Prosthetic Landscapes:

Reclaiming the Iraqi marshes

by
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Author's Declaration

I hereby declair that I am the sole author of this thesis.

This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

I understand that my thesis may be made electronically available to the public

Abstract

Hidden within the sands of the Middle Eastern desert, there lies a vast aging petropolis,[1] occupying territories in southern Iraq with mechanical drills and mobile machinery. The "West Qurna"[2] petropolis oil field, discovered in 1930 and constructed in 1971, is the largest in the area, and is situated in the southern part of the Iraqi marshlands. Marshlands that once consisted of freshwater bodies were transformed into a desert landscape through the introduction of oil industry, over a series of terraformation projects for the past three decades. With the current oil production capacity in Iraq, the projected inventory of oil is expected to diminish, and will likely lead to the suspension of oil extraction development by 2050. The expulsion of the industry from the marshlands will render these oil-terraformed strata obsolete and abandoned in the long run due to lack of maintenance.

The creation of the petropolis in southern Iraq deformed the urban landscape through multiple policies carried out by the government and multiple terraformation projects executed by the oil industry. This new oil strata constructed with machines, pipes and oil drills terraformed the marsh land to transform into an oil vessel controlled by oil investment interests, deforming this land from a vast greenfield into a massive oil field.

The hegemony of oil in the marshlands resulted in marsh drainage in 1993, along with pollution and desertification that continued from 1970 until 2004. Multiple projects were devised during that period, which benefitted the oil industry including the main outfall drain (MOD) to dry the marshes—the expansion of West Qurna oil field, Um-Qasr port, Al-Izz river and Al-Qurna canal. These projects contributed

1 Petropolis is a description added by Bhatia, Neeraj, and Mary Casper. *The Petropolis of Tomorrow*. Actar Publishers & Architecture at Rice, 2013, which is a description of a state or a location that uses the petrochemical industry as a reason for its existence, an instance of which is demonstrated in the transition of southern Iraq from a farming country into an oil exporting country in the span of a 100 years.

2 West Qurna is an oil extraction field discovered in 1968 in the northern part of Al-Hammar marsh in southern Iraq, built in 1971 on top of the permanent fresh marsh landscape, transferring it from a marsh landscape into a dry oil landscape as a result.

Fig 0.01- The dry Iraqi marshes

Fig 0.02- Excess gas is flared at the Rumaila oil field

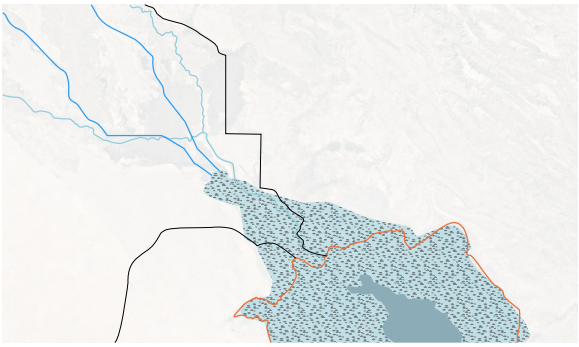
to the terraformation of southern Iraq into a landscape that accommodates oil industry, thereby distancing it from its original role of being an ecological haven for the local humans, animals and biotic life.

The oil industry led to numerous changes in the landscape of the marsh, resulting in a new terraformed landscape that supports oil. Consequently, the consumption of its natural resources of fresh silt and flowing water, used for agriculture, became a political tool to form a new oil landscape, removing original stakeholders who preserved the marshes since the beginning of civilization and replacing them with tools of Anthropocene, leading the marshes to eventual depletion and exhaustion.

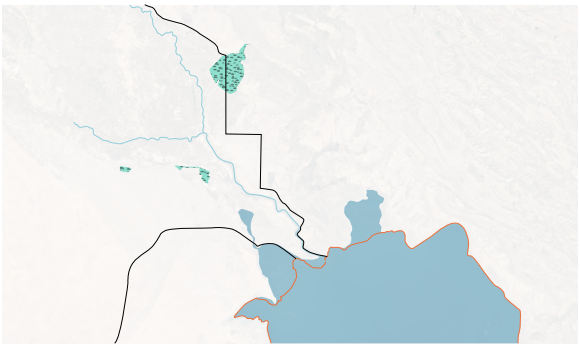
In a future scenario where the oil industry as a stakeholder is no longer a factor in forming land in Iraq, the Marsh-Arabs "Me'daan" would be the agent that comes back to populate the re-flooded marshes and rehabilitate them as a part of their heritage and livelihood. In reference to multiple instances in history where the Iraqi government failed to take responsibility of the state of affairs,[3] this thesis proposes a scenario where the Marsh-Arabs (Me'daan), who were forced to abandon the marshes, will be reclaiming land ownership from the private industry by squatting. The flexible nature of their resettlement will introduce new tools for inhabitation, by repurposing oil drills and mechanical equipment into construction tools that could mold silt terrains into a hybrid landscape, adjusted and manipulated to be adaptable over multiple scenarios.

The act of squatting is a common behavior in Iraq, going all the way back when Iraq was under the Ottoman rule in the 1500s, the chaotic properties of squatting allowed it to thrive in southern Iraq's political climate forming multiple pockets of unconventional living arrangement, especially around the Iraqi marshes due to its adaptability and ability manipulate landscape. This thesis serves as an illustration of the Me'daan squatting environment, speculating about how the Marsh Arabs might use tools on site as Me'daan can use tools on site as an apparatus to facilitate

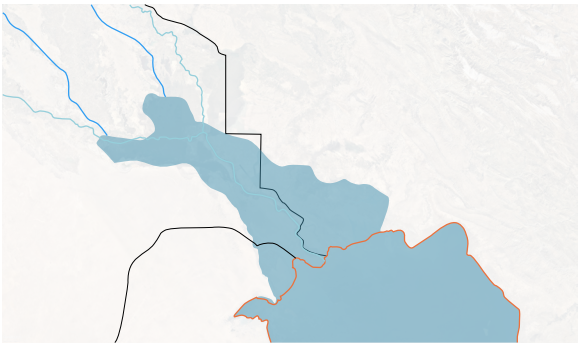
3 According to the Alnasrawi, Abbas. *The Economy of Iraq: Oil, Wars, Destruction of Development and Prospects, 1950-2010.* ABC-CLIO, 1994. the Iraqi government has a history of failure through the past decades, through the Iraq-Iran war in the 80s resulting in losing vast areas of land to neighbouring countries through mismanagement. In 1991, it purposely burned vast oil fields in Kuwait and Iraq, causing a massive act of migration and squatting through southern Iraq. In 2003, an even larger act of squatting took place and still developing to this day in a country that lacks basic ownership documentation and building permits and standards.



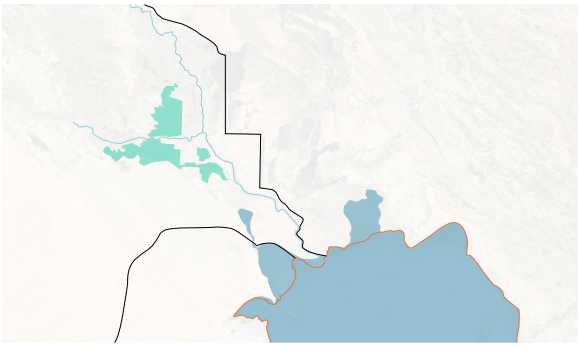
End of last ice age - 8500 BCE



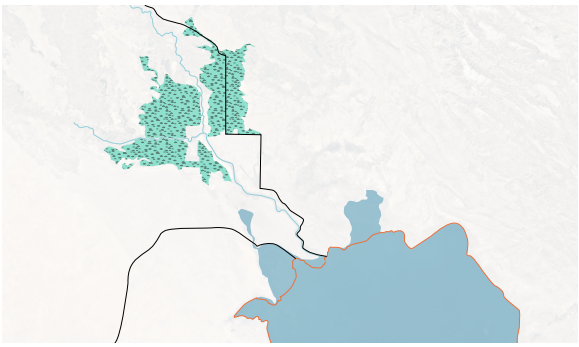
Iraqi marshes drying project - 1993



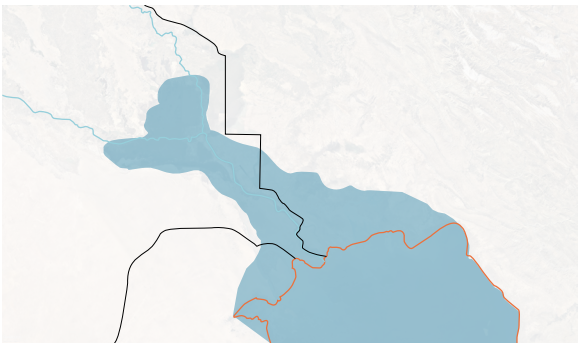
Late Sumerian settlement - 6000 BCE



Iraqi marshes revitalization - 2008



Iraqi marshes - 1980



Future scenario water level rise +5m - 2030

Fig 0.03- Iraqi marshes time-line

their new acquired environment.

These new tools or apparatus can be manipulated and altered to produce new functions in the marsh, where tools used to manipulate land for the purpose of flattening land for the purpose of oil extraction can be used to form new shapes to facilitate new ecological systems restoring the marsh to its health in an era post oil extraction. These tools will replace what the Me'daan used to manipulate land before the existence of oil and accelerate functionality of these post oil manufactured marshes to sustain Me'daan new hybrid way of living. Since these tools will function as a replacement for the original tools, doing the same function and enhancing the Me'daan performance, it draws a lot of similarities to prosthetics, them being familiar with the southern Iraq population, the largest community adopting medical prosthetics after multiple years of war and loss.

This thesis investigates the role of material use and technique in landscape terraformation in the establishment of a semi-fictional future connecting terraformed land survey with recognized squatting terraformation strategies made by the Me'daan. The two methods combined together provides a vision to the future that draws from fictional scenarios and material ontologies, and how this future will relate to current observations of land terraformation.

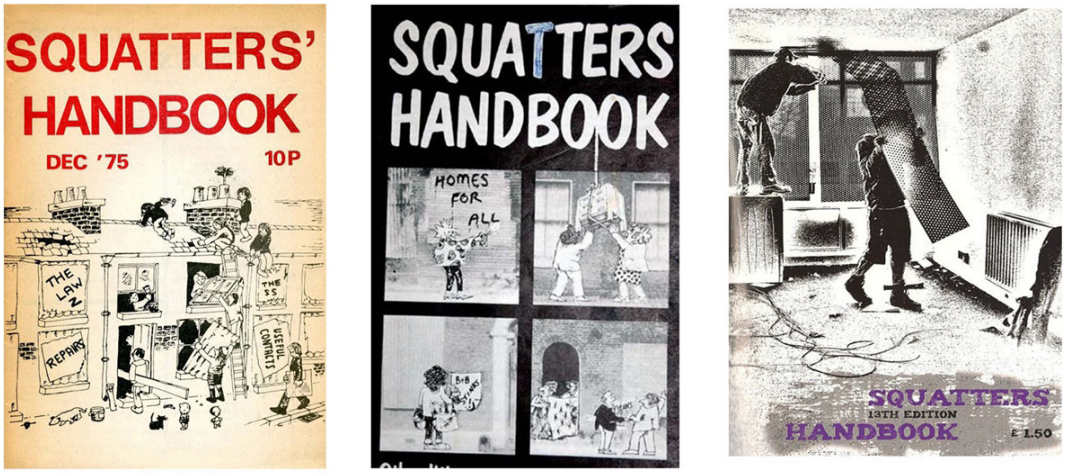


Fig 0.04- Squatters Handbook

Fig 1.05- A man and his wife punt a boat through marsh waters

Acknowledgments

First and foremost, I would like to thank my incredible committee. Your passion, patience, and knowledge added much needed insight into my journey making this thesis. Jane Hutton, your unwavering dedication, patience, and wealth of knowledge helped me create a solid base for my thesis. Lola Sheppard, your insight, perceptive comments, and resolute direction helped guide my thesis into a cohesive design with a manageable scale. Andrew Levitt, your help in understanding my own design methodology when I was in my first year of masters was a big effect on me as a designer. David Correa, with your guidance, encouragement, and selection of readings helped me narrow down my interest in this thesis, and in my future practice. For all this I thank you all.

I would also like to think my grandmother, my local guide into the Iraqi marshes since I was 4, growing up with tales and stories of the marshlands, its magical sensibility, and cruel realities. May she rest in peace.

The supporting team that I got to know (sometimes stumbled upon by accident) was a big contributor to a thesis where this remote site is out of reach. Keith Holmes (a Canadian researcher at the Hakai institute in Victoria, BC.) Your willingness to contribute with valuable information and share what you already know about the marshlands was the biggest contributor to my thesis, with most of my information came from your amazing research and documentation of the marshlands. Ayman Al-Amiri, the photographer I came across through social media, thank you for your valuable conversations and insight helped me understand a tremendous amount of details and photography sources that could not be obtained otherwise, and thank you for being my voice in the marshes, speaking on my behalf to local guides and marsh conservation experts. With the help of this team I would not be as proud as I am with the amount of information I obtained in an environment as chaotic, and unstable as the Iraqi marshes.

And I would love to acknowledge the wonderful community of waterloo architecture of staff, students, and faculty for helping me through my masters program. And special thanks to Jonas Chin, Daniel Abad, Michelle Bullough, Salim Filali for providing constant support and encouragement throughout the masters program.

Finally, I would love to thank my family for the constant support and believe through every phase and transition in our journey to be where we are right now. Thank you all so much.

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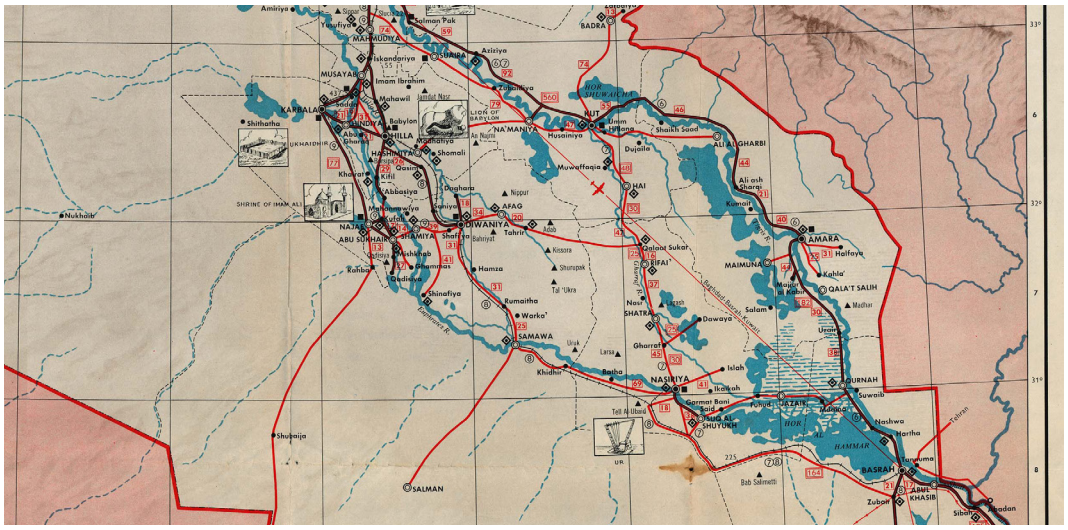

Fig 1.02- Southern Iraq 1970

Part one

Throughout the history of Iraq, water bodies have been a constantly contested resource, leading to an unstable landscape through the last few decades. The hegemony of water and silt as the dominant resource in the region was interrupted by the excavated black matter discovered and harvested in southern Iraq since the 1920s. British oil expeditions struck oil in the Iraqi marshlands and the political and material topography of Iraq started to shift massively towards oil extraction[4], forming a meshwork of changes propelling Iraq to the second industrial age, neglecting existing living systems and social networks to the point of destruction.

The beginning of the 20th century marked the last era in which the marshes were populated by the Me'daan, who had occupied the freshwater marshes since ancient times[5]. The Me'daan used silt and reed to create permeable structures on top of the marsh water basin. Making use of the property of the materials as an apparatus for making new permeable forms is something that developed organically and locally through trial and error. Properties of material (soil) were the main instrument in shaping the marsh, similar to the way pottery was used to hold liquid in Sumerian culture. Skilled potters in the Sumerian time used soil variation of clay, silt and loam as a tool for vessel formation. This practice of forming vessels transformed into a larger scale when the Me'daan started manipulating landscape to hold or drain liquid in farmlands. Mastery over this form of manipulation was only acquired through trial and error, and the constant shifting of topsoil allowed the Me'daan to experiment with landscape terraformation and to manufacture the marshes to be a large landscape vessel that holds the marsh waters in addition to its biotic substances.

4 E Roger Owen, "One Hundred Years of Middle Eastern Oil," Middle East Brief 24, 24 (2008): 16.

In the second half of the 20th century, foreign and domestic investment in oil industry started to expand and companies such as BP, Shell and BOC (Basra oil company) intensified their oil extraction operations, replacing organic materials that once existed in the marsh in abundance in soil and water, by machines and oil[6]. A change like this shifts skilled labor from working with soil and water into working with machinery and oil. This change started a series of events that shifted political will from preservation of the marshes into expanding oil fields on top of ecology zones such as the marshes and surrounding areas. This change in industry affected the Me'daan, who used the marsh for their livelihood, leading to a new wave of migration where these Me'daan moved as squatters to cities, or to work in skilled professions like the oil industry.

The redirection of resources from one that is sustainable (agriculture) into one that is depletable (oil) started shifting interest again in these marshes by the Me'daan. Where in a fictional future the oil industry is directed towards depletion around the middle of the 21st century[7], in this future scenario of the marsh where oil is depleted and replaced by mud as a raw material in a semi-fictional version of an alternative marshland economy, Me'daan have begun going back to the marshlands in small numbers to occupy land and reshape this land to be physically and ecologically suitable to their lifestyle. This return to land is accompanied by the use of oil drilling machinery as a tool to facilitate a manufactured water return to the marsh. With the next shift of labor heading back to agriculture and aquaculture, these machinery-skilled workers will be at the heart of this return to the marshes, transitioning their newly acquired skills to formulate new landscape and using their existing (abandoned) oil machinery as a tool to accelerate agricultural production and recovery. This post-natural phase of agriculture would depend on machines as prosthetics to shape and mold land as a vessel for water and agriculture, making it a container for agriculture and aquaculture like it used to be in 3000 BC.

6 Abbas Alnasrawi, The Economy of Iraq: Oil, Wars, Destruction of Development and Prospects, 1950-2010 (ABC-CLIO, 1994), no. 154.

7 Colin John Campbell and Alexander Wöstmann, Campbell's Atlas of Oil and Gas Depletion (Springer, 2013), 285–89.

Fig 1.03- Iraqi marshes desertification

Fig 1.04- Restored marshes

The second industrial age[8] in southern Iraq had devastating effects on the region. This chapter will identify these factors and place them into categories (geography, politics, material, and machines), looking to identify properties and contributing factors to southern Iraq's shift into the second industrial age. By identifying and analyzing the factors that contributed to that shift in phase and by using these same factors to speculate the next phase of terraformation of marshlands, the properties that will live on to the next post-oil phase can be determined.

8 According to Manuel Delanda and Jonathan Crary. ***A Thousand Years of Nonlinear History***. Zone Books New York, 1997. The second industrial age is "the age of oil" when oil and plastics industry took over as a new industrial revolution in the 1920s in the Middle East.

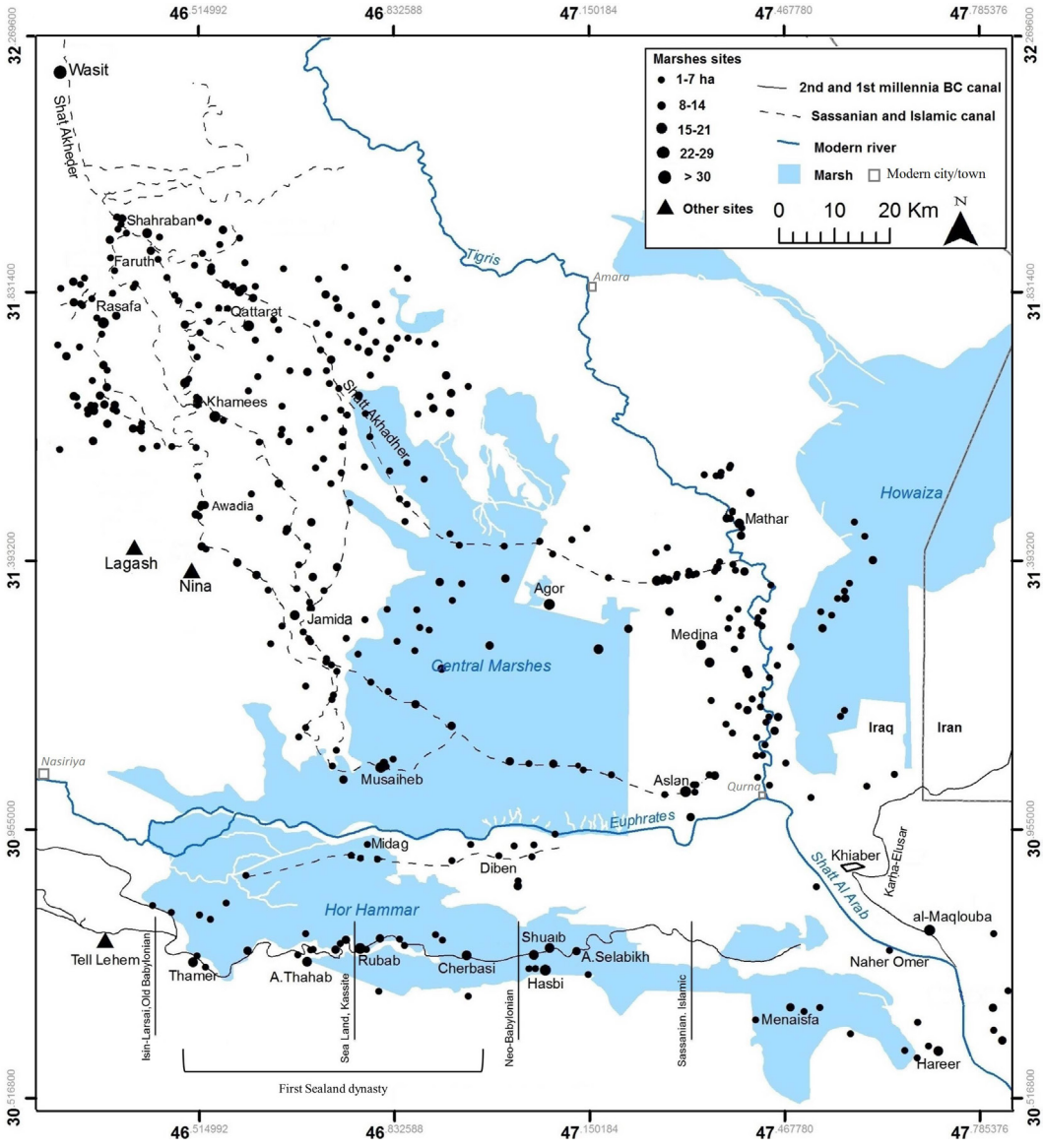

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Fig 1.06- “Marsh Arabs” photographed 1950

Fig 1.07- “Marsh Arabs” photographed 2018

Marsh-Arabs

The Marsh-Arabs, often referred to as "Me'daan" in Arabic language are Nomadic tribes settled in the Iraqi marshes, they intersect what is known in Iraq as the "Bedouins" and although they use land differently, there evolved between them a mutual interdependence[9]. Me'daan have been inhabiting the southern marshes in Iraq since the Sumerian era, multiple cuneiform clay tablets illustrate the housing system, animals raised and methods of farming used by the Me'daan, which displays the historical significance of the Me'daan way of living, and how these people adapted through thousands of years living in Iraq's southern marshes.[10]

A monitoring of the transformation of Iraq from an intensive agricultural landscape formed by the Sumerians into the industrial power that it currently is, shows multiple incidents of unique interaction between skilled workers and the tools they use. Moments of unique use of tools and equipment in a post-industrial form can shed light on what these tools can be used for in a post-oil era, when Me'daan will have to go back to their original occupancy of intensive farming/fishing, and how these functions can be executed with new repurposed oil industry tools.

Going through the historical context of the Iraqi marshes, numerous events act as a tool to change the topography of the marsh. Changes in the marsh never came gradually, they came directly by political decision and catastrophes. The next change planned by this thesis is planned to be politically motivated, a tribal uprising to take over the marsh after oil depletion. With this uprising the marsh landscape will be shifting immediately into a landscape of silt and water, fostering ecology and biotic life to maintain the livelihood of these tribes coming back to the marsh.

After the fall of the Saddam regime in 2003, when the country went into chaos, increased the Me'daan tribespeople identity of being an ethnic group, a political network, and sometimes a mafia. Some of these tribes formed tribal militias that got involved in smuggling antiquities, drugs and petroleum. They also attached themselves to larger political movements and parties.[11] A system that was necessary for them to survive since of the 300,000 to 500,000 Me'daan, almost all were forced off their traditional territory in 1993, with only 1,600 or so living on traditional floating grass platforms in 2003[12]. Many became wheat farmers and raisers of livestock on drained land. Others crowded into refugee camps or squalid shanty towns around small southern cities such as Kut and Amara or were forced over the border to Iran.

Numerous political events changed the timeline of the Marsh-Arabs "Me'daan" resulting in a mutilated inhabitation of the southern marshes, changing their occupation, methods of settlement and tribal system. inspecting changes affecting the marsh and the Me'daan and how that changed their tools and prosthetics help formulate a methodology for this thesis.

11 Juan Cole, "Marsh Arab Rebellion: Grievance, Mafias and Militias in Iraq," 2008.

12 Iraqi Ministries, "New Eden Master Plan for the Integrated Water Resources Management in the Marshland Area, Main Report, Iraqi Ministries of Environment," Water Resources Municipalities and Public Works with Cooperation of the Italian Ministry for the Environment and Territory and Free Iraq Foundation 20, 20 (2006): vol. 20.

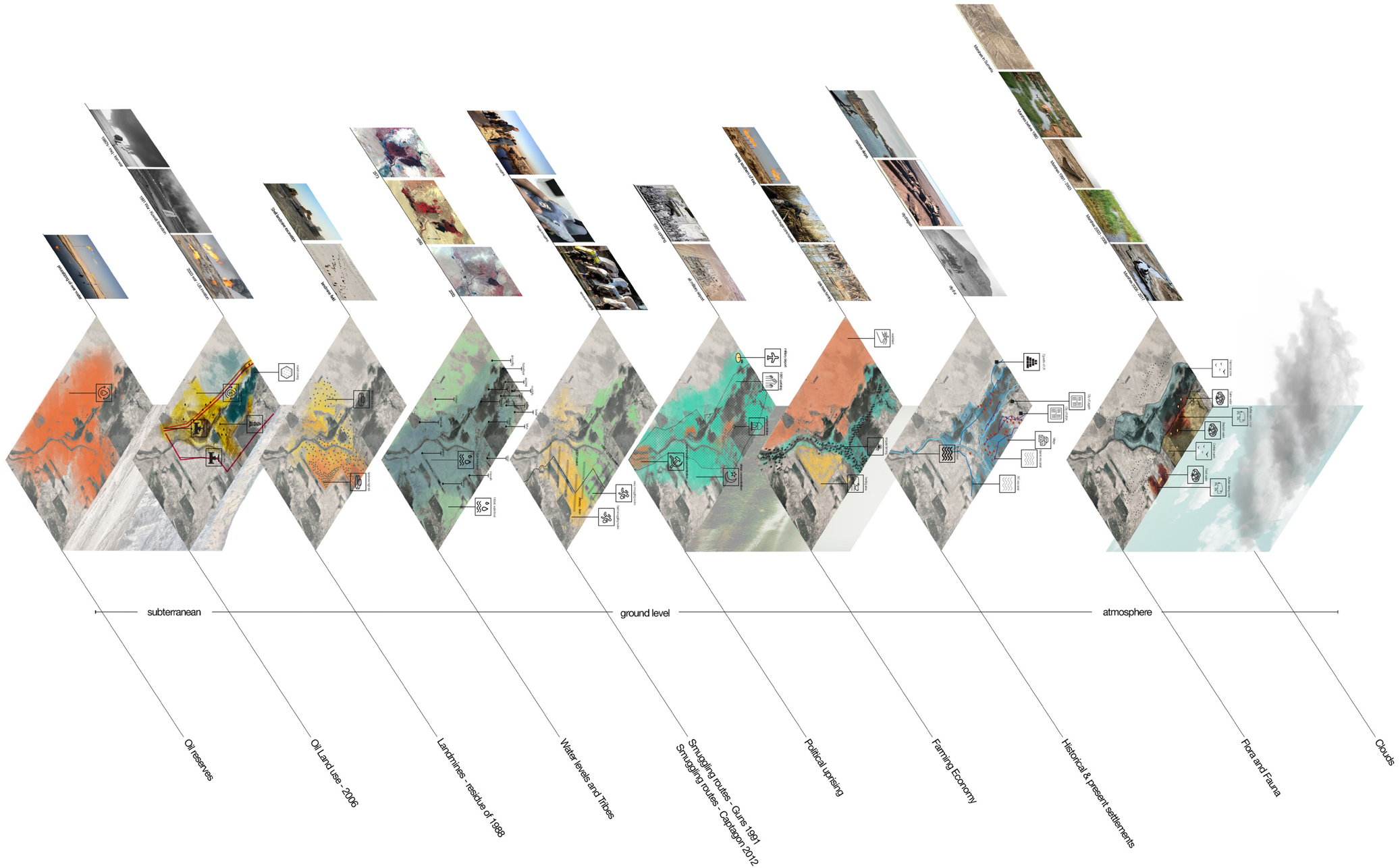
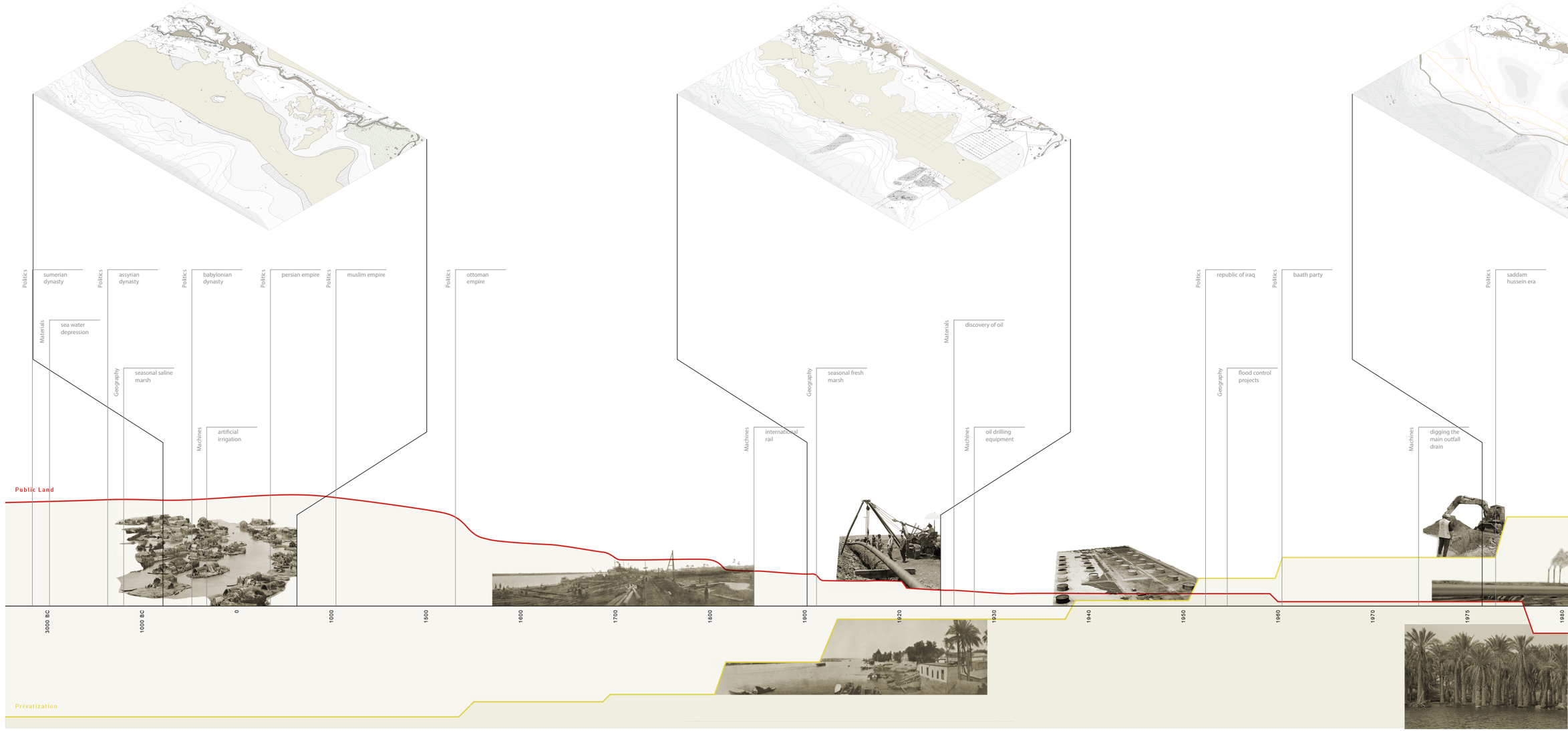


Fig 1.08- Analysis of oil, tribal, war influences on the Iraqi marshes



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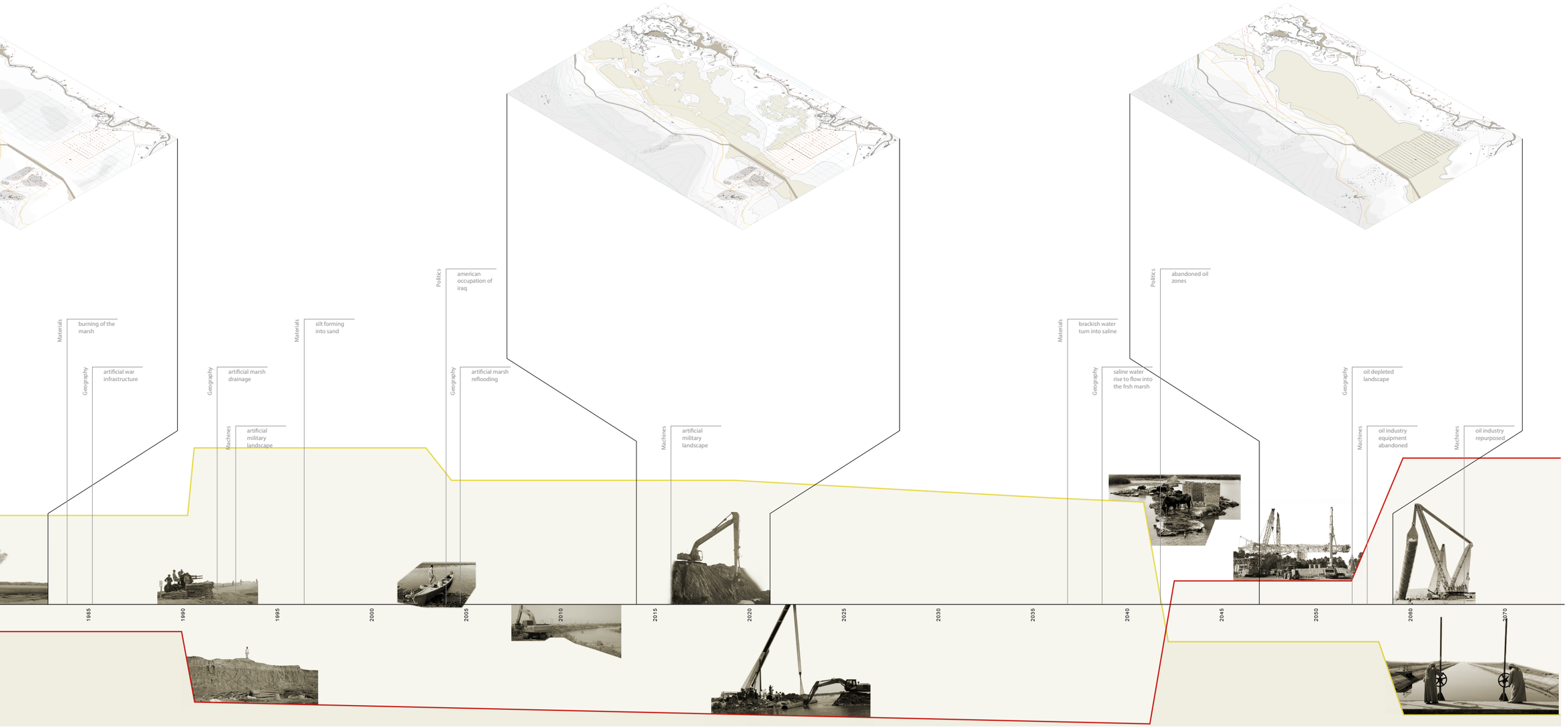
Politics
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Machines
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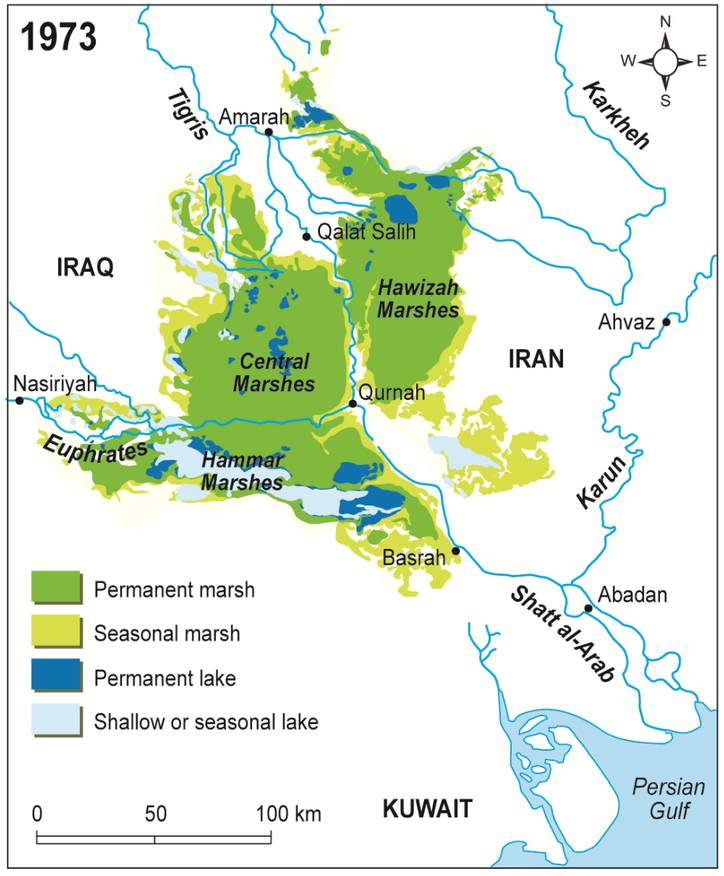


Fig 1.10- Iraqi marshes extents 1973 sourced from satellite images and maps originally created by PARTOW (2001) and modified by REKACEWICZ (2002).

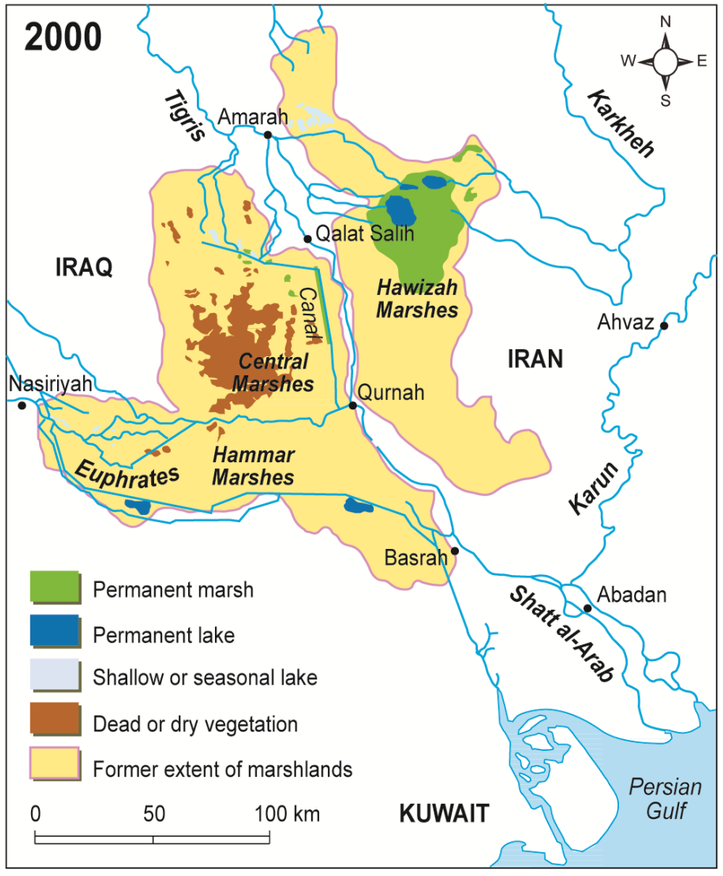


Fig 1.11- Iraqi marshes extents 2000 sourced from satellite images and maps originally created by PARTOW (2001) and modified by REKACEWICZ (2002).

Geography

In reviewing the historical context of the Iraqi marshes, it can be seen that numerous events acted as tools to change the topography of the marsh. Changes in the marsh did not come gradually; they came promptly and directly as a result of political decisions and catastrophes. The next change, posited by this thesis, is planned to be a politically motivated one as well: a tribal uprising to take over the marsh after oil depletion. With this uprising, the marsh landscape will be shifting immediately into a landscape of silt and water, with the help of new prosthetic tools fostering ecology and biotic life to maintain the livelihood of these tribes coming back to the marsh.

By investigating the role of mechanical oil tools to terraform landscape into the current oil field landscape, and from the material they use, this thesis will be able to identify methods to create new sculpted forms that will be able to host fresh water in 2050 or saline water in 2100, control that water and produce a functional landscape that can sustain the livelihood of the Me'daan living in these marshes.

Shift in resources in southern Iraq is a distinct one, and it is one that is felt acutely through geographical landscape. Passing through the current landscape of southern Iraq, we notice prominent human intervention in the form of political will that has allowed massive infrastructure projects being constructed, through manipulation of landscape to suit oil extraction industry.

The geography of southern Iraq is shifting constantly—the fluvial plain formation keeping the landscape in a constant state of change. With the discovery of oil, the upper geological strata started to shift rapidly, with an accelerated change from being a fluvial plain into becoming a desertified construction zone that hosts multiple extraction platforms. These changes to the strata have been manipulated through water infrastructures and oil infrastructures.

The water infrastructure has gone through different phases of evolution, changing from being a seasonal infrastructure into one that is permanent. Early trials to control water included control of the flow of water through the landscape of a farmland—a method learned through Sumerian tabloids and heritage sites. Water infrastructure started to shift gradually, moving from being formed with malleable material (clay, reeds and stone) to developing into being formed with clay bricks during the Islamic and Ottoman empires and finally into what currently is used in dams and covered river banks[13].

When the Iraqi government started investing heavily in the oil industry, the seasonal shift of the fluvial river flow started to be a problem, making the land unstable and unusable for constant oil extraction[14]. This meant that riversides had to be cast in concrete and there had to be increase in the amount of water infrastructure projects to prevent oil fields from flooding. The stabilizing of the riverbanks and the blocking of water flow started to push the landscape into desertification and salinity through oversaturation of the land with water. Now it is allowed to flow seasonally, as it was in Sumerian times, but it is hard to wash the salinity away[15].

On the other hand, oil infrastructure only grew bigger through the years. A landscape of oil platforms, oil pipes, transportation and roads are the most prominent features in the marshlands. It has become a fixed system that accommodates the oil industry as the only stakeholder in the marshlands. The infrastructure ended up putting the very existence of Iraq's marshlands and its people on the line—through desertification, pollution and material exploitation.

13 All-Union Design / Research institute, General Scheme of Water Resources and Land Development in Iraq, vol. 3, Water Supplies of Cities and Industry 3 (Government of Iraq, 1982), vol. 3.

14 Nadir A Salman, "Assessment of Environmental Toxicity in Iraqi Southern Marshes Using Fish as Bioindicators," Ekologija 57, 57, no. 1 (2011).

