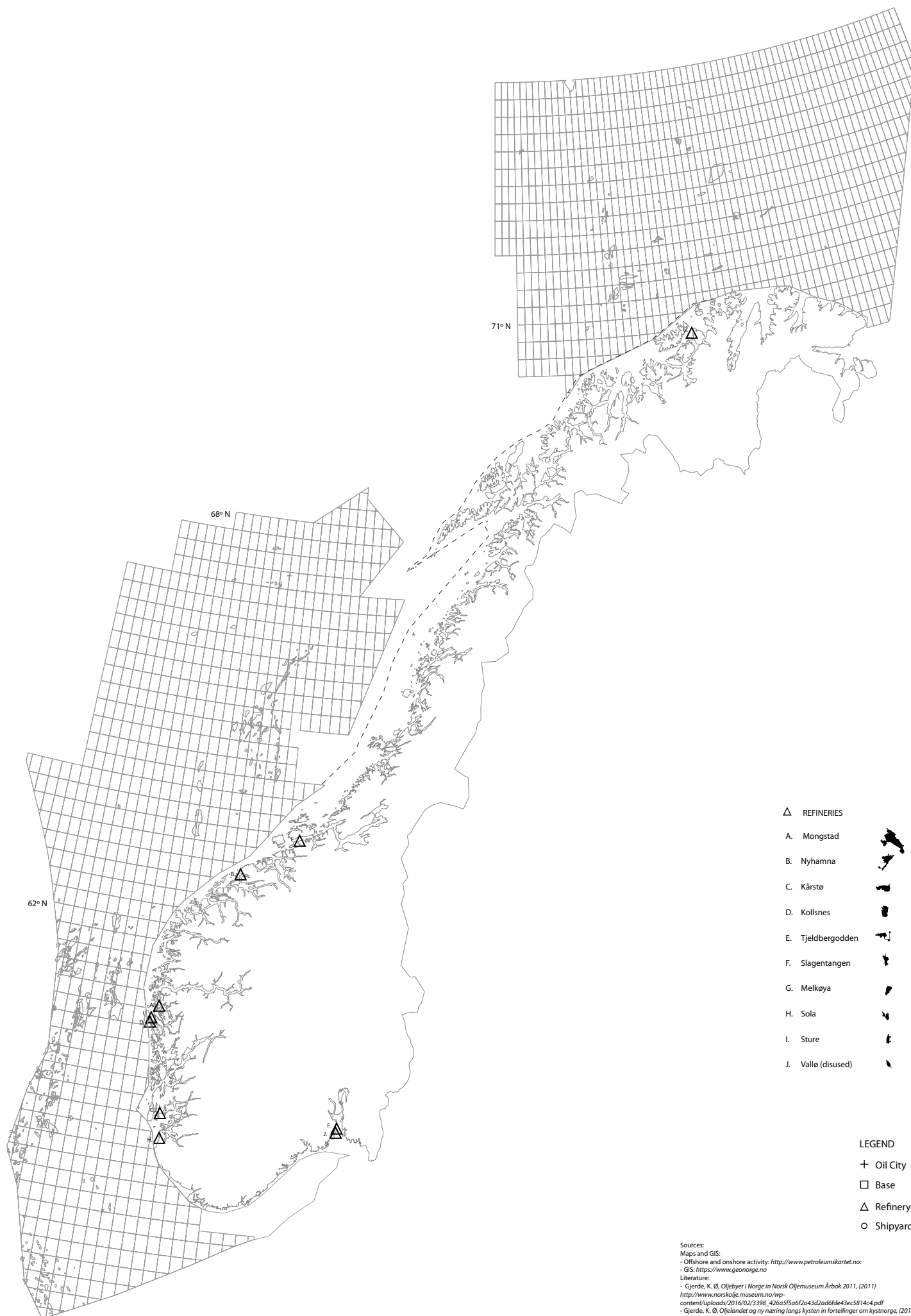
Location: Lysaker/Førnebu
Nearest city: Oslo
Year: 1984
59°53'58.27"N 10°37'43.32"E



Location: Lysaker/Førnebu
Nearest city: Oslo
Business district
59°53'58.27"N 10°37'43.32"E



Refinery



Sources:
 Maps and GIS:
 - Offshore and onshore activity: <http://www.petroleumskartet.no>
 - GIS: <https://www.geonorge.no>
 Literature:
 - Gjerde, K. Ø, *Oljebyer i Norge* in Norsk Oljemuseum Årbok 2011, (2011) http://www.norskolje.museum.no/wp-content/uploads/2016/02/3398_426a5f5a6f2a43d2ad6de43ec5814c4.pdf
 - Gjerde, K. Ø, *Oljelandet og ny næring langs kysten in fortellinger om kystnorge*, (2014) <http://www.kyst-norge.no/Dokmntr/Oljelandet.pdf>



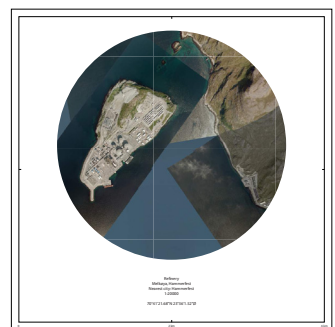
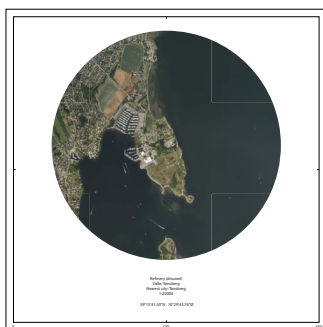
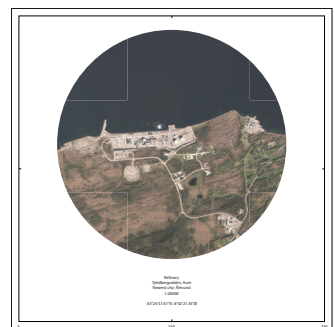
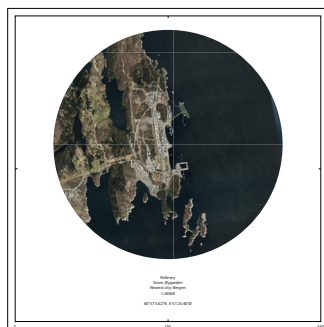
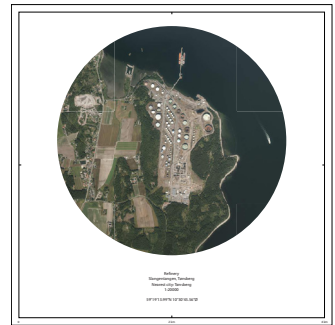
Refinery
Kårstø, Tysvær
Nearest city: Haugesund
1:20000

