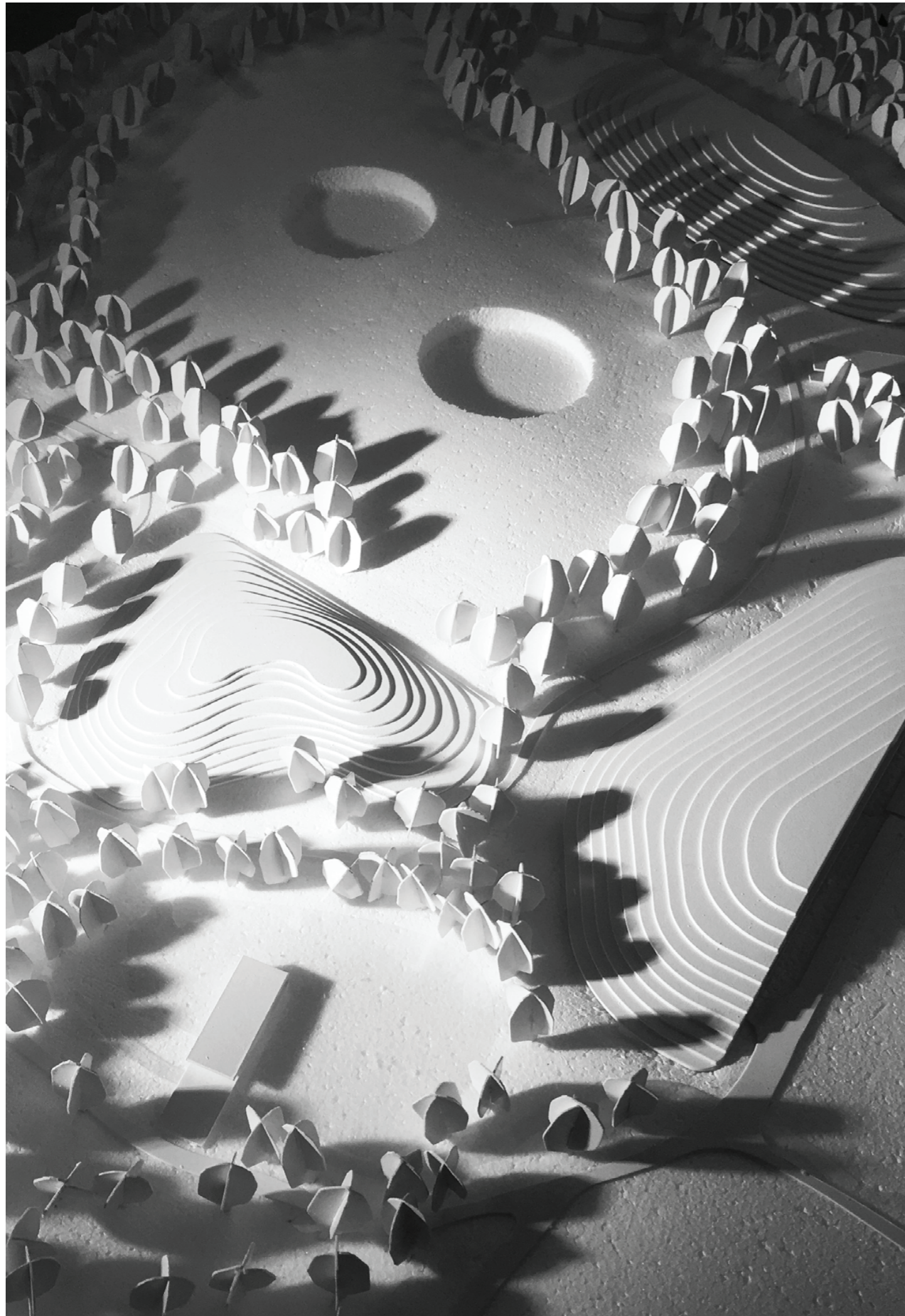


Project title: New Grønmo park

Diploma candidate: Yang Zhang
Student ID: s101681

Discipline: Architecture

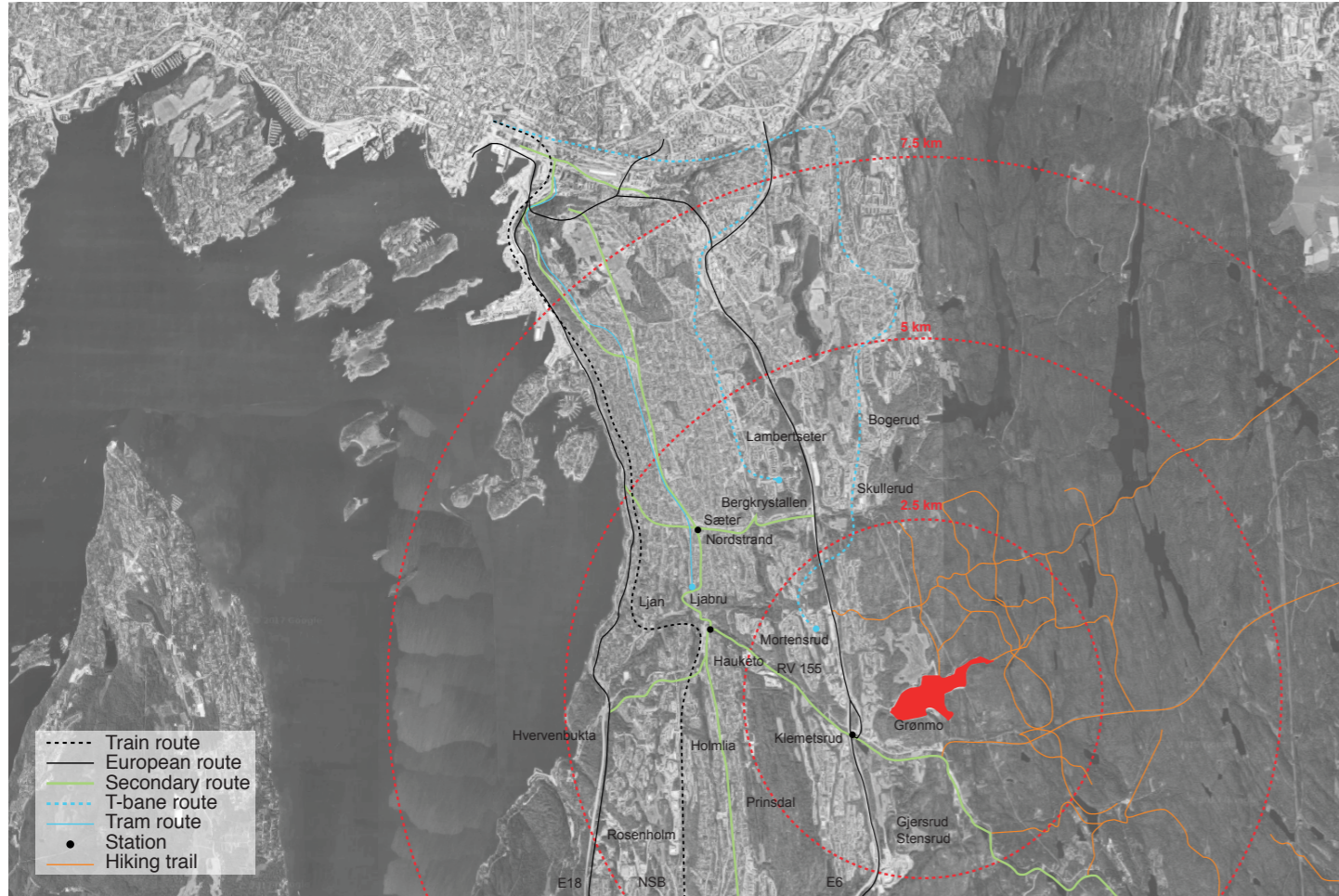
Main supervisor: Neven Fuchs Mikac
Secondary supervisor: Julie Aars
External supervisor: Thea Kvamme Hartmann



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1. Site background
2. Architectural vision
3. Program
4. Scientific research
5. Design concept and diagrams
6. Architectural drawings
7. Model photos

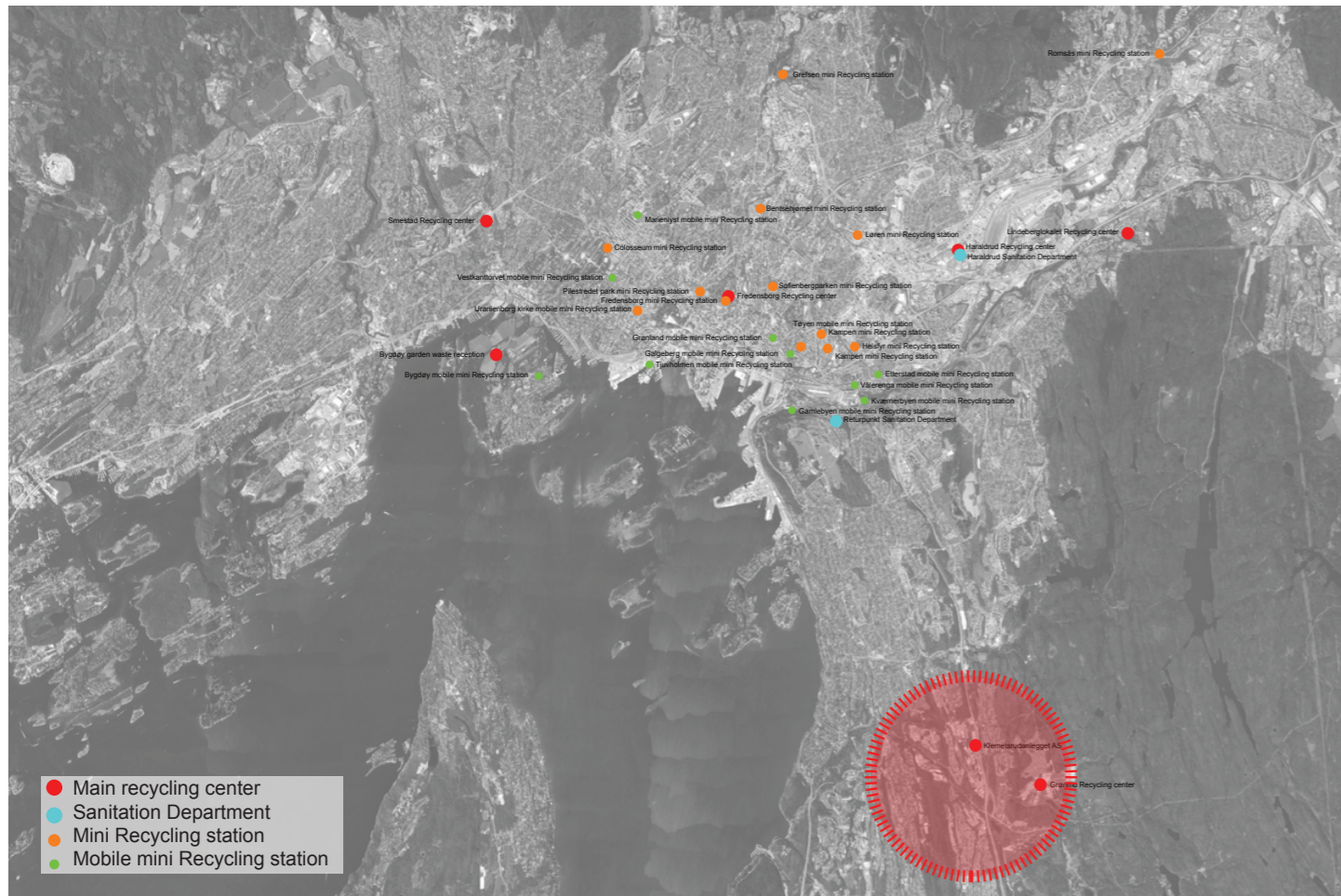
1. Site background



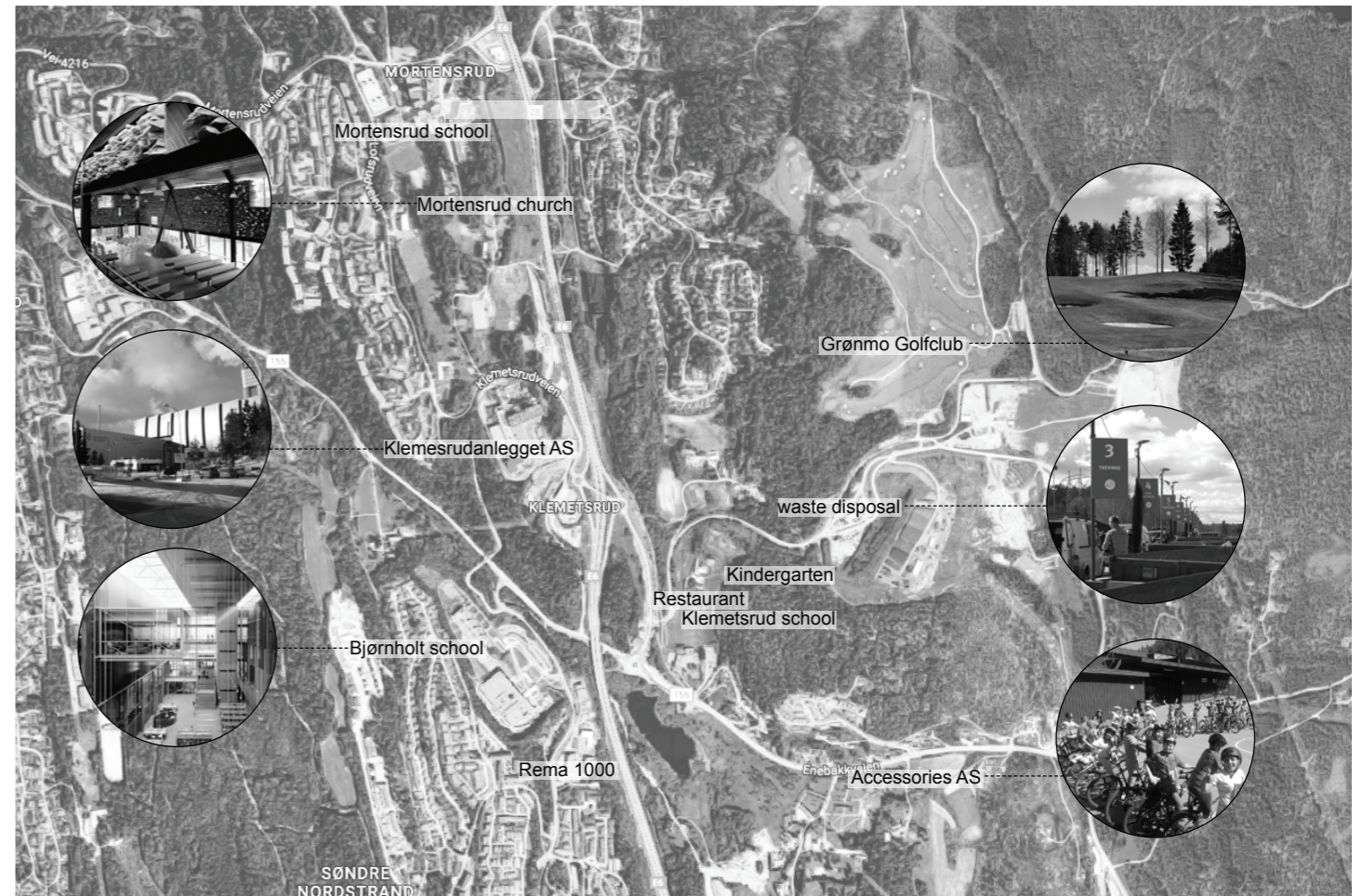
Site location



Oslo border forest



Waste material collection centers layout in Oslo



Facilities around Grønmo



Original site picture



Original site situation

Grønmo is located in the south eastern part of Oslo, in the district of Søndre Nordstrand, approximately 12km southeast of the Oslo Centre. The size of the project site is around 42.5 hector, approximately 1.5 times the size of the Frogner Park. This area is close to Sørliveien and E6 highway on the west and Grønmo golf course on the north. On the south, east and partly north, this area is surrounded by Østmarka. It is an important gateway to the forest since many hiking trails start from here. It serves as good meeting places between the noisy city life and the quiet forest.

