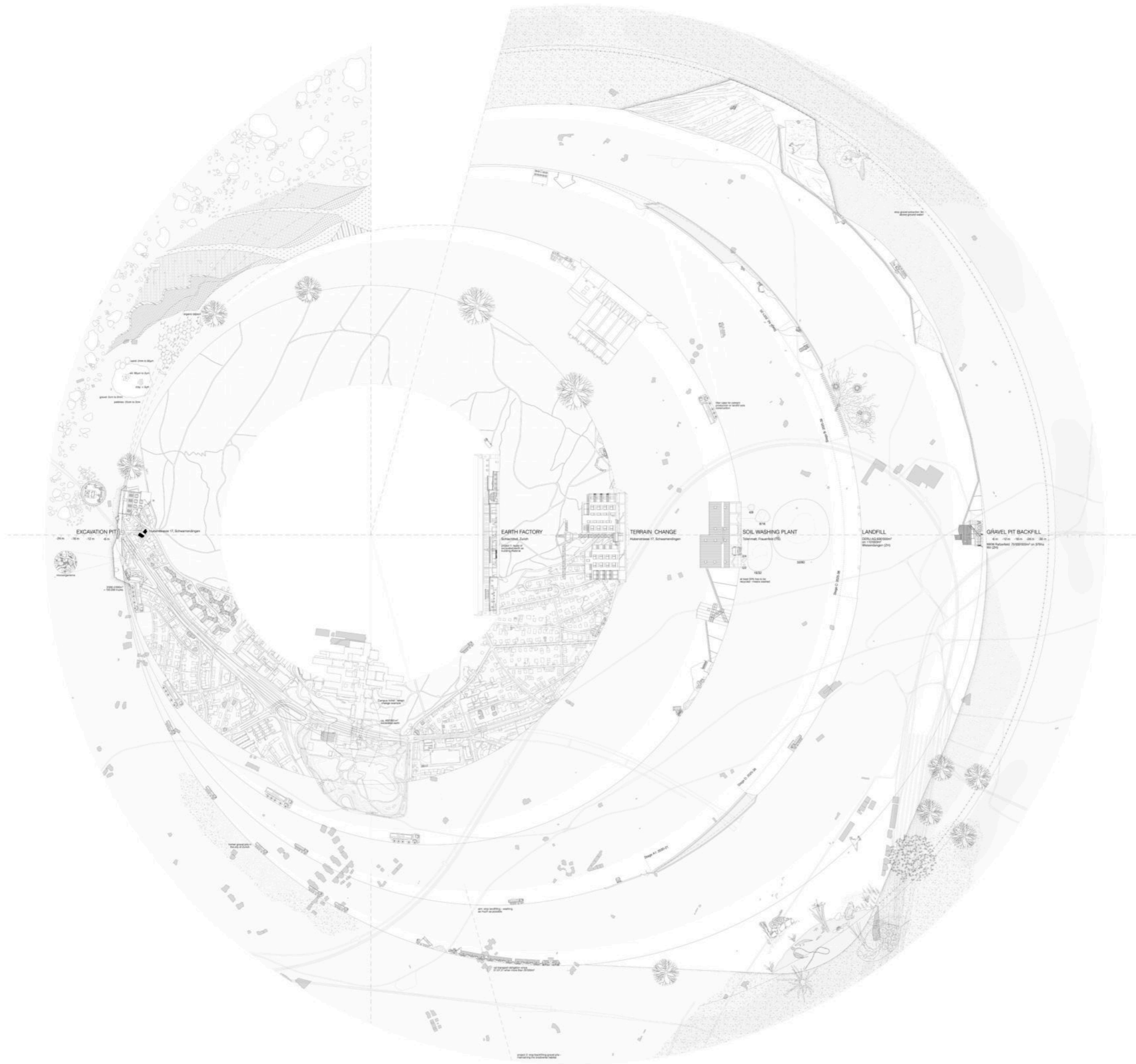
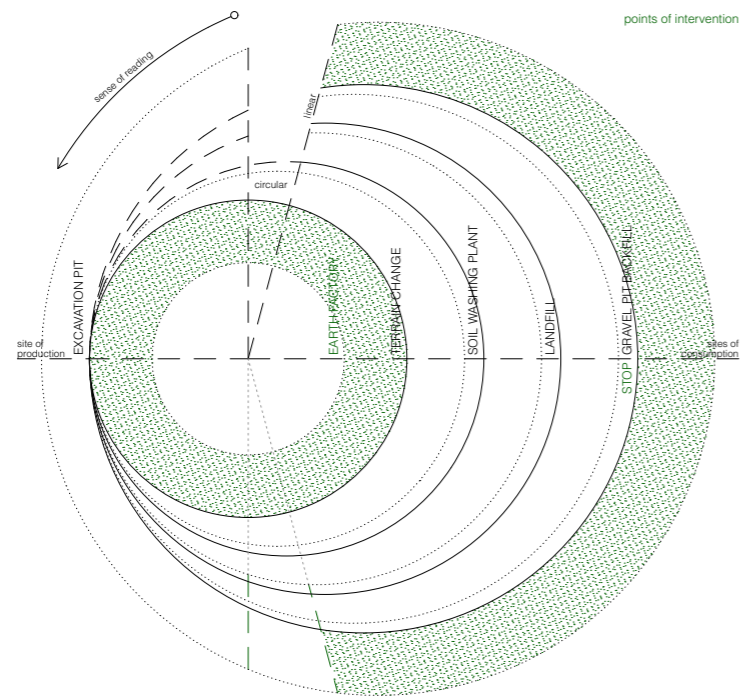


Emancipating Excavated Earth

SEREINA FRITSCHÉ
HS 2023



Research Phase



Excavated earth is about turning earth inside out, about shifting earth from one place to another, about creating holes and piling up mountains. Our inhabited world would barely function without underground space - subway transportation, pedestrian underpasses, parking garages, district heating, sewer systems, and anchoring buildings into the ground. Almost every architectural project begins with excavating a construction pit, resulting in excavated earth, which is legally considered as waste. It is the biggest waste flow in the construction sector with 40-60 million tons of excavated earth per year in Switzerland. We observe many construction sites, experience the truck traffic, but where this waste goes remains hidden from the public. Where all this material ends up is an important question that we as architects should face with more responsibility and awareness. In Zurich, more than 50% of excavated earth is backfilled into gravel pits. Contaminated earth is either deposited in landfills or washed in soil washing plants to gain sand and gravel out of it. A much smaller part is temporarily stored and reused for terrain changes and backfills on the construction site. Let's make the invisible visible and explore the material flow of excavated earth.

Toggenburger AG gave me the chance to visit the diverse destinations of excavated earth. Experiencing excavated earth is impressive – a clash of different realities and changing perceptions of earth depending on its context.