59°16'30.25"N 5°30'51.63"Ø

0

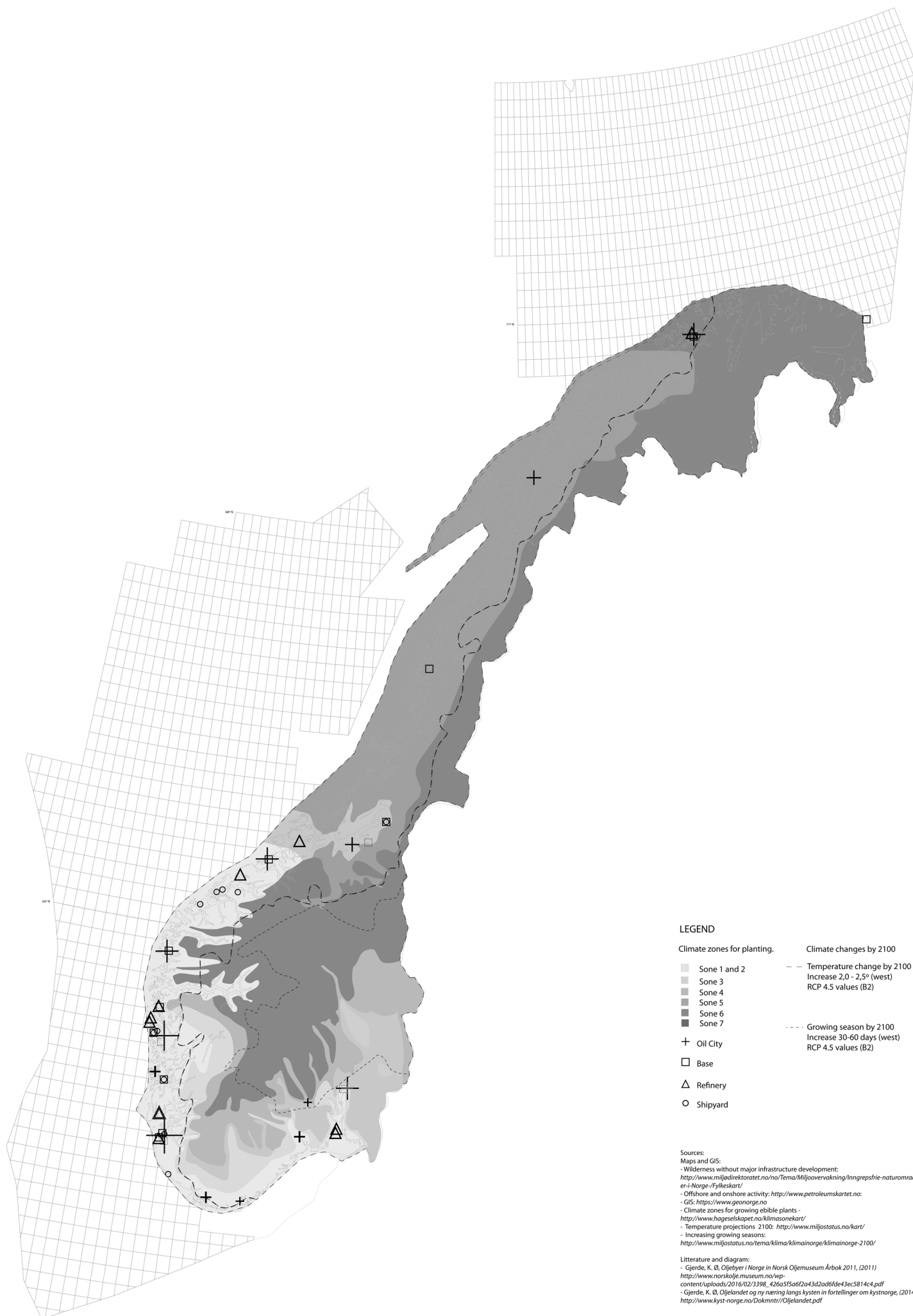
2 km

4 km



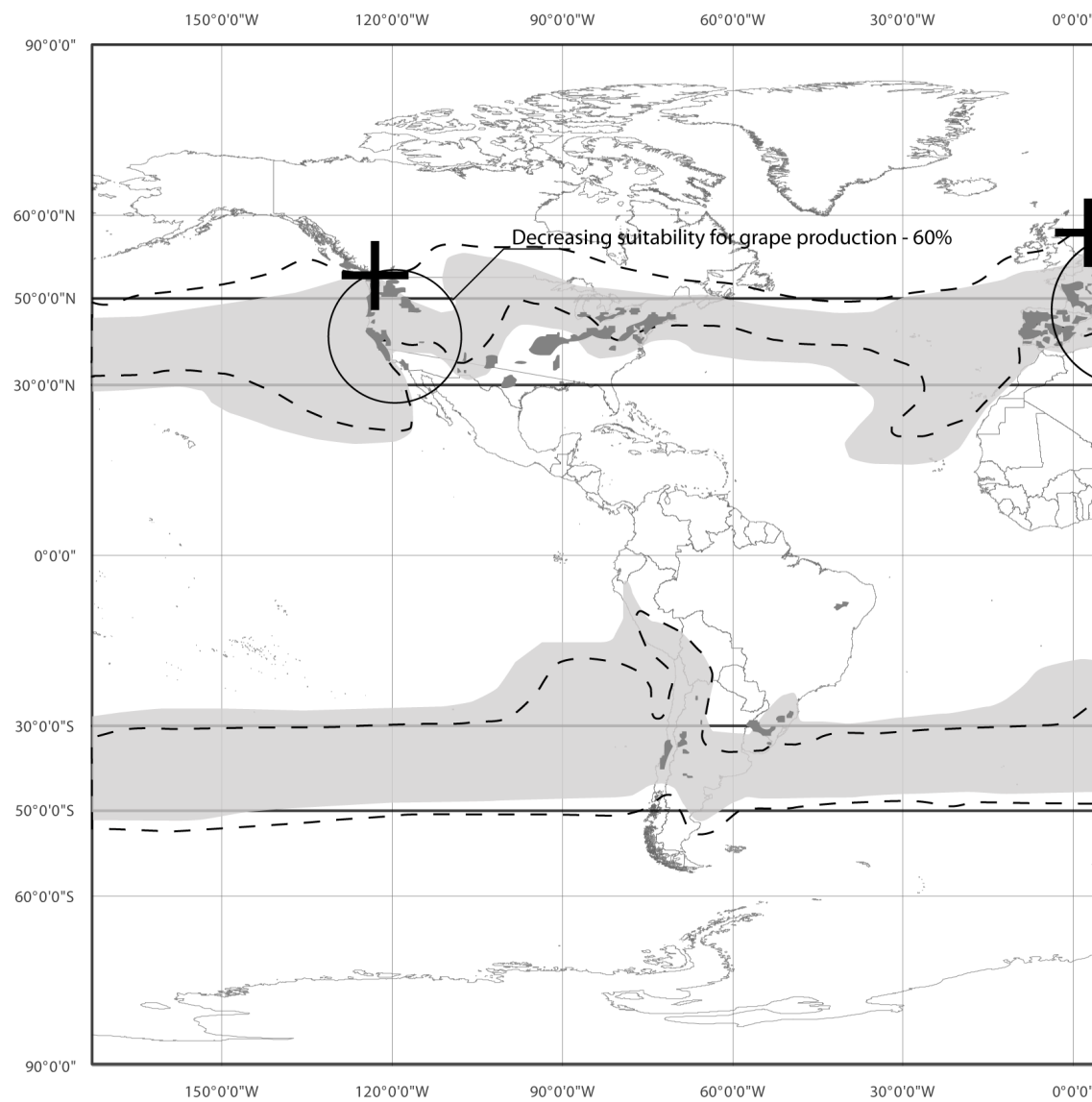
NATIONAL PREDICTIONS ON GLOBAL WARMING
by 2100

The Norwegian Environment Agency predicts 1 - 2 months extended growing seasons in the lowlands. It is estimated that the western part of the country can experience an increase in temperatures between 2.0 - 2.5°C (RCP 4.5 values)



GLOBAL

Global climate projections
There is a global shift in edible plants.
Grapes are moving polewards.



Changing suitability for grape production

0 312 625 1 250 2 500 3 000 Miles

1:150 000 000

Longitudinal "sweet spot" moves latitudinal towards the poles.

--- 2100
 ■ 2000

12-22 % Growing Season Isotherms
 Northern Hemisphere Apr. - Oct.
 Southern Hemisphere Oct. - Apr.

■ Wine producing regions

○ Regions losing grape production due to global warming
 - Burgund and Alsace (France), Oregon, Napa and Santa Barbara

✚ New suitable regions for wine production, North European - (England), New Zealand and Western North America

Source map and figures: <http://www.academicwino.com/2015/06/climate-change-global-wine-industry-somm-journal.html/>
 Jones, G.V. 2007. Climate Change and the Global Wine Industry. Australian Wine Industry Technical Conference, Adelaide, Australia. July 28-August 2, 2007. (Global)
 doi:10.1073/pnas.1210127110

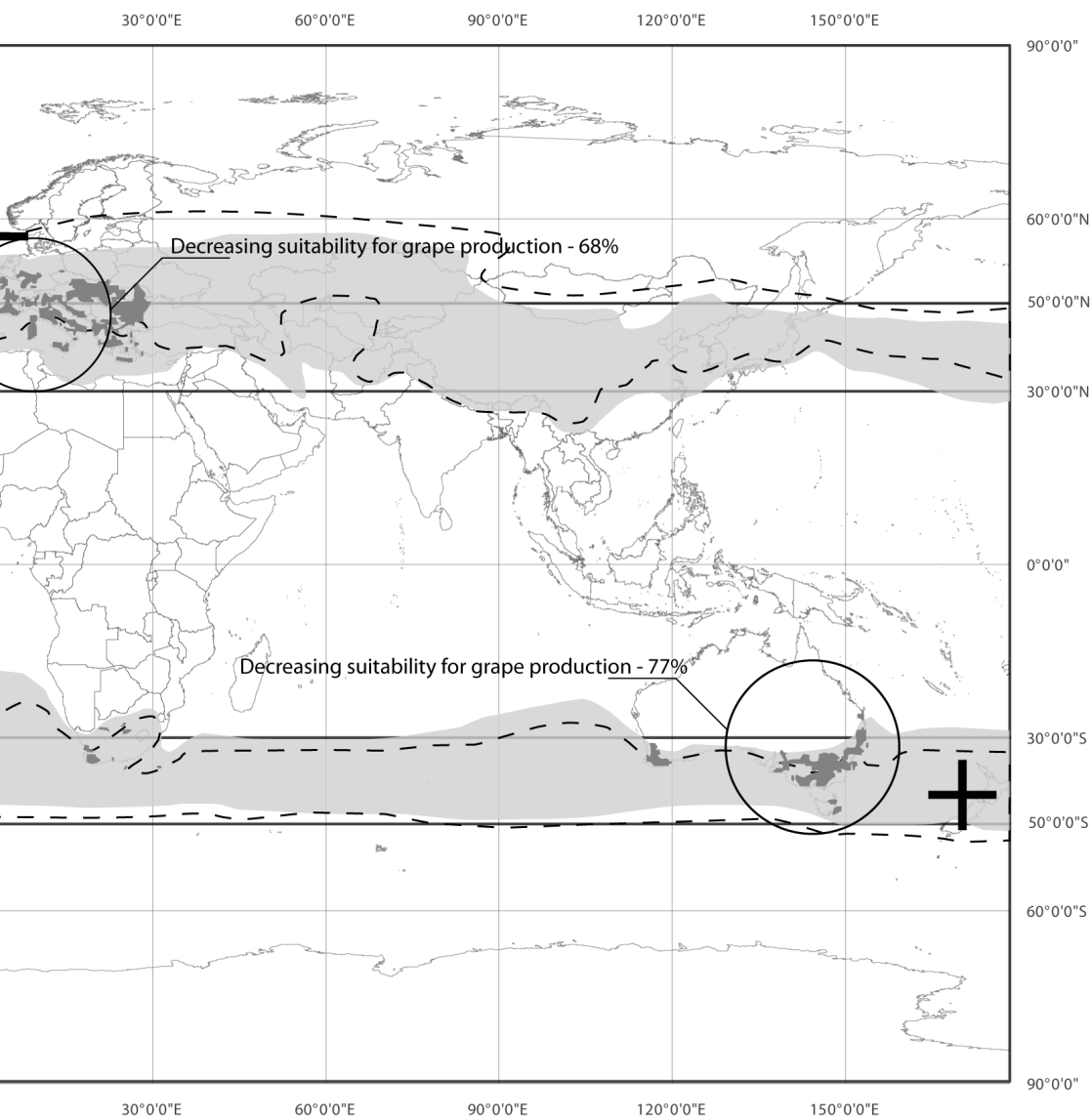


Table 1. Ecological footprint of viticulture 2050, RCP 8.5

2050 RCP 8.5	Net change in area suitable for viticulture, mean % (quantiles)	Ecological footprint 2000, % area (ha × 10 ⁹)*	Ecological footprint trend to 2050, % mean change (quantiles)
California	-60 (-42, -55, -66, -73)	29.8 (2.8)	10 (2, 5, 11, 27)
Chile	-25 (0, -17, -29, -55)	0.8 (0.05)	0 (-38, -25, 38, 50)
Mediterranean Europe	-68 (-39, -61, -78, -86)	2.4 (1.8)	342 (125, 263, 392, 525)
Cape floristic region	-51 (-41, -44, -54, -66)	46.0 (2.5)	14 (9, 11, 15, 19)
Australia (Med)	-73 (-61, -67, -76, -87)	44.0 (15.1)	-5 (-16, -8, 0, 6)
Australia (non-Med)	-22 (-15, -19, -23, -31)	40.9 (13.8)	2 (0, 2, 5, 11)
Northern Europe	99 (58, 83, 118, 149)	1.1 (2.5)	191 (-10, 10, 291, 618)
New Zealand	168 (104, 124, 216, 264)	6.6 (0.1)	126 (98, 103, 152, 174)
Western North America	231 (96, 201, 259, 338)	44.1 (4.9)	16 (2, 12, 23, 28)

Ensemble means are shown with quantiles shown in the order 5%, 25%, 75%, and 95%. RCP 4.5 values are given in [Table S1](#). Med, Mediterranean climate; non-Med, non-Mediterranean climate.