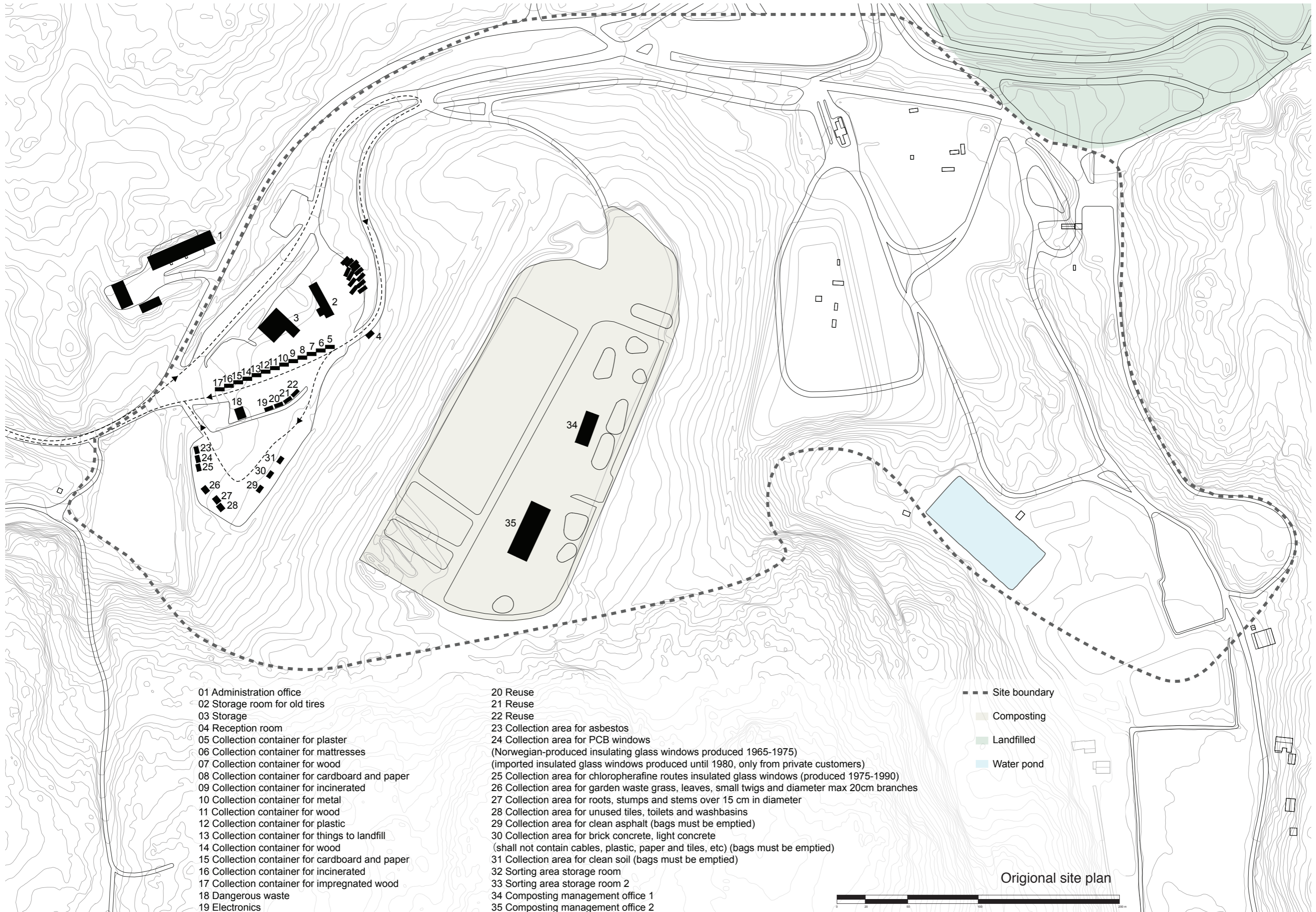
The district is highly multi cultural with 600 000 inhabitants. 47.7% are immigrants or have parents who are immigrants. 30% are less than 20 years old and 6% are more than 67 years old.

The Grønmo landfilled used to be the largest one in Northern Europe. Having functioned as Oslo's main spot for the unwanted since 1969, Grønmo covered over 8 million cubic meters of trash, more than 3 times of the volume of the Cheops pyramid. It was an enormous, artificial landscape built up from household waste, industrial waste, asbestos, hydroxide sludge, fly ash and etc.. It was closed in 2009. Today the waste is covered by a thin, green dressed, top cover preventing surface water from reaching in. Over 200 gas wells are built in Grønmo, making sure the continuous methane are directed transported into the nearby incinerator rather than leak out in the open air due to the anaerobic digestion of the waste.

Grønmo was entirely covered by forest in the past. The landscape within the area is hilly and characterised by low hills from the period of waste disposal. Part of the outskirts of the area are forest areas, where vegetation is high density with pine trees and some hardwoods. The landfilled area is partly grassy. It could rather be regarded as ugly scar in the beautiful natural Marka forest.

Right now, after the closure of the landfilled place, there are a recycling station, a sorting area and a composting plant on site.

Grønmo is one of the few areas in Oslo where it is possible to set up efficient area for the future oriented waste management.



- 01 Administration office
- 02 Storage room for old tires
- 03 Storage
- 04 Reception room
- 05 Collection container for plaster
- 06 Collection container for mattresses
- 07 Collection container for wood
- 08 Collection container for cardboard and paper
- 09 Collection container for incinerated
- 10 Collection container for metal
- 11 Collection container for wood
- 12 Collection container for plastic
- 13 Collection container for things to landfill
- 14 Collection container for wood
- 15 Collection container for cardboard and paper
- 16 Collection container for incinerated
- 17 Collection container for impregnated wood
- 18 Dangerous waste
- 19 Electronics

- 20 Reuse
- 21 Reuse
- 22 Reuse
- 23 Collection area for asbestos
- 24 Collection area for PCB windows (Norwegian-produced insulating glass windows produced 1965-1975) (imported insulated glass windows produced until 1980, only from private customers)
- 25 Collection area for chlorophenylene routes insulated glass windows (produced 1975-1990)
- 26 Collection area for garden waste grass, leaves, small twigs and diameter max 20cm branches
- 27 Collection area for roots, stumps and stems over 15 cm in diameter
- 28 Collection area for unused tiles, toilets and washbasins
- 29 Collection area for clean asphalt (bags must be emptied)
- 30 Collection area for brick concrete, light concrete (shall not contain cables, plastic, paper and tiles, etc) (bags must be emptied)
- 31 Collection area for clean soil (bags must be emptied)
- 32 Sorting area storage room
- 33 Sorting area storage room 2
- 34 Composting management office 1
- 35 Composting management office 2

- Site boundary
- Composting
- Landfilled
- Water pond

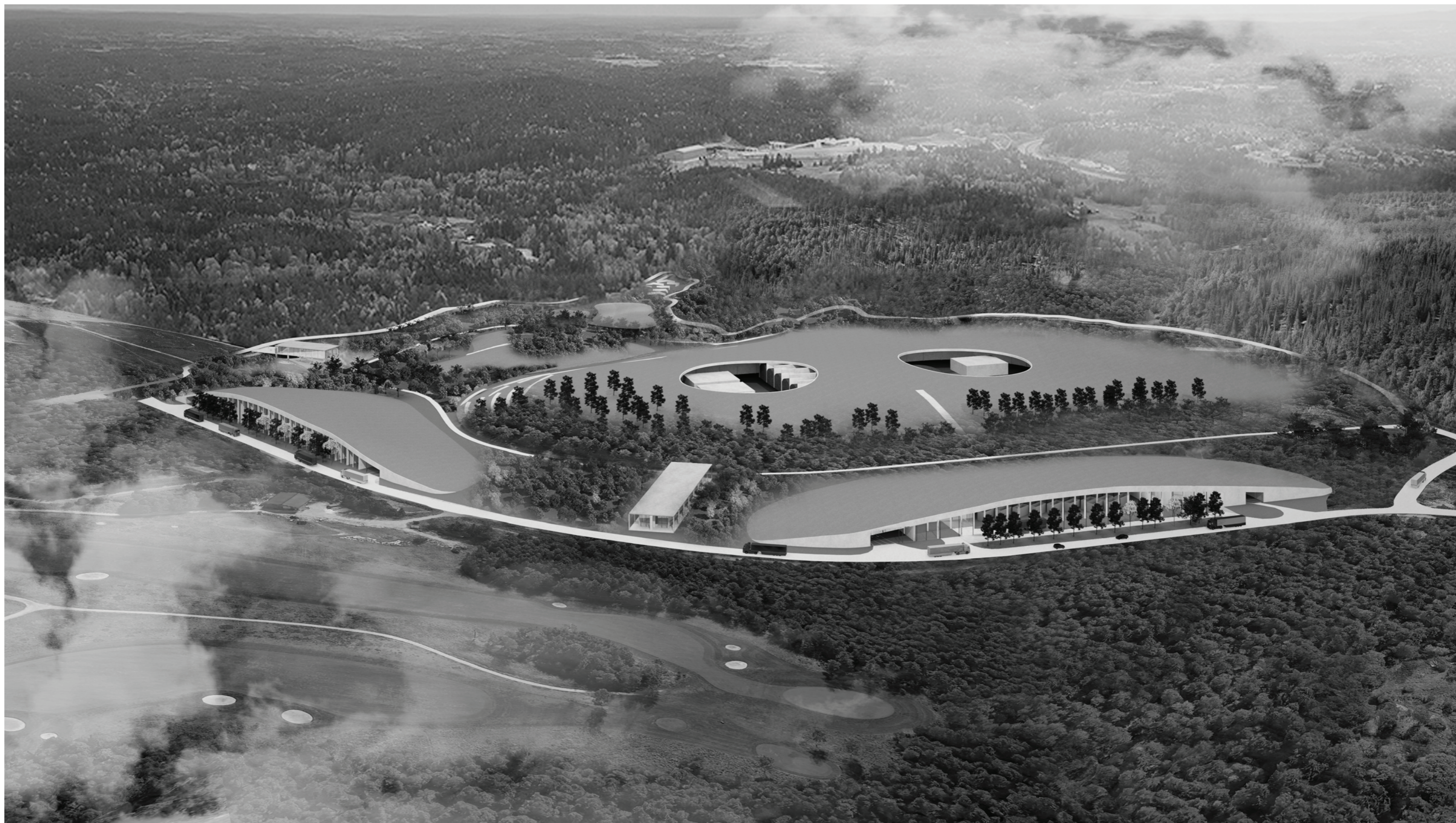
Original site plan



2. Architectural vision

In the new Grønmo park, Grønmo will be strengthened as an attractive gateway to Østmarka;
Grønmo will be a meeting place with good recreational and natural experiences for all age groups, year-round;
Through different experiences, Grønmo will inspire public for greater environmental commitment.

On the level of architecture and on the level of landscape, Grønmo will be constructed as a new meeting area between
the natural environment and the man-made artificial landscape. Grønmo will be given new identity through good coexis-
tence between recreation, learning, municipal engineering facilities and new recycle material treatment.



3. Program

A. Visitor center, 810 m²

Restaurant and Cafe
 Small auditorium
 Small exhibition space
 Office

B. 2nd hand flea market, 1336 m²

Outside space: temporary market space

Inside space: market shops
 offices
 meeting rooms
 storage
 equipment rooms

C. Material recycling area, 9100 m²

Outside space: roof

Inside space: material collection containers area
 administration office
 storage
 equipment rooms

D. Composting area, 21385 m²

Operational equipment space
 Curing and compost storage
 Raw material storage
 Composting pad

E. Material sorting and treatment area, 9700 m²

Outside space: roof

Inside space: Material sorting and treatment area
 Operational office

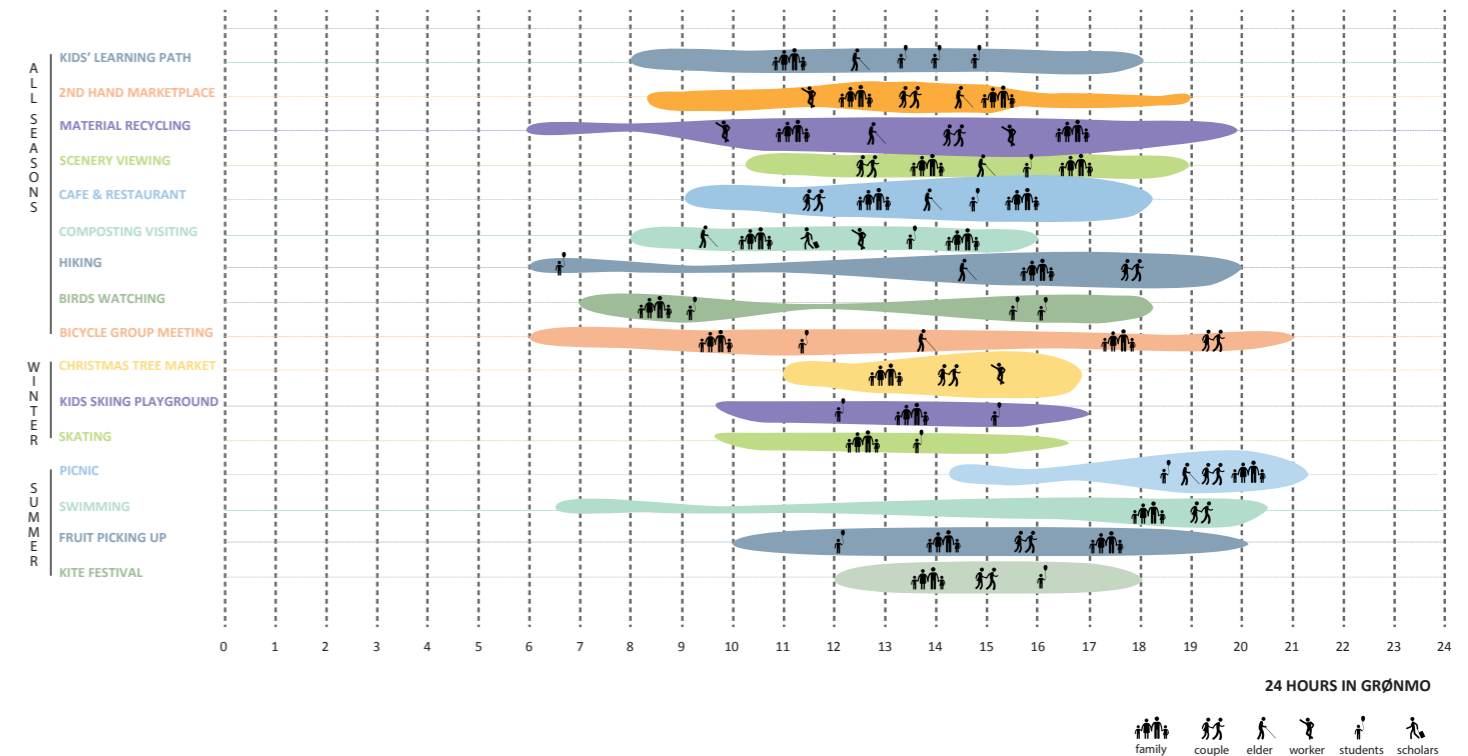
F. Landscape areas

Public area: parking area
 scenery platform
 gathering space
 skating plate
 landfilled park

Infrastructural landscape: warm water pond
 oxidation pond
 enhancement pond
 leachate water pond
 clean water pond
 wetland area

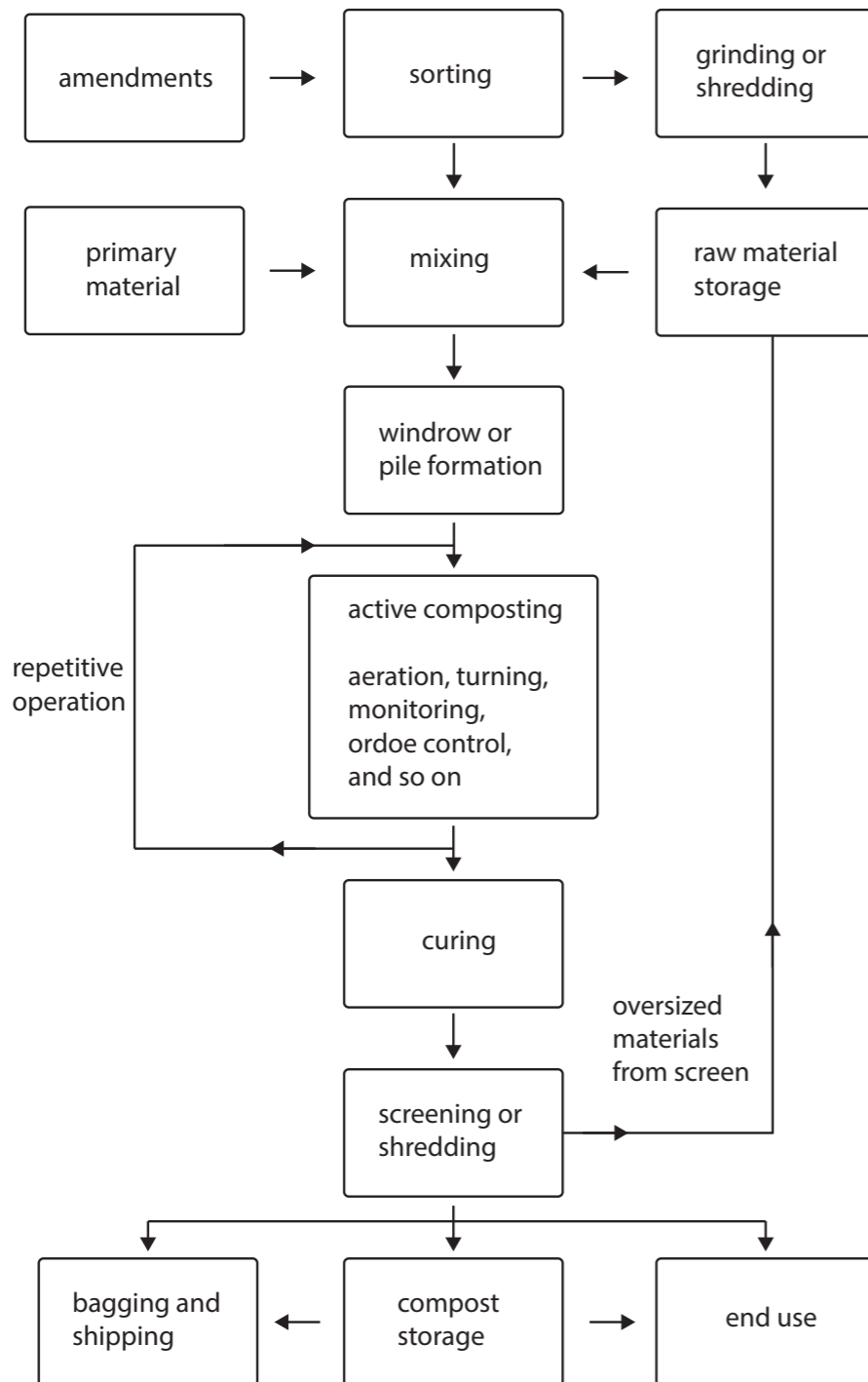
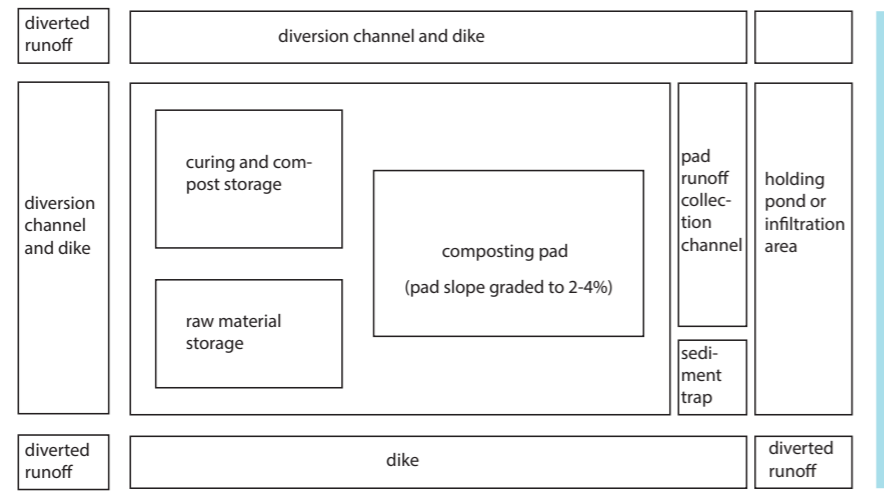
List of new activities in Grønmo

