

# ANALYSIS

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BITS, BYTES AND BATHS:  
data center and public swimming pool creates  
synergies in Åkrehamn

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fall 2020 - Master in Architecture  
The Oslo School of Architecture and Design

## THE S I S

As students of architecture we often search for the Zeitgeist - the spirit of our time - and the means to communicate it spatially. What are the cathedrals of our time? All our contemporary advances have been enabled by our ability to extract and store data. Today we store this information in data centers.

In my diploma work I wish to investigate an architecture that through a synergy of functions can support city development and where excess heat can power social interaction. In my attempt I will focus on the data center in synergy with a public pool.

## PRELIMINARY PROGRAM

### BATH FACILITIES

Entrance hall/reception	50 m2
Behind reception and offices	50 m2
Cafeteria	150 m2
Kitchen and desk at cafe	30 m2
Staff wardrobe and toilet (both data center and pool)	60 m2
Sanitary and lifeguard	60m2
Two locker rooms	
locker room	80 m2
a reception hall for meeting after pooltime and shoes	100 m2
shower room	25 m2
2 x toilet	7 m2
handi cap	7 m2
cleaning room	10 m2
1 x 25 m2 pool	306 m2
1x Kids pool	90 m2
1 x warm pool	80 m2
the room for the pools	1426 m2
outdoor dip area an outdoor diving tower bath house	55 m2

Technical for pool and air circulation 1 400 m2  
(the room is on the bottom floor of the entrance building  
and under the short end of the pool. In the m2 is also the  
space for ventilation shafts over the locker rooms.

3 869 m2

### DATA CENTER

server room	550 m2
servers stached on top of each other)	
water tank for pool	45m2
One technical room with battery room transformers	
cooling water tank	230 m2
Office spaces	
lunch, meeting room	10m2
control room	30 m2

815 m2

The final m2 of the project is 3 814 m2  
The plots size is 6500 m2

## EXPLANATION ROOMS

### BATH FACILITIES

#### TECHNICAL ROOM :

The equalization tank (utjevningstank) is often placed under the shallow end of pool. Treatment plant (rensplanlegg). A separate room for disinfectants, pH-regulants. In an average norwegian swimming facility the technical room is 0,6 m<sup>2</sup> per m<sup>2</sup> pool surface. Include workshop and storage space for janitor in this area.

#### TOILETS

In the transition area between wet and dry areas.

#### SANITARY ROOM

For emergencies. Door width min 10M, bc. of stretcher. In smaller facilities it can be combined with staff rooms. Separate room min 8m<sup>2</sup>.

#### TYPES OF LOCKER ROOMS

Temp ca 24 C.

##### 1. GENDERED locker rooms with bench and lockers (most common)

if gendered lockers consider cabin rooms for families and wheel-chairs. Turningpoint min 1,4m diameter. Bench 60 cm.

##### 2. FLEXIBLE SYSTEM is build on system 1, but with units that can open/close

more common in much bigger facilities than mine

##### 3. Common dressing rooms with lockers/cabin rooms. Min 1m x 1,2m size.

May be better for families, but can be perceived as confusing and cause queues.

### DATA CENTER

#### SERVER ROOM

Most important room, room for computers. Staff rarely enter here. The server room at uitkon (reference project, see "program" document) is 200 m<sup>2</sup> and only partially warming the pools

#### CONTROL ROOM

Connected to the server room, the main room for staff. Normally a room filled with computers and screens.

#### TELECOMMUNICATIONS

Might not be necessary. Control room is good enough.

#### BATTERY ROOM

Energy in case of emergencies.

#### TRANSFORMERS

Watertanks and transformers for translating energy to be used in the pools.

#### PRE-ACTION ROOM

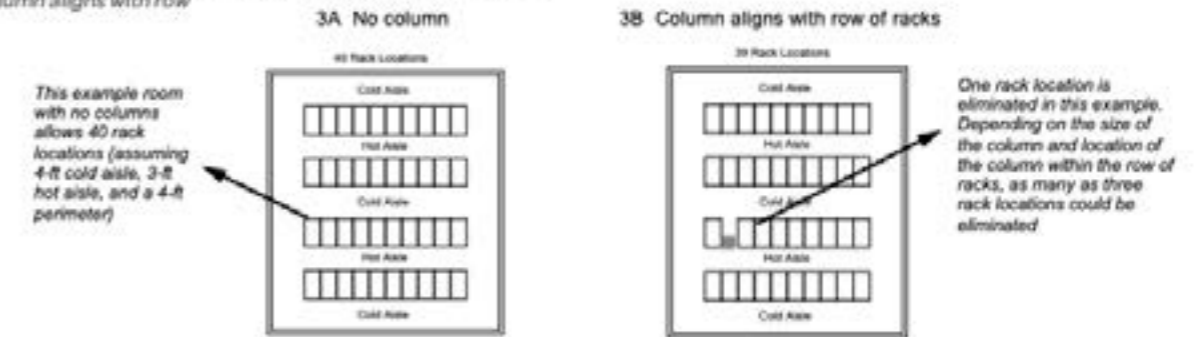
Water in case of fire. Cooling water tank of 70 m<sup>2</sup>.

#### COOLING WATER TANK

Water tank for cooling computers.

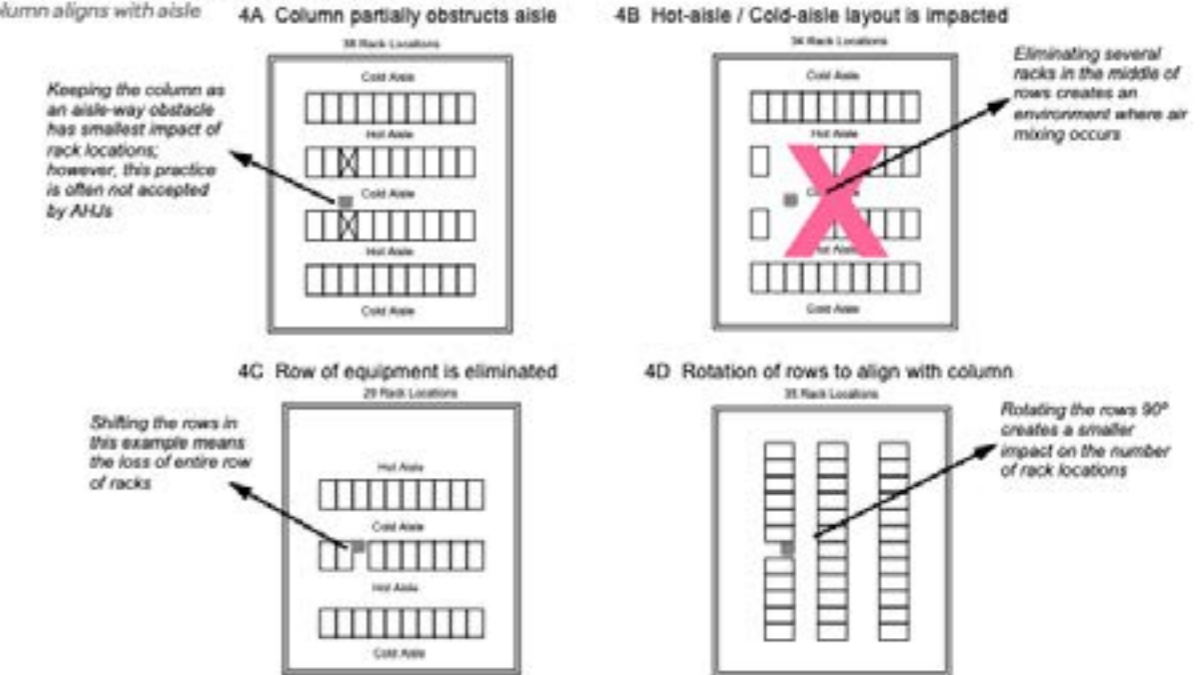
**Figure 3**

Sample impact of columns on number of rack locations when column aligns with row



**Figure 4**

Sample impact of columns on number of rack locations when column aligns with aisle



**Align the floor and/or ceiling tiles with the equipment**

In many data centers the floor and ceiling tile systems are used as part of the air distribution system. In a raised floor data center, it is essential that the floor grille align with racks. If the racks and the floor grid do not align, airflow can be significantly compromised. It is also beneficial to align any ceiling tile grid with the floor grid. **This means the floor grid should not be designed or installed until after the equipment layout is established**, and the grid should be aligned or indexed to the equipment layout according to the row layout options.