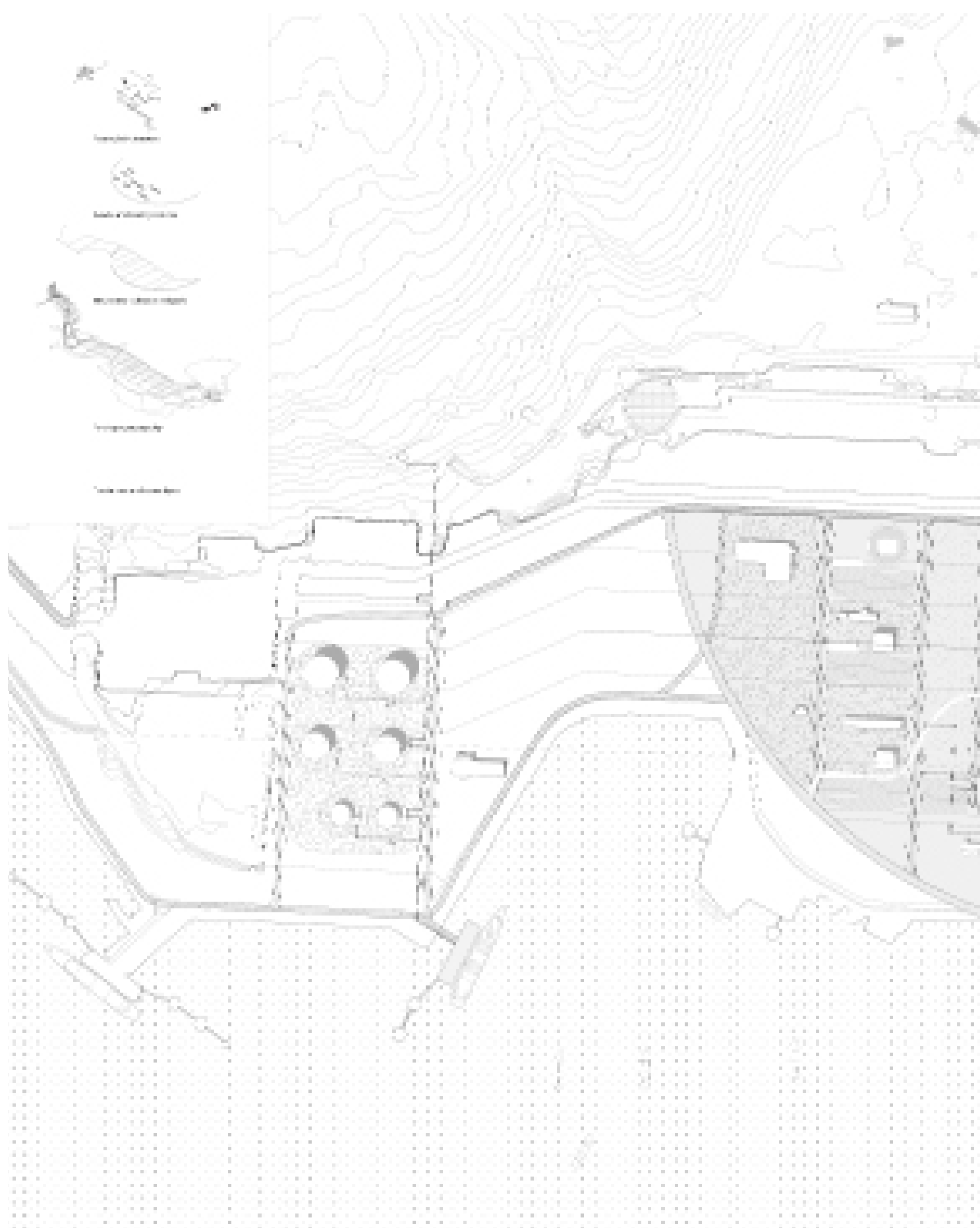
*Ecological footprint is the percentage of suitable viticulture area that intersects with natural lands as defined by HII < 10 (27).

Source: Table 1: Lee Hannah, Patrick R. Roehrdanz, Makihiko Ikegami, Anderson V. Shepard, M. Rebecca Shaw, Gary Tabor, Lu Zhi, Pablo A. Marquet, and Robert J. Hijmans. (2013). Climate change, wine, and conservation. *Robert E. Dickinson, University of Texas at Austin, Austin, TX*, (2013) doi:10.1073/pnas.1210127110

THE WILDCARD

The Wildcard works as a placeholder for tomorrow's viticulture. New site activities bring people from The Hinterland to see the newest studies on grapes. Scientists are restoring former buildings for the purpose of grape research.