First, I was invited to accompany the truck loaded with excavated material from the construction site in Schwamendingen to the gravel pit in Wil where we dumped it into the gravel pit. On the construction site it is just a lot of material and feels like a problem that needs to be disposed of. Once dumped into a huge gravel pit it suddenly looks insignificant and is just the next small pile within a huge landscape.

Secondly, I was able to visit the landfill in Wiesendangen, a very constructed landscape where the contaminated earth is wrapped and covered. The result is an agricultural area as before, only elevated a few meters. Since at least 50% of contaminated earth has to be recycled, parts of it is taken to a soil washing plant. I had a glimpse into the Tollenmatt soil washing plant in Frauenfeld, where they make products from waste. Washing the earth produces amazingly beautiful gravel and sand. The contamination sticks to the clay, which is washed out, pressed, and used as raw meal substitute in cement plants. Shifting the earth from one place to another means mixing up ecosystems from different places and creating a patchwork of the most varied habitats. Shouldn't a material as well as an organism have the right to stay in its original place?







Gravel pits are very spectacular, sublime, and somehow beautiful landscapes. They are considered as scars, shaped through the human act of extracting gravel. But actually, thanks to gravel extraction, they turned into ecologically important, biodiverse places, habitats for many species. It will be a waste to fill them again, especially by excavated earth, that does not have to be understood as waste at all. Enough – We do not have enough space to deposit excavated earth. Since more and more recycling gravel is used, gravel pits are not continued with the same speed. Some excavation landfills are full in 2024, other in 2038. A few can expand, but even they will be completely filled in the next 27 years. We are facing a systematic excess of excavated earth. Landfilling cannot go on forever.

We need to reduce excavation, stop considering the excavated earth as waste, and when we excavate, we must value the material and look for alternative ways to reuse the earth instead of dumping it. We should either wash the earth more to gain secondary material or we use it as building material, how it traditionally has used to be, in newly interpreted ways. What if the place of material production also becomes the place of material consumption? Drastic change is needed from the habit of 'material of choice' to the reality of 'material of necessity'.

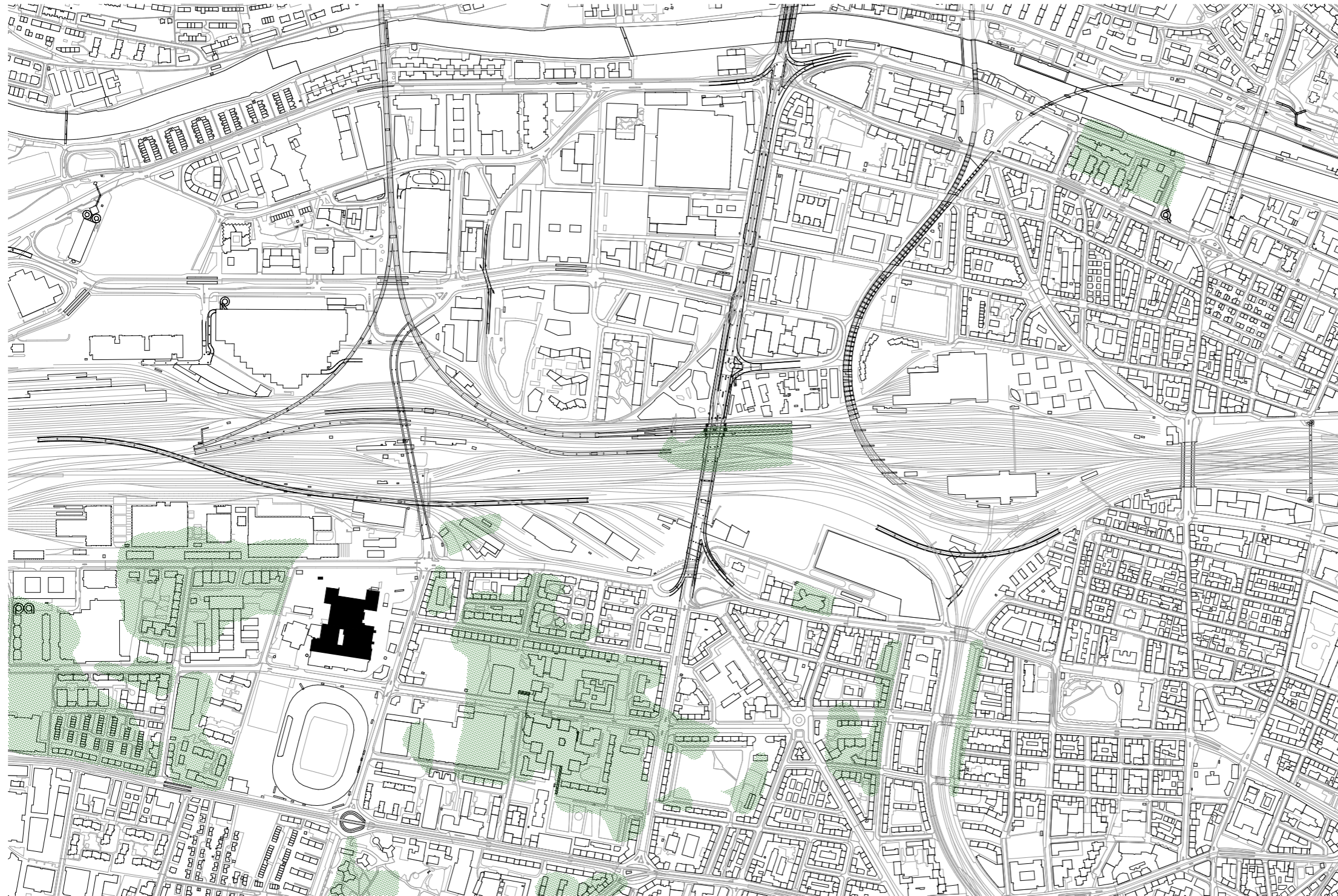
Earth is a topic that spans from the micro scale to the very macro scale. Earth is not only earth. Being composed out of clay, silt, sand, gravel, and stones, it also is the habitat of many organisms, allows plants grow, and provides the necessary sturdy underground that we can step on, every day. We can take a hand full of earth and start forming a ball out of it. It is very tangible but still forms huge landscapes we walk on. I'd like to discover the "consequential relationship" of those different scales - earth in its small components that need to be well mixed to build with or earth in its huge scale how it forms and shapes our landscapes. Why don't we turn gravel pits into „sites of memories“ - showing the human impact on nature through the regardless act of gravel extraction, creating huge holes within the landscape – and use the excavated earth to build with?