Type of sauna	Heat source	Temperature	Pre-heat time
Finnish sauna	Gas/electric/wood	160 to 194 F (71 – 90 C)	30 to 45 minutes
Infrared sauna	Infrared heating elements	100 to 150 F (38 – 65.5 C)	10 to 15 minutes
Portable sauna	Infrared heating panels	100 to 150 F (38 – 65.5 C)	10 to 25 minutes
Steam sauna	Steam Generator	90 to 120 F (32 – 49 C)	30 minutes

<https://www.sunrisespecialty.com/sauna-temperature>

[https://download.schneider-electric.com/files?p\\_File\\_Name=VAVR-6KYMZ7\\_R2\\_EN.pdf&p\\_Doc\\_Ref=SPD\\_VAVR-6KYMZ7\\_EN](https://download.schneider-electric.com/files?p_File_Name=VAVR-6KYMZ7_R2_EN.pdf&p_Doc_Ref=SPD_VAVR-6KYMZ7_EN)

PROJECT  
LOCATION  
Åkrehamn as a community

## KARMØY MUNICIPALITY

### KARMØY MUNICIPALITY

Karmøy is a municipality in Rogaland consisting of several smaller towns where three have official city status. Nearest larger city to Karmøy is Haugesund.

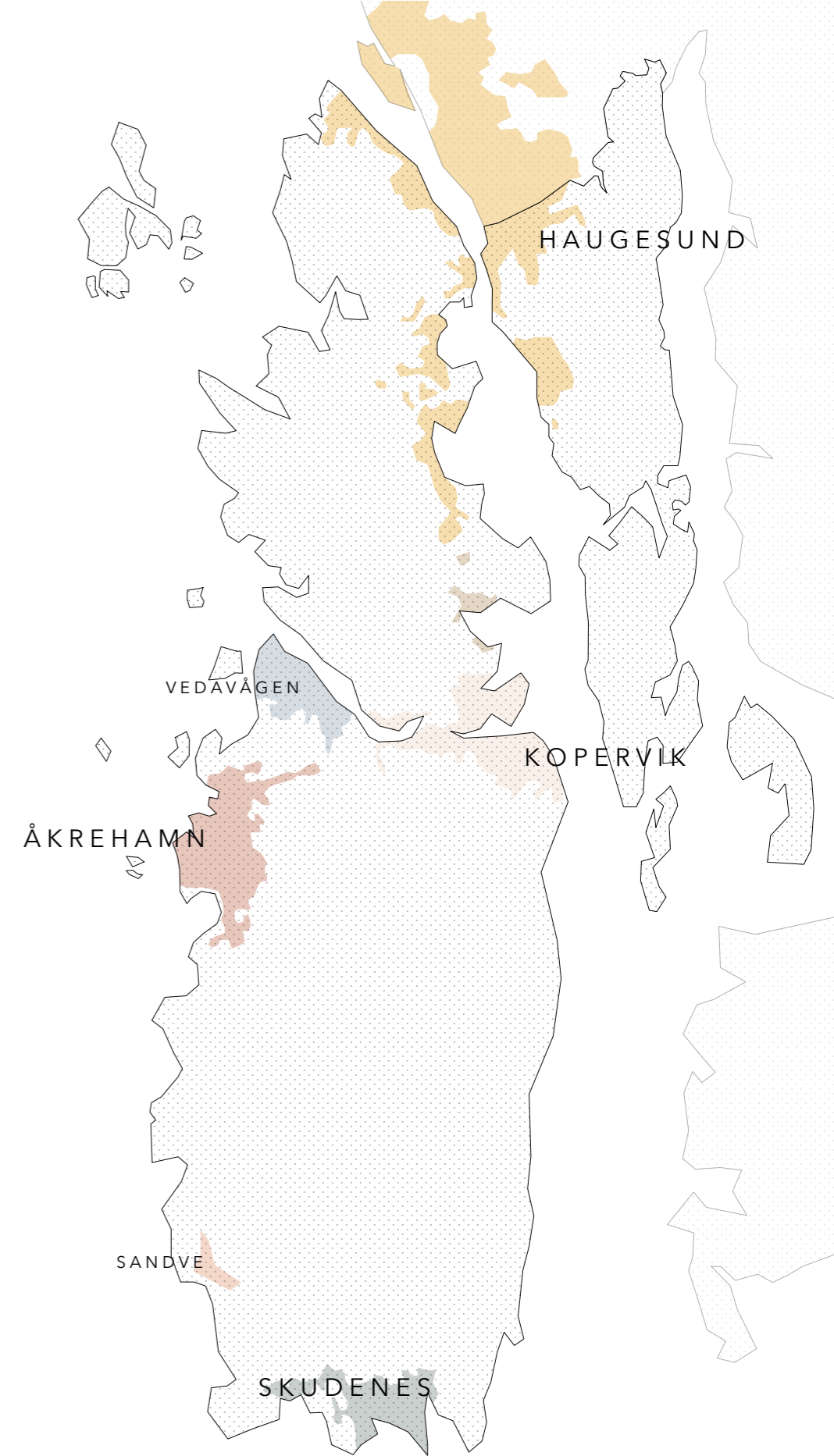


KOPERVIK: is the administrative center of the municipality, and was chosen for its location in the middle of the island. The population is 11 561 out of the local library, town hall, NAV, cinema, folk high school. At the beginning of the 20th century, the most important industries in the city were the shipping, fishing and canning factories. Today the biggest employer is Norsk Hydros aluminiumplant, Hydro Aluminium Karmøy.

SKUDENES: 3 334 people live here, at the southern most tip of Karmøy. Skudeneshavn was built around lobster fishing, herring fishing and the export of herring, which meant that Skudeneshavn grew strongly in the 19th century. Today, the city has a modern shipbuilding industry and one of the country's largest offshore shipping companies



ÅKREHAMN: is the youngest of the three cities.







# HISTORY

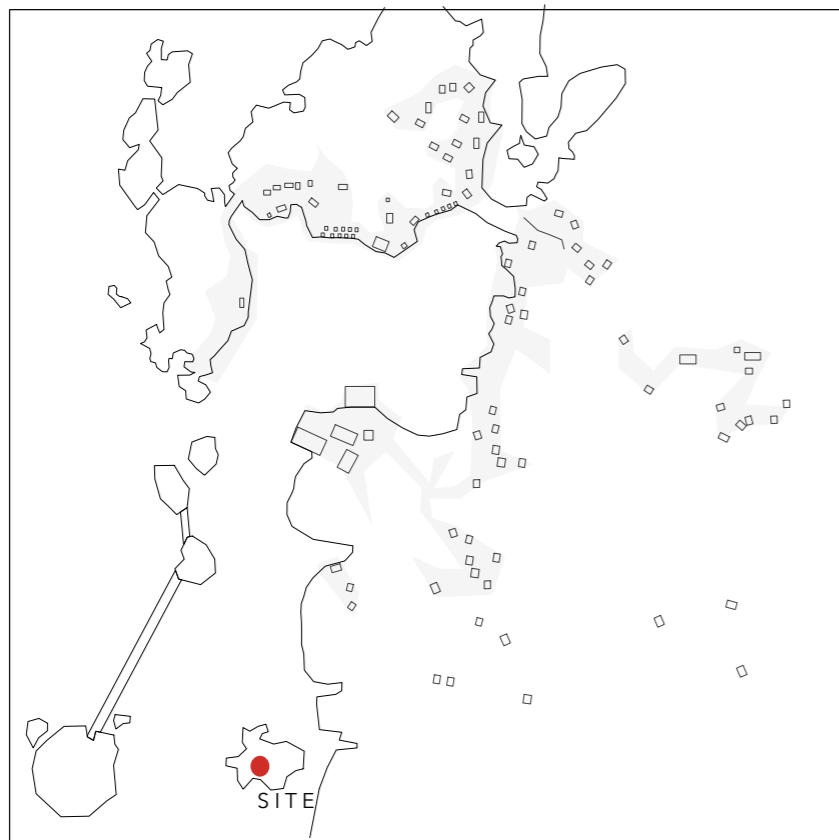
Local history of Åkrehamn



There are signs such as fragments of previous buildings and burial sites that there has been bosetning since folkevandringstiden (400-600 a.d.), even a center for power during the vikingtid. In 1603 there were 6 farms.