Fortification - plan

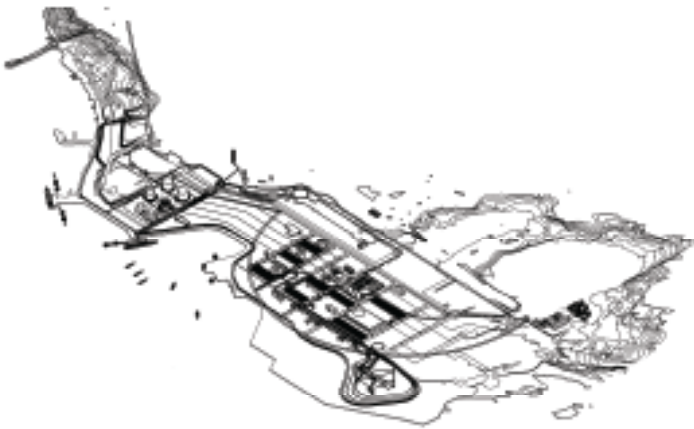


- 1. Trenches
- 2. Wall and bastions
- 3. Moat or ditch

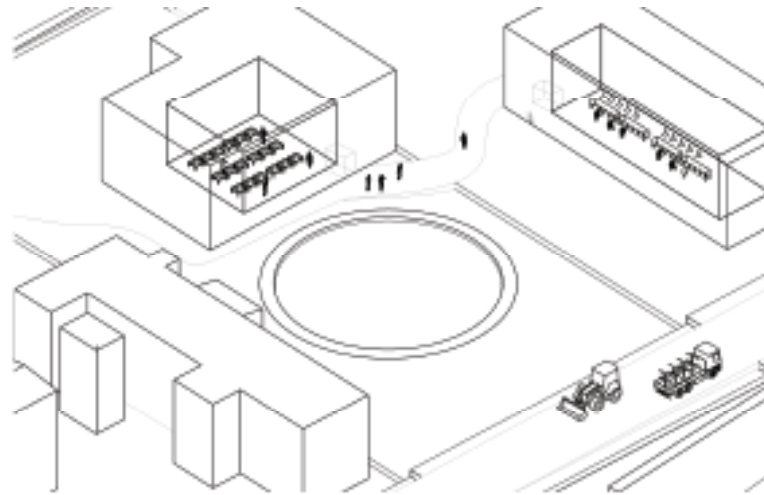
0 10 20
m



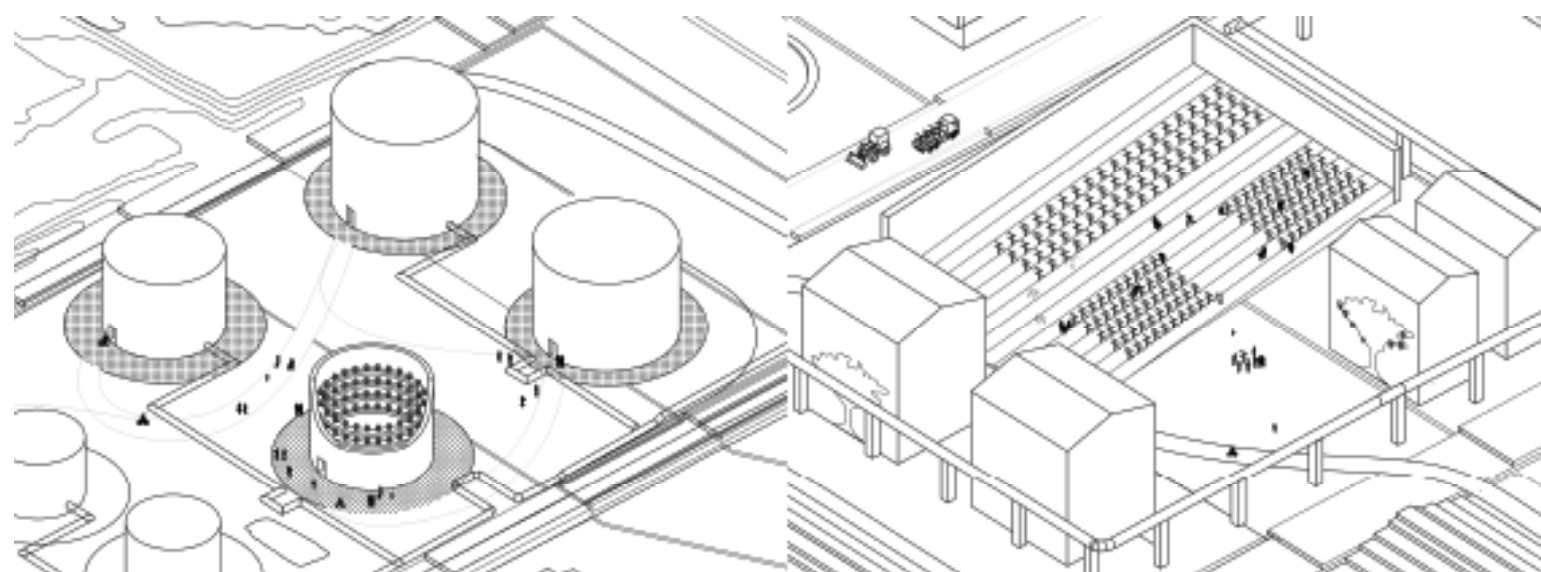




The Midland



**Scientific research on groups
before building and building**

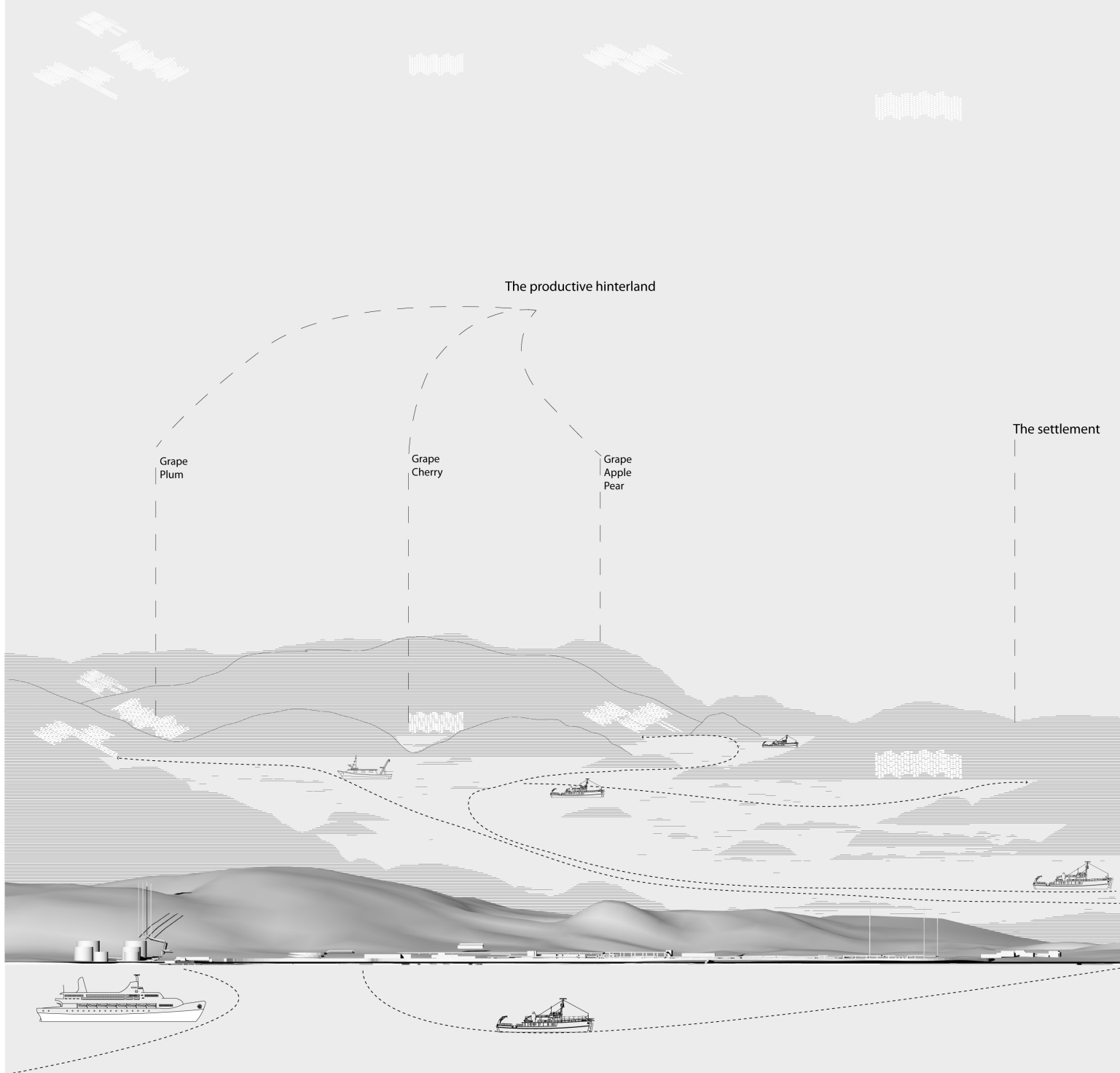


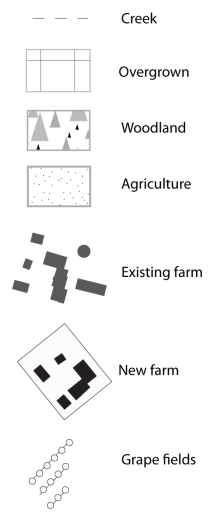
Storing water and gases from the treatment

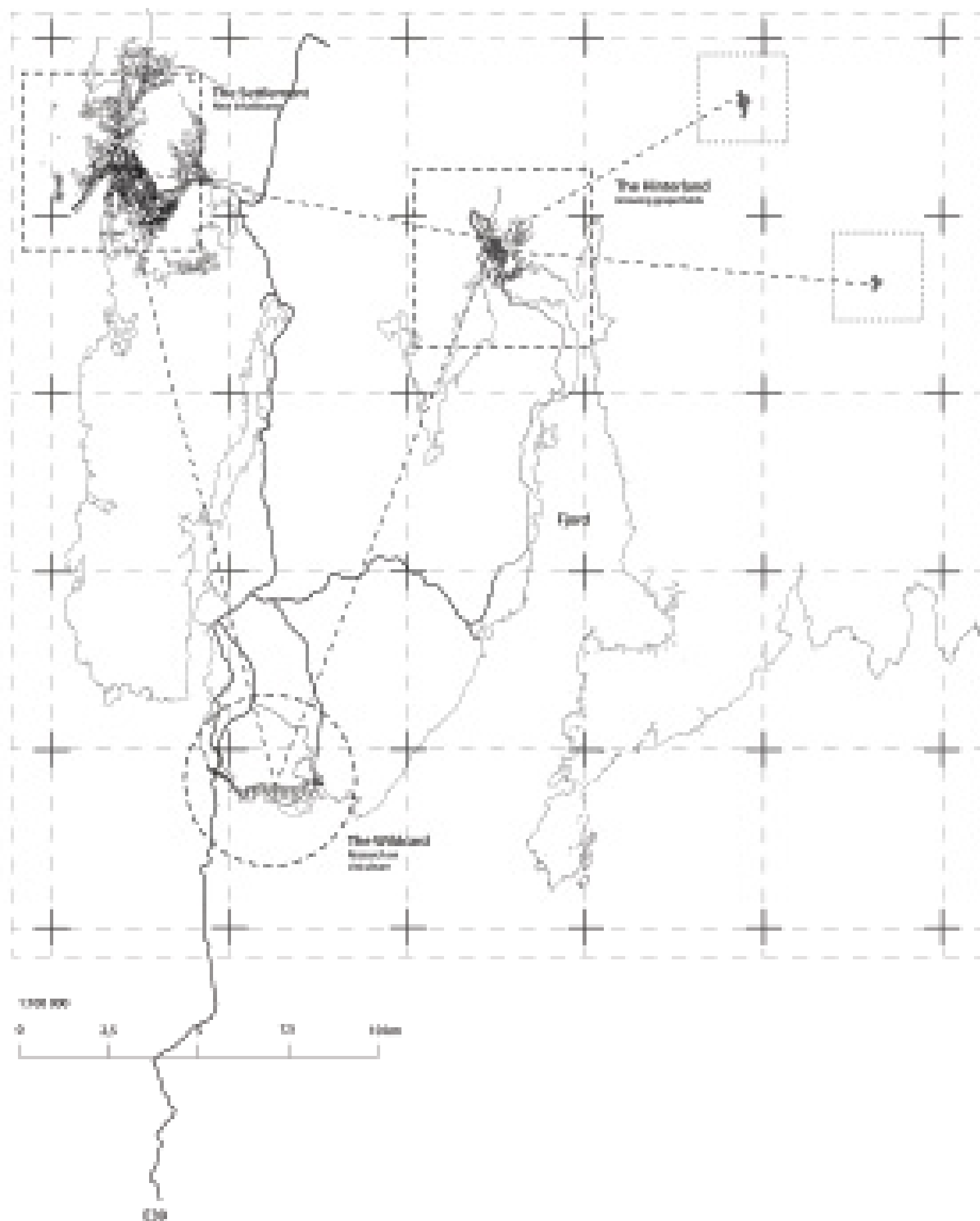
The Aeration of Wastewater

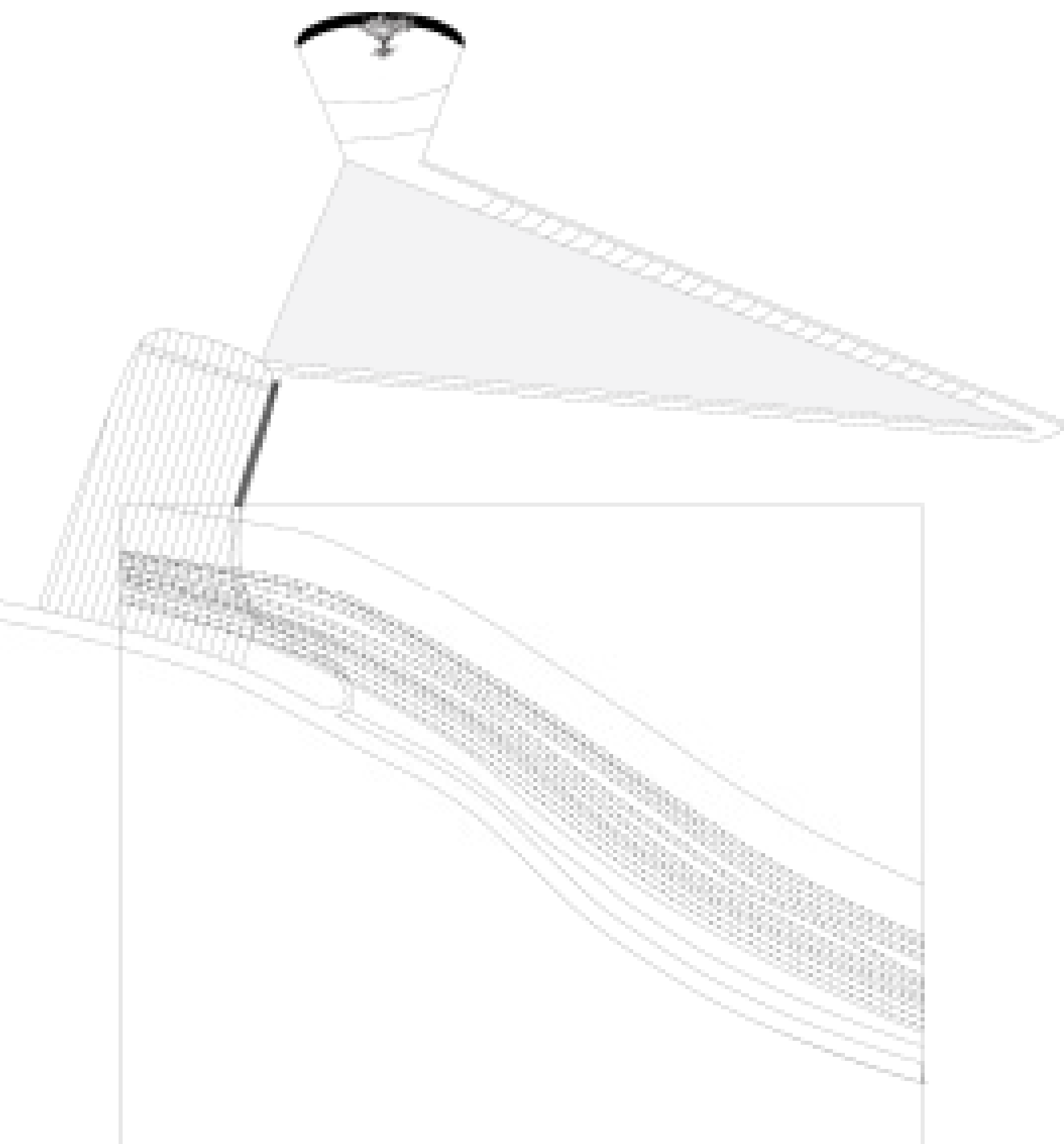
THE HINTERLAND

The Hinterland enables the cultivation for future grape fields. Newcomers bring viticulture expertise and knowledge. Temperatures increase. Due to extended seasons farmers are introducing grape fields as an alternative to the cultivated landscape. Overgrown areas are reclaimed for the growing of grapes.