- Kids' learning path
 - 2nd hand flea market
 - Compost soil market
 - Waste material recycling
 - Birds watching
 - Scenery viewing
 - Cafe & restaurant
 - Composting visit
 - Hiking
 - Bicycle group meeting
 - Campfire festival
- Winter activities: Christmas tree market
 skiing
 skating
- Summer activities: picnic
 swimming
 fruit pick up
 kite festival

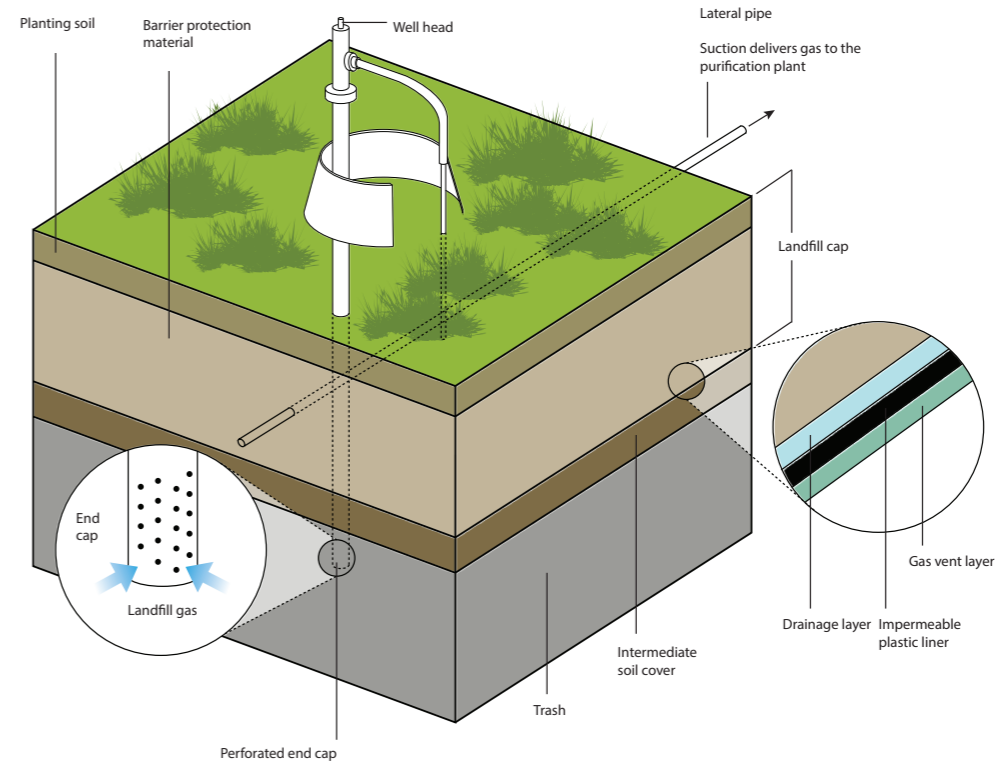
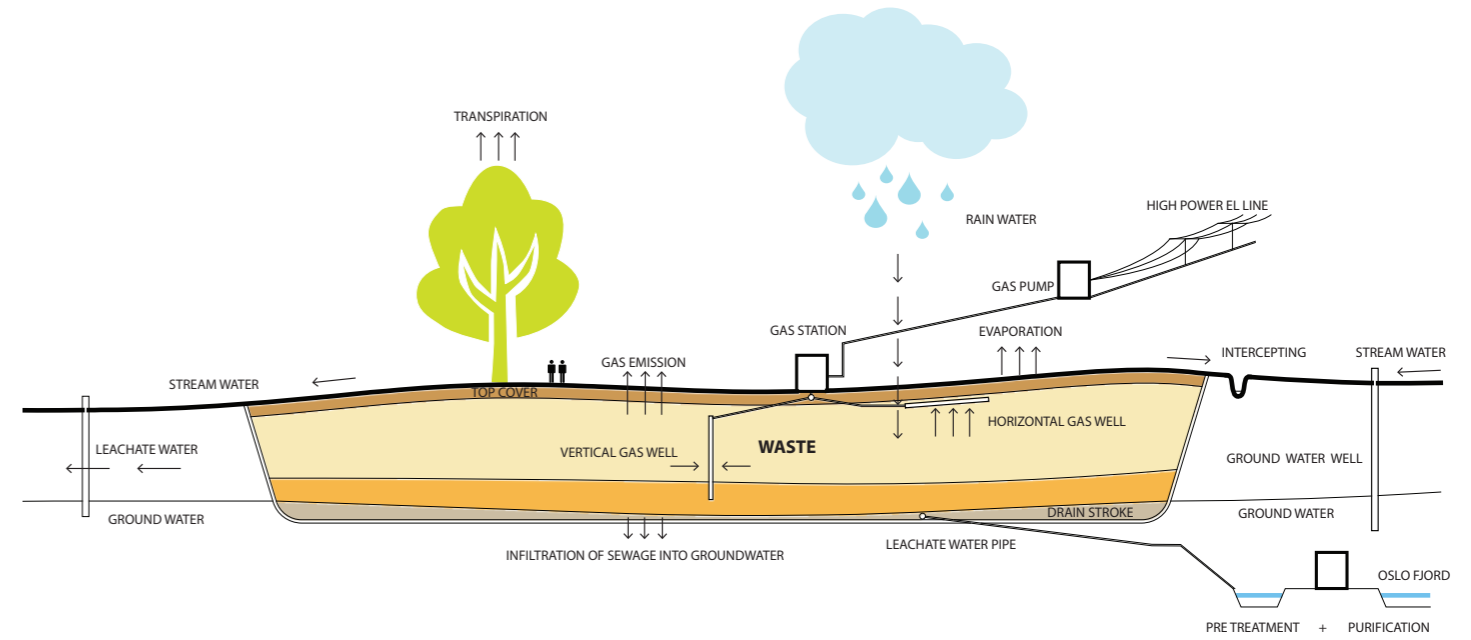


4. Scientific research

Research about composting process and organization



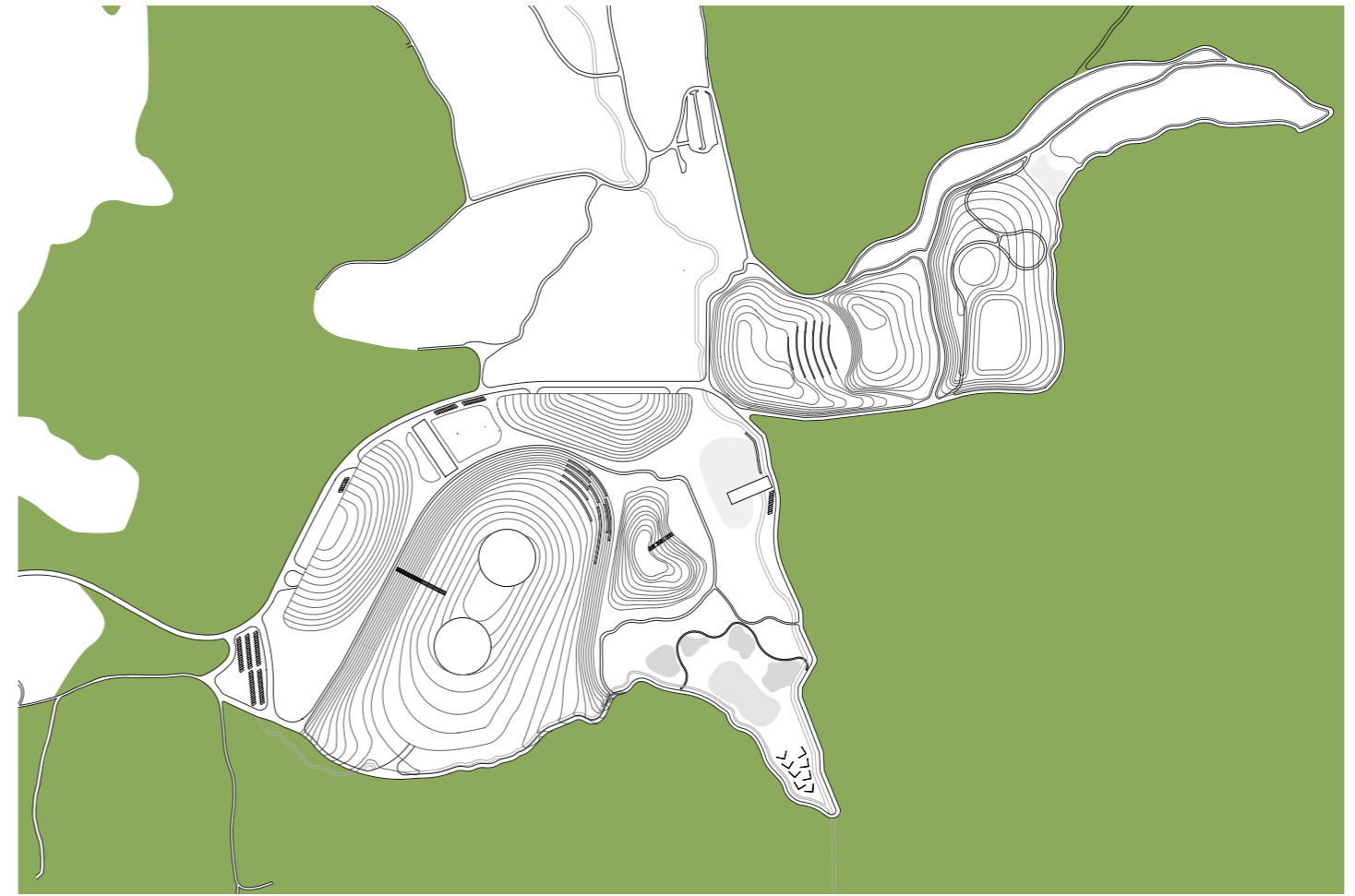
Research about the landfilled



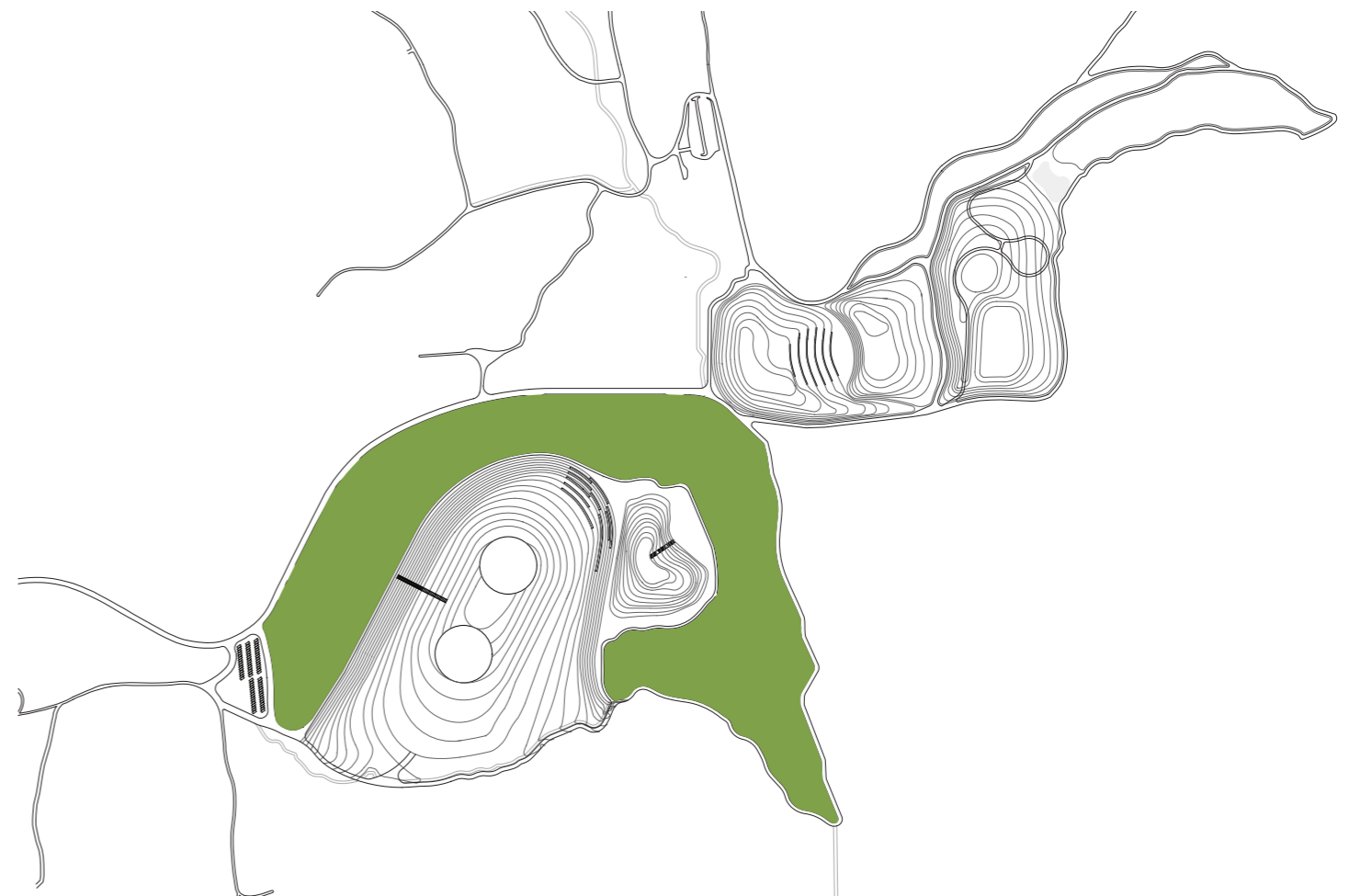
Picture source: New York City Sanitation Department

