Dow AgroSciences

Mogi Mirim Site Conceptual Master Plan

ch2m·

Dow

As part of our ongoing commitment to environmental stewardship, this page has been intentionally left blank to accommodate two-sided printing.

1.

INTRODUCTION, PROJECT GOALS & OBJECTIVES

1.1 INTRODUCTION

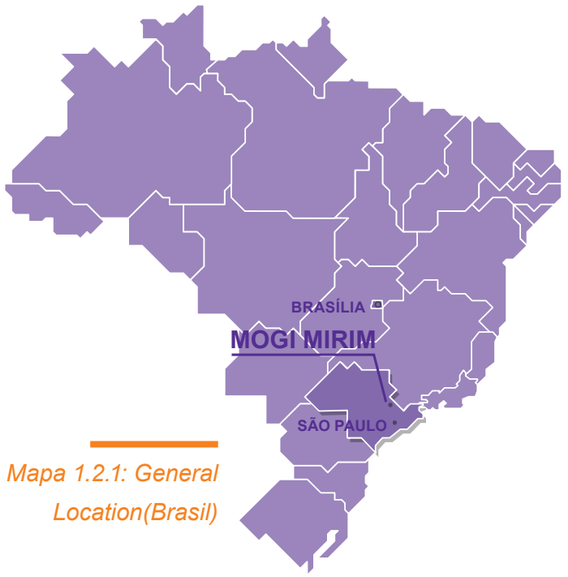
DOW AgroSciences (DAS) currently operates a seed and chemical R&D facility in Mogi Mirim - Brazil focusing on the development of crop protection chemical compounds. The current site has various spatial organizational challenges and inefficiencies. The site is expected to change considerably over the next year due to the site access highway duplication, which is already underway. The highway duplication and the start of the new Technology Transfer Center (TTC) operation in 2015 prompted the study of the site to accommodate the required changes while improving the site layout for improved spatial connectivity of its functions and to provide a better environment for the execution of science.

CH2M HILL (CH2M) has been contracted to support DAS in establishing a conceptual design for the retrofit of the property located at Mogi Mirim. The conceptual master plan includes a layout to accommodate DAS's current and future operations and equipment. The site analysis, including a preliminary utilities assessment, conducted in concert with the development of facilities programming requirements has resulted in the development of this conceptual plan report. The conceptual plan was tailored to address both near-term and longer-term planning and operational needs.

Mogi Mirim Research Center

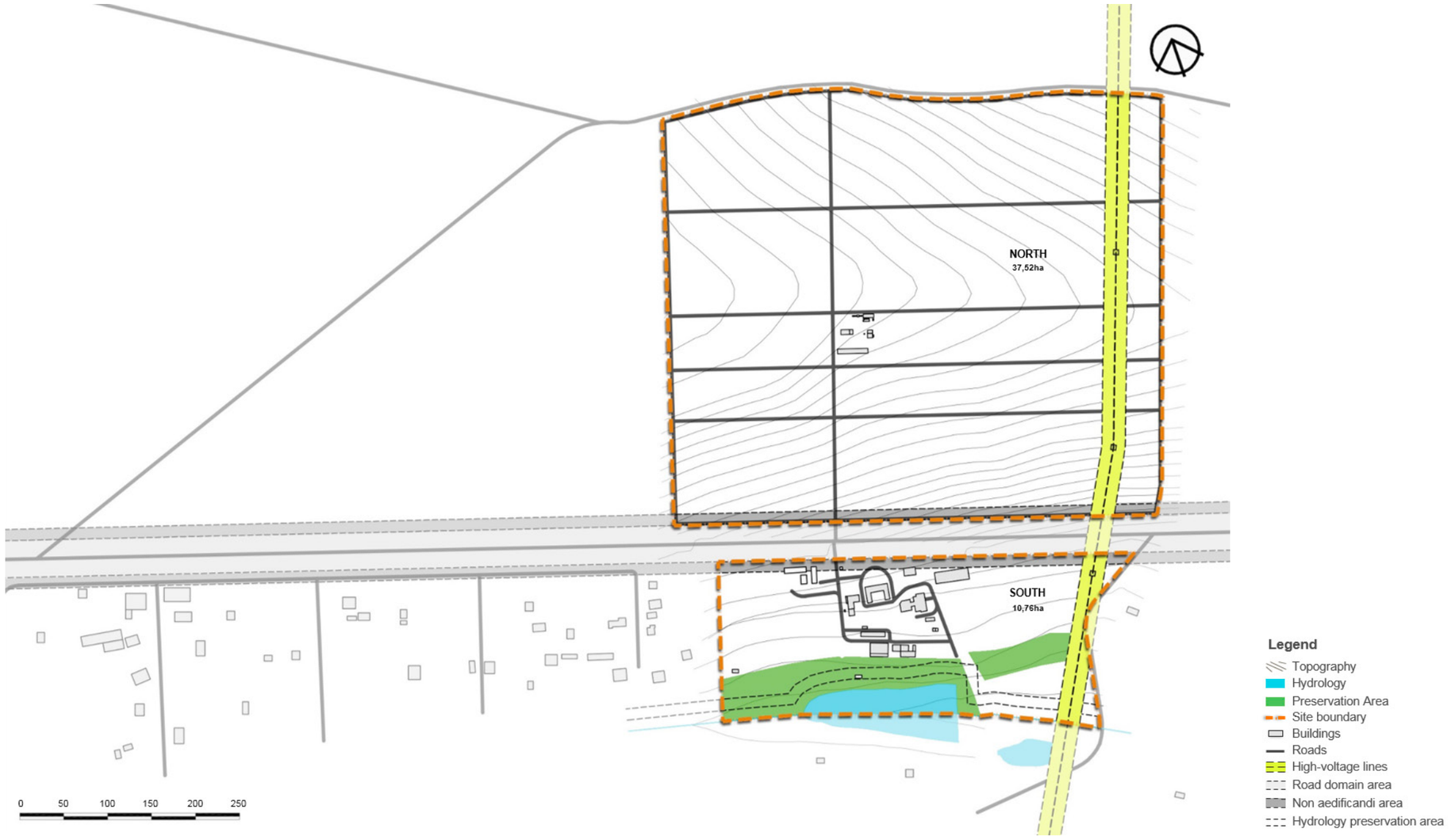
1.2 PROJECT LOCATION

The Project is located in the Eastern region of the State of São Paulo, Brazil; approximately 10 miles (16 km) West of Mogi Mirim, and 80 miles (128 km) Northwest of the City of São Paulo (State Capital). SP-147 is the main arterial road that provides immediate access to the site. Mogi Mirim is influenced by Campinas Metropolitan Region, the second region in São Paulo state. The area is characterized by being based on an agricultural economy with good and comfortable whether year around with temperatures ranging from 58F° to 76F° (14C° to 25C°). The region receives heavy rainfall between the months of November and March.



Mapa 1.2.1: General Location(Brasil)

Map 1.2.2: Vicinity Map



Map 1.2.3: Site Plan

1.3 VISION

To build on the existing site assets to develop a World Class R&D field station, while improving site safety, security and efficiencies.

1.4 PROJECT GOALS & OBJECTIVES

• Define the site and facility requirements necessary to support the functional and process needs for near and long-term planning horizons.

• Provide facilities of a quality equivalent to the standard set for other DAS sites.

• Establish the project needs for the Mogi Mirim site with staff input.

• Develop a master plan identifying changes, additions or upgrades to the existing facilities and infrastructure.

• Develop a conceptual site design solution for a new site entrance which will be impacted by the highway duplication project currently underway.

• Understand the impacts to the site and site processes by the segregation of the north and south properties with the highway duplication.

• Provide a report with sufficient information and documentation that allows DAS personnel to make recommendations to their management with the goal of obtaining approvals and funding for the project.

• Understand the opportunities that new land being purchased will have to the station R&D and how the new land relates to the existing properties.

Grape Field

2.

SITE ANALYSIS

2.1 SITE DESCRIPTION

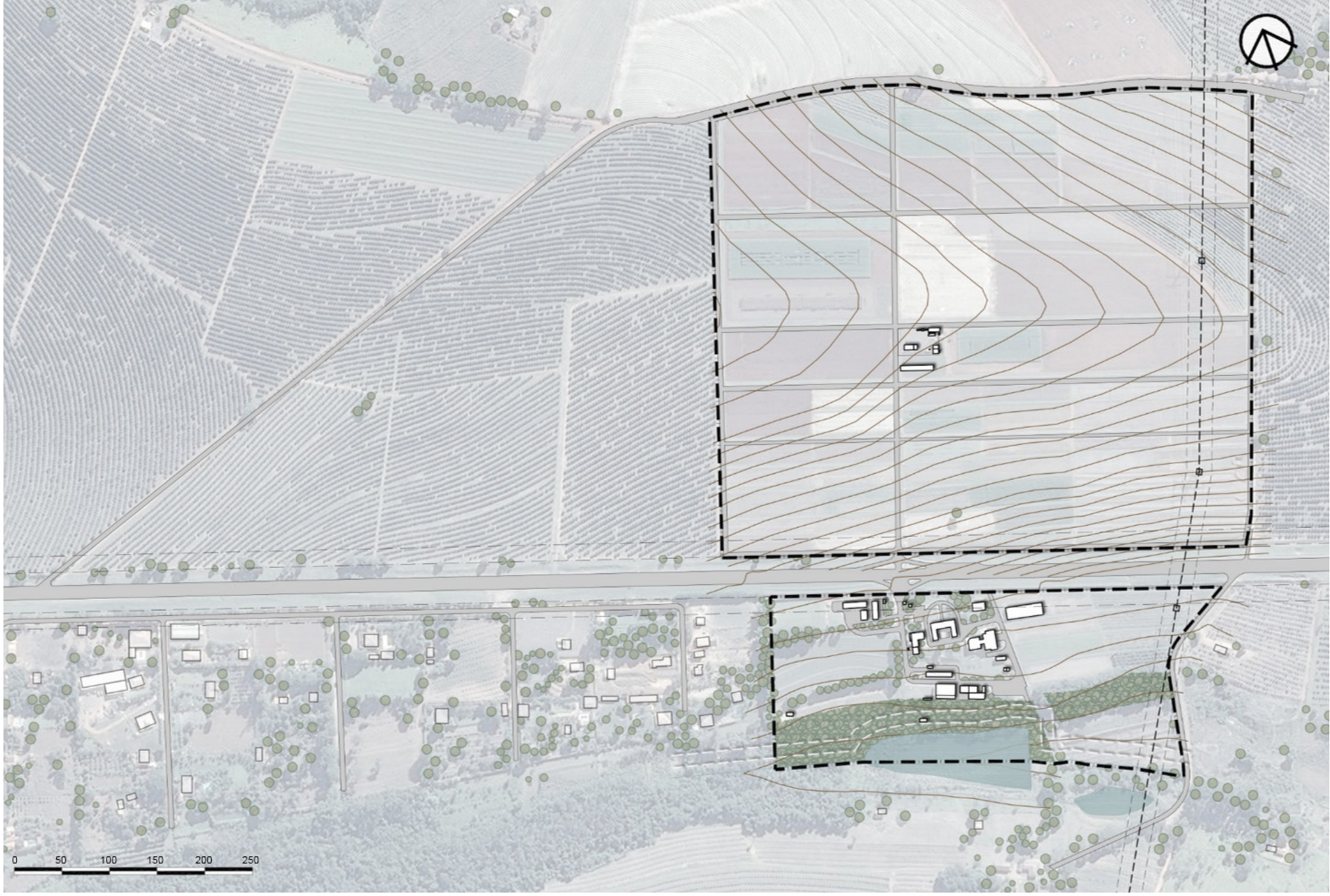
DAS owns a various parcels of land of 48.30 ha zoned urban and rural with existing structures already located on the site. The R&D site is divided in half by State highway SP-147. The Property to the North of the highway (rural) is dedicated to crops and the property to the south of the property (urban & rural) is where most of the building facilities are located. The types of facilities on the site can be summarized as follows:

NORTH PROPERTY

- Irrigation Equipment Storage Building
- Diesel Tank Facility
- Operations and Maintenance Yard
- Evaporation Bay
- Fertilizers and Herbicides storage
- Shadehouse

SOUTH PROPERTY

- Main Administration Building
- Guardhouse/ Gate
- Cafeteria
- LPG Storage Facility
- Laundry Building
- Fuel Station
- Warehouses
- Agricultural Equipment Storage Buildings
- Technology Transfer Center
- Pump House
- Insects Laboratory
- Storage Buildings
- Barbecue Structure
- Greenhouses
- Shadehouse



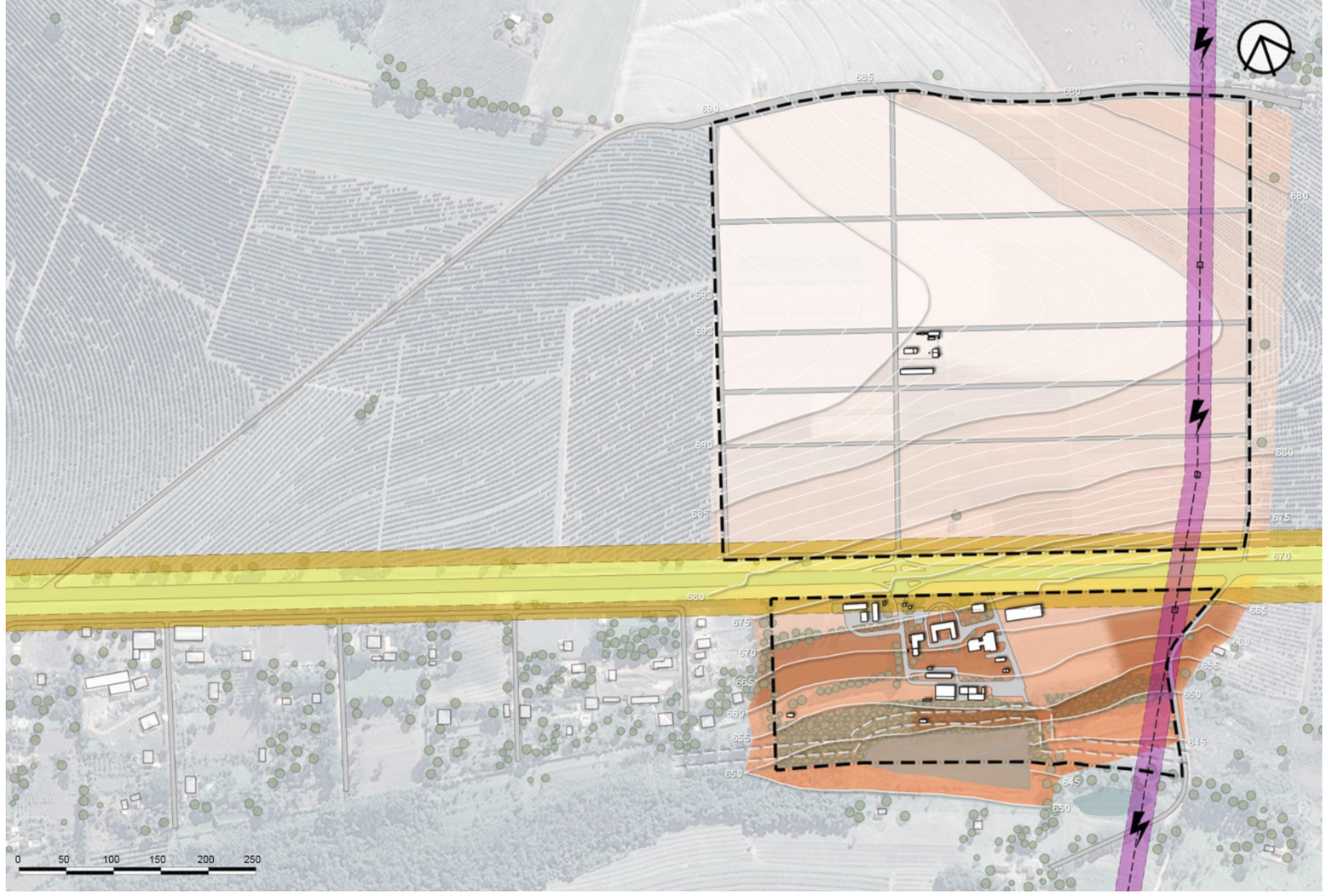
(See Maps 2.2.1 and 2.2.2 for enlarged site plan.)

Map 2.1.1: Existing Site

Legend

- Topography
- Hydrology
- Trees
- Preservation Area
- Site boundary
- Buildings
- Roads
- High-voltage lines
- Hydrology preservation area

In addition to the existing facilities and land, DAS has engaged local adjoining land owners to purchase additional land for R&D crops, which will add 19.45 ha to the Mogi Mirim field station. Such purchases are in advance stages of negotiation and are included as part of this report. The new properties are located to the West of the Northern crop property.



Map 2.1.2: Opportunities & Constraints

Legend

- Topography
- Declivity
- Hydrology
- Trees
- Preservation Area
- Site boundary
- Buildings
- Roads
- High-voltage lines
- Road domain area
- Non aedificandi area
- Hydrology preservation area

Non-Buildable Highway Setback Area

Environmental Protected Area

Topography

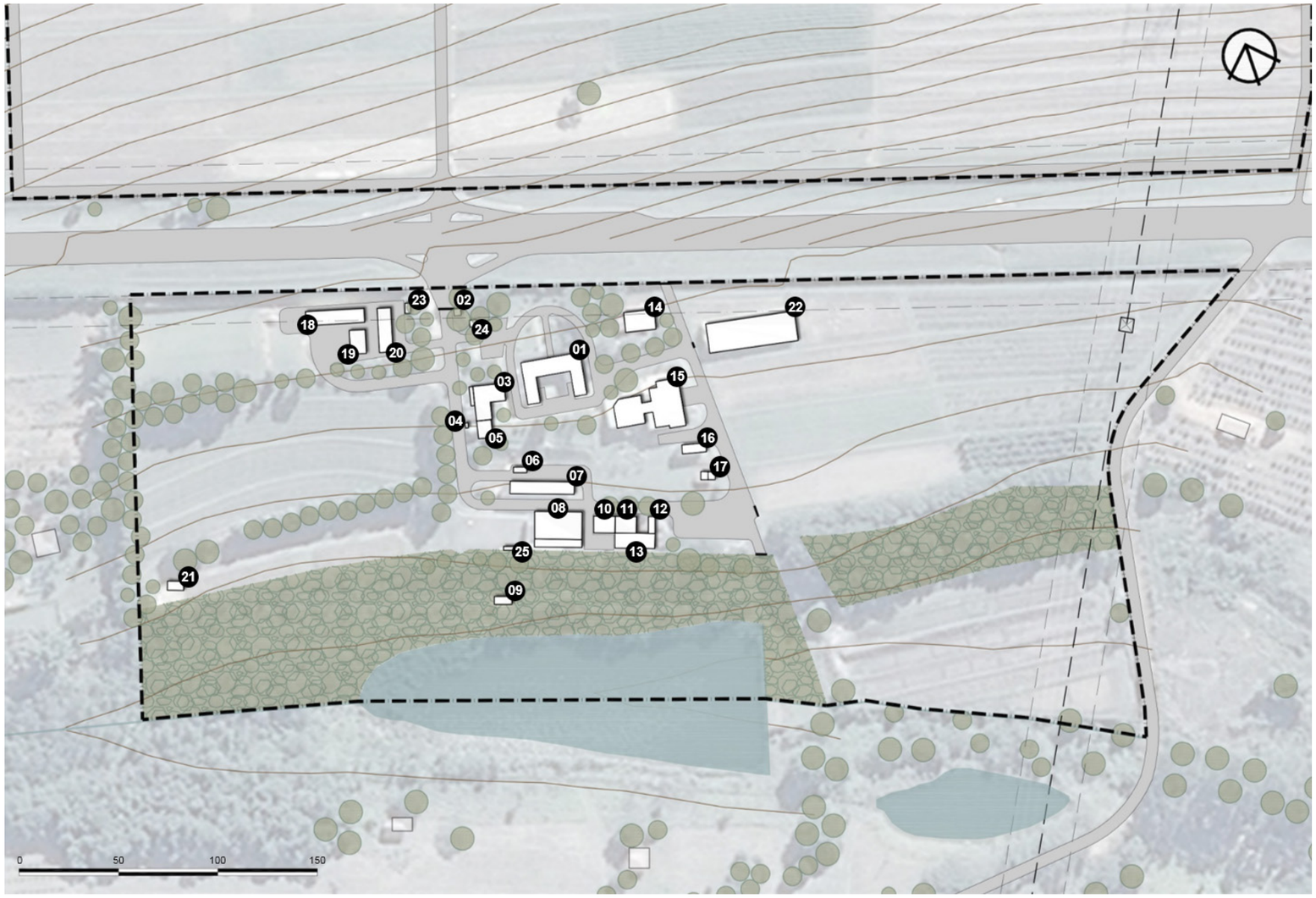
2.2 EXISTING SITE FACILITIES

The existing Mogi Mirim R&D site was an acquired site and not originally built by DAS. Various facilities were constructed by the former owners and most building are constructed utilizing concrete foundation and main structural elements with masonry infill. A few of the structures such as the barbeque area and southern storage building are of concrete foundation and wood frame construction. Overall the facilities are in good to fair condition, with exception of the wood frame buildings which appear to be in poor condition.

Much of the underground infrastructure location and type is unknown. The site administration has little or no information on underground cables and piping location and types of systems. The septic system location is known, however it is not known for what capacity it was designed for.

STRUCTURAL AND ARCHITECTURAL OVERVIEW

Evaluations of existing buildings are qualitative at this stage due to lack of as-built drawings. As a result, provisions for the building's own weight, collateral loads, and expected wind forces are not known. The rationale is that the existing buildings could be repurposed for new functions with some adaptations. Therefore, the work and cost to improve the existing buildings for new functions needs to be evaluated based on the potential future functions. New loads on the existing structures (insulation and architectural finishes, mechanical and electrical equipment, plumbing and fire protection piping, etc.) may be limited by available capacities and should be considered. It is assumed that the building's foundations contain adequate systems to support major renovations; however this should be further evaluated.