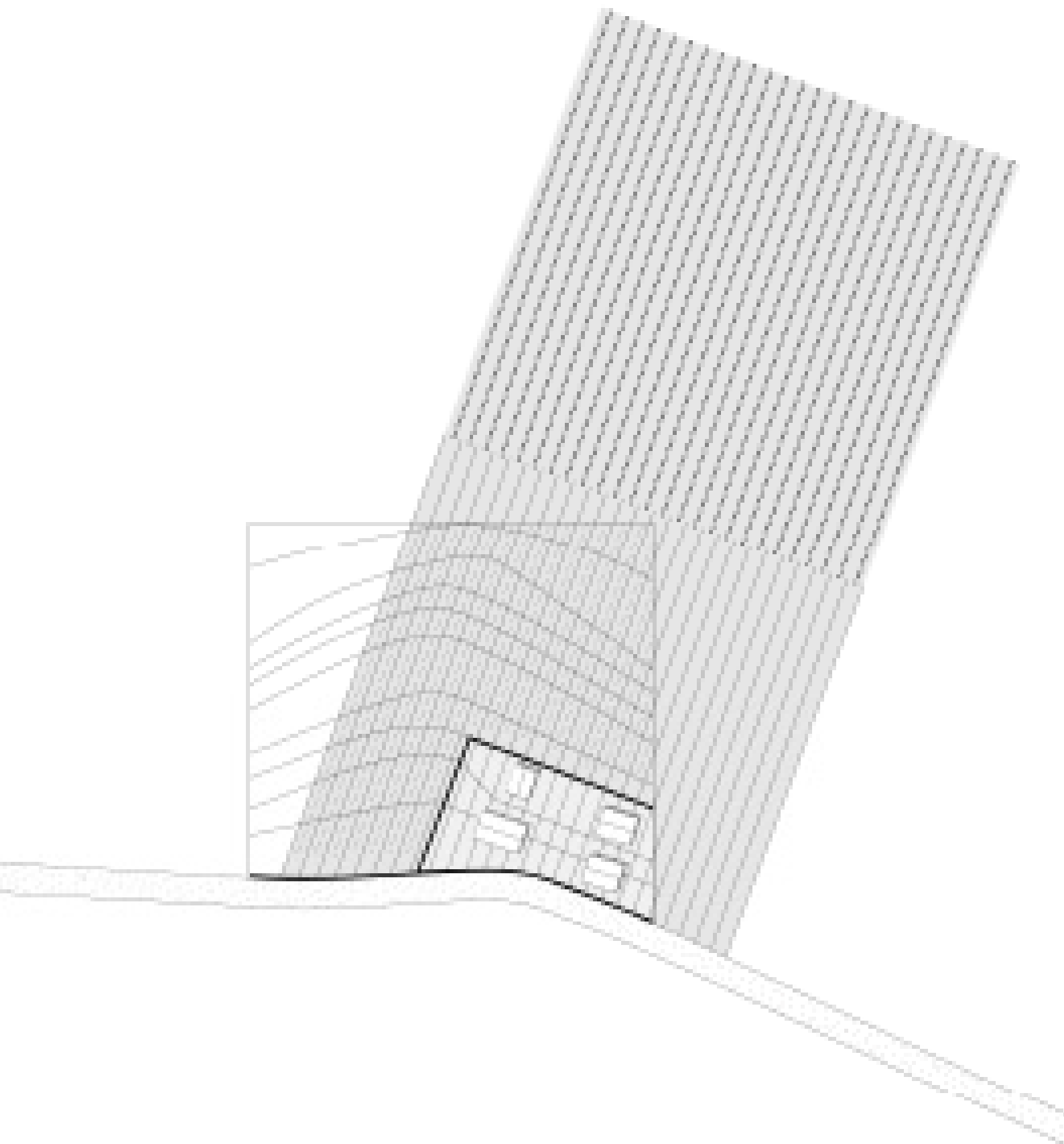








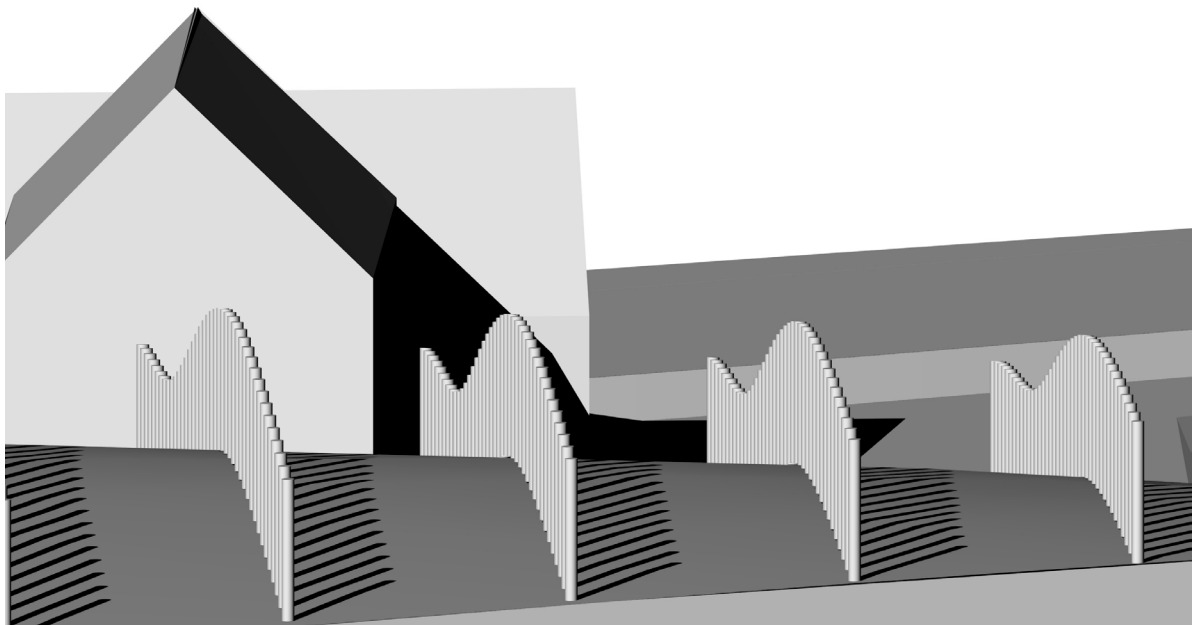
Legend:

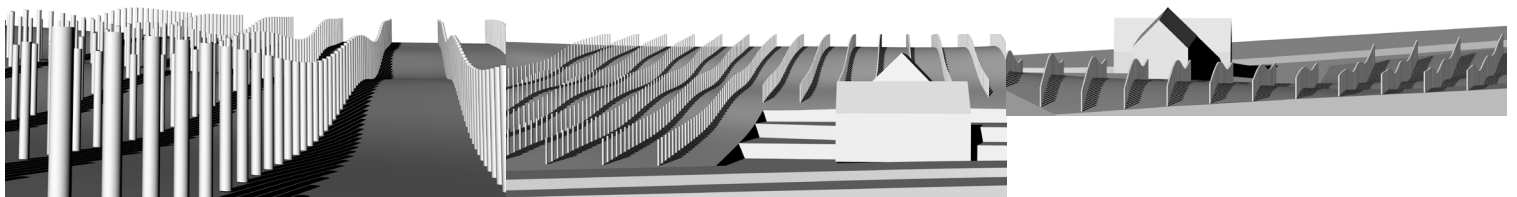
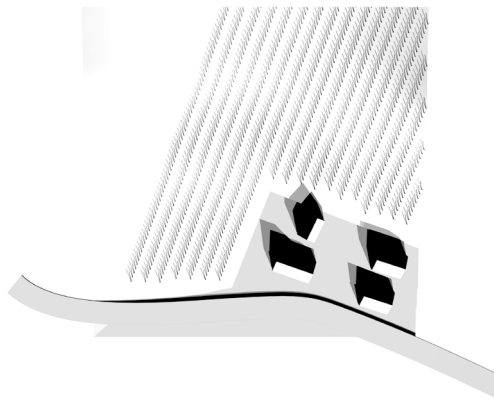