5. Design concept and diagrams

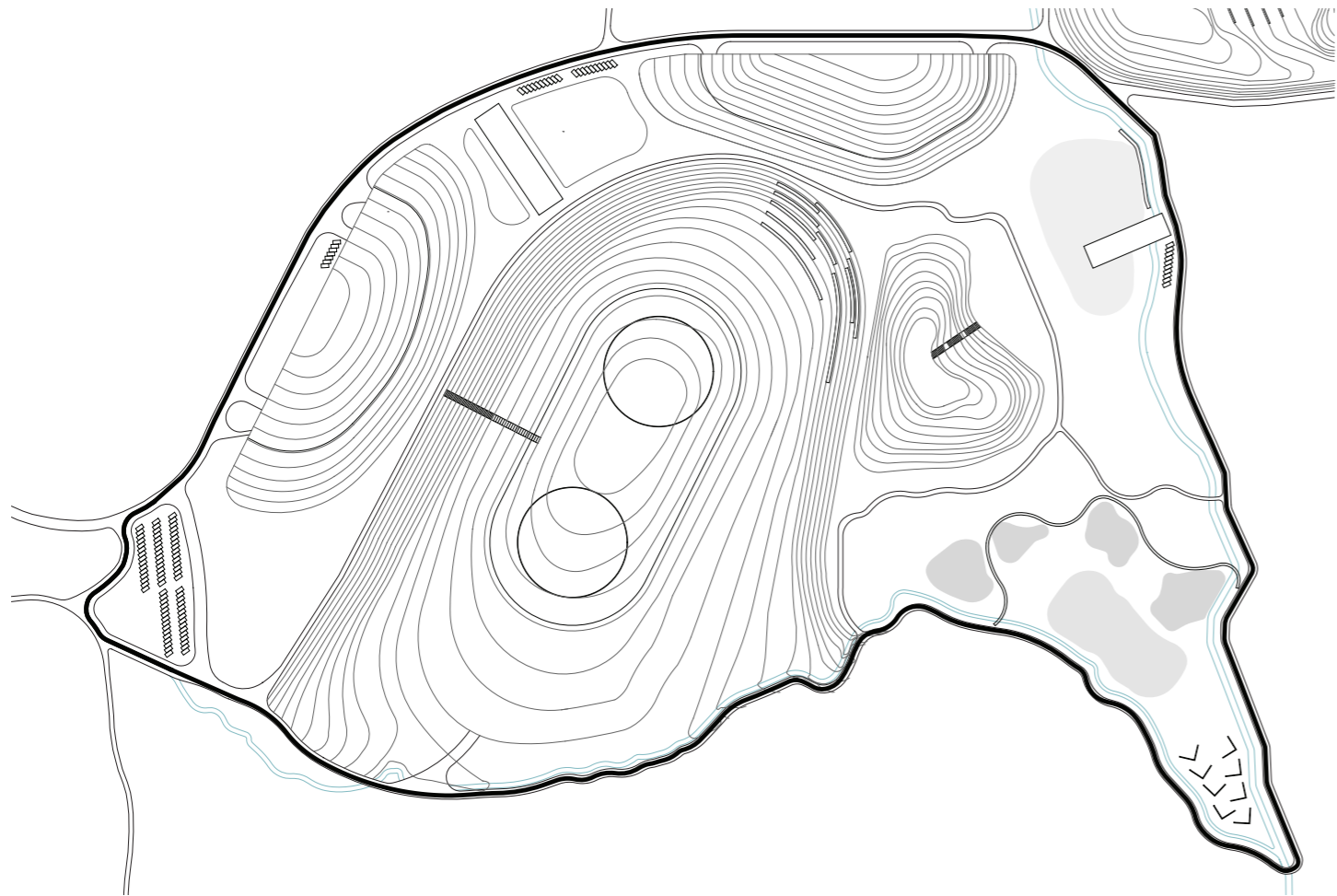
This project aims to transform the Grønmo area with large existing rubbish collection zones into a recreational park. At the same time, the current rubbish functions, material recycling, material composting and material sorting will be kept and be converted sustainable within the idea of the public park. The whole Grønmo area is around 42.5 hector. This transformation will reaffirm the qualities of river, forest, field site with the concept to infill new experiences into the area. There could be new activities in this area, including recycling learning classroom, birds watching, hiking, campfire festival, bicycle group gathering, picnic, Christmas tree market etc. This transformation project includes new organisation system of material collection, 2nd hand market, new organisation system of material sorting, new organisation system of material composting, visitor centre and new system of contaminated water filtering. To be able to connect the area to the existing morphology and natural environment of South eastern of Oslo, this project is part of the effort to turn the contaminated areas around Oslo into a new landscape scenery. The task of the thesis is on the crossing section of landscape design, architecture infrastructure design and architecture design.



Grønmo border forest



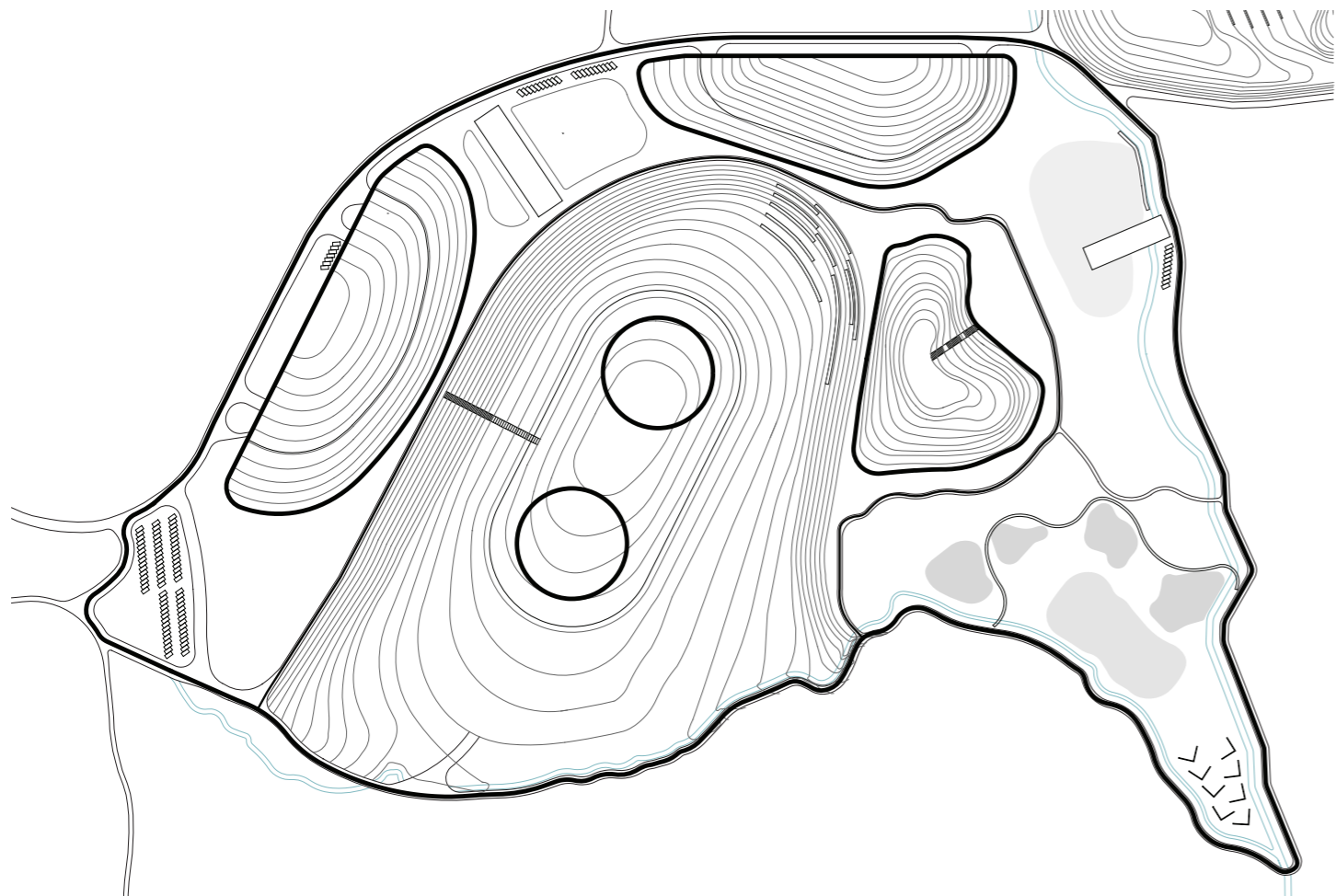
Artificial nature inside of the site



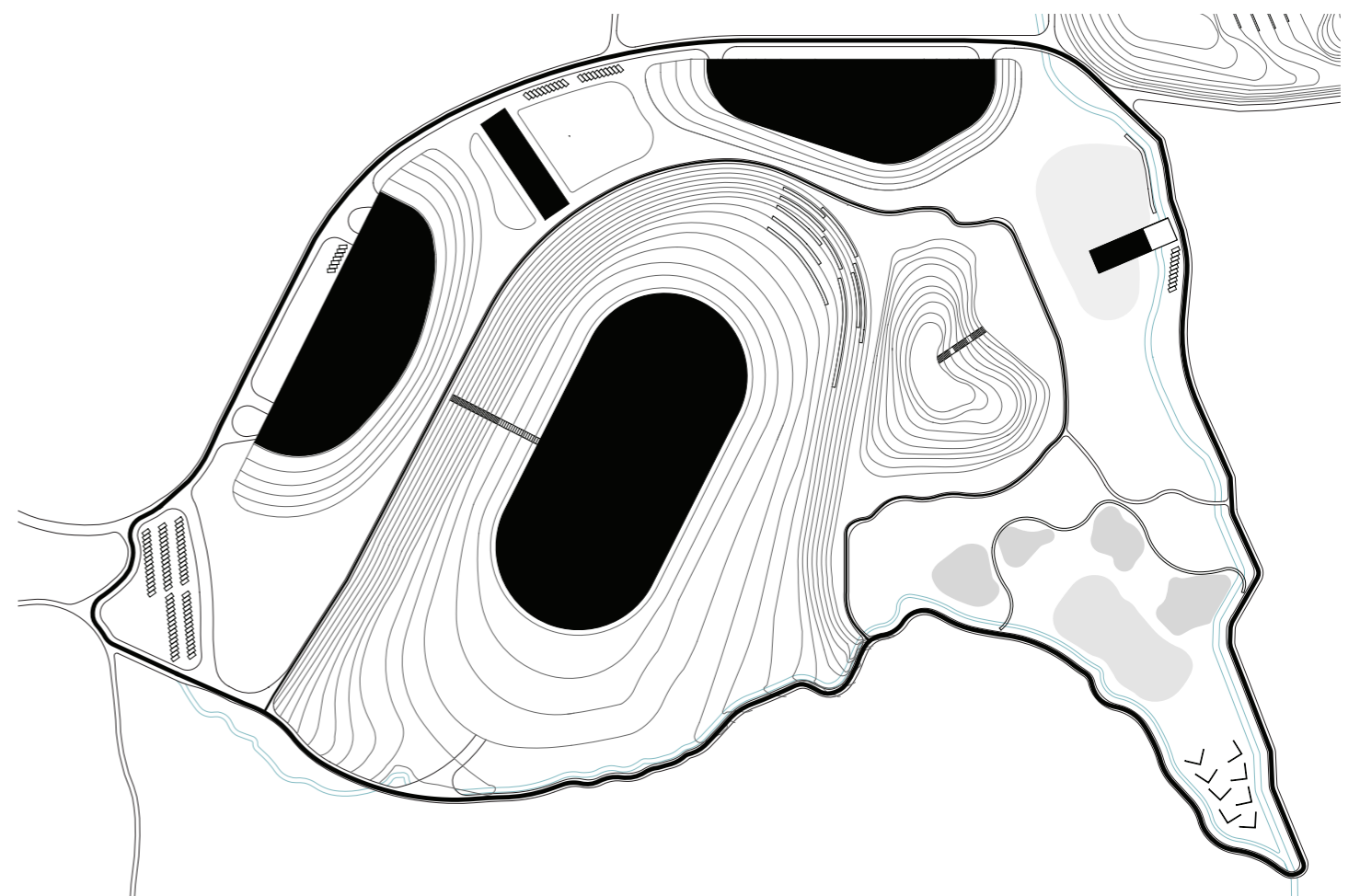
Design concept: boundary around the site