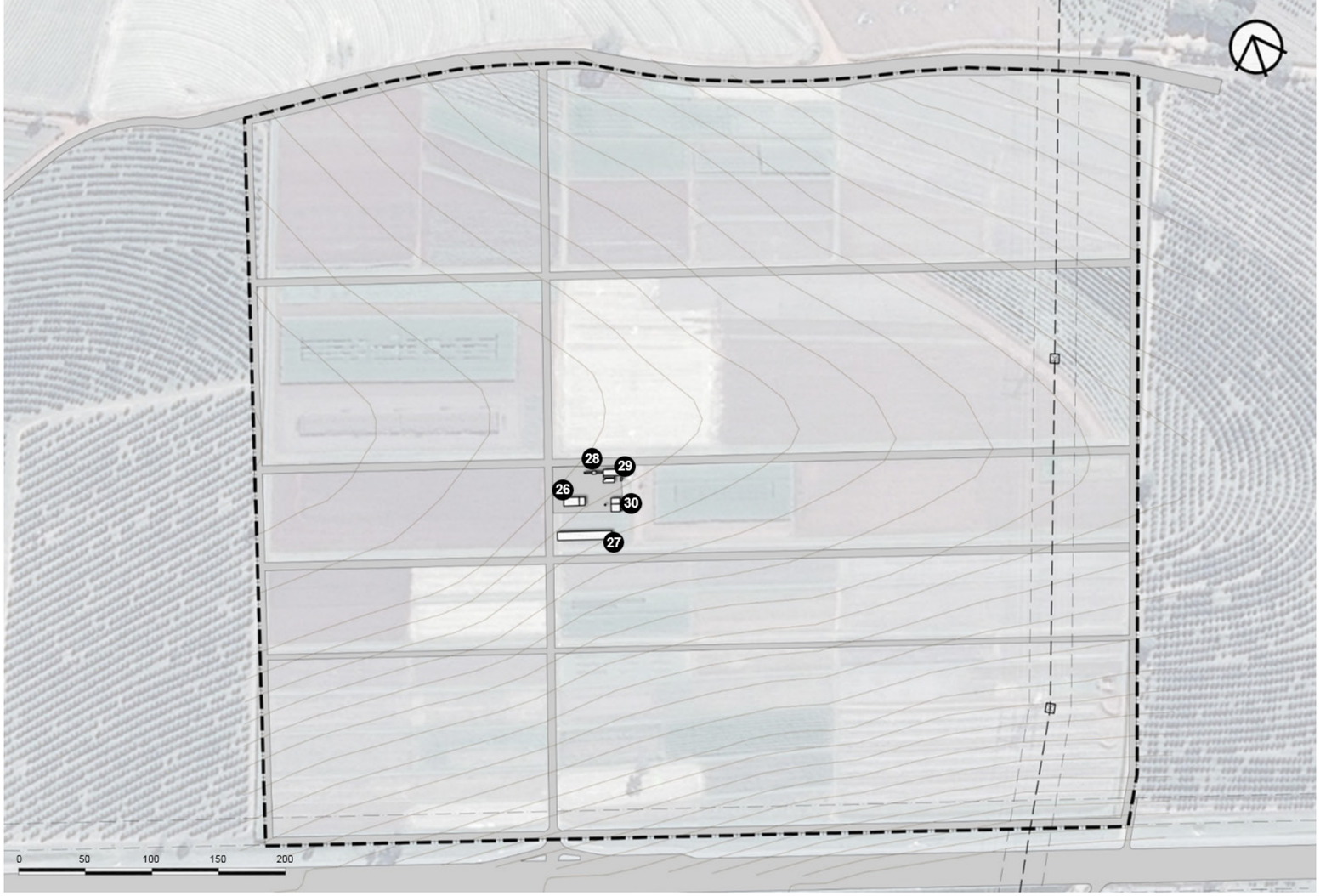


Mapa 2.2.1: Existing Buildings South

Legend

- Topography
- Hydrology
- Trees
- Preservation Area
- Site boundary
- Buildings
- Roads
- High-voltage lines
- Hydrology preservation area

01 Main building
02 Guard house
03 Cafeteria
04 LPG storage
05 Laundry
06 Fuel station
07 Warehouse 1
08 Warehouse 2
09 Pump house
10 Parking lot coverage
11 Insects laboratory
12 Plantation support
13 Plantation support
14 Barbecue area
15 TTC
16 Lab support
17 Harzardous materials storage
18 Warehouse 3
19 Greenhouse 1
20 Greenhouse 2
21 Plantation support
22 Shadehouse 1
23 Reservoir 1
24 Reservoir 2
25 Septic tank



Mapa 2.2.2:
Existing Buildings North

Legend

- Topography
- Hydrology
- Trees
- Preservation Area
- Site boundary
- Buildings
- Roads
- High-voltage lines
- Hydrology preservation area

26 Warehouse
27 Shadehouse 2
28 Drying Tank
29 Laboratory
30 Fuel Station

Shadehouse 1 (#20)

Greenhouse 2 (#23)

Warehouse 3 (#21)

Greenhouse 1 (#22)t

Cafeteria (#4)

Laundry (#6)

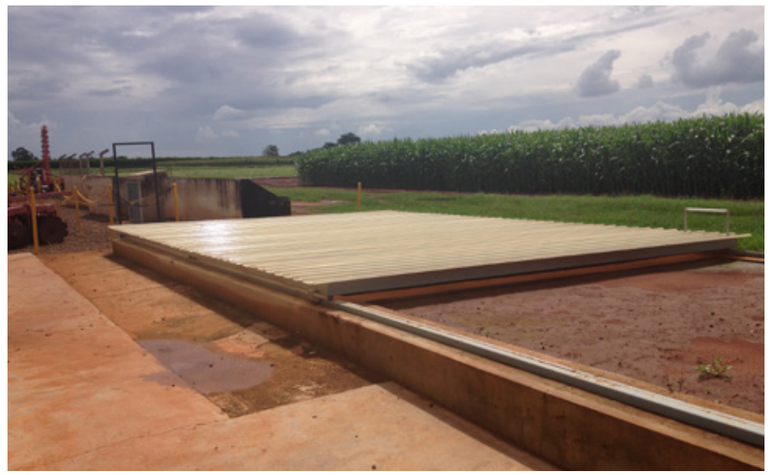
Parking Coverage (#12)

Warehouse 2 (#8)

TCC - Technology Transfer Center (#17)

Guardhouse (#2)

Warehouse 3 (#21)



Drying tank (#28)

Soccer pitch

Harzardous material storage (#19)

Irrigation pump house (#11)

Field equipment storage (#25)

Fuel Station - South Site (#7)

Water tank to be deactivated (#3)

Warehouse 4 (#26)

Chemicals Storage & Laboratory (#29)

Shadehouse 2 (#27)

Main building (#1)

Barbecue Area (#16)

Field equipment storage (#15)

Insects Laboratory (#13)

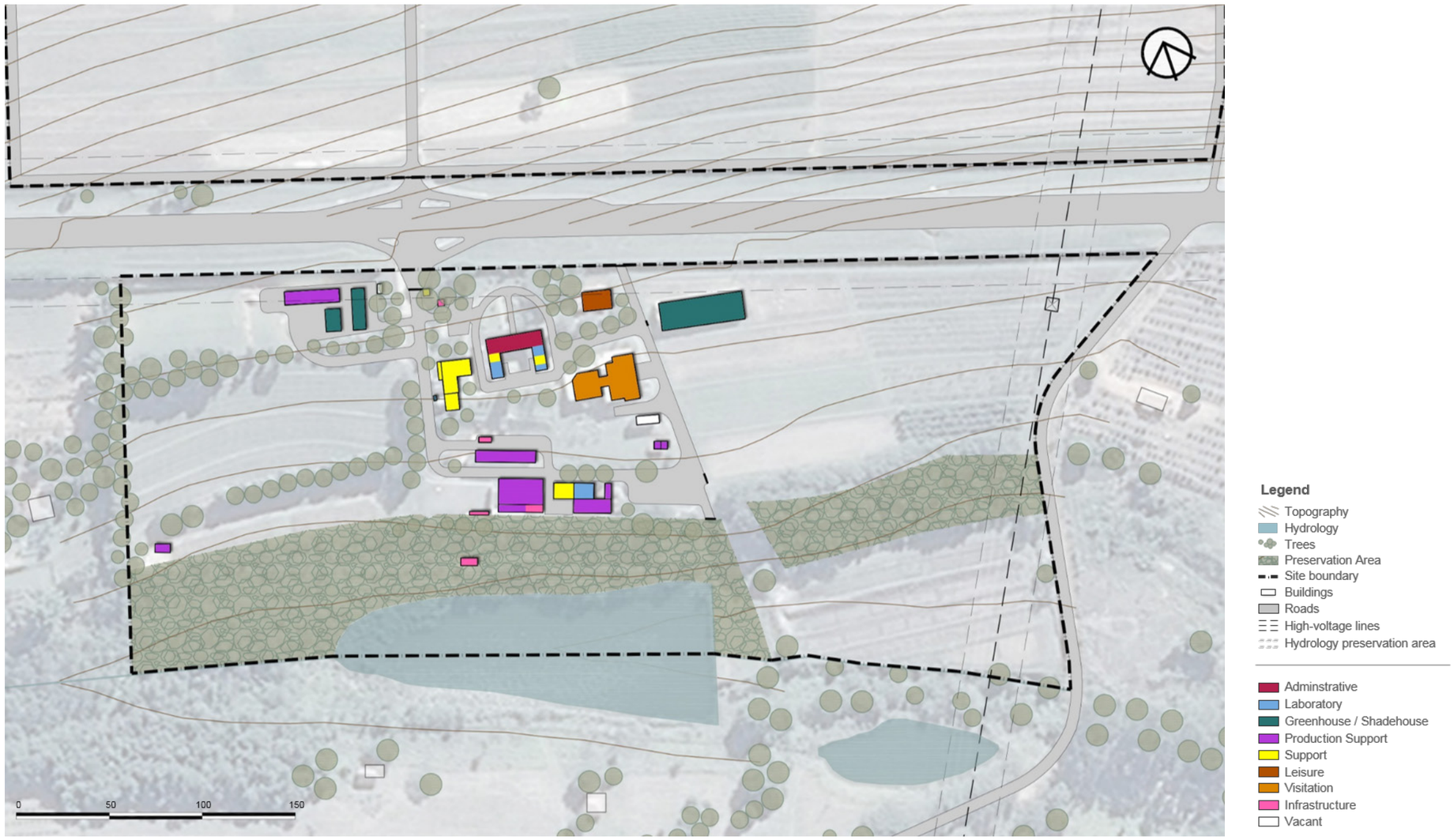
General Storage (#14)

Warehouse 1 (#9)

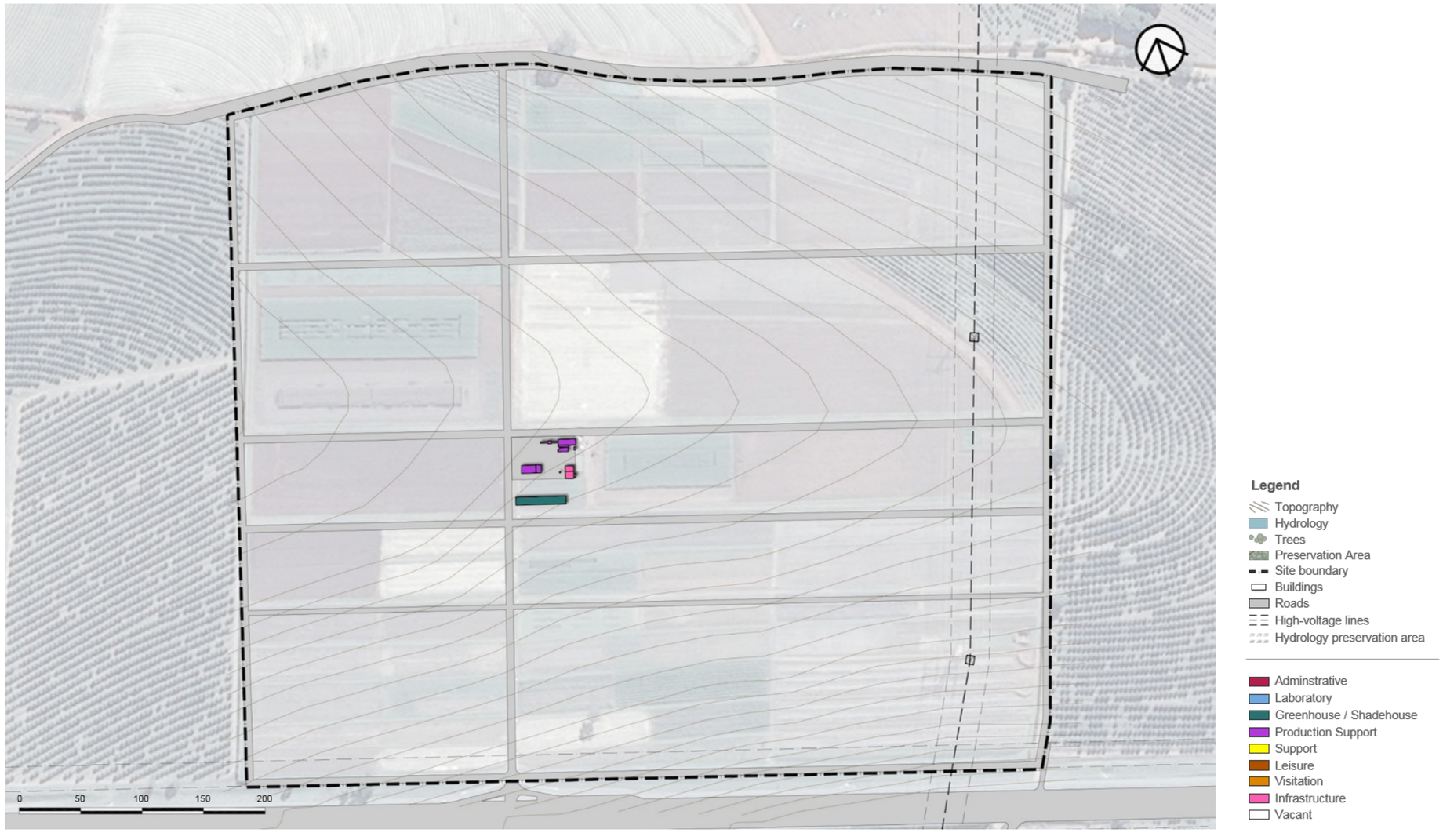
Septic tank (#10)

Septic tank

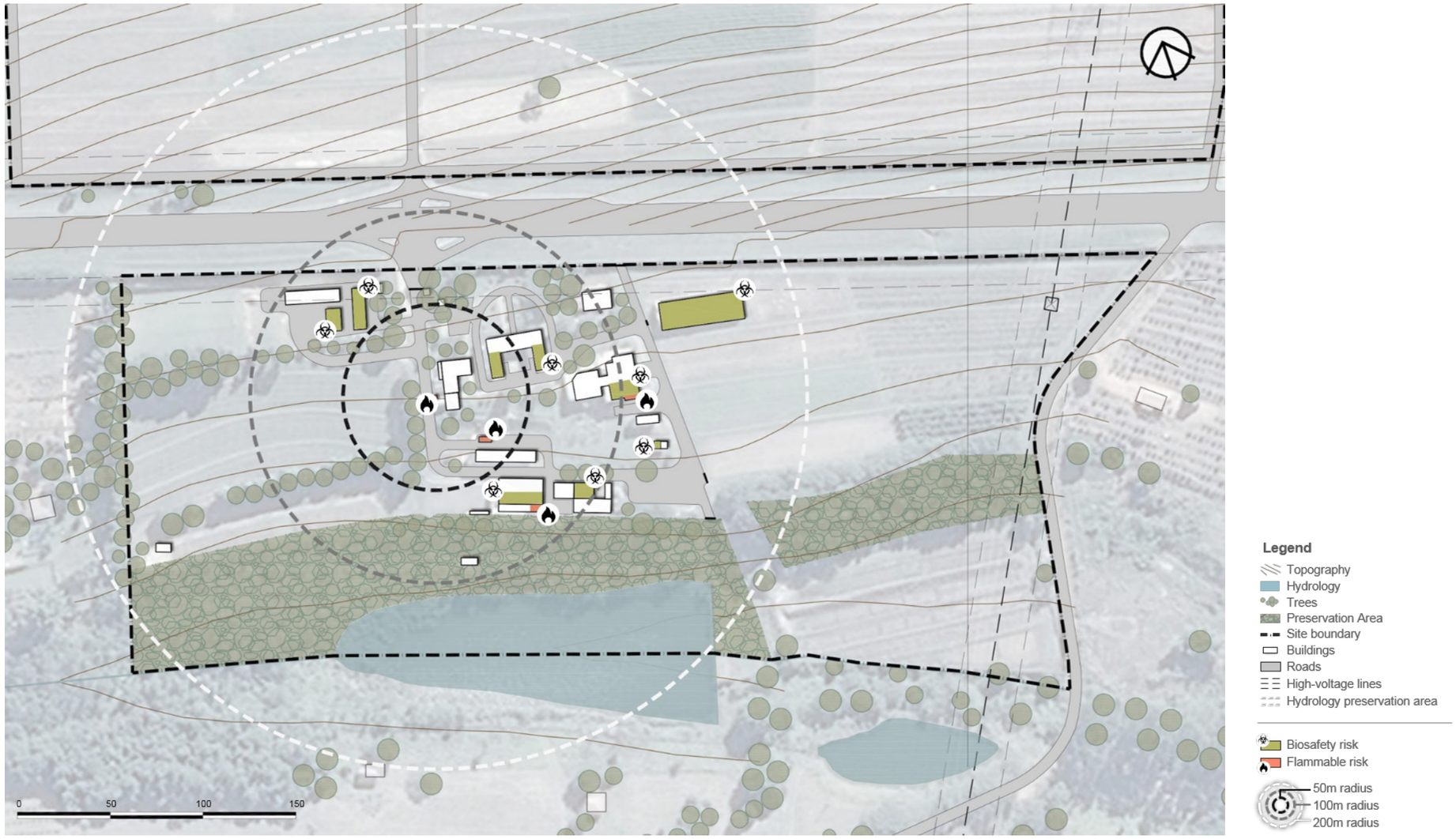
Water tanks (#24)