Figur 1: Avaldsnes kirke, year of photo unknown, <https://avaldsnes.info/historie/vikingtid-750-1100-e-kr/>



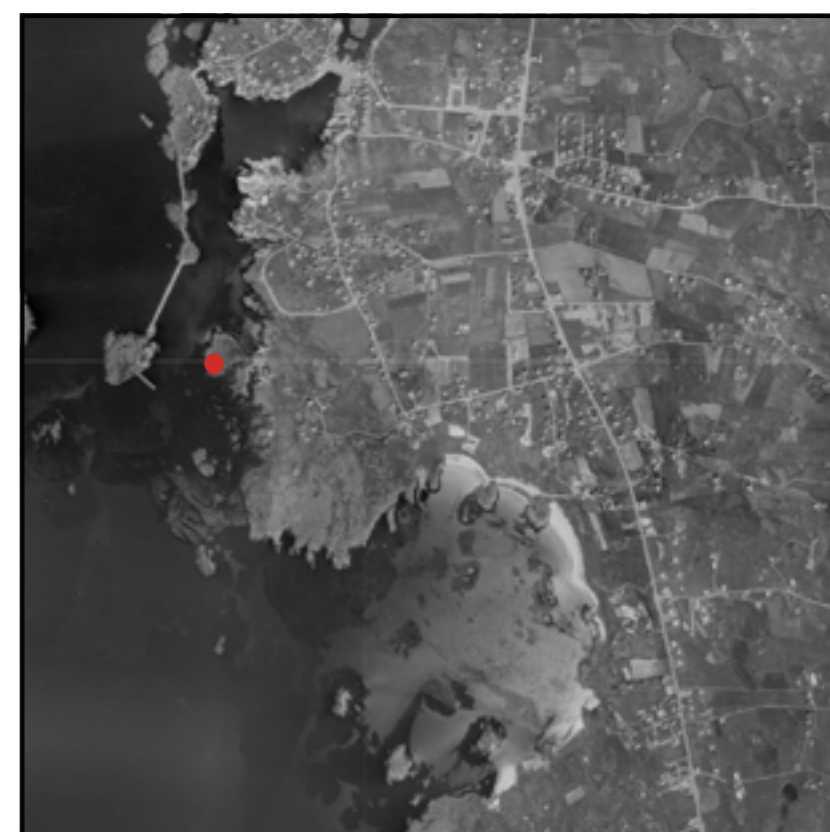
In 1760 there were possibly 16 farms. During the 1800s the population grew considerably because of the rich fisheries.



Figur: kartverket, 1760, <https://www.kartverket.no/Kart/Historiske-kart/Historiske-kart-galleri/historiske-kart---detaljer/?kartid=11204>



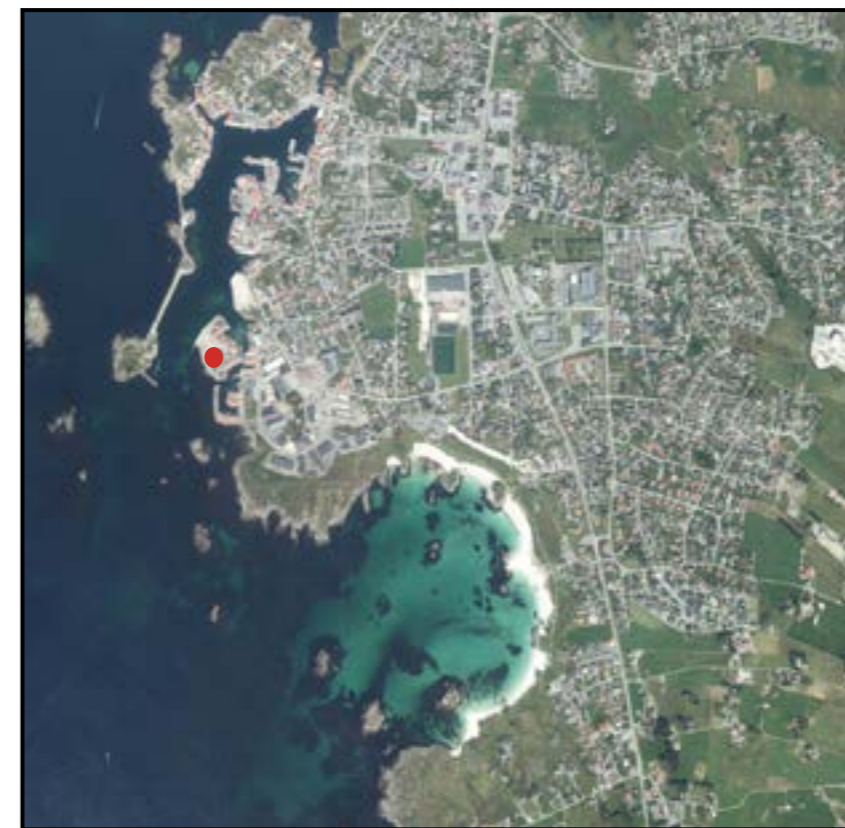
Åkrehamn experienced an industrialization after 1950. The aluminum plant was established in 1963, the introduction of the car improved the roads and communication on land, in 1965 Åkrehamn became a part of karmøy municipality which combined has 5700 inhabitants.



Figur: NASA, 1964, <https://kart.1881.no/?query=karm%C3%B8y>



In 1994 production stopped at the sildoljefabrikk. Åkrehamn officially became a city in 2002. The bay area changed focus from being for the industry to becoming housing. the city centre moved to the main road. The city experienced an construction boom and the population is still steadily rising, as opposed to other nearby cities and places.



Figur: google maps, 2020, <https://www.google.no/maps/place/Karm%C3%B8y/@59.2298321,4.6997942,10z/data=!3m1!4b1!4m5!3m4!1s0x463b-0f2b894fc315:0xa1d491c4185cb1c2!8m2!3d59.2823064!4d5.2801755>