Design concept: division about the function zones



Design concept: man-made slope

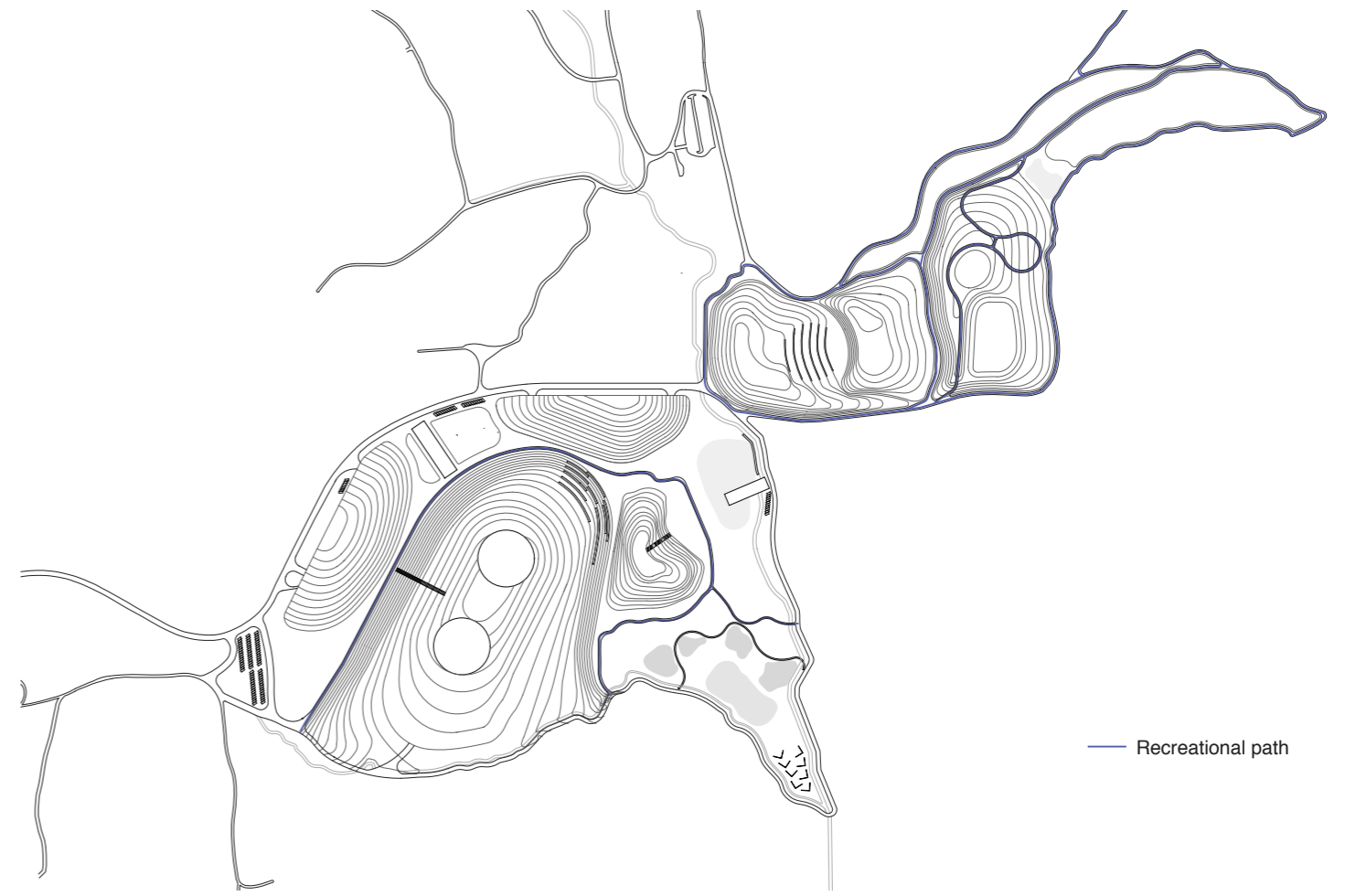


Design concept: inserted functions inside of the man-made landscape



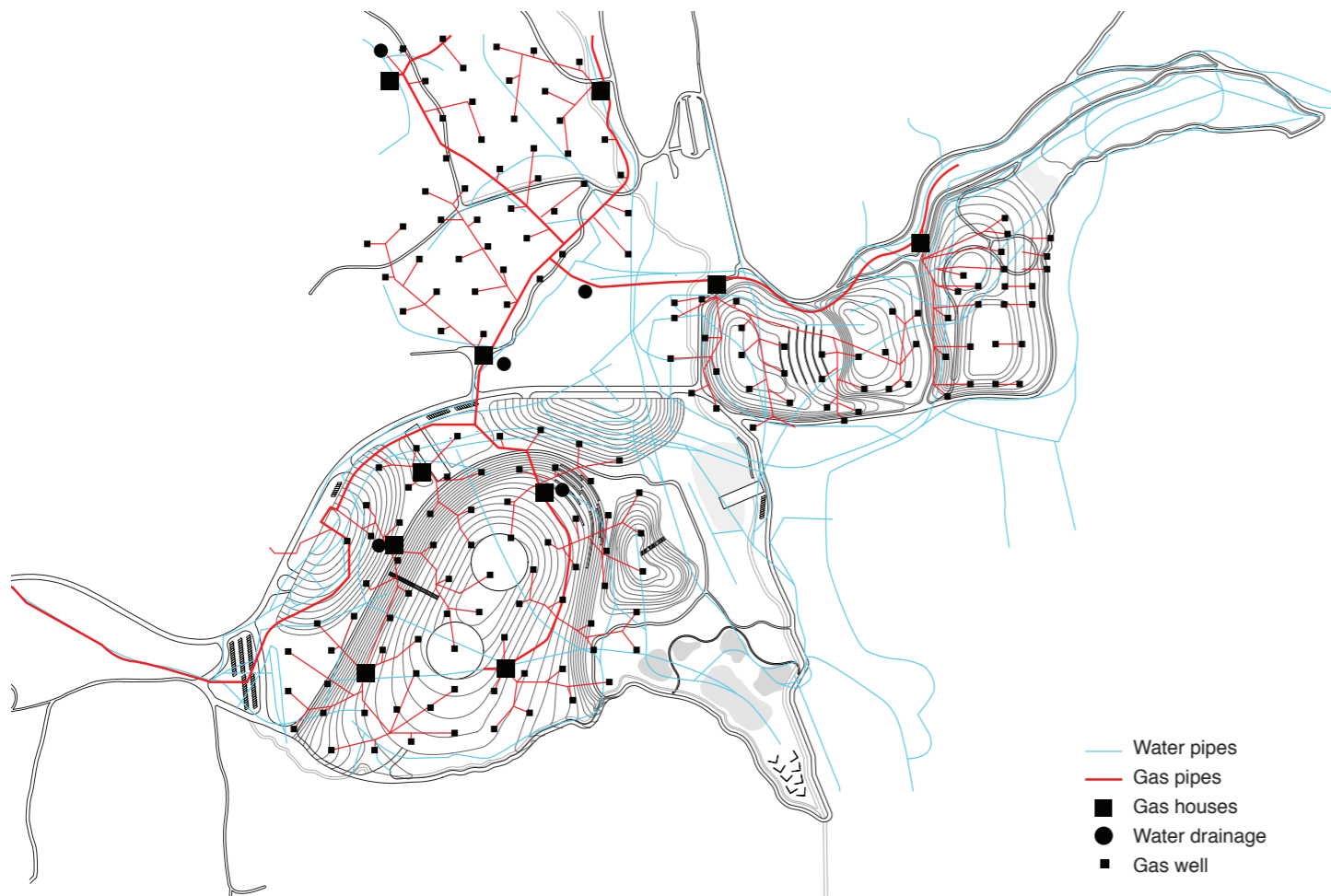
- Vehicle road
- Car parking

Analysis: vehicle road and parking



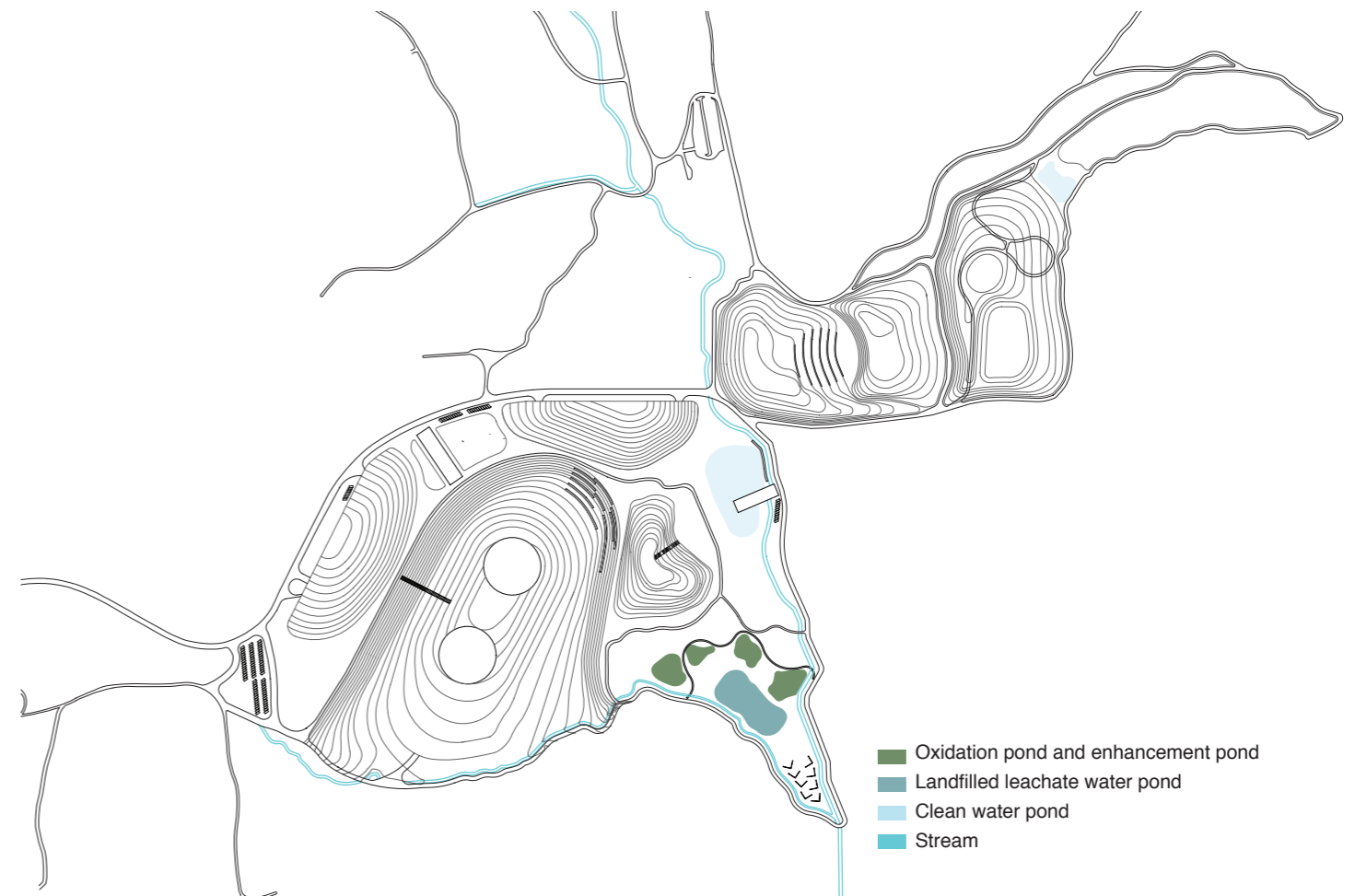
- Recreational path

Analysis: recreational path



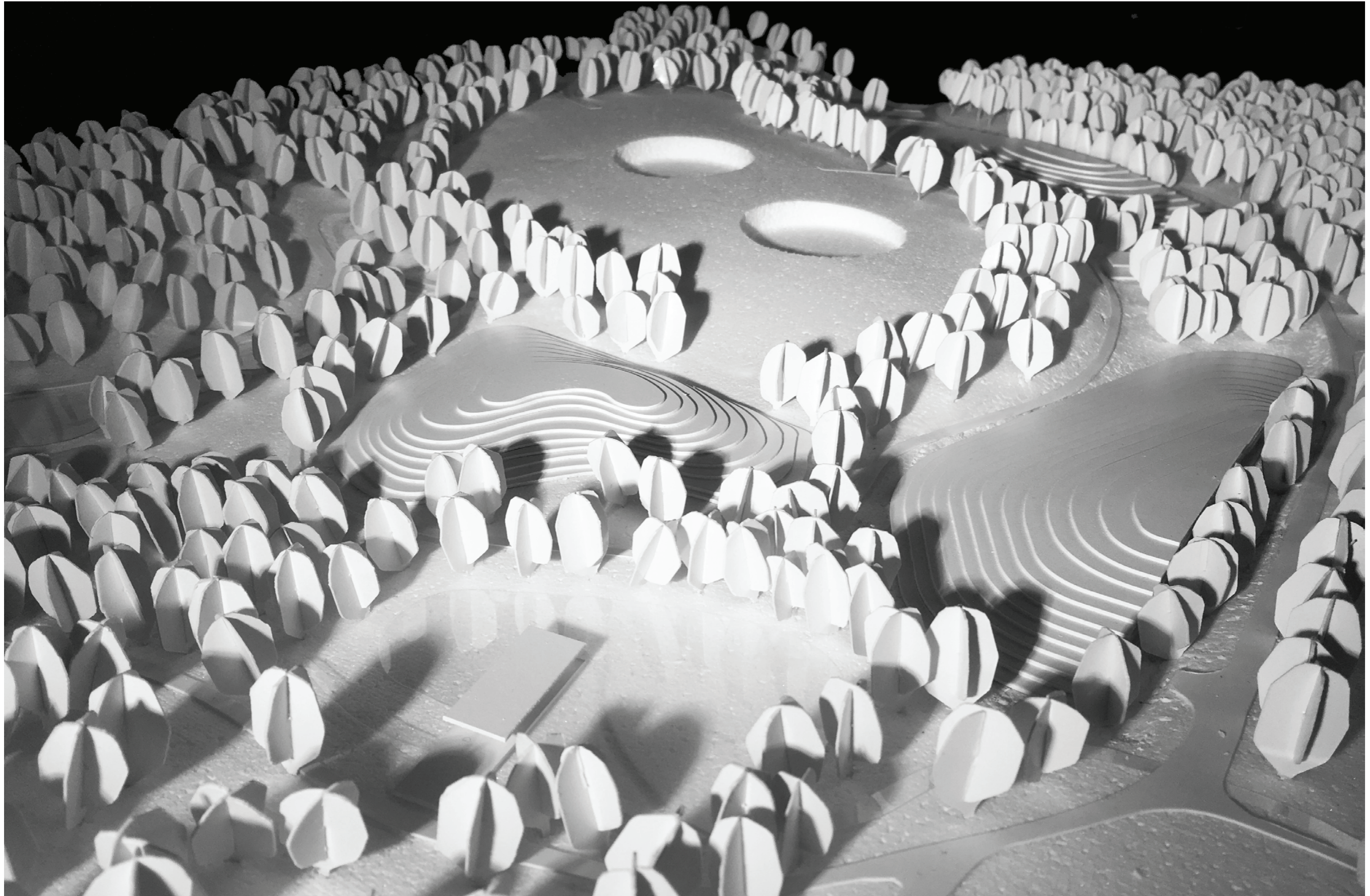
- Water pipes
- Gas pipes
- Gas houses
- Water drainage
- Gas well

Analysis: underground facilities layout



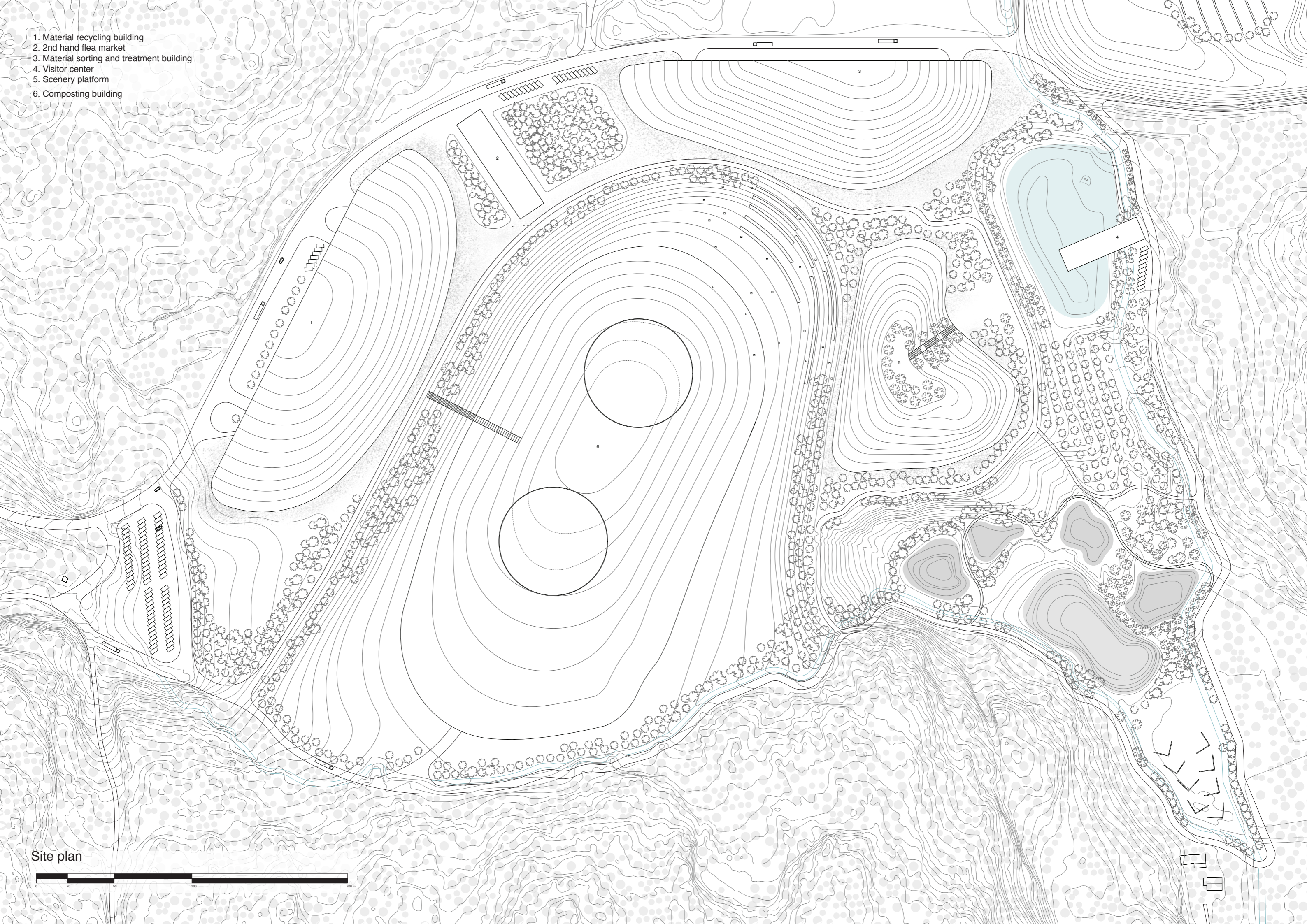
- Oxidation pond and enhancement pond
- Landfilled leachate water pond
- Clean water pond
- Stream

Analysis: water system





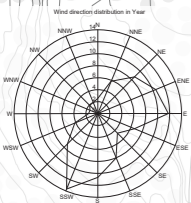
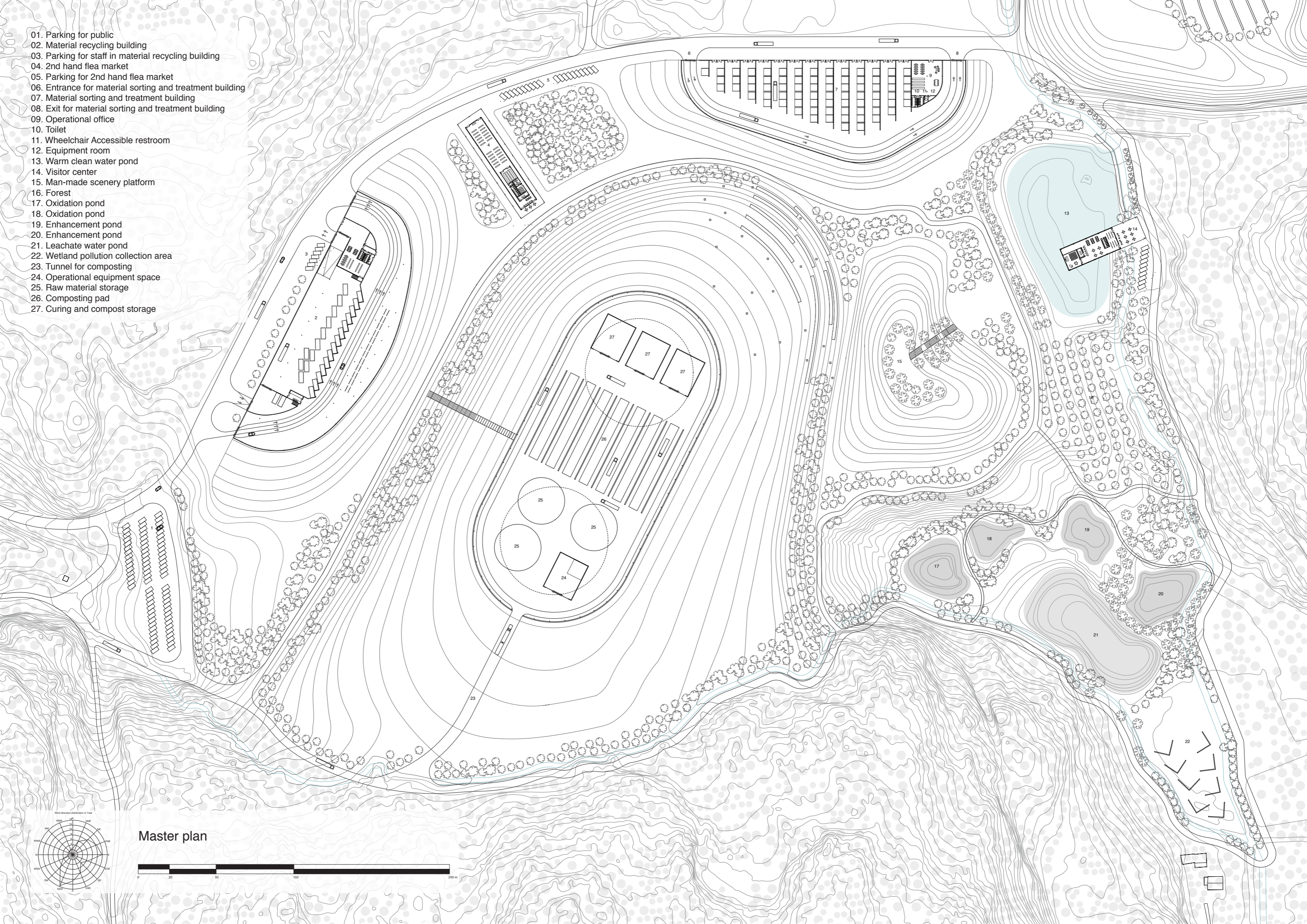
- 1. Material recycling building
- 2. 2nd hand flea market
- 3. Material sorting and treatment building
- 4. Visitor center
- 5. Scenery platform
- 6. Composting building