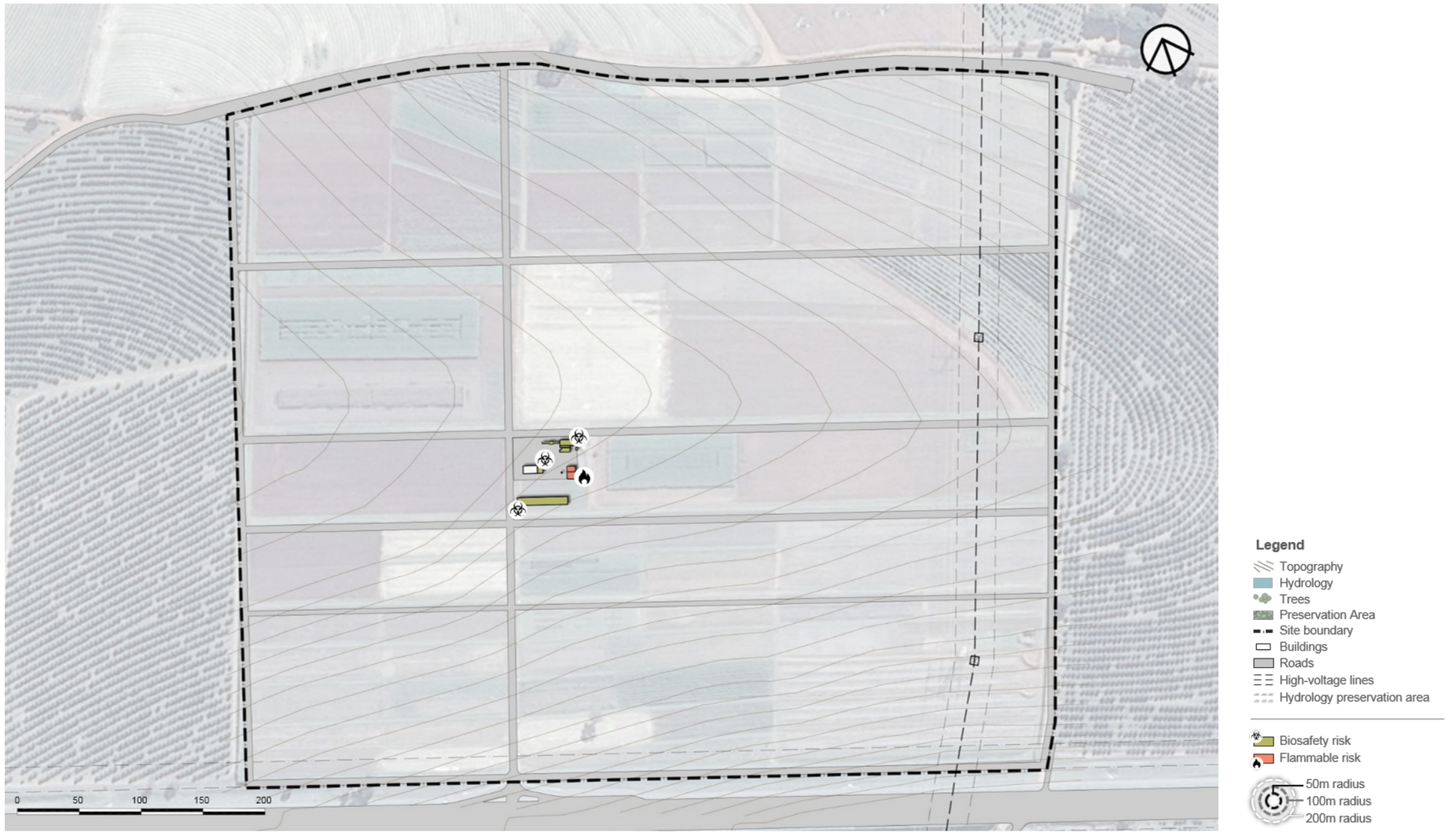
Mapa 2.2.3: Existing Land Uses South



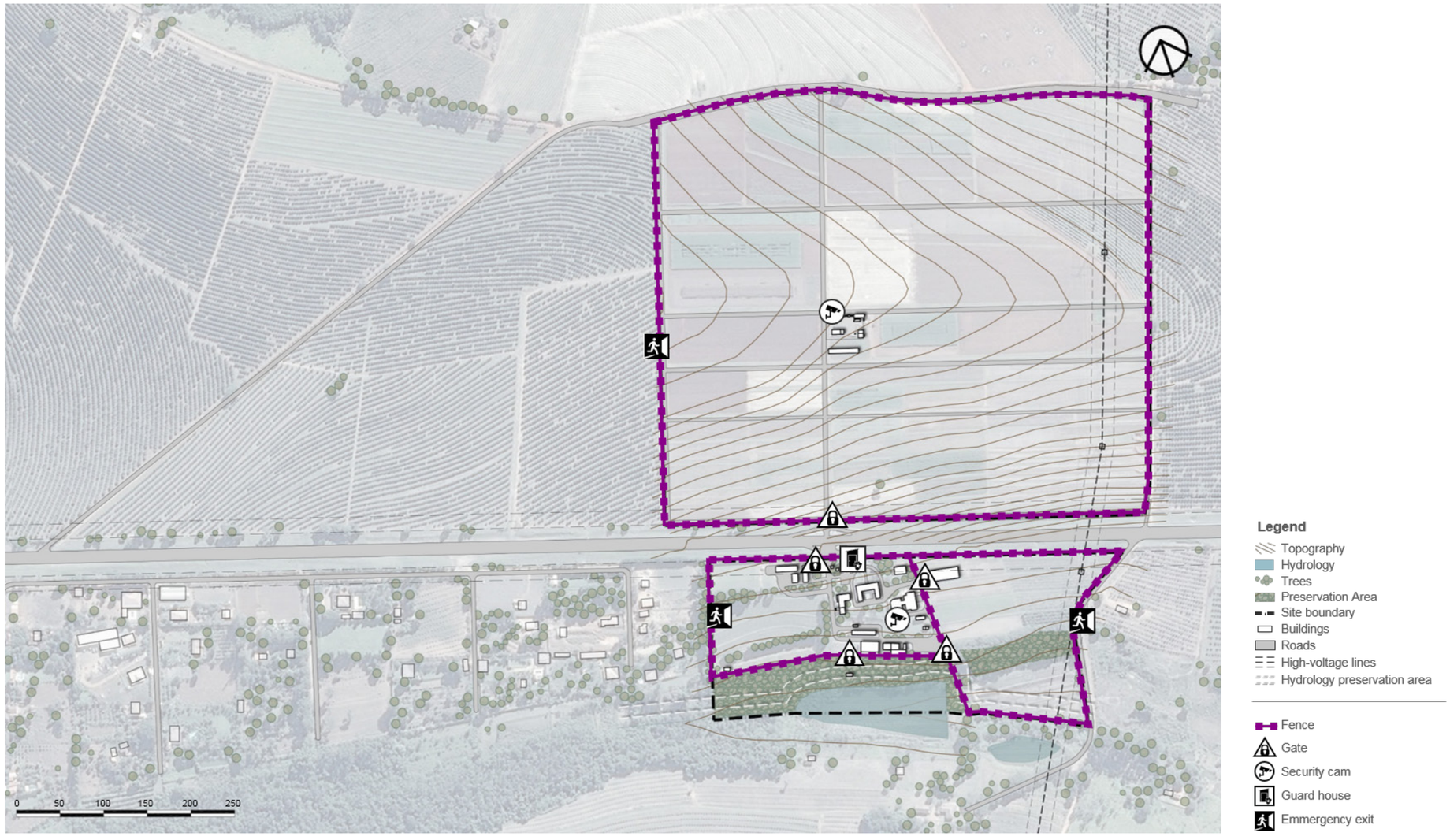
Mapa 2.2.4: Existing Land Uses North



Mapa 2.2.5: Existing Risks Land South



Mapa 2.2.6: Existing Risks Land North



Map 2.2.7: Existing Site Security

OLD Nº	BUILDINGS (SOUTH SITE)	USE	EXISTING AREA (M²)
1	Main building	Administrative	560
		Chemicals Laboratory	56
		Entomology Laboratory	32
		Fitopatology Laboratory	35
		Support (bath + locker room)	80
2	Guard house	Support	20
3	Water Tank 1	Support	
4	Cafeteria	Support	175
		Support (bath + locker room)	
5	LPG storage	Utilities	2
6	Laundry	Support	60
7	Fuel station	Utilities	
8	Warehouse 2 - equipment	Plantation support	210
9	Warehouse 1 - shop	Plantation & General storage	420
		Pesticide Storage	10
		Cold Storage	25
		Workpieces and tools storage	22
		Utilities (generator)	15
10	Septic Tank	Utilities	
11	Irrigation Pump house	Utilities	22
12	Parking Lot Coverage	Support	45
13	Insects Laboratory	Laboratory	95
14	Storage	Plantation support	150
15	Field tool storage	Plantation support	35
16	Barbecue Area	Leisure	155
17	TTC	Visitation/R&D	811
18	Vacant	Vacant	55
19	Harzadous material storage	Plantation support	30
20	Shadehouse 1	Greenhouse/ Shadehouse	650
21	Warehouse 3 - equipment storage	Plantation support	150
22	Greenhouse 1	Greenhouse/ Shadehouse	100
23	Greenhouse 2	Greenhouse/ Shadehouse	140
24	Water Tank 2	Support	
25	Rice storage shed	Plantation support	5
	SUBTOTAL		**4.165**

Nº	BUILDINGS (NORTH SITE)	USE	EXISTING AREA (M²)
26	Warehouse 4 - equipment	Plantation support	100
27	Shadehouse 2	Greenhouse/ Shadehouse	260
28	Drying Tank	Plantation support	20
29	Chemicals storage	Plantation support	110
30	Fuel station	Utilities	75
	SUBTOTAL		**565**
	TOTAL (M2 BUILT UP AREA)		**4.730**

Table 2.2.1 Existing Facilities

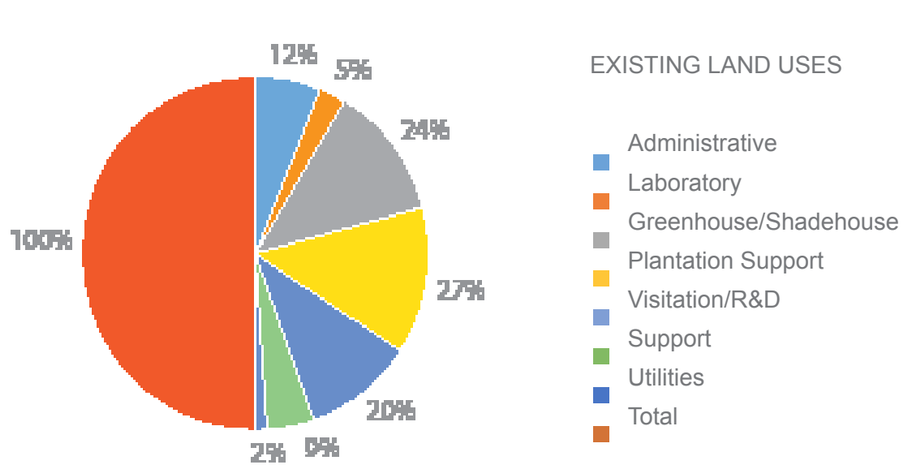


Figure 2.2.1 Existing Land Uses

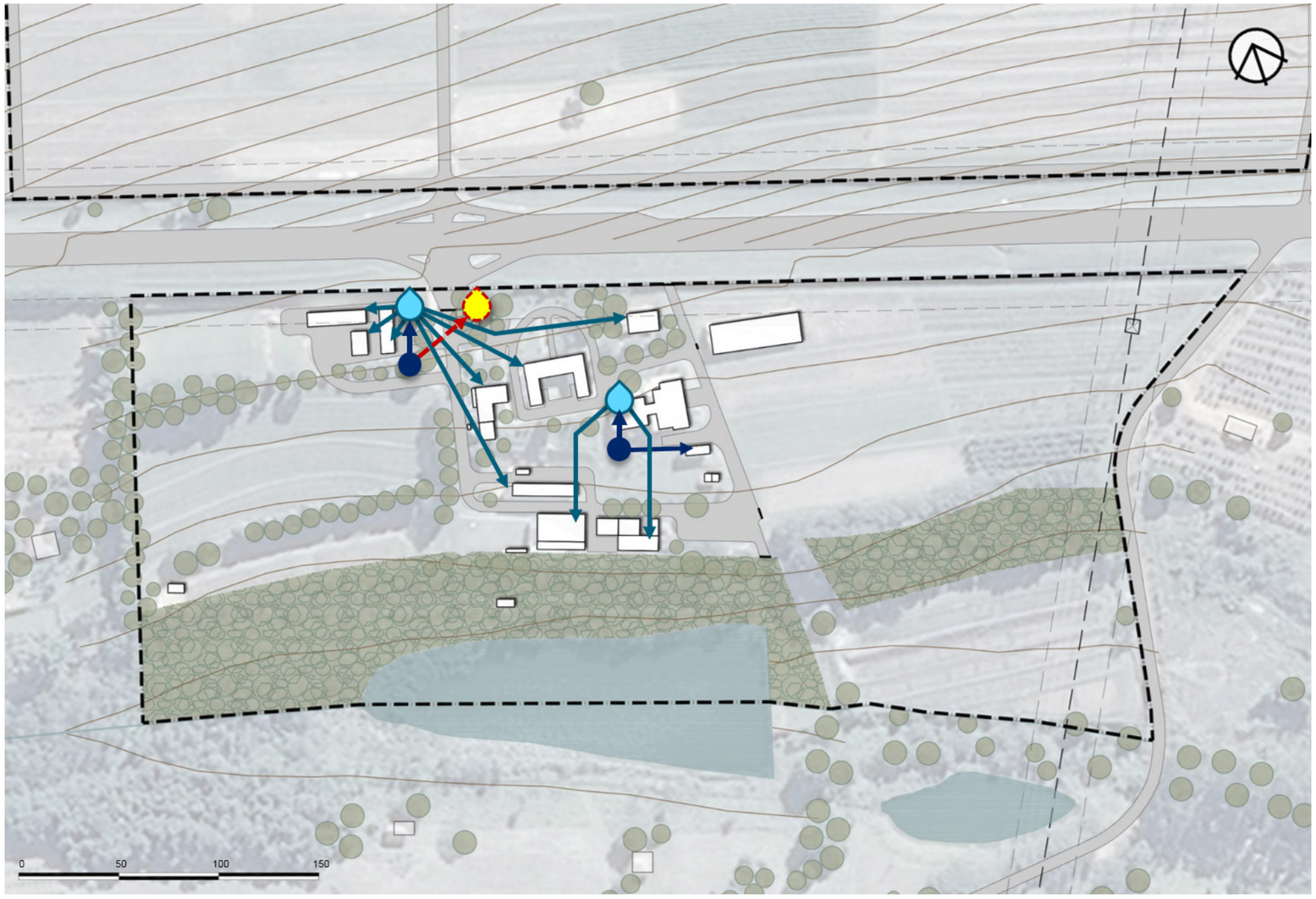
2.3 SITE UTILITIES

A site visit in March 2015 was conducted by the design team to visually inspect current conditions. Additionally a site survey was provided by DAS as part of the documents and direct inquiries during the workshop with the local utilities were all used to document existing site opportunities and constraints.

2.3.1 DOMESTIC WATER

The North side has no domestic water system, the water used in this side is pumped from the water reservoir/lagoon directly with no treatment.

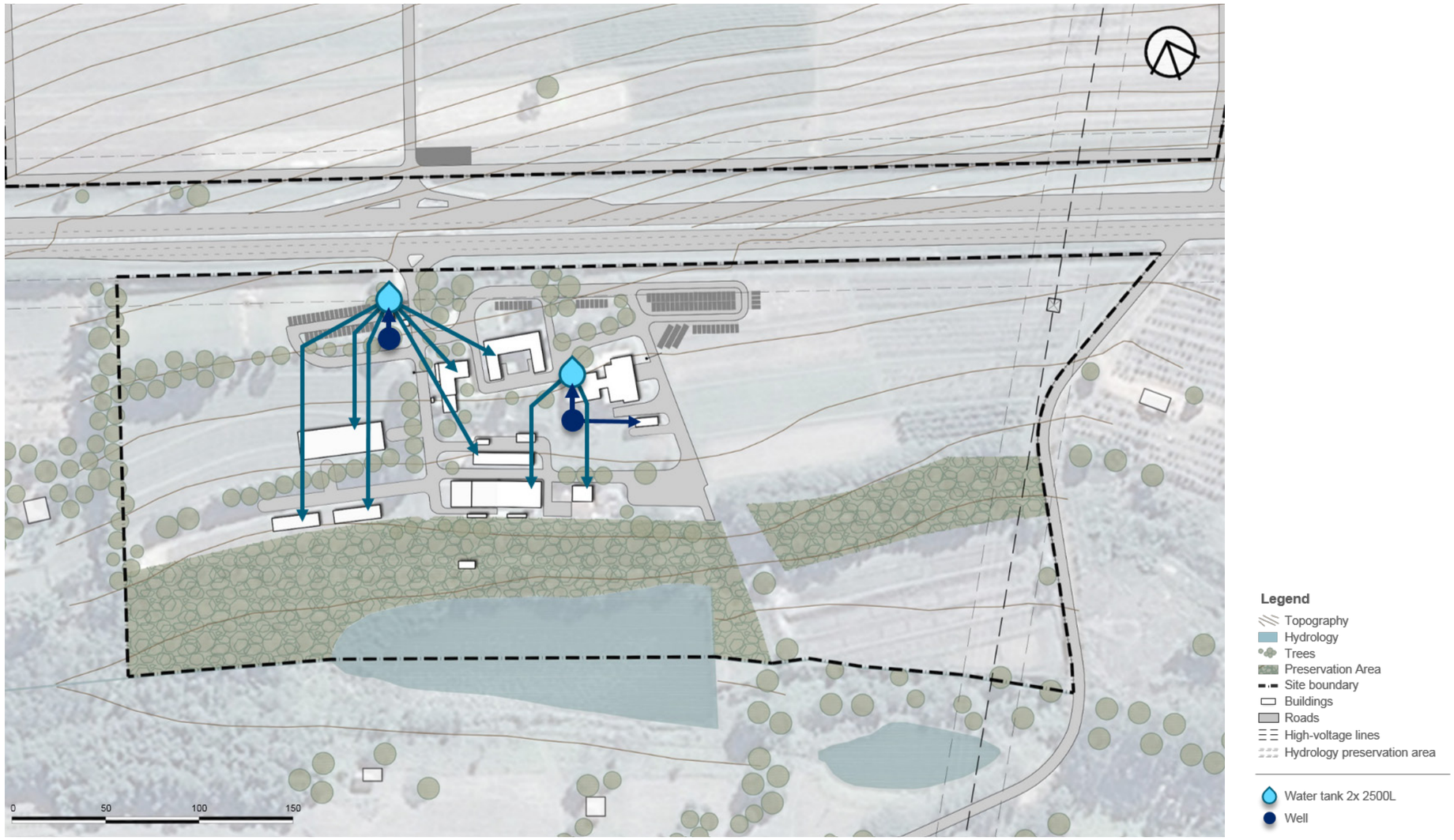
The South side is served by domestic water system that is comprised by 2 water wells: Station Well with 1.200m³/h that serves the Guard house, Greenhouses 1&2, Cafeteria, Administrative Building, and Laboratories, Laundry and Barbecue area and TTC well with 4m³/h serves the TTC building, Insect Lab, and Equipment Shop Warehouse. Both are connected to a pre-filtering and filter system and coloration treatment and the water is pumped to the water tanks located near the entrance and on the roof of the Tech transfer building. The concrete water tower will be decommissioned and demolished. New ground level tanks are in place and the usage demand will determine if more tanks are necessary. There is an existing pipeline running along the site, with distribution for the existing facilities. According to the survey, the exactly conditions and the location of the lines are not known at this time. The supply system can be validated via visual inspection. However, it is recommended that these be tested onsite to verify the system conditions.



Map 2.3.1.: Domestic Water

Legend

- Topography
- Hydrology
- Trees
- Preservation Area
- Site boundary
- Buildings
- Roads
- High-voltage lines
- Hydrology preservation area
- Water tank 2x 2500L
- Water tank 18m³ (to be desactvated)
- Well



Map 2.3.1.: Proposal Domestic Water

Water tank to be deactivated (#3)

Well #1

Well #2

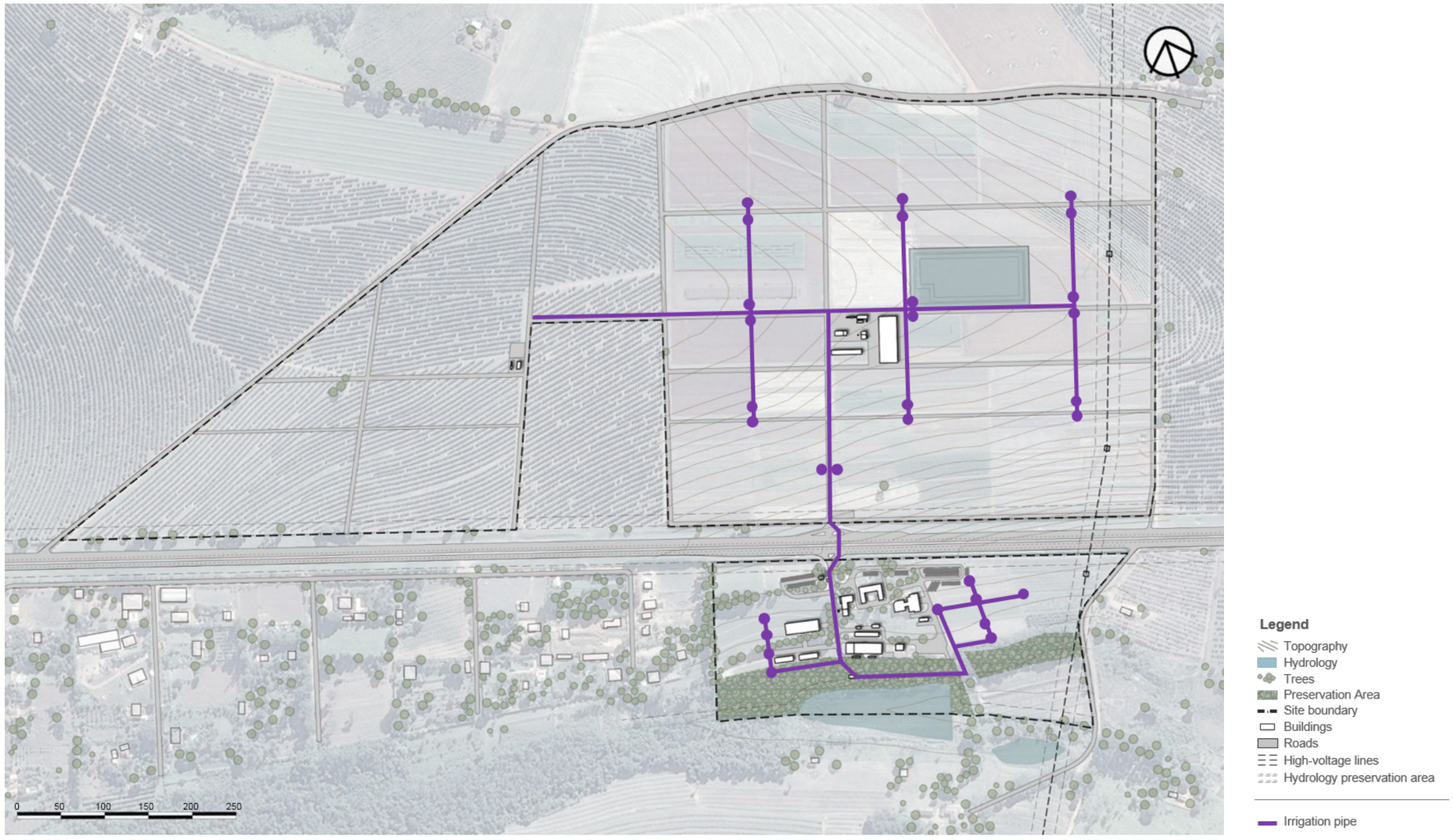
Water Filter

Water tanks (#24)

2.3.2. IRRIGATION SYSTEM

There is an existing irrigation water system with a current water lines supply on site. This lagoon is used to support irrigation for plantation on field and is comprised by electric pumps and pipelines that distributes the water along the property.