CITY DEVELOPMENT

VEAVÅGEN SKOLE

SVEVLAND SKOLE

KARMØY KULTURHUS

GRINDHAUG SKOLE

HELSE OG ÅKREHAMN

SOSIAL UNGDOMSSKOLE

SENTER

ÅKREHAMN KIRKE

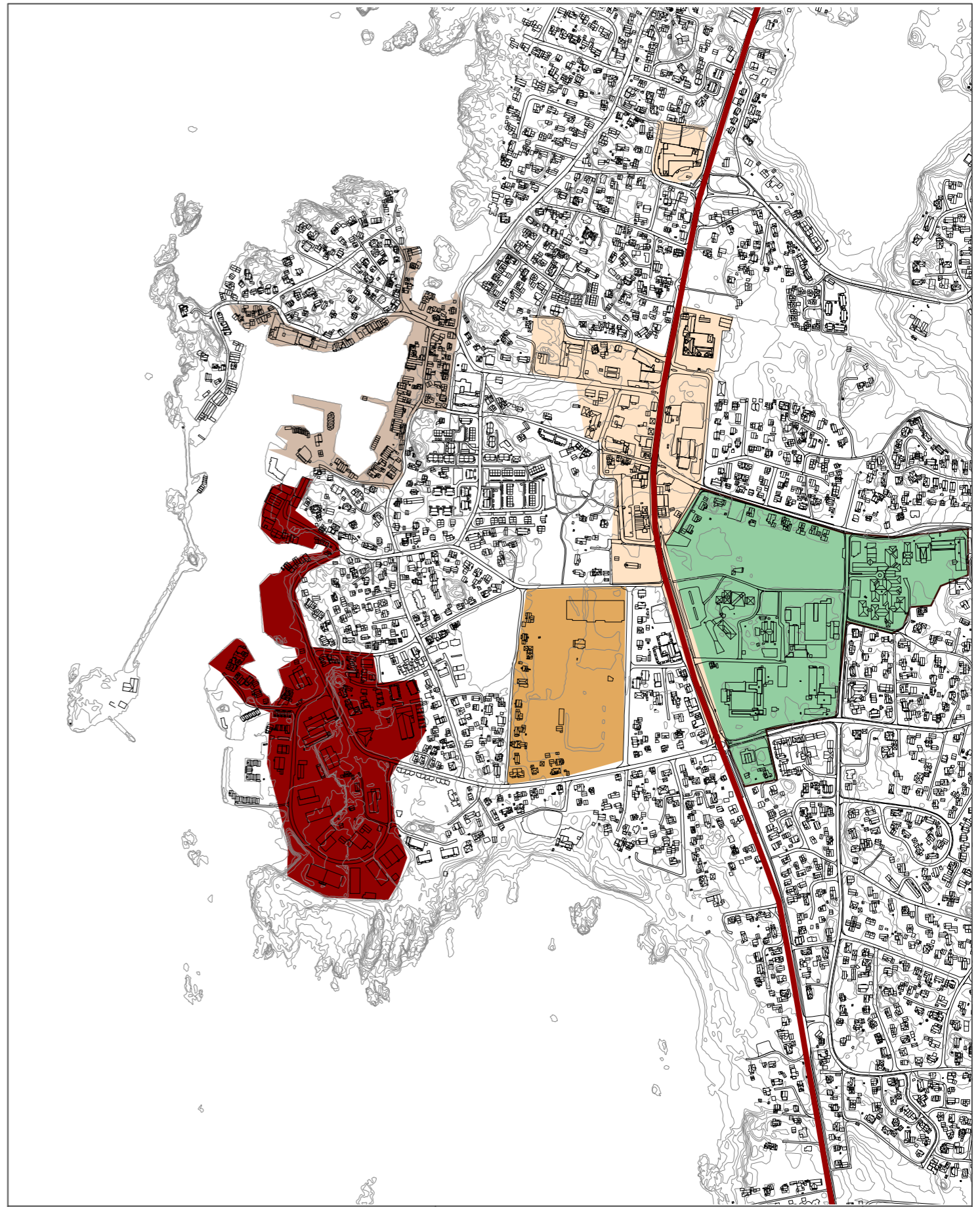
ÅKREHAMN VGS

ÅDLAND SKOLE



MAP OF RECREATIONAL AND CULTURAL ZONES

- Areas for sport
- Areas for culture



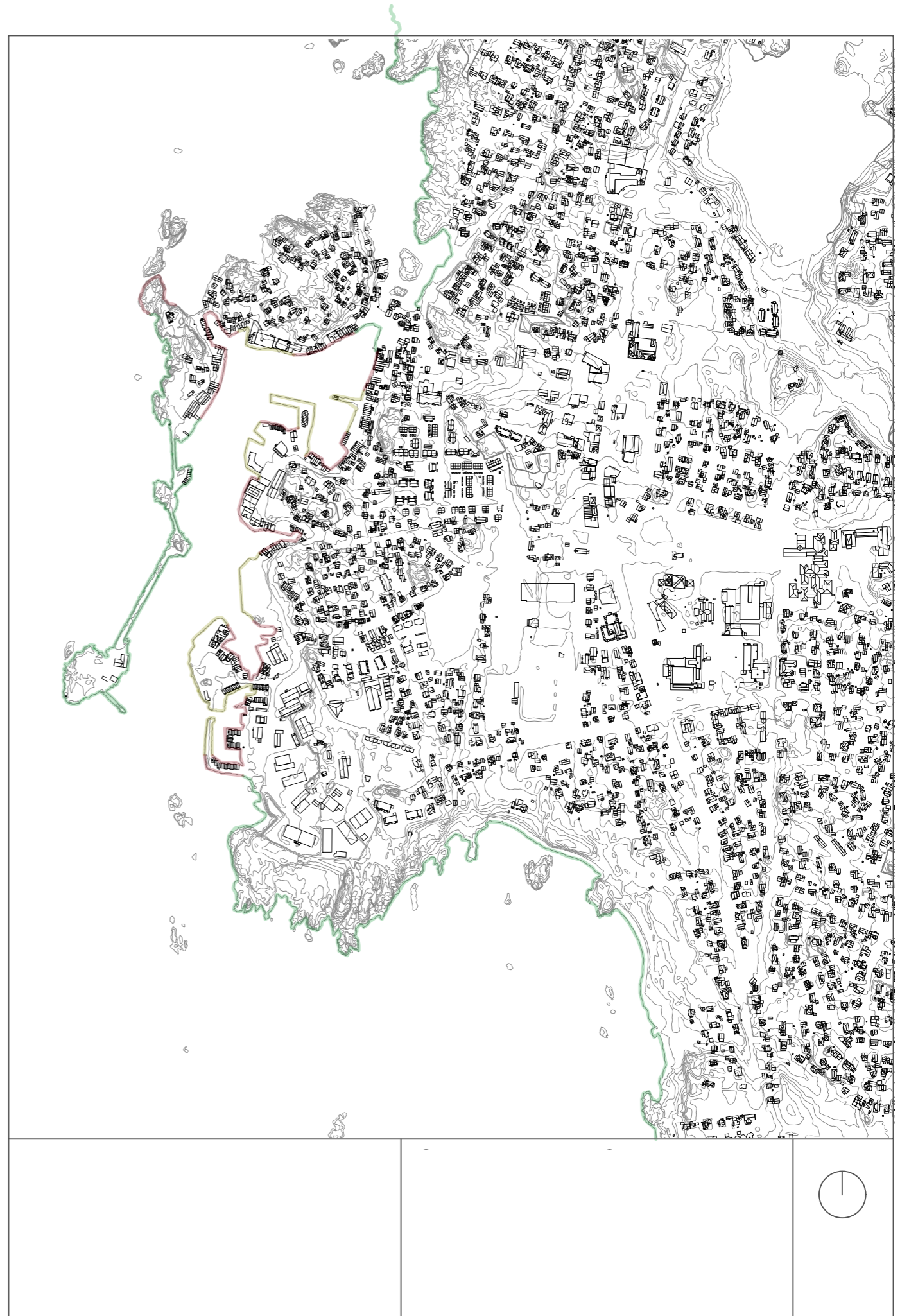
MAP OF ZONES IN ÅKERHAMN

- Årabråt industrial area
- Culture, sports and public services
- Sports park
- Shopping, recreation, center
- Waterfront
- Main Road: Riksvei 47





This map describes how accessible the shoreline is. Not in topography but in ownership. Some places private property claims the shoreline. Although "allemannsretten" a law in Norway allows free access to the shoreline, there are many situations like this, where you have to pass through private land to access the shoreline. The areas marked in red are where private structures have claimed the shoreline, i.e. a private boat-house is placed at the shoreline, while the yellow line is where it is either a private harbour or the area is blocked by a private plot. The green area is easily accessible areas.



# BUILDING STYLES IN ÅKREHAMN



ÅKRA PRIMARY SCHOOL



KARMØY KULTURHUS



ÅKREHAMN HIGH SCHOOL

## MONUMENTALITY

Some important buildings have a size, design and location which makes them and the series of monumentality and thus key elements in the cityscape.



ÅKRA GJESTEHAVN



MORTHOLMEN SILDSALTERI

## TRADITION

The historic heritage of Åkrehamn is from fishing and agriculture. The seahouses, piers, lighthouses and sildoljefabrikken are central traditional elements. Åkrehamn also has a near historic relation to the United States and some influences building-wise.

## AESTHETICS



SEAFRONT HOUSING



BOLIGPROSJEKT:  
TJØSVOLLVATNET

### A MORE UNIFIED AESTHETIC

In the more “new” projects from the 2000 and onward the aesthetic is more unified and either customized for a seafront or more rural aesthetic, depending on where the project is.

It seems that what happened here is what happened many other places; the construction industry became more professionalized and the initiated and performed by larger builders. Larger building models are introduced.



HOUSING BY THE  
INDUSTRIAL AREA



SKUDE BYGG A/S

### MODERN AND INDIVIDUAL

The projects in Åkrehamn initiated by smaller, private actors are more individualistic. Especially the structures around Åkrakrosset, which are mostly built up to the 1960s.

Amfi Senter is an example of both a unified aesthetic where the old part is built in style with the seafront while the newer part is more individualistic.

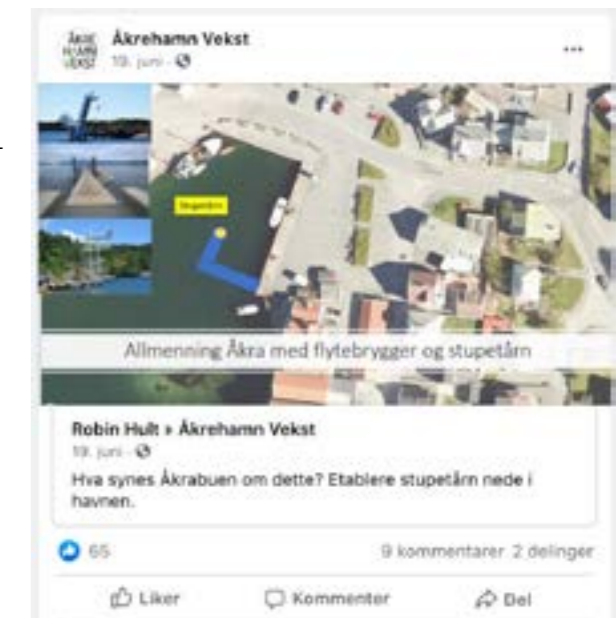
# WEB RESEARCH

Before visiting Åkrehamn I researched the web and came across two facebookpages of local initiatives. These were also some of the people I got to meet in Åkrehamn later.



## THE WANTED AESTHETIC?

There are a few local, online platforms for discussing the future aesthetic for Åkrehamn. It seems like the preferred aesthetic is catered towards the summer town.