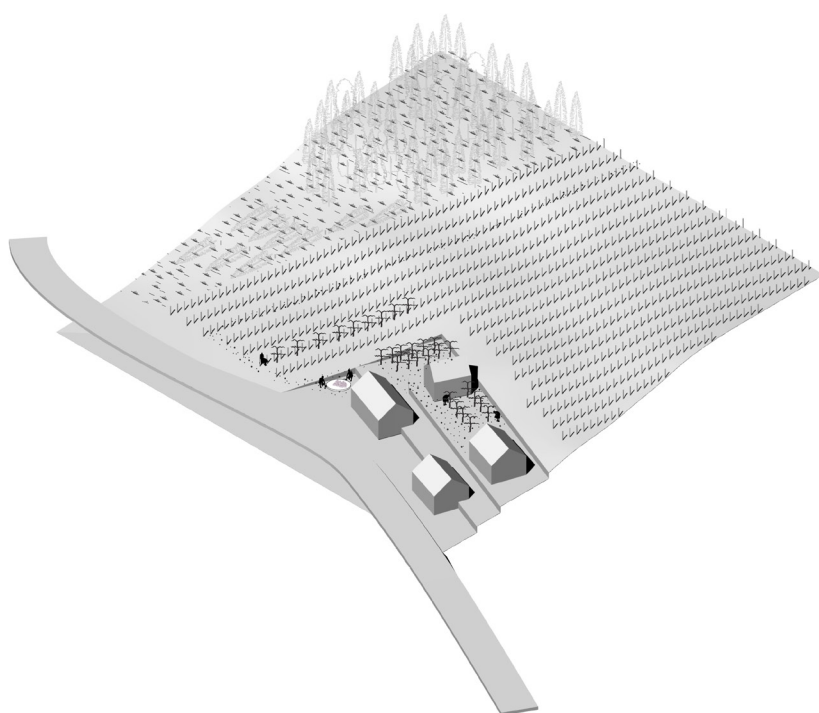
GRAPES OF THE NORTH

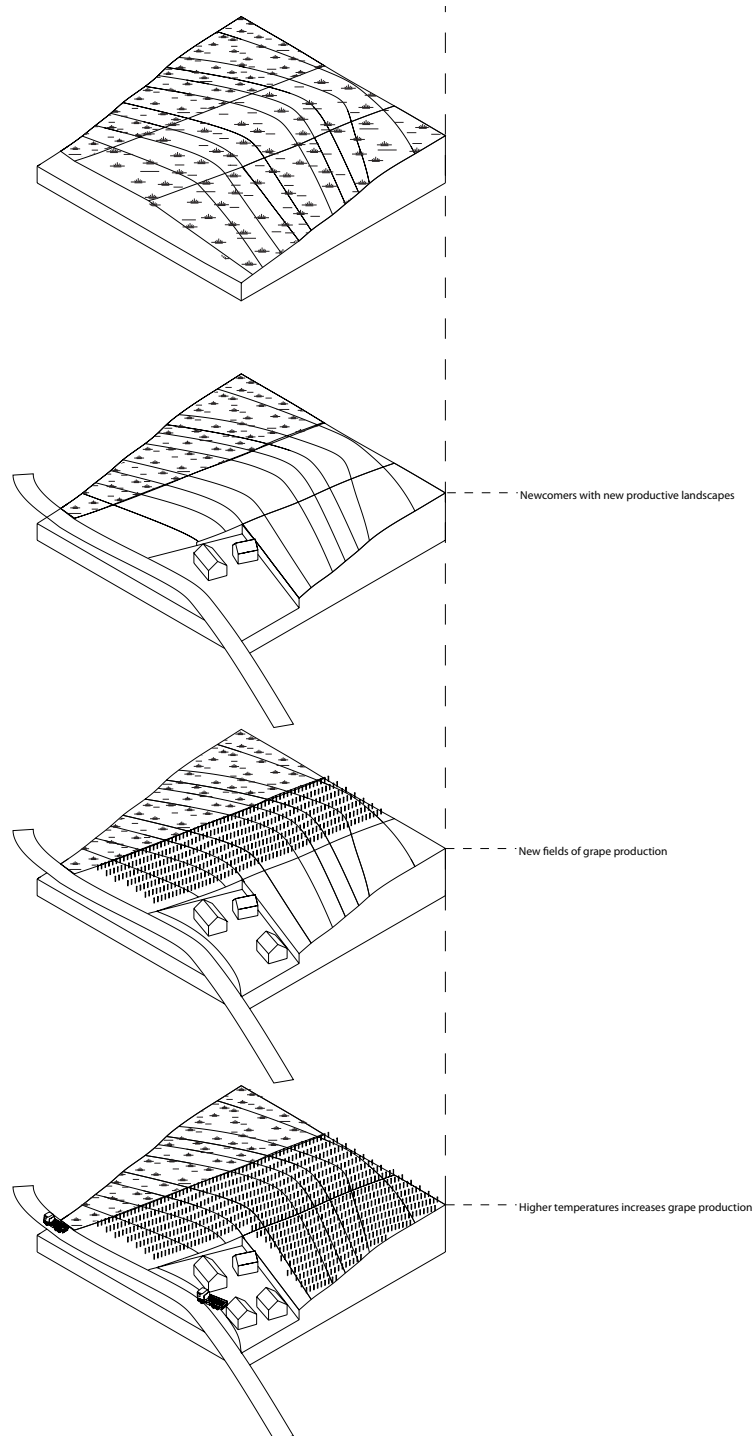
In the future, the Scandinavian region can expect a global change suitable for grape and wine production. Meanwhile the Norwegian landscape can seize the opportunity for grapes to thrive in more poleward areas. This will become an addition to the existing farmland.



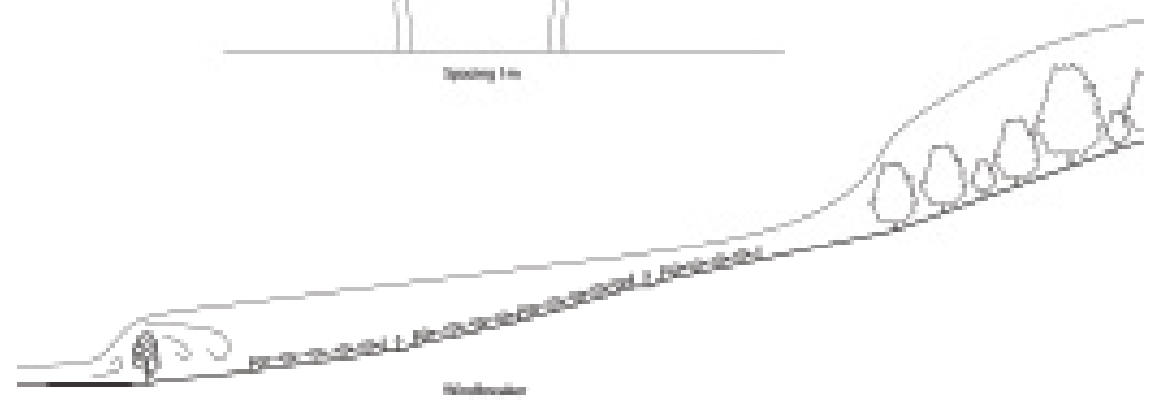
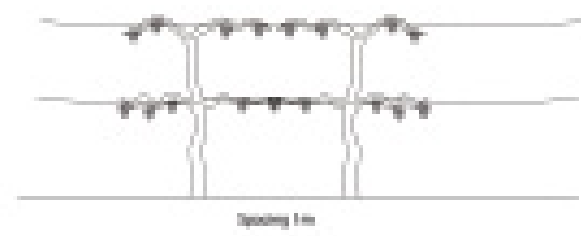
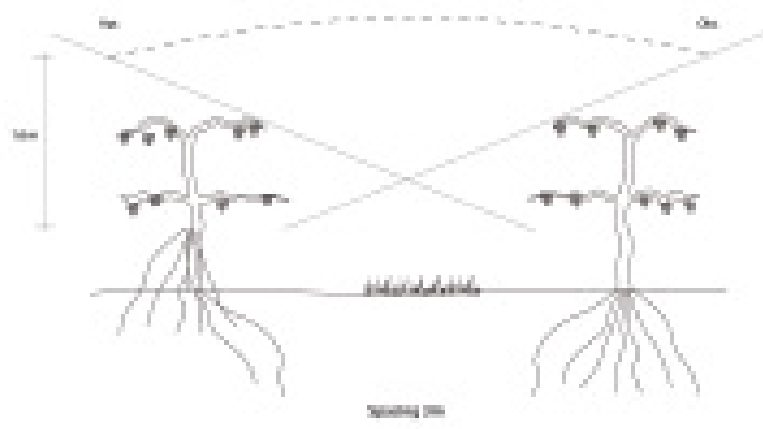
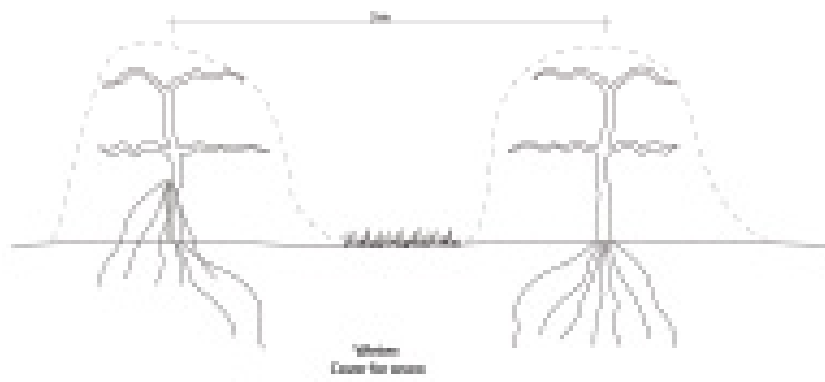















Reclaiming overgrown fields



The Grape

Grapes

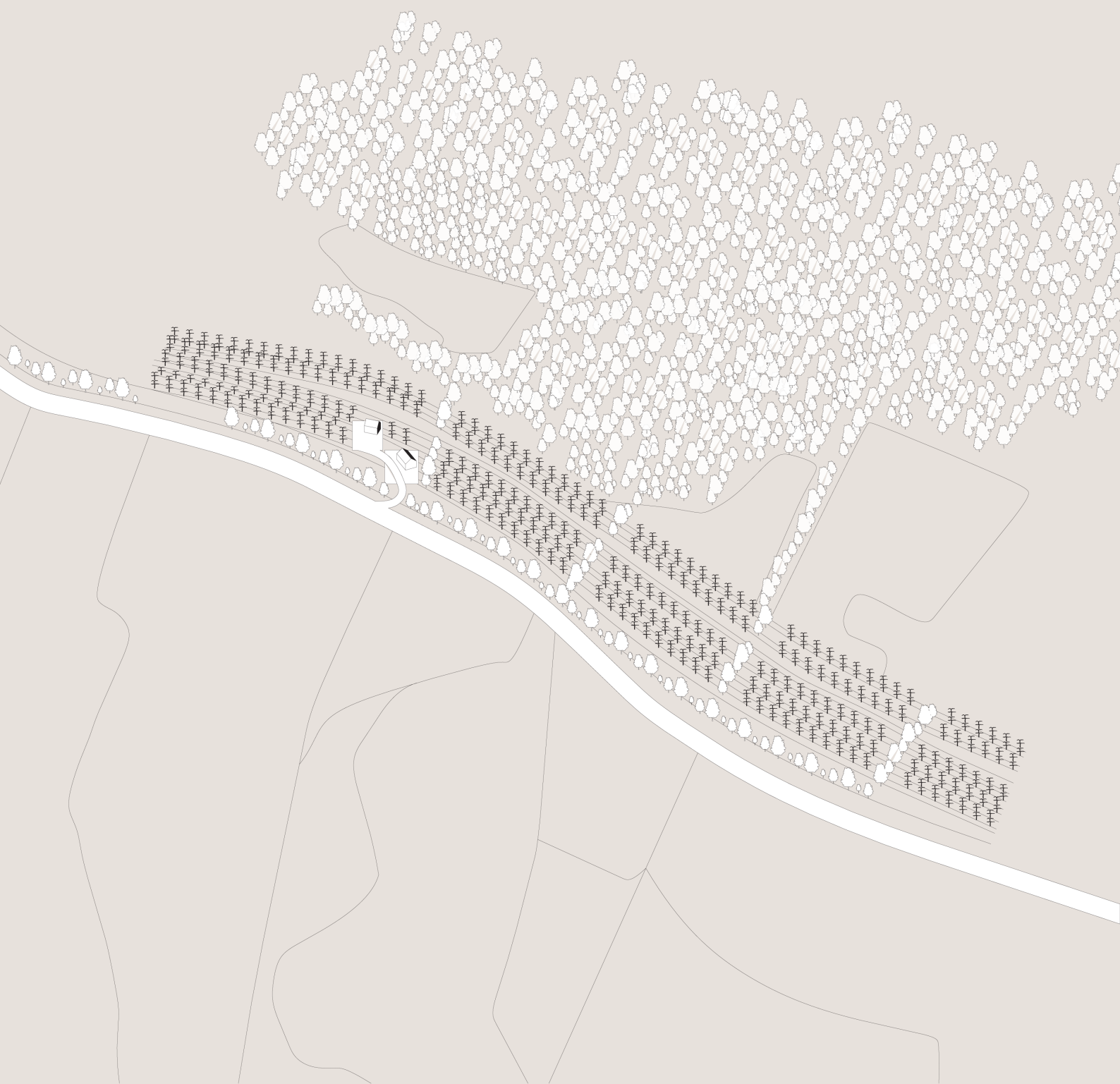
Hasansky Sladki Russian Rosewine	_____	_____	Cold-hardy, -25-35°C	_____	_____	_____	_____	Harvest - early September.	_____	_____	
Skandia Minnesota, USA	_____	_____	Cold-hardy, -20-35°C	_____	_____	_____	_____	Harvest - late September.	_____	_____	
Guna Latvia	_____	_____	Cold-hardy, -20-30°C	_____	_____	_____	_____	Harvest - late September.	_____	_____	
Solaris German White wine	_____	_____	Cold-hardy, -16-22°C	_____	_____	_____	_____	Harvest - late September.	_____	_____	
Somerset Seedless USA	_____	_____	Cold-hardy, -30-35°C	_____	_____	_____	_____	Harvest - late September.	_____	_____	
Zilga Latvia	_____	_____	Cold-hardy, -30-40°C	_____	_____	_____	_____	Harvest - late September.	_____	_____	
Supaga Latvia	_____	_____	Cold-hardy, -30-35°C	_____	_____	_____	_____	Harvest - late September.	_____	_____	