Elaboration Phase

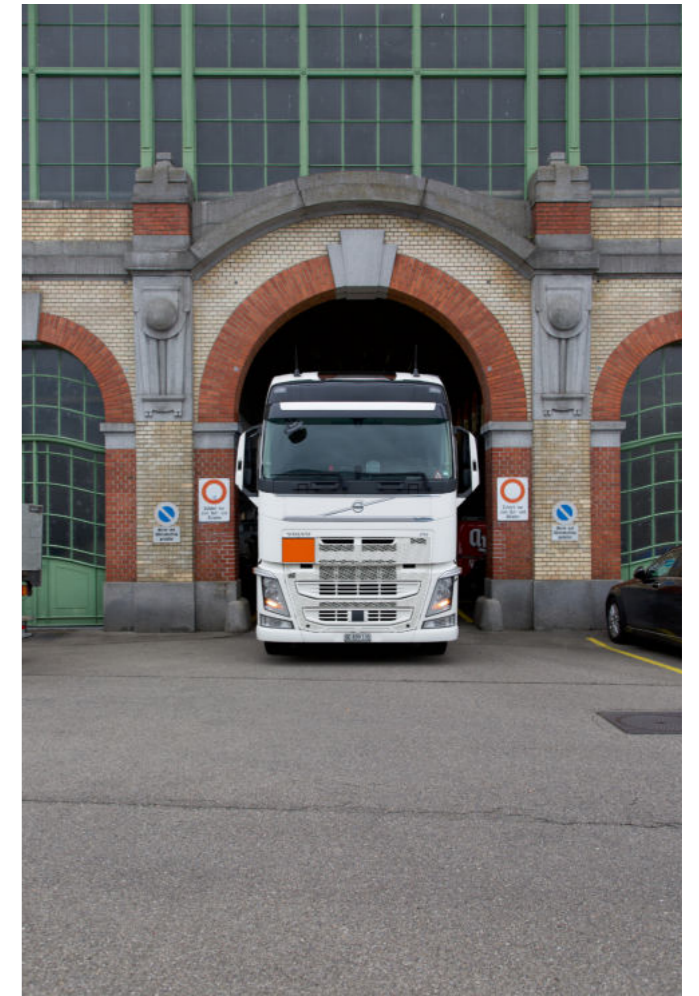
The revival of earthen architecture and the advantages of earth as building material elucidates the inherent potential of excavated earth to be used as building material. Moreover, we are facing a systematic excess of excavated earth whereas a change in the material flow of excavated earth is needed. As intervention an earth factory is proposed where excavated earth is locally transformed into building products which then can be implemented in the urban fabric of Zurich. The earth factory is located at the 'Schlachthofareal'. Since the contract of the slaughterhouse expires in 2029 it is debated how the existing buildings should be converted. There is not only a need for a secondary school as well as for green spaces, but it should stay a site of urban production.¹ The area offers a lot of space and through the proximity to the train tracks and the highway it would be a good location for the earth factory. Furthermore, the location also fits symbolically, as it is located in an area where many former gravel pits have been backfilled with excavated earth. The protected brick facades perfectly represent the production and materiality of the factory. The aim is to combine and interweave production and the public. The earthen production should be made visible and partly accessible. The excavated earth is staged in a way to make the material experienceable and to show its beauty and potential since it is legally considered as waste and often seen as dirt.

1 «Nutzungsstrategie Schlachthofareal Zürich: Materialiensammlung», EBP Schweiz AG, September 2021, p. 16 and others.

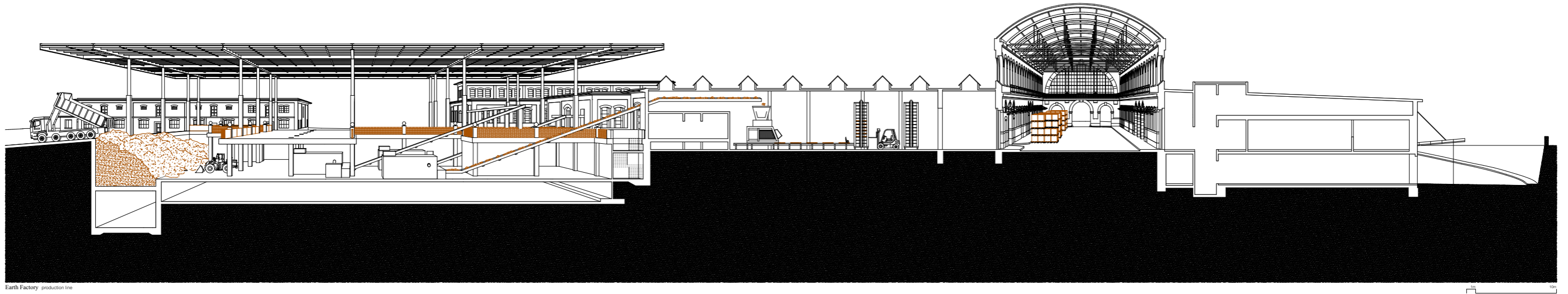


Urban Context former gravel pits

1:10'000

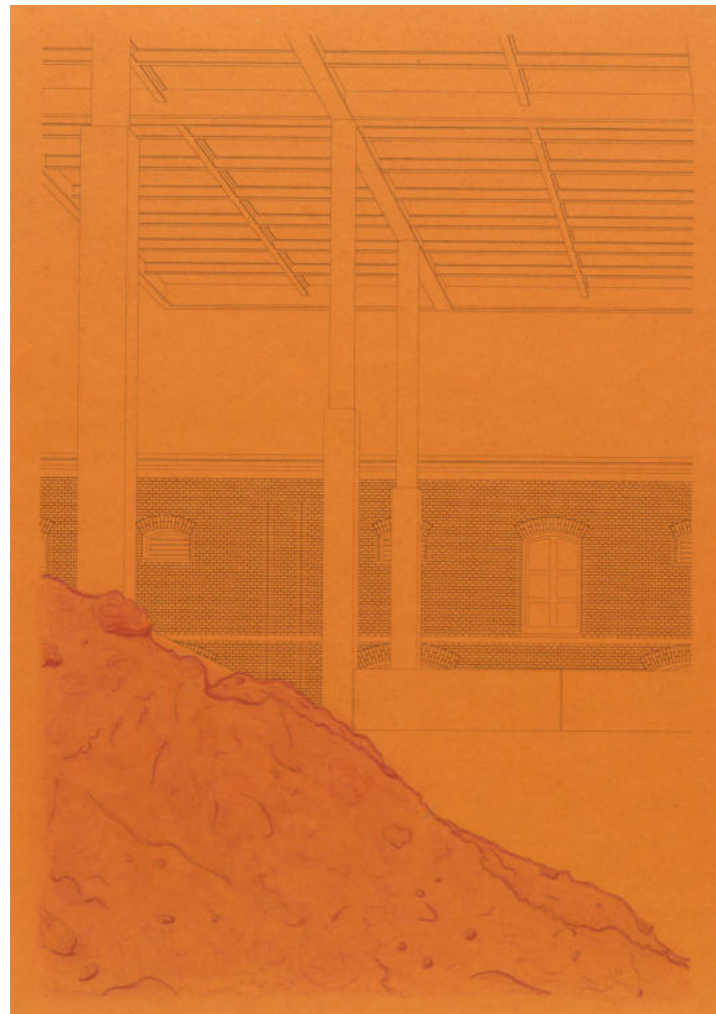


Historical Situation Schlachthof Zürich. Werner Friedli, 08.05.1968, e-pics.