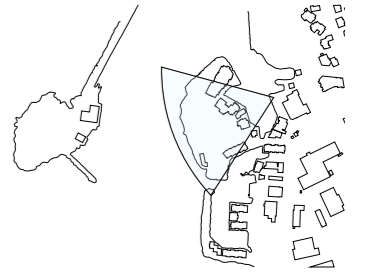
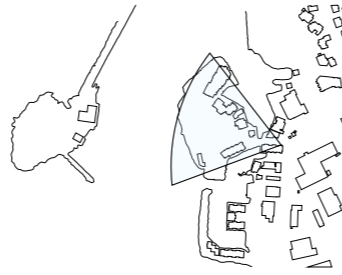
PHOTOS

À RABROT (the site)

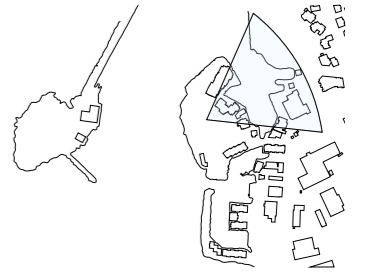
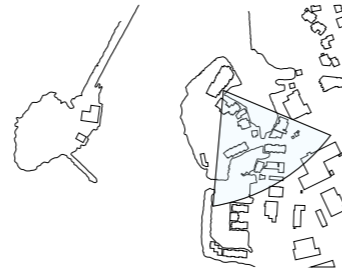
THE SITE  
THE BACKSIDE  
AS SEEN FROM THE MAINLAND



THE SITE  
THE BACKSIDE  
AS SEEN FROM THE MAINLAND

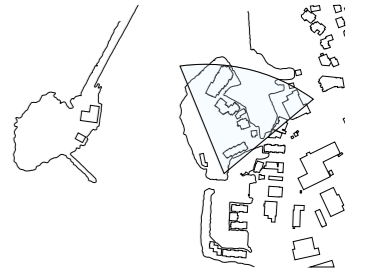


THE NEIGHBOURS  
HOUSING - EAST

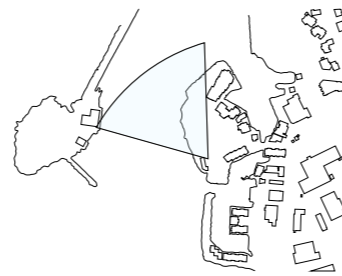




NEIGHBOURS  
HOUSING - SOUTH



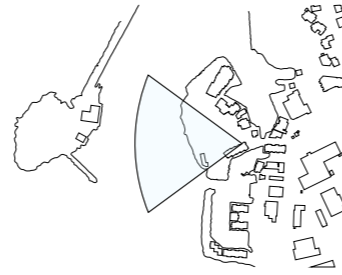
THE SITE  
THE BEACH



OBSERVATIONS : Although the built structures on the small island is relatively new (see historic maps page...) the island is heavily altered. Land masses have been blown up, and new have been added.

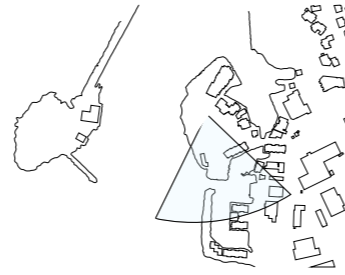


# THE SITE AND NEIGHBOURS



OBSERVATION: The island has been heavily altered. In the bottom right corner you can see some of the original stone.

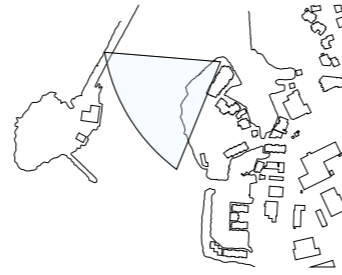




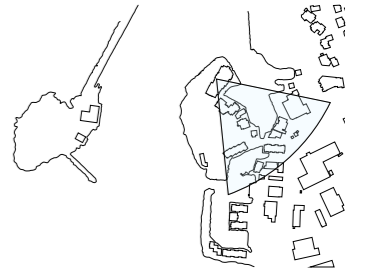
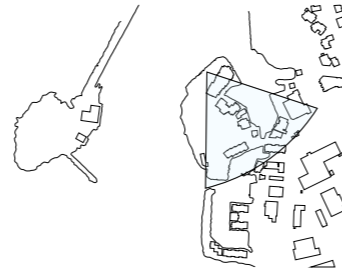
CARAVAN PARK



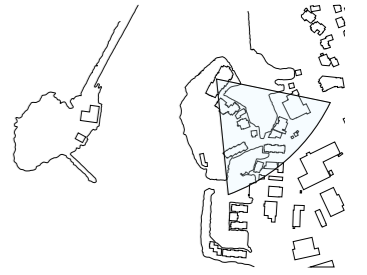
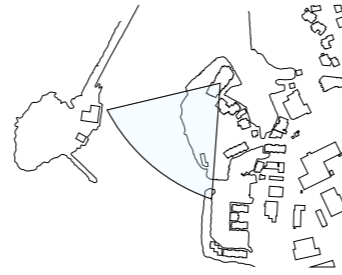
NEIGHBOURS



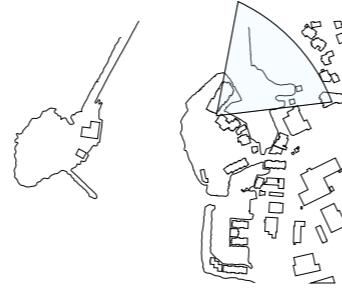
NEIGHBOURS



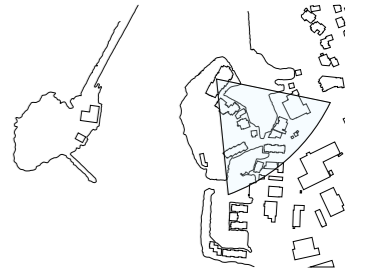
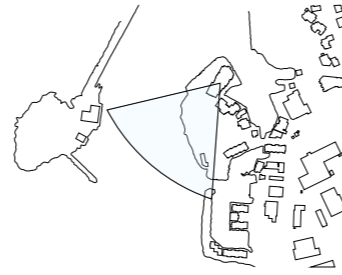
NEIGHBOURS  
ÅKRA SJØMAT - RESTAURANT+BAR



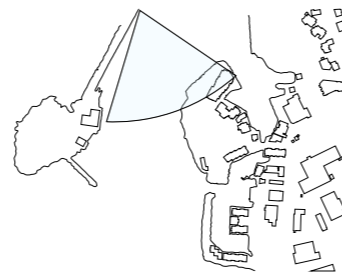
NEIGHBOURS  
ÅKRA SJØMAT - FISKE BUTIKKEN



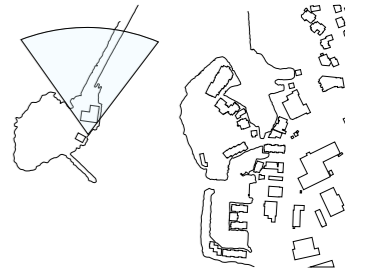
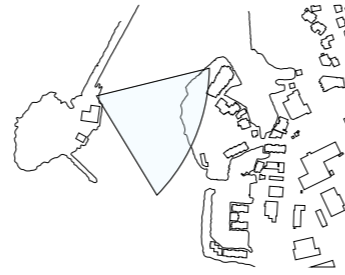