15 Sama AlMaarofi, "Ecological Assessment of Re-Flooded Mesopotamian Marshes (Iraq)," 2015, 2–15.

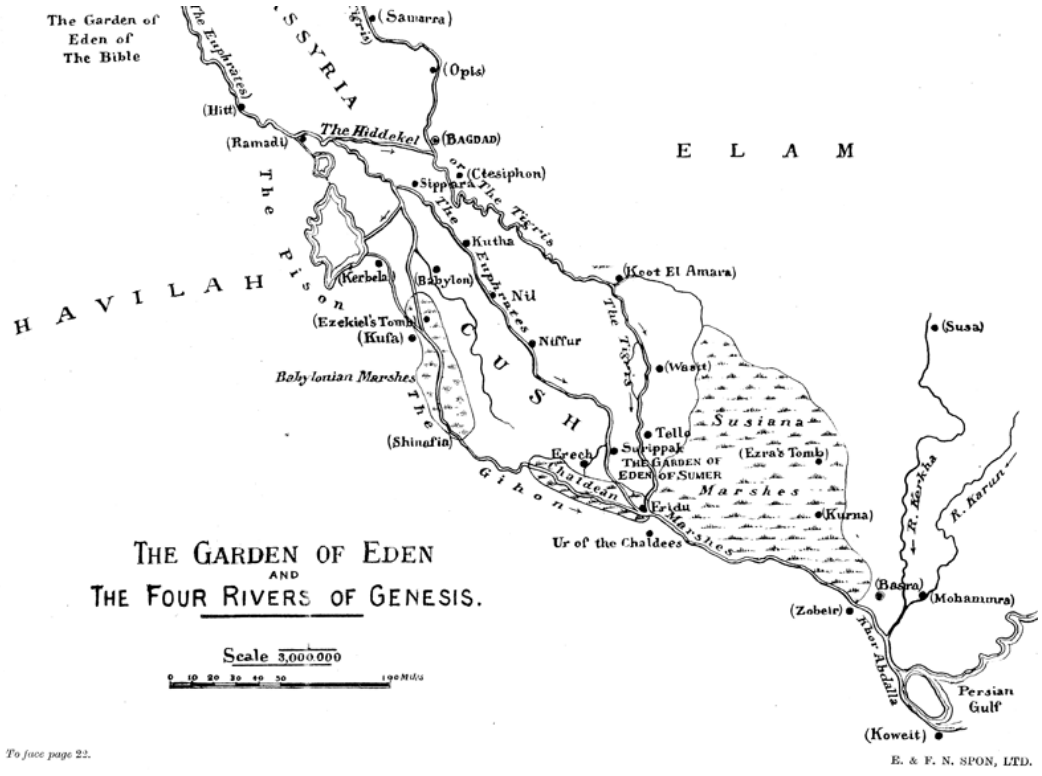
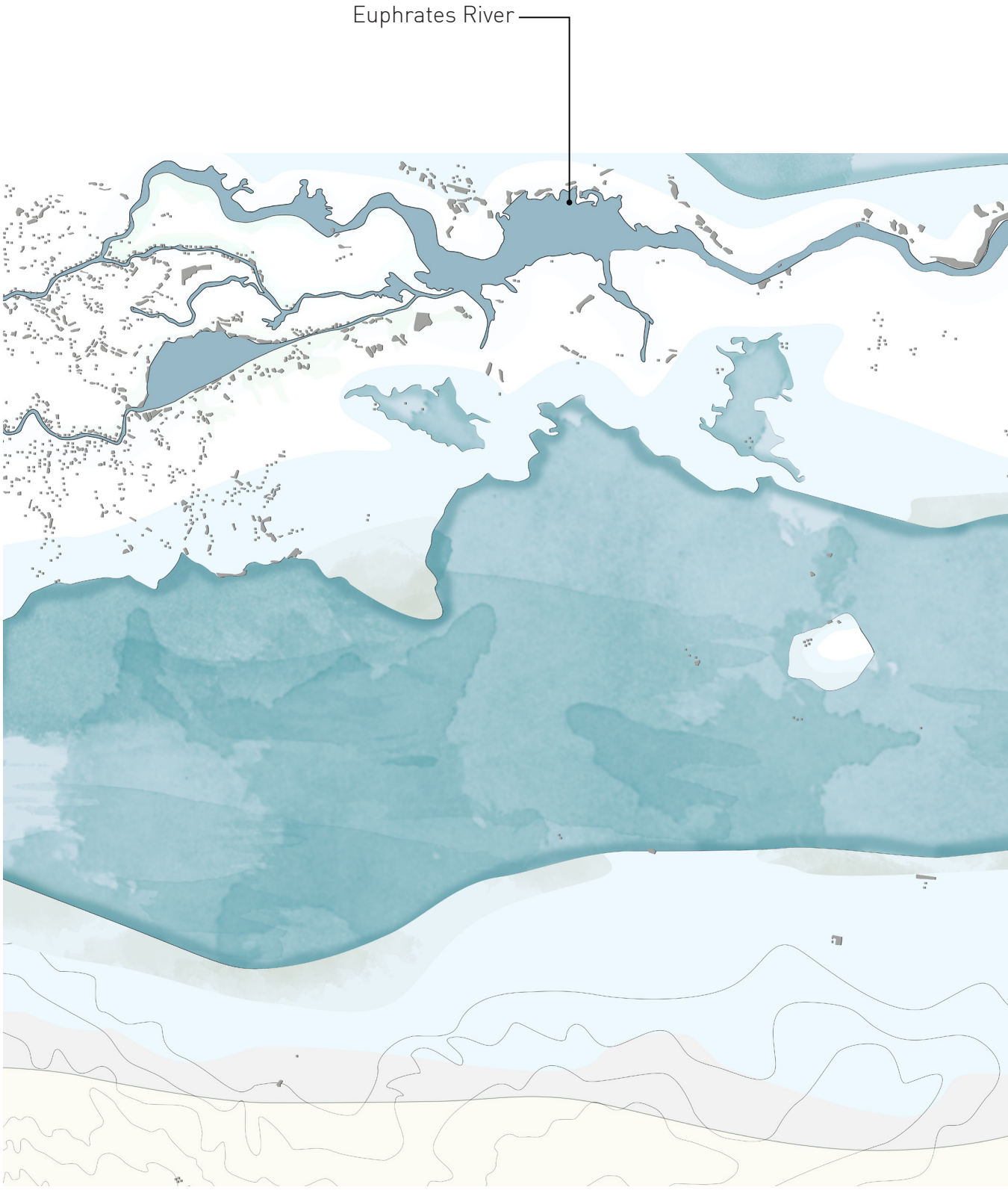


Fig 1.12- Mesopotamian marshes



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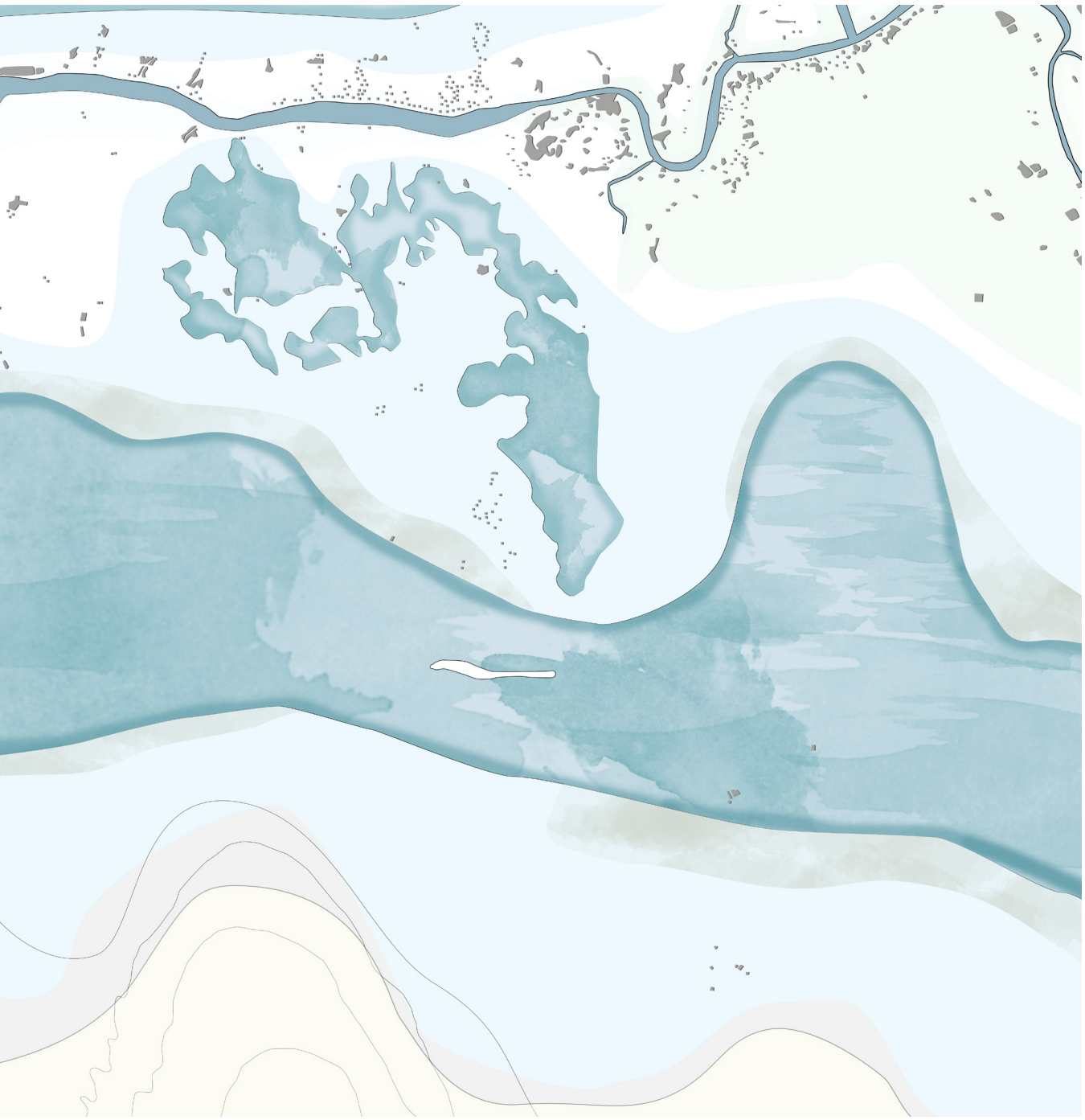


Seasonal Marsh

Permanent Marsh

Arable Land

Dry Land

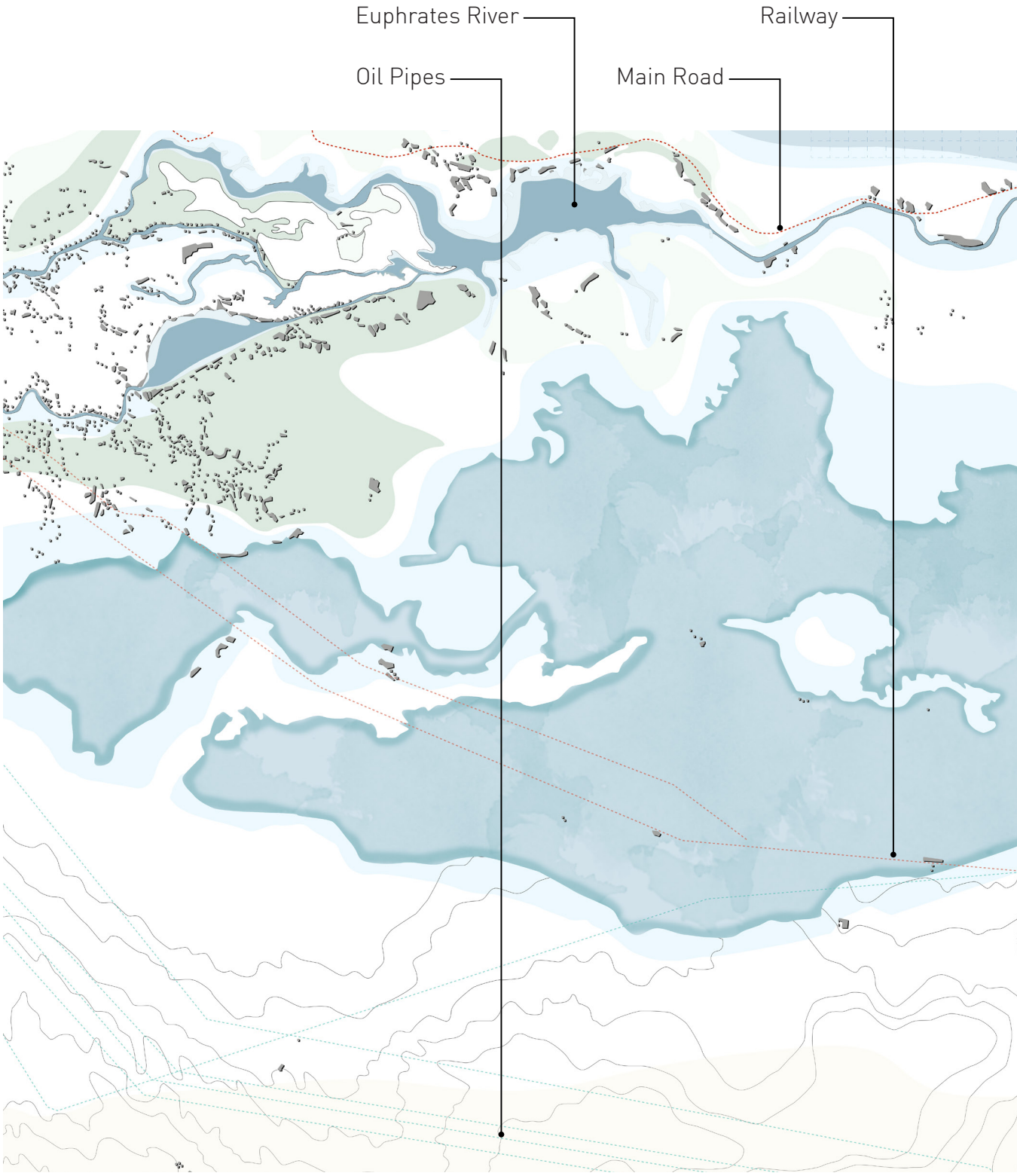
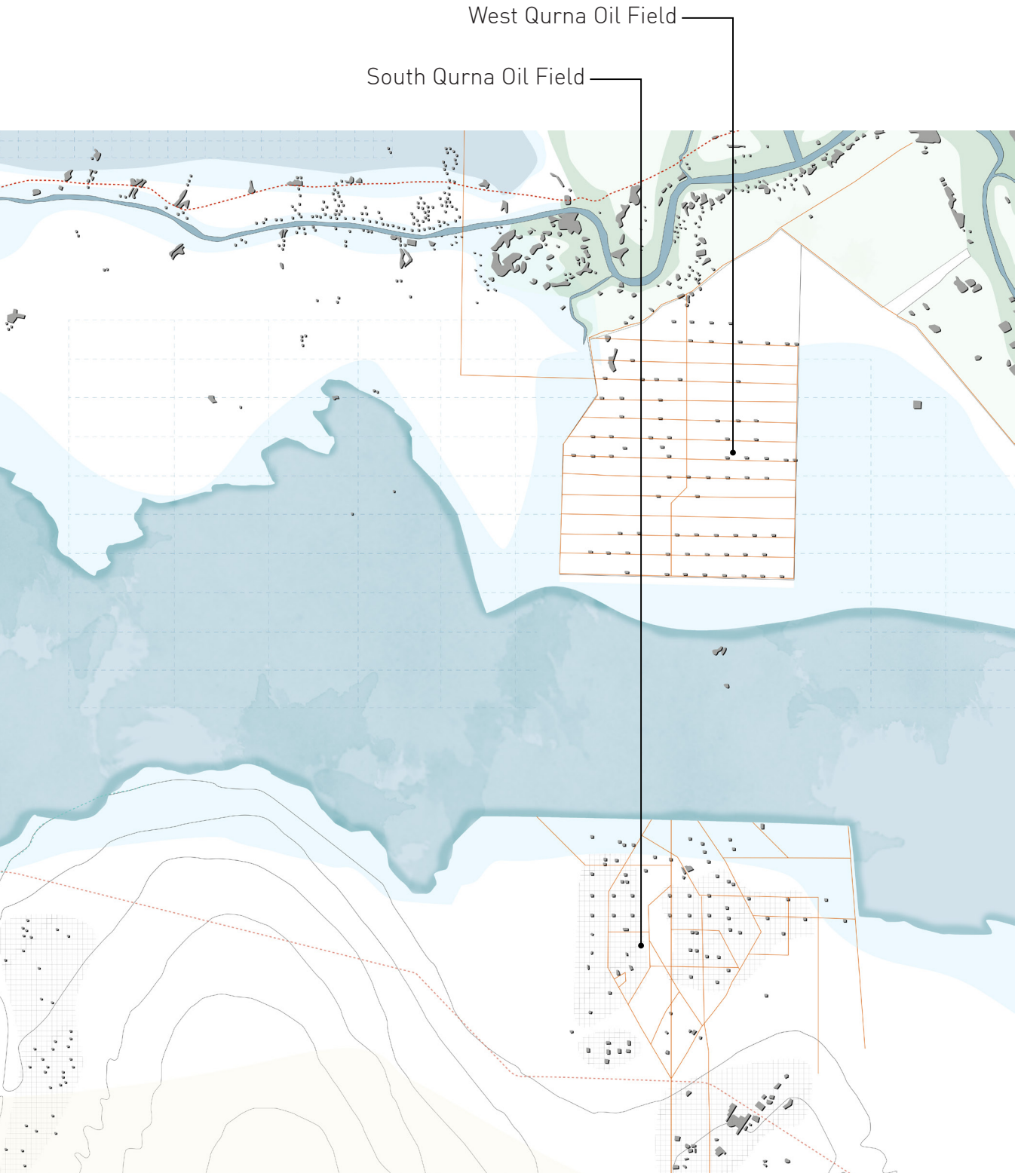


Fig 1.14- Hammar Marsh 1979



Seasonal Marsh

Permanent Marsh

Arable Land

Dry Land

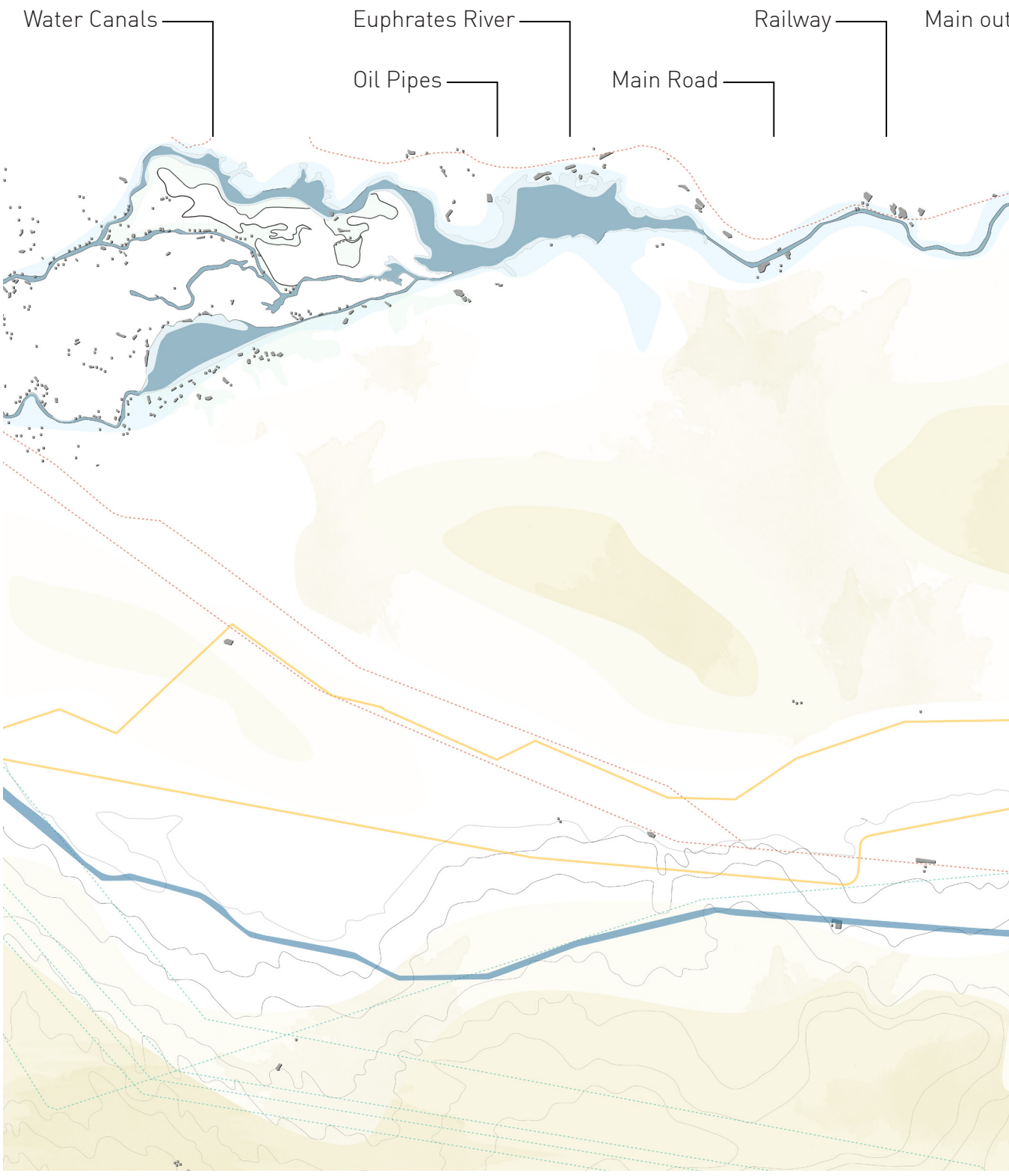
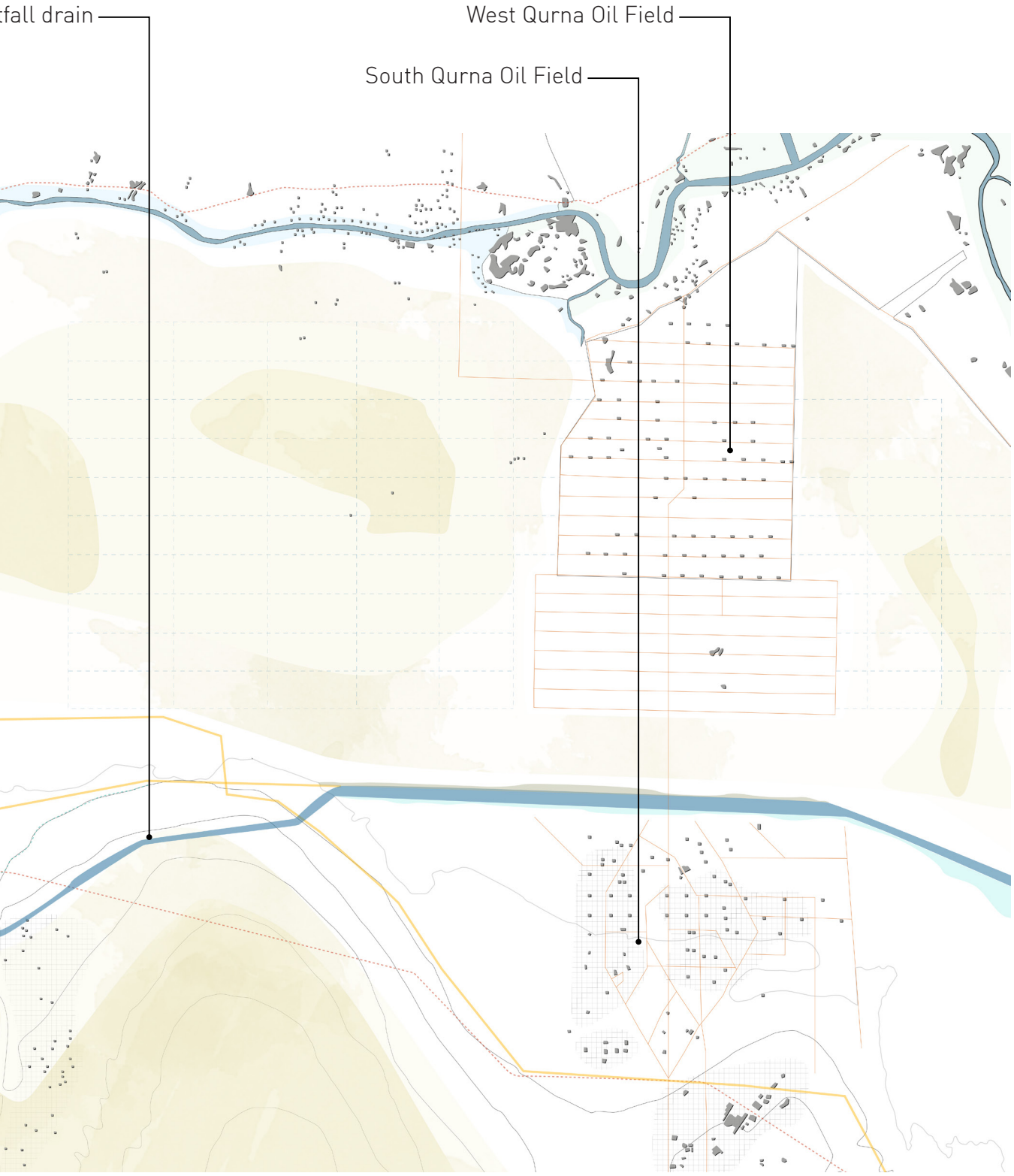


Fig 1.15- Hammar Marsh 1991



Seasonal Marsh

Permanent Marsh

Arable Land

Dry Land

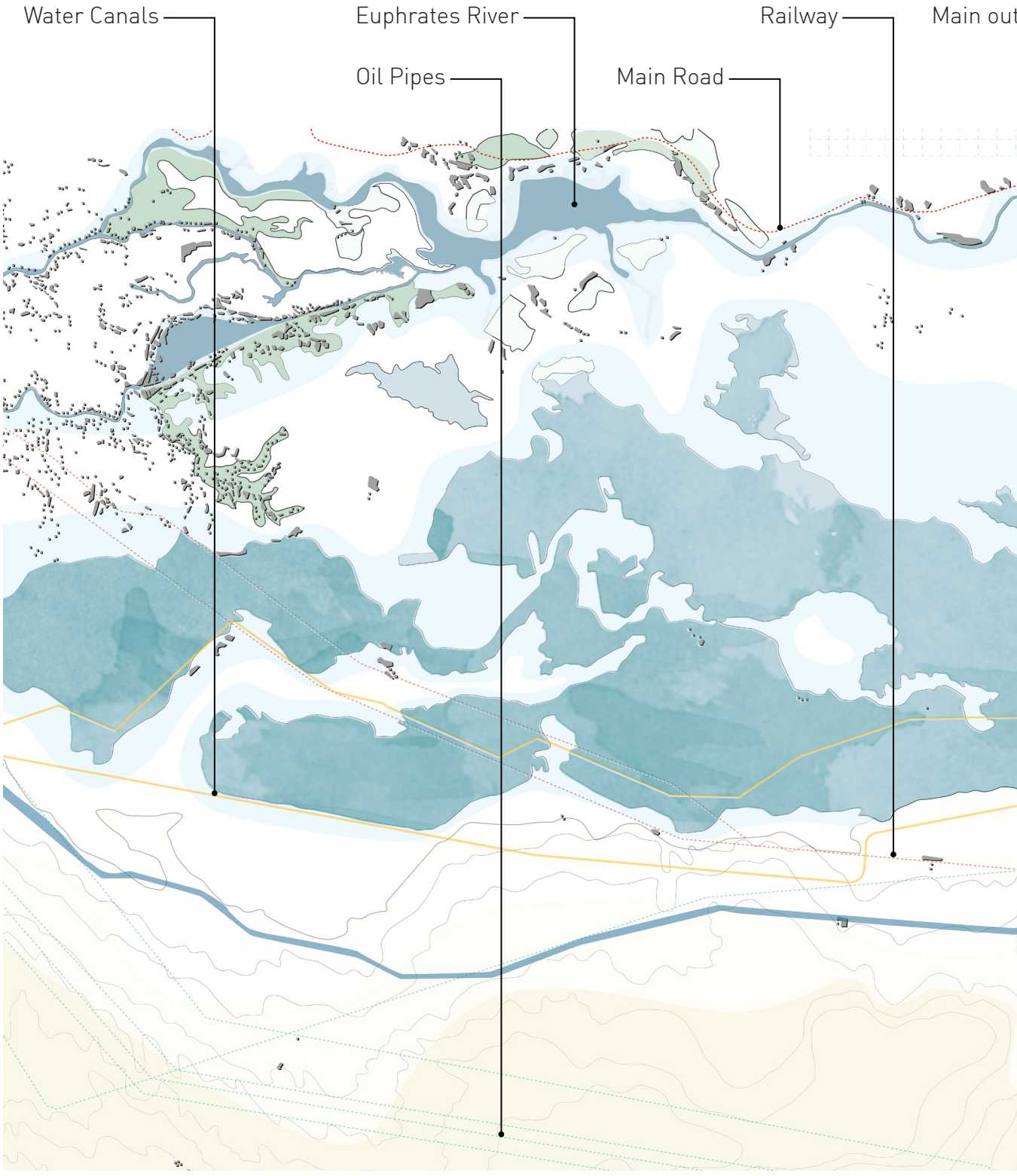
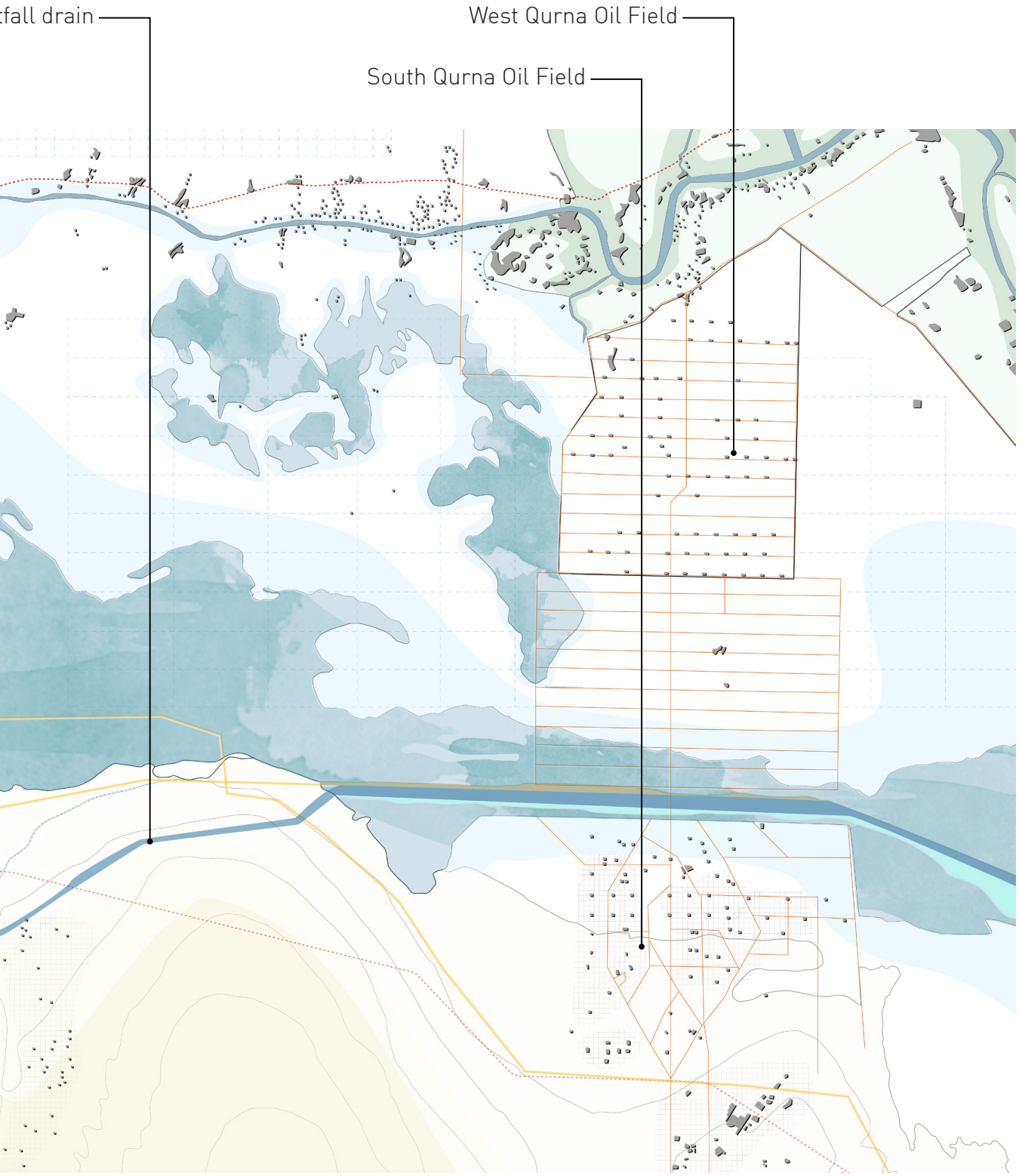


Fig 1.16- Hammar Marsh 2016


tfall drain
West Qurna Oil Field
South Qurna Oil Field
Seasonal Marsh
Permanent Marsh
Arable Land
Dry Land

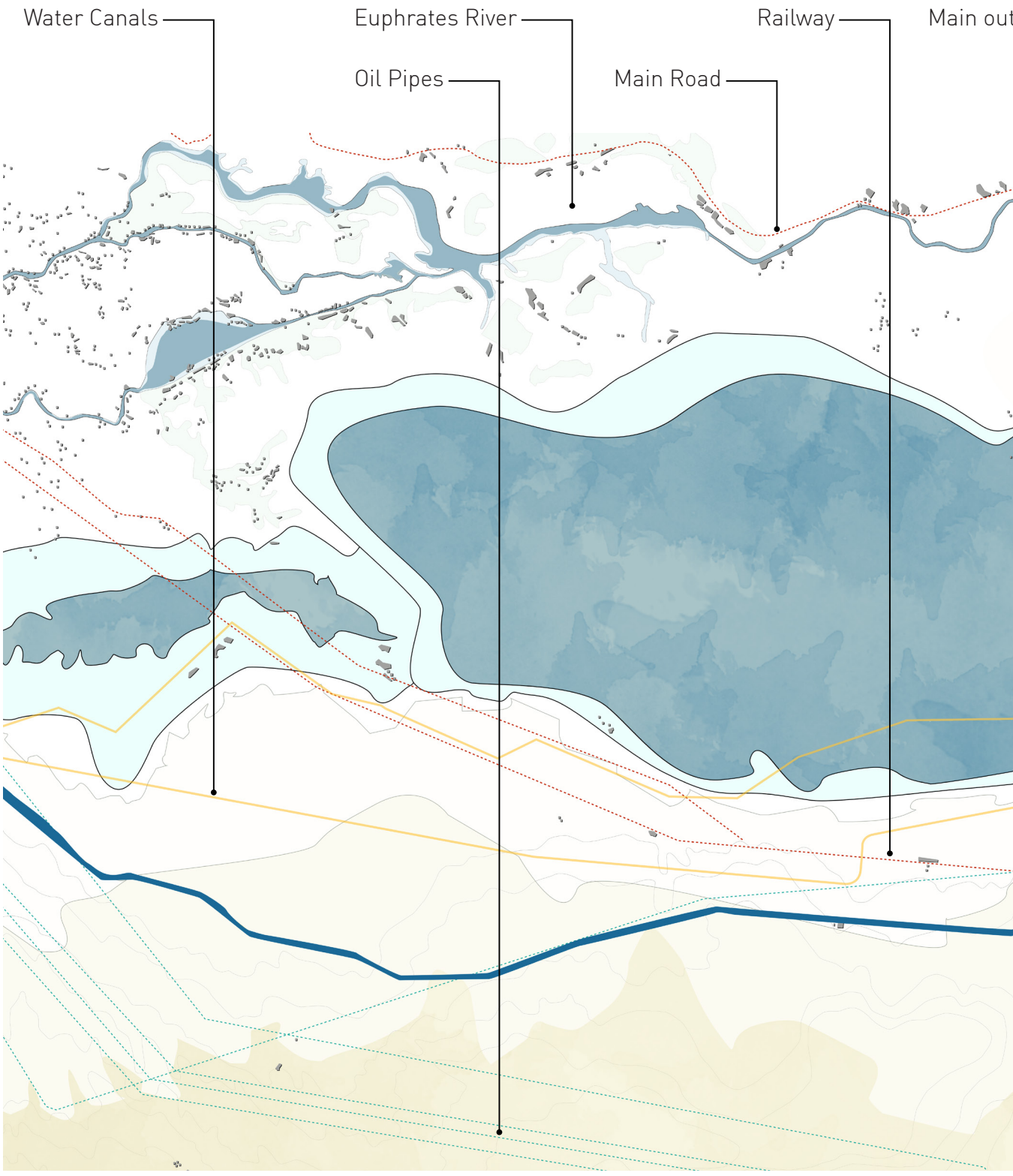
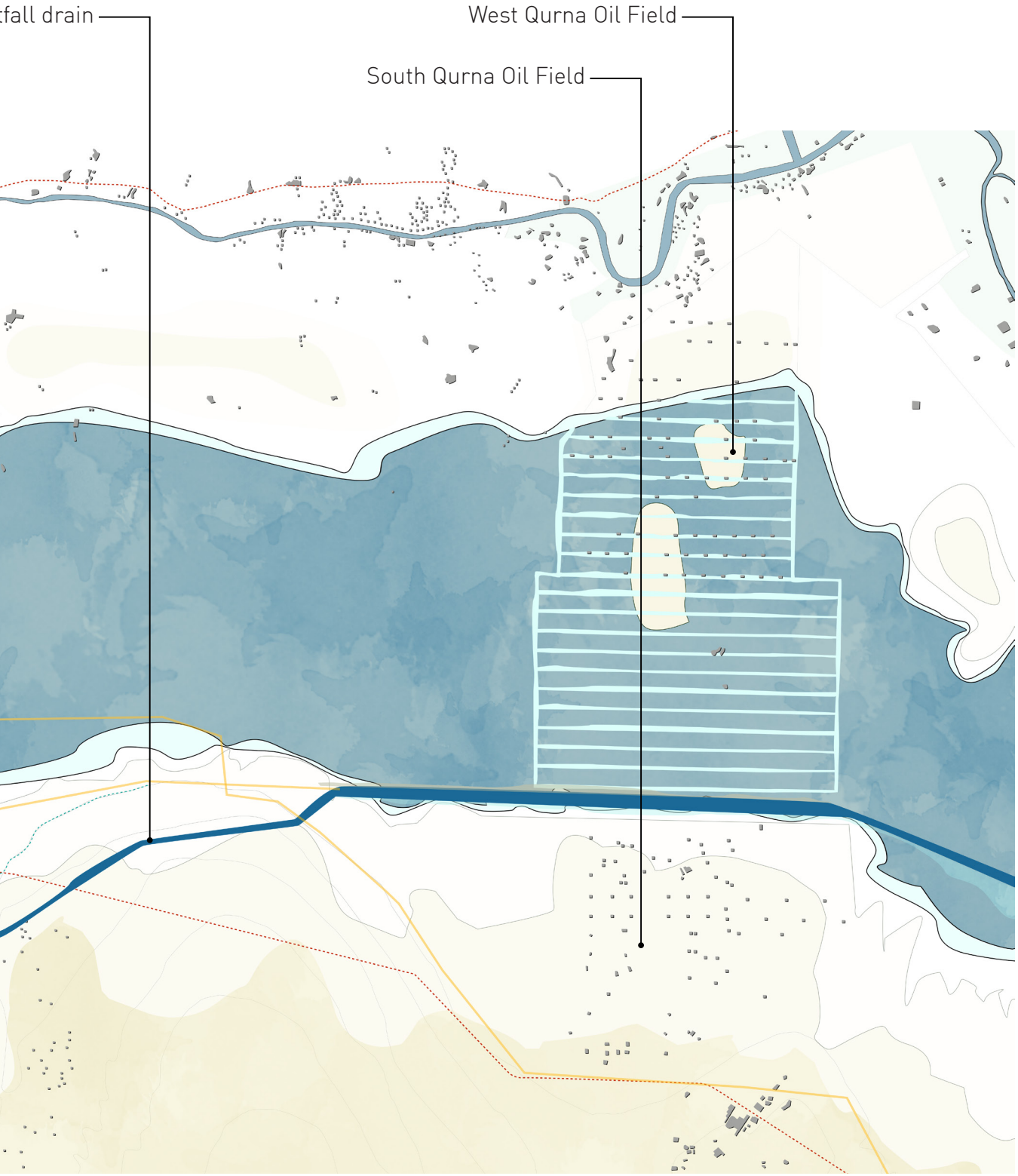


Fig 1.17- Hammar Marsh 2050



Seasonal Marsh

Permanent Marsh

Arable Land

Dry Land

Politics

The system of land ownership in the Iraqi marshes experienced extensive changes over time, from being a collective tribal system reliant on a shared economy and shared land resources in the Sumerian era, to a system of corporate private ownership and foreign investment where land is secluded and militarized in 2006. This privatization of marshland meant that marsh individuals and tribes were gradually displaced from their inhabited environment, which in turn changed the social and political fabric of the land[16].

The first mode of settlement was devised by the Sumerians, in a political system that was somewhat in between a monarchy and a democracy, a system that had a land caretaker, alongside a tenured system of sharing that incorporated arable land rotation between different families, a tenured system of alternating the capital city of the Sumerian empire as a shared political system.[17] The tenure system was a necessary tool for building the irrigation system in the marshlands. Artificial irrigation was the main tool for agriculture and with it came the need for a horizontal ownership system of sharing land and resources.

The second form of settlement in the marshlands was an Islamic system of ownership, which differed from the Sumerian system by being a unique system that ascribed all land ownership to "Allah," subsequently giving it to the crown ruling the land, allowing private ownership of land as an exclusive right of enjoyment, including the right of using, altering, disposing of but not destroying the object owned,[18] since destroying something owned by god is a religious crime in Sharia law.

In the 1600s, during the rule of the Ottoman Empire, the ownership system started to evolve from the Islamic system, controlling the approval of private ownership of individuals to their registration in the army, where a person needs to join the army ranks to receive a land ownership for the purpose of agriculture, this type of ownership allows household owners to employ "peasants" to harvest land, while the government receive tax payments and military service from the household owner. [19]

16 Kojin Karatani and Michael K. Bourdaghs, The Structure of World History (Durham: Duke University Press, 2014), 57–81.

17 Johannes M. Renger, "Institutional, Communal, and Individual Ownership or Possession of Arable Land in Ancient Mesopotamia from the End of the Fourth to the End of the First Millennium BC," *Chi.-Kent L.Rev.* 71 (1995): 269.

18 S. Salasai, "The Concept of Land Ownership: Islamic Perspective," *Bulletin Geoinformasi* 2, no. 2 (1998): 285-304.

19 Berfu Durak-Sen, "Comparative Evolution of Institutions: Property Rights on Land in the Ottoman Empire and Modern Turkey," *The Economic History Society* (2008): 140.

This system started to become a norm in the Iraqi marshes, with the Ottoman Empire starting to register marsh people for the Ottoman army, but the Me'daan would hide and flee from volunteering for the Ottoman Empire. As a consequence, many of them lost stakes in their own land, fleeing from the Ottomans. This system to govern the marshlands, the "fief" system, evolved further to become a feudal system where "peasants" farming the land would have to pay taxes to the government (just like the Islamic system does) but in addition would also be required to pay fees to the land owners as a fee for using their land. This system of land ownership formed a monopoly over the marsh, limiting livelihood of Me'daan and was the first step in privatization of the marshlands.

With the Ottoman's introduction of land use, the marshland was classified into private land and some into land owned by the state. Several categories of land were introduced by the Ottoman making land ownership a given right by the government, restricting tribal movement in the marsh landscape system introduced earlier. Landscape was classified into 5 categories

1. **Arazi Memluke**– Lands held in fee—simple, freehold lands where owners need to pay taxes and serve in the military to hold a certain size of land
2. **Arazi Mirie**– Crown lands belonging to the state exchequer which was land seized by the Ottoman to make strategic projects (including water diversion projects)
3. **Arazi Mevkufe**– Lands possessed in mortmain, but tenanted by a kind of copyhold
4. **Arazi Metruke**– Lands abandoned without cultivation or ostensible owner
5. **Arazi Mevat**– Dead lands, uncultivated and unappropriated[20]

20 Frederick Ongley and Horace Edward Miller, The Ottoman Land Code (W. Clowes and sons, limited, 1892).

Which puts more land under the control of the Ottoman government, allowing them to dictate irrigation project placement along state land or corporate land to yield more privatized zones and politically controlled zones.