Site plan

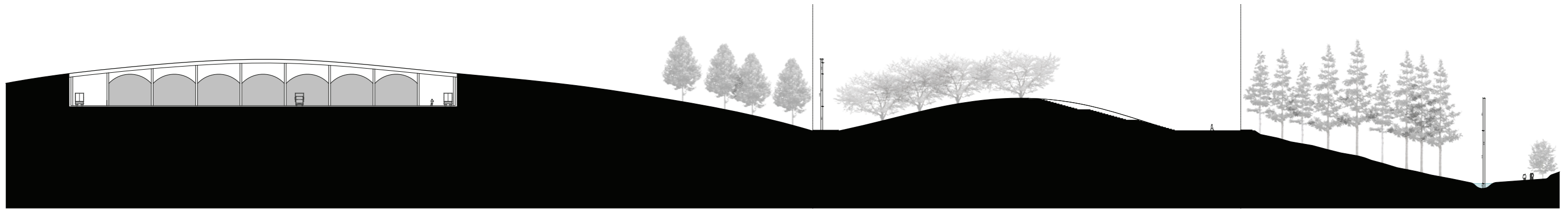


- 01. Parking for public
- 02. Material recycling building
- 03. Parking for staff in material recycling building
- 04. 2nd hand flea market
- 05. Parking for 2nd hand flea market
- 06. Entrance for material sorting and treatment building
- 07. Material sorting and treatment building
- 08. Exit for material sorting and treatment building
- 09. Operational office
- 10. Toilet
- 11. Wheelchair Accessible restroom
- 12. Equipment room
- 13. Warm clean water pond
- 14. Visitor center
- 15. Man-made scenery platform
- 16. Forest
- 17. Oxidation pond
- 18. Oxidation pond
- 19. Enhancement pond
- 20. Enhancement pond
- 21. Leachate water pond
- 22. Wetland pollution collection area
- 23. Tunnel for composting
- 24. Operational equipment space
- 25. Raw material storage
- 26. Composting pad
- 27. Curing and compost storage

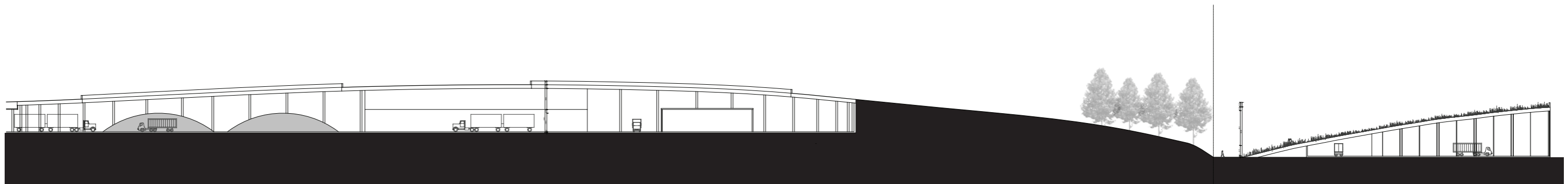


Master plan



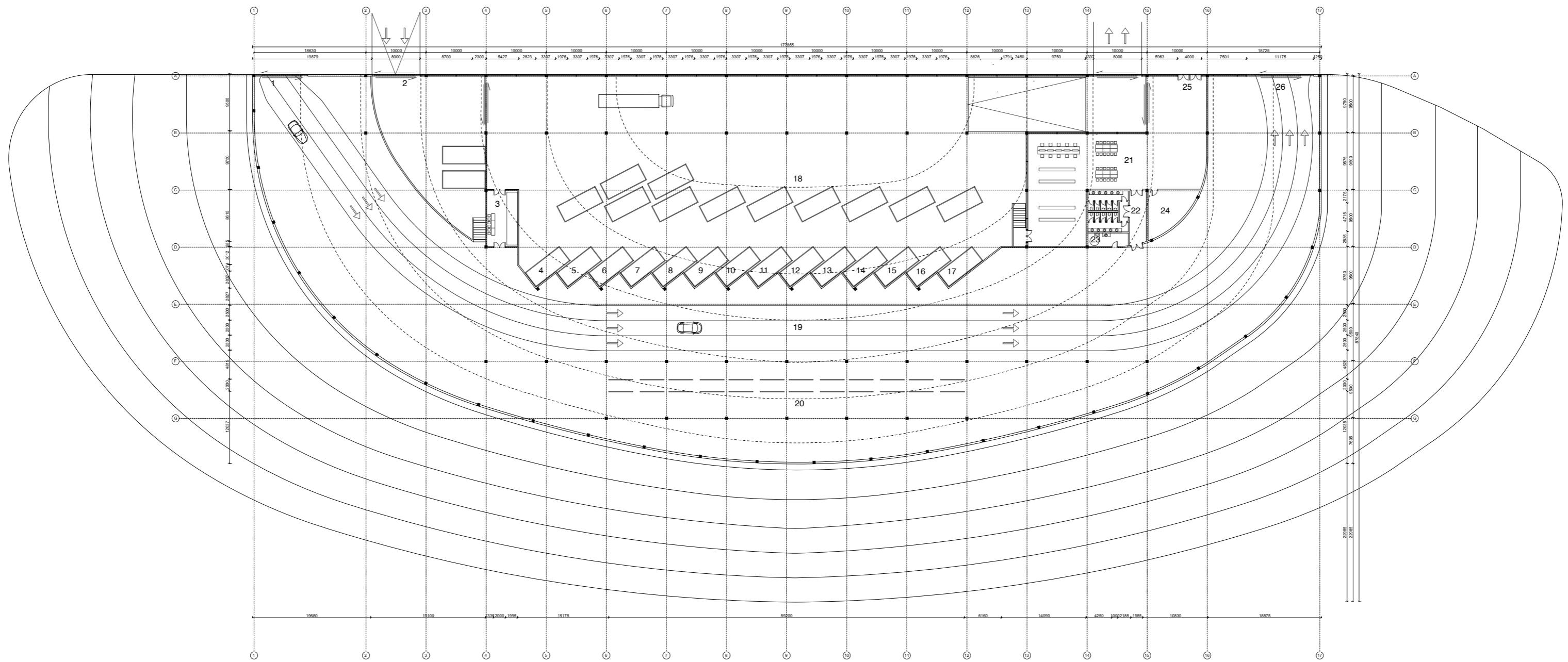


Section



Section

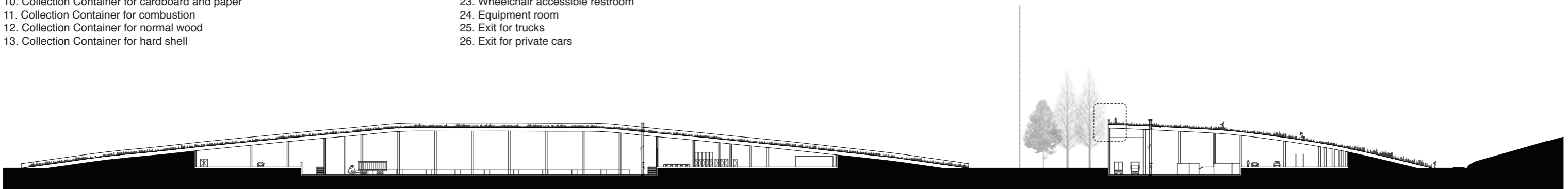




- 01. Entrance for private cars
- 02. Entrance for trucks
- 03. Collection area for Hazardous waste
- 04. Collection Container for Plaster
- 05. Collection Container for Mattresses
- 06. Collection Container for Impregnated wood
- 07. Collection Container for Metal
- 08. Collection Container for Plastic
- 09. Collection Container for Waste electricity equipments, appliances, cables
- 10. Collection Container for cardboard and paper
- 11. Collection Container for combustion
- 12. Collection Container for normal wood
- 13. Collection Container for hard shell

- 14. Collection Container for vinyl flooring and vinyl insulation
- 15. Collection Container for garden waste for composting
- 16. Collection Container for fluorescent lights
- 17. Collection Container for glass
- 18. Containers collection and storage area
- 19. Tracks for private cars
- 20. Exhibition and guidance area
- 21. Administration office and supervision area
- 22. Toilet
- 23. Wheelchair accessible restroom
- 24. Equipment room
- 25. Exit for trucks
- 26. Exit for private cars

Material recycling building plan

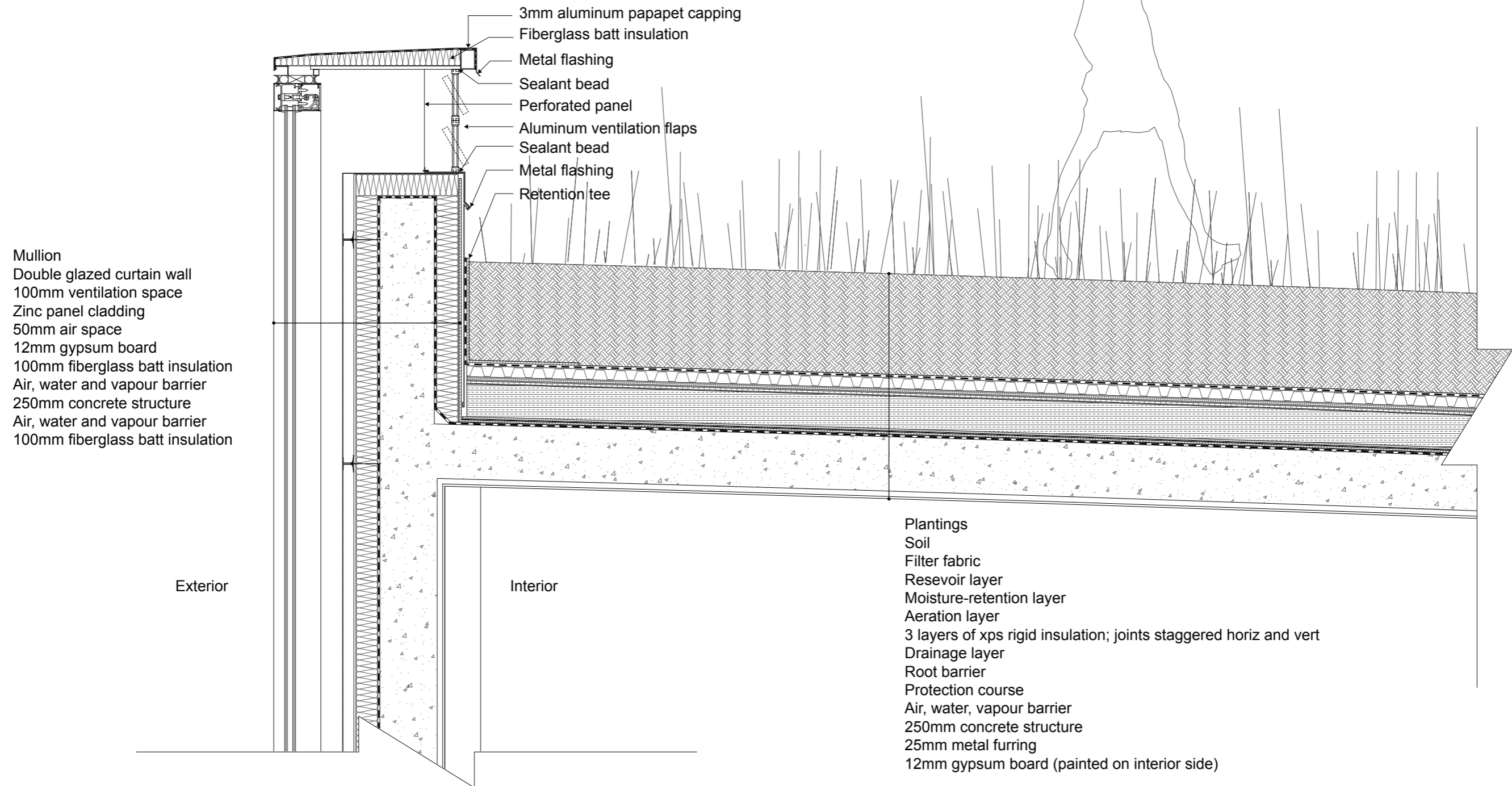


Material recycling building section





Material recycling building interior view



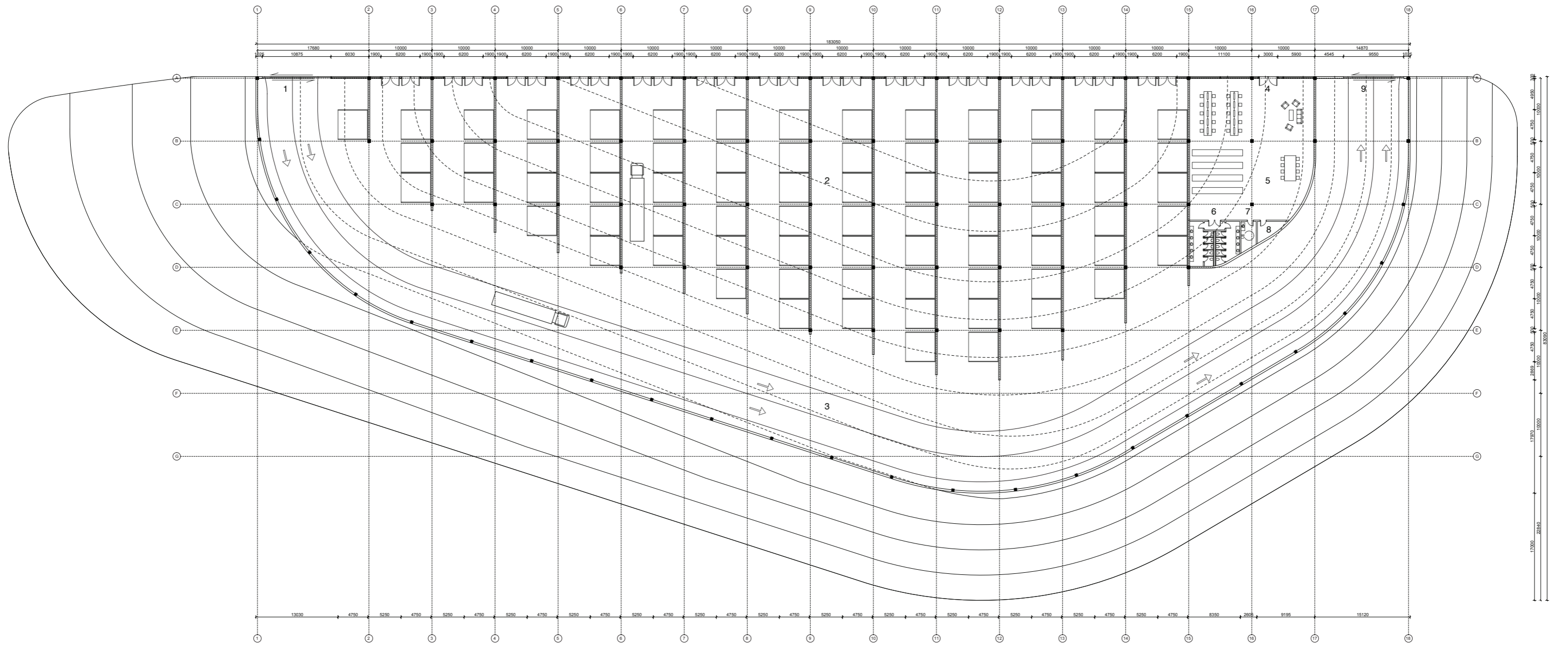
Mullion
 Double glazed curtain wall
 100mm ventilation space
 Zinc panel cladding
 50mm air space
 12mm gypsum board
 100mm fiberglass batt insulation
 Air, water and vapour barrier
 250mm concrete structure
 Air, water and vapour barrier
 100mm fiberglass batt insulation

3mm aluminum parapet capping
 Fiberglass batt insulation
 Metal flashing
 Sealant bead
 Perforated panel
 Aluminum ventilation flaps
 Sealant bead
 Metal flashing
 Retention tee

Plantings
 Soil
 Filter fabric
 Reservoir layer
 Moisture-retention layer
 Aeration layer
 3 layers of xps rigid insulation; joints staggered horiz and vert
 Drainage layer
 Root barrier
 Protection course
 Air, water, vapour barrier
 250mm concrete structure
 25mm metal furring
 12mm gypsum board (painted on interior side)