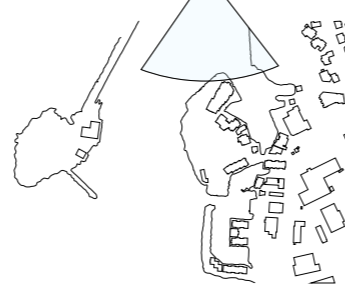


THE SITE  
THE BREAKWATER



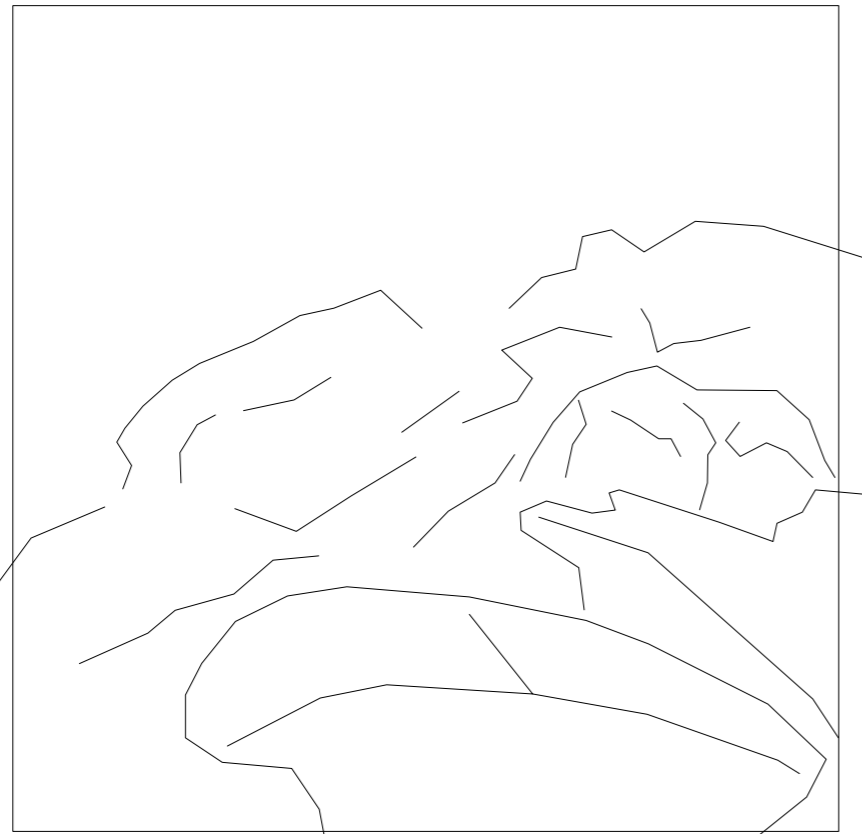
MORTHOLMEN SILDSALTERI  
SPISERI





## PHOTOS

Textures of the area around Árabrot



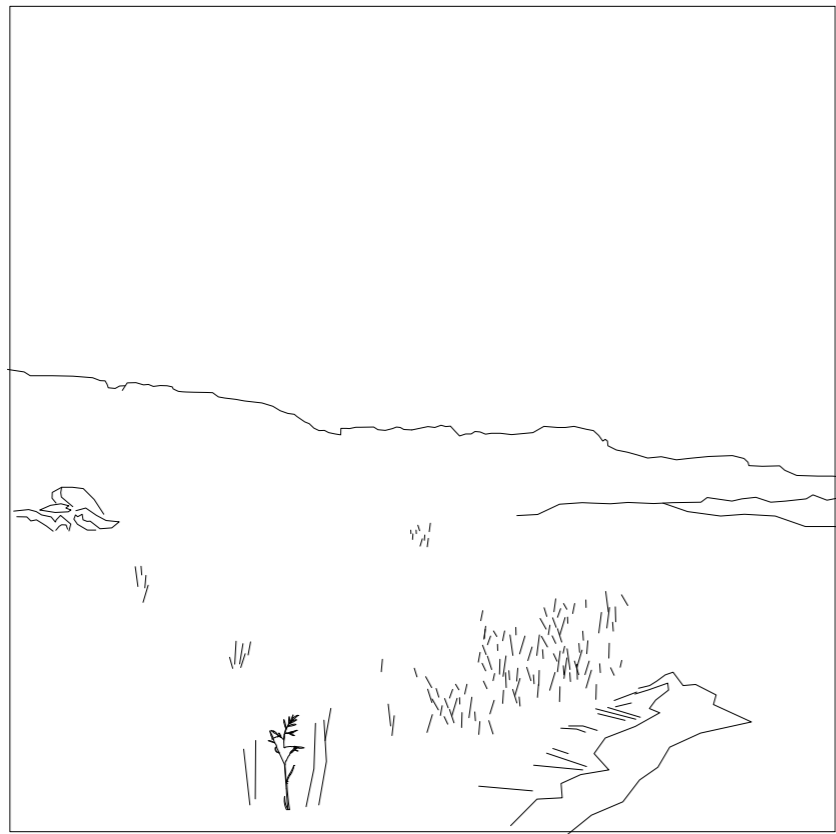
I imagine the beach at my site would look something like this if it was left alone from human forces.





Åkrasanden is one of Norway's most famous beaches, for film production, photography and visitation.





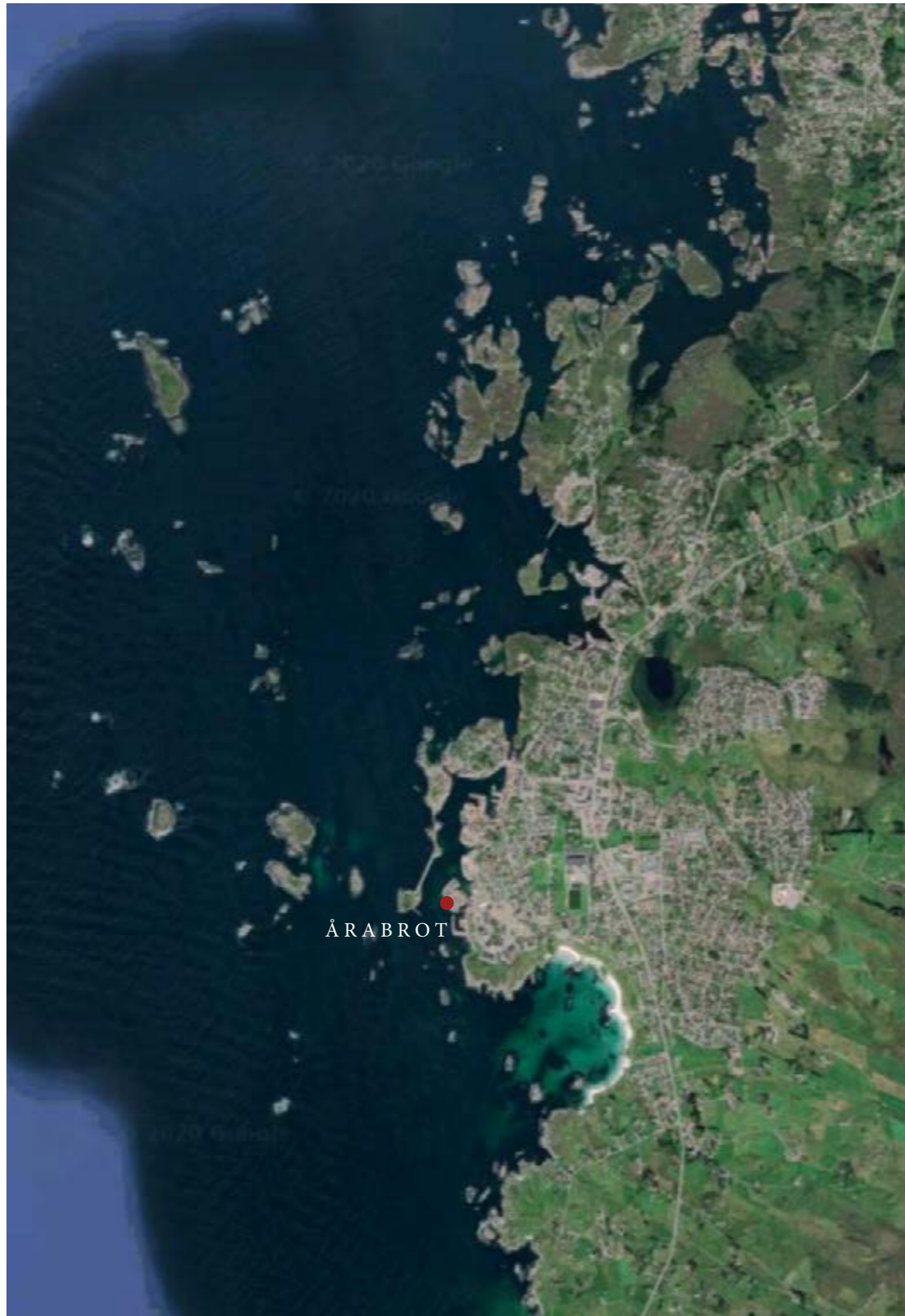
The vegetation on Karmøy is low, with the exception of a few small clusters of trees, too small to be woods.





SITE ANALYSIS

ÅRABROT



## SITE: ÅRABROT

### ÅRABROT

(name of the islet and also the business park in the east)

Historical: The area was associated with fishing and shipping. The herring oil factory at the north end was in operation until 1994, burned in 2020.

Before Åkrakrossen was developed, it was characterized by more shops and offices than today. The highway became the main shopping area and they moved there. Construction boom in the early 2000s at Årabrot.

Today: a lot of arial-demanding business, the area has been expanded. Large proportion of companies in construction. Also industry and maritime activities. A few craft businesses and car, boat and engine.

The fishing port has fallen sharply in production. See project report "Seafood in Åkrehamn, from sea to table"

ANALYSIS SITE



MORTHOLMEN

ÅRABROT

LIGHT HOUSE

FISKARBONDEN SPISERI  
ÅRABROT CARAVAN CAMP  
ÅKRA SJØMAT (BUTIKK)