In the current political history, oil industry ownership has been a contested business between British, American, Russian and Chinese oil companies, shifting ownership after each of the 1958 revolution against the royal crown (shifting ownership from The British Petroleum Company into an Iraqi joint venture)[21], 1972 revolution by the Iraqi nationalist party (owned by Iraq National Oil Company), 1980s war with Iran (extracted by The British Petroleum Company), 1991 war on Kuwait (oil extraction was done by South Oil Company), and the 2003 American war on Iraq (owned by Shell and Exxon Mobil and in 2009 moved ownership to Russia Lukoil and Norway Statoil). These ownership contracts started as a lease to the oil field land in the 1970s where the marsh landscape was allowed to exist next to the oil industry, until 1991 when the Iraqi government dried the marshlands for political purposes, and that extended to the era after 2003 where companies like Lukoil and Shell were given legal zoning representation as an "oil zone" extending through marshlands, with no environmental protection rules in place.

Soil is a combination of biotic and abiotic elements coming together to form a layer of topsoil, through numerous generations of change and numerous climate factors, new layers of material start filling on top of old layers creating geological formations over long periods of time. This accumulation of materials form what Manuel Delanda describes as the physical structures that form our reality[22], and the environment we live in. Materials determines if land becomes arable, dry, or uninhabitable. Human dependency on material is extensively evident in the Iraqi marshes where the first agricultural civilization was constructed

21 Abbas Alnasrawi, The Economy of Iraq: Oil, Wars, Destruction of Development and Prospects, 1950-2010 (ABC-CLIO, 1994), 1–33.

22 Manuel De Landa and Jonathan Crary, A Thousand Years of Nonlinear History (Zone Books New York, 1997), 11–22.

Water infrastructure

With the privatization of oil land, multiple projects that aim to control the marshes have been introduced.
It is visible on this map labeled with red showing the proximity to the marshes, and its connection to water flow system in southern Iraq.

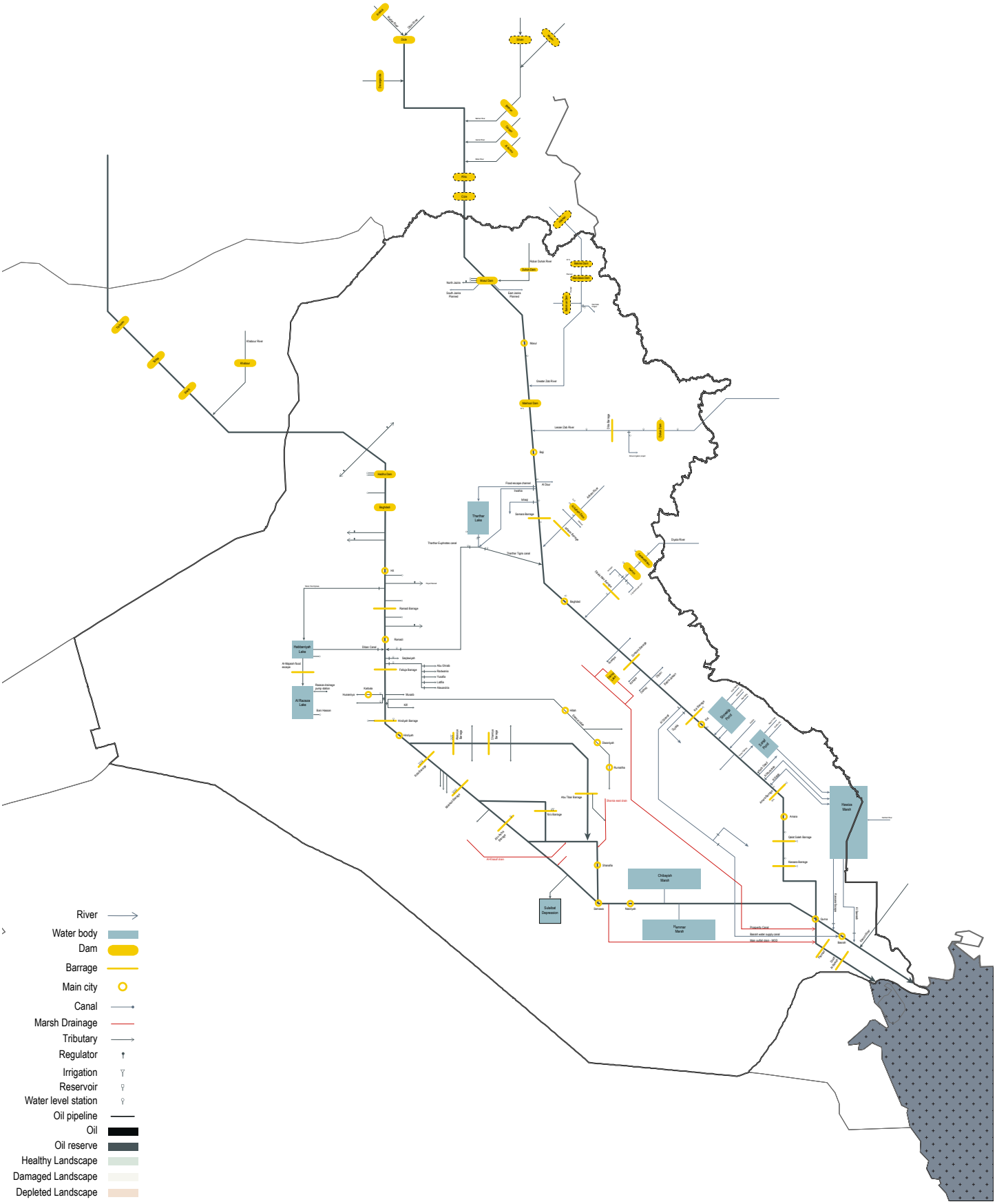


Fig 1.18- Water infrastructure

Oil infrastructure

Oil companies intentions can be noticed on this map of overlapping oil industry and marshes, multiple oil fields are on top of the marshlands, in addition, multiple oil pipes need to pass through the marshes to pass through to Jordan and Saudi Arabia to go directly to their ports.

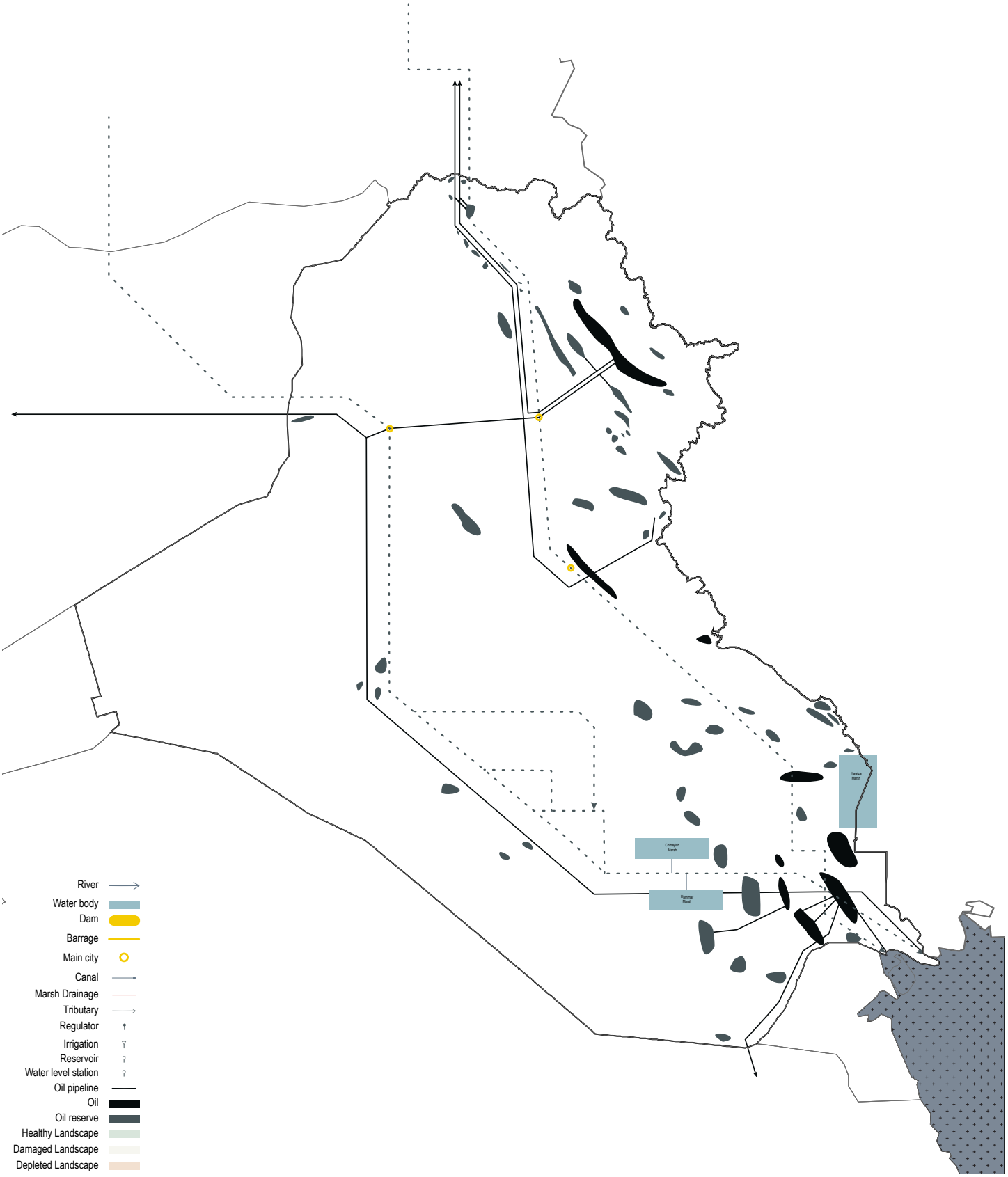


Fig 1.19- Oil infrastructure

Infrastructure impact

The impact of the oil industry could be seen with this map of desertification in southern Iraq, depleted landscape started to grow and change the properties of the soil and weather in southern Iraq

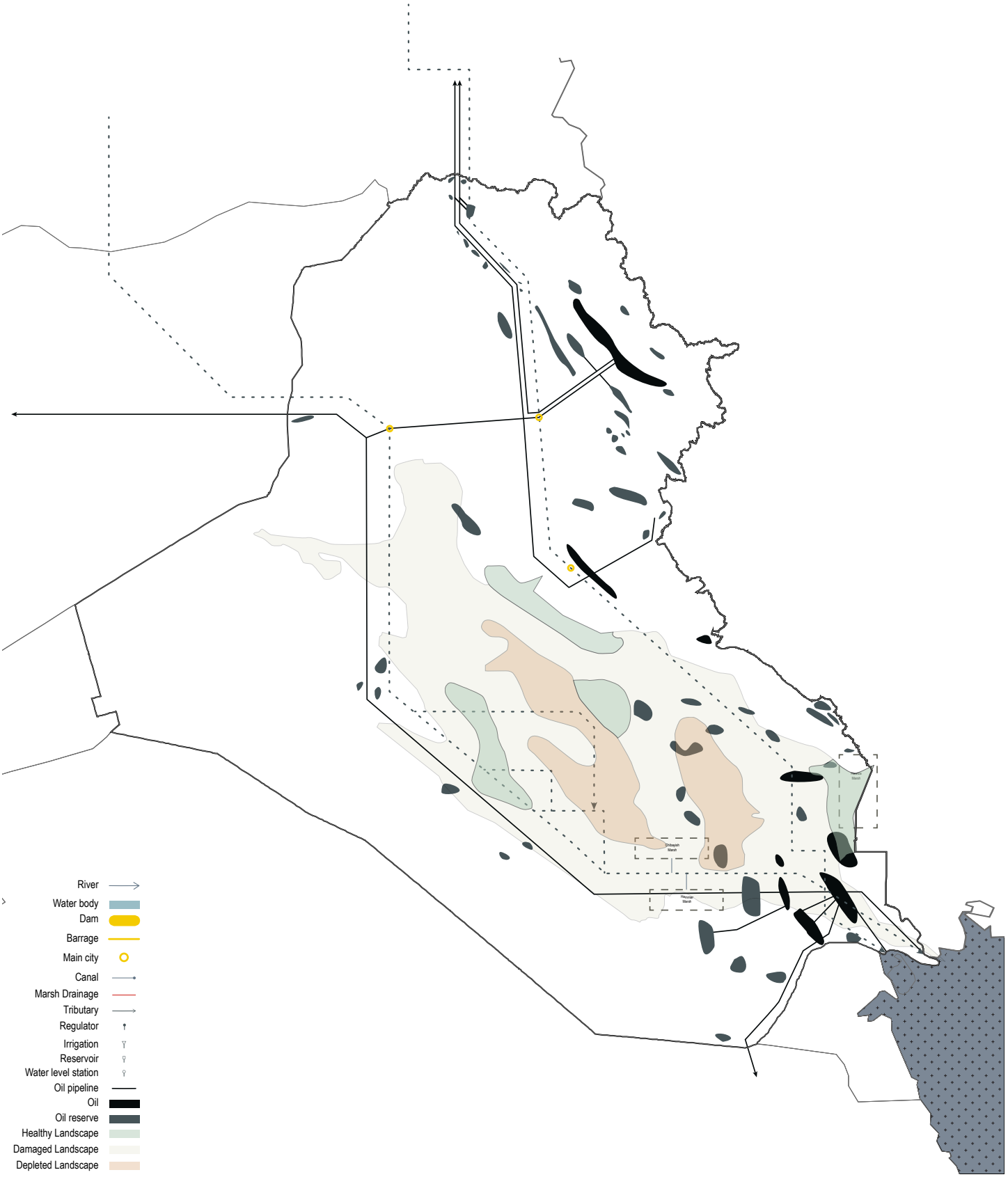


Fig 1.20- Infrastructure impact

Material

Marshlands were formed through silt deposition over millions of years, a process of accumulative sedimentation of various materials flowing with the Tigris and the Euphrates. Due to the reshaping of this flexible landscape into a rigid one formed by oil industry, the marshlands started to deteriorate and mutate into a stagnant water pond preventing new silt flow to southern Iraq and replacing that silt with oil drilling aggregates and oil residue. This process of replacing materials in the marsh was not done with the aim of deliberately losing marshlands, but it was nevertheless the result of a human decision pursued for profit.

Material shift from an arable clay, silt-loam landscape into an infertile sand-loam soil changed the habits of humans living by the marshes, who originally formed their economy around marsh resources of fishing, farming, and herding and were subsequently forced into an economy of oil drilling and processing petrochemicals. A change in function on such a large area of land in the span of a century began impacting availability of materials and rock types in the area, its weather and its environment. This change in properties was a product of human behavior, and of deliberate adoption of a tool to create more income for the oil industry and for the government through oil extraction.

Through a series of human interventions in the 20th century, human settlement started a new shift in resources away from conventional farming and toward mining and trades. For example, in the UK town of Manchester, a change in the type of jobs around the city from farming into coal mining occurred, which contributed in making a new type of inhabitance that focused on coal as a resource instead of traditional farming, making a new coal city instead of the traditional farm town. According to Manuel Delanda, a territory's material is affected by its function.[23] He says that human occupancy results in a set of unplanned results of human agency—in the case of the marshes, this took the form of shifting resource materials from being a resource of oil into a resource of silt as a tool to change human agency, and keeping the income factor as a tool for human expansion and prosperity.

While in the 1800s, the intense circulation of coal energy allowed a larger number of new (mining and factory) towns to emerge, in the Ruhr region in Germany and Lancashire in Britain[24]. This shift of resources from silt and water to oil changed social operations in southern Iraq from farming into the industrial zone that it is today, creating a large number of smaller worker towns scattered around oil fields,

23 Ibid., 71–99.
24 Ibid,25-57.

within driving distance of work sites. These smaller towns altered the behaviors of Me'daan from being nomadic tribes who inhabit seasonal settlements into becoming permanent residents in the Iraqi marshes, producing new types of human agency, aiming to control marsh flow to sustain living by controlling environmental changes and seasonal flow.

This act of control is an act of forcing human agency on the strata, an act of forcing the landscape to be suited for human settlement. This can be seen in the example of the Netherlands, where, by using a form of rigid control, human agency has been forced on sea water by constantly sectioning land. This act of constant sectioning is a chronic threat due to the constant flux of tides, winds, and sea level rise. But by changing the strategy into an adjustable system that does not force hard borders on landscape, the Netherlands places itself in a position where landscape material forces its agency on human population, and by the constant manipulating of this material, the Netherlands has begun to make an alternative option to coal and oil cities where excavated material started terraforming the surface through accepting natural flow as a part of terraformation rather than blocking natural flows. [25]

25 Jan PM Mulder and Pieter Koen Tonnon, ""SAND ENGINE ": BACKGROUND AND DESIGN OF A MEGA-NOURISHMENT PILOT IN THE NETHERLANDS," Coastal Engineering Proceedings 1, 1, no. 32 (2011): 35.

Temporal section

The hegemony of oil intensified at the era of extraction, when the oil industry started to take over the marsh, the diagram shows how political decision making contributed in the topographic change in the marsh

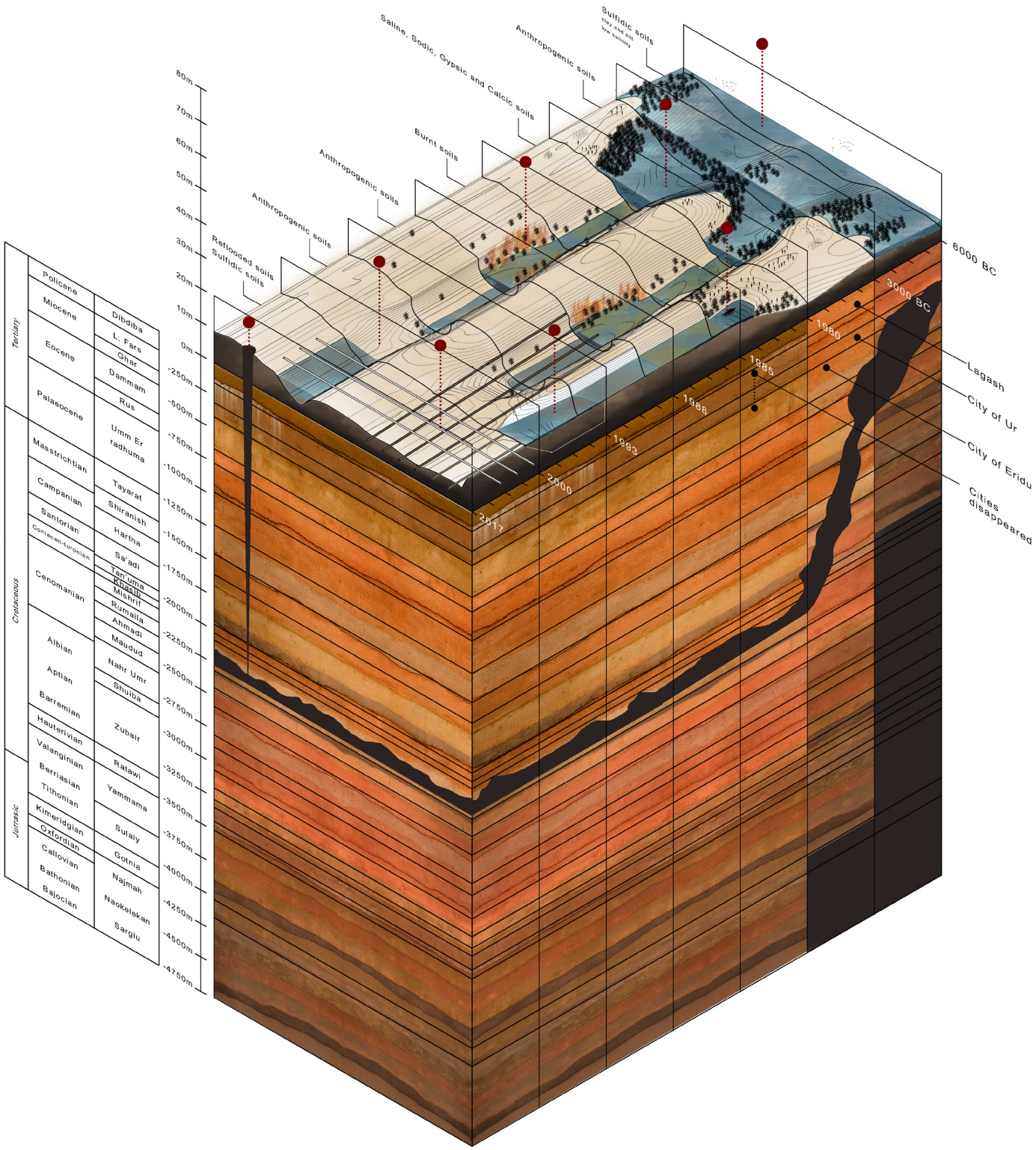
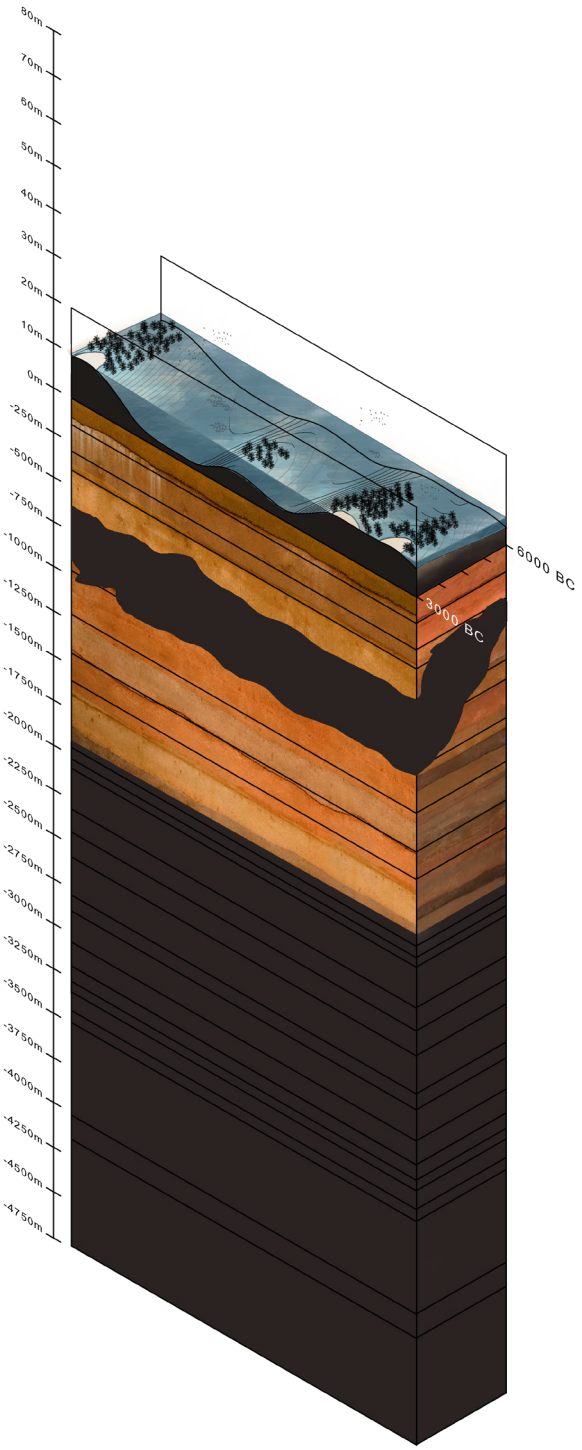


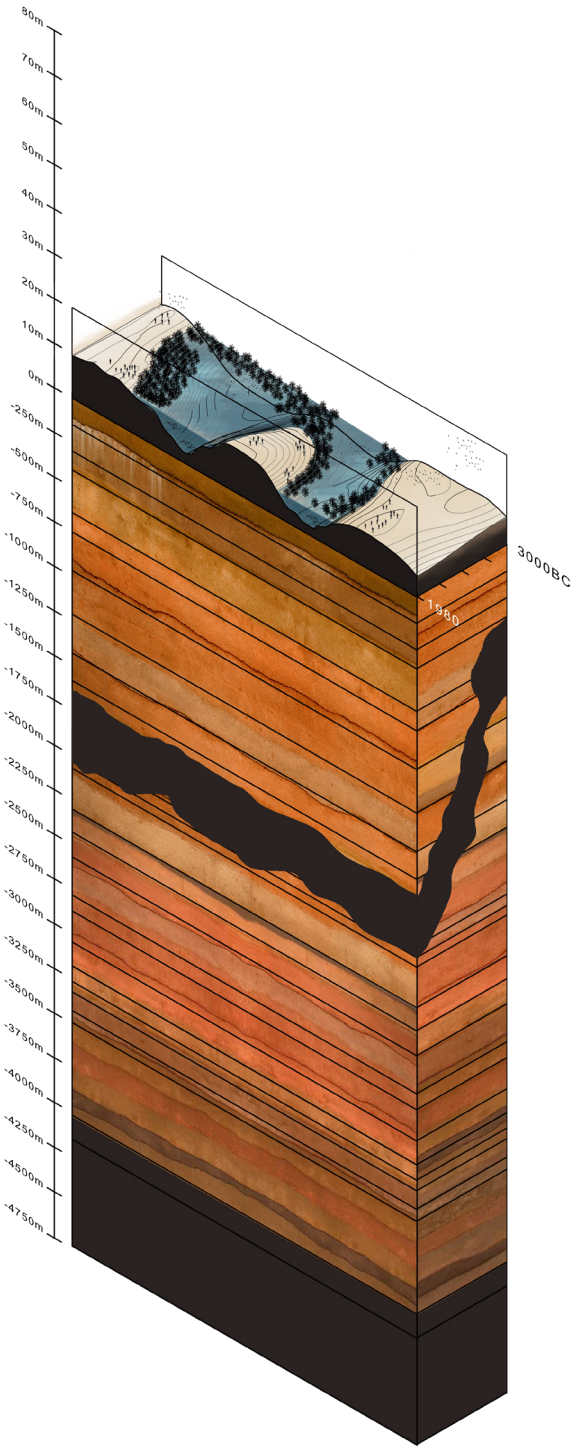
Fig 1.21- Temporal section



6000 BC

Marsh landscape was a combination of saline seawater, silt, and rock formations produced by the split in between the Arabian tectonic plate and the Eurasian tectonic plate, forming the Zagros fold passing through current day Iran, and forming the Mesopotamian foredeep enclosing the Iraqi marshes.

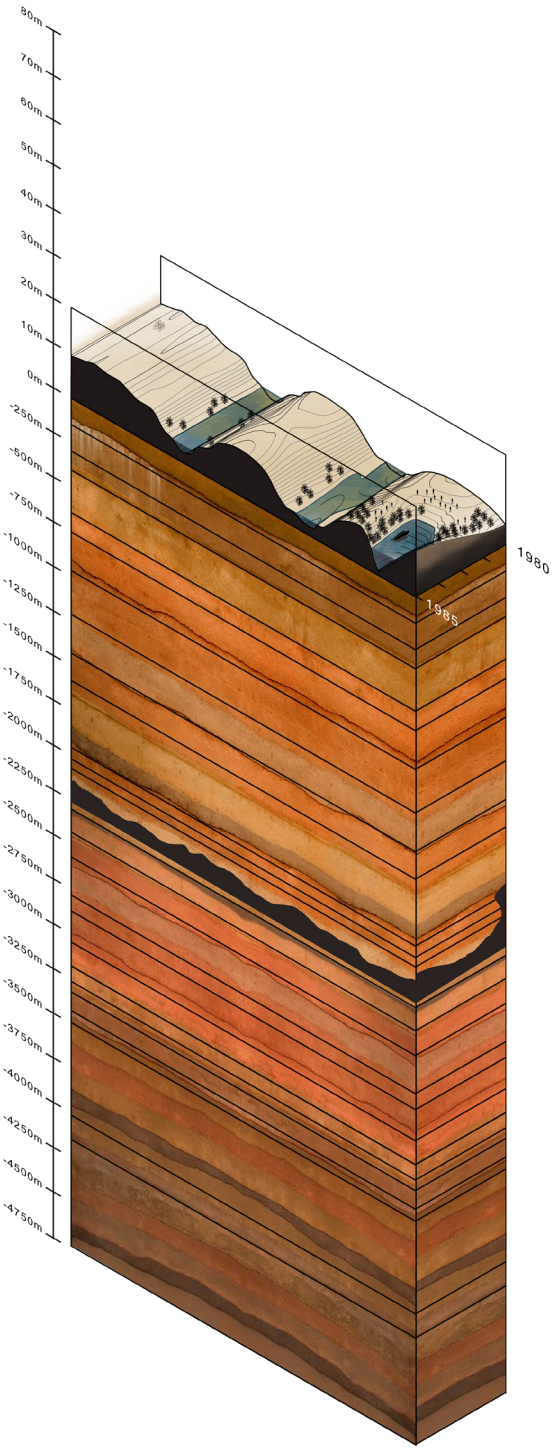
Fig 1.22- Temporal section 6000 BC



3000 BC

With the depression of saline water into lower levels, saline marshes started to receive more fresh waster from rivers to form a fresh water deposition. This change to fresh water accommodated artificial irrigation and farming in the marshes

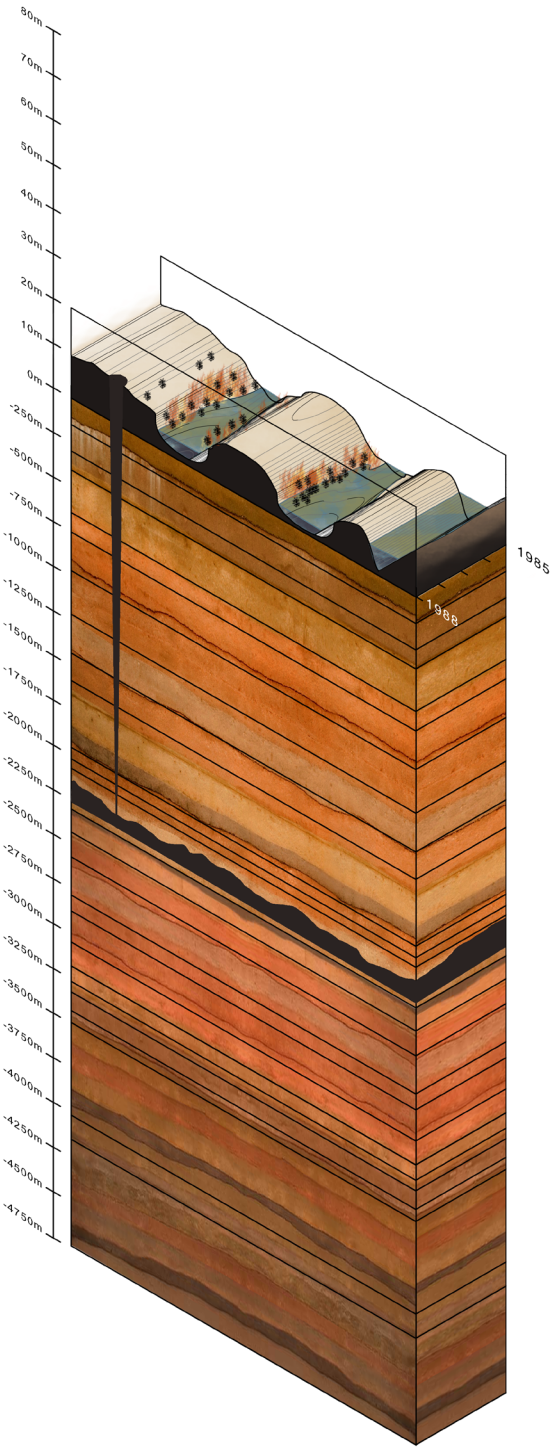
Fig 1.23- Temporal section 3000 BC



1980-1985

Due to political and military reasons, the iraqi government started a new stage of control, directing fresh water through canals to clear more spaces in the marshes for military movement, and strategic farming

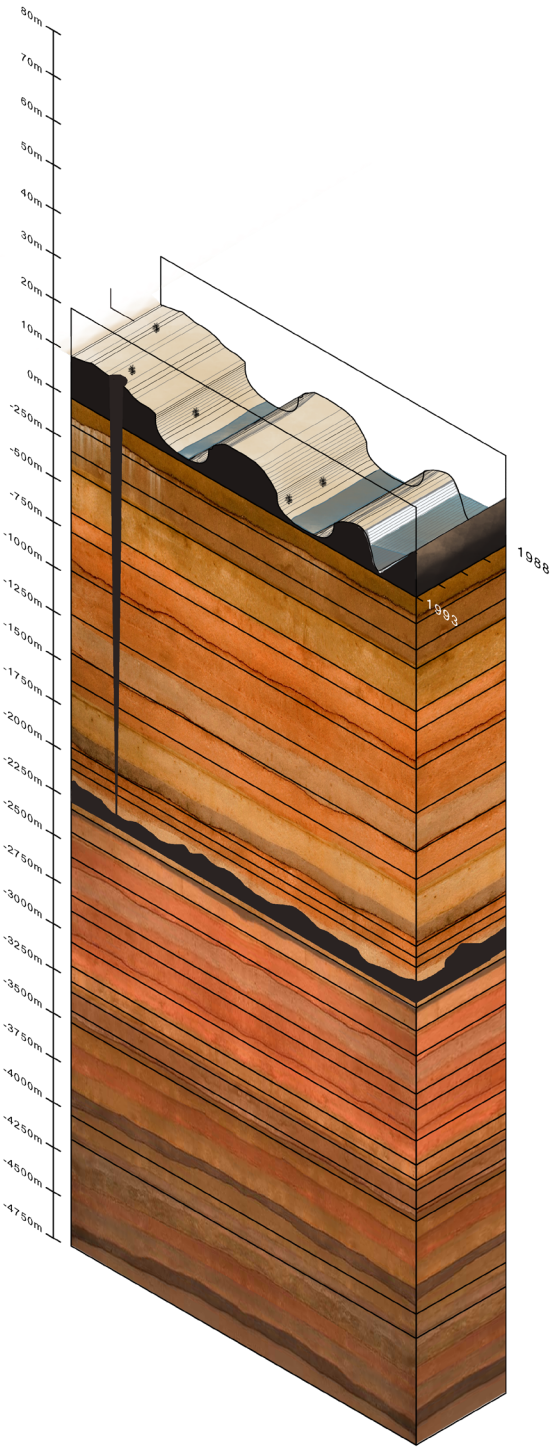
Fig 1.24- Temporal section 1980- 1985



1985-1988

At the end of the IraqIran war, part of the marshlands was burned to form strategic new lands for farming. by burning marsh reeds to clear way for farming equipment, the iraqi government did not go through with the project, and the marshes ended up with vast areas of burned and futile land

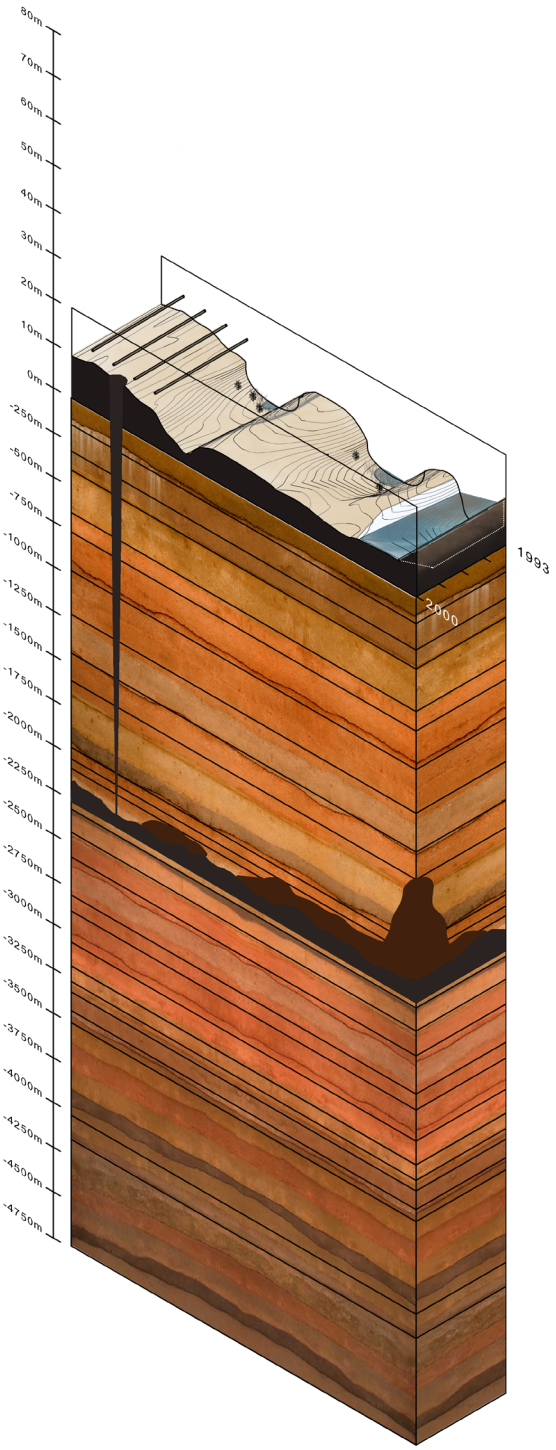
Fig 1.25- Temporal section 1985- 1988



1988-1993

After the Kuwait invasion in 1991 the Iraqi government wanted to control the population of the marshes, and produce more oil at the same time to supply government spending. The Iraqi government started leasing marsh land to the Iraqi oil company to expand their fields and operation, but at the same time dry the marshes.

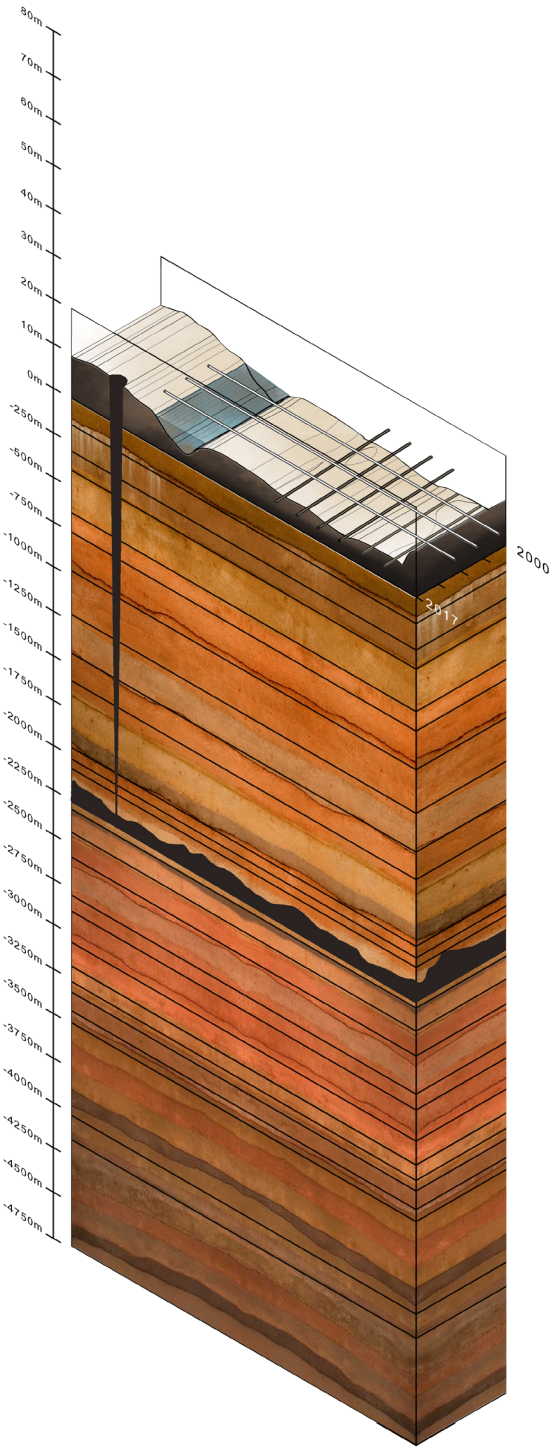
Fig 1.26- Temporal section 1988- 1993



1993-2000

1993 marked the point when the marshes became a fully dry zone, all the water has been diverted through canals directly to the sea, making these marshlands into a new man made desert that spans over 500 km sq. with more space for the oil industry to expand over the new accessible landscape

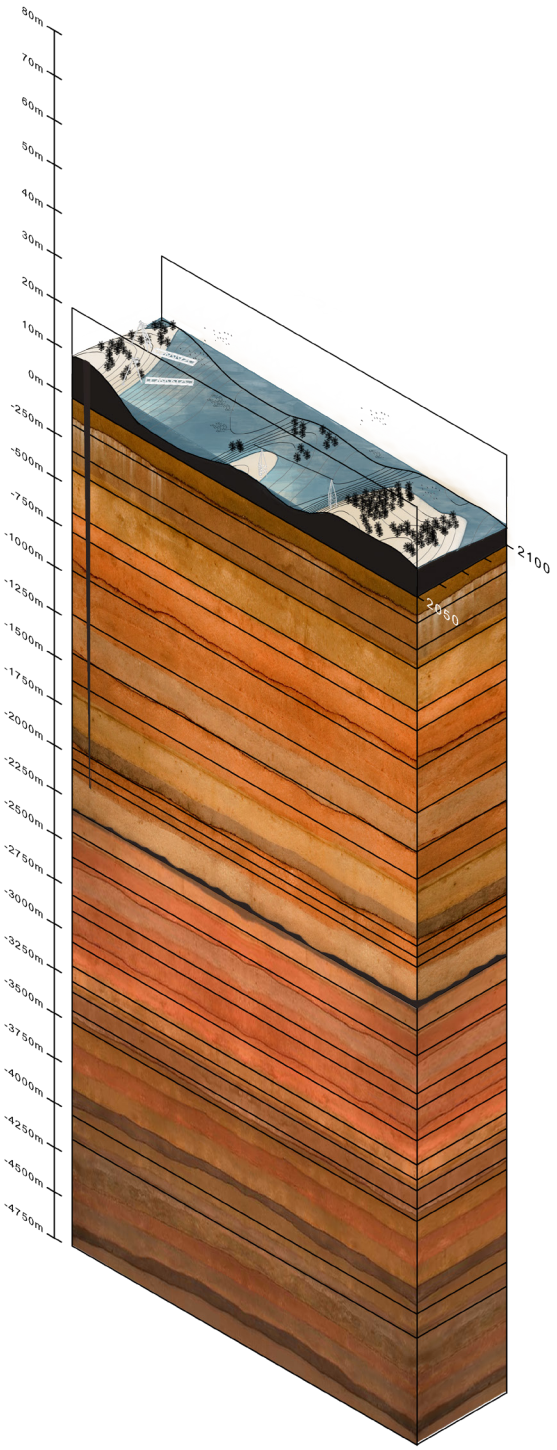
Fig 1.27- Temporal section 1993- 2000



2000-2017

After the fall of the political system in 2003, the marshes have been re-flooded again through the breakdown of the canal barrier to the marshes. A new system started to emerge overlapping the marshes with the industrial piping / platforms of the oil industry producing material overlap and pollution

Fig 1.28- Temporal section 2000- 2017



2050-2100

With the constant sea level rise, saline water will find its way back into the Mesopotamian foredeep, forming a new overlap which will change the way people interact with the new saline environment, and how the oil industry interact with the water flow into their platforms

Fig 1.29- Temporal section 2050- 2100

Machines

The intensification of agriculture in the Sumerian era was a vital technological first step that evolved to produce more complex industrial tools, pushing the marshes into their current oil boom. The development of artificial irrigation was realized using tools that human race learned to manipulate through trial and error creating a workforce that possess the technical knowledge of agriculture. At that time, the simple act of using sticks, shovels, and buffalos as work tools became the norm, generating a skilled work force engaged in farming and possessed the knowledge and the knowhow to grow crops.

With the use of animals as an apparatus to replace human muscle power, animals transformed into mere tools in the hands of the skilled workers,[26] as Delanda argues. Prosthetics need energetic human input to be a catalyst to produce and sustain an agricultural / industrial revolution.

In the case of the Iraqi marshes, several prosthetic tools were introduced to the landscape at the beginning of the agricultural revolution and during the industrial phase (oil extraction). These are evident in the form of machinery, and the landscape adaptation to that process of machinery.