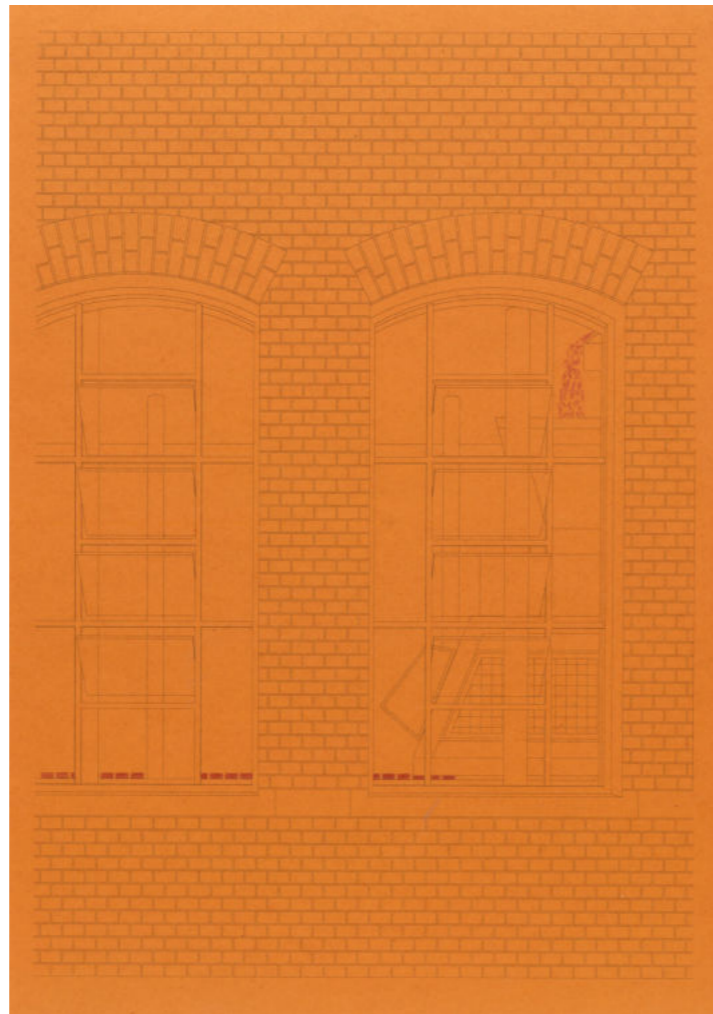


The factory is aligned according to the following subsequent steps: Delivering excavated earth, storing, preparing, processing, producing, drying, storing, and collecting earthen products. Excavated earth is delivered by trucks which dump it directly into the basement where it is then stored and prepared. Conveyor belts transport the earth into the three production halls where the earthen products are produced and dried. In the long, vaulted hall the earthen products are stored and picked-up by trucks.