Mapa 2.3.2: Irrigation System



Mapa 2.3.2: Proposal Irrigation System

Irrigation pipelines

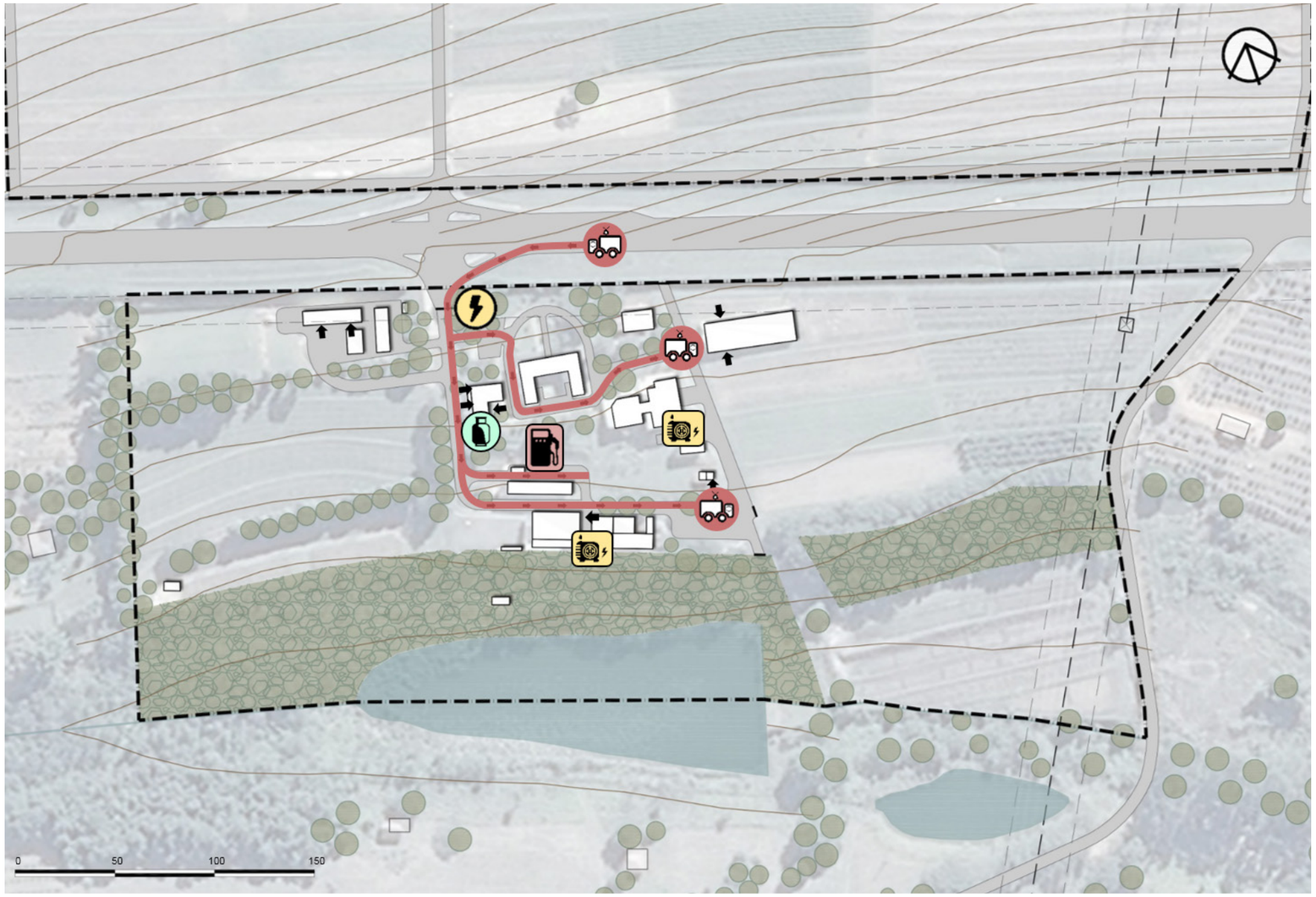
Plantation / Irrigation System

2.3.3 FIRE PROTECTION

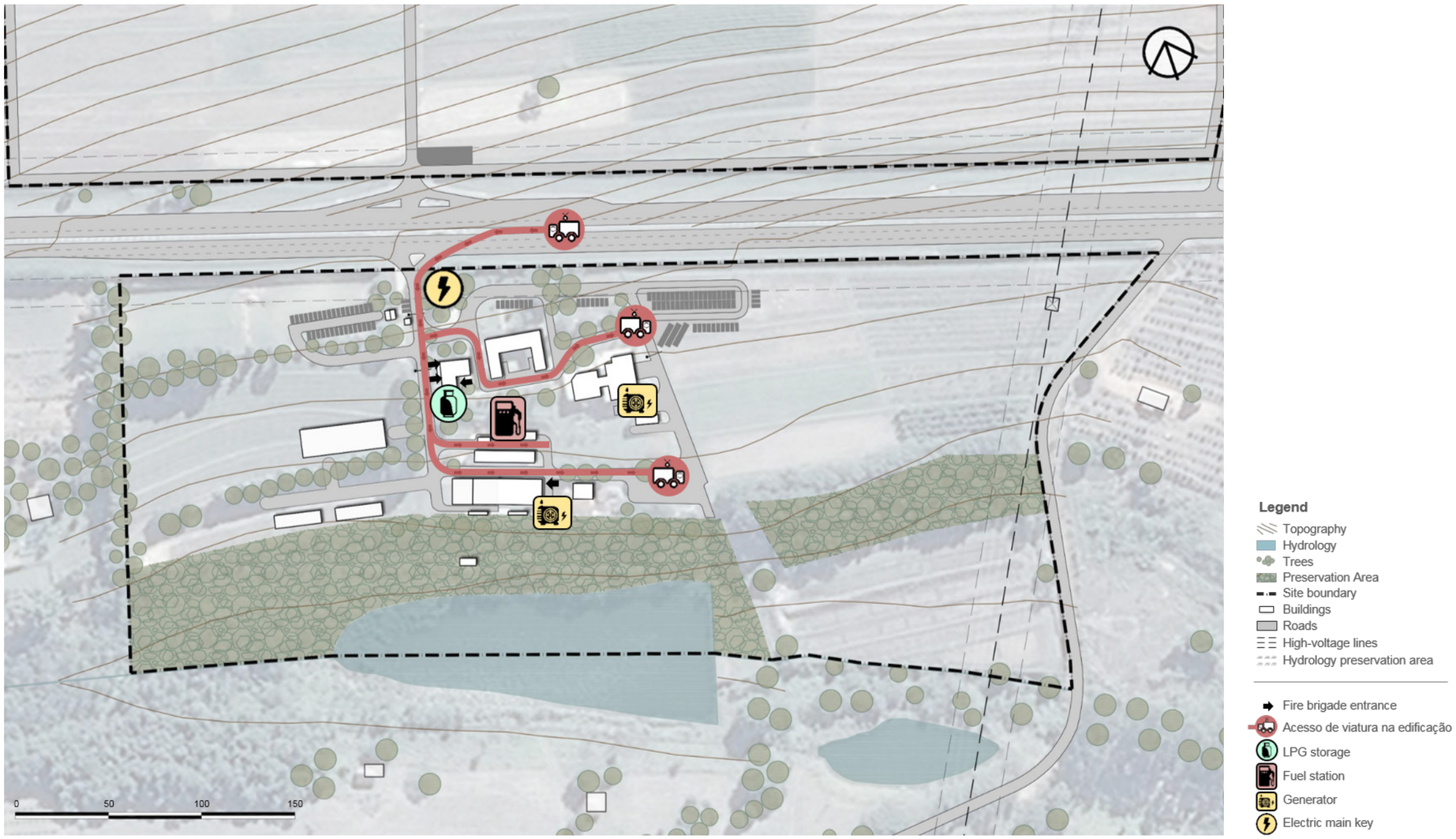
North side - None of the existing structures on north side have a fire protection system in place except for fire extinguishers. Based on the code analysis completed for this site, it was determined that fire sprinkler coverage is not required as long the buildings have less than 2.000m² of area but will also depend in the use of the building. All buildings with more than 750m² need a hydrant system and for that a water tank or reservoir is needed. The new Irrigation pound can be used to provide water for the Fire Hydrants.

In the south side a fire combat system is in place and hydrants are placed to cover existing buildings. The Tech Transfer Center building has a sprinkler system with pumps and water tank under the building.

If more buildings will be built on the site the hydrants system will need to be revised.



Map 2.3.3: Fire Protection



Map 2.3.3: Proposal Fire Protection

Pumps for the Fire fight system - under the TTC building

Fire Protection Device

2.3.4 STORM DRAINAGE

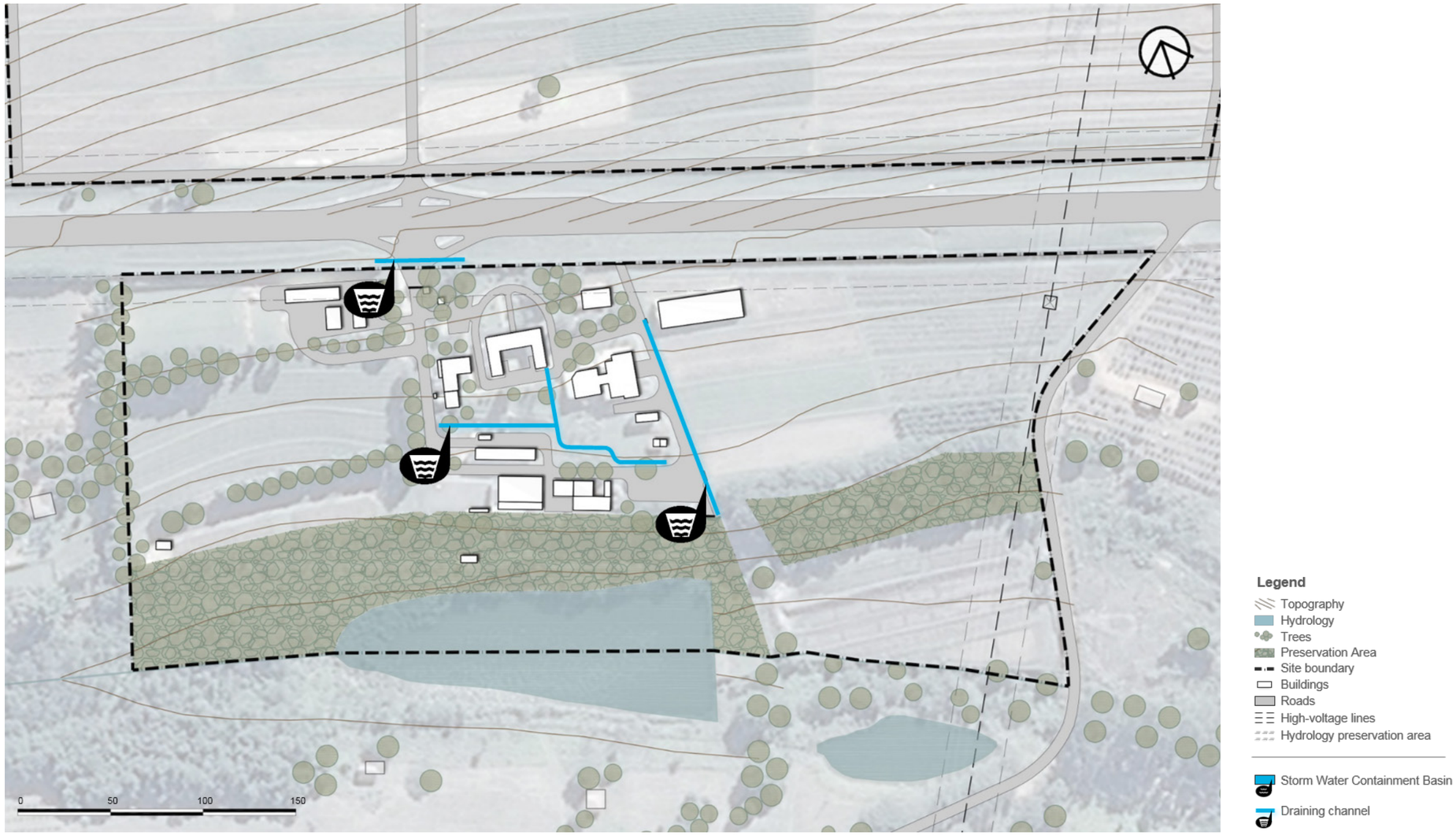
In the north side there is a retaining pond to prevent the municipal road, that runs in the northern border of the property, doesn't get flooded no other existing storm water system was identified. Site drainage appears to drain via overland flow. As analyzed on site, there are no storm water Improvement requirements associated with the proposed construction beyond ensuring that onsite drainage is maintained to the existing discharge point. Storm water detention/ retention is required if impervious area in the UAE utility area is built.

In the South side a drainage system is in place and is comprised of surface concrete channels and underground collection and junction boxes along the internal roads that lead to pipes that run underground to the lower part of the property flowing into the water lagoon.

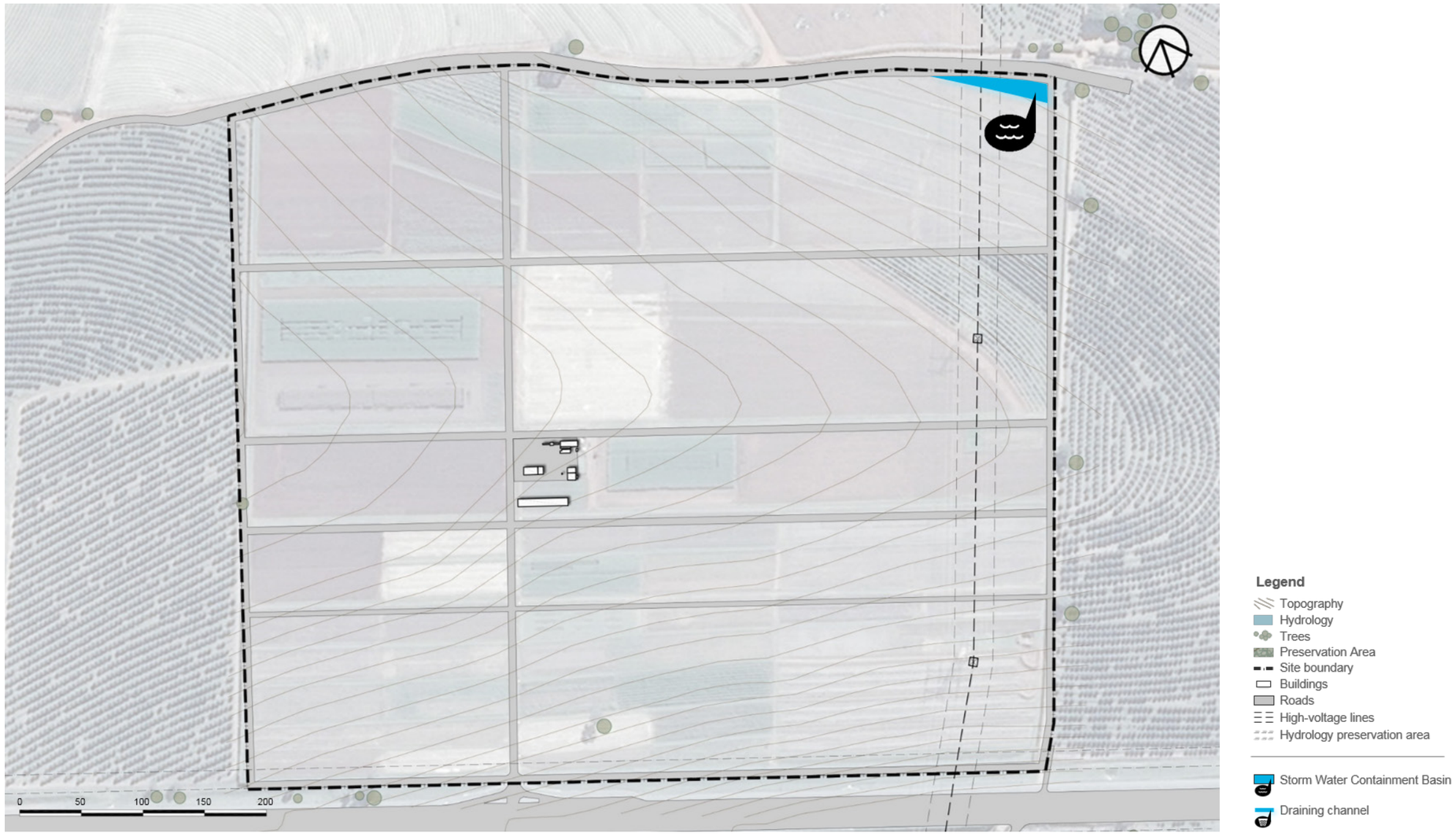
Draining channel

Natural Drainage

Drainage system



Map 2.3.4: Storm Drainage South

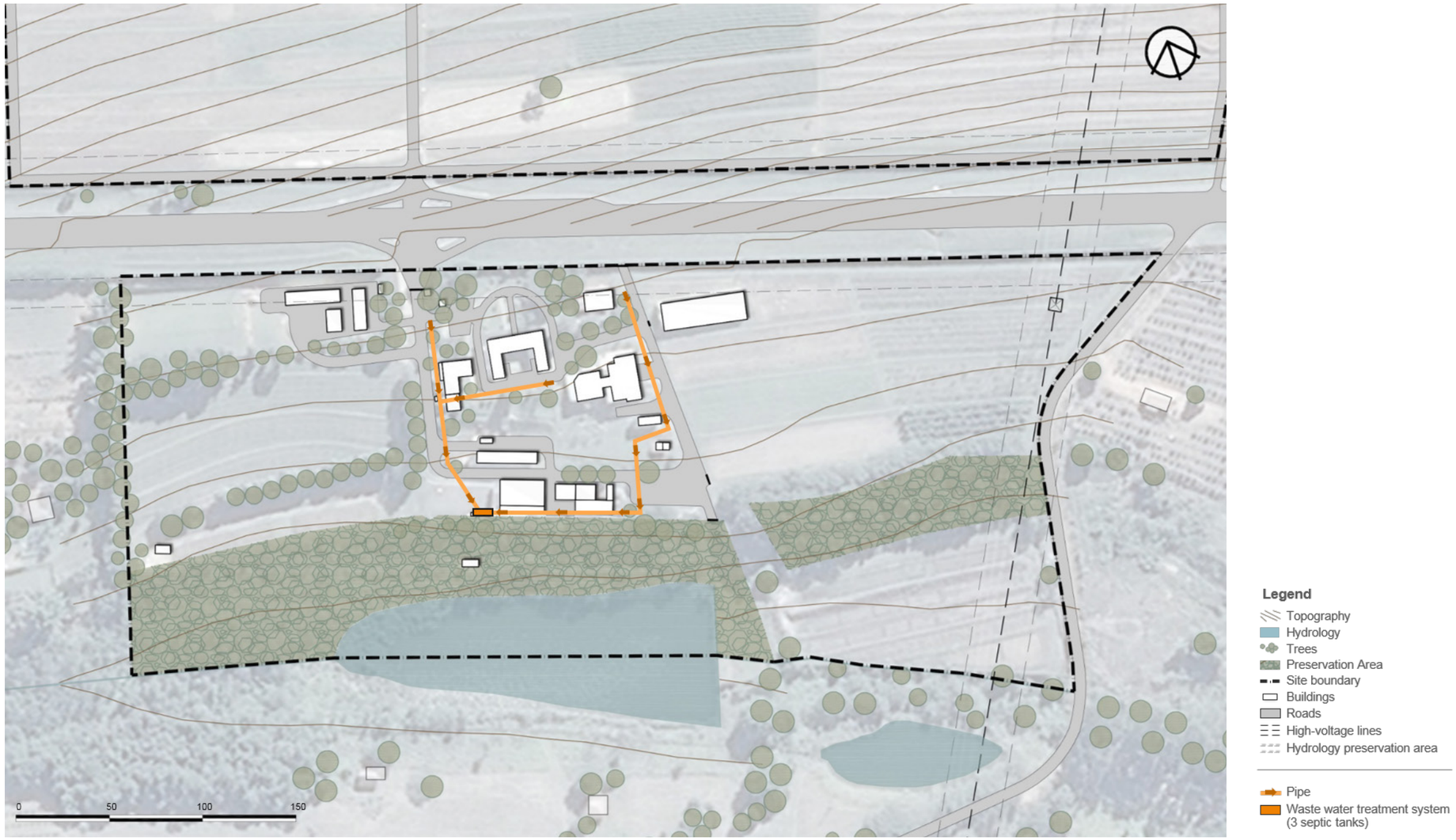


Map 2.3.5: Storm Drainage North

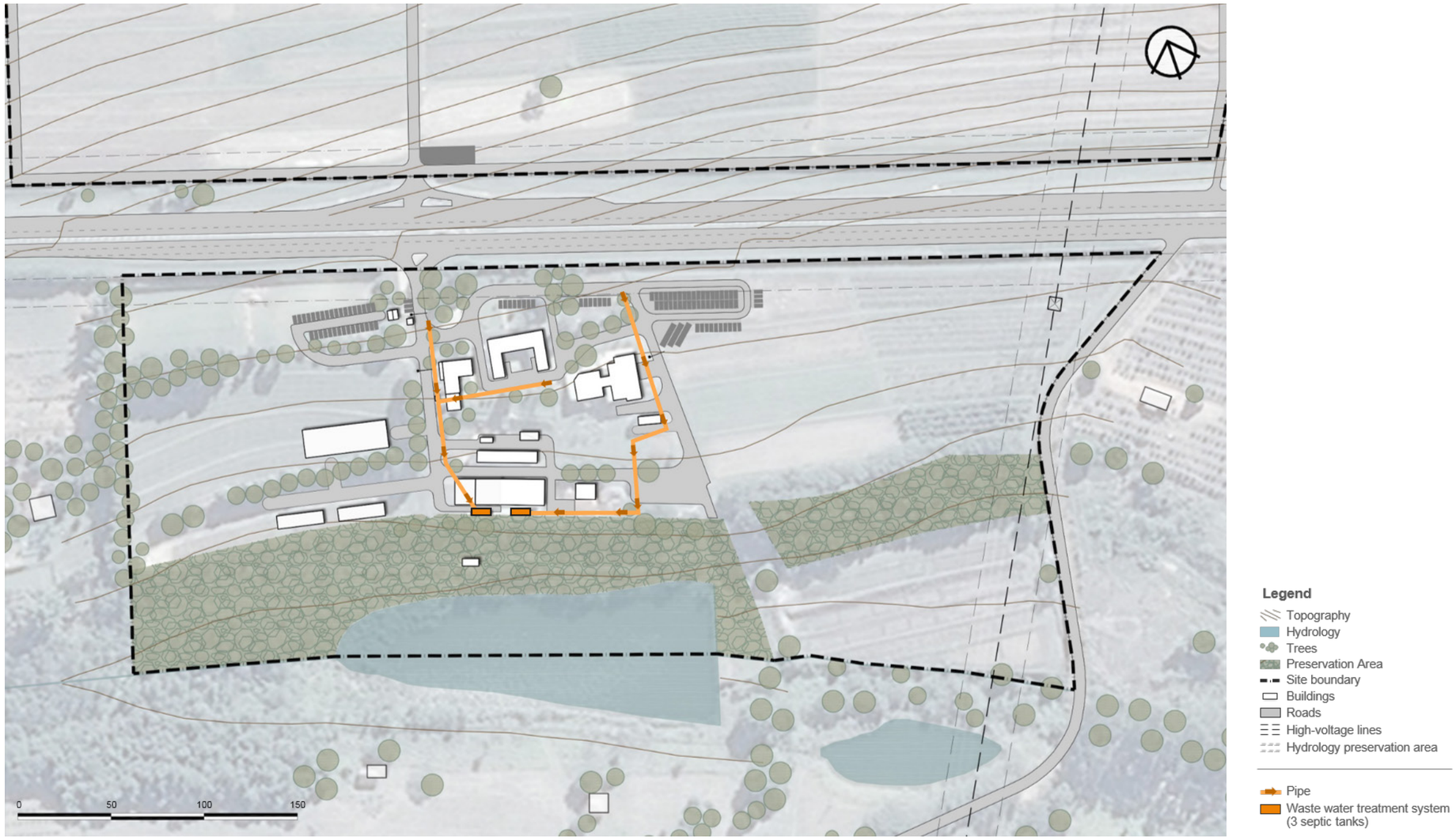
2.3.5 SANITARY - SEPTIC SYSTEM

The present system for the site is a drain field (absorption field). Site sanitary system drains to sumps on-site and to the septic tank prior to the absorption field. There are two septic tanks onsite Septic Tank 1 is 1,50m deep with 1,00m of diameter and Septic Tank 2 is 2,50m deep with 2,00m of diameter .There is no infrastructure provide by the City, County and State. Due to the increased discharges volumes associated with the necessary change of occupancy, it is assumed that the existing system will be undersized. For the purposes of this report it is assumed that a new system will be required to attend the new buildings on both sides.

Septic tank



Map 2.3.6: Sewage Treatment



Map 2.3.6: Proposal Sewage Treatment

2.3.6 WASTE WATER SYSTEM

In the north side no existing waste water system was identified. Site waste water / liquid waste is collected into drums and/or disposed directly to the evaporation chambers in the Utilitiy area (UAE) and the solid remains are burned or disposed properly.

In the South side a waste water system is in place collecting the waste water from the Chemical lab to a tank system that is cleaned twice a year by a specialized firm which disposes the waste water properly.