Tracing the history of production tools in the Iraqi marshes will lead one back to the first phase of the agricultural revolution in 6000 BC, when using wooden and brick tools to manipulate landscape and to create an artificial landscape irrigation system, using domesticated animals to do daily activities of irrigation, digging and harvesting, was prevalent. The function of the animals was very clear: to be an apparatus for human decision-making that manifested the disparity between the original argument of the agricultural revolution being driven by domestic animals and the development of tools, into adding the factor of skilled workers who function as a "complimentary input" for these machines or tools and act as a catalyst "bringing together and amplifying flows of energy and material."[27]

In the oil industrial revolution in Iraq, when human and political decision changed the flow of materials from silt and mud being the main medium of agriculture to oil as a new industry, a new intensive material to exploit was found. Available tools started to evolve and become more integrated into the system of oil extraction, and instead of the traditional tools of handheld devices and animals, the

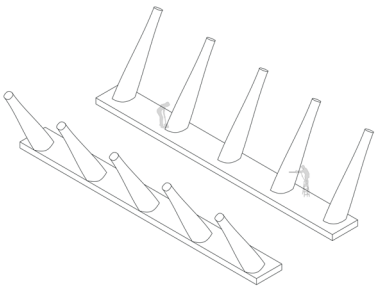
27 Manuel De Landa and Jonathan Crary, A Thousand Years of Nonlinear History (New York: Zone Books,1997), 71-103.

28 Ibid, 79.

oil revolution started to use cranes, loaders, dumpers, and excavators. This change in machines system started to yield results different from the previous phase: acts of flattening land and drilling were prominent in the marshlands. This transition between the two phases started to produce numerous workers who were out of jobs in the marsh agricultural fields and who now started working in the oil fields using these new machines as a new medium to manipulate landscape.

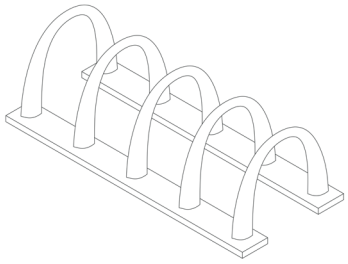
Skilled workers who moved from intensified agriculture into the second industrial revolution had a unique perspective to craft. Their accumulative knowledge of agriculture and marsh material started to yield new formations in the marsh topography, and with the new meshwork of tools available, workers started to generate new artificial terraformation of water basins and settlement zones in the marsh.

Development of tools in the marsh started with the first settlements in 6000 BC, with the introduction of different types of boats to suit diverse formations of water and silt, alongside different techniques to inhabit the marsh without affecting the productivity and health of the marsh. Studying local formations and tools would provide a platform to understand methods of using materials on site to shape landscape and readjust to it.



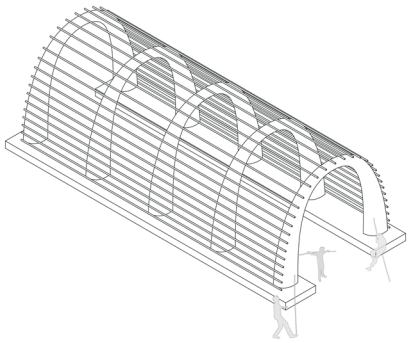
Phase 1

Reed is the main tool used to build dwelling on the marsh. A family dwelling is usually built with reeds, ropes and stacked soil beds for support.



Phase 2

Reed is used as a main ingredient for the structure. An arch is formed from bundled dry reed, binded and fastened together to create a solid form of structure that can support arched structures



Phase 3

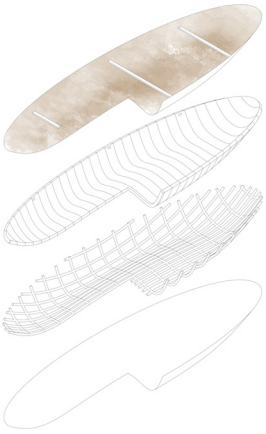
A weaved cover of reed is added to the structure as a cover for the structure, making a breathable enclosure that is adjustable to weather conditions and is portable which adabts to the marsh arabs seasonal movement

Fig 1.30- Marsh homes construction

Fig 1.31- Marsh homes construction

Reed basket boat

Are boats that are used mostly for transporting goods to markets and selling them. These basket boats are different in their round shape where it can maneuver the harsh marsh landscape of reed and unpredicted shrubs



Reed mat boat

Reed boats are used heavily in the marsh due to the availability of reed, and the need for using these boats for transportation.

Wood frame boat

Wood frame boats were introduced later to the marsh, where imported wood was used to manufacture boats that could sustain its structure for longer periods of time, and easier to maintain.

Fig 1.32- Boats construction

Fig 1.33- Coracle construction

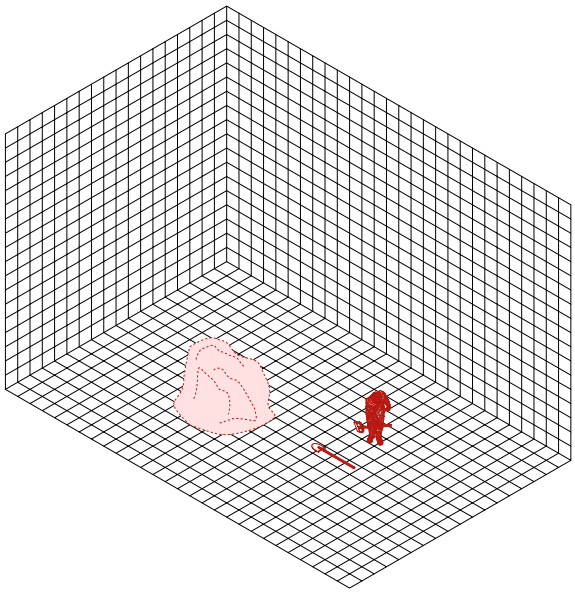


Fig 1.34- Soil Manipulation

Soil manipulation

Soil manipulation is one of the main inventions that helped the marsh arabs to kickstart the sumerian civilization. the ability to manipulate land into a functional agricultural landscape that permits water to flow through an inlet and an outlet.

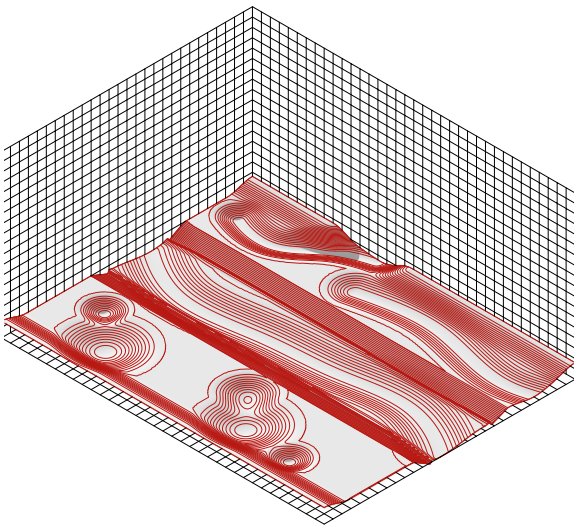


Fig 1.35- Intensive manipulation

Intensive manipulation

Intensive farming was possible for the marsh arabs because of availability of silt and soil that is suitable for farming.
Through the flow of the Tigris and Euphrates, precipitating silt from the two rivers allows new soil to regenerate and replace the old soil, that in addition keeps accumulating because of the low slope of land in southern Iraq.

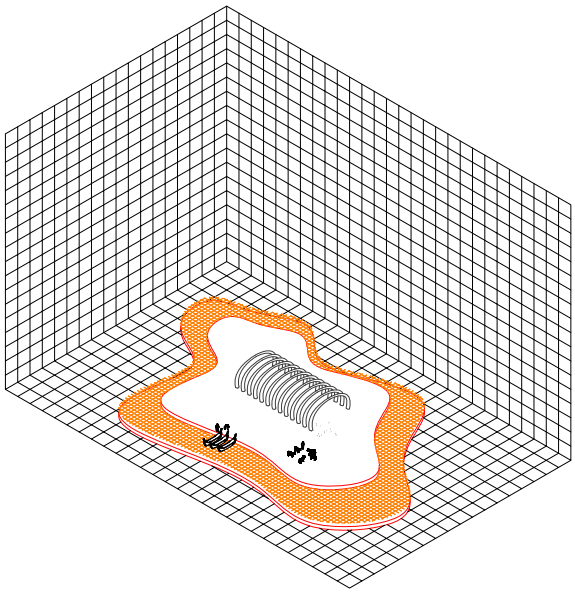


Fig 1.36- Island building

Island building

With the constant sea level rise, saline water will find its way back into the Mesopotamian foredeep, forming a new overlap which will change the way people interact with the new saline environment, and how the oil industry interact with the water flow into their platforms

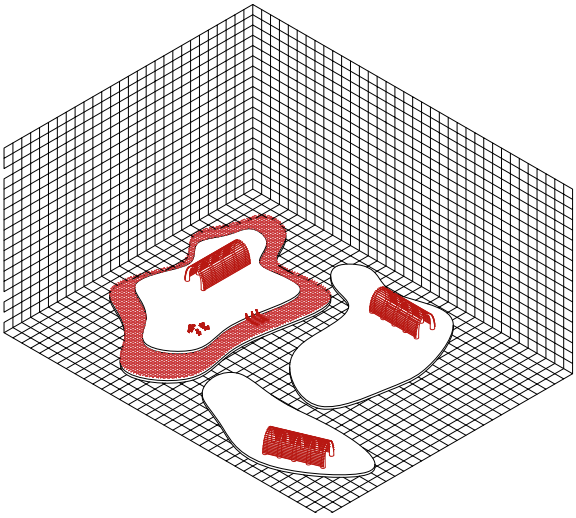


Fig 1.37- Island expansion

Island expansion

Islands are formed using compact soil and reed mats to house the marsh arabs on top of the marsh. These islands work in networks where an expanding family starts building neighboring islands to house new family members and their animals.
This mesh of islands work together to form a community of farming, fishing or herding.

Fig 2.01- Girsu Bridge by the British museum, 4 April 2018.

Part two

Malleability is what allows soil to be adjustable and be reformed and reshaped with various tools. The various ingredients of soil, like silt, mud, and sand allow different levels of permeability to host water and organic remains. The combination of these three components, water content and organic materials formed the foundation of settlement in southern Iraq for a long period. This valuable resource has been the cornerstone of humanity's evolutionary jump to agrarian societies. As De Landa and Crary point out, "Some historians postulate that urban life began in Egypt and Mesopotamia precisely because the land there was flat and hence not subject to erosion and soil loss."[29]

Properties of the clay topsoil in southern Iraq was a perfect tool to shape landscape in an agrarian society, a pliable habitat that allows itself to be shaped easily into any artificial configuration. This property allowed Sumerians to build an organic meshwork of households and a controlled agricultural infrastructure as well, revolving around users and function.

Forming clay is a process that is local for native Me'daan, a craft that has been developed by skilled workers since 3000 BC, devising a process of forming, patching, and control shifting clay from being a property of the current strata, into a tool in the hand of human settlers. This evolution of materials from being a resource into becoming a tool is a process that has been the key to human evolution, through craft and through abilities of skilled workers using physical and mental capabilities to form new tools. In Iraq during the age of energy revolution, skilled workers lost their connection to materials and tools, alienating them from labor and instead giving precedence to drilling machines, pipes and pumps.

With the emergence of information technology, it became possible to see humans and machines overlap in function and purpose, allowing machines and skilled workers to mesh and produce more integrated results. this, in turn, made it possible to humanize machines and machinize humans[30], allowing machines to be an integral part of the human development and experience in the context of the Iraqi marshes. With the depletion of oil as a resource in the coming years, Me'daan will be in transition between machines back to manual labor. Their existing detachment from labor and the domination of machines will generate a form of overlap between a population that is disconnected from skilled work as a human function and

29 Manuel De Landa and Jonathan Crary, A Thousand Years of Nonlinear History (New York: Zone Books, 1997).

30 Kim Jaehee, "Superhumanity- Posthuman Labor," e-flux, March 15, 2018, https://www.e-flux.com/architecture/superhumanity/179232/posthuman-labor"

amputated by the oil industry.

Historically, the Iraqi marshes have been a landscape wounded by war, political disaster, and capitolocene, and just like a wounded body, a landscape that is amputated needs to be prosthetically patched. A landscape that lost its connection with its material needs prosthetic help to reinstate it to a productive landscape: prosthetics in the form of mechanical tools and machines used through the process of the oil industry. Reconnecting with these tools through skilled labor would reinstate a connection to labor that has been lost through industrialization in Iraq from the 1930s.

A prosthetic is a tool that can replace, transform, and provide a new experience to the body, replacing the subject's missing part, and facilitating it's function as a replacement for a missing part, performing in the same manner or it introduces a new mechanism to replace the original one. According to Morehshin Allahyari and Daniel Rourke in "The 3D Additivist Manifesto "A prosthetic extends, enhances, and potentially completely transforms how we think about the human body" [31]. In evaluating the form of prosthetics as described in the "archaeology of additivism," it becomes evident that a prosthetic can range between an internal and an external prosthetic, and would change in their levels of adjacency and intersection.[32] Analyzing the range of prosthetics in southern Iraq would yield several prosthetic ad-hoc solutions in a country where prosthetic culture is at its highest, with a million and a half disabled citizens.[33] These ad-hoc prosthetics start with an individual scale (through post-war injuries through mortar shells and explosive devices), but grow exponentially to include residential prosthetics (through the act of squatting in post-war Iraq) all the way to urban infrastructure (road control by terrorist groups in 2004-2010, and Mosul dam control by ISIS in 2014).

31 Morehshin Allahyari and Daniel Rourke, "The 3D Additivist Manifesto," 2015, Additivism.org., https://additivism.org/manifesto, 2015.

32 Ibid., 87–93.

33 [5] National Disability Center in Iraq, "Disability Census in Iraq," 2016, http://www.cosit.gov.iq/ar/2018-08-29-07-56-45

An urban translation of the prosthetic would be of objects that pierce the urban setting, expanding and transforming it[34]. In the Iraqi marshes, prosthetics were introduced in the form of oil drilling platforms in the 1970s, and expanded to be multiple highways in the 1980s, and the prosthetic of the main outfall drain (MOD) in the 1990s was the most influential, draining the marshes and transforming them into a desert.

After 2004, the Me'daan started revolting against these urban prosthetics with tools of their own. They used medium sized prosthetics of loaders and dumpers to manufacture a new formation in the marsh, deforming the main outfall drain (MOD) and starting a new method of forming a tribal body prosthetic intervention allowing water back into the dried marshes forming a new reflooded marsh that is built on top of the remains of the previous marsh. The new layers of sediments and water move beyond the blueprints of the oil industry and form a new strata of tribal scale control that takes place in the marsh basin.

By analyzing the marsh terraformed landscape and the prosthetic tools used by the oil industry to alter the marsh, This thesis can investigate how that tribal body may function after the oil industry collapses, and how that tribal body can transform into being an urban body that influences the region through adjacent prosthetic.

34 Morehshin Allahyari and Daniel Rourke, "The 3D Additivist Manifesto," 2015, Additivism.org., https://additivism.org/manifesto, 2015.

Satellite mapping

With the militarization of the Iraqi marshes, especially the section closer to the oil fields, it is impossible to land any information related to oil field sites. Information is inaccessible and restricted by government bodies. Common citizens never understood the magnitude of change oil industry carried out in the marsh until 2003, after the fall of the dictatorship, and the increased access to Internet and geographic information.

Contested spots—like oil fields, ports, massive water projects—were not shown to the public through falsified maps distributed by the government; it is shown through a third-party source hiding nothing but American bases. This new access to information and satellite imagery was a new form of human rights that was concealed by the government. With the new satellite imagery access to the marsh and oil fields, information on the ground remained scarce. Even though oil companies' data is not officially restricted, it is protected and secured by either militarized system or by tribal leaders.

By using satellite imagery and GIS data obtained through the Hakai institute in Victoria, this thesis starts to reconstruct and visualize the marshes as they are on site: a restricted private landscape heading towards depletion, which allows the Me'daan to plan a future without oil in the massive leftover landscape created by the oil industry. In this case, remote sensing operated as a powerful tool of exposure and a means to visualize space and events in the privatized/militarized sections of the marsh to the scrutiny of the Me'daan.[35]

Satellite imagery is becoming a tool of design in disputed zones, providing a spatial visualization of an inaccessible space, becoming a form of prosthetic to visualize space. A prosthetic that connects what is present on site with people's awareness of space, making a space that is otherwise militarized, into one that is accessible and displayed for Me'daan.

35 Bechir Kenzari, ***Architecture and Violence*** (Barcelona/New York: ACTAR Publishers, 2011), 127–148.

Marsh Dwelling

Oil Workers Town

Workers town of Al-Madina is a town that is connected with the DS6-DS7-DS8 drill wells in the Qurna west field by highway, providing homes for skilled workers employed in the oil industry, connecting them with nearby towns.
This assembly resulted in making a few plastic, brick and paper factories in the marsh highway.
Assembley of oil towns is similar in size, arrangement of a marsh arabs town, these towns follow both sides of the water stream.
Worker towns are build with more permanent material of clay and concrete bricks.

Company workers 3000 people

Small Tribe Dwelling

The ancient town of Al-Chibayish exte
3000 BC, traces of human assembly is
mound structures made to protect a s
water level rise in rainy seasons.
The city of Al-Chibayish has evolved to
in Iraq, Marsh Arab tribes reside in a r
surrounded by water, with street and c
time would reside in another structure
to reside on dry seasons.

One tribe 100 people

Fig 2.02- Satellite maps

nded through the marsh since
evident through multiple
eries of reed houses from

adapt to political conditions
manufactured island stucture
canal access, and at the same
e north by the marsh highway

Dwelling Along Inlet Canal

The town of Suq Al Shiukh was built during the Ottoman empire as a capital Al-Muntafik Emirate of since 1885 - 1918. The fact that emirate extended into the Arabian gulf allowed it to be a multicultural center at that era, which allowed it to keep its identity of farming and fishing.
After re-flooding the marshes, Suq Al Shiukh's residents started moving back to spots close to the water using the existing road and rail system built in the 70's to connect Suq Al Shiukh to the oil fields.

Multiple tribes 7500 people

Dwellings Along Euphrates River

Chibayish town is historically the center to build boats in the marshes, a land center in the heart of the marshes allowing wood and reed supplies to reach the core of the marsh.
The only civilian permanently dry zone in the marsh with transportation infrastructure.

Beni Isad tribe - 5000 people

Martyrs Monument in Chabaish

The Martyrs monument was built in the 1993 by the dictator government in Iraq, it was a new type of building in the marshes, making a monumental structure in the middle of the marsh, made on top of a concrete platform.

Hybrid infrastructure

Byproduct of the Oil infra-structure

In 1991 the Iraqi government started a series of canals in the marshes, using these canals to dry the marsh through sectioning parts of the marsh to dry it faster, also by sectioning the marsh, military control would be much more accessible for military control. Through the 1990's sectioning the marsh was an affective military method designed originally to turn the marsh into farmlands. After 2004 re-flooding the marsh with significant amounts of water turned the marsh into an area that is susceptible to drought with those sectioned evaporation zones.

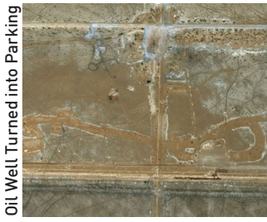
Abandoned Oil Drilling Plat-forms

With several oil drilling platforms done in the 1970 and in the expansion in 1993, numerous oil platforms became a regular in the marsh. With the formation of new platforms, roads and canals, the marsh landscape becomes less accommodating to water flow. Restraining water flow in the marsh started increasing salinity and desertification in marsh landscape, disrupting the yearly cycle of water through the marsh to the sea.

Inspection wells on the marsh floor

Oil companies started forming inspection wells in the 1970's comprised of a raised land platform with street connection to the main land. these oil inspection wells were used to dig for oil before the marsh was dried in 1993, which gave oil companies an idea on where to dig for oil and where the extraction is more profitable. These oil platforms have been abandoned by private industry and left to be used by mash arabs as ports or living platforms

Oil Well Turned into Parking



With the constant change i
strategy the west qurna oil
that are empty lots of conc
industry, and adapting to b
drivers and oil workers.

Fig 2.02- Satellite maps

n ownership, systems of drilling, and oil
field ended up with multiple platforms
rete hosting the remains of the oil
e parking lots, or rest zones for oil

Outlet Canal

The main outfall drain (MOD) was dug by the Iraqi government to divert river water coming from the euphrates to the sea directly, diverting it away from the marshes.
Through the lack of planning from the government after 2004, the MOD is still functional, diverting water from the zones that need it most, with no plan to shut down the project or integrate it into the marsh hydrology.

Industry

Oil Equipment

Oil Drill with Injection Site

An established oil drilling site on the left shows the amount of equipment needed to finish an oil drilling job, a series of heavy equipment is moved in and set up on site to finish the drilling process.
On the right an oil extraction zone, where oil drilling equipment is phased out of site, turned into a pumping station connected to a pipe, or sometimes into a container moving oil through liquid trucks.

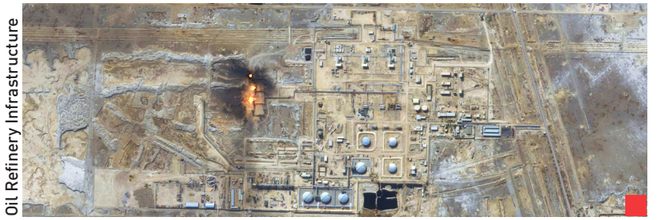
Injection sites are formed on the perip
water into the reservoir replacing the
These platforms were created on the p
pressure oil into the extraction zones,
pressure in the ground.

Fig 2.02- Satellite maps

hery of the oil field, pumping
oil and gas extracted.
periphery of oil fields to
increasing the amount of

Oil Drilling platforms

Oil extraction zones produce oil and gas byproduct which would be burned if it was a gaseous well, and discarded in artificial depressions for liquid byproduct.
These two techniques produce a mutilated landscape that is transforming the marsh into a series of oil ponds, deforming land and polluting soil.



Oil Refinery Infrastructure

DS6
West Qurna oil field is a refinery system connected with oil pumps, connecting fields with refinery equipment.
Due to equipment age, and disregard for environmental policies, west qurna oil field byproduct is dumped either as burned gas, or through controlled dry pits

Oil Ponds

Al Rumaila
Al rumaila oil field south of west qurna, is an older oil refinery sytem dumping excess crude oil in the form of large lakes. and dispose of gas in the form of burned gas.

Fig 2.03- Marsh satellite map

Marsh Tributaries

Most of the Hammar marsh tributaries flow from the Euphrates river, which flows from Turkey passing through Syria, increasing flow of water through its movement. Since the construction of Ataturk dam in Turkey, the amount of water supplied to the marshes through the Euphrates river drastically decreased making marsh recovery a challenging task with the decreased water discharge from water reservoirs

Transportation

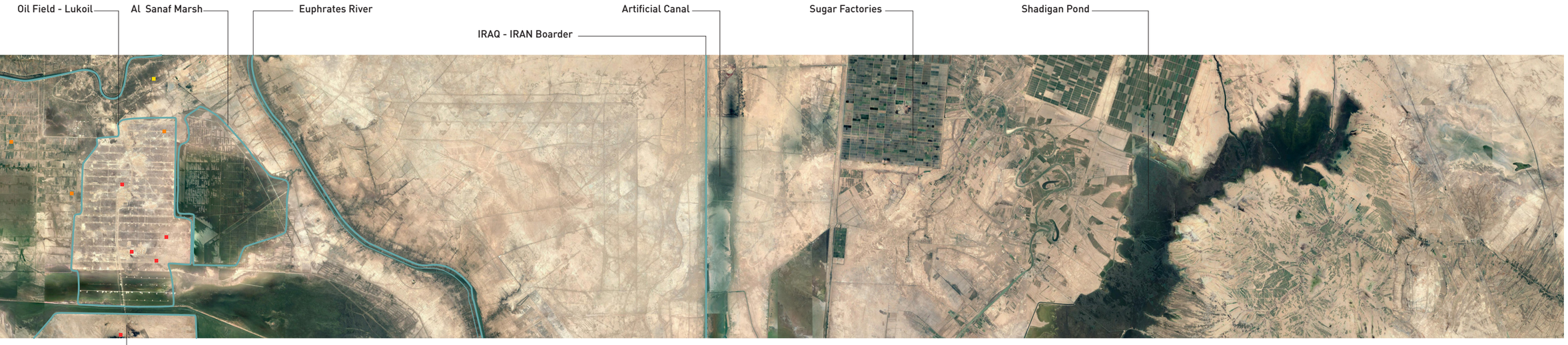
Rail roads and streets were introduced to the marshes in the 1950's as a part of the trans arab transportation projects connecting the Persian gulf with the Mediterranean sea.
The trans-arab railway was supposed to be built hand in hand with the pipeline connecting southern oil fields with the Mediterranean sea.
Which was also followed by the Basrah airport and Jalibah Airfield (destroyed by the US in 1991)

Oil infrastructure

Oil infrastructure is a complex system that involved extraction, processing, and transportation of oil, forming a system of oil drills aligned in a gridiron structure that spans over 500km in the size of the city of Basrah (the second largest city in Iraq)

Hammar Marsh

Hammar marsh is a fresh water depression formed by the Euphrates river. the size of the hammar marsh depends entirely on the Euphrates river making it susceptible to dry seasons, forming parts that are seasonal marsh, and parts being permanent.
This seasonal change affects Marsh Arabs living on the marsh landscape establishing a unique type of seasonal dwelling, a form of pastoral system.



West Qurna oil field

West Qurna oil field was discovered in 1968, and extracted in 1971 by the Basra Oil company (BOC) and not by an oil giant due to oil nationalization in Iraq at the time.
After 2009 West qurna oil field was awarded to Exxonmobile and Shell as phase 1, and phase 2 was awarded to Lukoil and Statoil making it fully owned by foreign investment

Qurna

Qurna is the meeting point of the Euphrates and Tigris in southern Iraq,
Qurna is an artificially made meeting point after the drying of the marshes due to the divert of the Euphrates water into it, while the two rivers used to meet in karmat ali before water diversion projects were in place

War boarder

Iraq-Iran boarder witnessed a continues tension between the two countries during the period from 1980 - 1988 due to the war betweeen the two countries, which is evident in aerials showing war and mine field terra-formation

Tributaries from Iran

Water flowing from Iran make s a large amount of the water that feeds into the Iraqi marshes (especially the Huwaiza marsh)
Tributaries from Iran (the karun river in particular) became a drainage system for sugar cane factories in south west iran, pushing more waste towards Iraq's weak infrastructure in addition to its own waste

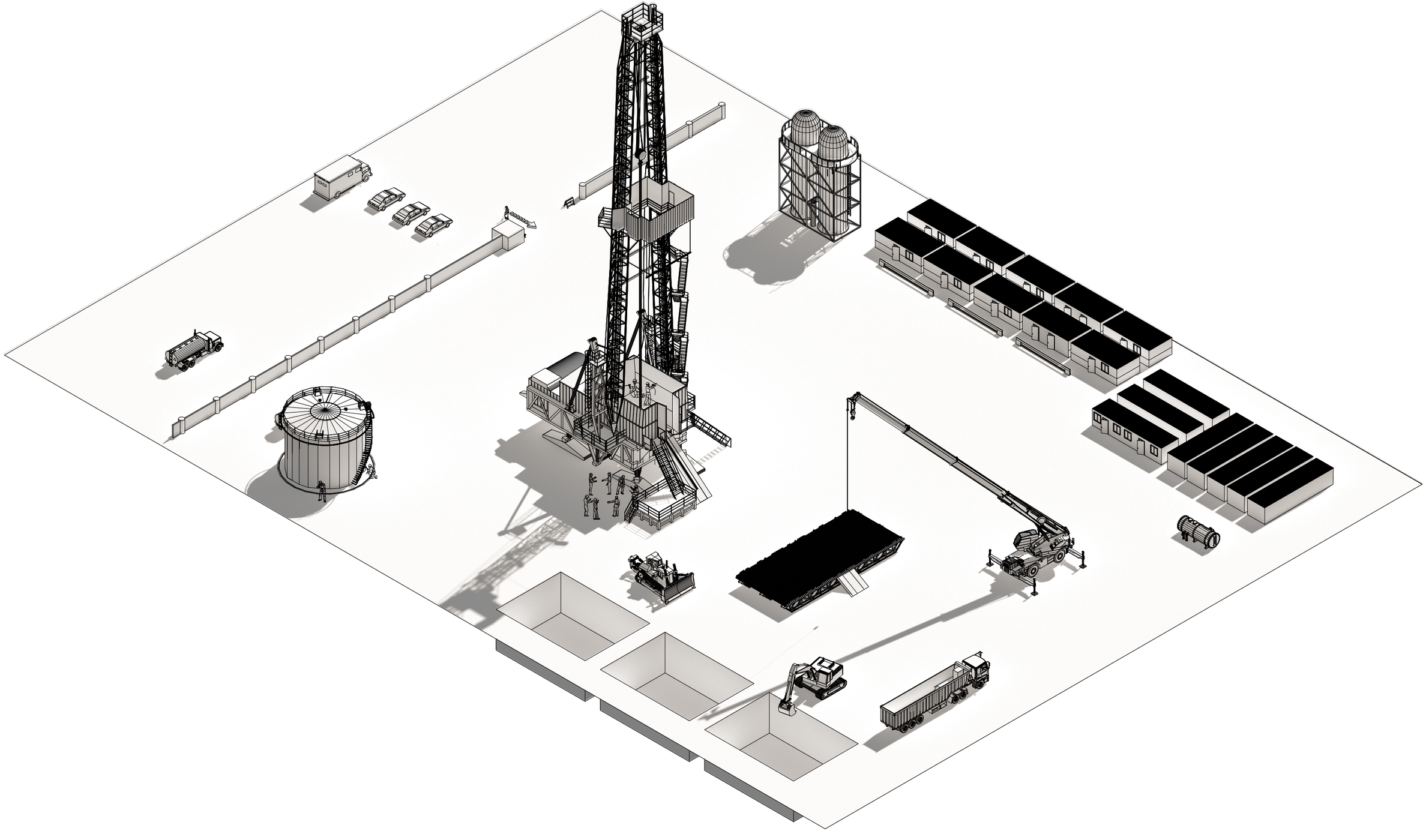


Fig 2.04- Oil field site

Oil field site

The practice of visualizing oil fields was an exercise manifested through satellite imagery and crowd sourcing. Using these tools as a prosthetic tool to determine private land's shape and oil practices was a major way to uncover oil fields operation and working grounds.

Oil industry in Iraq being secretive and private, its operation has always been exempted from safe/ethical obligations related to the process of extracting and processing oil, which allows for more machinery to be present to move oil through liquid tankers, move land through dumpers and loaders, using cranes and excavators to dump access oil in oil pits allowing oil to evaporate and seep through the soil.

Through the water and sanitation research done by the Italian Ministry for the Environment and Territory and Free Iraq Foundation showed concern over contamination of pipes and oil industry dumping of oil, alongside the deliberate drainage of the marshes to expand oil fields.[36]

35 Iraqi Ministries, "New Eden Master Plan for the Integrated Water Resources Management in the Marshland Area, Main Report, Iraqi Ministries of Environment," Water Resources Municipalities and Public Works with Cooperation of the Italian Ministry for the Environment and Territory and Free Iraq Foundation 20, 20 (2006): Vol. 1, B 4, 12.

Oil field disassembled

By 2050, oil industry in Iraq is projected to reach lower production rates when extracting oil is no longer viable. With this deadline approaching, oil platforms will become obsolete and oil industry equipment will be in a situation where most are owned by private contractors and will be left on site.

With the lack of hierarchy and law enforcement by the government in Iraq in the last 10 years, it is projected that a massive number of squatters will inhabit oil industry marshes in the hope of disassembling machines and producing an alternative economy in a few years after the oil industry has ceased to function.

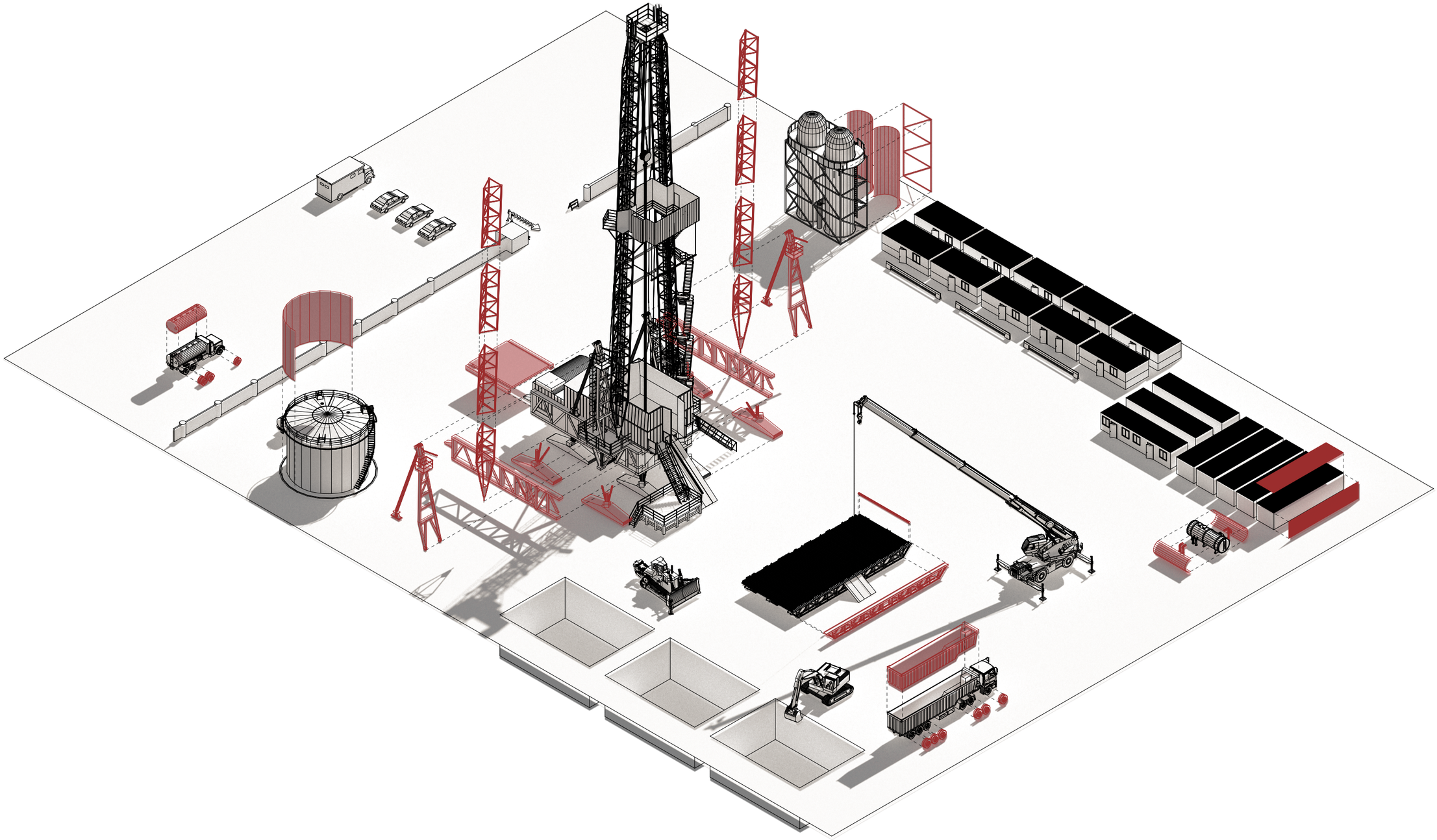


Fig 2.05- Oil field disassembled

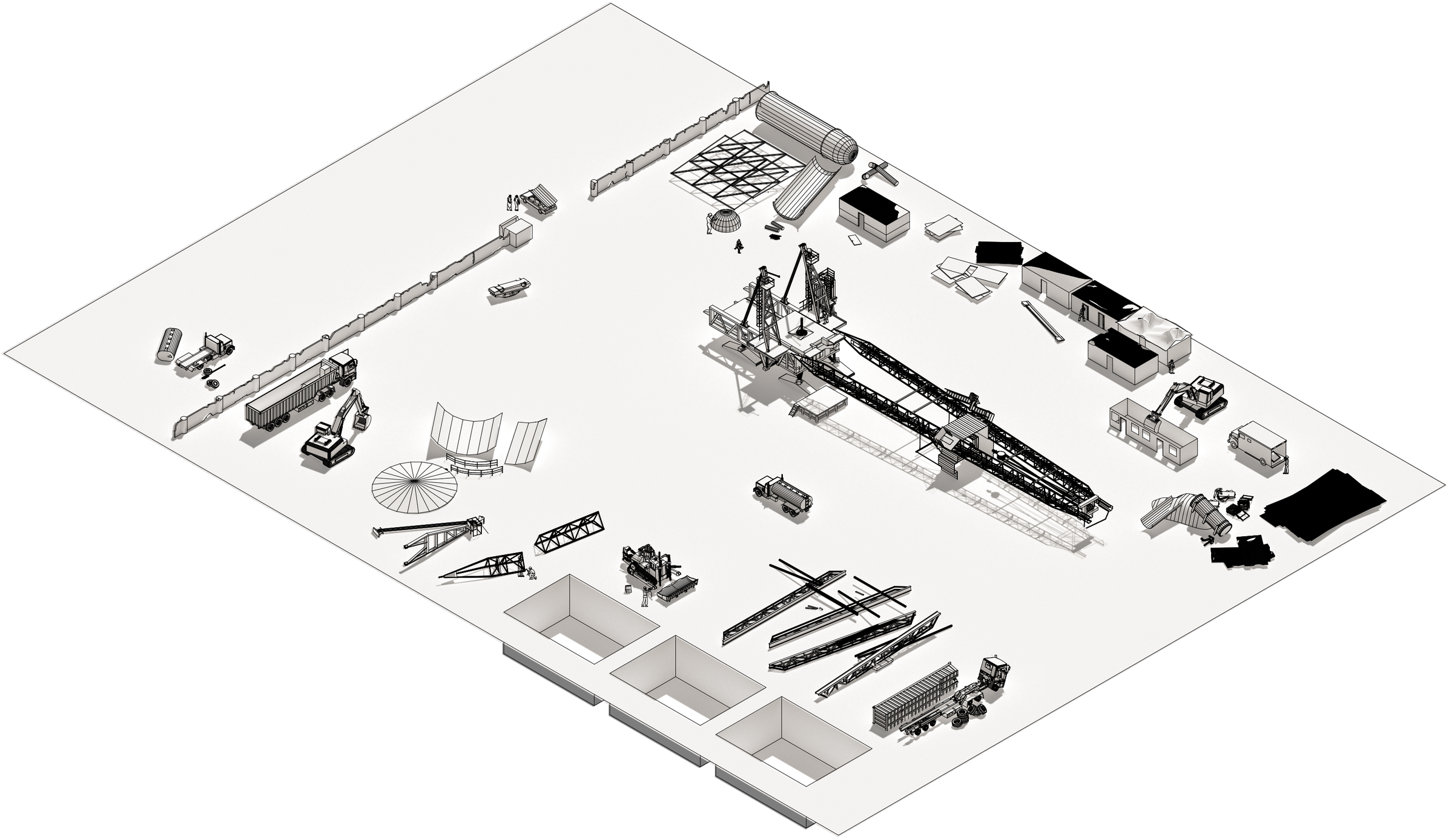


Fig 2.06- Abandoned oil field

Abandoned oil field

Squatting has been a prominent phenomenon in Iraq since the 1800s, with people hiding from the Ottoman Empire, sheltering from census and compulsory army recruitment at the time, extending to the time nomads and tribes hid from the British army in the 1920s as an act of defiance. This trend of squatting and using neglected, abandoned zones and buildings to hide from the government was a tool of resistance for these nomads.

The link between government control and squatter spaces is made through a "third space," or as Deleuze and Guattari mention, a space that can also be referred to as the "holey Space,"[37] which is an extension of the "underground" space being used by the Me'daan to hide from authority.

Holey space is a marker of resistance, a dwelling system that embraces the stratum and connects surfaces and the underground of the settlement through this dwelling system—giving rise to a unique interaction between nomadic squatting and the solid infrastructure.

37 Gilles Deleuze and Felix Guattari, ***A Thousand Plateaus: Capitalism and Schizophrenia*** (Bloomsbury Publishing, 1988), 231–243.