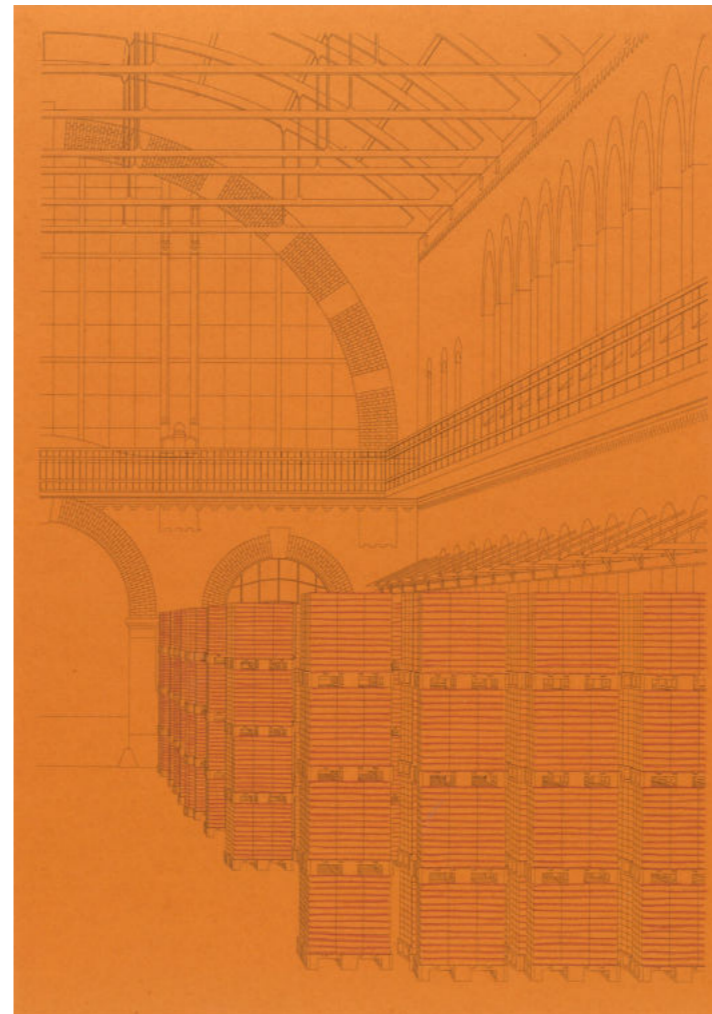
DELIVERING - STORING



PRODUCING

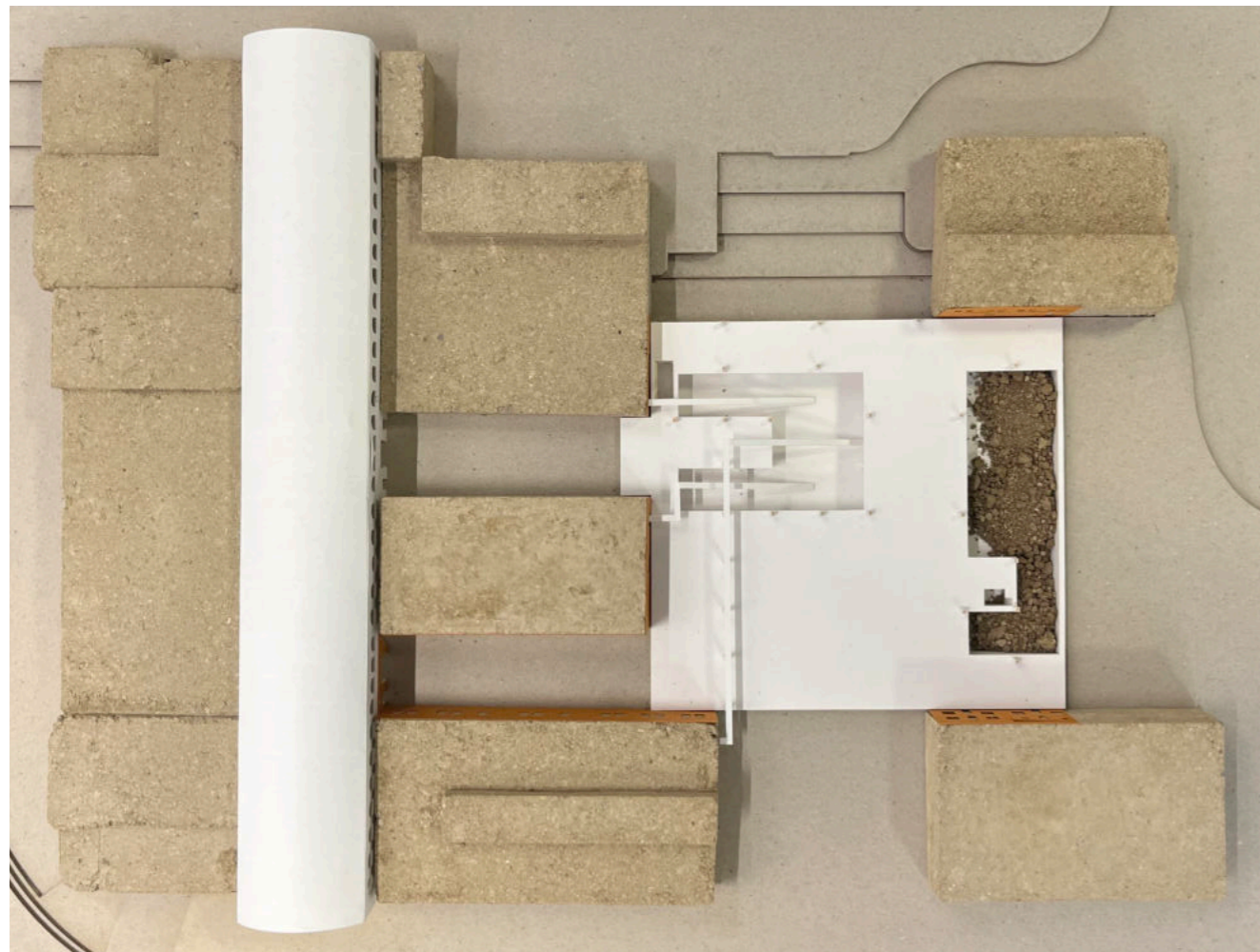
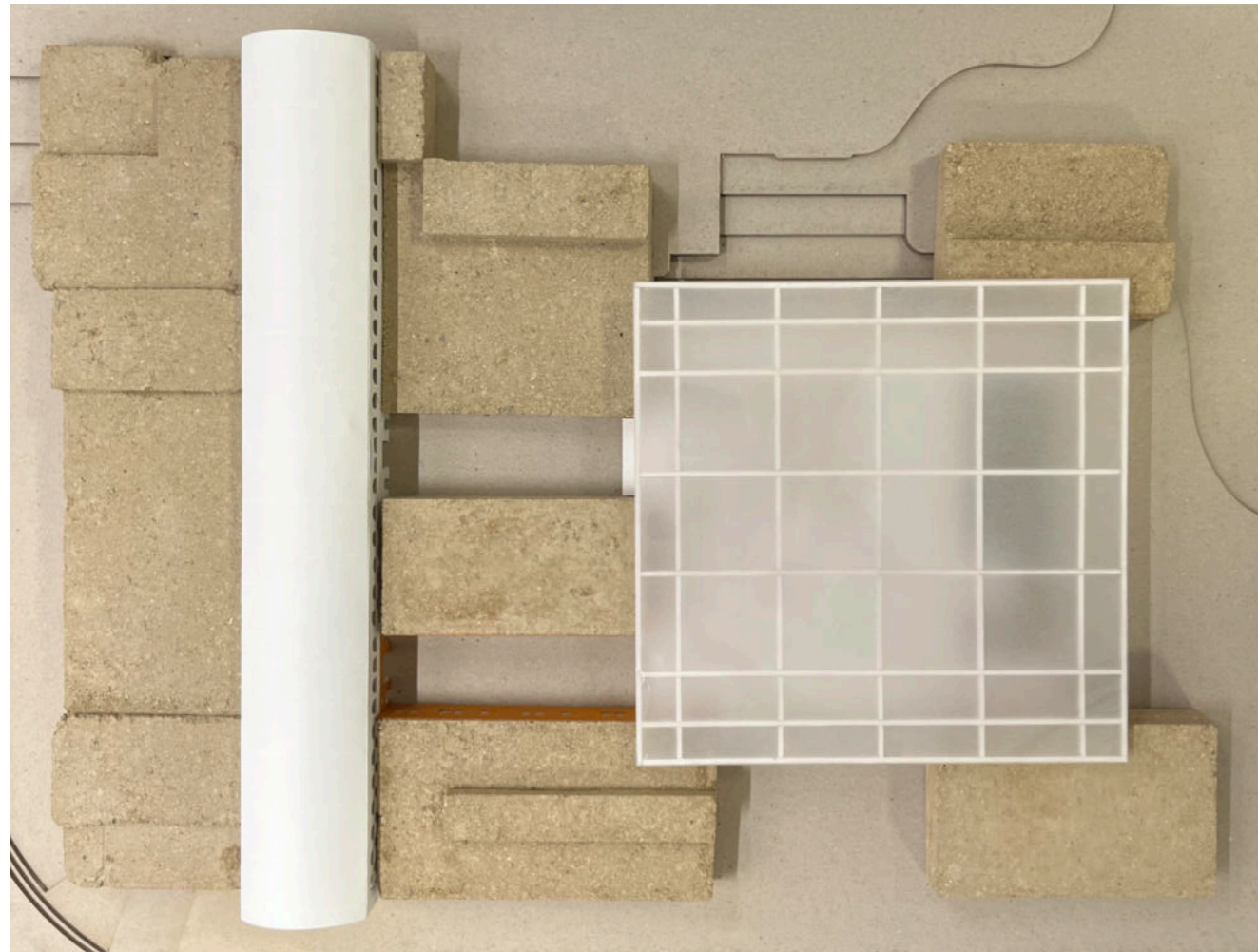