# ZONING PLAN

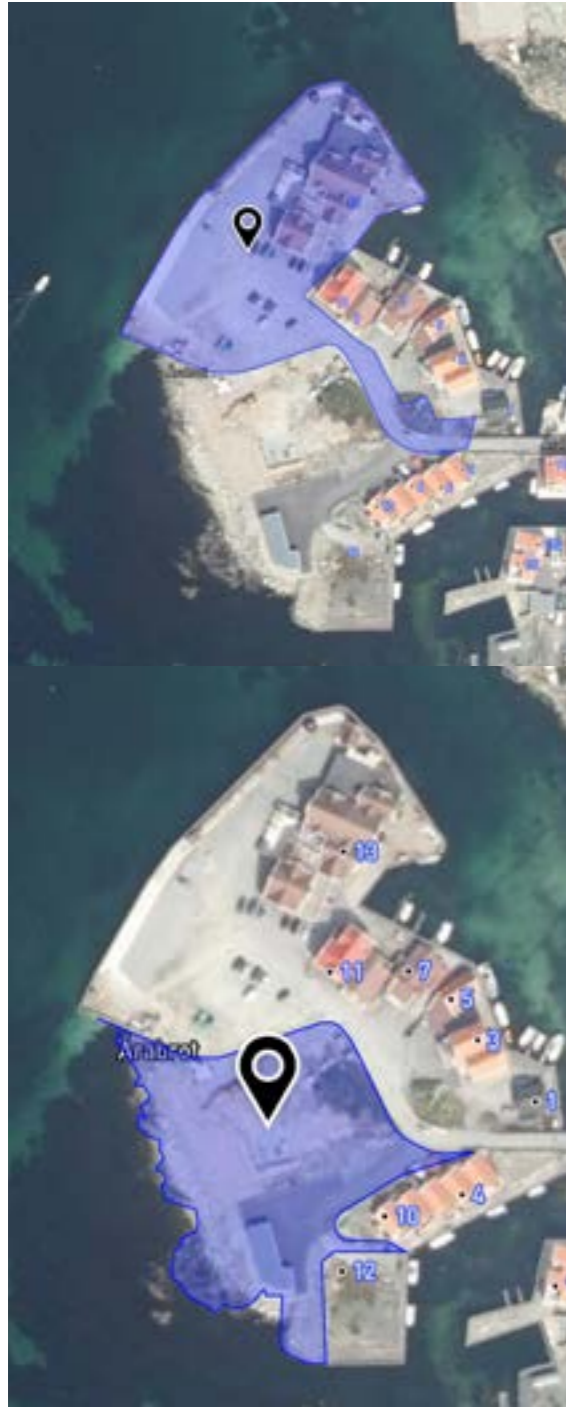
Reguleringsplan/Bebyggelsesplan PBL 1905	
	Område for boliger med tilhørende anlegg
	Friliggende småhusbebyggelse
	Konsentrert småhusbebyggelse
	Blokkbebyggelse
	Område for forretning
	Område for industrifager
	Område for frilidsbebyggelse
	Offentlig barnehage
	Offentlig undervisning (skole, universitet mv.)
	Offentlig kirke
	Offentlig foreningslokale (kino, teater mv.)
	Område for særskilt angitt almennyttig formål
	Borinstasjon
	Leireutviklingsområder
	Offentlige trafikkområder
	Kjøreveg
	Annens veggrunn
	Gang/sykkelveg
	Gangveg
	Gatestun
	Torg
	Parkeringsplass
	Bueterminal
	Kai
	Trottoirkområde i sjø og vassdrag
	Frømråder
	Anlegg for lek
	Anlegg for idrett og sport
	Privet veg
	Parkerte i industristrøk
	Friluftsområde (på land)
	Friluftsområde i sjø og vassdrag
	Grav- og urnelund
	Privat småbåthavn (land)
	Privat småbåthavn (sjø)
	Område for anlegg og drift av kommunaltekniske virksomheter
	Annet spesialområde
	Felles ankjørsel
	Felles gangareal
	Felles parkeringsplass
	Felles lekeareal for barn
	Felles gårdsplass
	Felles grentanlegg
	Annet fellesareal for flere eiendommer
	Bolig/Forretning/Kontor
	Forretning/Kontor
	Forretning/Kontor/Industri
	Annet kombinert formål
	Grense for restriksjonsområde

Reguleringsplan PBL 2008	
	Friliggende ved veg
	Grense for bevaringsområde
	Bevaring av bygninger og anlegg
	Bevaring av bygninger
	Bevaring av anlegg
	Reklatolgebestemmelser
	Bikningsgrense
	Støyseparasjon
	Angitt høydegrense
	Bestemmelsegrense
	Boligbebyggelse
	Boligbebyggelse - friliggende småhusbebyggelse
	Boligbebyggelse - konsentrert småhusbebyggelse
	Boligbebyggelse - blokkbebyggelse
	Forretninger
	Undervisning
	Foreningslokale
	Kulturinstitusjon
	Industri
	Idrett
	Renovasjonsanlegg
	Telekommunikasjonsanlegg
	Småbåtanlegg i sjø og vassdrag
	Uthushvilstedehur
	Annens særskilt angitt bebyggelse og anlegg
	Utøppningsareal
	Lekoplass
	Arvel utøppningsareal
	Kombinert bebyggelse og anleggformål
	Boligforretning
	Boligforretning/kontor
	Bolig/forretning
	Bolig/kontor
	Forretning/kontor
	Bebyggelse og anleggformål kombinert med andre org
	Veg
	Kjøreveg
	Fortau
	Torg
	Gatestun
	Gang/sykkelveg
	Gang/sykkelvegareal/pågate
	Annens veggrunn - tekniske anlegg



# ZONING PLAN

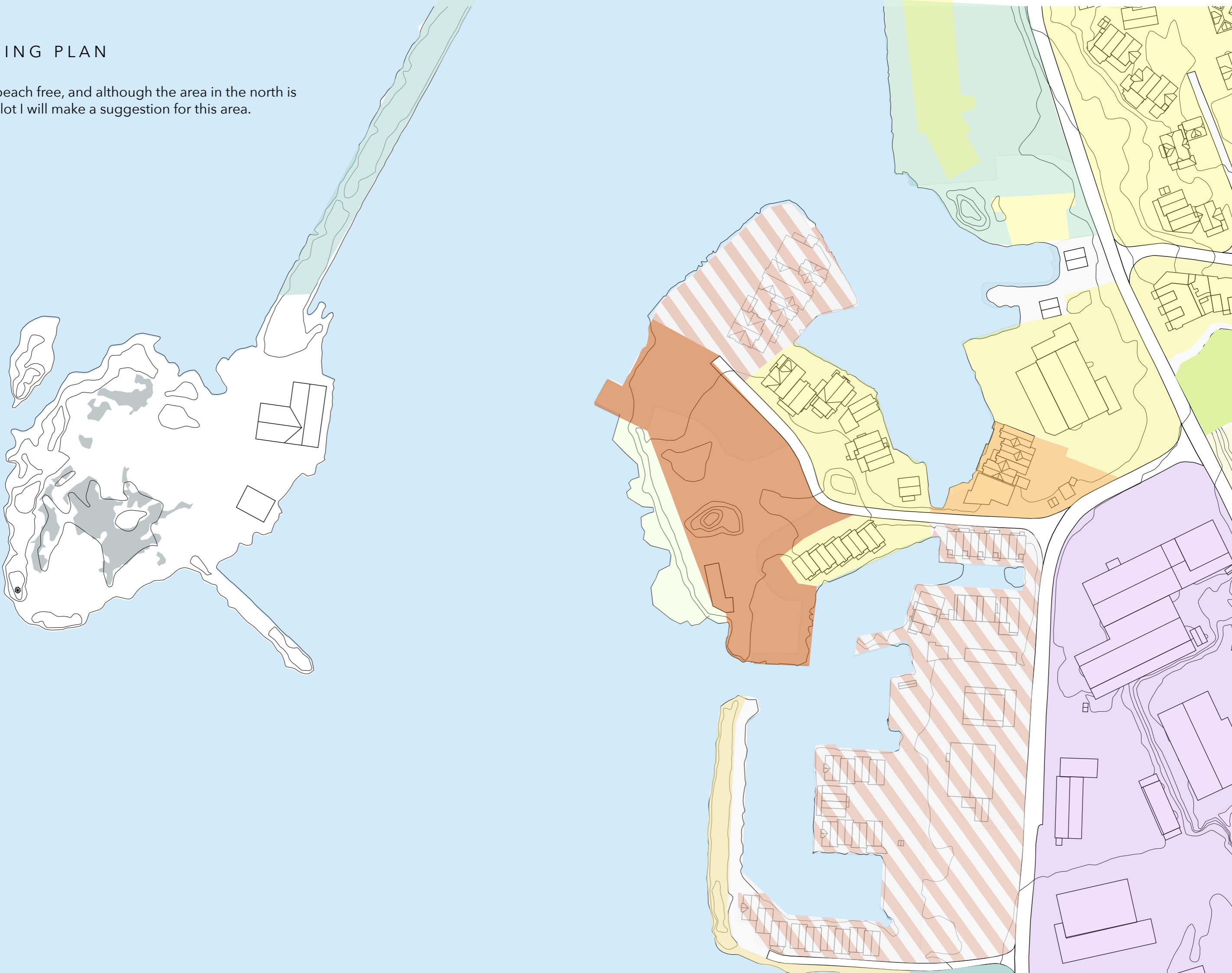


<b>Eiendom</b>		↕
Areal	6 395 m <sup>2</sup>	
Kommune	Karmøy	
Gnr	15	
Bnr	1042	
Fnr	0	
Snr	0	
Areal	6 395 m <sup>2</sup>	
Fjern markering		
Se Eiendom og	Vis i Webmatrikkel -	
<b>Eiendom</b>		↕
Areal	4 892 m <sup>2</sup>	
Kommune	Karmøy	
Gnr	15	
Bnr	1235	
Fnr	0	
Snr	0	
Areal	4 892 m <sup>2</sup>	
Fjern markering		
Se Eiendom og	Vis i Webmatrikkel -	
Grunnbok	Karmøy	



# NEW ZONING PLAN

I will keeps the beach free, and although the area in the north is not part of the plot I will make a suggestion for this area.