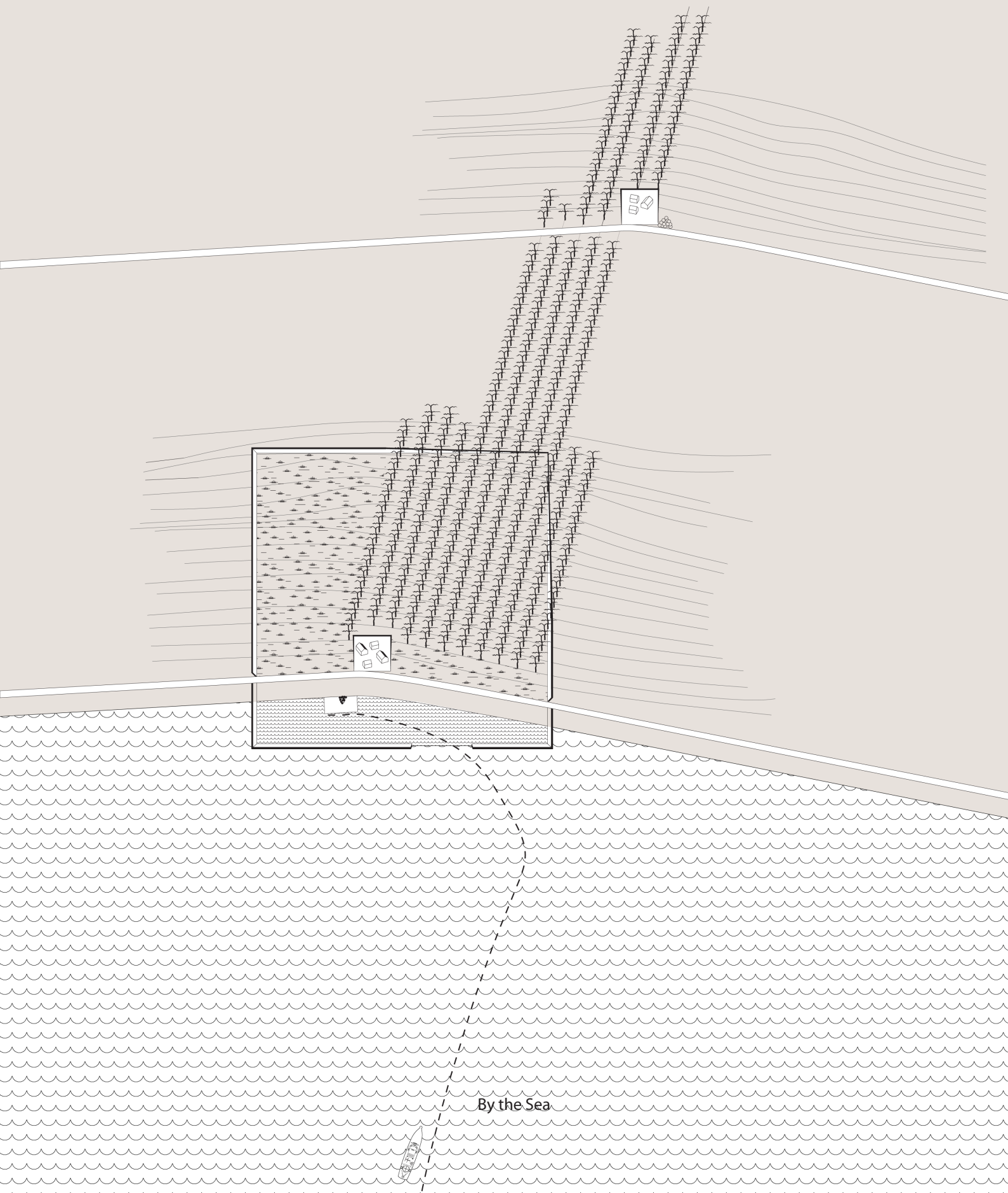
Month

March

September

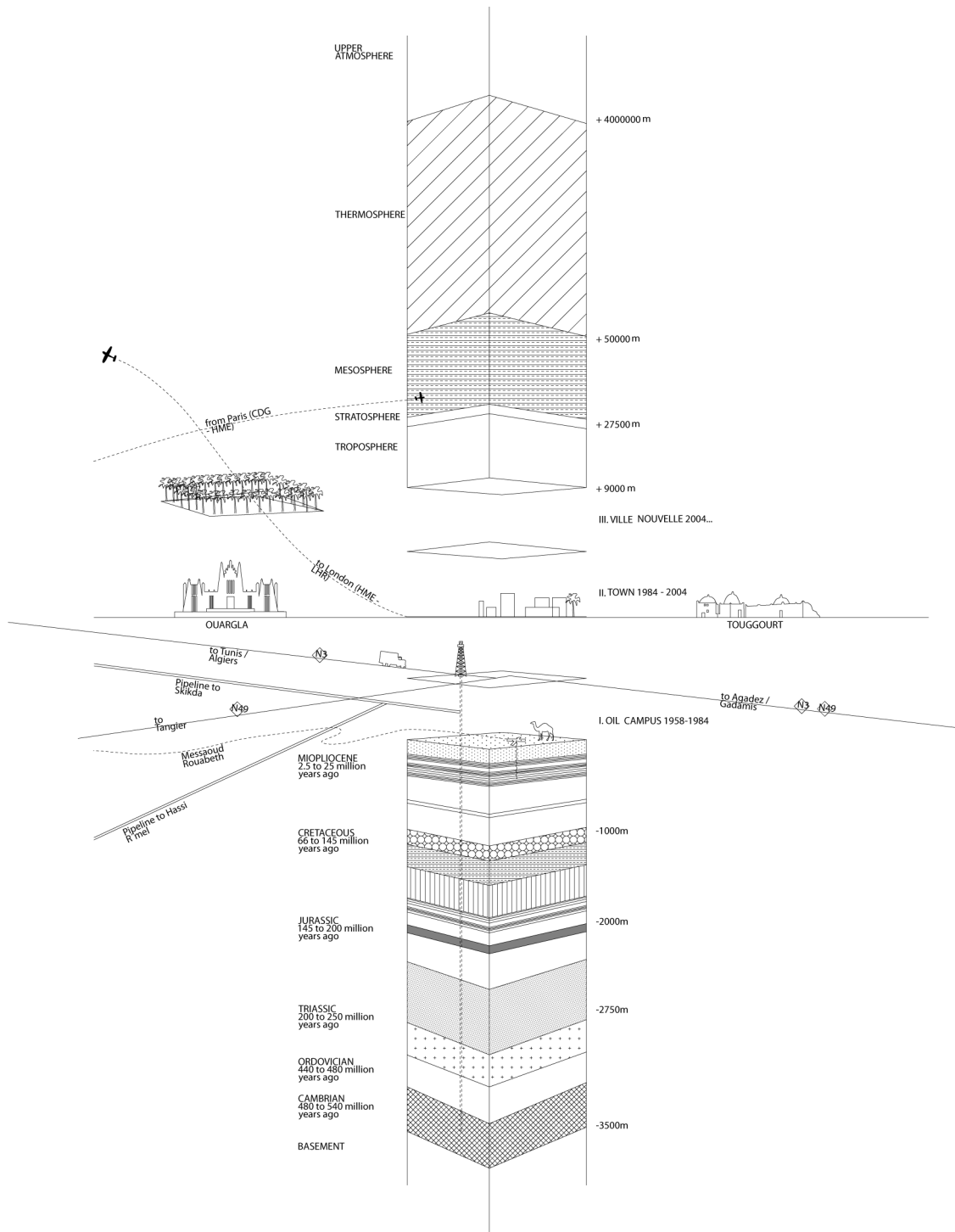
Grapes to grow in Norway



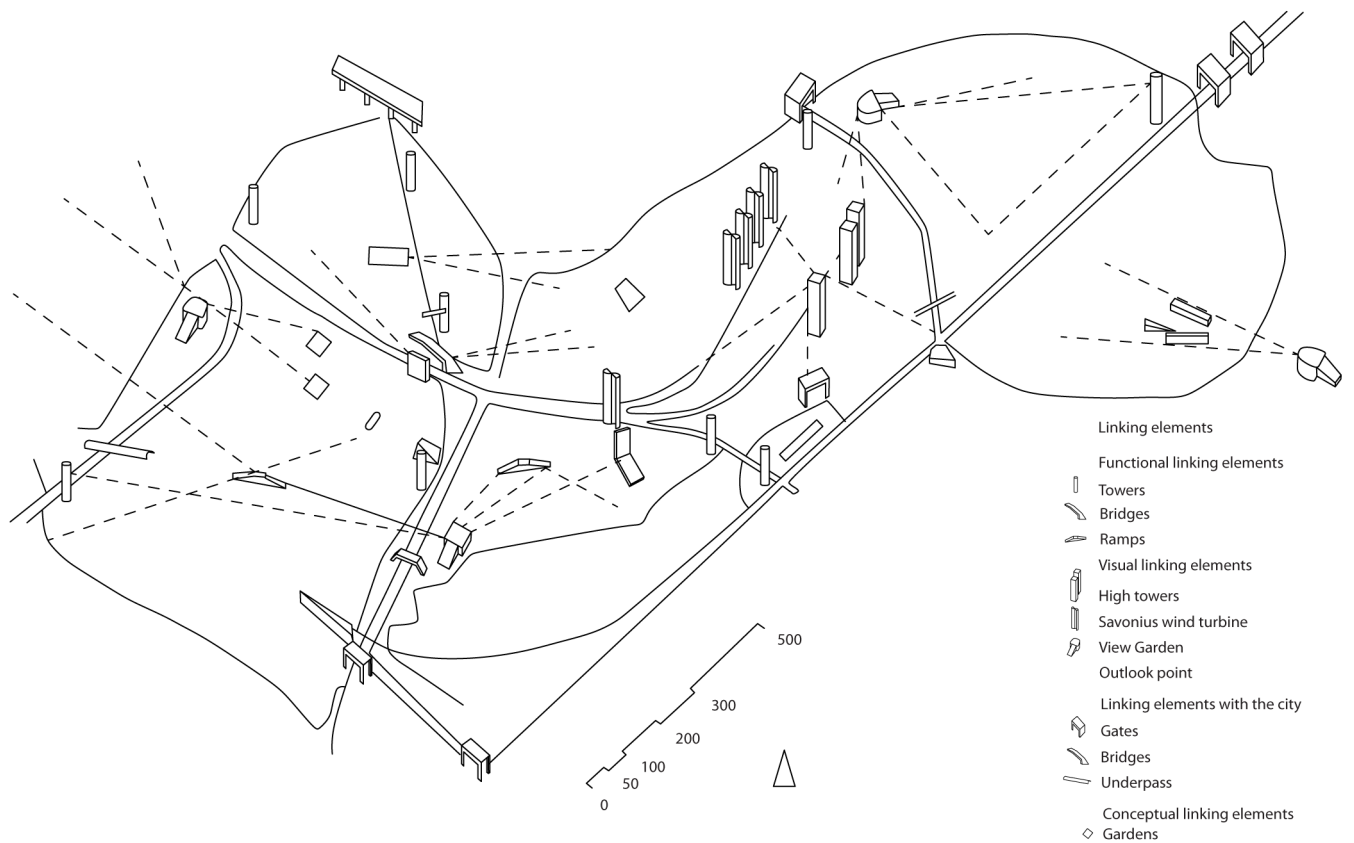


By the Sea

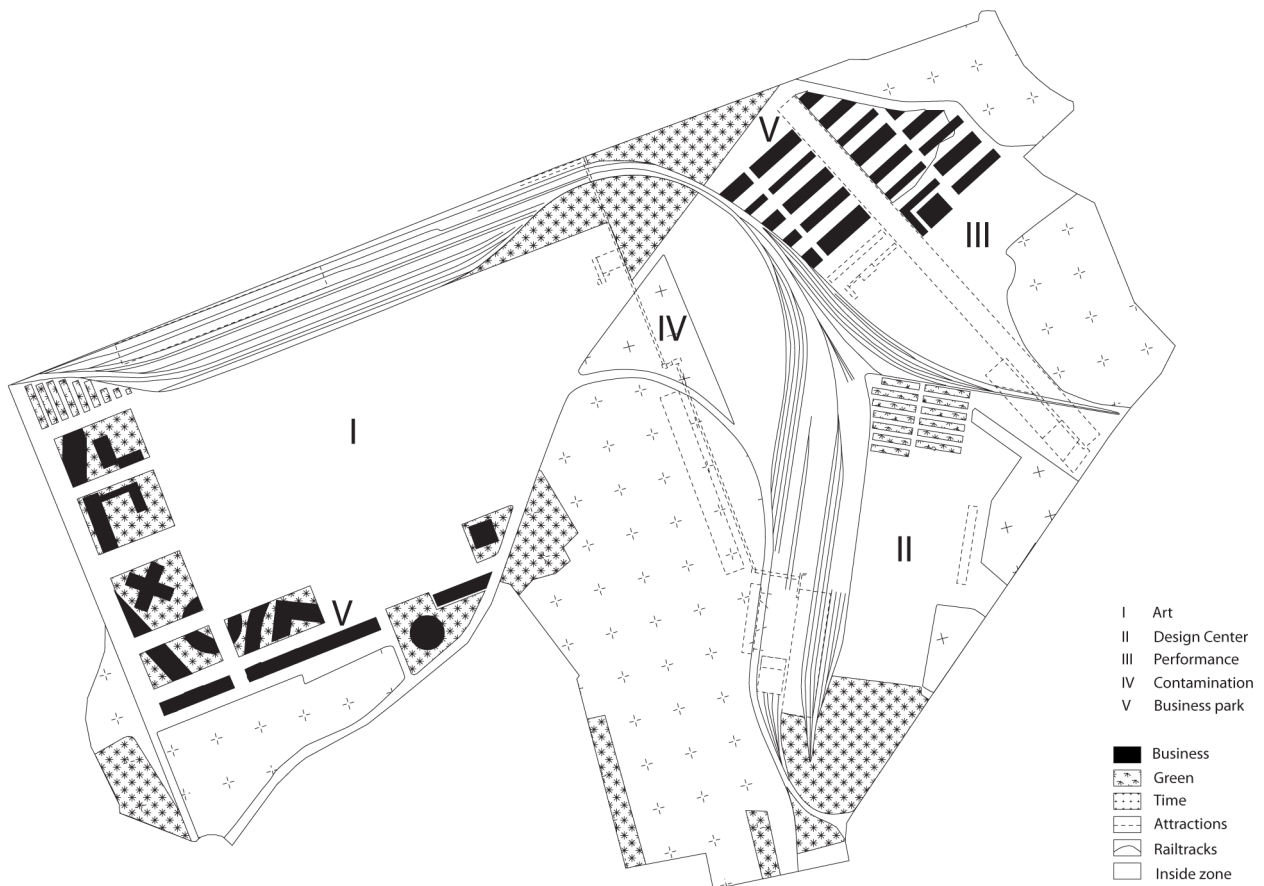
Reference projects



Redrawing
 Rania Ghosn and El Hadi Jazairy
 Book: New Geographies 06, Grounding Metabolism
 Article: Hassi Messaoud Oil Urbanism
 Year: 2014



Redrawing
 Duisburg - Nord Landscape Park
 Peter Latz + Partner
 230 ha
 Year: 1991



Redrawing
Zollverein Masterplan
OMA
100 ha
Year: 2001-2010

Reference list

- Becca, (2015) "The Effects of Climate Change on The Global Wine Industry: A Meta-Analysis for SOMM Journal" <http://www.academicwino.com/2015/06/climate-change-global-wine-industry-somm-journal.html/>
- Gjerde, K. Ø, Oljebyer i Norge in Norsk Oljemuseum Årbok 2011, (2011) http://www.norskolje.museum.no/wp-content/uploads/2016/02/3398_426a5f5a6f2a43d2ad6fde43ec5814c4.pdf
- Gjerde, K. Ø, Oljelandet og ny næring langs kysten in fortellinger om kystnorge, (2014) <http://www.kyst-norge.no/Dokmntr//Oljelandet.pd>
- IPCC, 2013: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1535 pp.
- Jones, G.V. 2007. Climate Change and the Global Wine Industry. Australian Wine Industry Technical Conference, Adelaide, Australia. July 28-August 2, 2007. (Global)
- LatzundPartner (1991) NODU, Duisburg Nord Landscape Park. (<http://www.latzundpartner.de/en/projekte/postin-dustrielle-landschaften/landschaftspark-duisburg-nord-de/> (Accessed:15.03.17)
- Miljødirektoratet. "Increasing growing seasons": <http://www.miljostatus.no/tema/klima/klimainorge/klimainorge-2100/> (Accessed: 24. April 2017)
- Miljødirektoratet. "Temperature projections 2100": <http://www.miljostatus.no/kart/> (Accessed: 24. April 2017)
- Lee Hannah, Patrick R. Roehrdanz, Makihiko Ikegami, Anderson V. Shepard, M. Rebecca Shaw, Gary Tabor, Lu Zhi, Pablo A. Marquet, and Robert J. Hijmans. (2013). Climate change, wine, and conservation. Robert E. Dickinson, University of Texas at Austin, Austin, TX, (2013) doi:10.1073/pnas.1210127110
- OMA (2010) Zollverein Masterplan. <http://oma.eu/projects/zollverein-masterplan> (Accessed:15.03.17)

Illustration, photo and image credits:

10-11, 14-15 -18-19 - Aerial photos: <https://www.google.com/earth/> and Google Earth Pro