DRYING - STORING



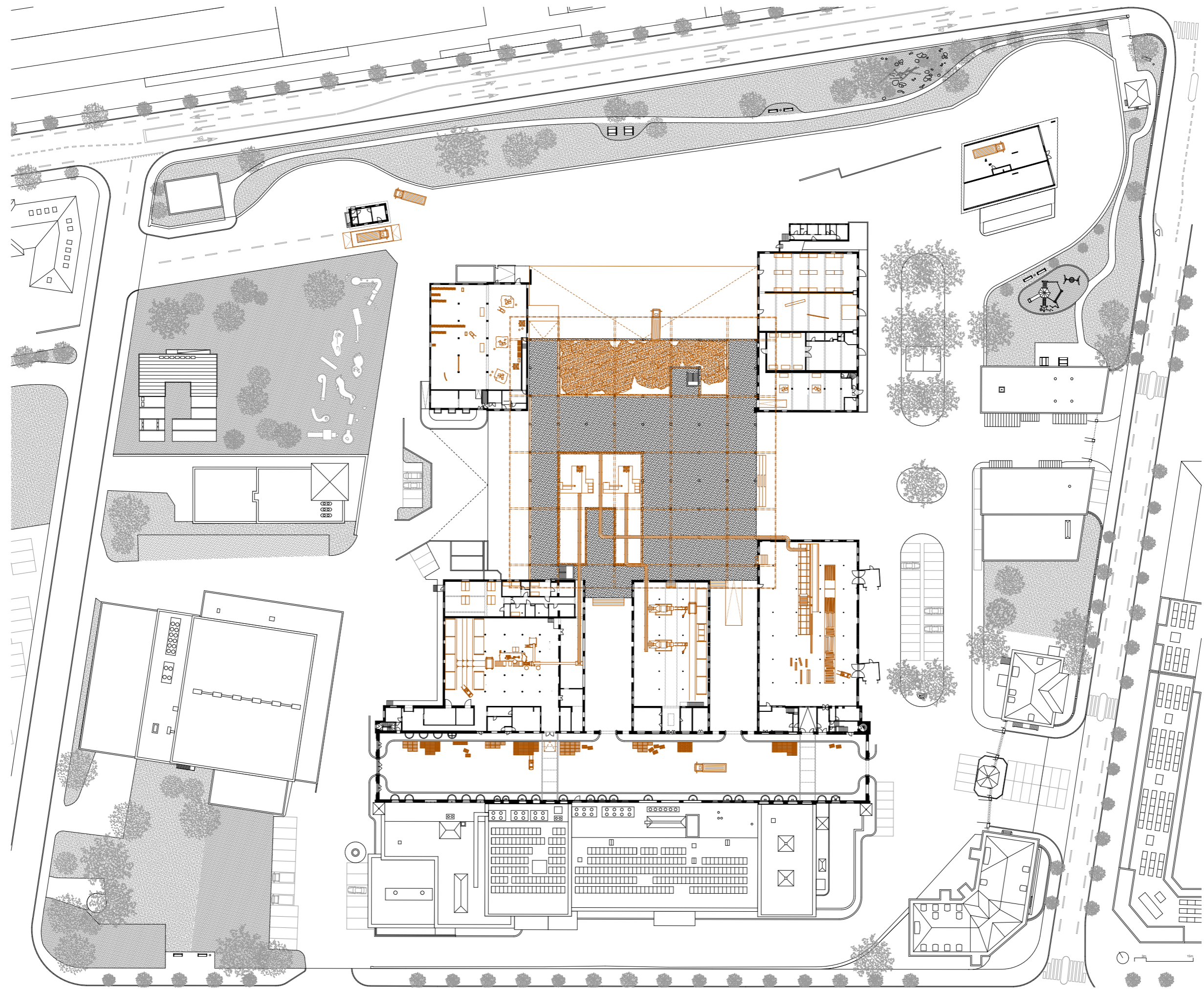
USING





The urban situation is architecturally rebalanced by partly removing the building from the 80ies and giving the heritage protected buildings more space and presence. The 80ies building is dismantled by one story to free the facades from the five attaching heritage protected buildings and create a slightly elevated public square. Cut ins in the concrete slab allow visitors to gain insights into the factory. On the existing concrete columns there are steel columns placed to support a new lifted roof that overstrains the historic buildings. As this roof is covered by translucent solar panels, it offers a huge surface for energy production, feeding the factory as well as the neighborhood. The visible and physical connection through the area is recreated, how it historically has used to be. A sequence of public spaces, covered and uncovered, allows the visitor to slender through the area and experiencing the earthen production through various insights and sensing the earth. Furthermore, the workshop space in the former pigsty offers interested people to learn the craft of earthen construction. The earth factory acts as a catalyzer for the transformation of the area that should turn into a vibrant place of urban production, education, recreation and gathering.