NEW ACTIVITIES



TYPES OF  
EXPERIENCES  
POOLS



## TYPES OF EXPERIENCES

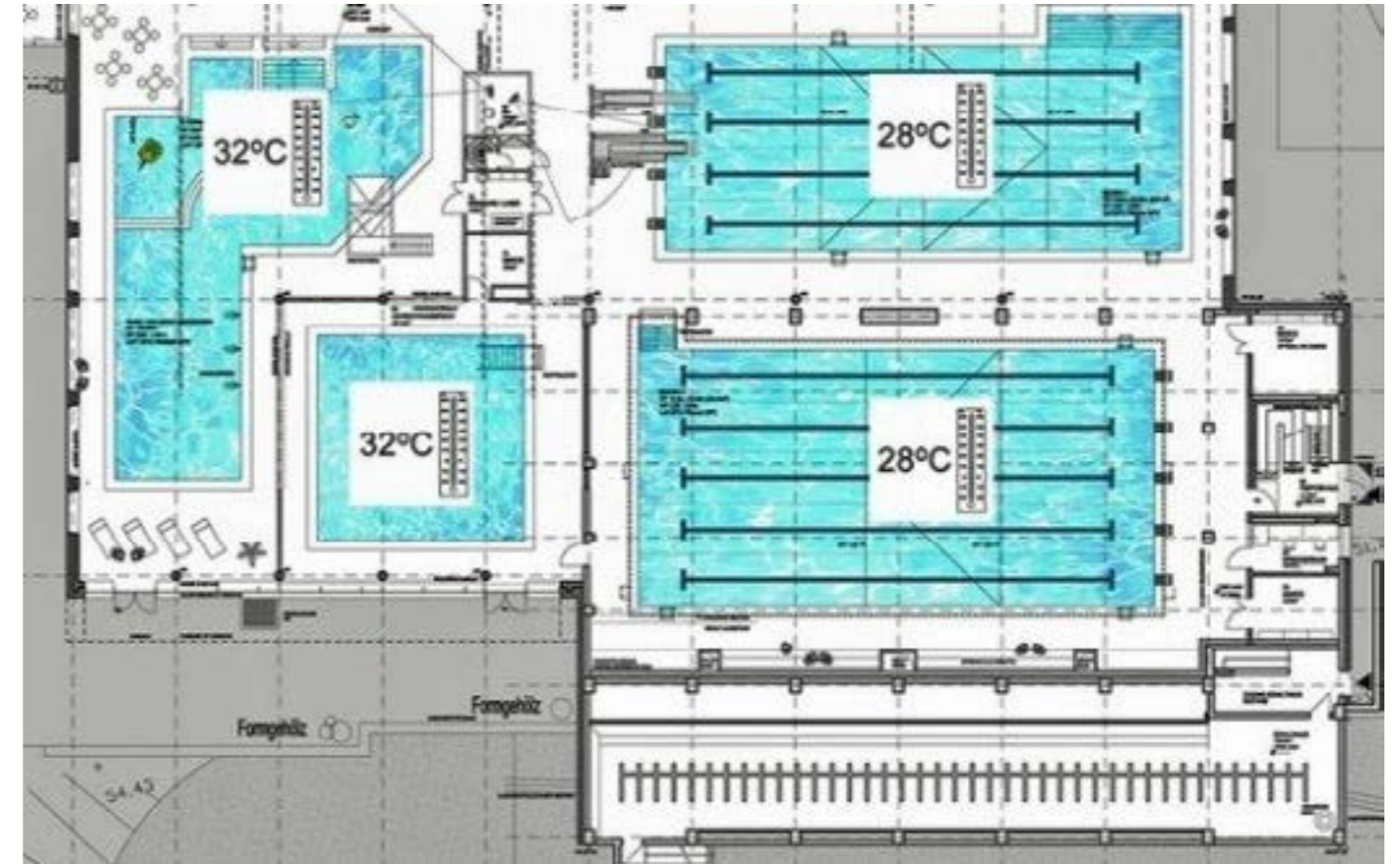
### MOST BATHING FACILITIES IN NORWAY OFFER:

- One sport swimming pool (, this pool is the main pool and present so it can be rented out for schools and courses).
- One play pool ( this is the most popular pool, sometimes with extra additions such as waves. Can sometimes be a part of the long distance pool).
- One warm pool or hot tub (usually used for babyswimming and relaxation)

### IN MY FACILITY:

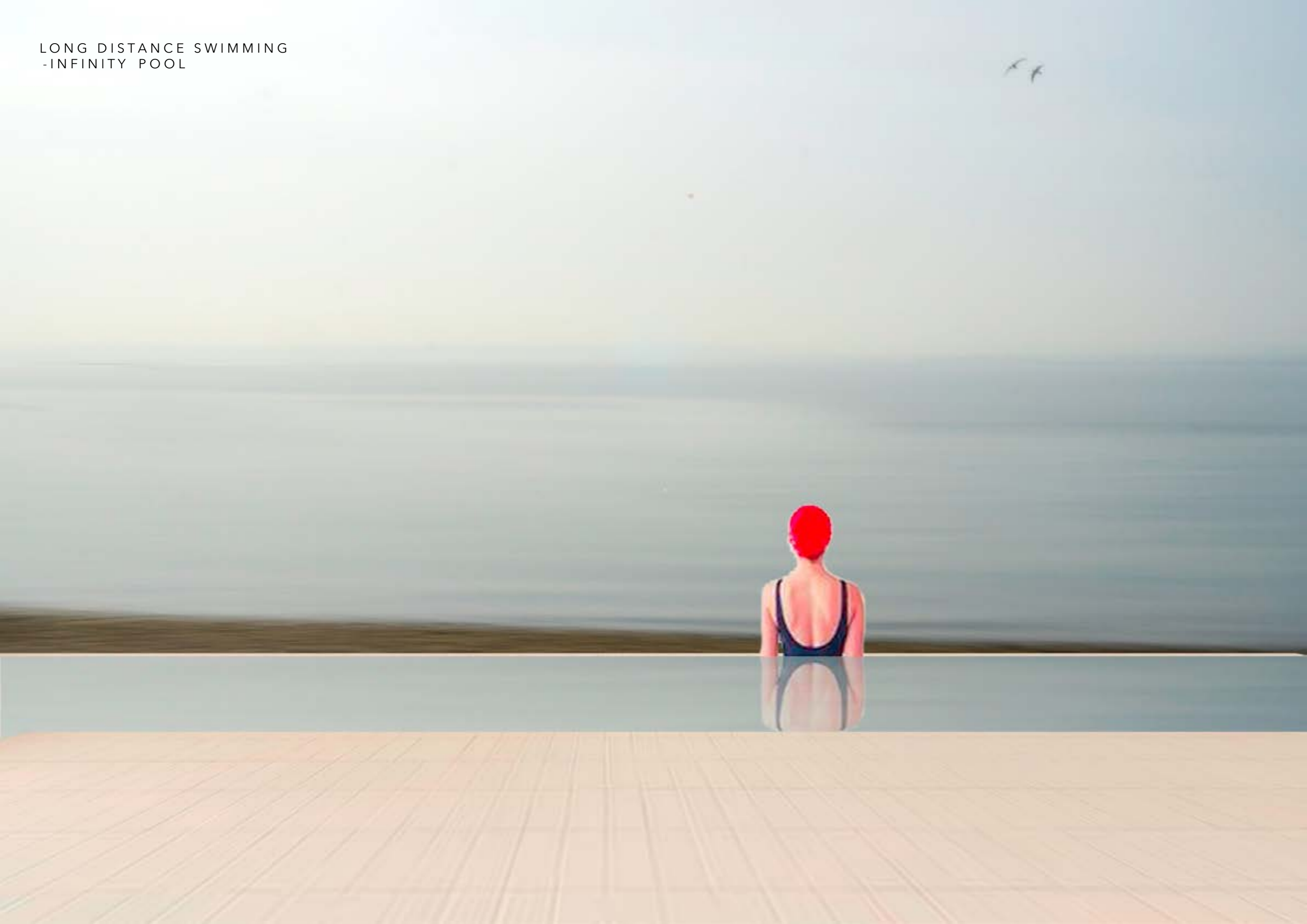
I wish to have these three pools, but as different experiences. The warm pool can be secluded in a cave like feeling and skylights. Small nook like spaces to hide and relax. Would be nice to be in connection to a more secluded part of the beach. In connection to the sauna. This pool will be in relation to a loon pool; catering to adults as it will be secluded from the families.

The play pool should be light and out in the open. Good overview for parents and lifeguards. Having this connected to the outdoor area is a bad idea because of children that can run off. This can be a more limited area. these pools often double as sports pools or are an addition. These two can therefore be placed in relation to each other as the groups using them produce much noise and overview os a must for safety.



figur: Lippe bad Lunen, passivhusbad, 2011 <https://inhabitat.com/worlds-first-passivhaus-public-pool-opens-in-lunen-germany/lippe-bad-lunen-passivhaus-pool-4/>

LONG DISTANCE SWIMMING  
-INFINITY POOL





FIGUR: barn som bader, 2020, <http://www.aftenposteninnsikt.no/viten/sv-mme-hallens-storhetstid-og-forfall>