22-23 - Aerial photos: <https://www.norgeibilder.no>

5. Groven, R. (1975) "Oljemaleri". <http://www.groven.no/rolf/images/previews/preview14.jpg> (Accessed: 4. May 2017)

24 - Map. Climate zones and climate change

- Miljødirektoratet. "Temperature projections 2100": <http://www.miljostatus.no/kart/> (Accessed: 24. April 2017)

- Miljødirektoratet. "Increasing growing seasons": <http://www.miljostatus.no/tema/klima/klimainorge/klimainorge-2100/> (Accessed: 24. April 2017)

"Climate zones for growing edible plants" <http://www.hageselskapet.no/klimasonekart/> (Accessed: 24. April 2017)

GIS:

- "Wilderness without major infrastructure development": <http://www.miljodirektoratet.no/no/Tema/Miljoovervakning/Inngrepsfrie-naturomrader-i-Norge-/Fylkeskart/>

- Offshore and onshore activity: <http://www.petroleumskartet.no>

- <https://www.geonorge.no>

28 - Map

- Source map and figures:

Becca, (2015) "The Effects of Climate Change on The Global Wine Industry: A Meta-Analysis for SOMM Journal" <http://www.academicwino.com/2015/06/climate-change-global-wine-industry-somm-journal.html/>

Jones, G.V. 2007. Climate Change and the Global Wine Industry. Australian Wine Industry Technical Conference, Adelaide, Australia. July 28-August 2, 2007. (Global)

- Source, Table 1: Lee Hannah, Patrick R. Roehrdanz, Makihiko Ikegami, Anderson V. Shepard, M. Rebecca Shaw, Gary Tabor, Lu Zhi, Pablo A. Marquet, and Robert J. Hijmans.

(2013). Climate change, wine, and conservation. Robert E. Dickinson, University of Texas at Austin, Austin, TX, (2013) doi:10.1073/pnas.1210127110

28-29 - IPCC, 2013: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1535 pp.

38-39 - Basemaps: GIS: <https://www.geonorge.no>

49 -Diagram - Sort table: <http://druer.org/Sorter.html#Sortstabel>

53: Redrawing diagram: Goshn, R and Jazairy, H L. Hassi Messaoud Oil Urbanism in Grounding Metabolism NG06, p. 151.

54: Redrawn plan: LatzundPartner (1991) NODU, Duisburg Nord Landscape Park. (<http://www.latzundpartner.de/en/projekte/postindustrielle-landschaften/landschaftspark-duisburg-nord-de/>) (Accessed: 15.03.17)

55: Redrawn plan: OMA (2010) Zollverein Masterplan. <http://oma.eu/projects/zollverein-masterplan> (Accessed: 15.03.17)