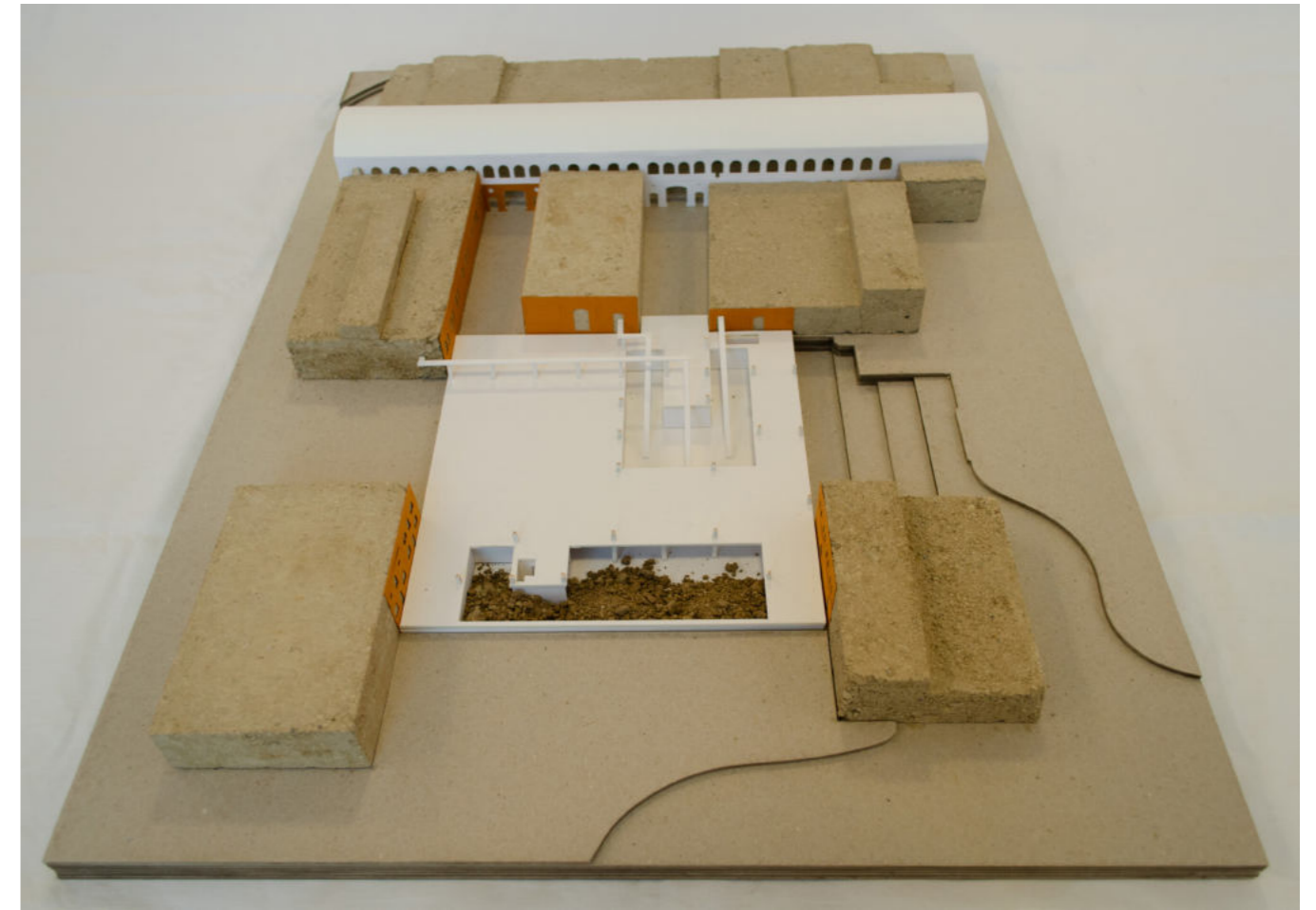


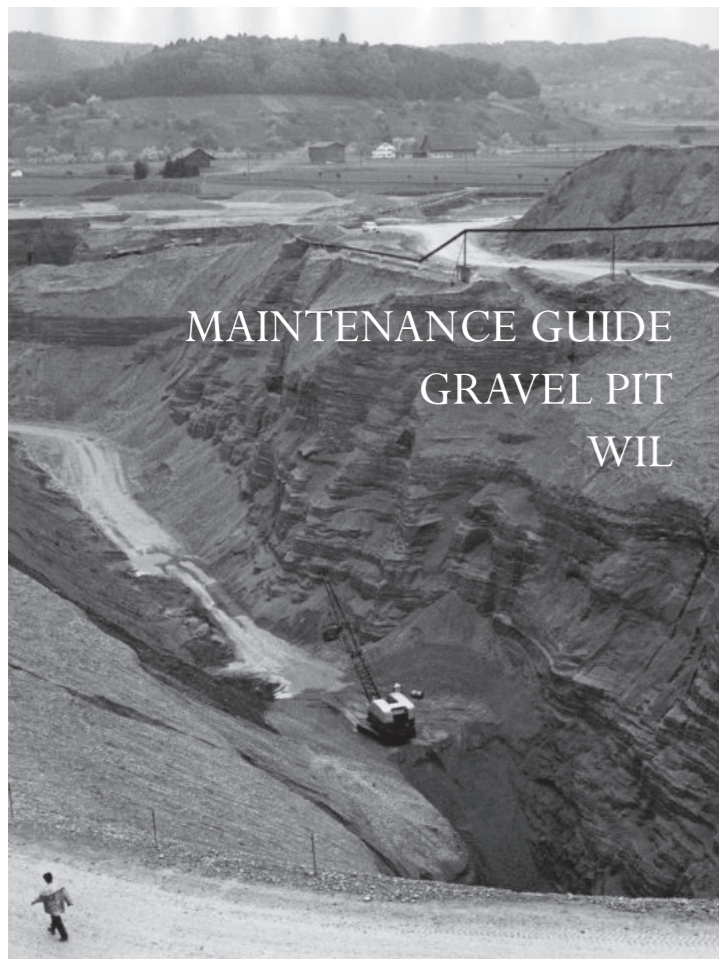
As corresponding project there is no longer the need to backfill gravel pits which then can be given back to nature as anthropogenic landscapes. There are many species living in gravel pits where some of them don't find barely other habitats to survive. It is the dynamic change of extracting gravel and backfilling that make the landscape such rich for species. Therefore, a small need of maintenance and dynamic change is necessary to keep the valuable conditions as they are now. Inspired by Lara Almarcegui's guide The Gravel Pits of Basel, I propose to make and distribute a leaflet which should raise the awareness of gravel pits as valuable habitats as well as help maintaining them in a proper way to support the species inhabiting those sublime landscapes.

The two projects seek both inspiration in landart which is closely connected to earthen architecture. *"Land art is like a reflection of the fragility and incompleteness of architecture. It makes clear the dependence on clients, external conditions and climatic and economic coincidences [...] and addresses the fact that every landscape is characterized by economic conflicts."*²

The area of the slaughterhouse can be perceived as a ruin landscape, reading it in a fragmented way. The partly demolition of the building of the 80ies revives it for the next years until it will probably be demolished completely and turns the area into a sensually experienceable earth factory. Excavated earth is the actor and visitors should have the chance to experience it in different ways. At the gravel pit it is about the uncontrollable and the natural dynamics of formation and decay where non-human species are the actors. Both projects reflect and question the current habits of the construction sector and try to raise awareness that a change is needed in which the knowledge of different disciplines must be combined. We as humans need the courage to shift the focus away from ourselves and towards our environment - let excavated earth and other species be the key players.

² Philip Ursprung, 'Die Präsenz der Landart', archithese 4 2018 Landart | Erdarchitektur, pp. 9-10, translated by deepL.





MAINTENANCE GUIDE
GRAVEL PIT
WIL

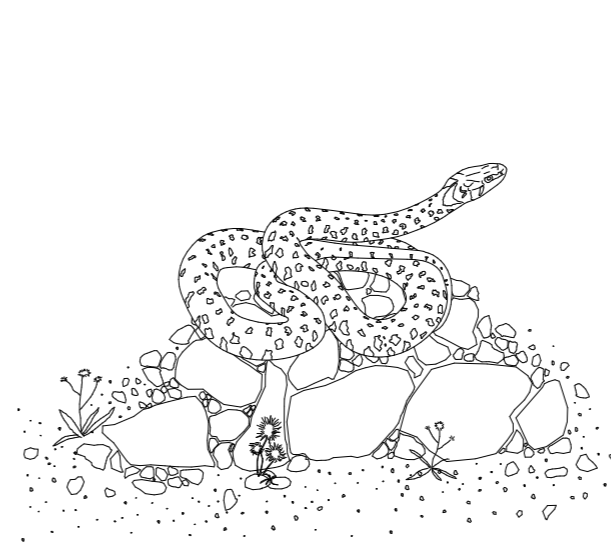
Image: gravel exploitation in the Pfäzlerfeld, around 1970, Studio AG für Film Foto Ton Zürich (Sozialarchiv).