Waste Water System

Solid waste storage

2.3.7 SOLID WASTE

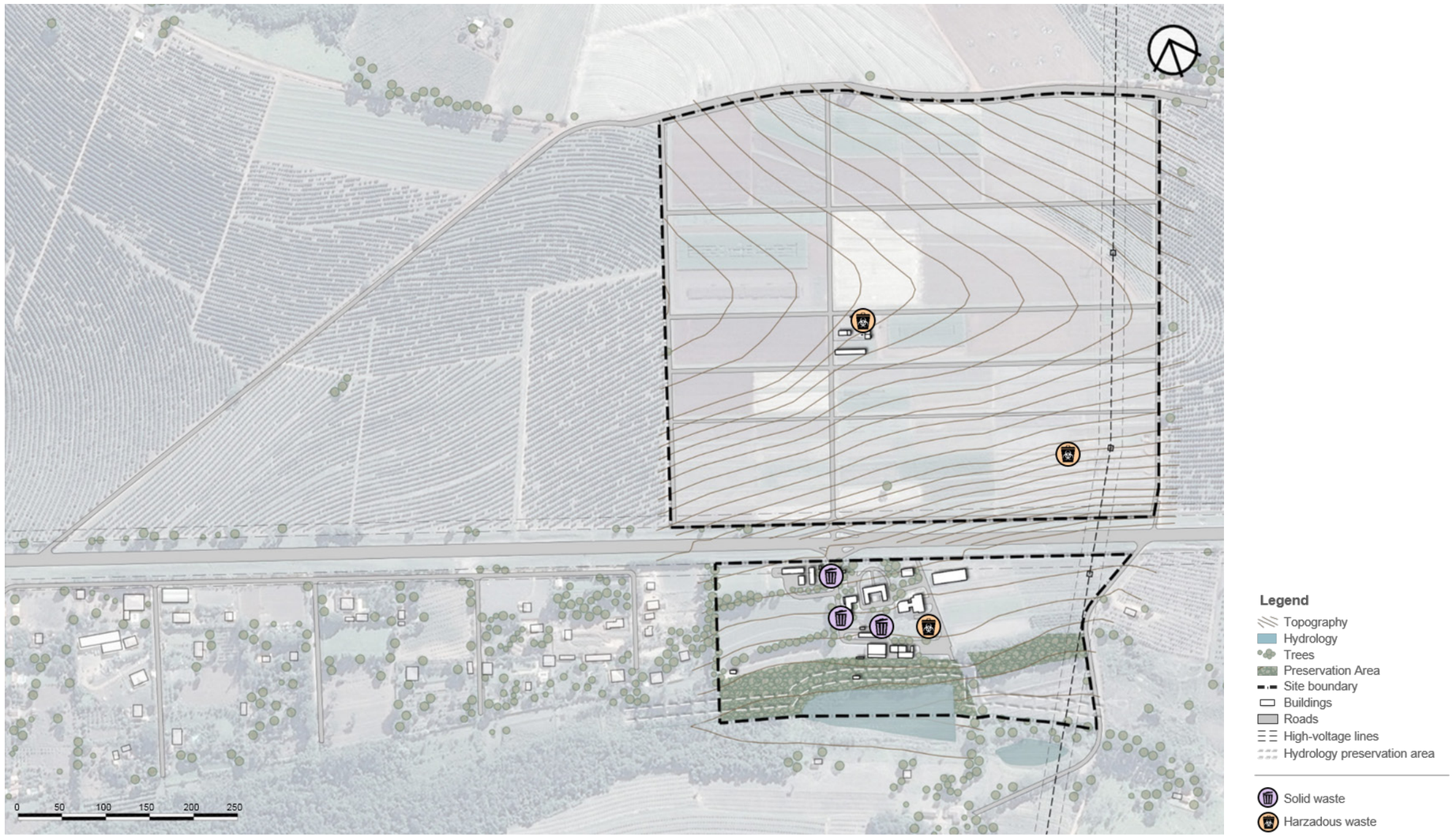
There are two types of solid waste in the site, normal domestic and waste generated in the R&D activities (regulated).

For the domestic waste the site has two solid waste area in the South side, one external next to the gate house and other close to the cafeteria kitchen and the municipal service collects the solid waste weekly,

For the regulated waste the site has an incinerator (in the UAE) and a ditch in the plantation field.

For the new layout in the south side a solid waste warehouse with separations for different types of solid waste and hazardous waste will be built.

Solid waste



Map 2.3.7: Soliid Waste Storage Location

2.3.8 ELECTRIC SYSTEM

Based on the information received on site and Electrical diagrams provided the electrical system is comprised of:

SOUTH SIDE:

Tree entrances service, from CEMIRIM, that runs in an overhead line:

-TRF 1 with, 13,8 KV, 3 phases, 60 Hz

The primary feed is connected to a power transformer, oil insulated, mounted in concrete pole with 150 Kva (see picture on the right).

In an electrical room, a low voltage panel (QGBT) is installed, which feds the TTC, in 220 V, 3 phases, 60 Hz. A diesel power generator with 210Kva (220V/127V) is connected to the system to provide power to the building and its systems.

TRF 1

TRF 2

- TRF 2 with 13,8 KV, 3 phases, 60 Hz

The primary feed is connected to a power transformer, oil insulated, mounted in concrete pole with 75 Kva.

In an electrical room, a low voltage panel (QGBT) is installed, which feds the Administrative building, Cafeteria, Laundry, Laboratories, Cold Chamber, Equipment Warehouse, Diesel Filling Station, Security System and Gard House, in 220 V, 3 phases, 60 Hz ,

A diesel power generator with150Kva (220V/127V) is connected to the system to provide power to the building and its systems (see picture on the left)

- TRF 3 13,8 KV, 3 phases, 60 Hz

The primary feed is connected to a power transformer, oil insulated, mounted in concrete pole with 150 Kva

In an electrical room, a low voltage panel (QGBT) is installed, which feds the Irrigation pumps, Green Houses and UAE in the north side, in 380 V, 3 phases, 60 Hz , (see picture to the right).

Underground system is used to get infrastructure for the buildings and systems on site.

NORTH SIDE (UAE)

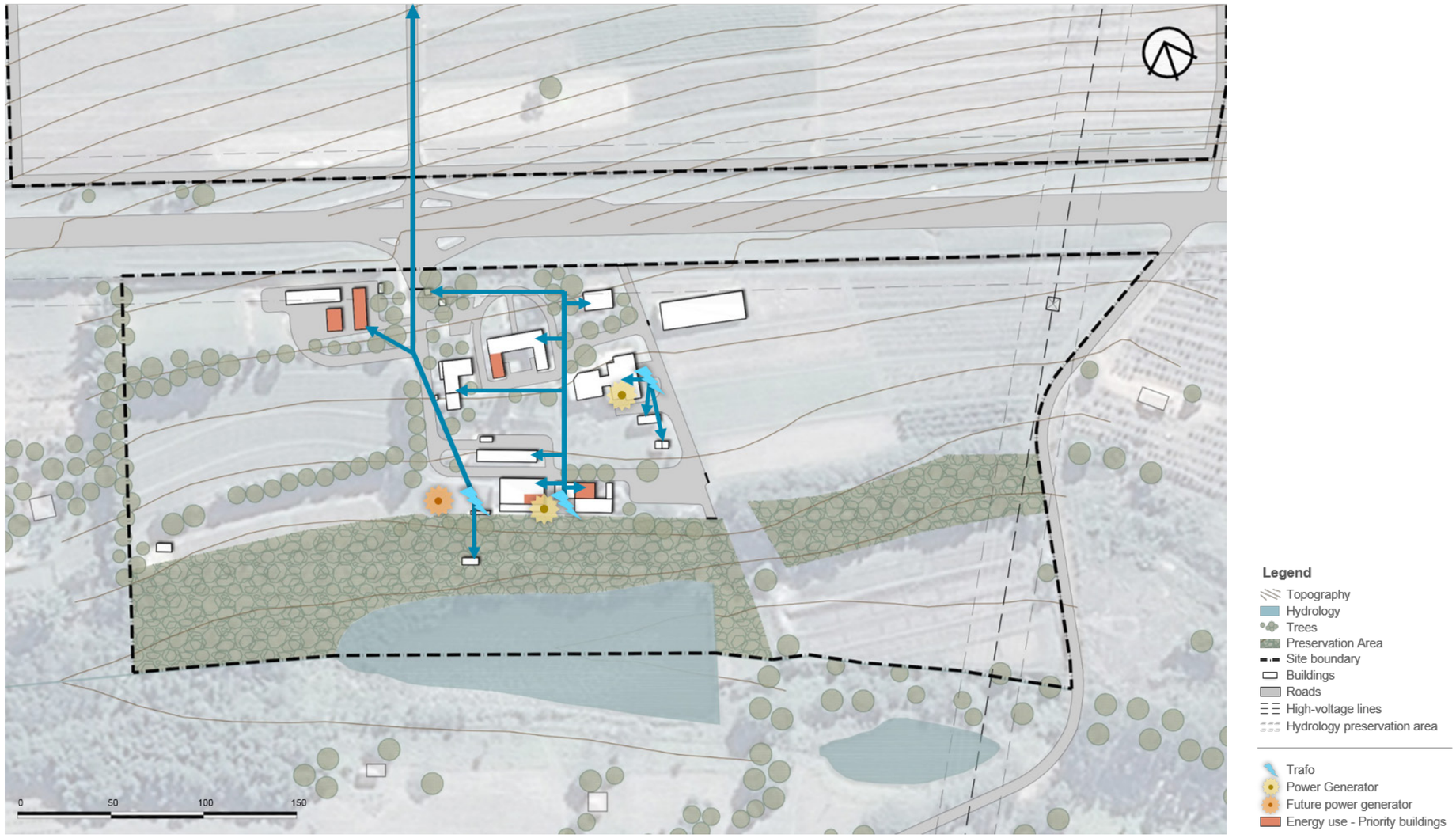
An overhead line crosses the Road (SP147) to the north side and Underground system is used to get infrastructure for the buildings and systems on site (3x35mm² 750V for 330m distance).

In the UAE a 15Kva transformer (with a 35mm² 750V type cables) feeds the buildings and systems with 220V/110V.

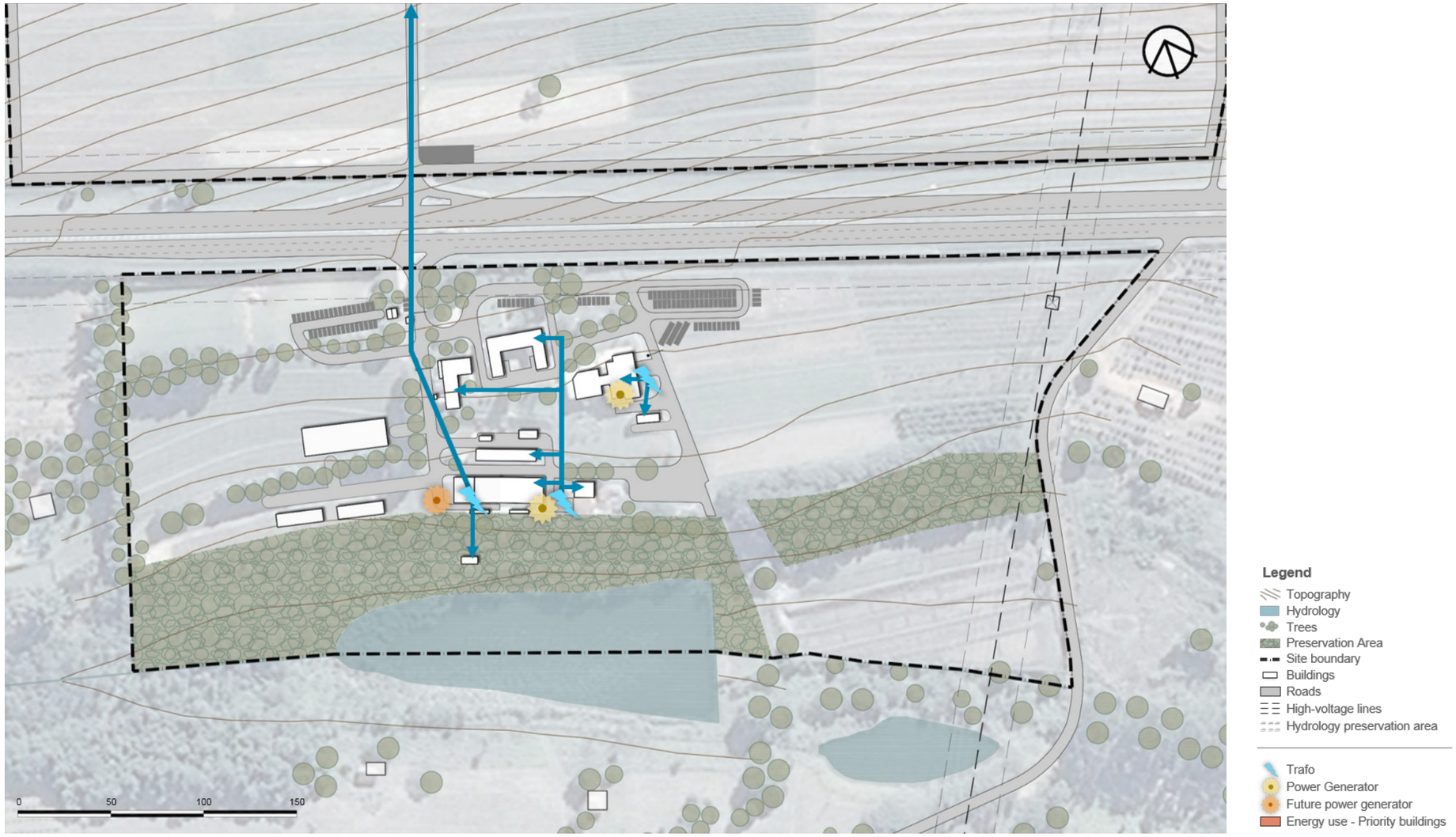
Underground system is used to get infrastructure for the buildings and systems on site.

The Electrical system appears to have spare capacity to be used on new buildings and systems, but a power demand study adding new demands need to be conducted to determine the new power demand.

TRF 3



Map 2.3.8: Electrical Service

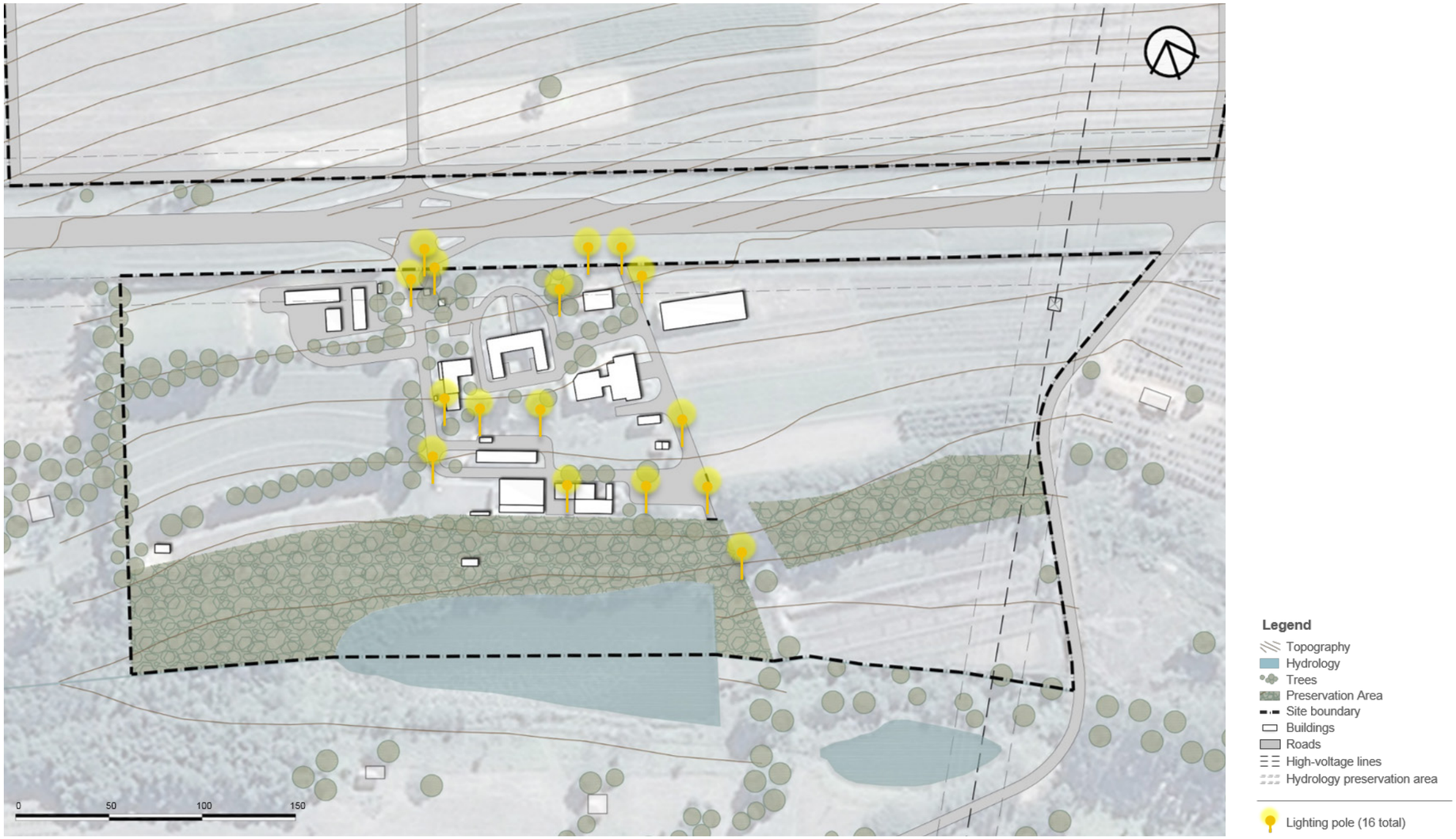


Map 2.3.8: Proposal Electrical Service

2.3.9 EXTERNAL LIGHTING

Infrastructure for external lighting is done by underground line, concrete pole and spot light system (see picture 7) distributed in the south side with sixteen pole in total, the site external illumination will need to be revised with the new site layout.

Lighting Pole

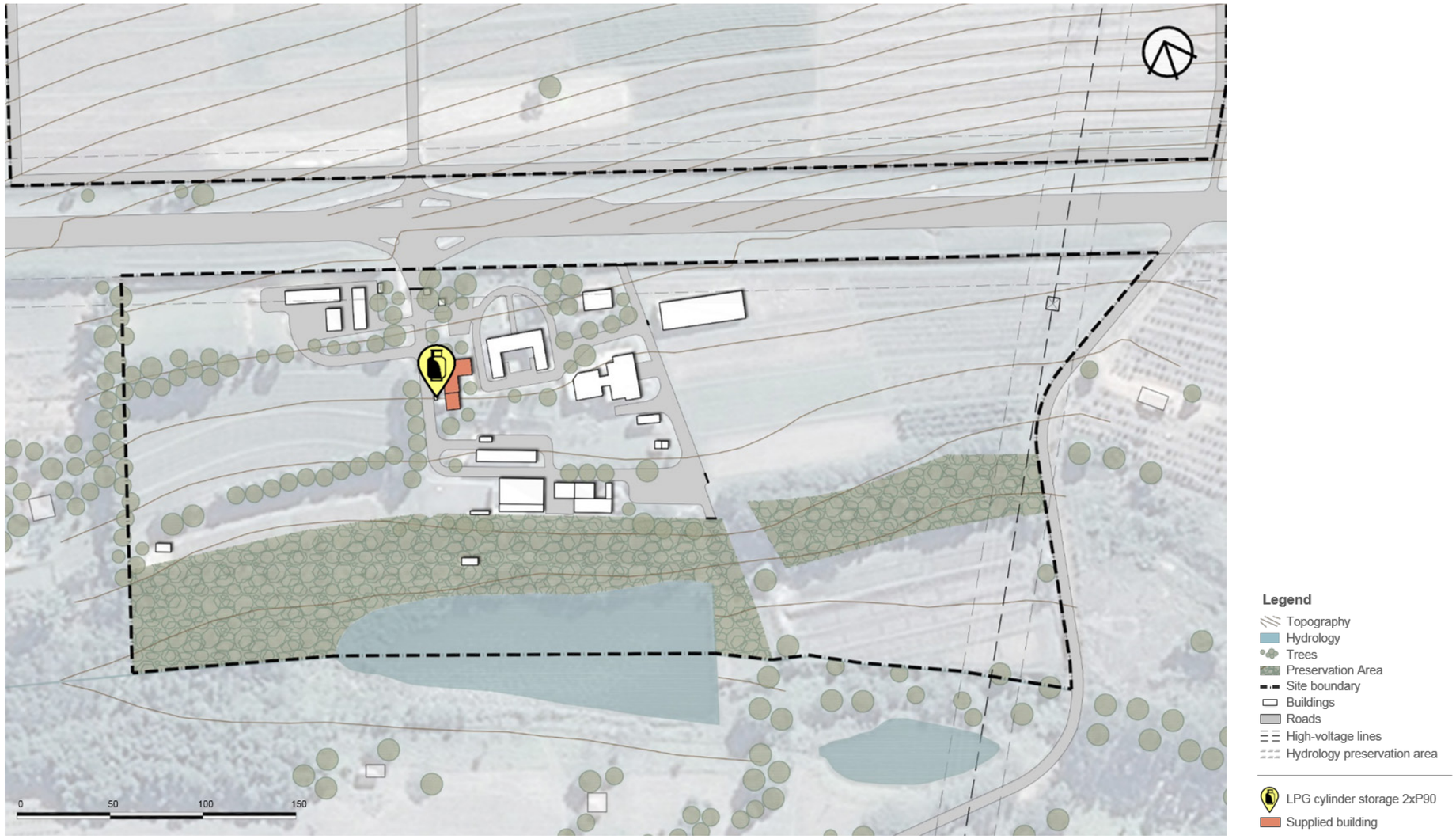


Map 2.3.9: Lighting

2.3.10 LPG SERVICE

LPG gas is currently available at the site. There are 1 LPG storage with two P90 tanks (90kg) close to the kitchen. There is no local agency which provide this utility. Based on the preliminary usage estimate, the utility indicated that the currently supplier will continue likely a single feed.

LPG Storage (#5)


0
50
100
150
Legend
Topography
Hydrology
Trees
Preservation Area
Site boundary
Buildings
Roads
High-voltage lines
Hydrology preservation area
LPG cylinder storage 2xP90
Supplied building

Map 2.3.10: LPG

Fuel Station - North Site (#30)

Fuel Station - South Site (#7)

2.3.11 DIESEL TANK SERVICE

There are 4 existing diesel tanks on site. DAS has a two 500 liter tanks for each generator and two 2000 liter tanks for the filling stations (in the south and north sides. Diesel tank and pump are locate near the Equipment Warehouse. There is a Truck parking, slabs for tanks, pumps and the spill containment systems.