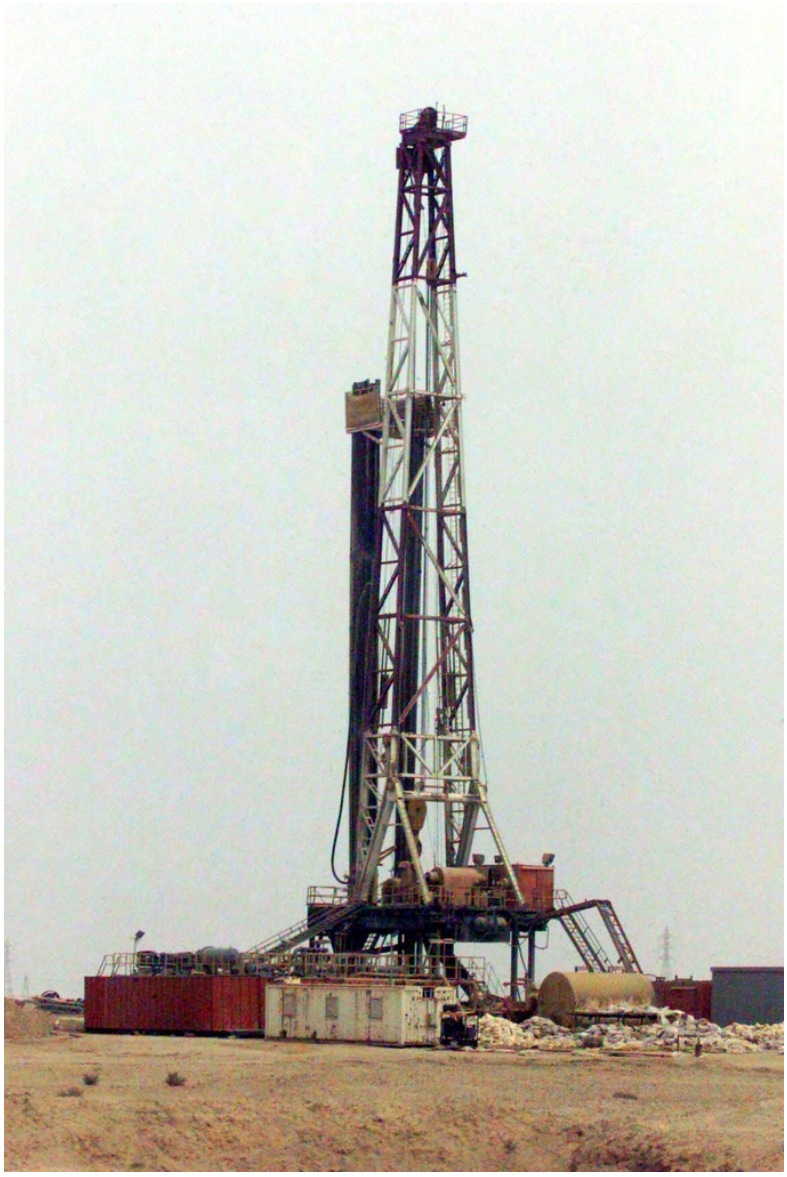


Fig 2.07- abandon Oil Factory

Fig 2.08- Crane terraforming landscape

Fig 2.09- Bulldozer terraforming landscape

Loader

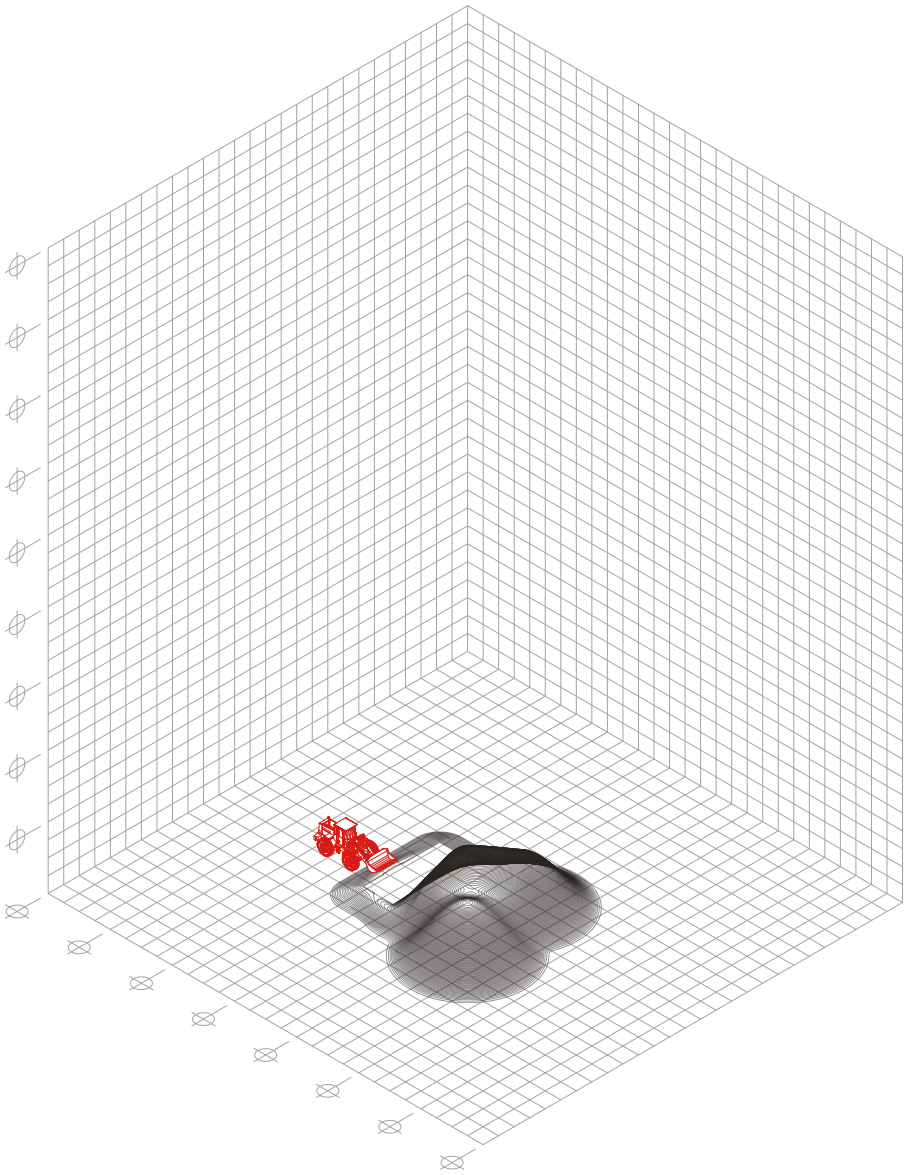


Fig 2.10- Machine sand box

Crane

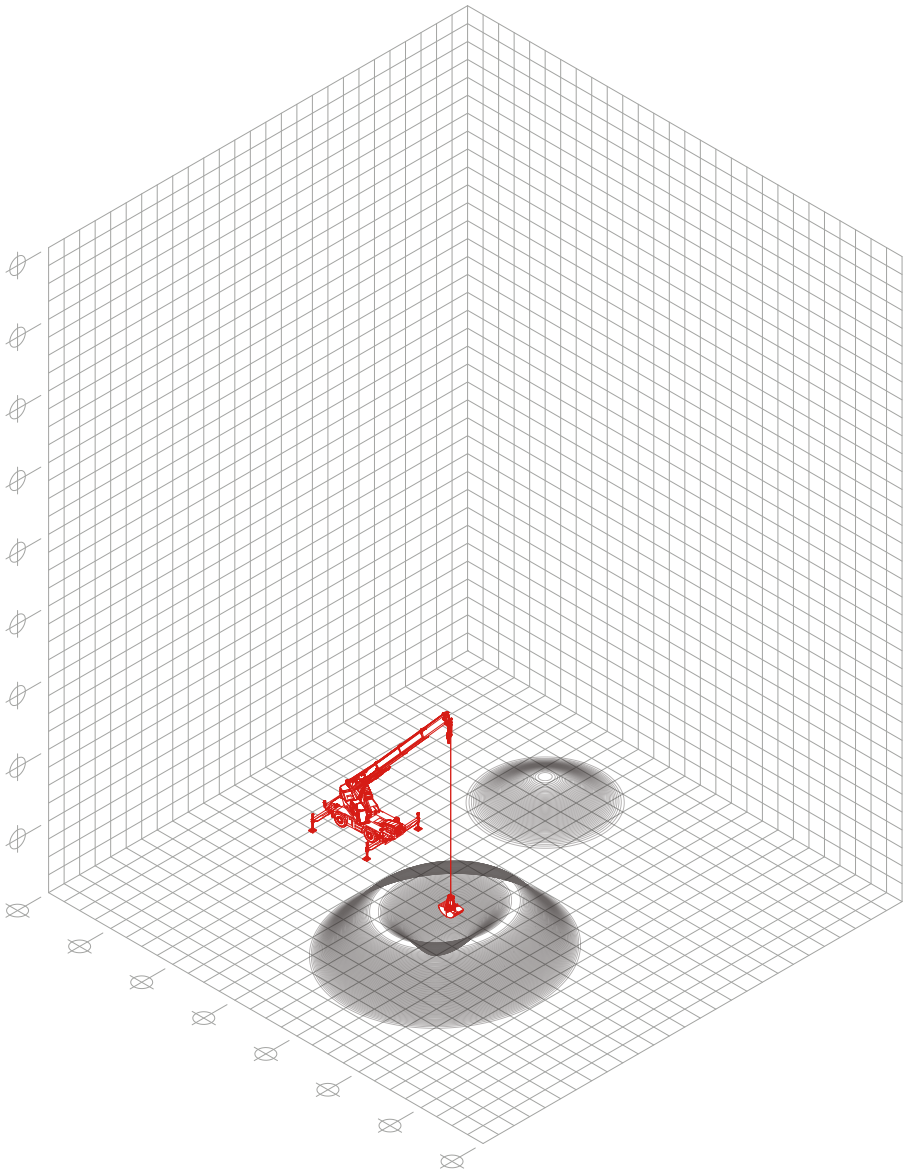


Fig 2.10- Machine sand box

Excavator

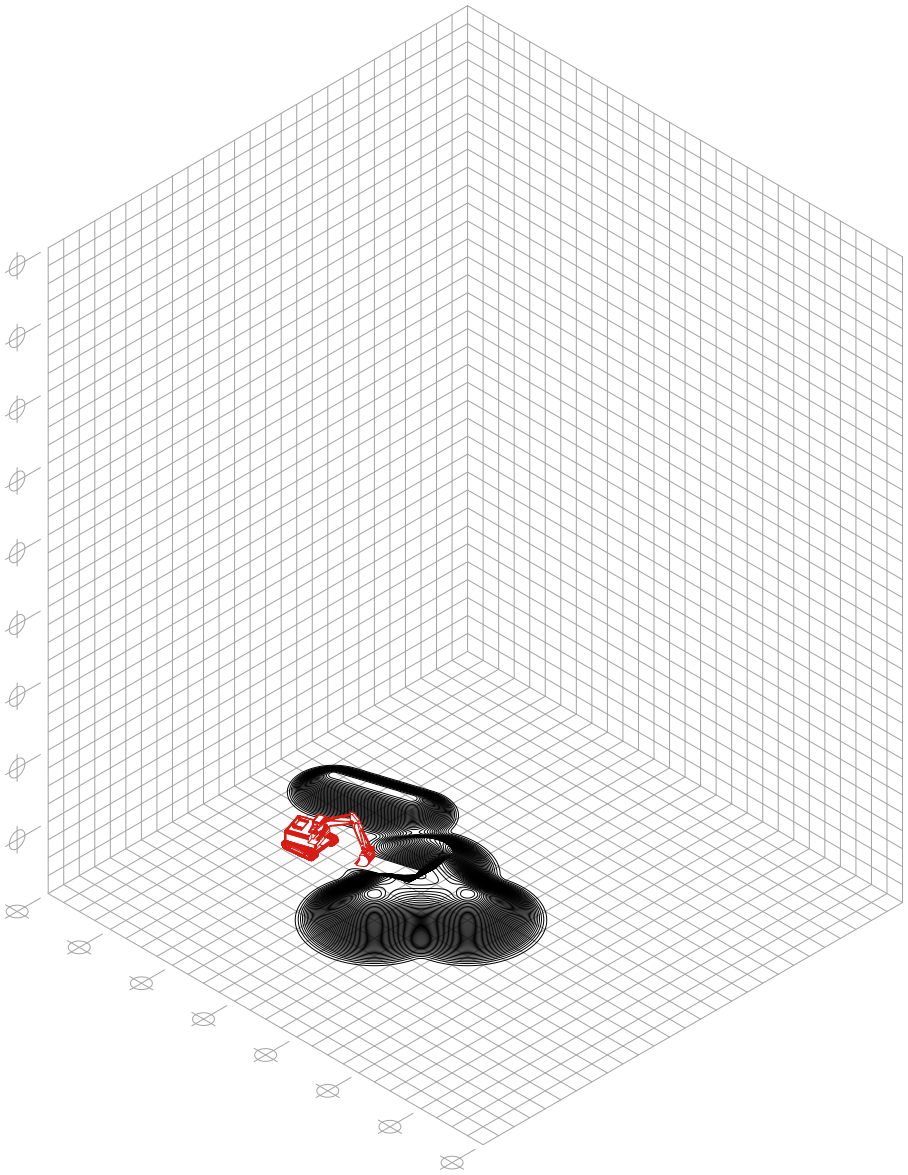


Fig 2.10- Machine sand box

Long range excavator

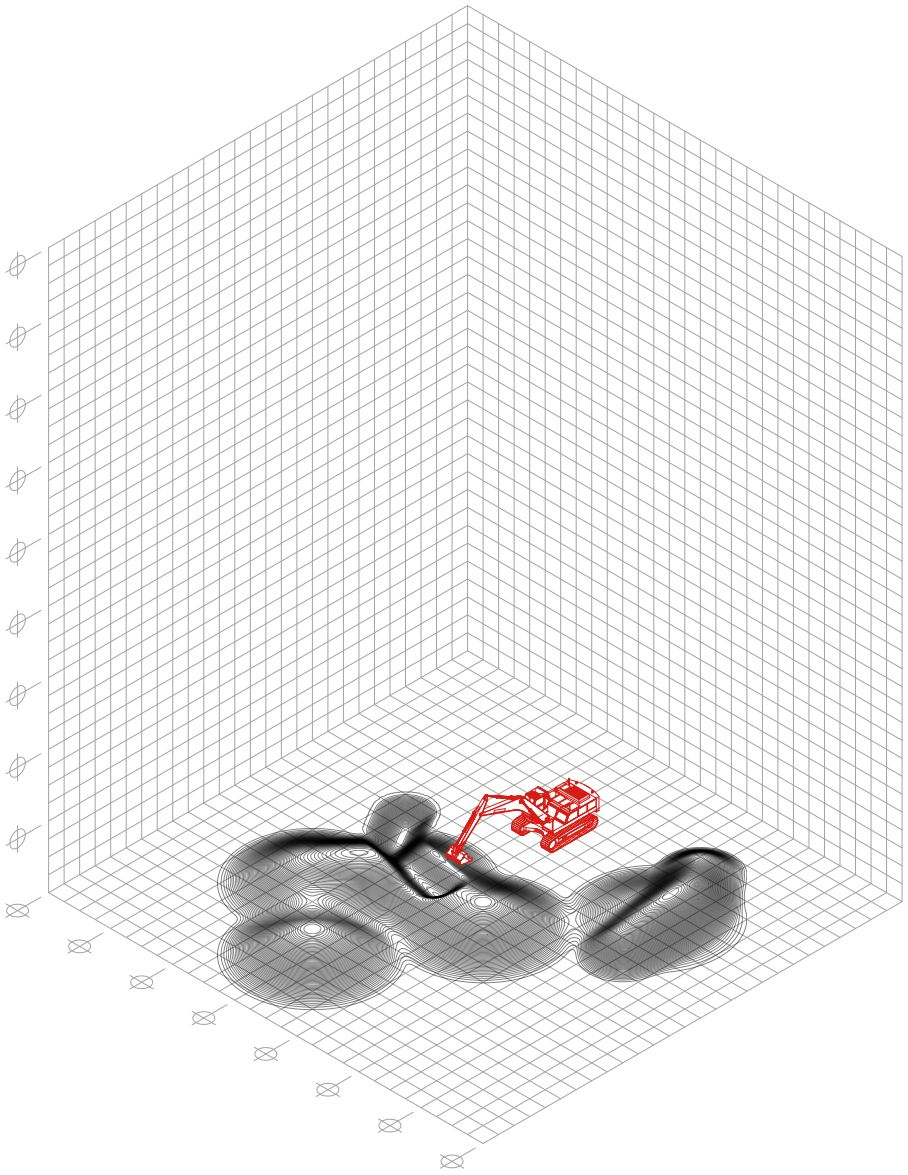


Fig 2.10- Machine sand box

Bulldozer

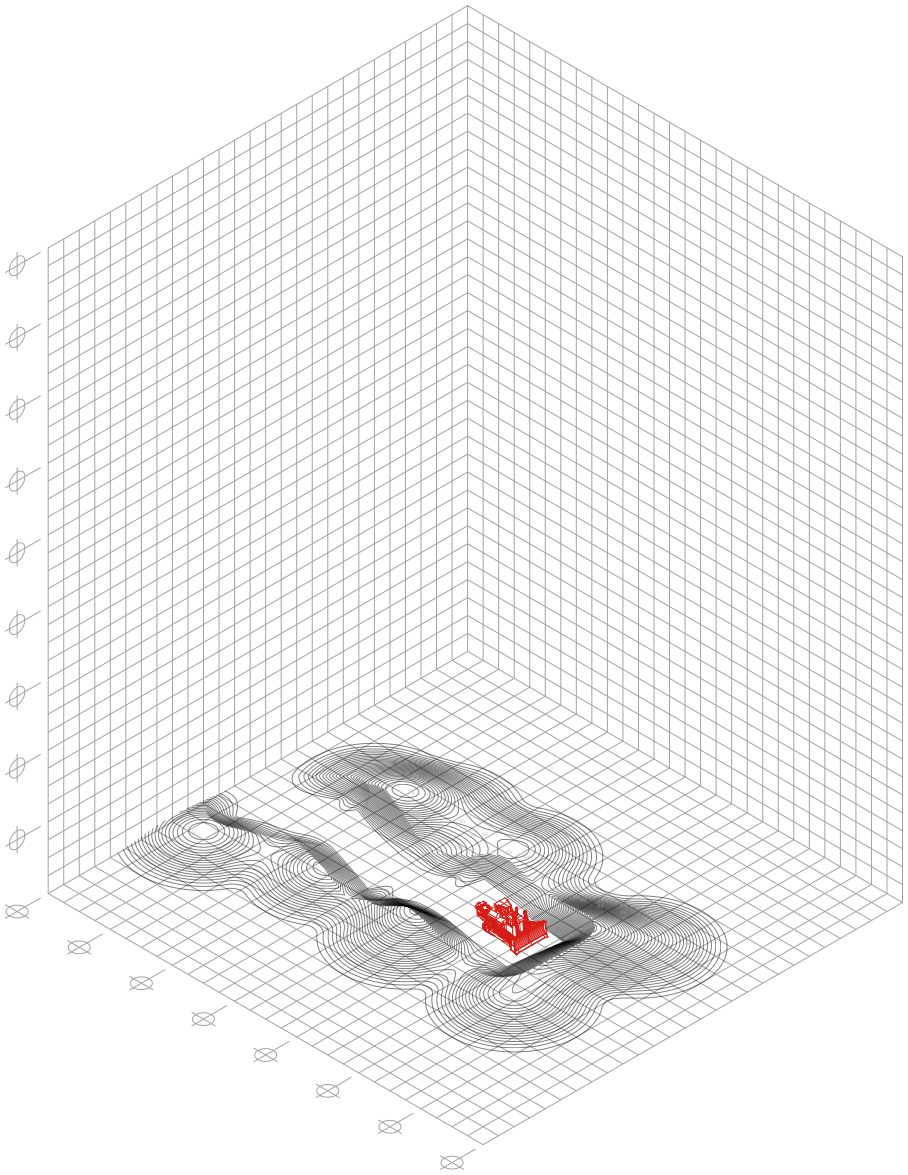


Fig 2.10- Machine sand box

Dumper

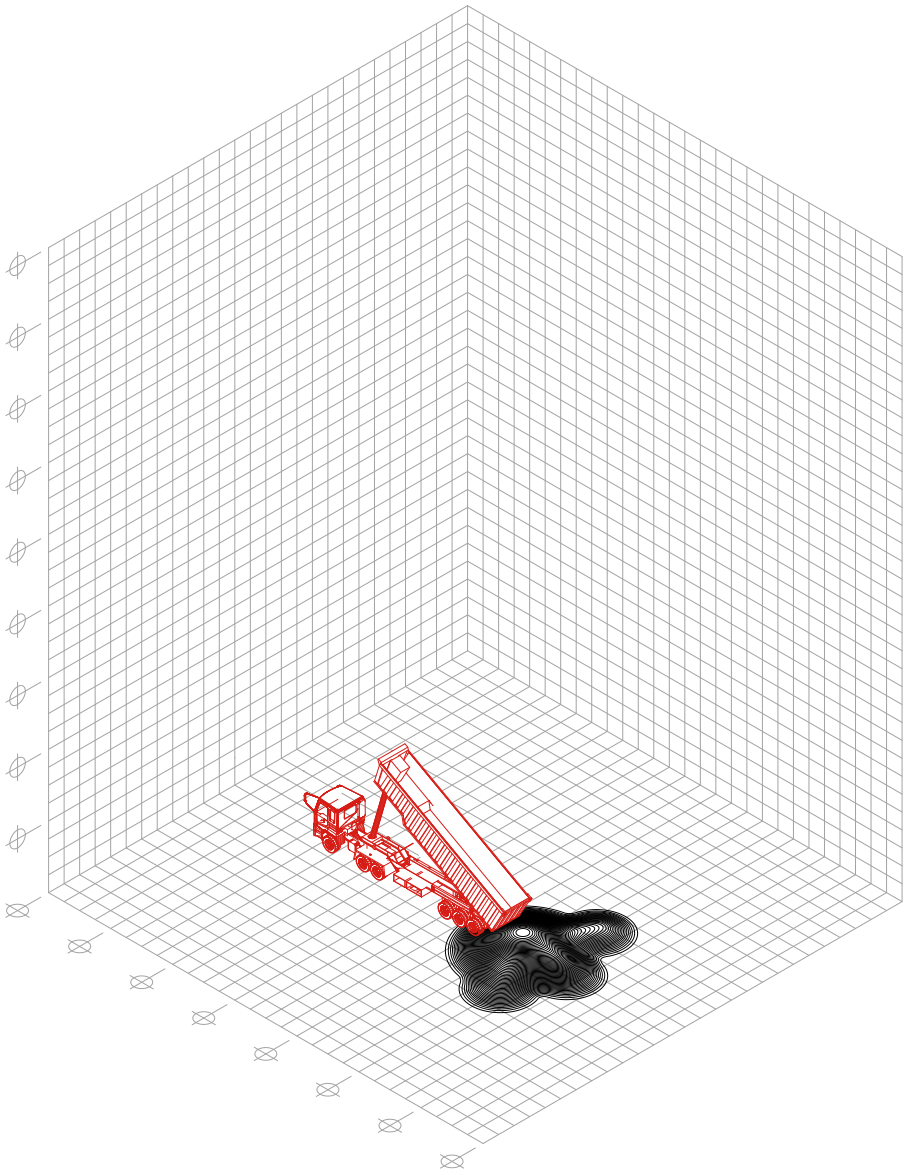


Fig 2.10- Machine sand box

Tank + pipes

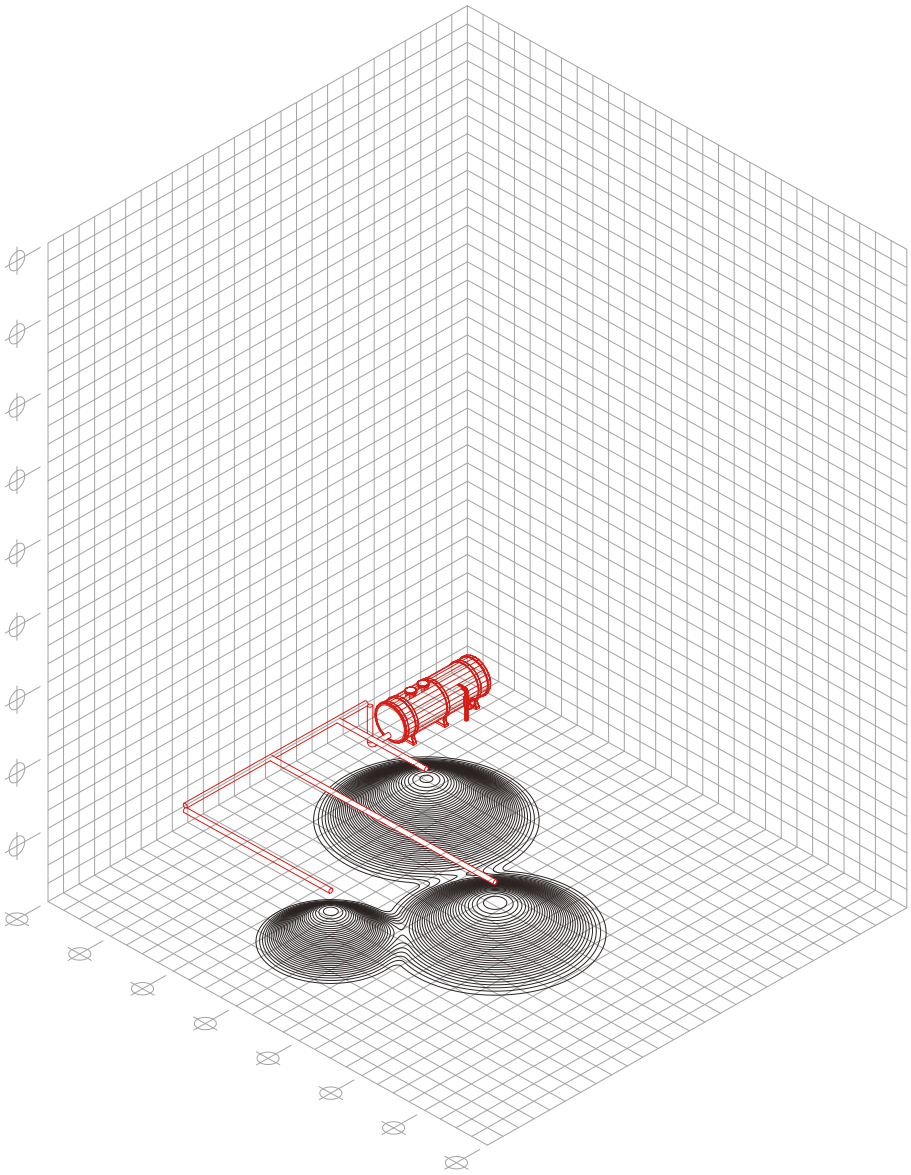


Fig 2.10- Machine sand box

Excavator

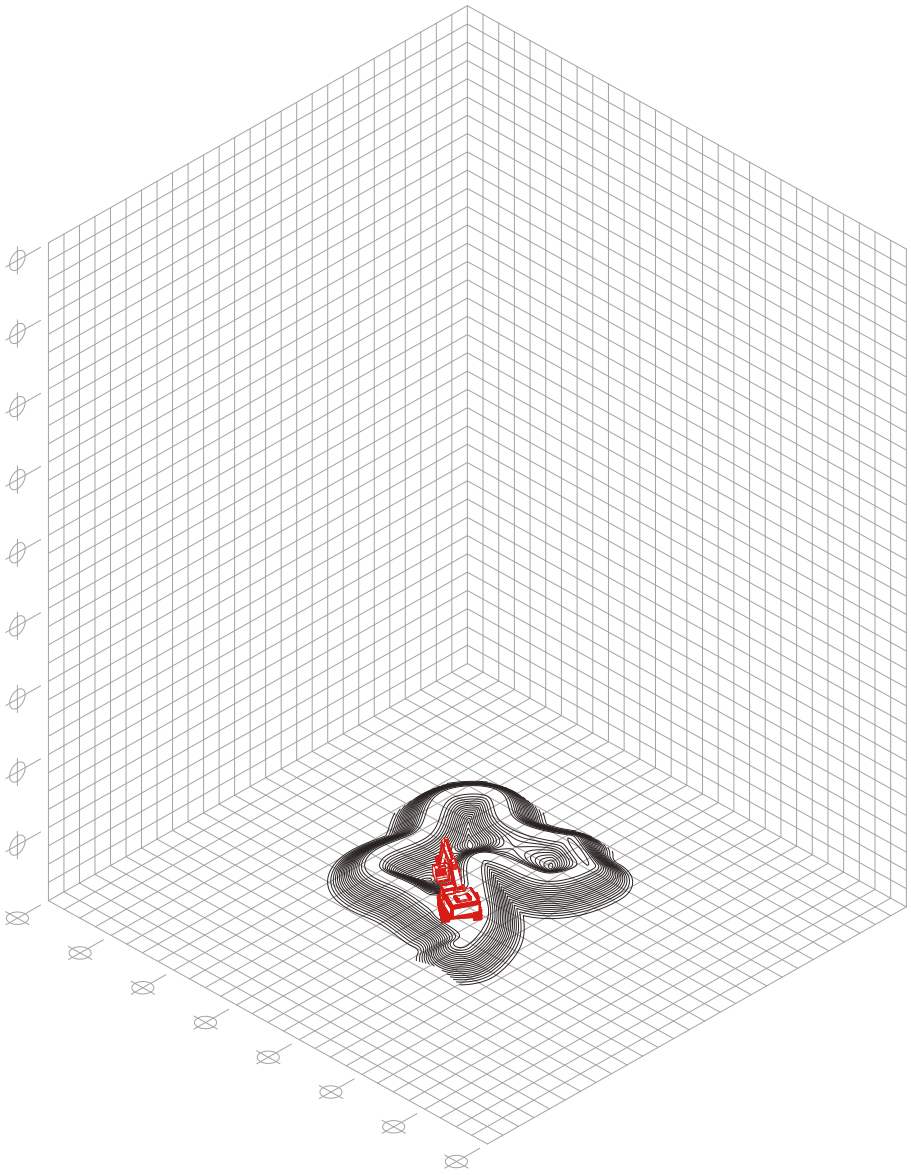


Fig 2.10- Machine sand box

Loader

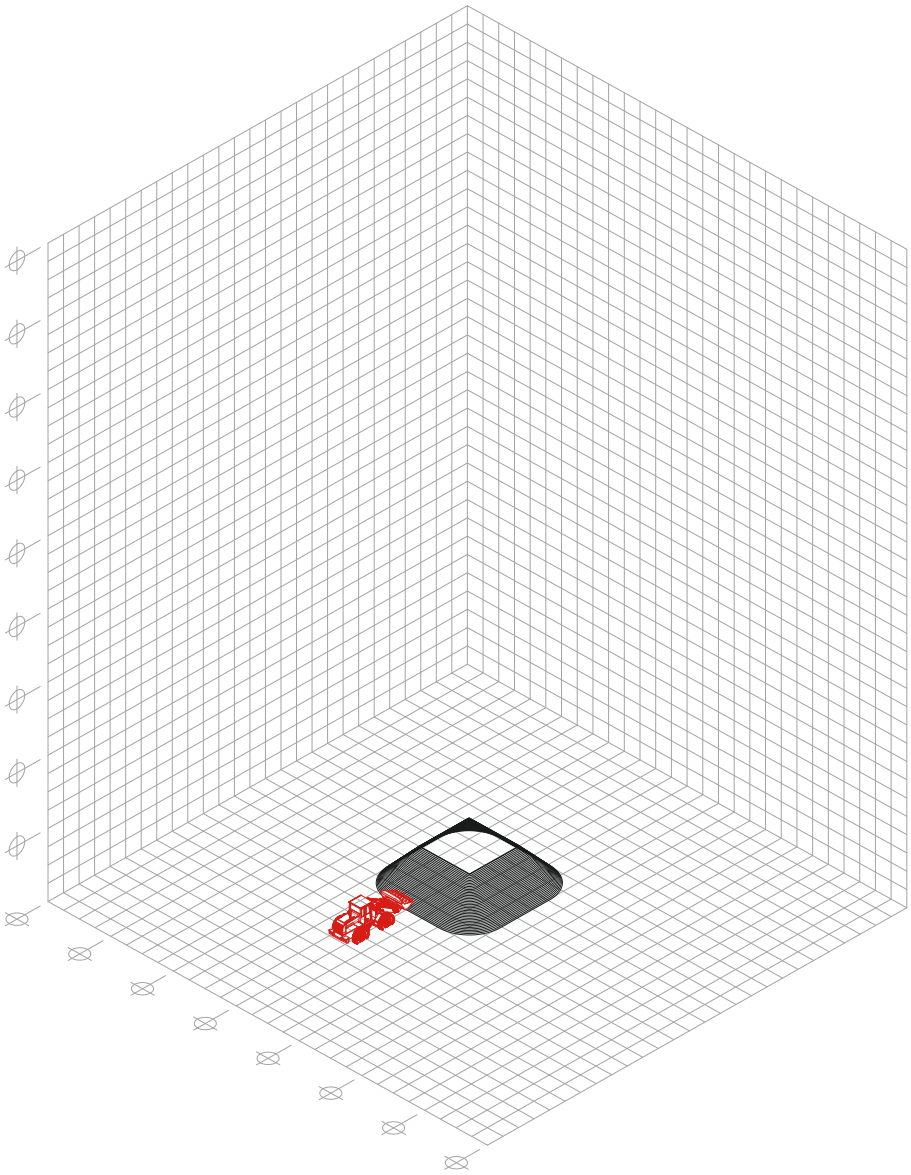


Fig 2.10- Machine sand box

Crane

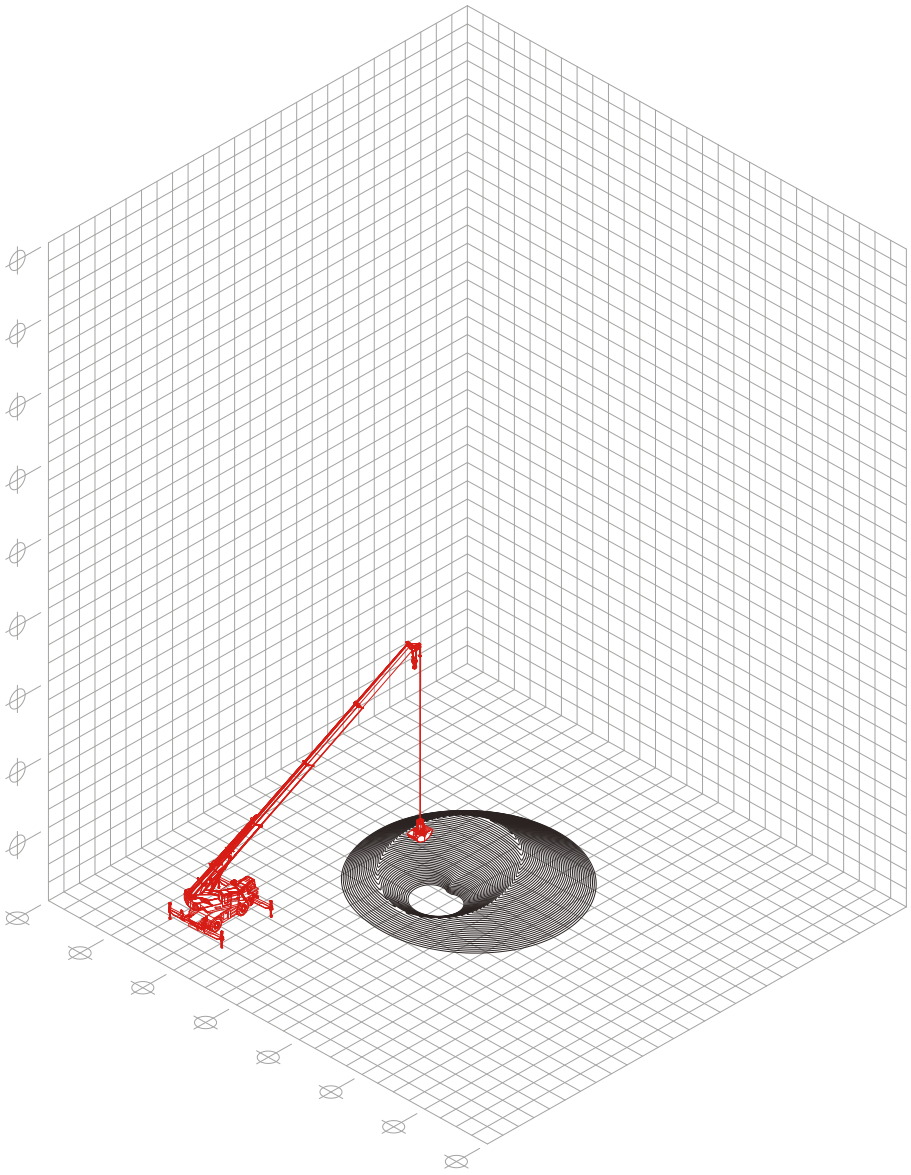


Fig 2.10- Machine sand box

Bulldozer

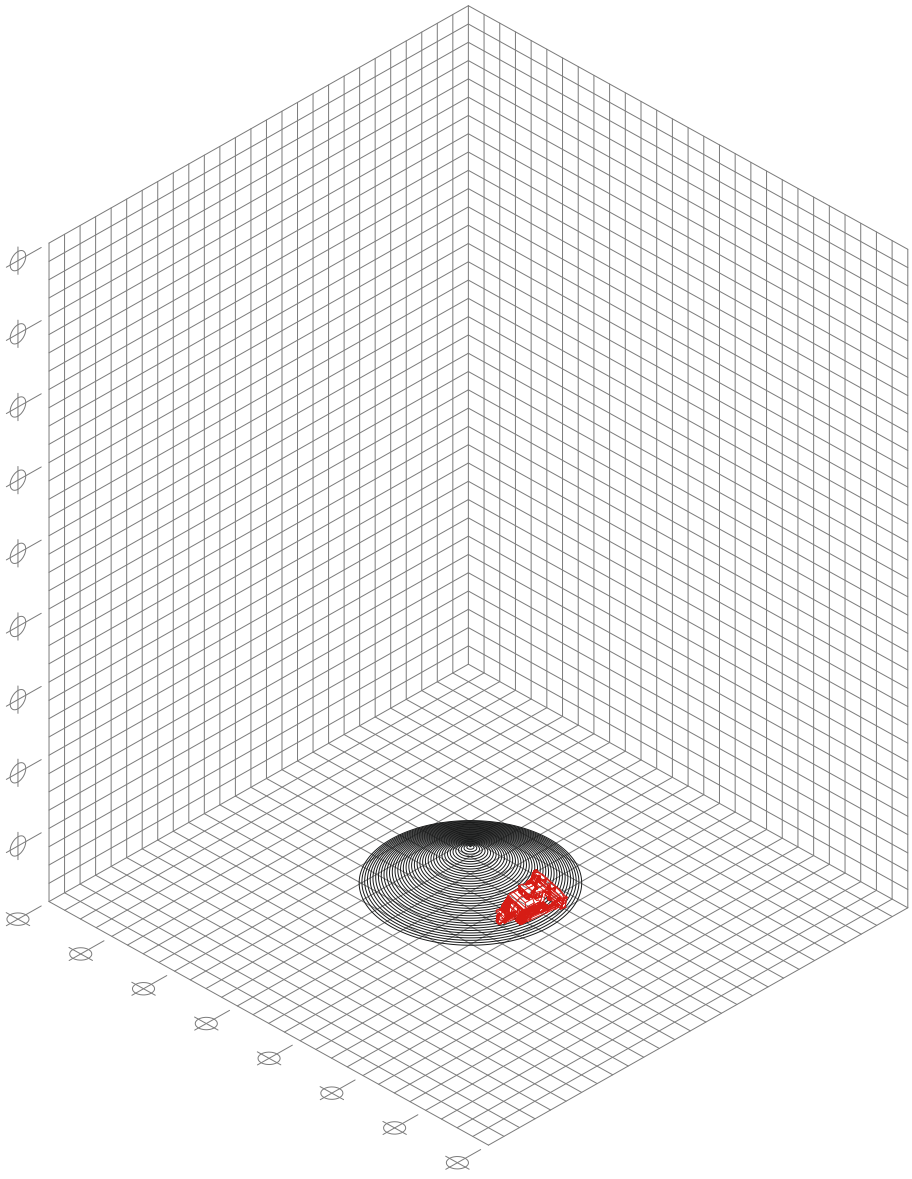


Fig 2.10- Machine sand box

Long reach Excavator

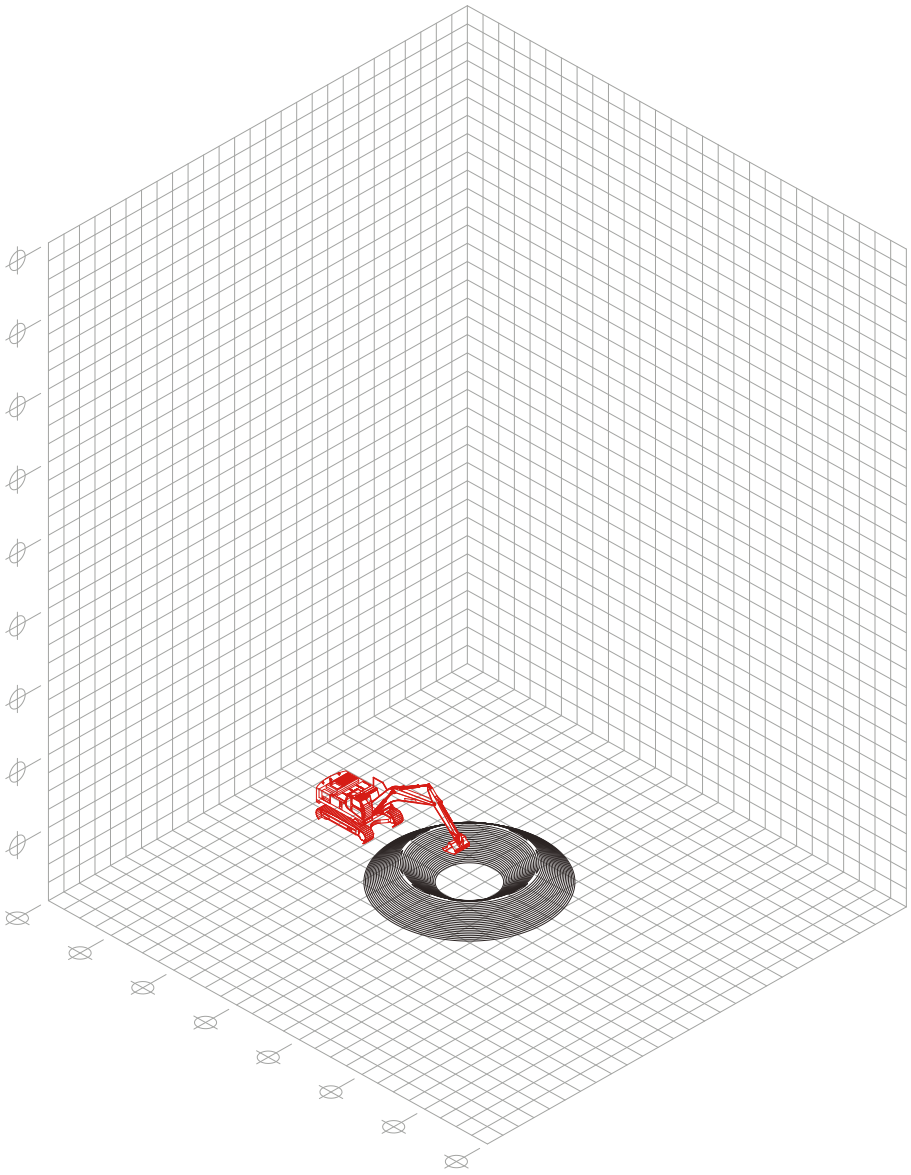


Fig 2.10- Machine sand box

Crane + Bulldozer

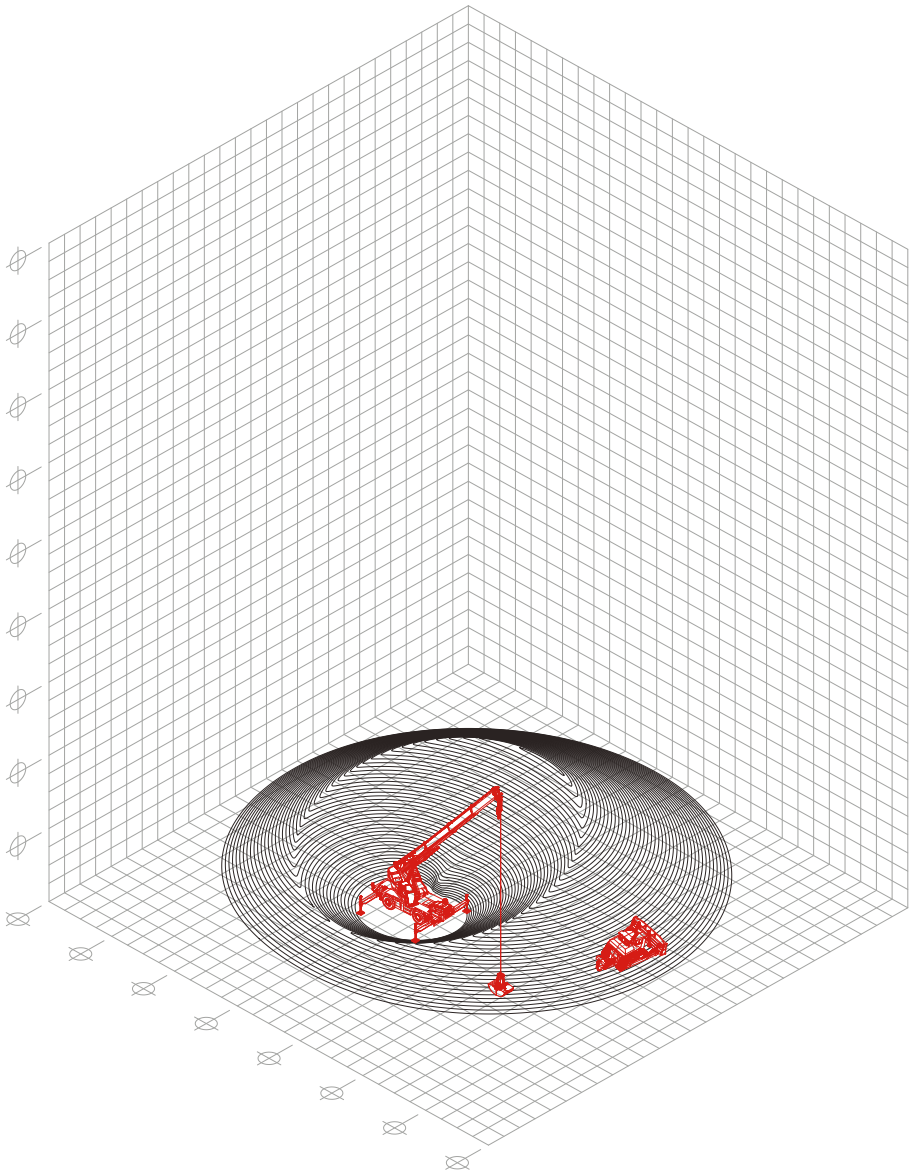


Fig 2.10- Machine sand box

Loader + Long-Reach Excavator

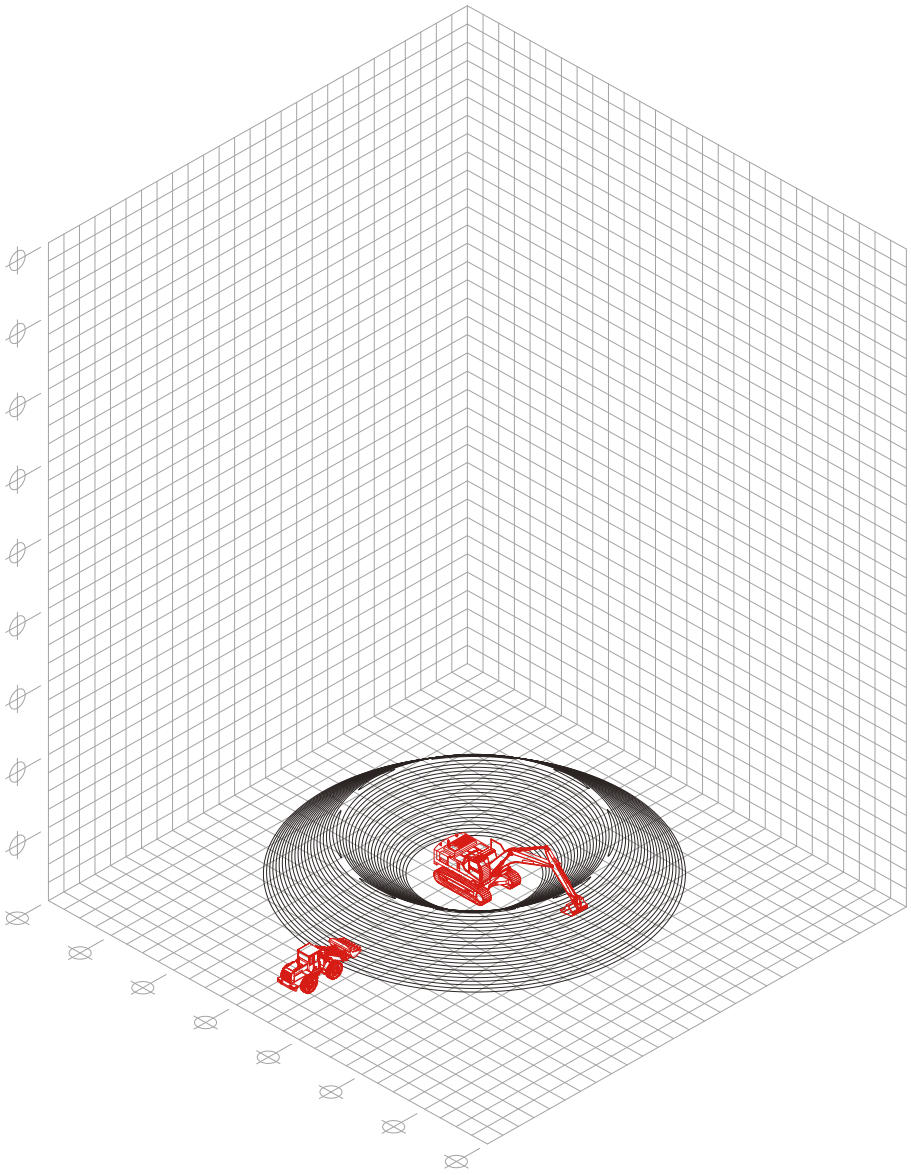


Fig 2.10- Machine sand box

Excavator + Long-Reach Excavator

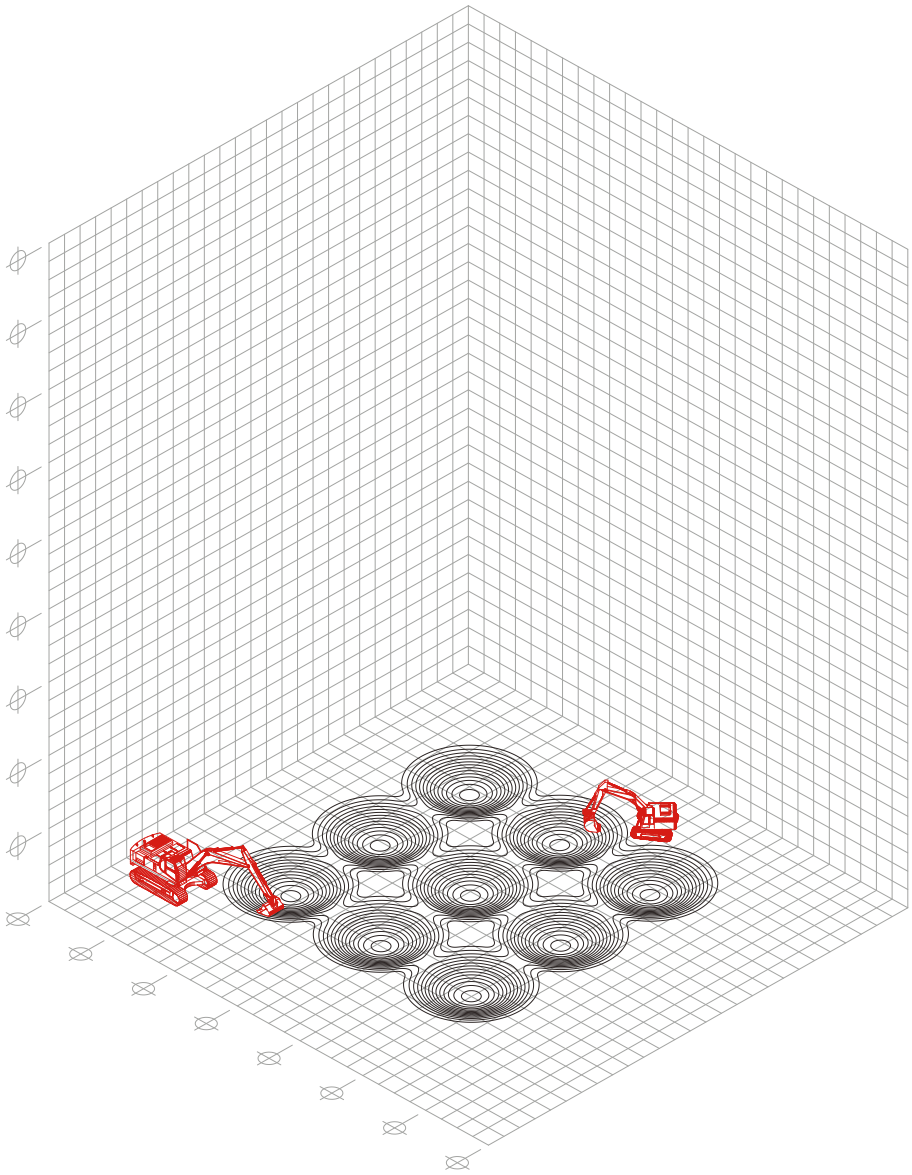


Fig 2.10- Machine sand box

Excavator + Loader

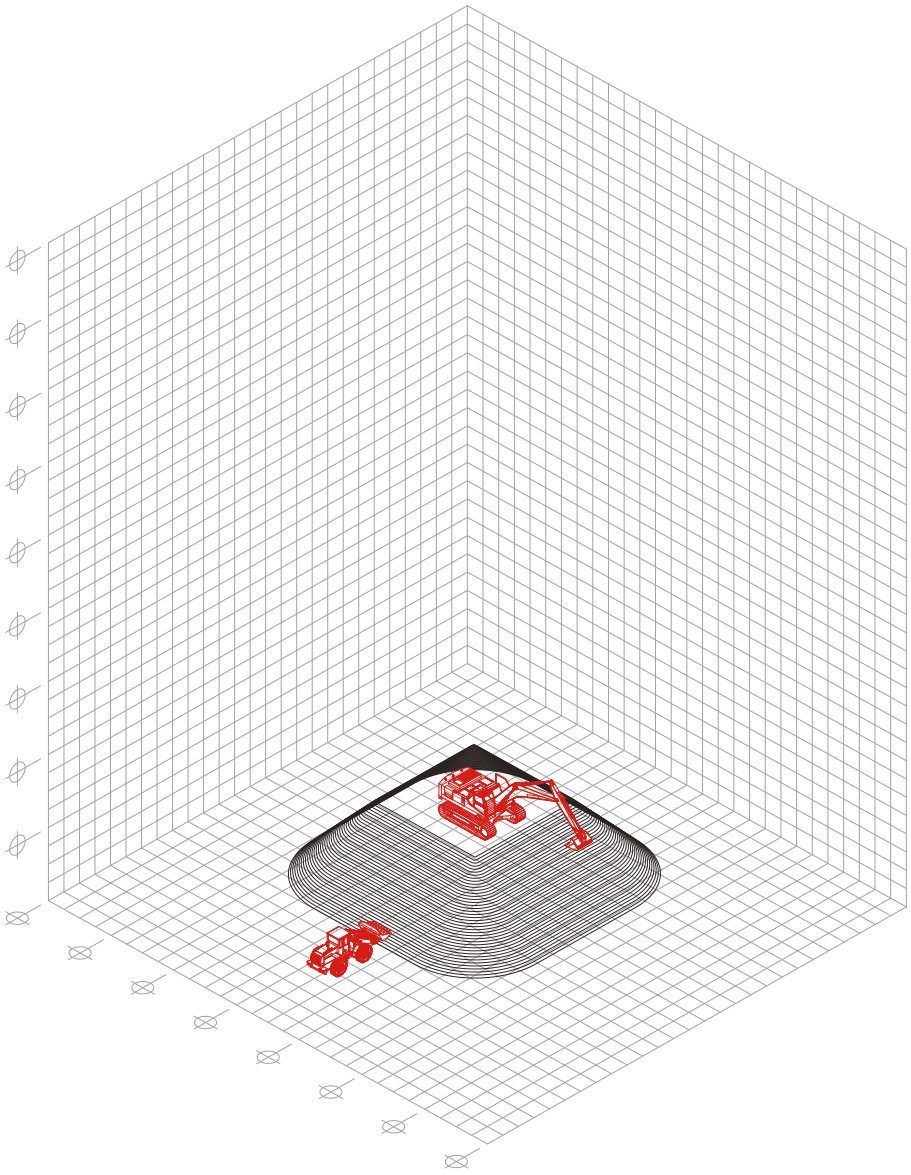


Fig 2.10- Machine sand box

Excavator + Loader + Reed mats

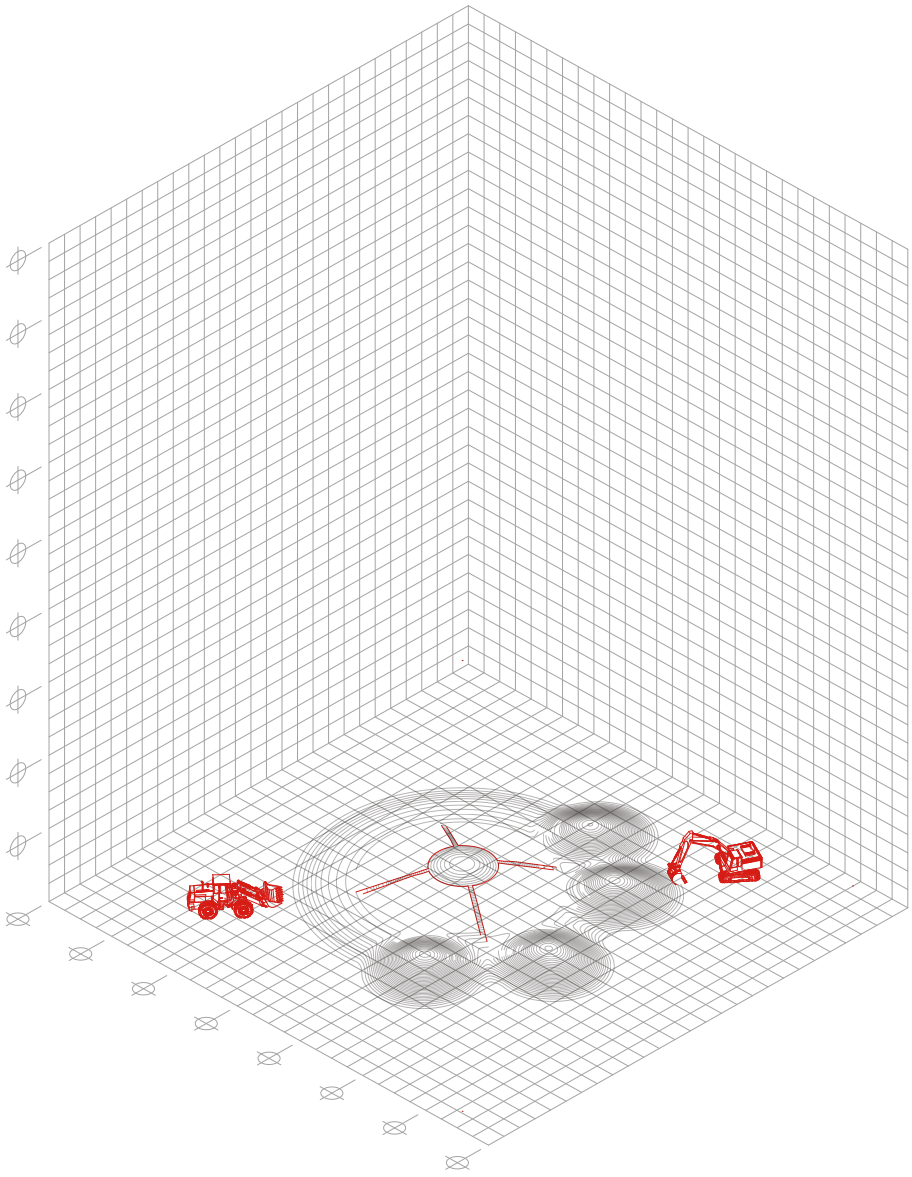


Fig 2.10- Machine sand box

Excavator + Loader + Tires

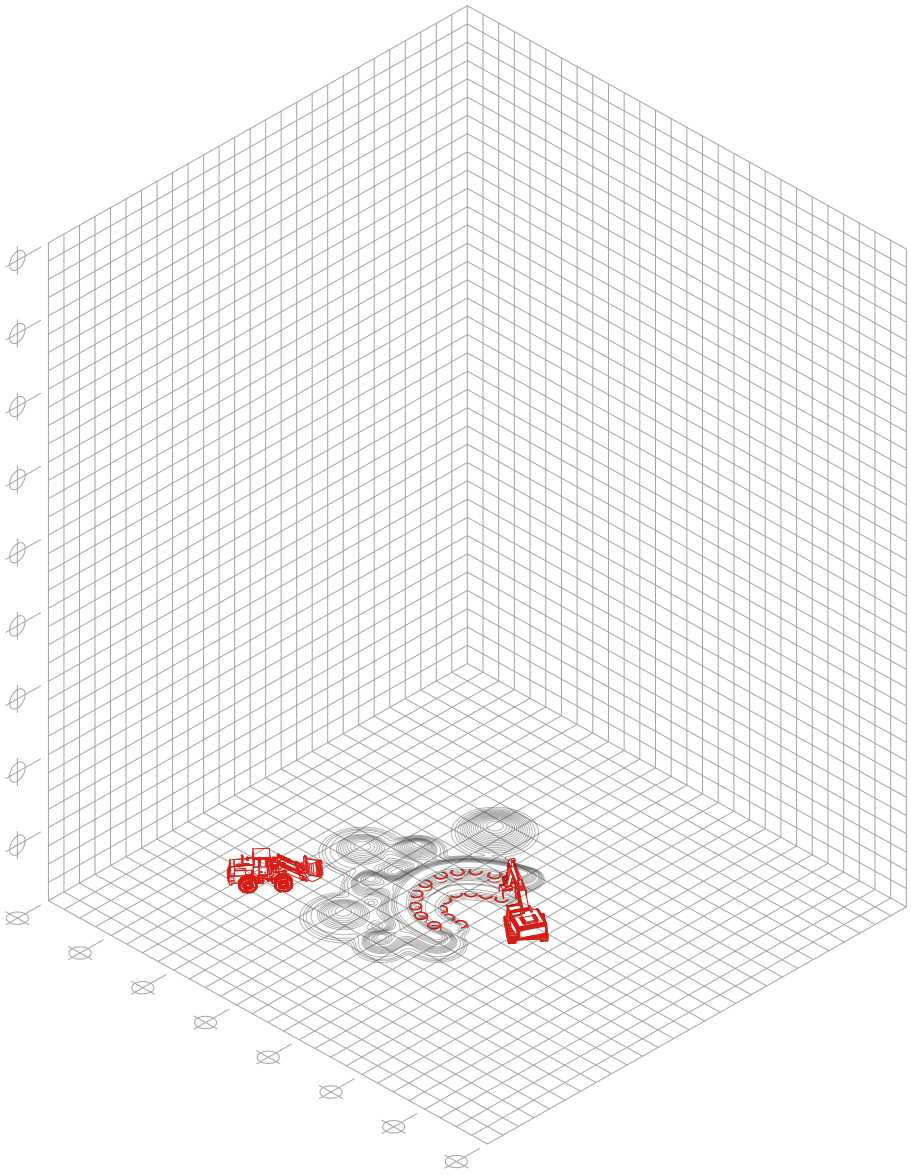


Fig 2.10- Machine sand box

Crane + Excavator + Beams

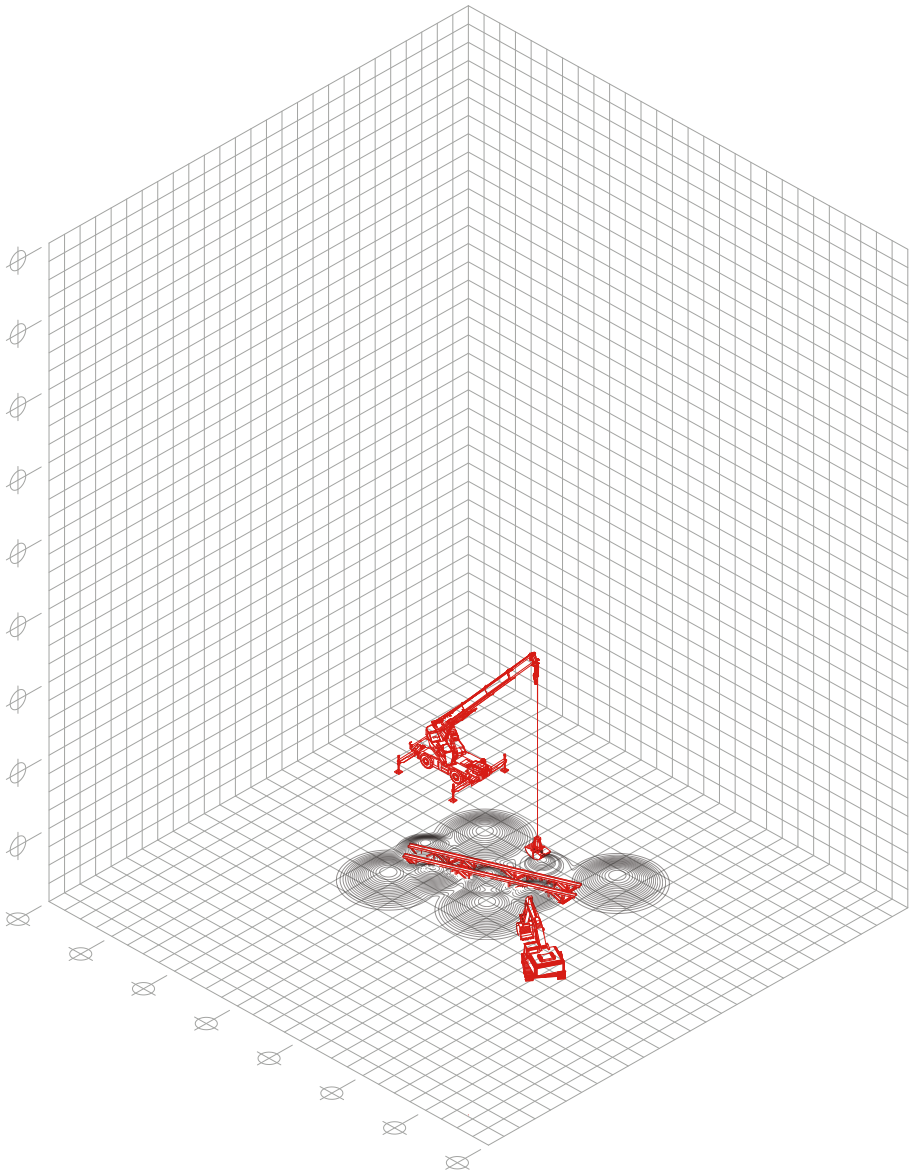


Fig 2.10- Machine sand box

Crane + Space frame

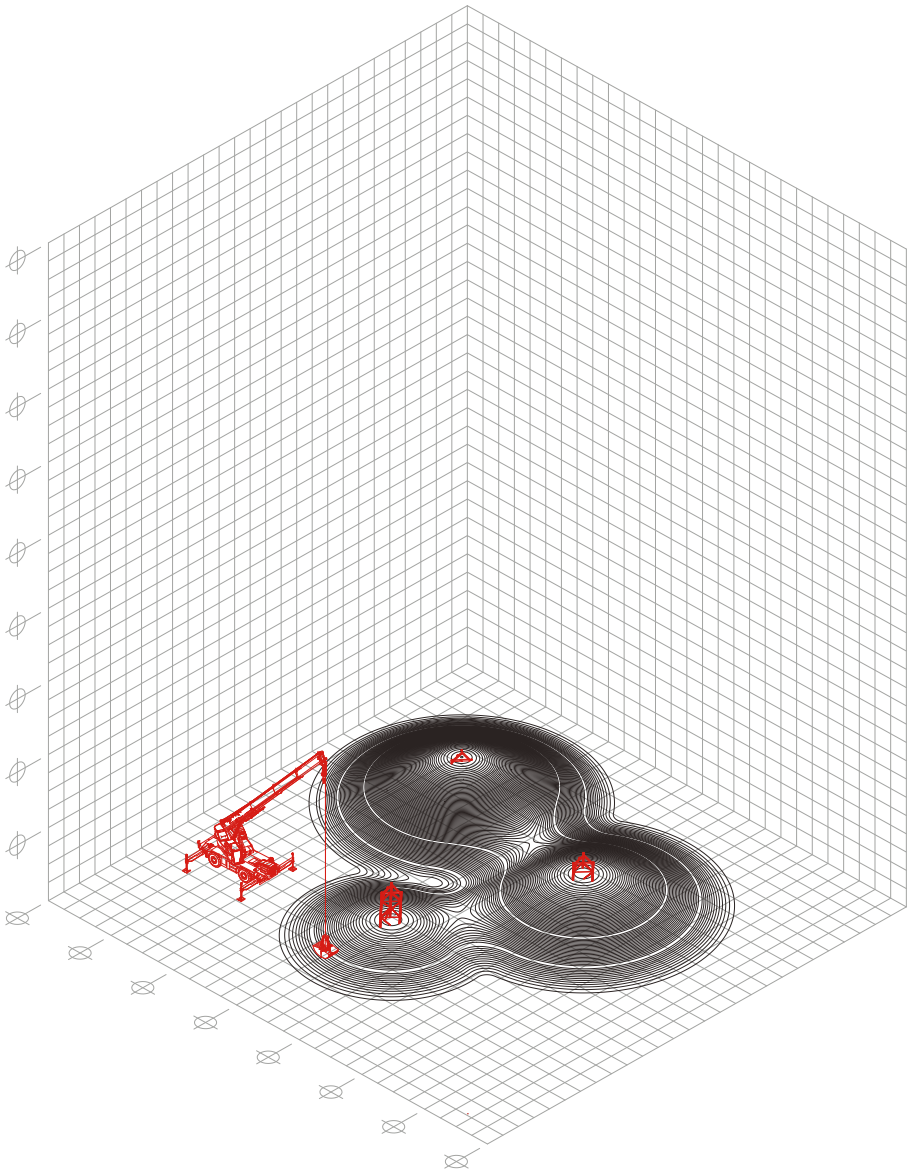


Fig 2.10- Machine sand box

Abandoned Oil Rig

Oil rig will be disassembled into smaller usable pieces by the marsh arabs

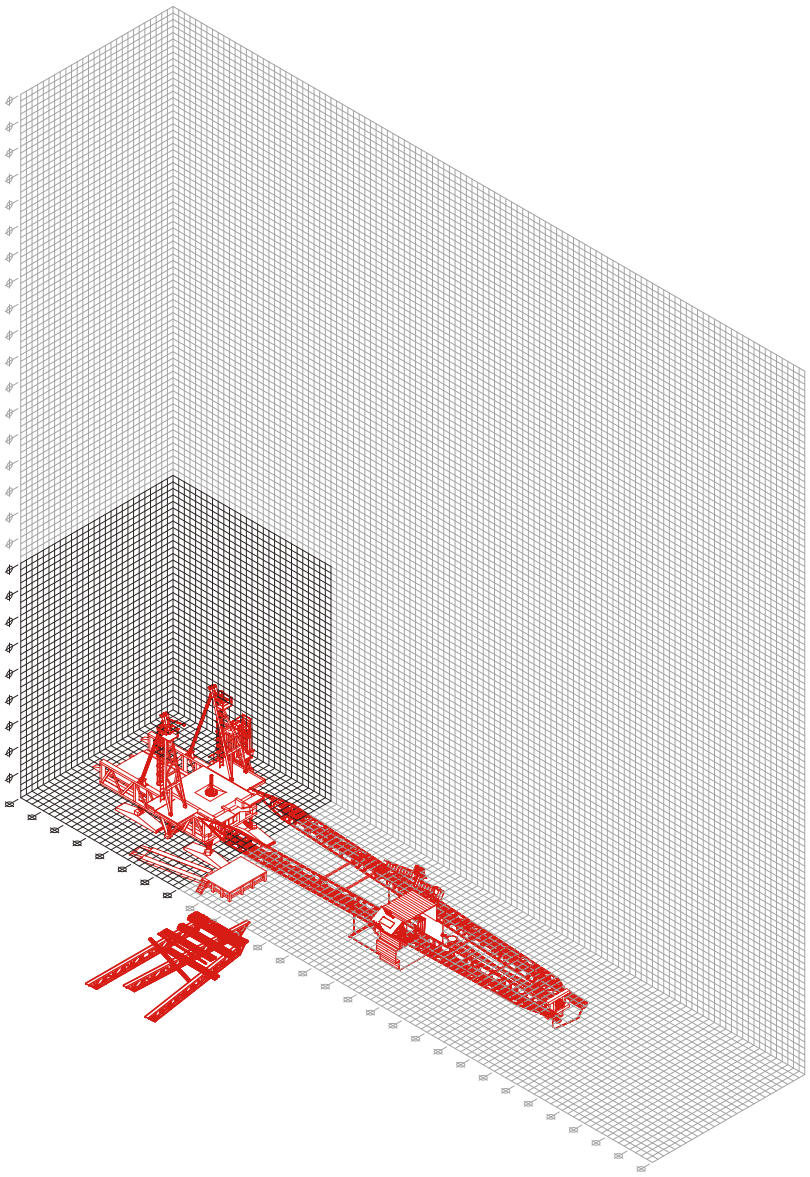


Fig 2.10- Machine sand box

Disassembled Oil Rig

Pieces extracted from the oil drilling rig

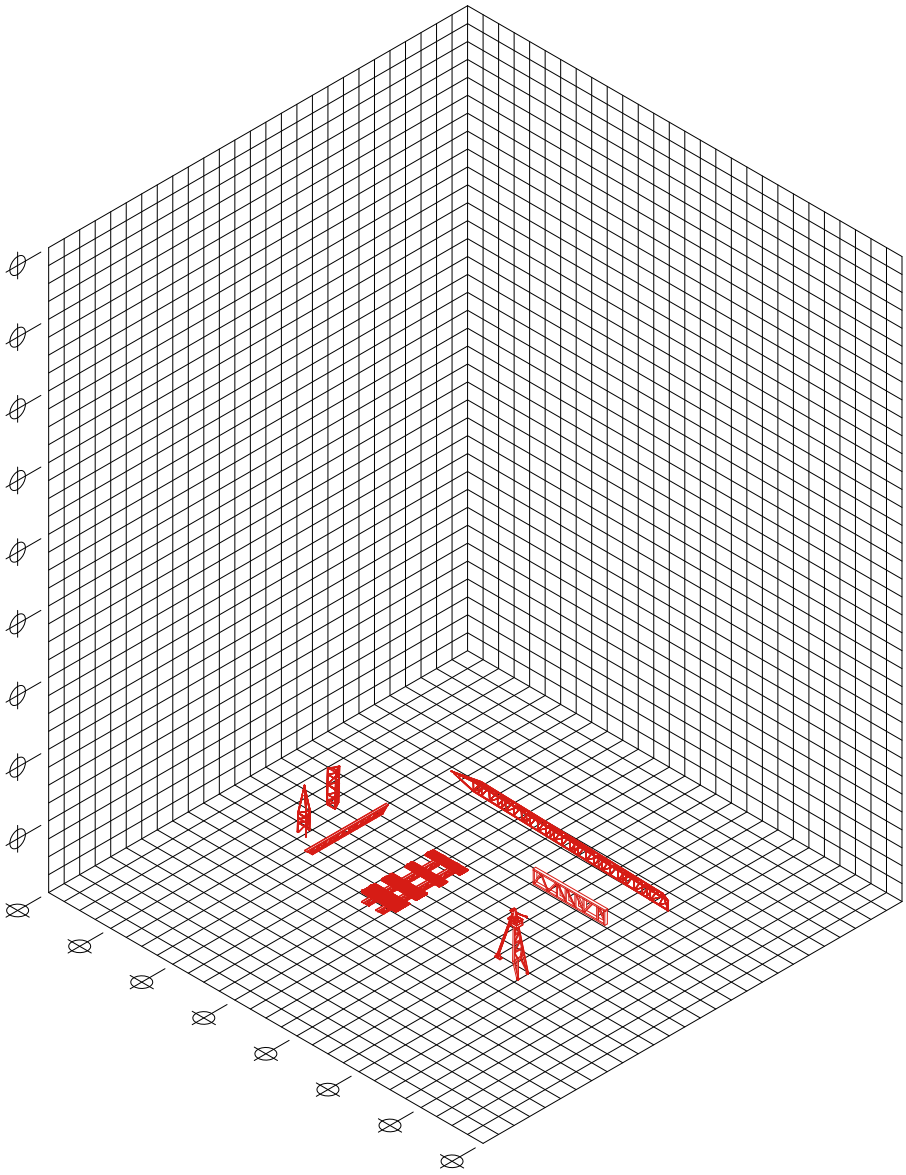


Fig 2.10- Machine sand box

Fig 2.11- Kuwait oil landscape 1991

Sculpting land

Land sculpting is an act of terraformation of landscape, a form of land manipulation that has traditionally been used for several purposes including agriculture. Sumerians used it to intensify agriculture and water manipulation and the Dutch used it to manipulate sea water and produce land.

Sculpting land can be used to produce a specific function that is necessary for users in a certain season, or during a certain time of the year, to counteract flooding, low water levels, or to manipulate flow of water. This is influenced by pottery and how in it water can accelerate or decelerate in certain grooves or formations and can be manipulated through bigger or smaller surface area.

With the new squatting state that the Me'daan get into, emerges a population mutilated by war and relocation. The act of squatting intersecting the act of nomadism produces a new type of building environment, a system where services and infrastructure are produced in groups (tribes).

According to the "New Eden master plan,"[38] one of the most applicable solutions to water sanitation is through defragmenting systems of sanitation and running them through tribal zones, using local labor and experience to manufacture a mesh of water systems that can work together gradually.