RIPARIA RIPARIA



The Sand Martin returns to Switzerland from the south every spring and builds its nesting holes in the steep gravel walls of the gravel pits. To make sure that the nesting hole is good, they want to make a new hole in the wall every year. It is therefore important that the gravel walls are dynamically removed and prepared anew every spring to remove last year's holes. To do this, a layer approx. 50 cm thick must be removed.

NATRIX NATRIX



The Grass Snake seeks out sunny, warm places with retreats such as piles of stones or old wood, or grass and leaves that are frost-proof. It mainly hunts amphibians that live near ponds. The grass snake seeks a specific temperature to lay its eggs. Structures such as large compost heaps or big root plates buried crosswise in sand are helpful for this.

CREPIS FOETIDA



The Stinking Hawkbeard likes dry, stony places, which gravel pits can offer it. The gravelly ground allows water to seep away easily, making the soil dry.

ORTHETRUM CANCELLATUM



The black-tailed skimmer is an insect hunter and therefore needs plenty of hiding places with aquatic plants such as reeds or bulrushes where it can lurk and hunt insects. It lays its eggs in the water, for which it prefers a continuous tidal landscape with aquatic plants. The dragonfly larva lives in the water for up to three years and hunts invertebrate larvae. If the pools become too overgrown, plants must be removed.

BOMBINA VARIEGATA



The Yellow-bellied Toad seeks dynamic habitats with different bodies of water, as it lays its eggs in water. Ponds of different sizes, preferably connected by small streams over height differences, help to keep them dynamic. Rain causes high and low water levels, which leads to a stagnant pond or water run-off.

TYPHA SHUTTLEWORTHII



Shuttleworth's Bulrush grows in fresh, rapidly renewing, still water such as pools in disused gravel pits, which are dynamically created by differences in height combined with rainwater. Neophytes such as waterweed should be removed as they take away space and light from the cattail. A founder population can be planted to initiate its colonization. It is endangered by recreational activities and active gravel extraction, among other things.

Image: flying picture, 22.09.2022, calörscher hinner Ingenieure Geometer Planer AG (Toggenburger AG).



A BIODIVERSE HABITAT

The gravel deposits in the Rafzerfeld are up to 70 meters thick and date back to the Ice Age, with the lower 35 meters lying in the groundwater. Gravel may only be extracted up to 3 meters above the groundwater level in order not to affect the water quality. Gravel extraction in the Rafzerfeld in Wil is currently operated by HASTAG AG, Holcim Kies und Beton AG and Toggenburger AG. The gravel plant of Toggenburger AG was opened in Wil in 1958. The companies are committed to the fastest possible extraction and subsequent recultivation. Gravel pits are valuable habitats for many animal and plant species due to the constant man-made changes caused by gravel extraction and refilling. This rare habitat type is comparable to a meandering, uncorrected riverbank, which is also becoming increasingly rare.

This leaflet aims to change the way gravel pits are considered - from scars in the landscape to valuable biodiverse habitats. It is not always about actively intervening and creating something new, but sometimes we have to learn to take a closer look, appreciate what is there, maintain and preserve it and become aware of its value. The leaflet is intended to question the habit of filling gravel pits with excavated material, to initiate discourse and to bring together the knowledge of different disciplines.

Gravel pits must remain dynamic and be periodically disturbed by us humans by driving on the gravel areas with machines or digging up overgrown areas. In general, measures should be taken in the fall/winter, when life is less active and therefore less disturbed, and must be supported by a specialist. It is important to monitor the occurrence of species and to design and maintain areas with a high structural richness in a way that is tailored to the species.









Note: Only six selected species are listed as examples, but many more species live in the gravel pit in Wil. They are intended to speak for a wider range of actors.

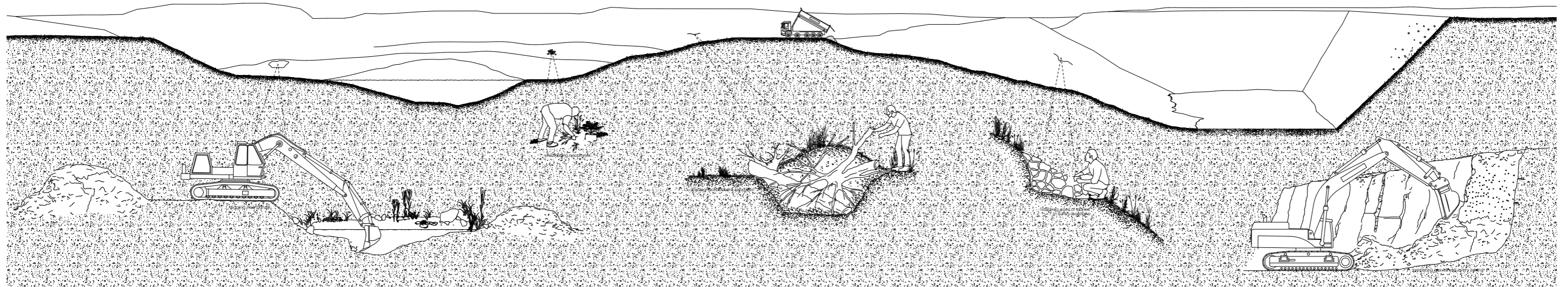
It should be a habitat for non-humans where the humans can observe the area from indicated view points.

Sources: <https://toggenburger.ch/firma/geschichte>, <https://www.wkw-rafzerfeld.ch/oekologie-2/> and <https://www.biodivers.ch/de/index.php/Abbauegebiete>.



MAINTENANCE RULES

-  Migration corridors must be created to connect the different ecological areas with each other.
-  Partial backfilling with excavated material can be used to create terraces and tubs.
-  Species-rich rough pastures should be sown along the edges of the pits (June-August) and maintained (July-October).
-  Gravel processing water and rainwater should be collected to create a dynamic, alternatingly moist to waterlogged landscape. Ponds and mud ponds must be created at different heights and connected to each other in order to provide suitable spawning grounds and habitats for amphibians. The relocation and modification should take place from September to November.
-  Small ecological structures (piles of branches, stones, or rootstocks) offer reptiles and small mammals places to retreat and various insects nesting opportunities. They should be created at various locations and renewed/extended from time to time (only in March/April and September/October).
-  Sand piles intermixed with large stones in sunny, south-facing locations provide egg-laying sites for reptiles and nesting sites for insects. Sandy areas must stay untouched from March to October. Vegetation must be removed at regular intervals.
-  The area must be constantly checked for neophytes and cleared of these (ensure they are disposed of properly) to make room for and protect other plants.
-  For sand martins, the gravel walls must be prepared anew every spring to remove the old nesting holes and provide them with a fresh wall. To do this, 50-100cm must be removed. The walls must not be touched from mid-April to the end of August.



Maintaining the Gravel Pit