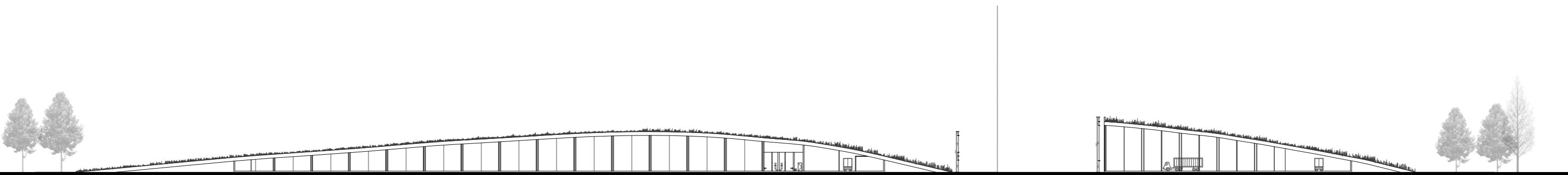
Exterior

Interior



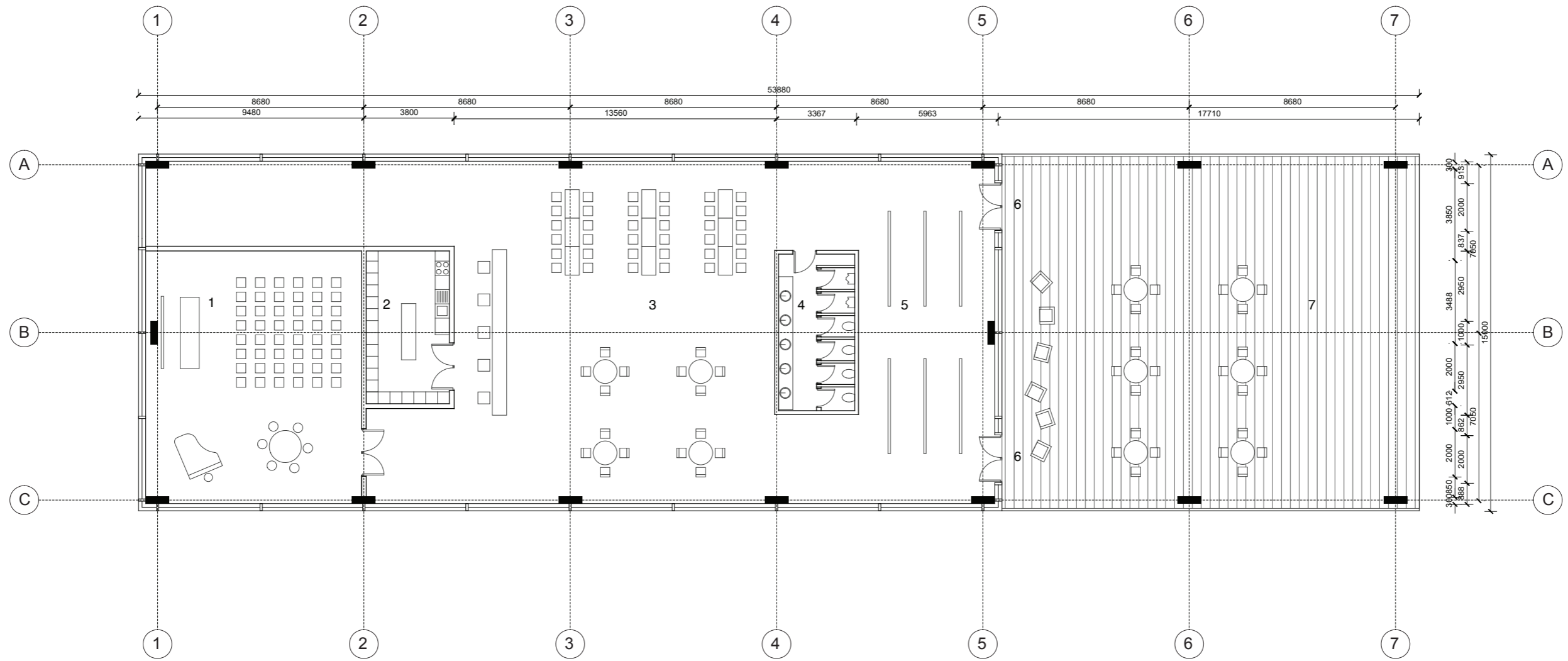
- 01. Entrance for trucks
- 02. Material sorting and treatment area
- 03. Tracks for trucks
- 04. Entrance for staff
- 05. Administration office
- 06. Toilet
- 07. Wheelchair accessible restroom
- 08. Equipment room
- 09. Exit for trucks

Material sorting and treatment building plan

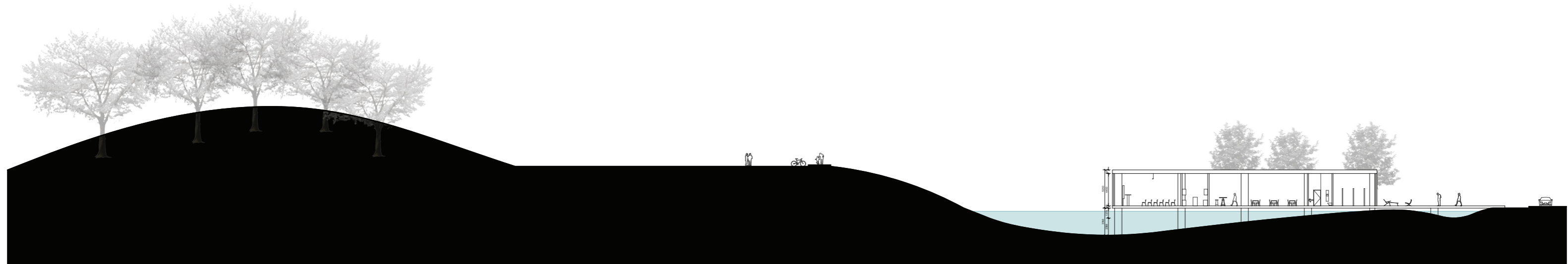


Material sorting and treatment building section





- 1. Small auditorium
- 2. Kitchen
- 3. Restaurant and Cafe
- 4. Toilet
- 5. Small exhibition space
- 6. Entrance
- 7. Platform

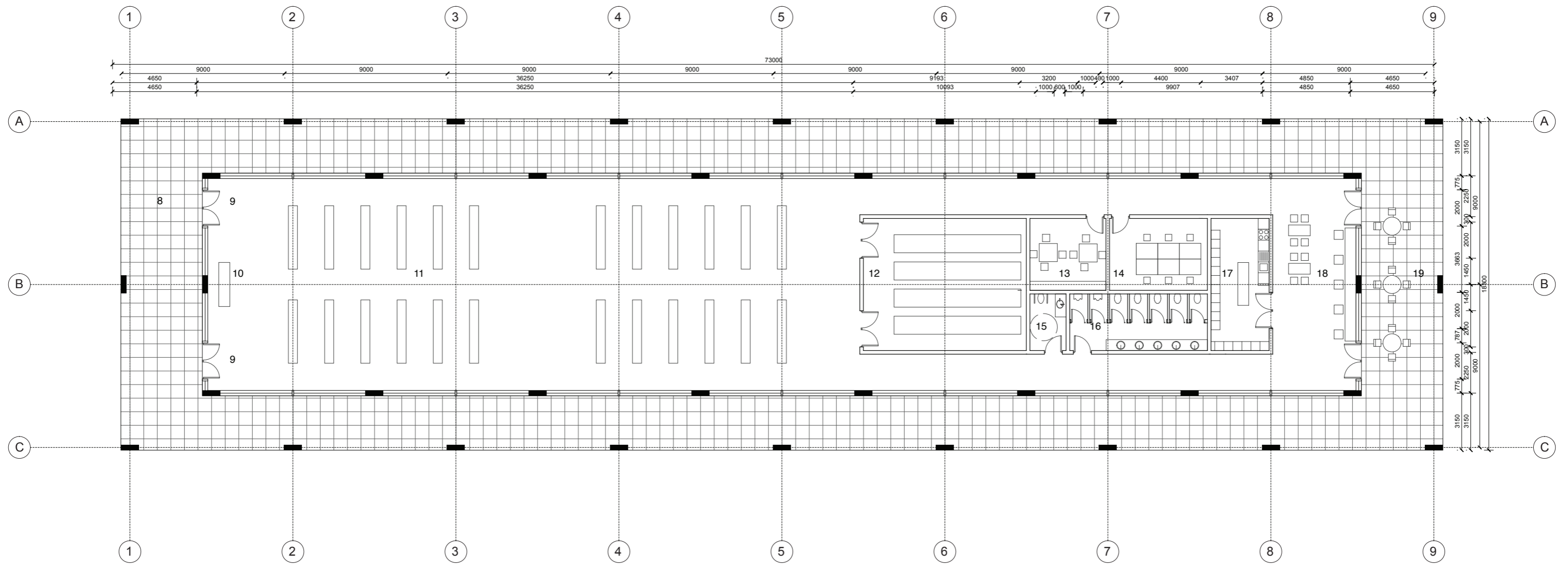


Visitor center section

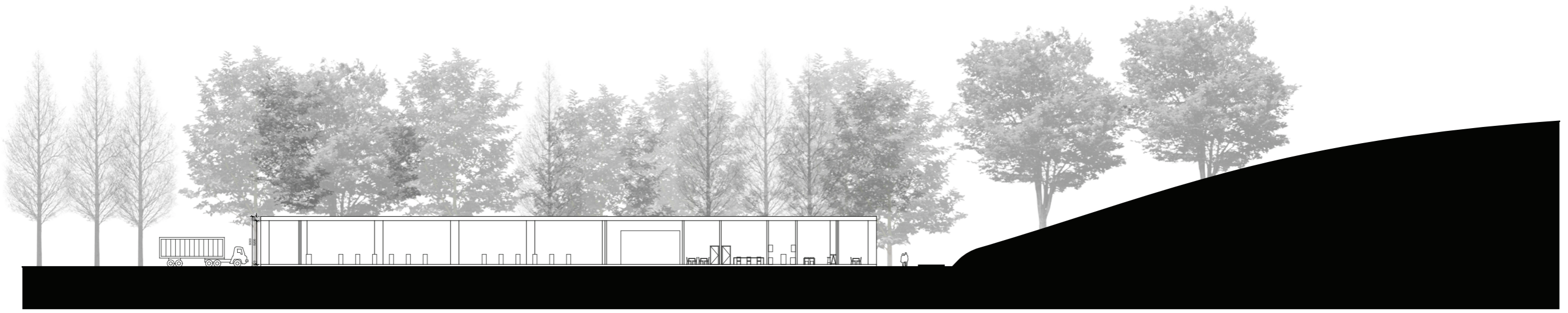




Visitor center exterior view



- 8. Temporary market space (Christmas tree market, compost soil market)
- 9. Entrance
- 10. Lobby and Reception
- 11. 2nd hand market space
- 12. Storage
- 13. Workshop and repair room
- 14. Management office
- 15. Wheelchair Accessible restroom
- 16. Toilet
- 17. Kitchen
- 18. Cafe
- 19. Outside cafe