Me'daan being native residents of the marsh, who have been devising their own systems for living in this landscape for thousands of years, there is strong motivation for them to come back and look into repopulating it. This act of coming back to the marsh will be accompanied by new skills that will become devalued with the disappearance of oil industry, but nevertheless very important in the new phase. As Leslie explains, "The work process of oil drilling industry de-skills operators, industrial work processes are an 'automatic operation,' wherein each act is an exact repetition of the last."[39] Indeed, in the new phase, the Me'daan will need to use these equipment and machinery not as an act of machinery repetition that Leslie mentions but in a way that accommodates their agricultural and nomadic skills in manipulating soil, using these machinery as prosthetics to do so.

Agricultural land in the marshes has a slow harvest season and will not be productive enough to be economically viable for the Me'daan. Unless the process

38 Research done by the Iraqi government in collaboration with the Italian Ministry for the Environment and Territory and Free Iraq Foundation to assess ecology in southern Iraqi marshes.

39 Esther Leslie, "Walter Benjamin: Traces of Craft," *Journal of Design History* 11, no. 1 (1998): 5–13, http://www.jstor.org.proxy.lib.uwaterloo.ca/stable/1316160.

Fig 2.12- Marsh re-flooded landscape

of agriculture turns into a process of permaculture, in which zones of the marsh are dedicated for certain types of ecologies where it is manipulated and controlled through machinery and industrial tools to be more productive as an inhabited agriculture / fishing zone that is invaluable for the health of these water reservoirs—the same way they were invaluable as an oil reservoir—the system will not be sustainable.

Me'daan will need the agricultural and resource gathering process to speed up, and explore the possibilities of using prosthetics to push an agrarian society into a hybrid state connecting the oil industry boom with intensive farming, pushing silt cycles through new phases of production to make compound landscapes that can host several types of living organisms, forming marsh soil into a new resource for a new landscape that can sustain loss of oil as the main economy and replace it with a more regenerative / recyclable resource.

Formation - 1

Slow water flow

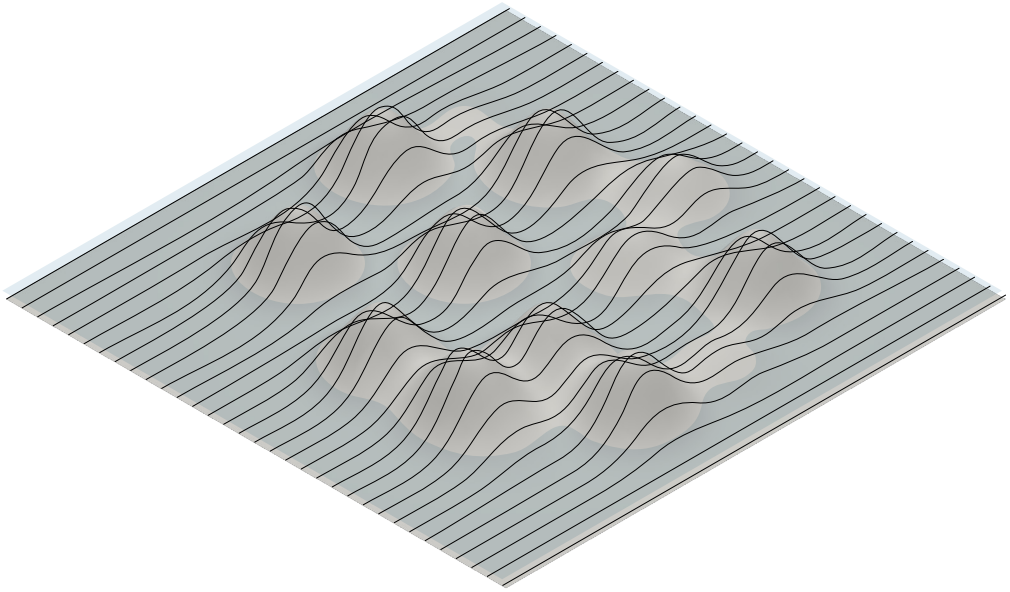


Fig 2.13- Water control formation

Formation - 2

Contain water

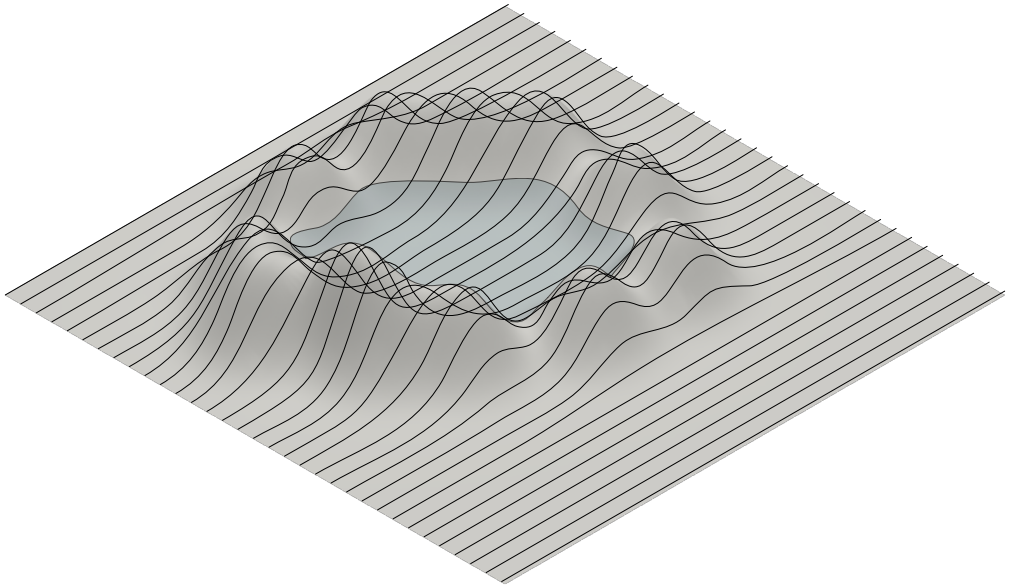


Fig 2.13- Water control formation

Formation - 3

Save water

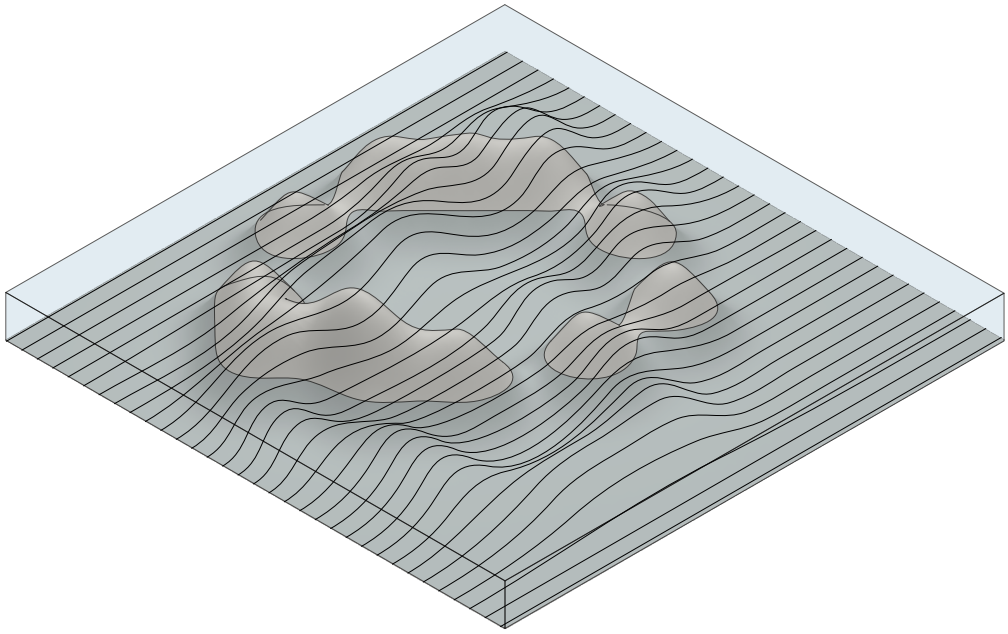


Fig 2.13- Water control formation

Formation - 4

Disrupt water flow

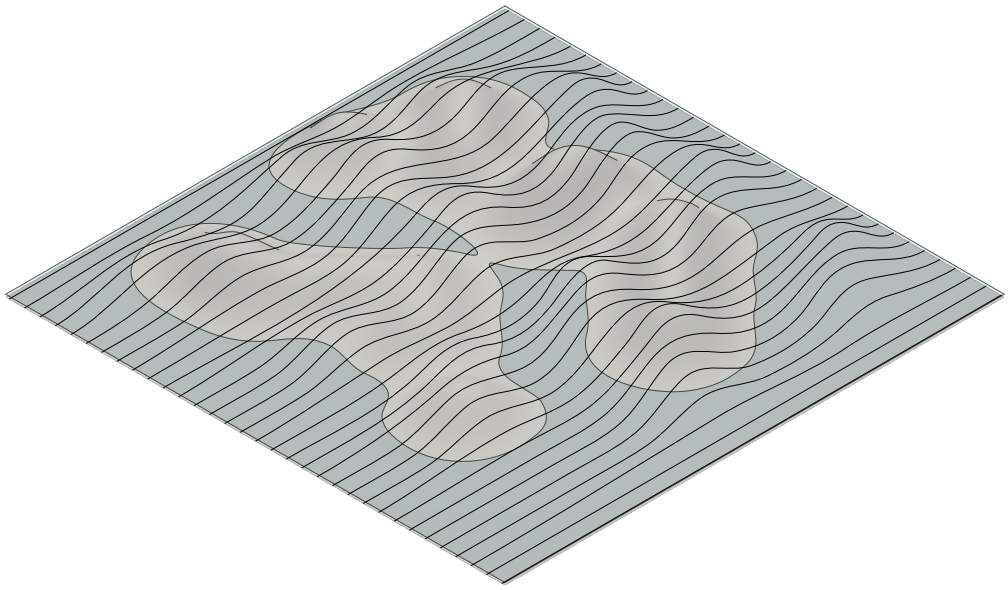


Fig 2.13- Water control formation

Formation - 5

Control water intake

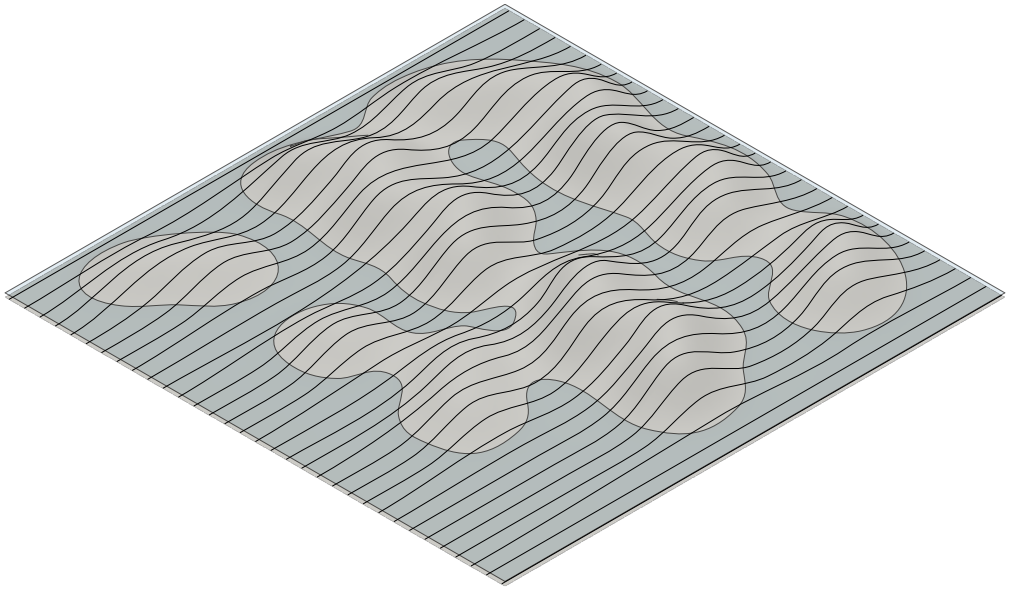


Fig 2.13- Water control formation

Formation - 6

Breakwater structure

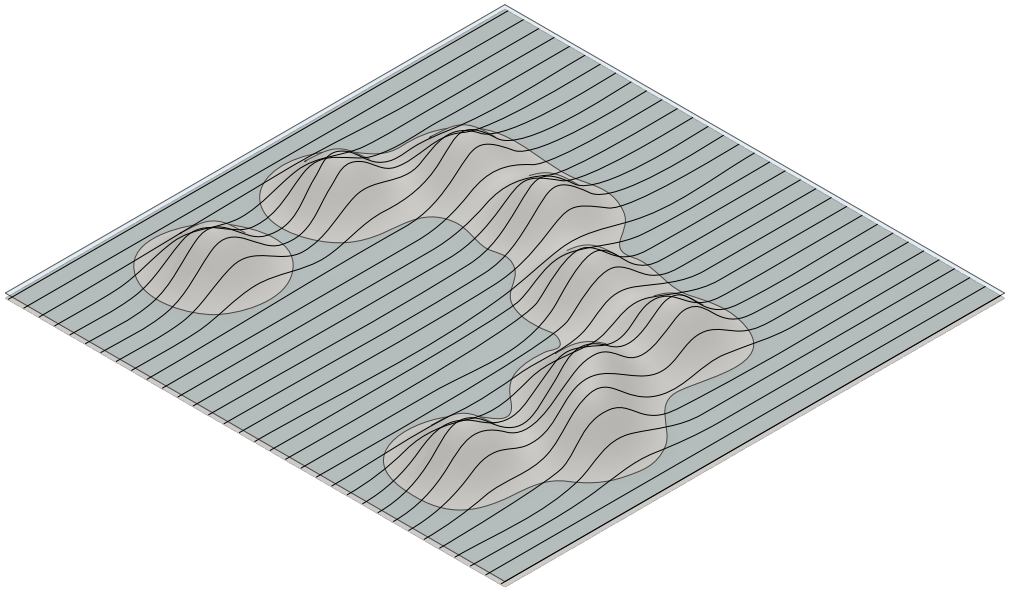


Fig 2.13- Water control formation

Connection phase - 1

Water control + Water sanitation

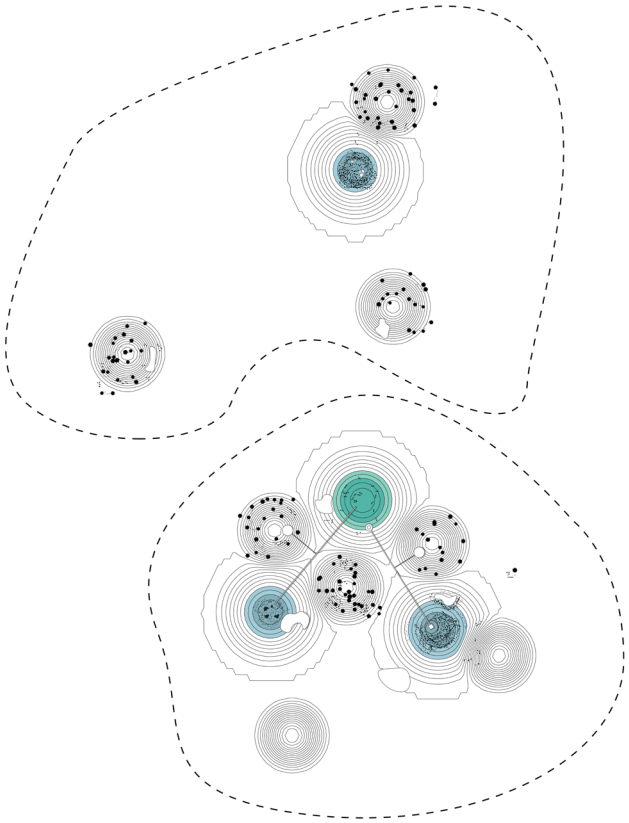


Fig 2.14- Tribal cluster

Connection phase - 2

Water control + Water sanitation
Support reed habitat+ retain soil

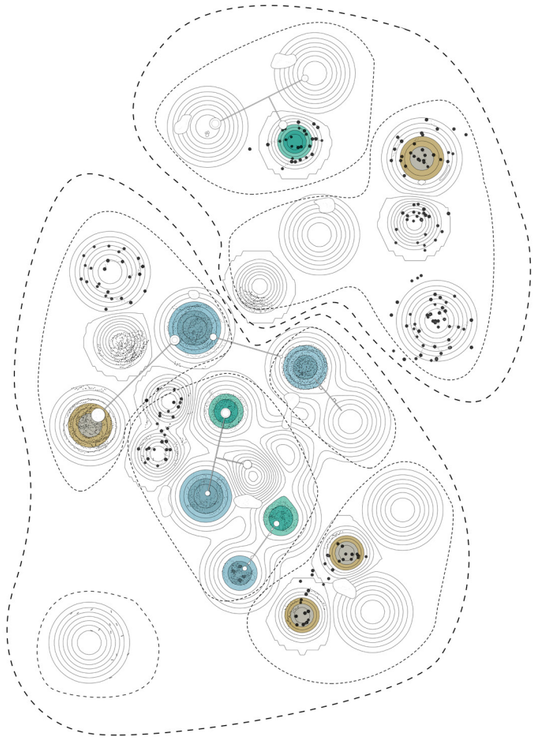


Fig 2.15- Tribal clusters including family clusters

Connection phase - 3

Water control + Water sanitation
Support reed habitat+ retain soil
Manage saline water intake