2.3.12 COMMUNICATION AND DATA SERVICE

The site is served with an antenna connection for data and voice, the system is located in the Tech Transfer Center building in the server room, and is distributed to the site with an underground infrastructure,

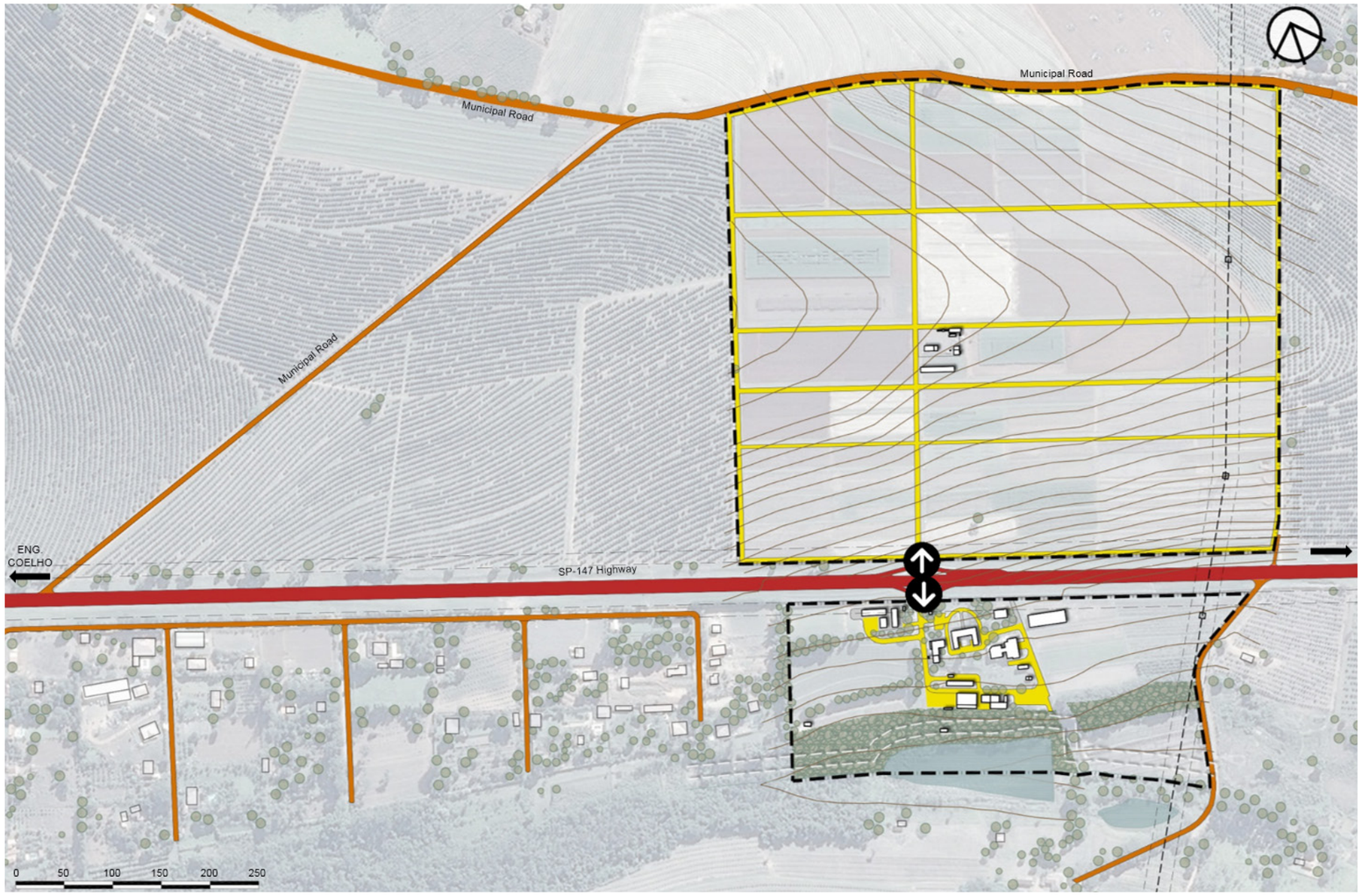
2.4 EXISTING SITE CIRCULATION

The existing site is separated by a state road, SP-147, which is under duplication works. Each site has its main entrance on the highway, but only the south site has a Guardhouse that controls both entrances.

To access the South Site it is necessary to be identified at the guardhouse. On the South Site most of the streets are paved with asphalt. There is no control nor separation between flow of vehicles (employees, visitors and suppliers) and trucks. Vehicles park in different areas and there is no separation between employees, visitors or suppliers vehicles.

Pedestrians, whether employees, visitors or suppliers, also circulate freely throughout the site. There is no sidewalk on the site but there are some paths or stairs between buildings. Nowadays pedestrians cross the road by an underground tunnel, accessed by stairs, to access the North Site. To access the north side, vehicles need to cross the road directly and the gates are open by the guard in the South Site.

On the North Site streets are not paved and vehicles usually park at the UAE (Unidade de Apoio Experimental), but there is no specific parking lot area. Pedestrian circulate throughout the site. The North Site is nowadays used by employees, and rarely by visitors.

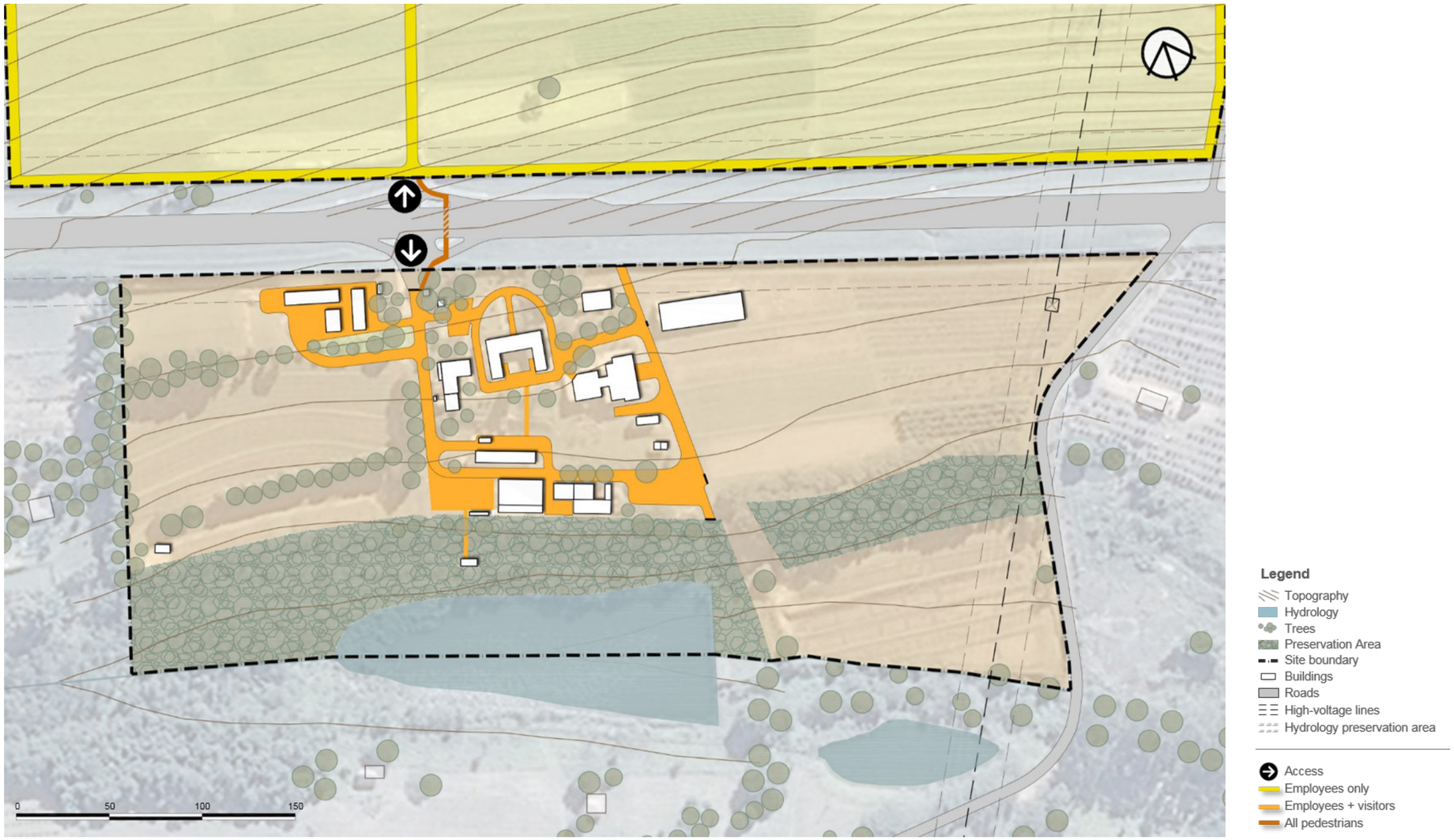


Legend

- Topography
- Hydrology
- Trees
- Preservation Area
- Site boundary
- Buildings
- Roads
- High-voltage lines
- Hydrology preservation area

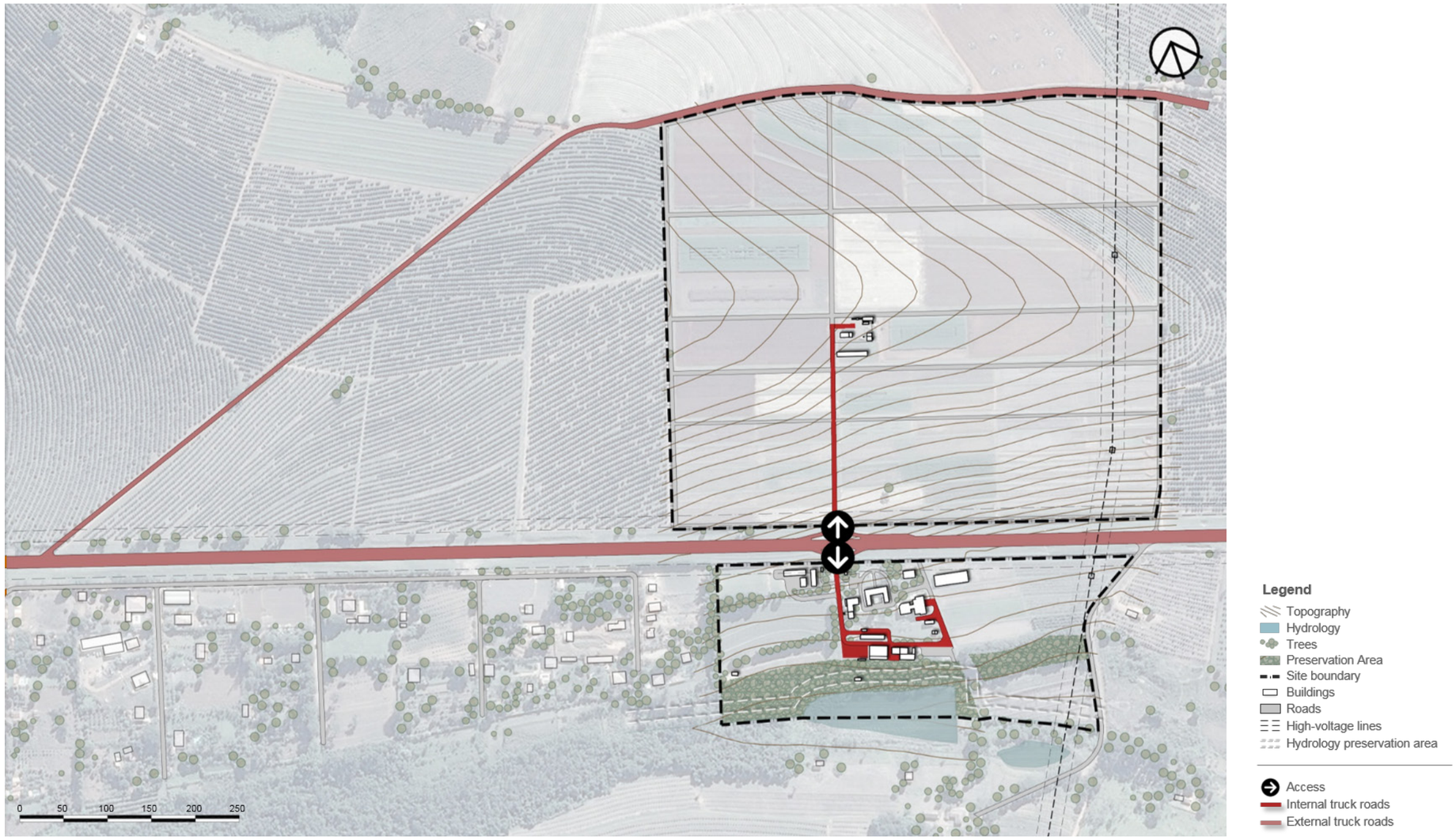
- Access
- Internal vehicles roads
- Local roads
- Highways

Mapa 2.4.1: Circulation



Mapa 2.4.2: Pedestrian Flow

Mapa 2.4.3: Vehicles Flow



Mapa 2.4.4: Trucks Flow

Mapa 2.4.5: Parking Area

North Site Access

South Site Main Entrance

Pedestrians underground passageway - South

Internal road

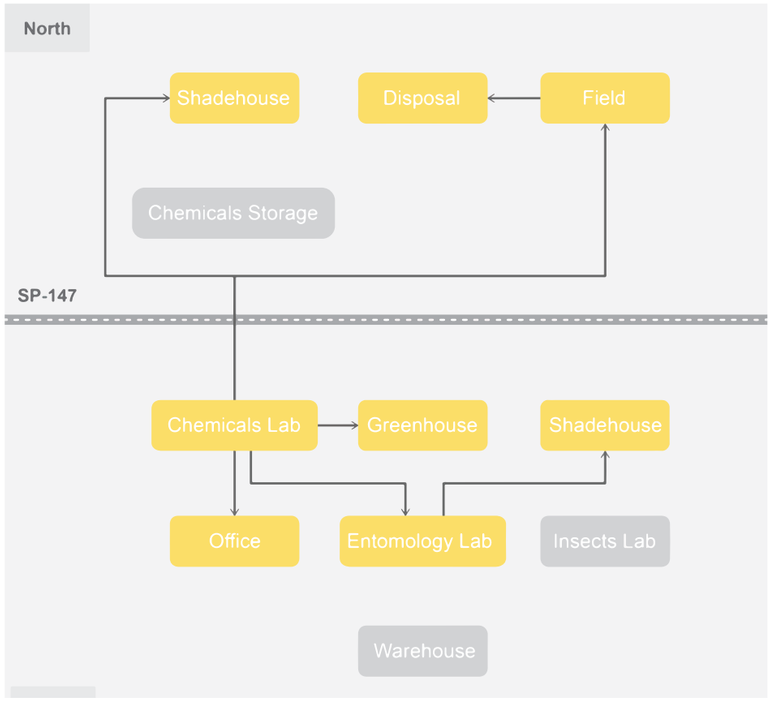
2.5 PROCESS FLOW

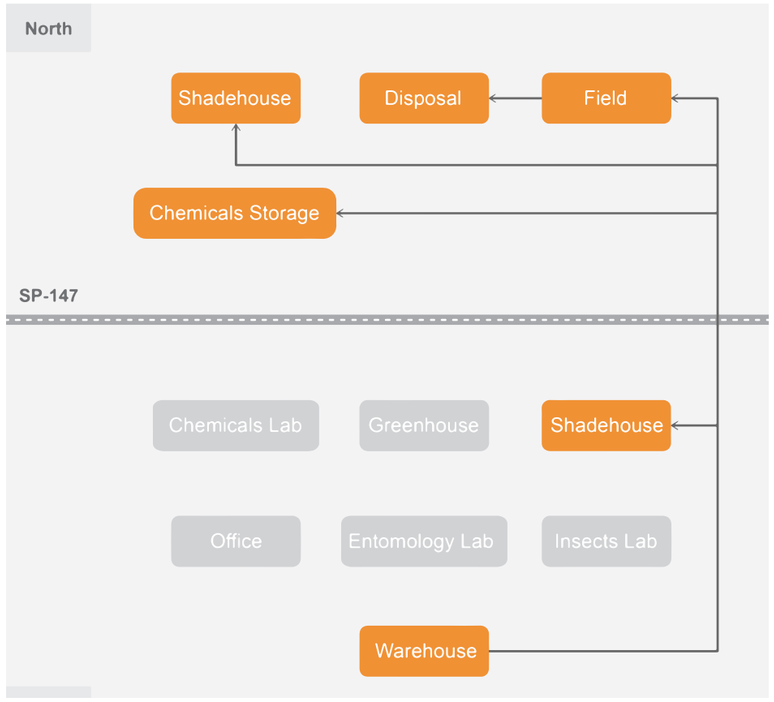
The site process flow is based on several activities that are held onsite and generate an intense people and vehicle circulation in the South and North sides of the Field station.

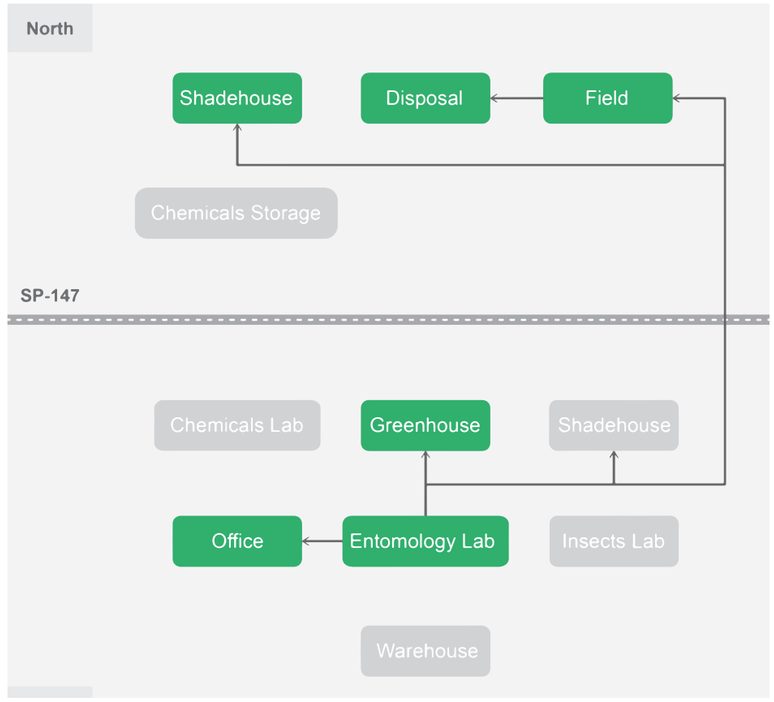
In the south side the flow occurs between the labs, greenhouses, shadehouse and plantation. Located in disperse areas the laboratories are the main center of activity distribution connecting the all support activities and the plantation areas in the South and North areas.

Calibration Devices

Figure 2.5.1: Existing Process Flows

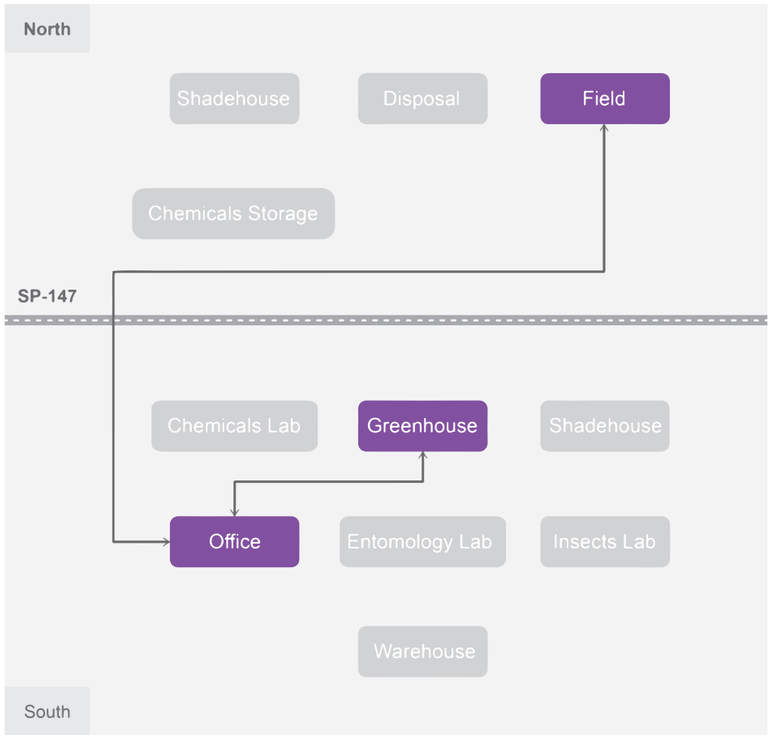


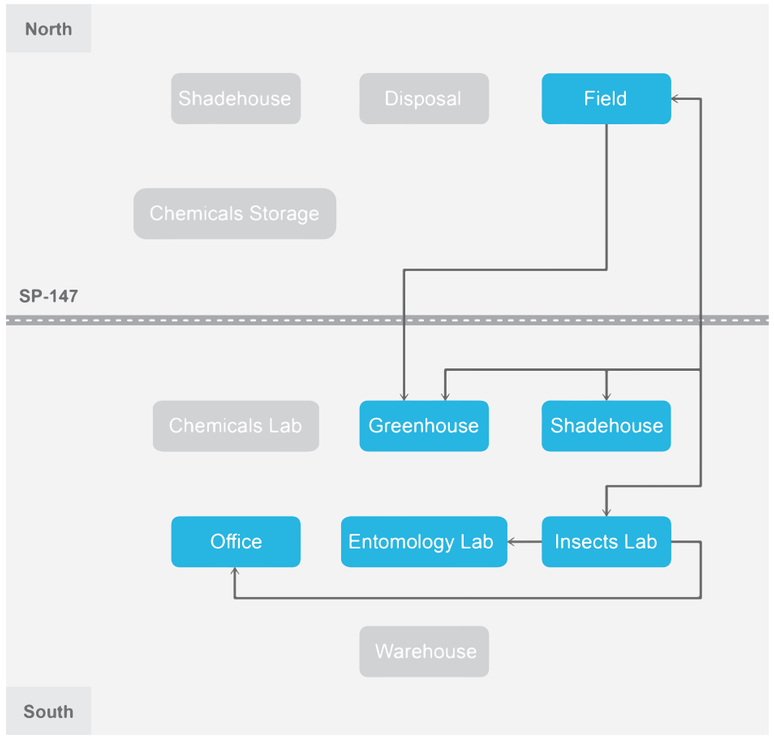


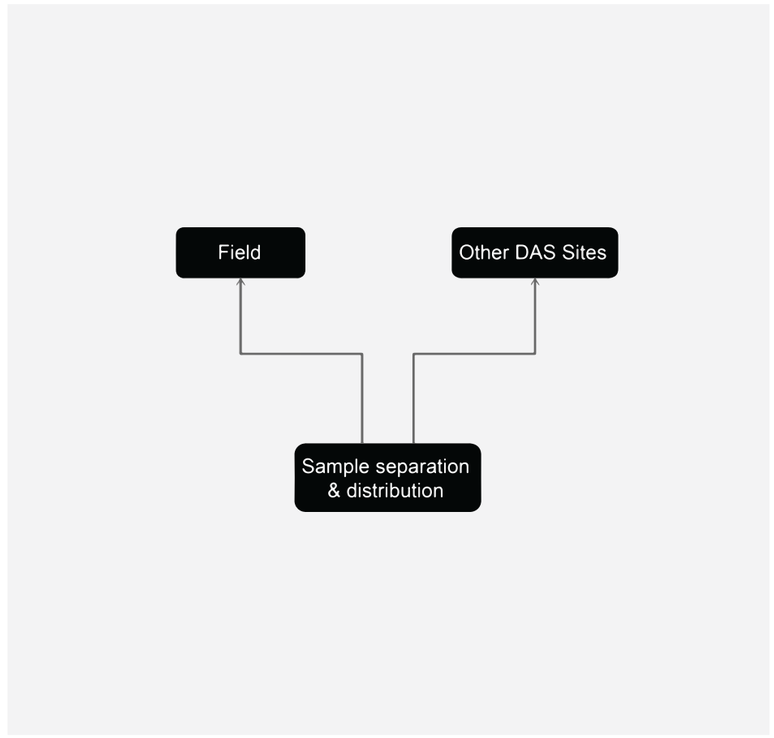


Chemicals Laboratory

Figure 2.5.1: Existing Process Flows







2.6 HIGHWAY DUPLICATION

The highway SP-147 that currently serves both the R&D station northern and southern properties is currently under construction to be duplicated from one lane each way to 2-lane each way. The final highway design will have a concrete barrier in the middle, and the highway duplication is being planned to occur on the south side of the existing highway. The highway duplication will have significant impact to the station operations and access, such as:

• The new highway will be much closer to the southern property. Due to the existing difference in grade from the highway and entry gate, the highway expansion may create an entry drive with a slope that is too steep.