2nd hand flea market section



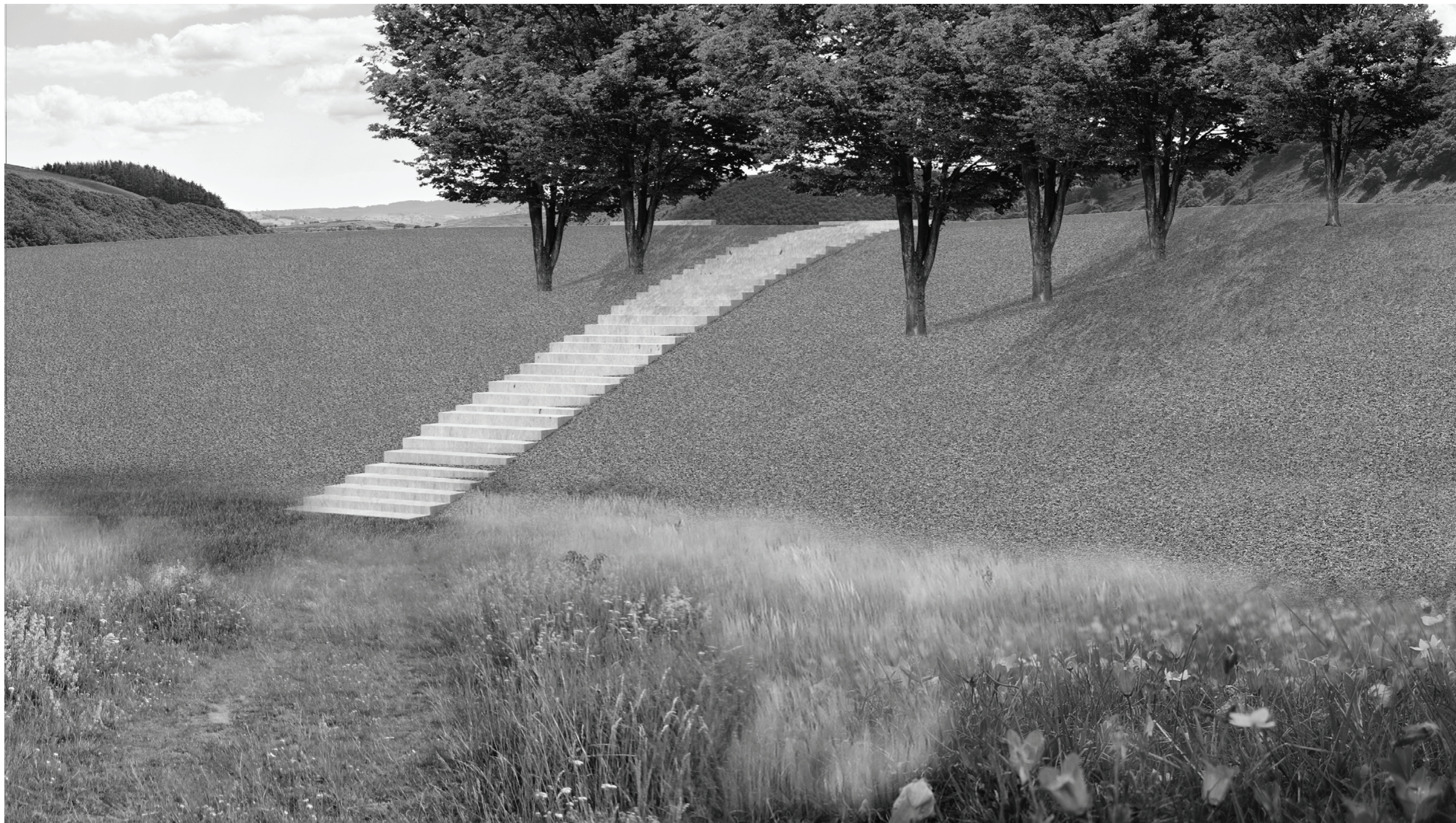
2nd hand flea market exterior view



2nd hand flea market semi-exterior view



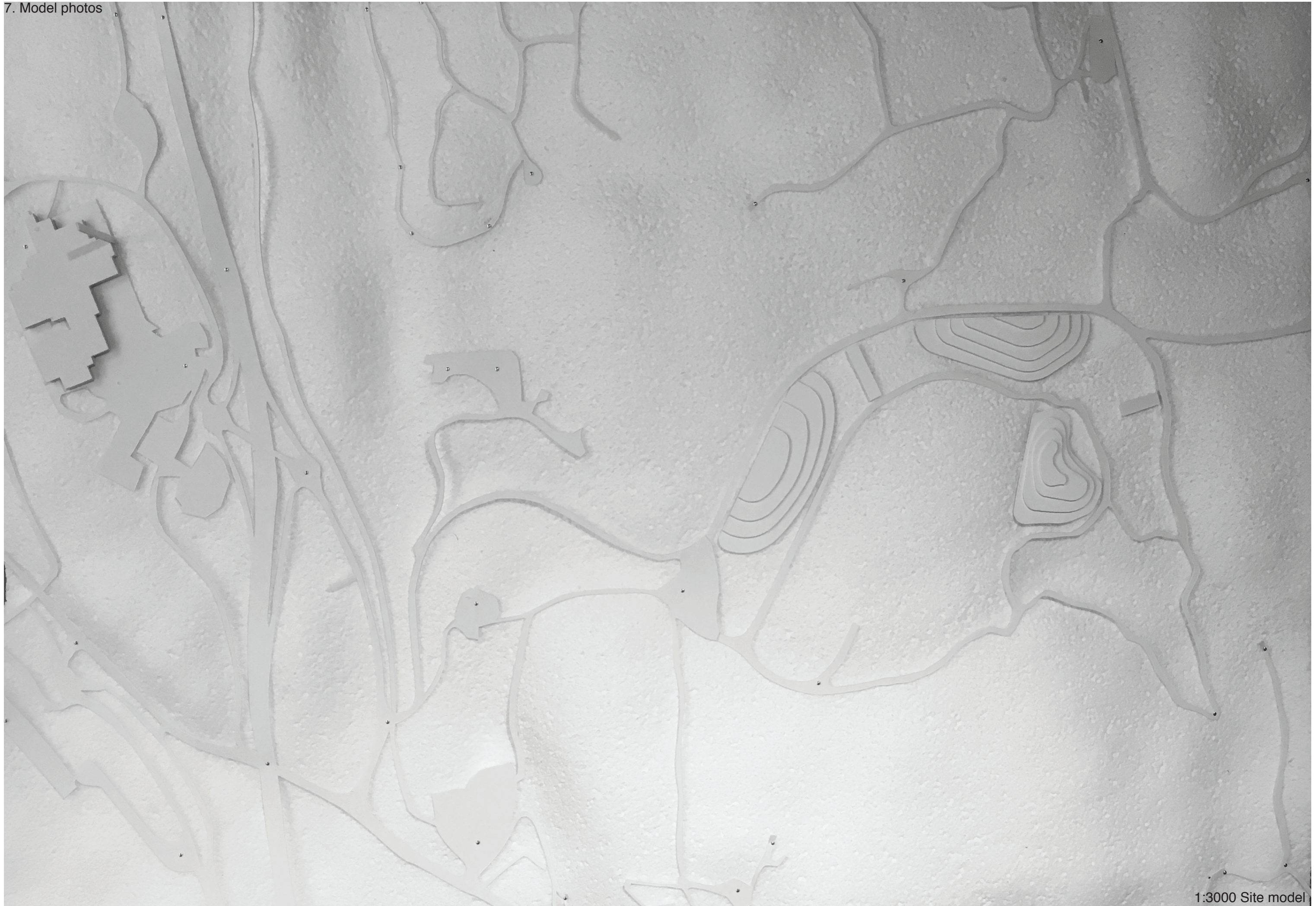
Wetland area view

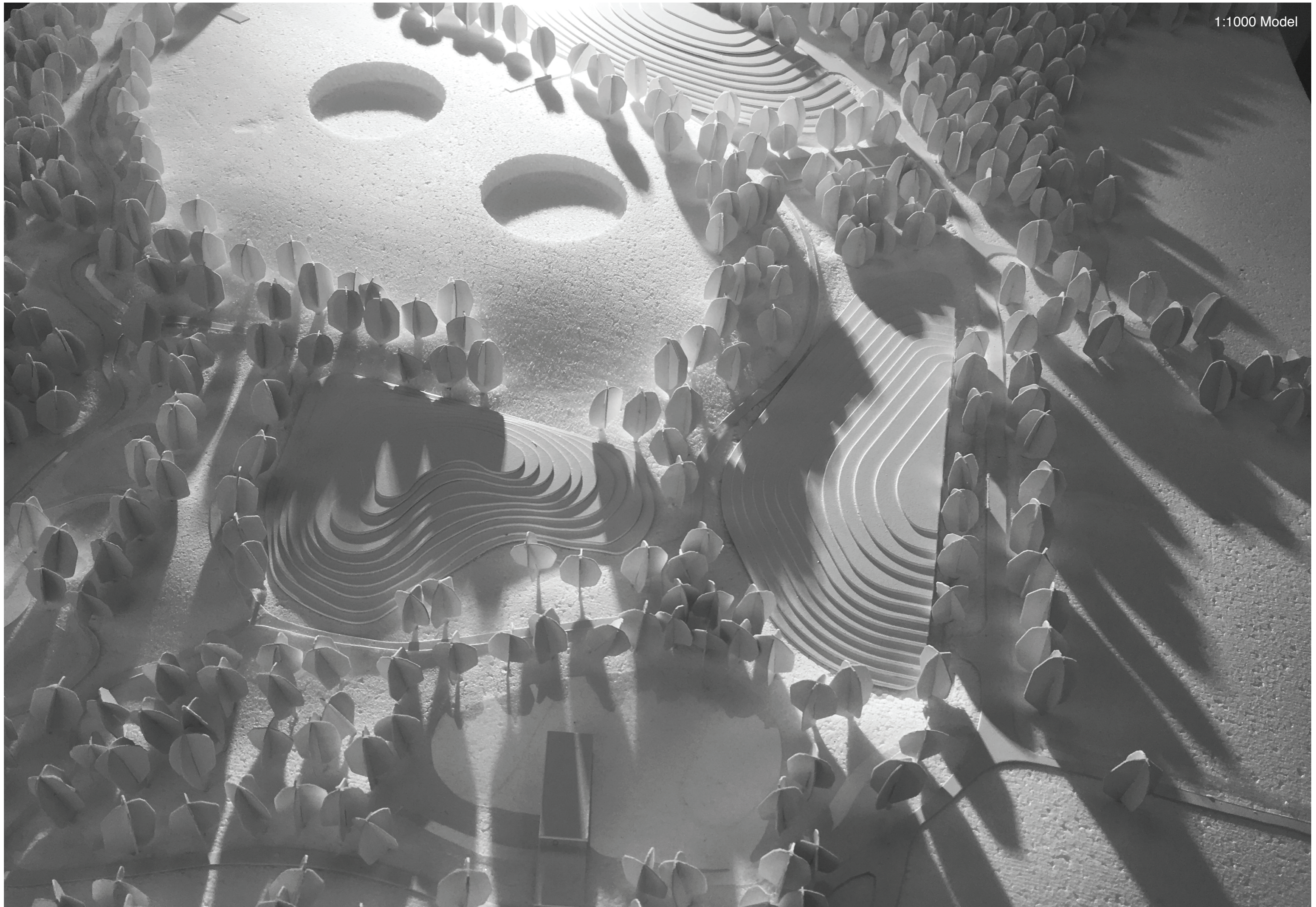


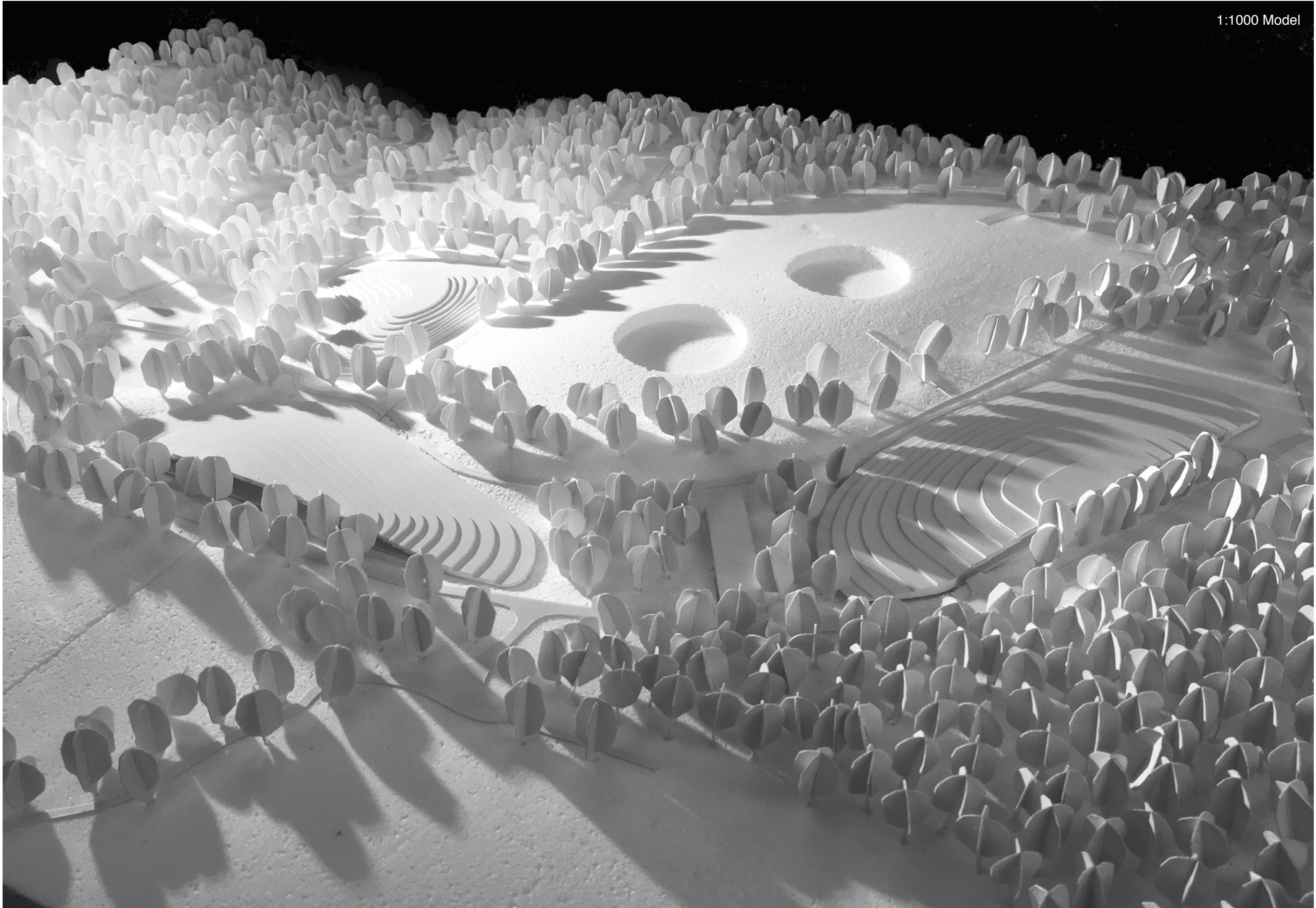
Scenery platform view

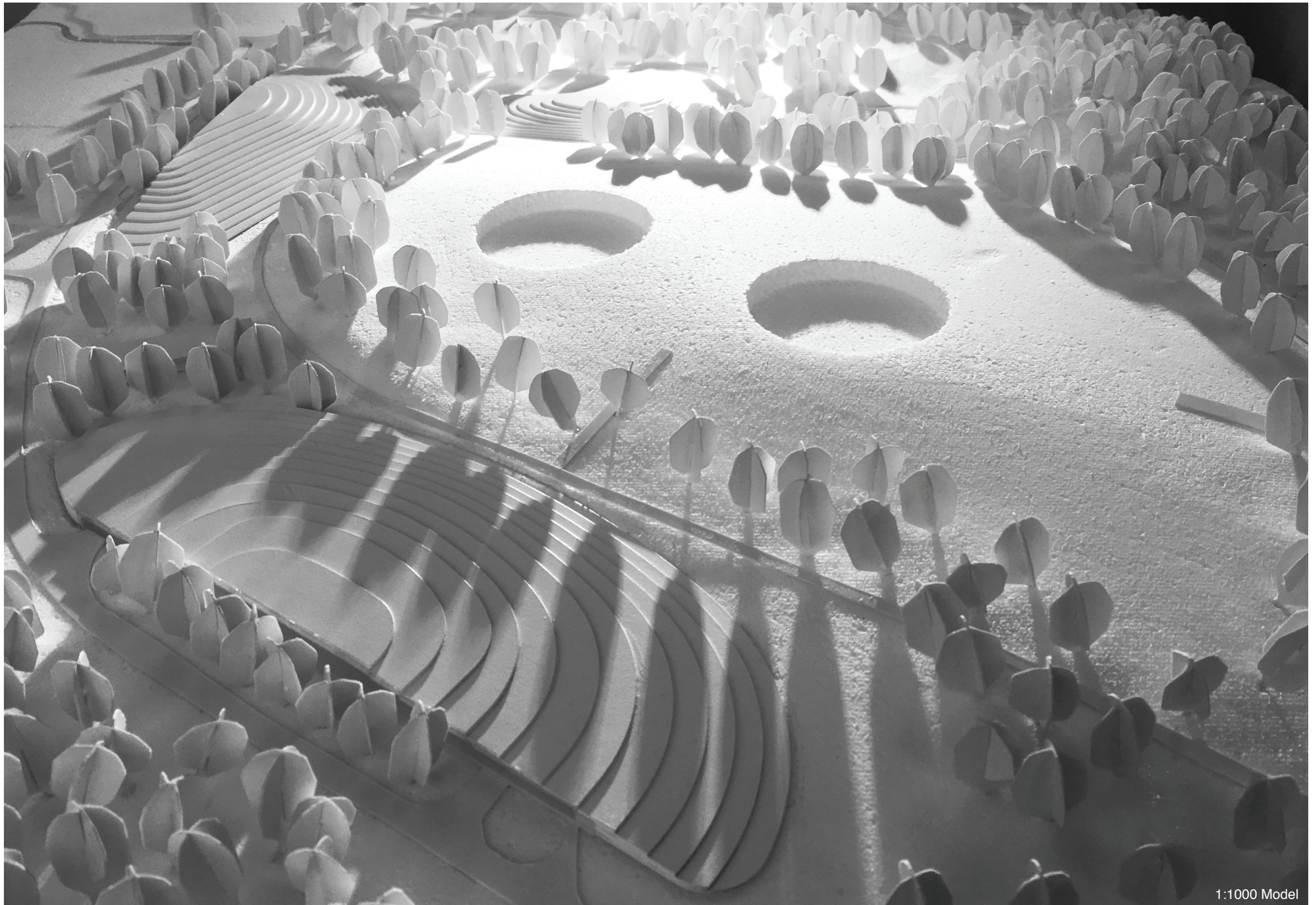


Material sorting exterior winter view



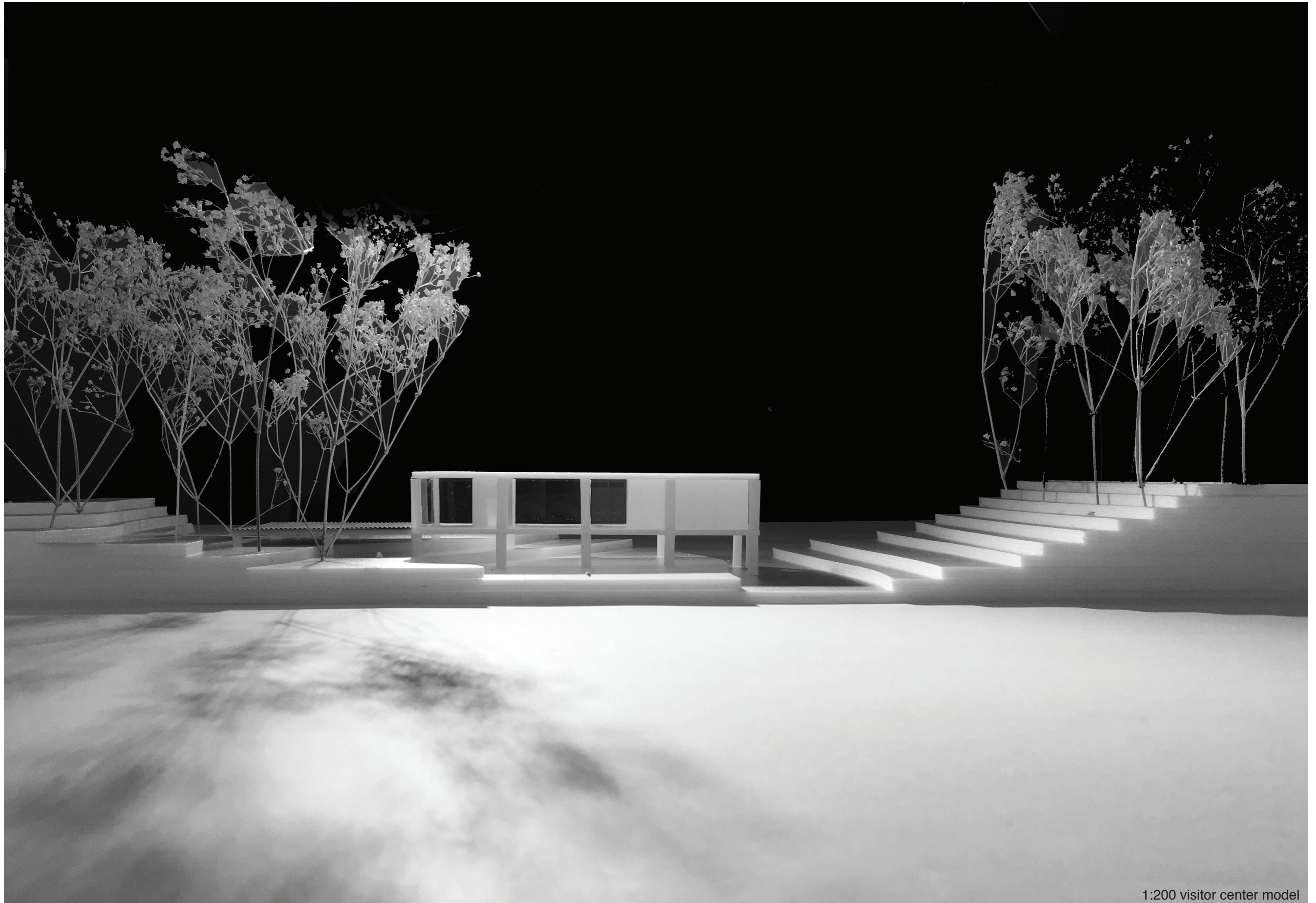








1:200 2nd hand flea market model



1:200 visitor center model