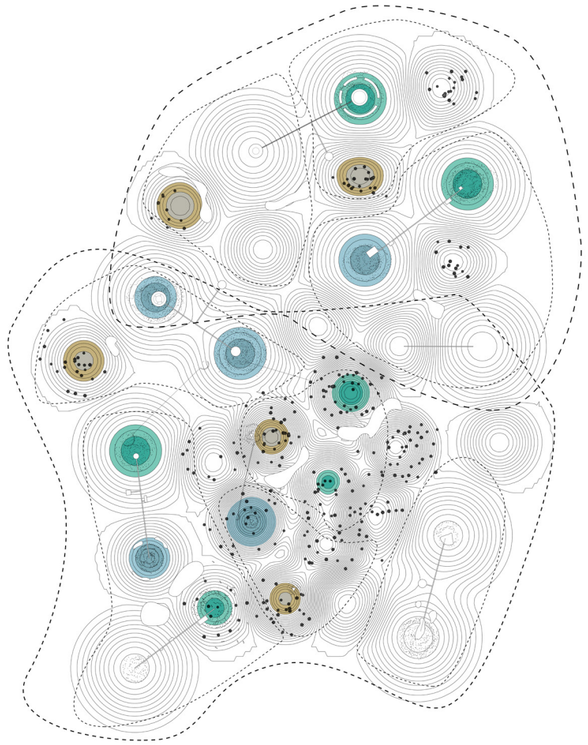


Fig 2.16- Tribal clusters including interlocking family clusters

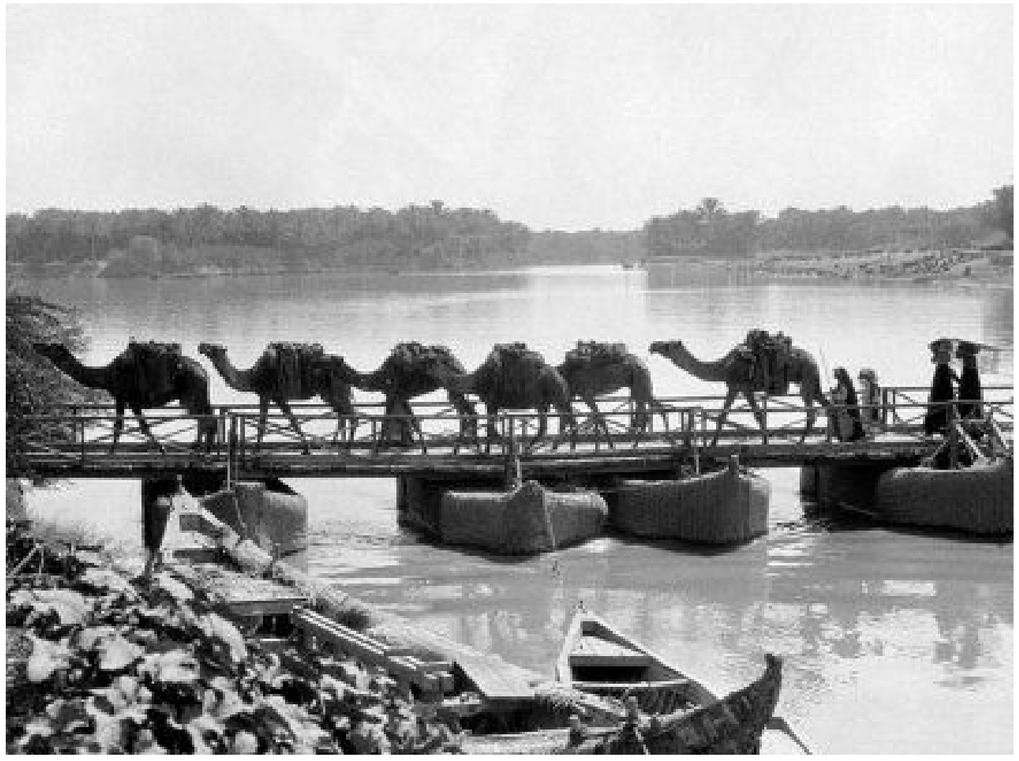


Fig 2.17- Bridge over the Euphrates River

Fig 2.18- Marsh Arabs coracle

Water surface

With large surface area comes increased exposure to the sun and other weather conditions, and this large exposure area increases the surface area of the marsh, allowing it to evaporate faster during summer months, leaving the land dry and saline.

There are two ways of tackling this issue with water: either to use a deeper system to contain water and keep the water cooler and reduce the amount of sun exposure, or to use plant cover through reed or date trees.

Due to the high levels heat in Iraq, the marshes are exposed to high degrees of evaporation and salinity during hot seasons. The marshes sustain being in the flatland of southern Iraq with the help of the green cover provided by the huge number of reed present in the area, decreasing exposed surface area of water that is exposed to the sun, and providing the cover needed for these marshes to thrive though these months.

The Me'daan started controlling the amount of reed they extract from the marsh, using a system of rotation in which reed is cultivated as fuel or building material to keep the marshes covered to shade water bodies.

With the new industrial prosthetic tools provided, the new landscape will start recreating the lost ground reed cover through multiple connected ponds to expand reed cover closer to the water zone.

With the availability of pipes and tools to transform water, this valuable resource can be rotated and moved through different ponds and containers left from the oil industry. Rotation of water from land reservoirs to sculpted clay reservoirs could create a cooler environment for water to stay sanitized and hard to evaporate.

Water Flow

High and low flow of water can determine the amount of topsoil that is preserved on land. The Iraqi marshes have been typically a bedrock for agriculture since the slow flow on the flat land allows it to sustain its valuable topsoil for generations.

The flip side of that feature is that stagnant water creates issues with water health and lets toxic content accumulate, especially in a country like Iraq that dispenses sewage water directly to water bodies without treatment.

The Me'daan depended on the high amount of water flowing through the marsh, moving the marsh water, preventing it from being stagnant. Change happened with moving this water flow into the Euphrates river and the main outfall drain (MOD), changing the slow water flow into one that flows directly to the sea with high speed.

After the reflooding of the marshes, the Me'daan started controlling the water flowing from the water streams into the marsh, creating a system that resembled the marsh but is controlled by political and tribal desires. This reflooding control (flood in the winter and trap water inside the marsh in the summer) results in the increase of salination and dryness, which is already impairing the marshes.

With the new equipment, the Me'daan can create local control zones for the water flow, allowing it to slow down around the marsh area but keeping it healthy with the right physical and biological tools at their disposal to control flow and to choose the right vegetation and cover for the soil.

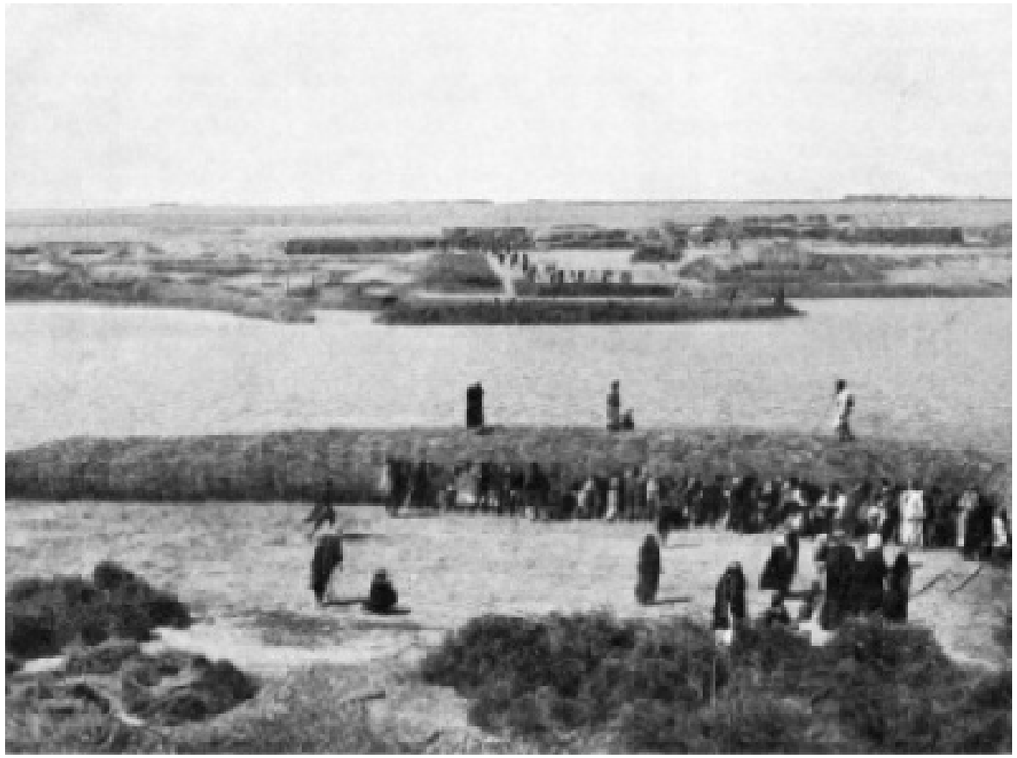


Fig 2.19- Construction of the Hindiya barrage

Fig 2.20- Marsh town sections

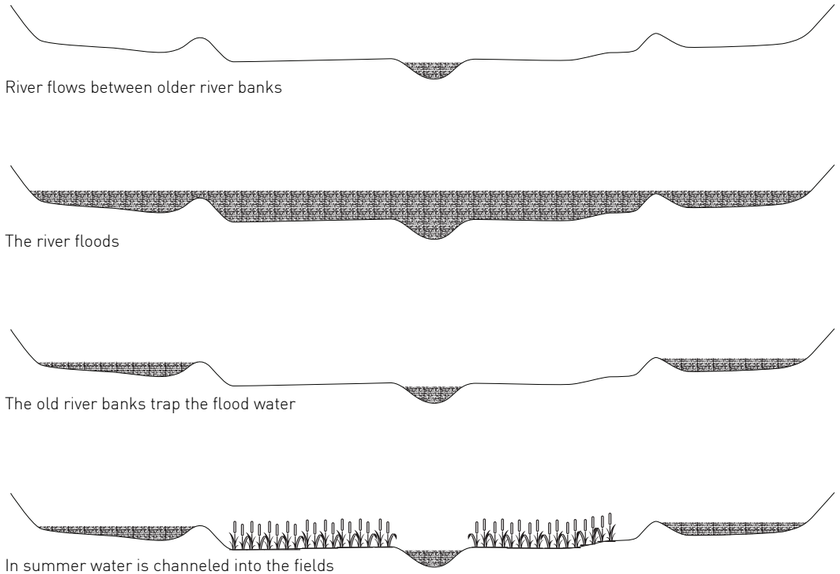


Fig 2.21- Sumerian irrigation system

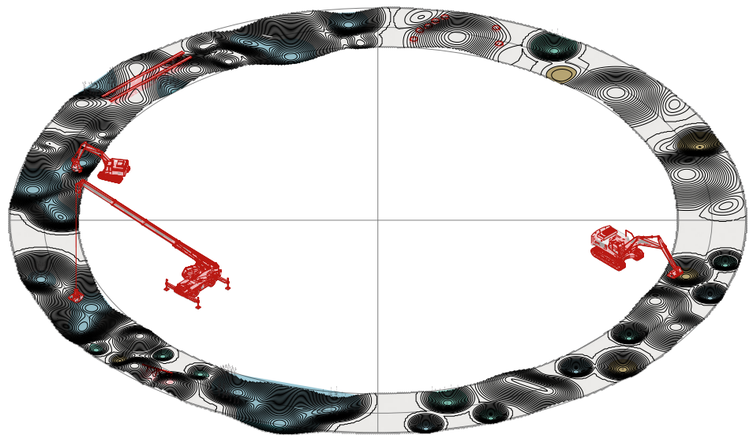


Fig 2.22- Water Cycle

Water Cycle

Due to high temperatures, dry season, and high wind speeds in the summer in southern Iraq, water bodies are prone to evaporation. According to the New Eden master plan project, evaporation in Iraq can reach around 50% of the water body in the summer,[40] making water a very valuable commodity in the summer months, when Me'daan need to maintain and control it as a main source for their livelihood.

According to the New Eden master plan, the amount of evaporation in some parts of the marshes is lower than regular rates in the summer months due to the smaller surface area—since the marsh is not always filled with water, making the surface area way smaller than a full marsh. The other crucial reason is the use of vegetation such as reed, which works to maintain water either by shading or by using marsh water stored in their body.

Through sectioning water from flooding season, controlling it and maintaining smaller orchards, agriculture practices in Sumerian time started to expand and became the main source of income in Sumer.

Prosthetics will allow the squatter Me'daan to manipulate landscape into smaller deposits of water that could save water content through flooding season, generating an oasis type of environment in dry seasons, as a first phase to rehabilitate the soil and turn it from being sand loam into clay loam, which can sustain marsh vegetation and allow it to thrive.

40 Iraqi Ministries, "New Eden Master Plan for the Integrated Water Resources Management in the Marshland Area, Main Report, Iraqi Ministries of Environment," Water Resources Municipalities and Public Works with Cooperation of the Italian Ministry for the Environment and Territory and Free Iraq Foundation 20, 20 (2006): vol. 20. Book 1- 37

Fishing Cycle

With the marshes recovering from major depletion in the period between 1993 and 2004, fish species have been recovering slowly, aided by the increase of fishermen and the lack of any government body to control mass fishing. The New Eden plan suggests some locally controlled fisheries to produce more fingerlings to add to the marsh during winter seasons. Consequently, these marshes could be considered as large multi-species fishery.[41]

With the increased amount of greenery and feeding grounds for fish in the marshes, compared to other water bodies in Iraq, the marshes became a spawning ground for fish and aquatic organisms. This allowed the marsh to be a large fishery pond for locals, which formed a big part of their livelihood in the marsh.

Me'daan have been using controlled systems of fishing since the time before the dehydration of marshes in 1993. After the reflooding of the marsh, these fishing techniques changed to include more aggressive sorts of fishing through poison, electricity and explosives. The disappearance of safe locations for fish to spawn and grow between reeds is allowing fishermen to fish in a random and aggressive manner that hinders their efforts to thrive and multiply.

With the new phase, the need to form a controlled water zone by each tribe to allow fish to grow and multiply in that zone and be a source for certain types of aquatic organisms will gain importance.

Along with a system that allows the use of tribal connections and constant movement where nurseries are sectioned, being owned by tribes or a group will allow the marshes to be a source of sustainable livelihood, limiting mass fishing and allowing fry and fingerlings to grow and populate in a safe environment as a first phase, until marsh vegetation can grow and allow these fish to live in the marsh with the protection of ample reed forests and greenery.

41 Iraqi Ministries, "New Eden Master Plan for the Integrated Water Resources Management in the Marshland Area, Main Report, Iraqi Ministries of Environment," Water Resources Municipalities and Public Works with Cooperation of the Italian Ministry for the Environment and Territory and Free Iraq Foundation 20, 20 (2006): vol. 1. Book 4, 101

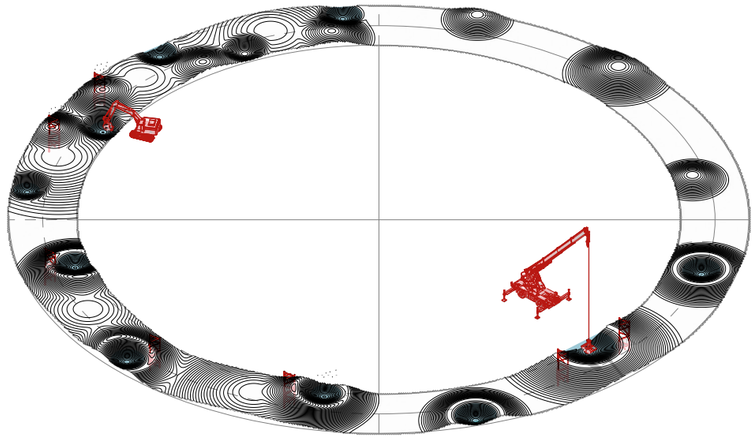
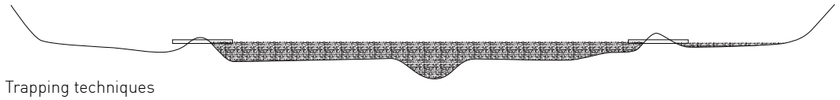
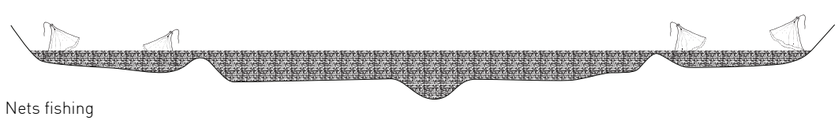


Fig 2.23- Fishing Cycle





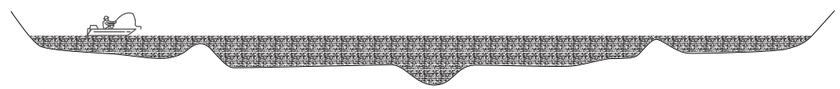
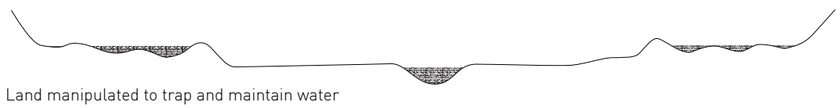


Fig 2.24- Sumerian fishing

The river floors

The old river banks trap the flood water



Land manipulated to trap and maintain water

Land manipulated to trap and maintain water

Fig 2.25- Canal irrigation system

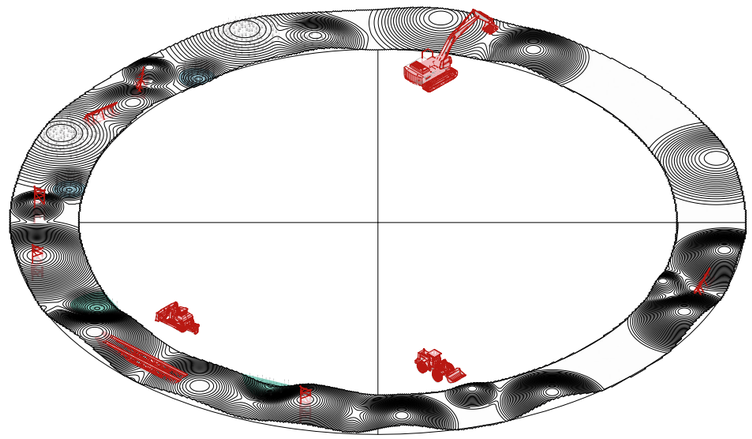


Fig 2.26- Farming Cycle

Farming Cycle

The marshes have been plagued with the issues of lack of gravity irrigation, high salinity and the high levels of underground water—factors that affected the marsh landscape in previous years. But with the flow of water being at higher rate than it used to be before the Ataturk dam was built in 1993 and the dehydration of the marsh, a drainage system was already in place to drain agricultural land of excess water. With the low levels of fresh water and destruction of drainage projects, it is difficult to go back to the agrarian society that existed before 1993, unless a system to drain the soil is reintroduced to the landscape.

One of the Sumerian techniques of drainage is the subdivision of drainage units where each tribe or community would introduce their own drainage system connecting to the river. Following the reflooding of the marshes, the New Eden plan suggests going back to that ancient system of drainage as an option.

With the introduction of the new oil tools, this drainage system can be synthesized using land manipulation tools, pipes and water management. The combination of these systems can produce a better managed system where Sumerian techniques can be recreated and processed more effectively using mechanical prosthetics to manipulate land and change soil properties.

Living Cycle

The Me'daan have been using soil and reed as a main construction material in the marshes. This localized use of materials allowed the marsh to be a closed sustainable system since the Sumerian times. With the cycle of dehydration and hydration of the marsh, and the introduction of foreign material (concrete and steel), the sustainable cycle for soil and clay began to be interrupted, leaving land bare and susceptible to erosion.

Determining Sumerian building techniques as a case study for composite materials and supporting topsoil and resisting landscape from being eroded, forming islands on top of the marsh as a tool for controlling livelihood in the marsh, controlling water, fisheries, farming and settlement revealed important clues for building a post-oil return to sustainable living on the marshes.

The evolution of this methodology was determined by the oil industry where they formed the West Qurna oil field as a giant platform to control water flow, and to use topsoil as a tool of control rather than a resource.

When the importance of topsoil as a resource started to disappear, new materials started to be prominent in the marsh, forming a new stratum of concrete, steel and plastics.

Dwelling on top of the marsh requires constant manipulation of land, which was done through primitive tools. But with the introduction of new oil industry tools, the constructed landscape can be manipulated in an accelerated pace, changing the top soil more frequently, and enabling rotation of silt seasonally, for more permeable and stable landscape that allows the marsh to exist in parallel to the new intensive ecology.

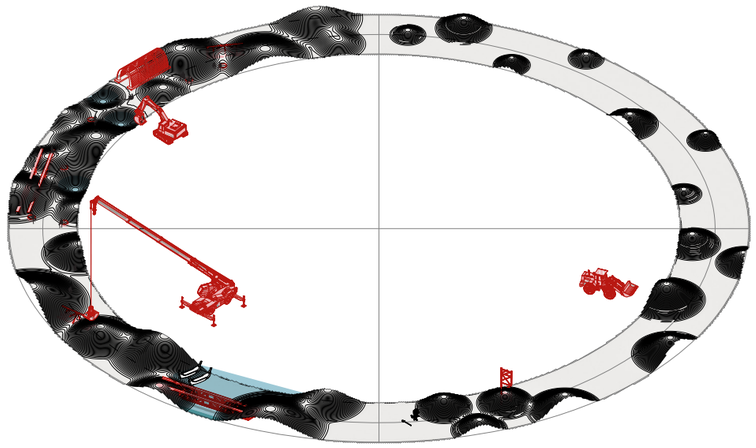


Fig 2.27- Dwelling Cycle

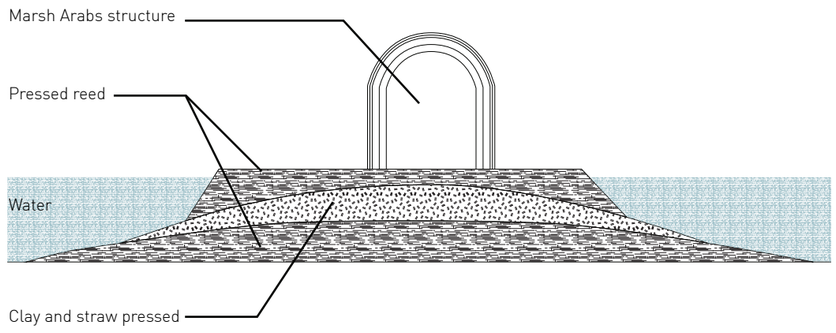


Fig 2.28- Sumerian Island

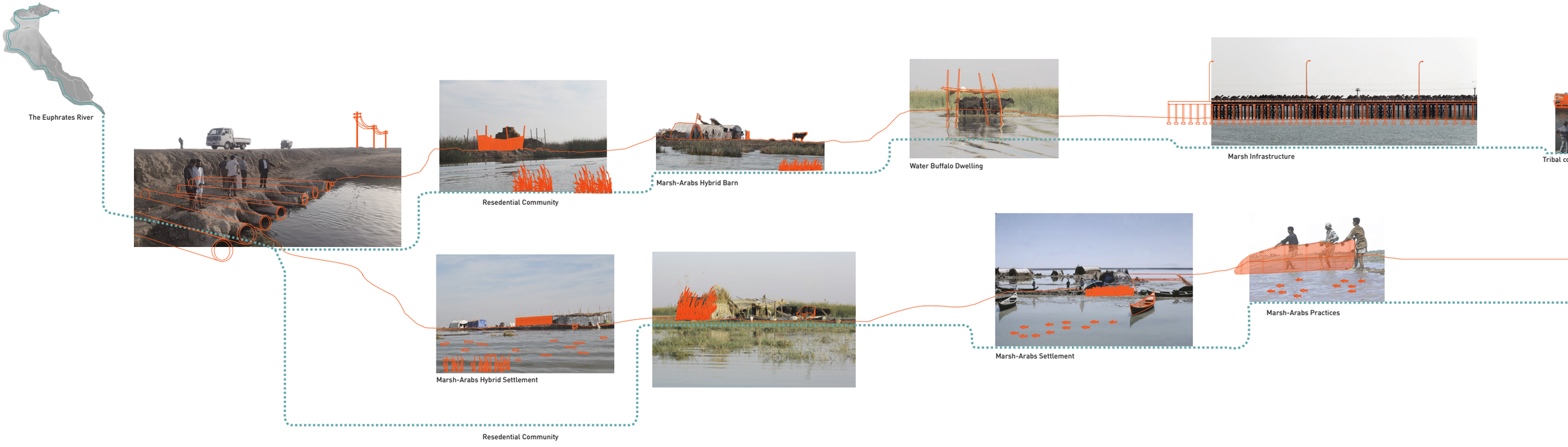


Fig 2.29- Flow of marsh water systems

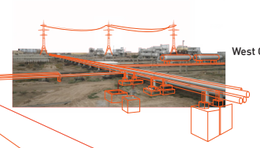
ontrol

Terrain manipulation

Prosthetics for control

Makeshift connections

Controlled marsh zone



West Qurna Oil Field

West Qurna Infrastructure

Persian Gulf
(Arabian Gulf)

Water pipes integrated on site

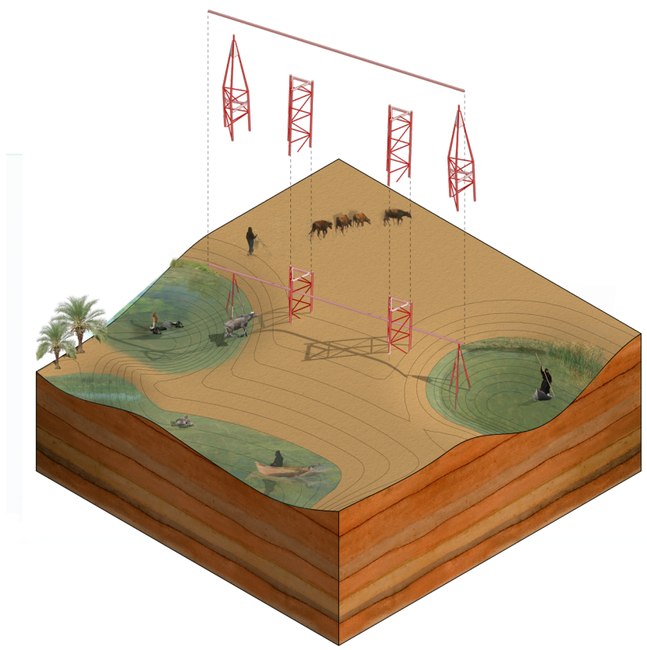


Fig 2.30- Prosthetic Tools

Oil Drill integrated on site

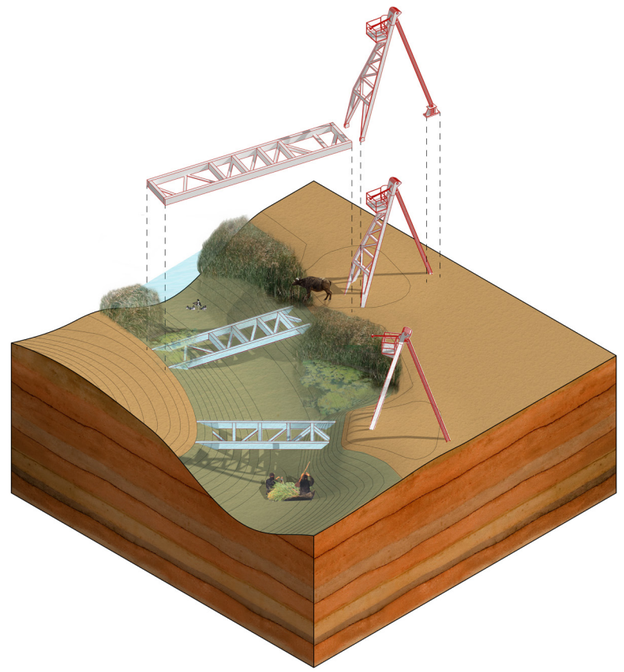


Fig 2.30- Prosthetic Tools

Reed mats integrated on site

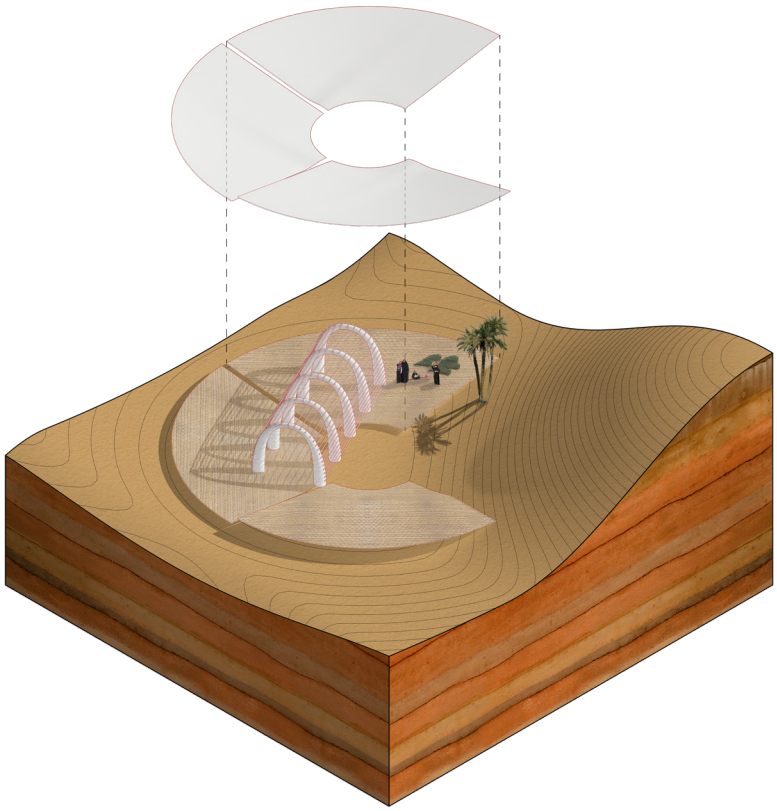


Fig 2.30- Prosthetic Tools

Oil pipes integrated on site

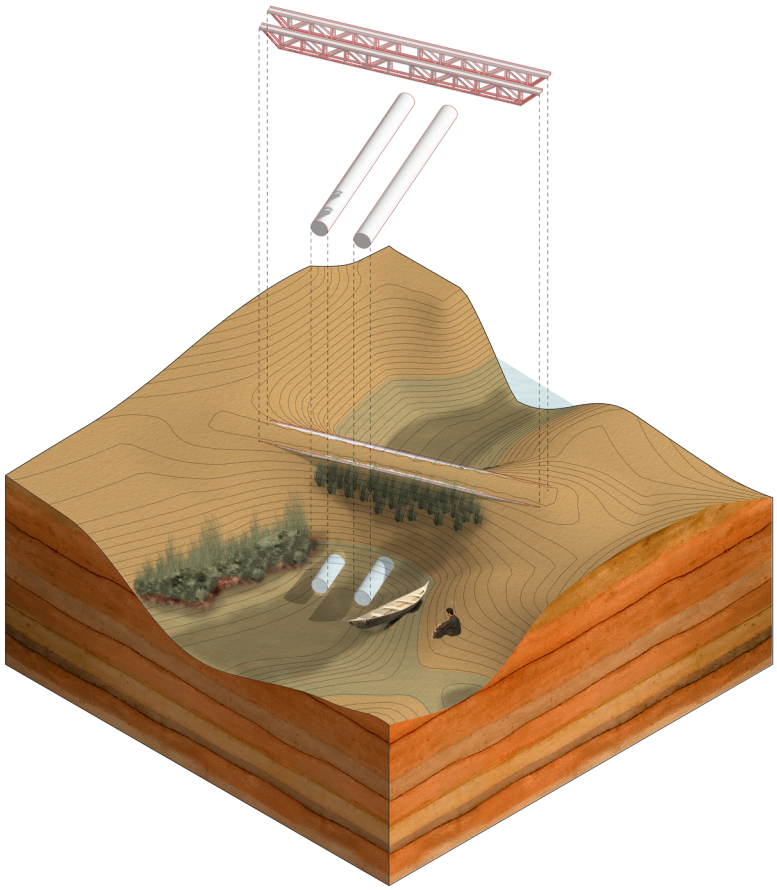


Fig 2.30- Prosthetic Tools

Diagrid integrated on site

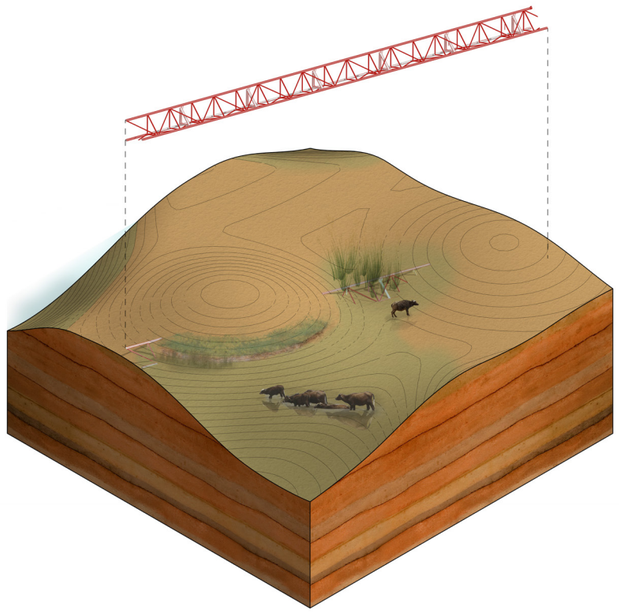


Fig 2.30- Prosthetic Tools

Tires integrated on site

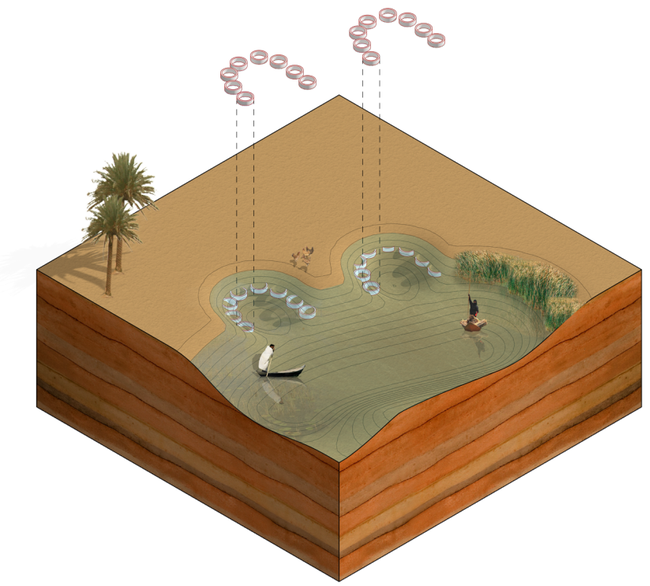


Fig 2.30- Prosthetic Tools

Water level

Population

Oil Nationalization

Oil Land Expantion

marsh population rise

Iraq-Iran war

Marsh Political Takeover

marsh draining

Refloodin

Native Plants Species

Foreign Plants Species

Phoenix dactylifera - Date palm

Ceratonia sil

Populus euphratica - Euphrates poplar

Zizar

Arundo donax - Giant Reed

Phragmites australis - Common Reed

Cyperus papyrus - Umbrella Sedge

Hordeum vulgare - Barley

1970 1975 1978 1980 1984 1988 1991 1995 1998 2000 2004

Fresh Water **Low Salinity Water** **Marginal Water**

- 0.75 ppi **0.75 - 1.5 ppi** **1.5 - 3.0 ppi** **3.0 - 7.5 ppi** **7.5 - 10 ppi**

Native Fish Species

Foreign Fish Species

Aspius vorax - Shilik

Alburus mossulensis - Lassaf

Barbus grypus - Shabbot

B.sharpeyi - Bunni

Tenualosa ilish

Silurus triostegus - Jerri

Heteropneustus fossilis - Abu Hakim

Liza abu - Kishni

Mastacembelus mastacembelus - Marmerage

Fresh water retained

Fresh water in marsh

Saline water in marsh

Saline water retained

Fig 2.31- Ecological Timeline of species change in the marshes

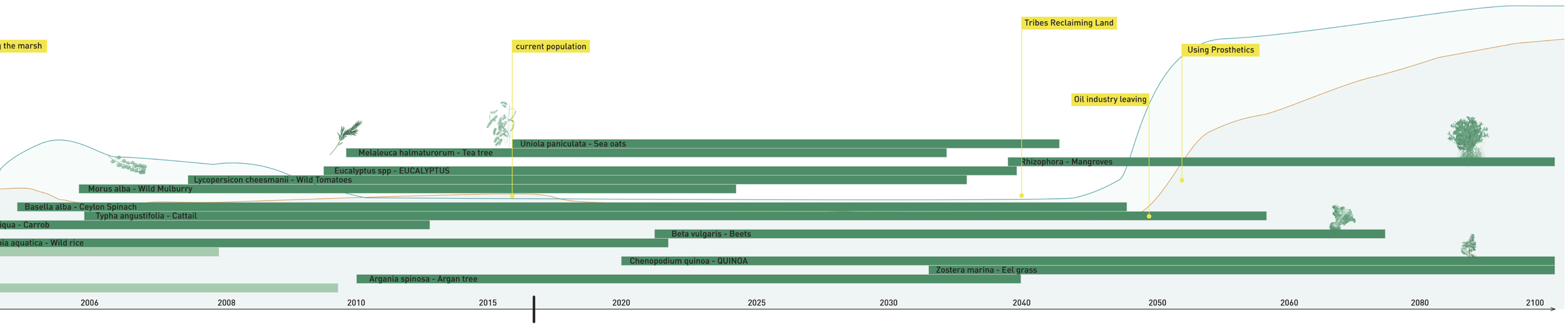

the marsh
current population
Tribes Reclaiming Land
Using Prosthetics
Oil industry leaving
Uniola paniculata - Sea oats
Melaleuca halmaturorum - Tea tree
Rhizophora - Mangroves
Eucalyptus spp - EUCALYPTUS
Lycopersicon cheesmanii - Wild Tomatoes
Morus alba - Wild Mulburry
Basella alba - Ceylon Spinach
Typha angustifolia - Cattail
qua - Carrob
Beta vulgaris - Beets
ia aquatica - Wild rice
Chenopodium quinoa - QUINOA
Zostera marina - Eel grass
Argania spinosa - Argan tree
2006
2008
2010
2015
2020
2025
2030
2040
2050
2060
2080
2100
Brackish Water
Brackish Water
Saline Water
10 - 12.5 ppi
12.5 - 15 ppi
15 - 17.5 ppi
17.5 - 20 ppi
20 - 22.5 ppi
22.5 - 25 ppi
- Sbour
L.subviridis - Beyah
Acanthopagrus latus - Shanak
Sparidentex hasta - Sheim
Boelophalmus boddarti - Abu Shlambo
Thryssa mystex - Shegah
Ctenophryngodon idella - Gareba
Cyprinus carpio - Karp