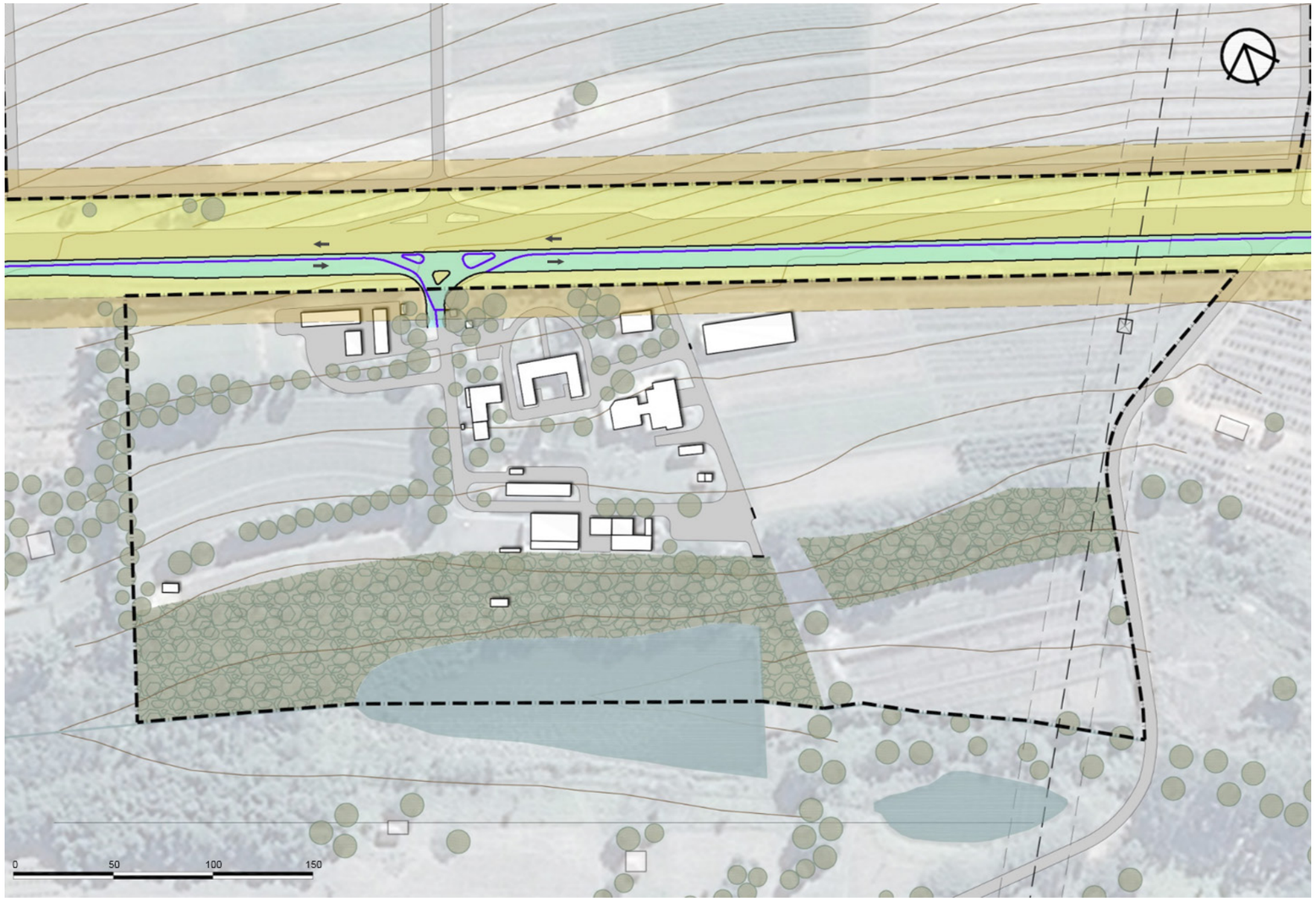
• The highway earth fill will be close to DAS' property fence. Storm water from the highway may impact DAS's property.

• The highway duplication creates a 15 meter no-build setback on DAS property which will impact existing structures.

• The Highway duplication will require a complete re-arrangement of the site access guardhouse and gate to the south property.

• Currently the site tractors cross the highway from the southern property to the northern property. With the highway duplication this direct access between the 2 properties will no longer be available for the daily site operation.

Much of the details on the highway duplication and layout was not made available from the highway management company. This study has the goal to identify as much as possible the impacts of the highway and advise the local station administration on the immediate changes that are required to maintain and/or improve the site operations due to these changes.



Mapa 2.6.1: HighwayDuplication

Figure 2.6.1: Road Duplication Design

Figure 2.6.1: Junction Design to the East

Figure 2.6.3: Impacts on the Site

SP-147 Highway Duplication Works

SP-147 Highway Duplication Works

3.

MASTER PLAINNING

3.1 PROGRAMMING

The Master Plan Programming was conceived together with key DAS stakeholders during workshops, site visits and meetings. The programming established qualitative and quantitative requirements for the identified activities, whether existing or forecasted.

Although there was no Lean Assessment Report for the site, CH2M tried to understand site process flow, operation, requirements, and expansion needs.

The ongoing highway duplication will change significantly the access and interaction between sites. The right-of-way will be used for a new land and the access to the South Site will need to be remodeled. Therefore, a new guardhouse is going to be built.

A demand for a new warehouse on North Site was identified during this project aiming to reduce equipment flow between sites. The warehouse design has already started by CH2M team and its specific programing identified the need of 1,200m².

The forthcoming beginning of Tech Transfer Center activities will change the current dynamics of the site. TTC building on the South is being refurbished and from September 2015 it will receive an average of 100 people a day during the courses period. New land on the west of the existing North Site is under negotiation to be purchased to attend TTC visitation activities. Consequently, there will be a new flow of visitors between South and the new North Site areas. (see Figure 3.1.3)

CH2M has identified laboratories area growth demand due to the need for new equipment and for new activities and processes (e.g. sample selection and distribution, mist chamber).

DAS forecasted a growth of 10 employees in the next years, which is not a big impact compared to the new visitors flow.

All these changes will require adjustments to the internal road system, new parking areas, buildings refurbish, demolition and construction needs and update for infrastructure and utilities supply. For the irrigation of the new plots, a specific study for water demand is being conduct by CH2M specialists.

Field equipment to be storaged in the new Warehouse at north site

PEOPLE FLOW PER BUILDING				1	2	4	6	11	18, 19, 20, 22	16	26	N/A
				MAIN BUILDING	GUARDHOUSE	CAFETERIA	LAUNDRY	LABORATORIES	GREENHOUSES & SHADEHOUSES	TECH TRANSFER	EQUIPMENT WAREHOUSE (UAE)	FIELD
1	Luiz Claudio da Cunha	DOW	Pesquisador									
2	Cristiane Müller	DOW	Pesquisador									
3	Dauri Fadin	DOW	Especialista Compliance									
4	Esmeraldo Alves	DOW	Operador Campo									
5	Everaldo Guerra	DOW	Operador Campo									
6	Fabrício Baviera	DOW	Técnico Agrícola									
7	Maick Jose dos Santos	DOW	Técnico Agrícola									
9	Rodrigo Neves	DOW	CPRD Business Partner									
10	Luiz Henrique Marques	DOW	Gerente									
11	Mauricio Batista	DOW	Técnico Agrícola									
12	Nelson Alvarenga	DOW	Coordenador Campo									
13	Rafael Rodrigo Giraldin	DOW	Coordenador EH&S									
14	Rogério Rubin	DOW	Pesquisador									
15	Valdi Guerra	DOW	Operador Campo									
16	Jaciara Benatti	DOW	Recepcionista									
17	Sergio Tronquini	DOW	Técnico Agrícola									
18	Gabriel Dornelas	DOW	Pesquisador									
19	Luiz Pavan	DOW	Pesquisador									
20	Augusto Kalsing	DOW	Pesquisador									
21	Henrique	DOW	Estagiário									
22	Lucio	DOW	Estagiário									
23	Matheus	DOW	Estagiário									
24	Emerson	DOW	Estagiário									
25	Carlos Picoli	GRAMAR	Auxiliar Serviços Gerais									
26	Jose Picoli	GRAMAR	Auxiliar Serviços Gerais									
27	Douglas Rocha	GRAMAR	Auxiliar Serviços Gerais									
28	Sirelene	GRAMAR	Auxiliar serviço Limpeza									
29	Rosilaine	GRAMAR	Auxiliar serviço Limpeza									
30	Juliana Bissoli	GRAMAR	Auxiliar Laboratório									

FREQUENTLY

SOMETIMES

RARELY

Figure 3.1.1: People Flow per Building

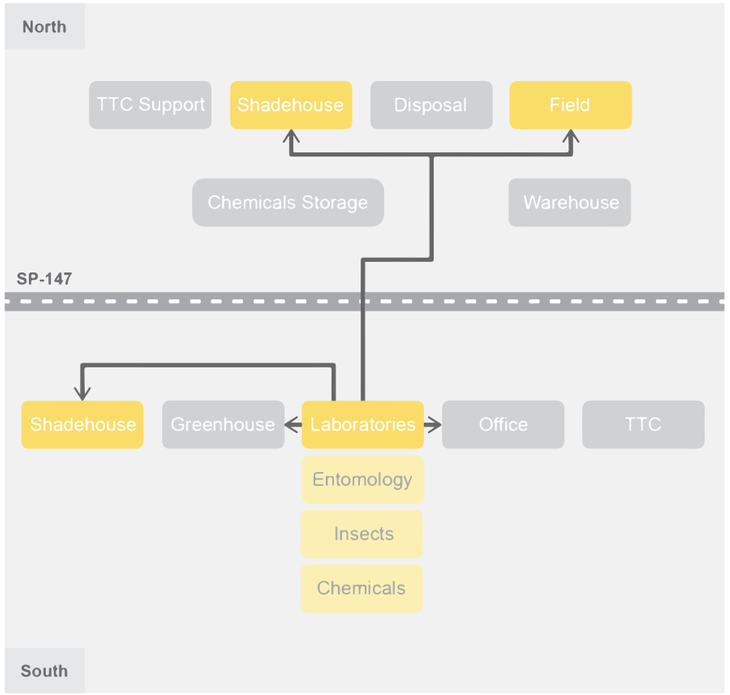
PEOPLE FLOW PER BUILDING				1	2	4	6	11	18, 19, 20, 22	16	26	N/A
				MAIN BUILDING	GUARDHOUSE	CAFETERIA	LAUNDRY	LABORATORIES	GREENHOUSES & SHADEHOUSES	TECH TRANSFER	EQUIPMENT WAREHOUSE (UAE)	FIELD
31	Americo Coutinho	GRAMAR	Auxiliar Serviços Gerais									
32	Carla Detoni	GRAMAR	Auxiliar Laboratório									
33	Larissa Durando	CEBE	Aprendiz									
34	Paula Roberta	GRSA	Cozinheira									
35	Leonilda Matias	GRSA	Auxiliar Cozinha									
36	Maria Carolina	GRSA	Nutricionista									
37	Patricia	GOCIL	Vigilante									
38	Marcos	GOCIL	Vigilante									
39	Jessica	GOCIL	Porteiro									
40	Joaquim	GOCIL	Vigilante									
41	Rinaldo	GOCIL	Vigilante									
42	Luiz Carlos	GOCIL	Porteiro									
43	João	GOCIL	Porteiro									
44	Fabio	GOCIL	Porteiro									
45	Future employee	DOW	Técnico Agrícola									
46	Future employee	DOW	Recepcionista									
47	Future employee	DOW	Estagiário									
47	Future employee	DOW	Estagiário									
48	Future employee	DOW	Agrônomo									
49	Future employee		Auxiliar Serviços Gerais									
50	Future employee		Auxiliar Serviços Gerais									
51	Future employee		Auxiliar Serviços Gerais									
52	Future employee		Auxiliar Laboratório									
53	Gustafo Tofoli	DOW	Tech Transfer Leader									
54	Visitors	N/A										

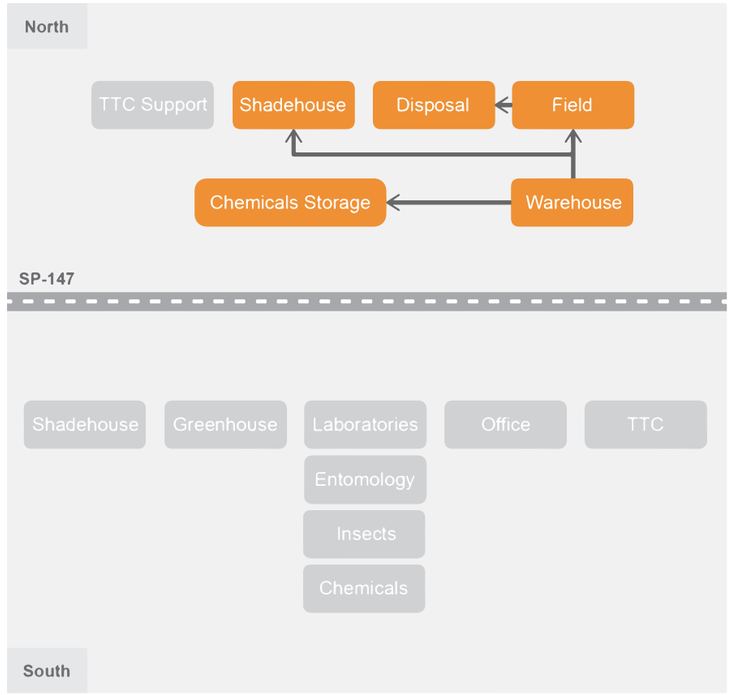
(Cont.) Figure 3.1.1: People Flow per Building

FREQUENTLY

SOMETIMES

RARELY





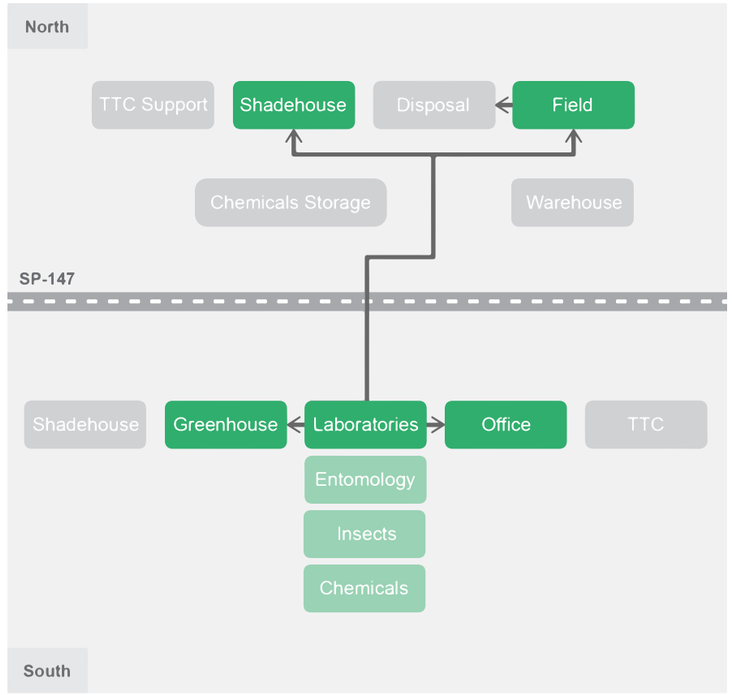
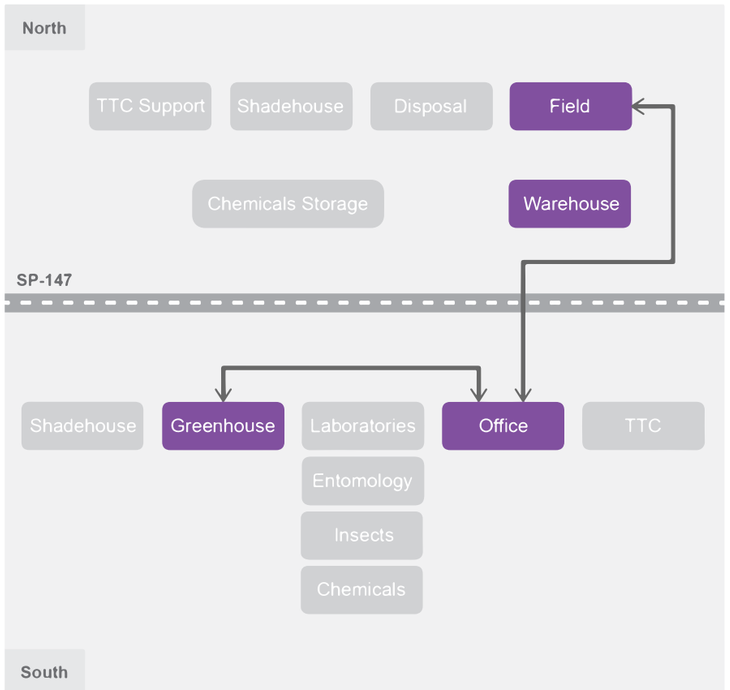
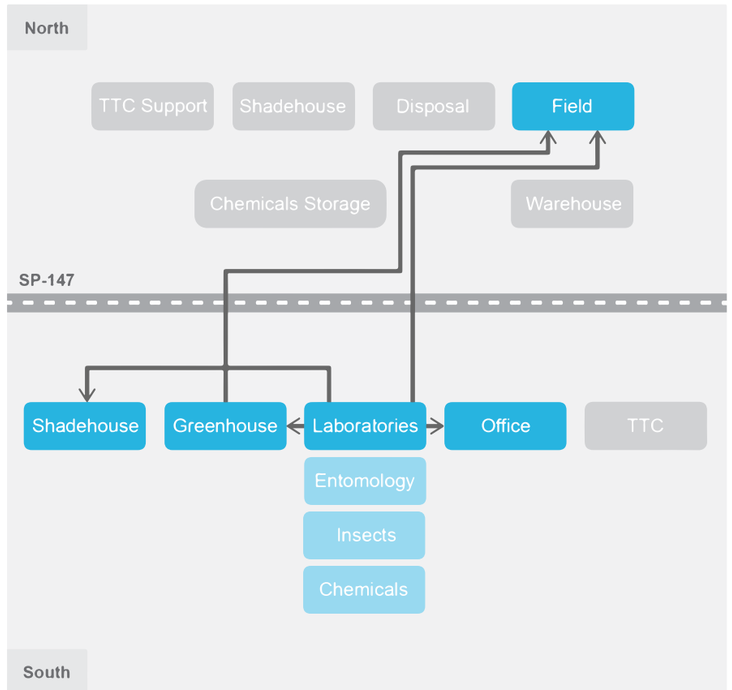
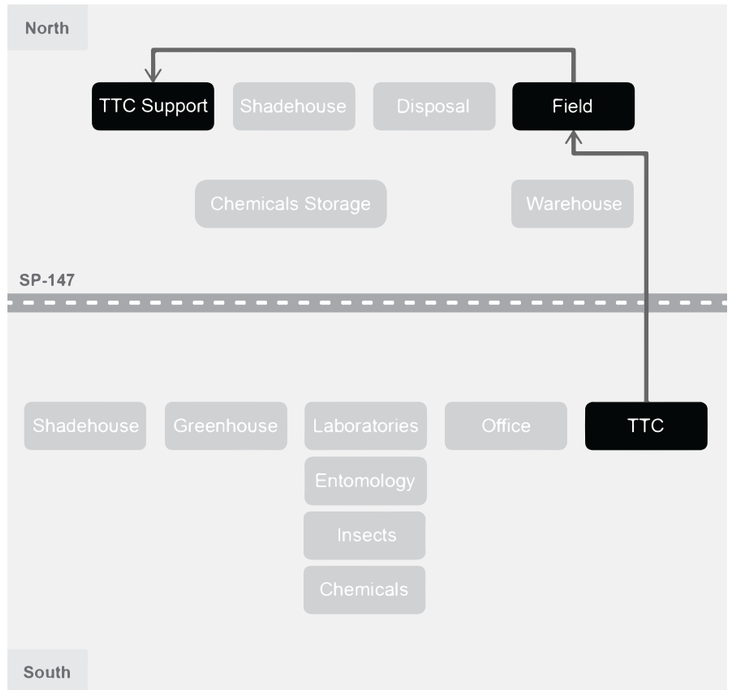


Figure 3.1.2: New Process Flow







(Cont.) Figure 3.1.2: New Process Flow

Greenhouses replacement area

Chemicals Laboratory to be expanded

New laboratory area

NEW Nº	BUILDINGS (SOUTH SITE)	USE	FORECAST AREA (M²)	CHANGE (%)
1	Main building	Administrative Support (bath + locker room)	640 120	114.29% 214.29%
2	Guard house	Support (bath + locker room)	20	NEW
3	Water Tank	Support		NEW
4	Cafeteria	Support	175	No Change
5	LPG storage	Utilities	2	No Change
6	Laundry	Support	60	No Change
7	Fuel station	Utilities		No Change
8	Solid waste storage	Support	25	NEW
9	Warehouse 2 - equipment	Plantation support	210	No Change
10	Due/Mist Chamber + Track Sprayer	Plantation support	150	NEW
11	Laboratory	Chemicals Laboratory Entomology Laboratory Fitopatology Laboratory Insects Laboratory Sample Selection + Distribution Cold Storage Circulation & support areas Utilities (generator)	112 80 80 180 20 25 138 15	200.00% 250.00% 228.57% 189.47% NEW No Change NEW No Change
12	Septic Tank 1	Utilities		No Change
13	Septic Tank 2	Utilities		NEW
14	Irrigation Pump house	Utilities	22	No Change
15	Equipment Storage	Production support	95	Refurbished
16	TTC	Visitation/R&D	811	No Change
17	Chemicals Storage	Production support	55	Refurbished
18	Shadehouse 1	Greenhouse/ Shadehouse	650	Replaced
19	Greenhouse 1	Greenhouse/ Shadehouse	100	Replaced
20	Greenhouse 2	Greenhouse/ Shadehouse	140	NEW
	SUBTOTAL		**3,925**	

	BUILDINGS (NORTH A SITE)	USE	FORECAST AREA (M²)	CHANGE (%)
21	Warehouse 4 - equipment	Plantation support	100	No Change
22	Shadehouse 2	Greenhouse/ Shadehouse	260	No Change
23	Drying Tank	Plantation support	20	No Change
24	Chemicals storage	Plantation support	110	No Change
25	Fuel station	Utilities		No Change
26	Equipment Warehouse	Plantation support	1,200	NEW
	SUBTOTAL		**1,690**	

	BUILDINGS (NORTH B SITE)	USE	FORECAST AREA (M²)	CHANGE (%)
27	TTC Support area	Visitation Support	45	NEW
28	Septic Tank	Utilities		NEW
29	Water treatment	Utilities	10	NEW
	SUBTOTAL		**55**	

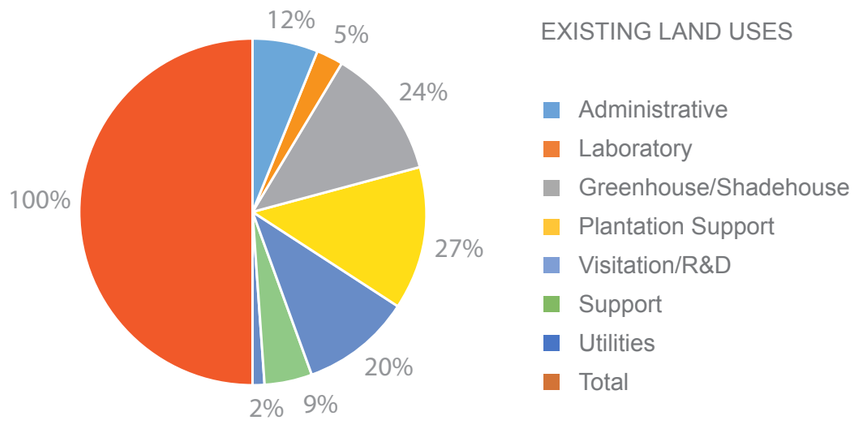


Figure 3.1.3: Proposed Land Uses

Table 3.1.1: Proposed Built Up Area

3.2 CONCEPT DESIGN

3.2.1 CONCEPTUAL SITE DEVELOPMENT

The conceptual Master Plan was conceived to address near and long-term planning for the operational needs based on the following general guidelines:

1. Suit R&D, Education and Plantation activities on the Site;
2. Minimize impacts and risks associated to the highway duplication;
3. Provide necessary support for the upcoming TTC activities;
4. Optimize laboratories operation;
5. Improve process and people flow within the site and between north and south sites;
6. Update utilities needs;
7. Preserve non aedificandi areas;
8. Promote site safety and security.