Fig 2.32- Farming collage

Farming

Fig 2.33- Date trees orchards

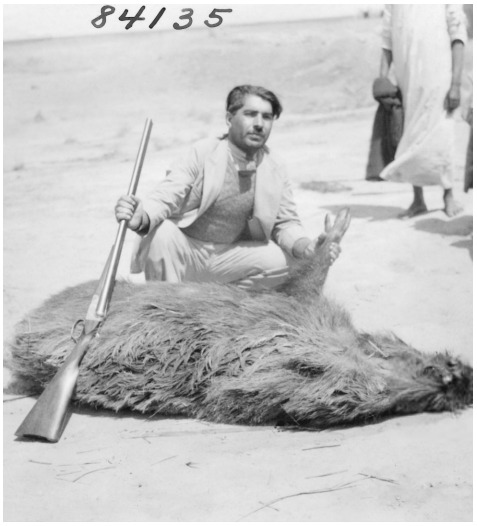


Fig 2.34- Hunting in the marshes

Fig 2.35- Marsh reed

Fig 2.36- Bread making and baking

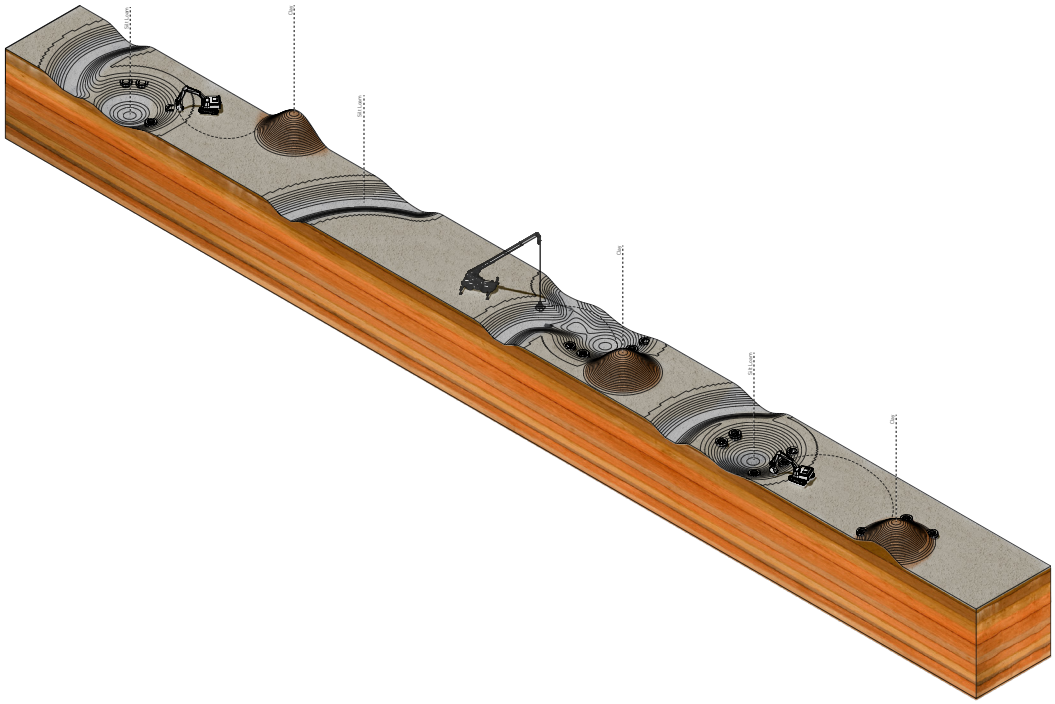


Fig 2.37- Farming Terraformation 2050

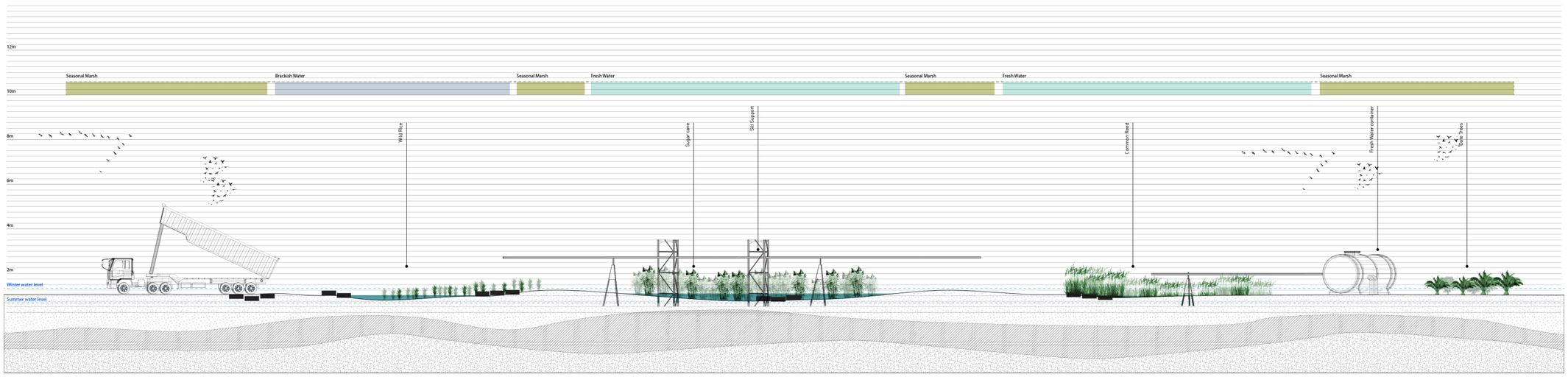


Fig 2.38- Farming Section 2050

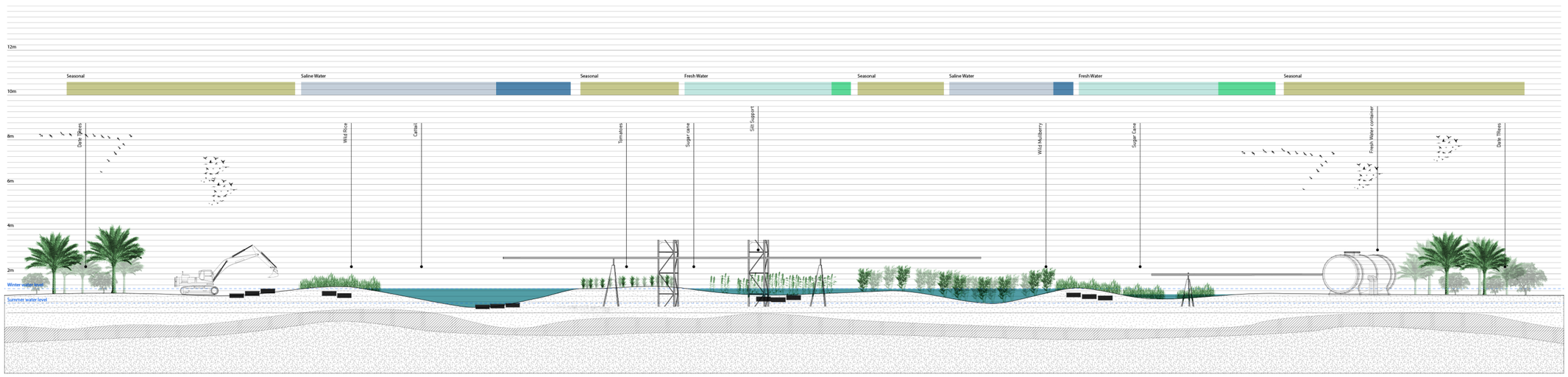


Fig 2.39- Farming Section 2075

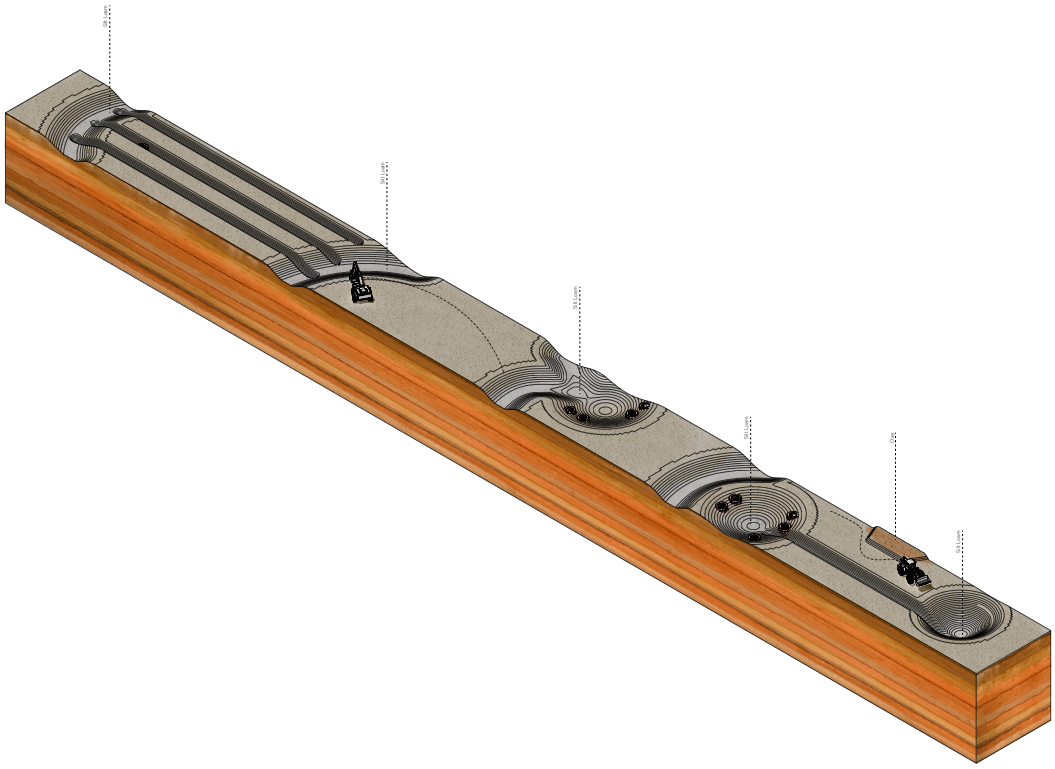


Fig 2.40- Farming Terraformation 2075

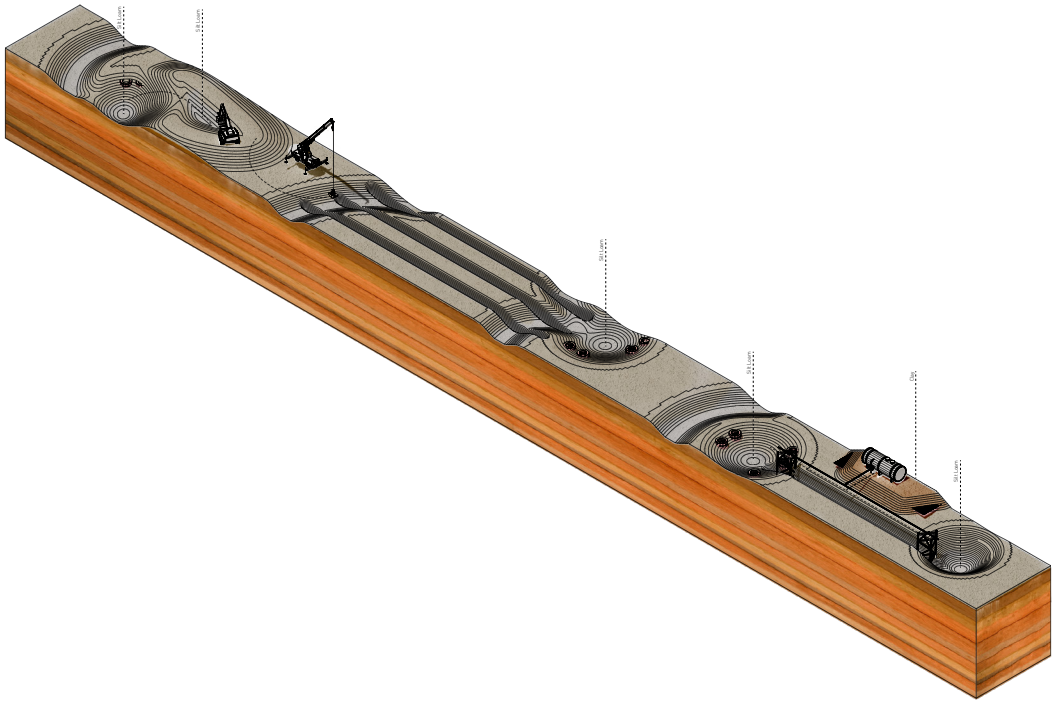


Fig 2.41- Farming Terraformation 2100

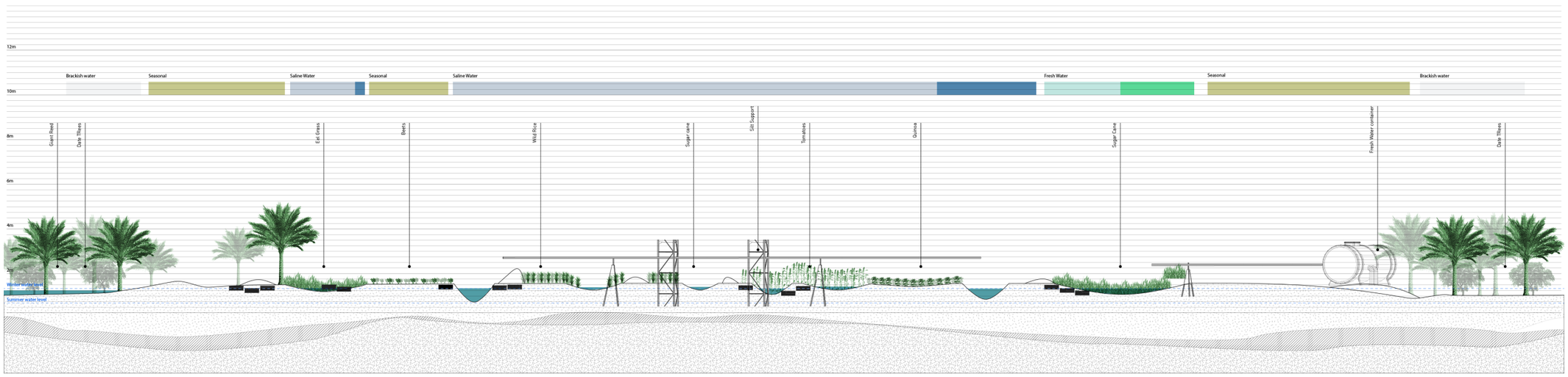


Fig 2.42- Farming Section 2100

Fig 2.43- Dwelling collage

Dwelling

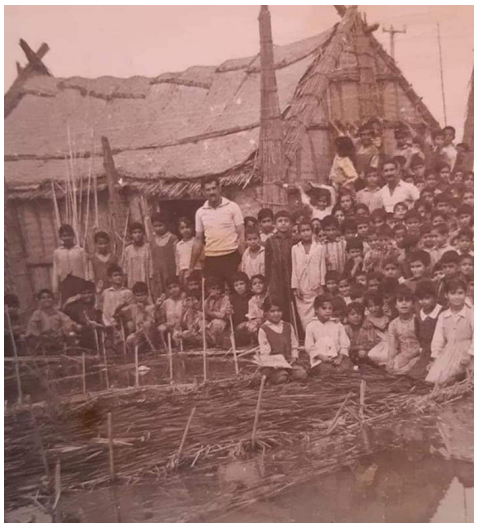


Fig 2.44- Marsh school

Fig 2.45- Boat workshop

Fig 2.46- Marsh dwelling

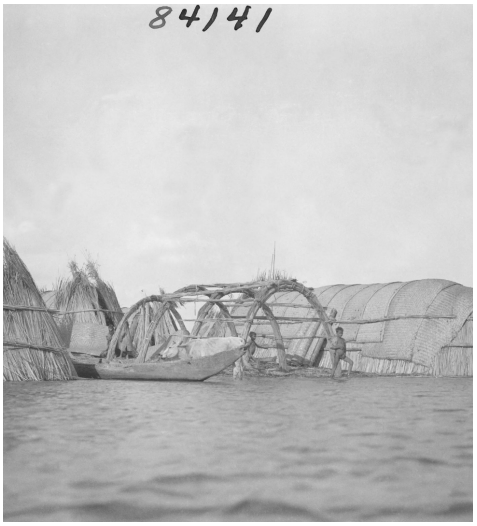


Fig 2.47- Marsh dwelling construction

Fig 2.48- Dwelling Terraformation 2050

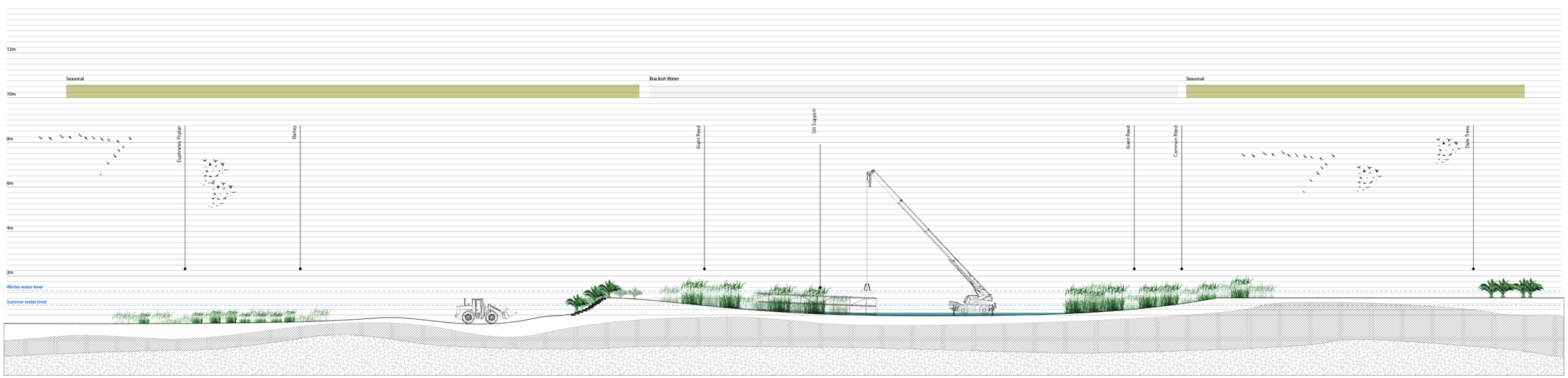


Fig 2.49- Dwelling Section 2050

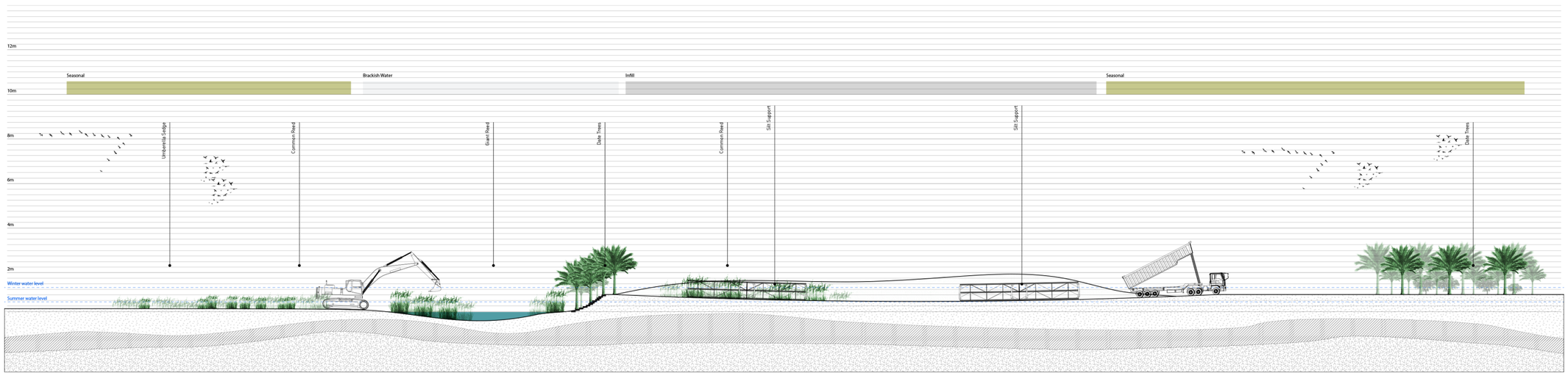


Fig 2.50- Dwelling Section 2075

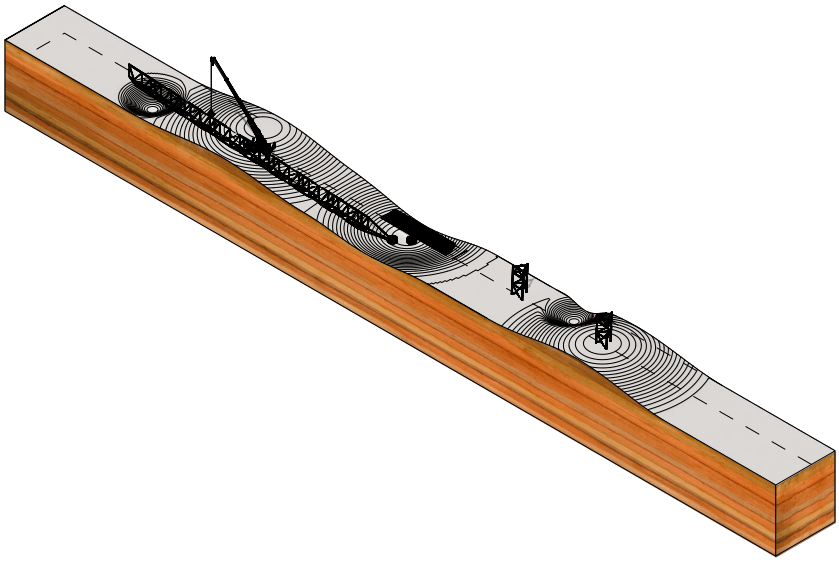


Fig 2.51- Dwelling Terraformation 2075

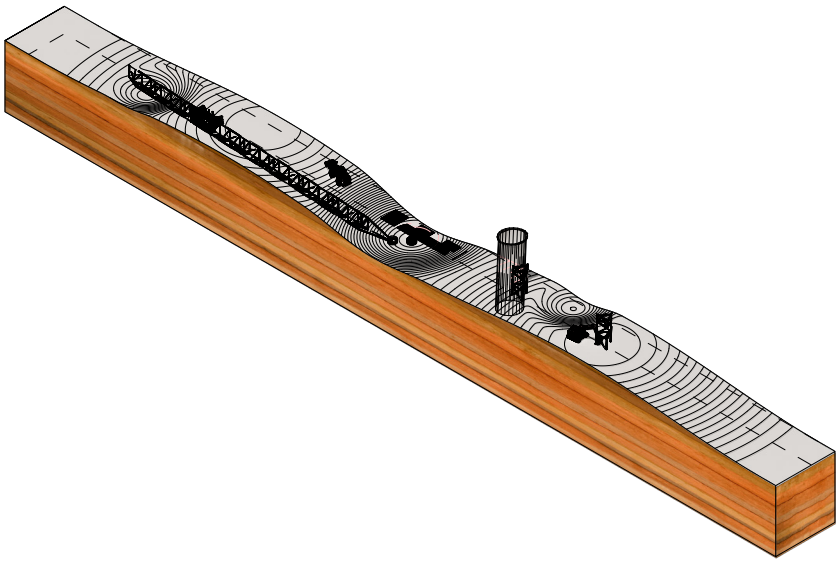


Fig 2.52- Dwelling Terraformation 2100

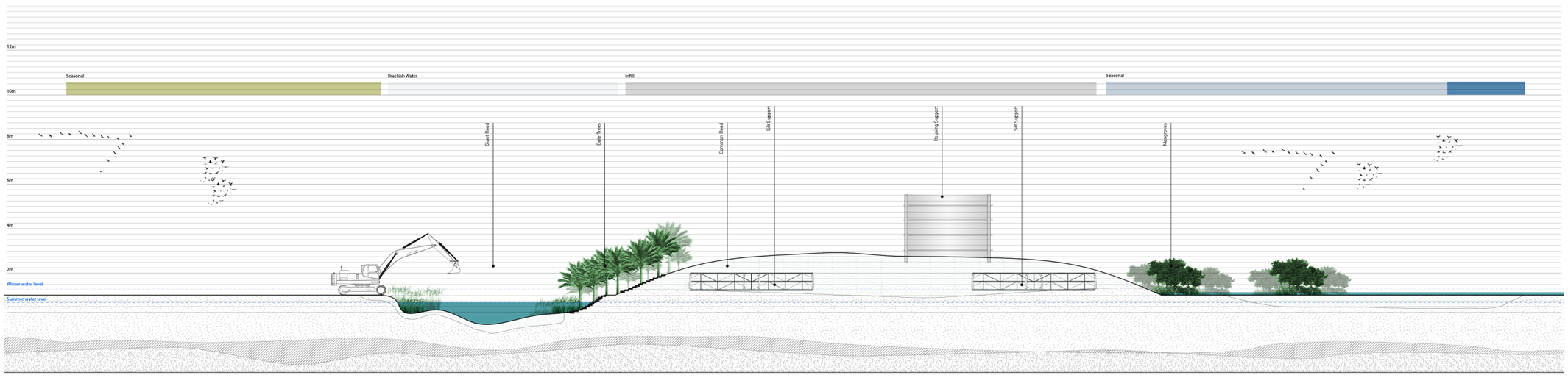


Fig 2.53- Dwelling Section 2100

Fig 2.54- Water collage

Water

Fig 2.55- Crane terraformation

Fig 2.56- Water transportation

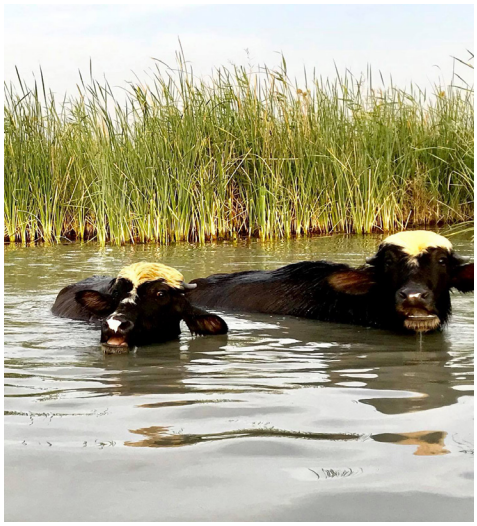


Fig 2.57- Water as resource

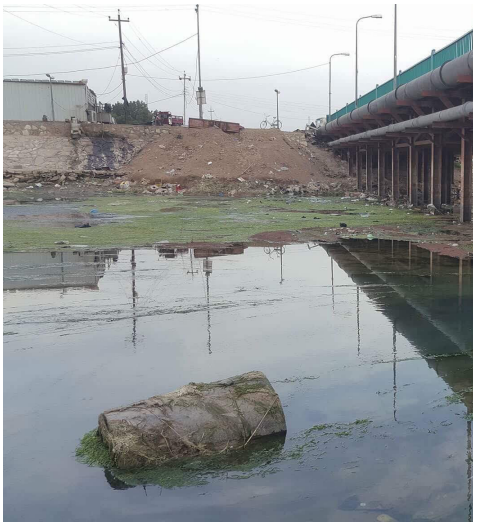


Fig 2.58- Water contamination

Water Terraformation 2050

Fig 2.59- Water Terraformation 2050

Water Section 2050

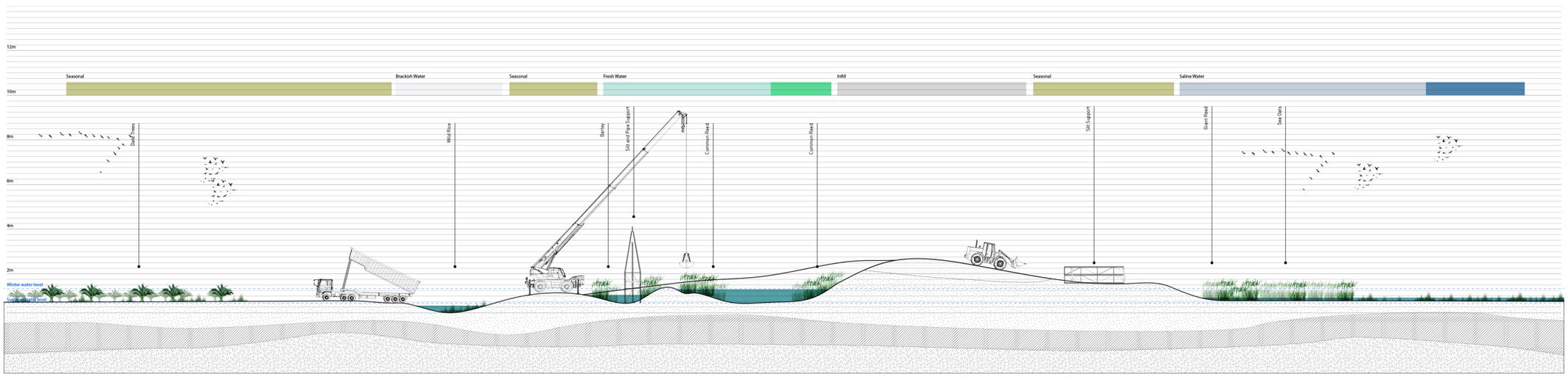


Fig 2.60- Water Section 2050

Water Section 2075

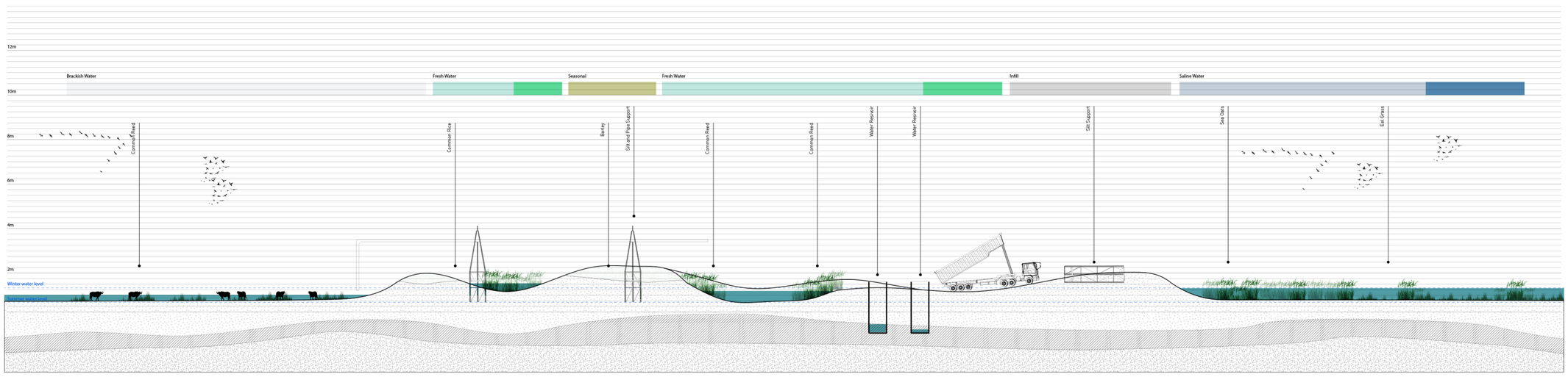


Fig 2.61- Water Section 2075

Water Terraformation 2075

Fig 2.62- Water Terraformation 2075

Water Terraformation 2100

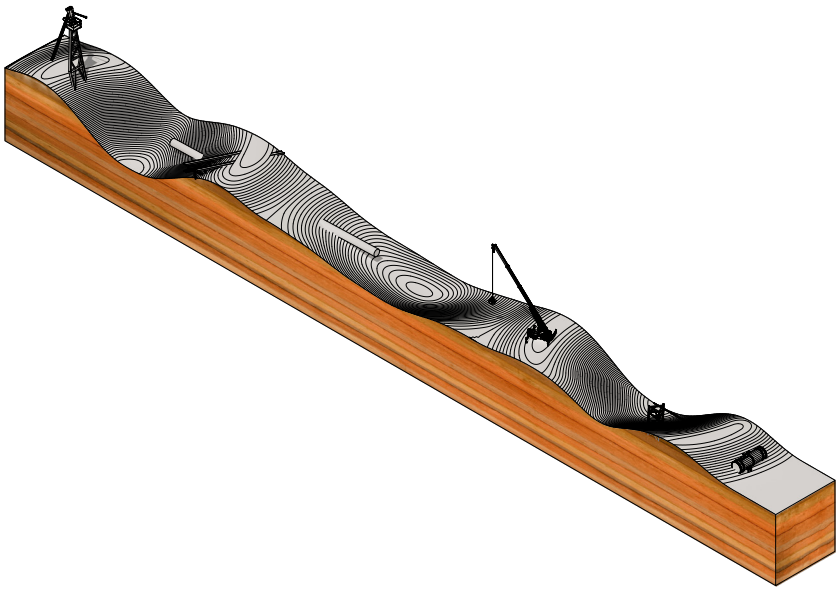


Fig 2.63- Water Terraformation 2100

Water Section 2100

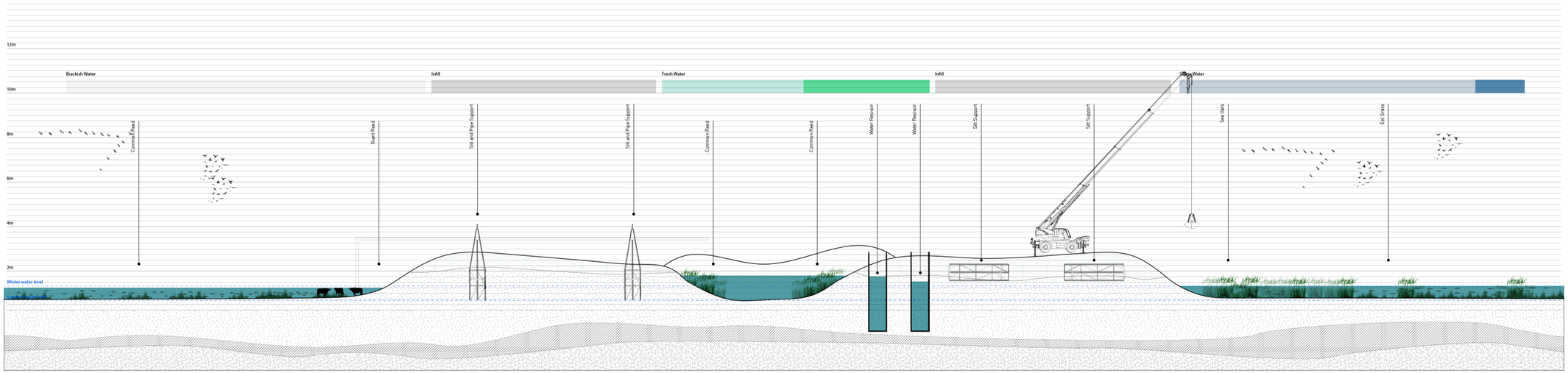


Fig 2.64- Water Section 2100

Fig 2.65- Fishing collage

Fishing

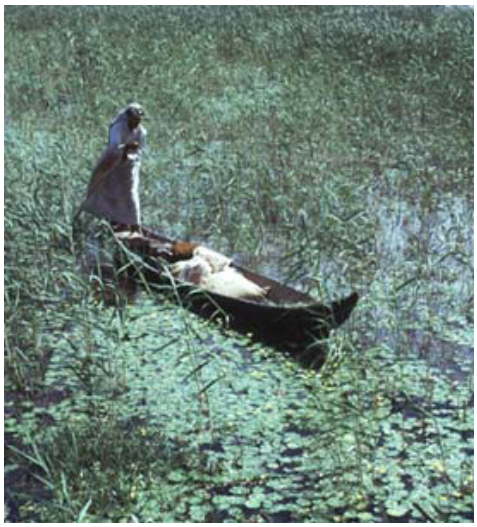


Fig 2.66- Marsh fisherman

Fig 2.67- Coracles

Fig 2.68- Marsh Arabs Fishing

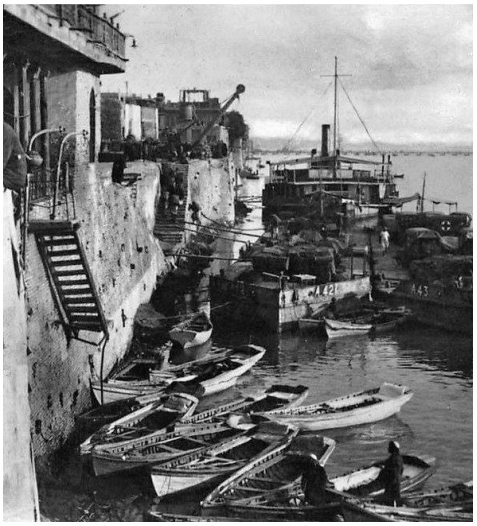


Fig 2.69- Boats

Fishing Terraformation 2050

Fig 2.70- Fishing Terraformation 2050

Fishing Section 2050

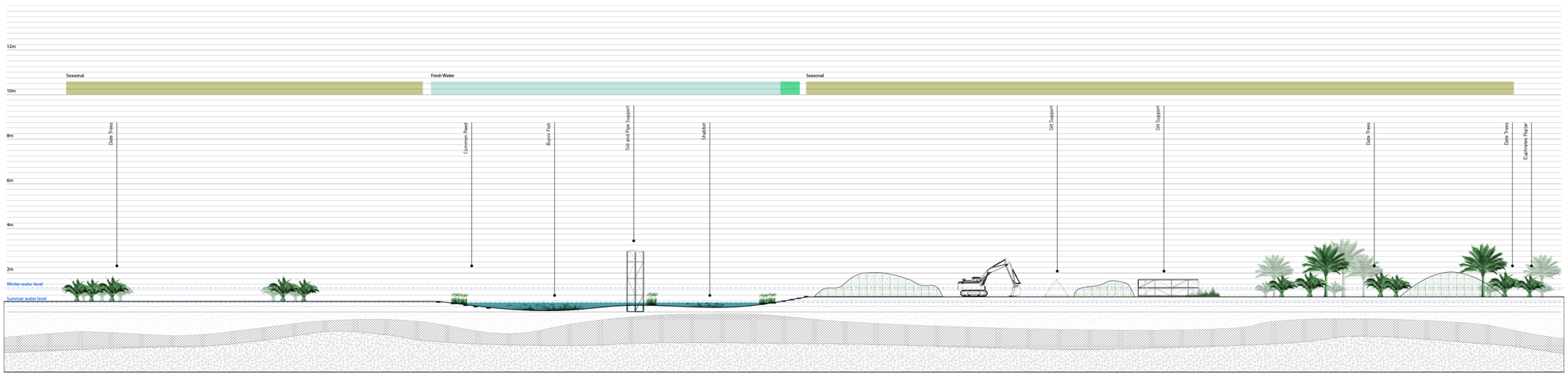


Fig 2.71- Fishing Section 2050

Fishing Section 2075

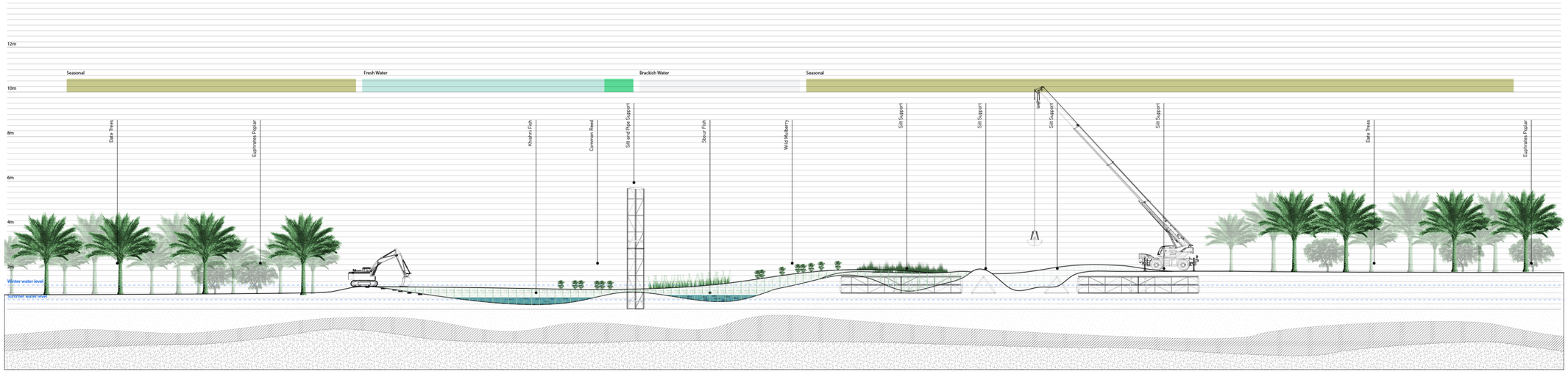


Fig 2.72- Fishing Section 2075

Fishing Terraformation 2075

Fig 2.73- Fishing Terraformation 2075

Fishing Terraformation 2100

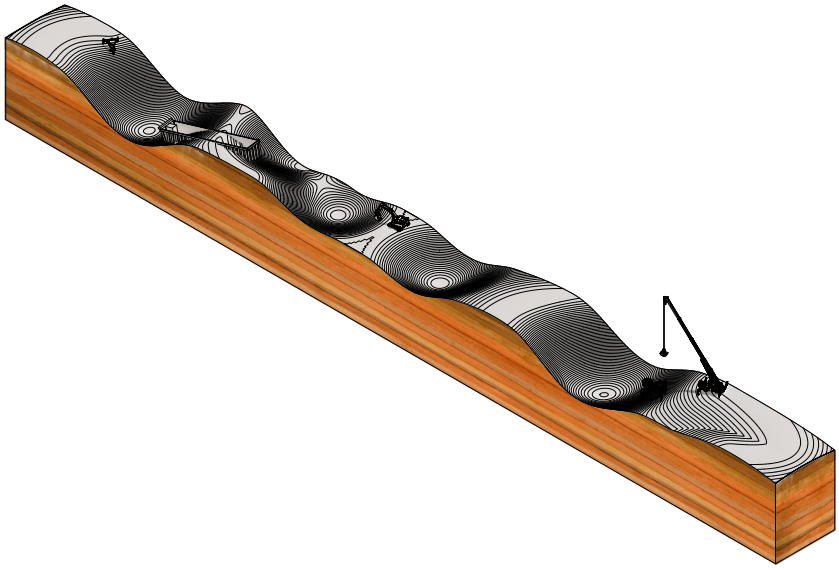


Fig 2.74- Fishing Terraformation 2100

Fishing Section 2100

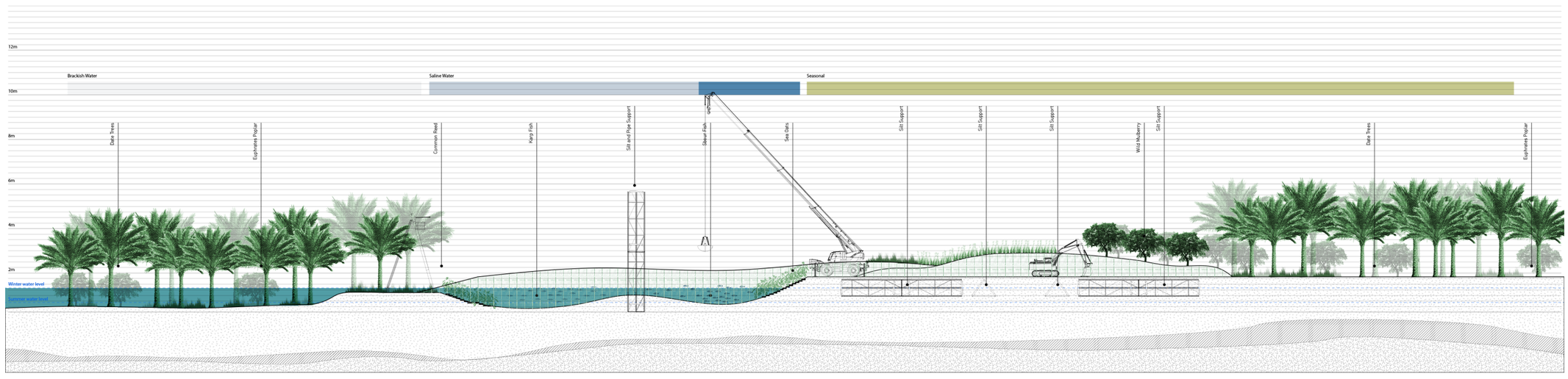


Fig 2.75- Fishing Section 2100

Conclusion

"Prosthetic landscapes" is a thesis about hope, future scenarios and materials. It unveils the relationship between infrastructure and materials in a certain site, and the long-term sustainability and resilience of that landscape. It looks at developing new methodologies through cultural practices and at material properties acting as agents of positive change and reform that emphasize ecological preservation and societal transition to a system of regionalism evolving off regional tribal organization.[42]

The process of engaging the site, in this thesis, included the intersecting of cultural practices involving materials such as mud and clay, with clay handling tools. It considers how an iterative process of engaging forms derived from cultural practices on site with oil industry machinery produces a series of solutions that accommodate biotic and abiotic agents on site. Understanding the ground, its political history and material formation helped devise a tectonic-based strategy of the mechanical apparatus network introduced by the oil industry, particularly through the tribal takeover of the oil industry and production of a new level of hybridity through tribal control and unorthodox squatting. The introduction of diverse and interchangeable functions enables spaces of synergy and innovation, and the coupling of cultural and ecological systems reproduces a sense of identity and ownership.

This investigation of material impact on culture and economy requires an incremental intervention that focuses on the relationship between human culture and ecology, using the social and economical structural of tribal systems to produce an evolved societal structure that is aided by new tools (prosthetics[43]) that could aid tribal system to be a prominent component of the marsh landscape after a period of wars and ecological disasters. Design becomes a negotiation between the formal and informal, between traditional and experimental—a trial and error system that allows skilled workers to take over prosthetics, leading them to push the boundaries of these machines, forming new systems that can host multiple ecological systems and be a permeable vessel for new systems of fresh and saline water.

42 Christopher Lloyd, The Structures of History (Oxford: Blackwell, 1993), 2–28.

43 Prosthetics are artificial body parts that are used to replace or be added to the human body, on the notion of "that which is added to" the injured body.

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