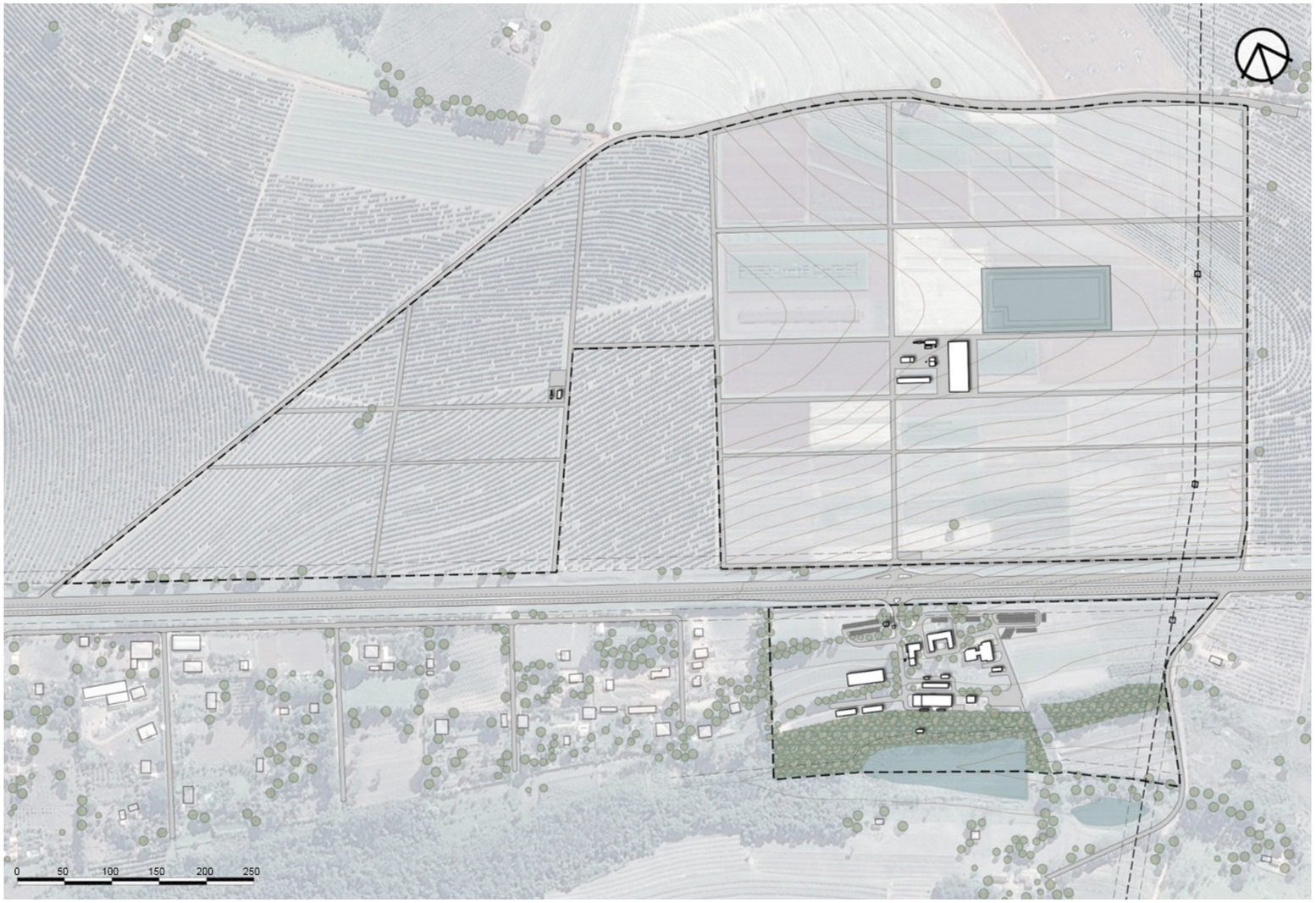
Three alternatives were considered for Site Development. The following diagrams represent the preferred option. The others are included for reference in the Appendix.

The current Mogi Mirim field station site facilities and infrastructure were evaluated for functionality, performance and adaptability for the near and long term planned needs. As a result of this analysis it was determined that certain existing structures should be retained, some reorganized or demolished and new ones built. The master planning exercise concluded that the most efficient and flexible layout for future development could be achieved with the construction of a new laboratory, a new equipment warehouse and a chemicals storage. New locations are proposed for some of the support facilities such as guardhouse and solid waste area.

Additional design services are required for the next phase of the study, where proposed improvements would be further studied and detailed for implementation.

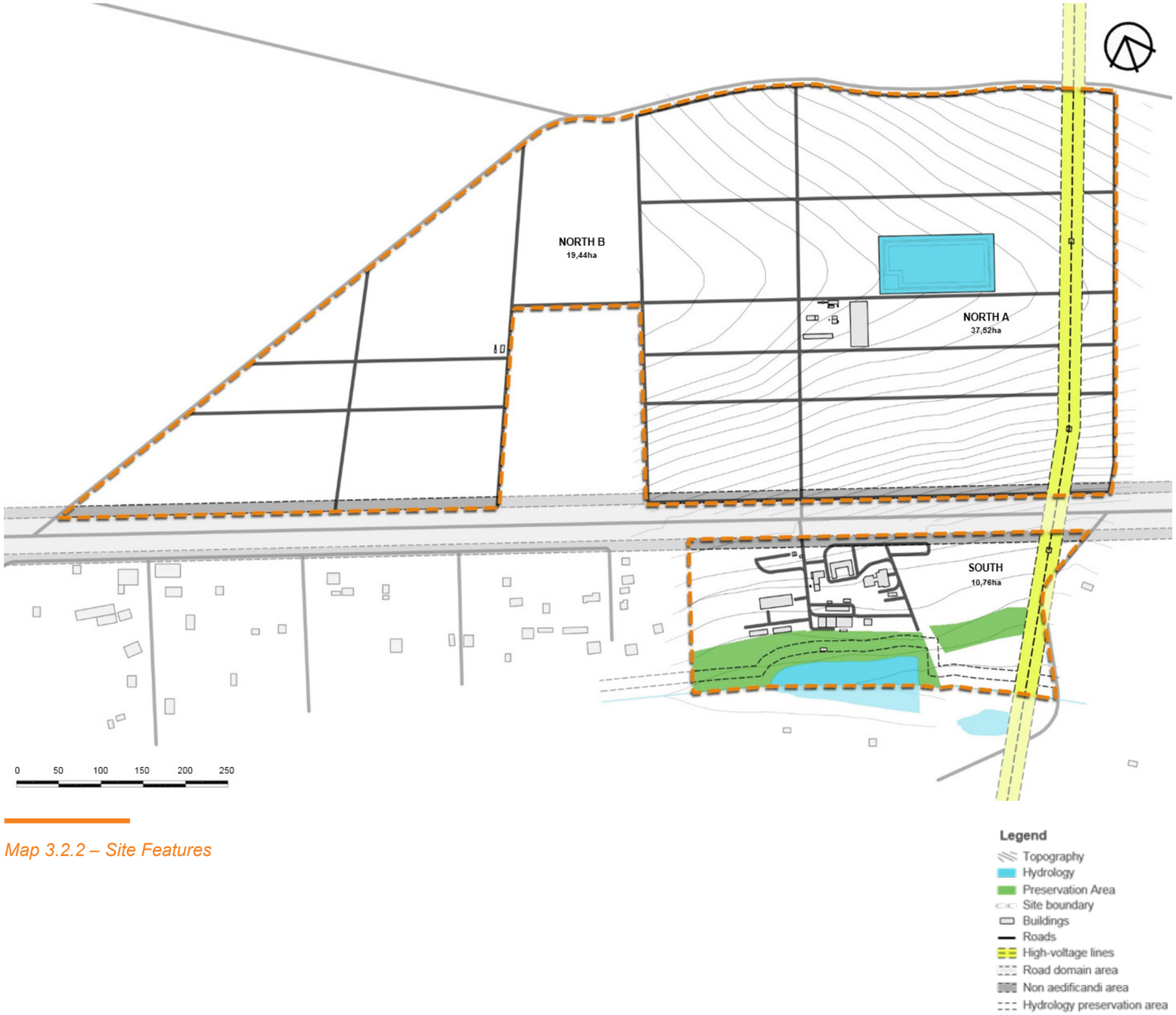
The map 3.2.1 shows conceptual Master Plan preferred layout.

Figure 3.2.1: Main Site Activities



Map 3.2.1 – Conceptual Master Plan

The conceptual Master Plan considered the acquisition of the 19 ha new land. Non-buildable areas were considered as site restrictions: 15 meters non-buildable setback, environmental protected area and transmission line, as shown in the Figure 3.2.2.



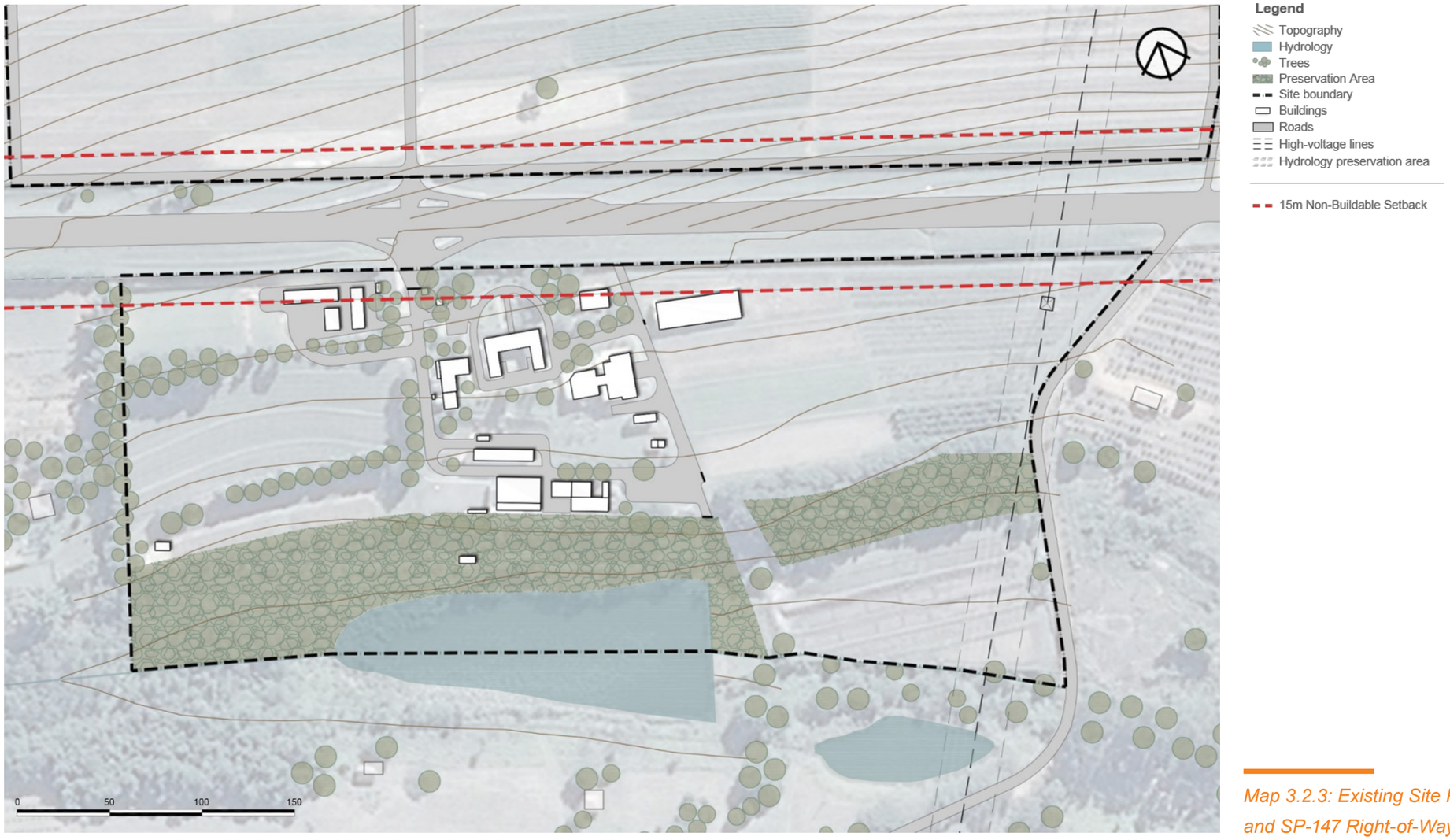
Map 3.2.2 – Site Features

Storage building
to be demolished

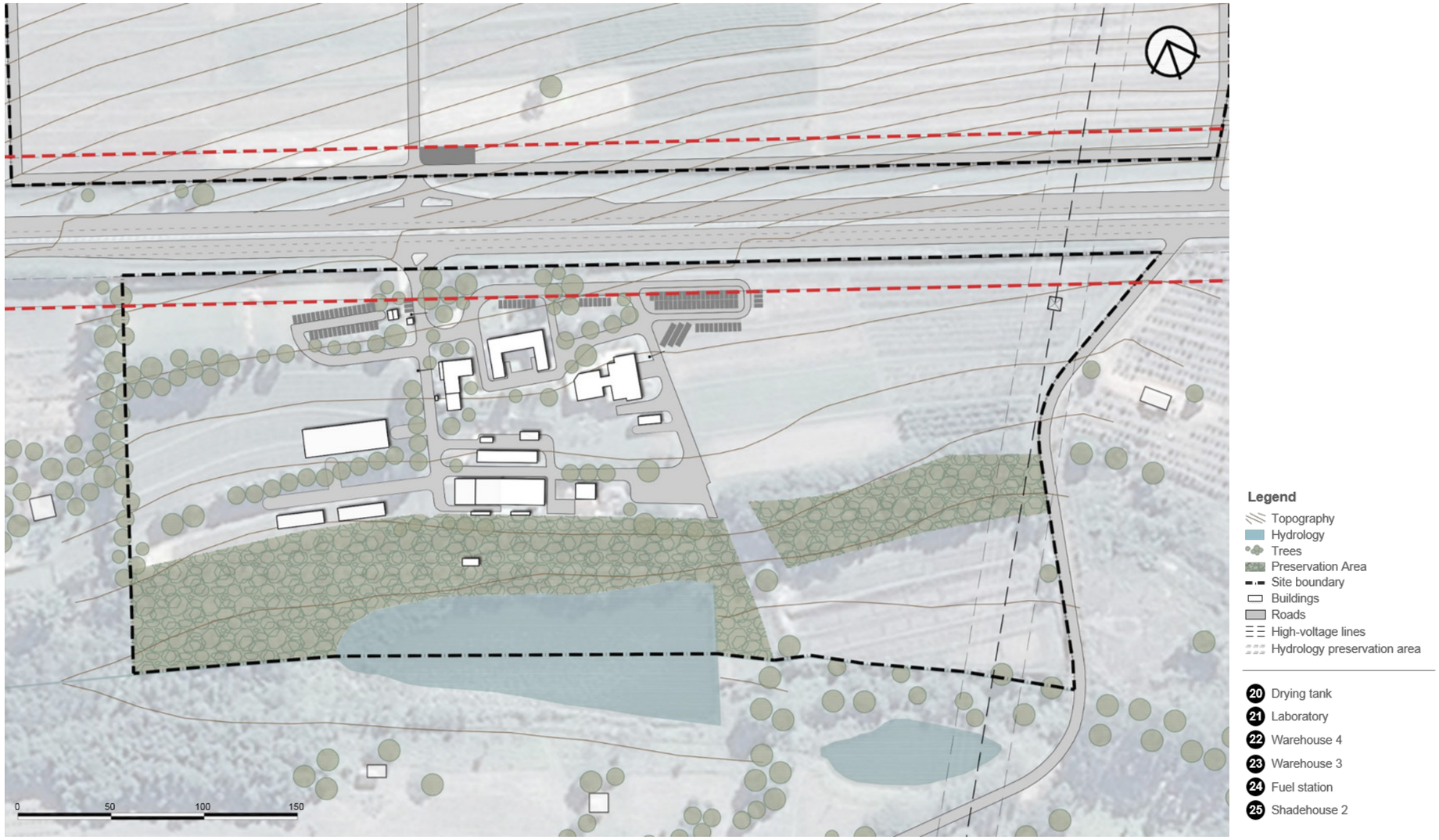
Landscape Design Priority Area

3.2.2 BUILDINGS

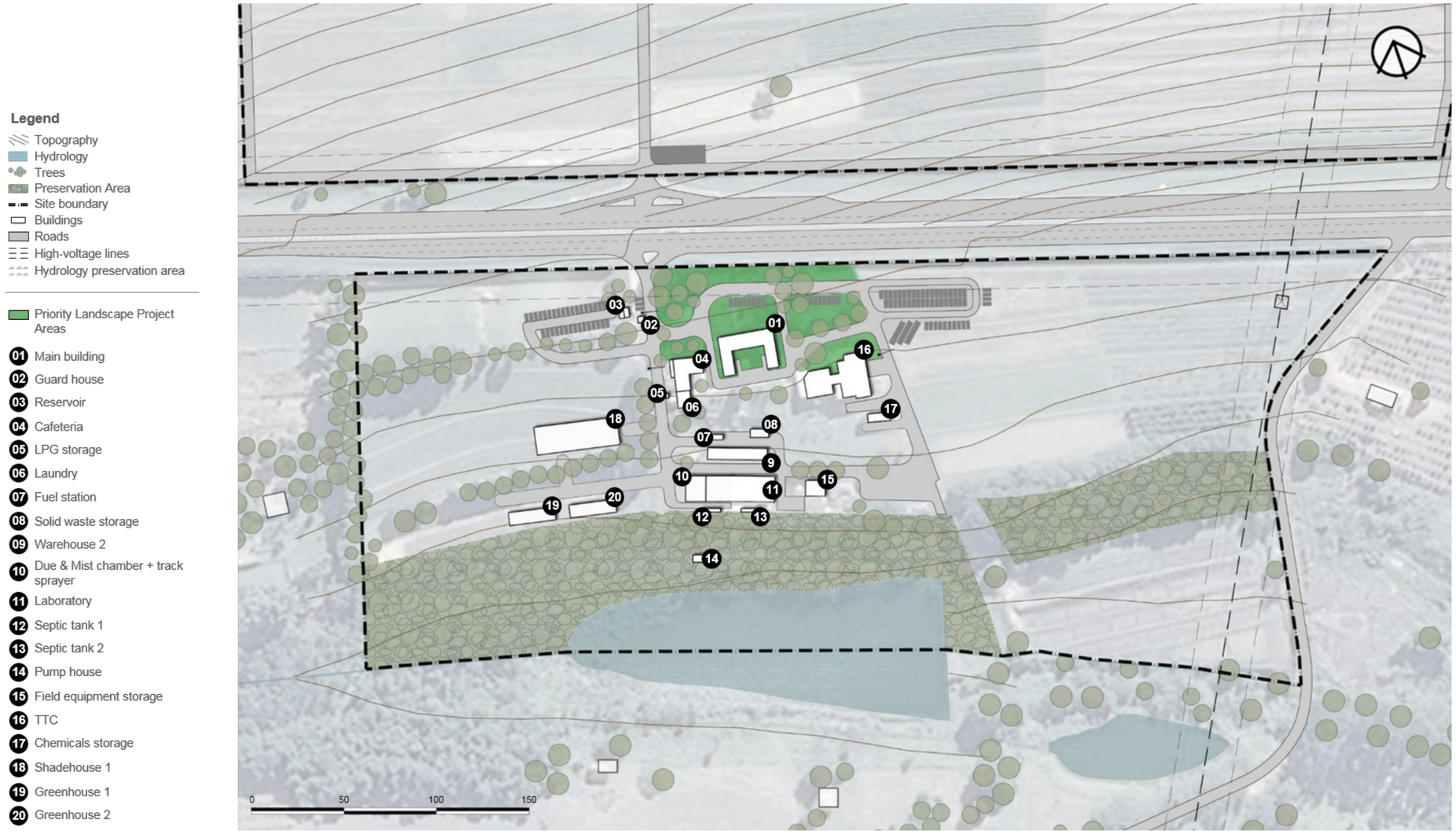
DAS H&S guidelines defined all existing buildings on non aedificandi area (15 meters from right-of-way) should be demolished. The greenhouses will be placed in the rice field area, and the shadehouse will be reassembled in the grape field area. Both water tanks need to be deactivated and rebuilt. Warehouse 3 and Barbecue Area should also be de demolished.



Map 3.2.3: Existing Site Plan and SP-147 Right-of-Way



Map 3.2.3: Existing Site Plan and SP-147 Right-of-Way



Map 3.2.5: Conceptual Master Plan – South

The four existing laboratories (phytopathology, entomology, chemicals and insects), will be centered in one building (number "11"), sharing common facilities and improving flows between labs. This building will utilize the existing Warehouse 1 structure, on the south portion of the site, and build an extension to the west to accommodate the estimated 650 m² built up area.

Mogi Mirim Site will house sample selection and distribution activities for other DAS Sites. This activity will take place in a separate room inside the new laboratory.

A new facility will be built beside the laboratory to accommodate the identified demand for a due and mist chamber, track sprayer and vases assembly, aiming to support and facilitate activities and process flow between this building, labs and green and shade houses.

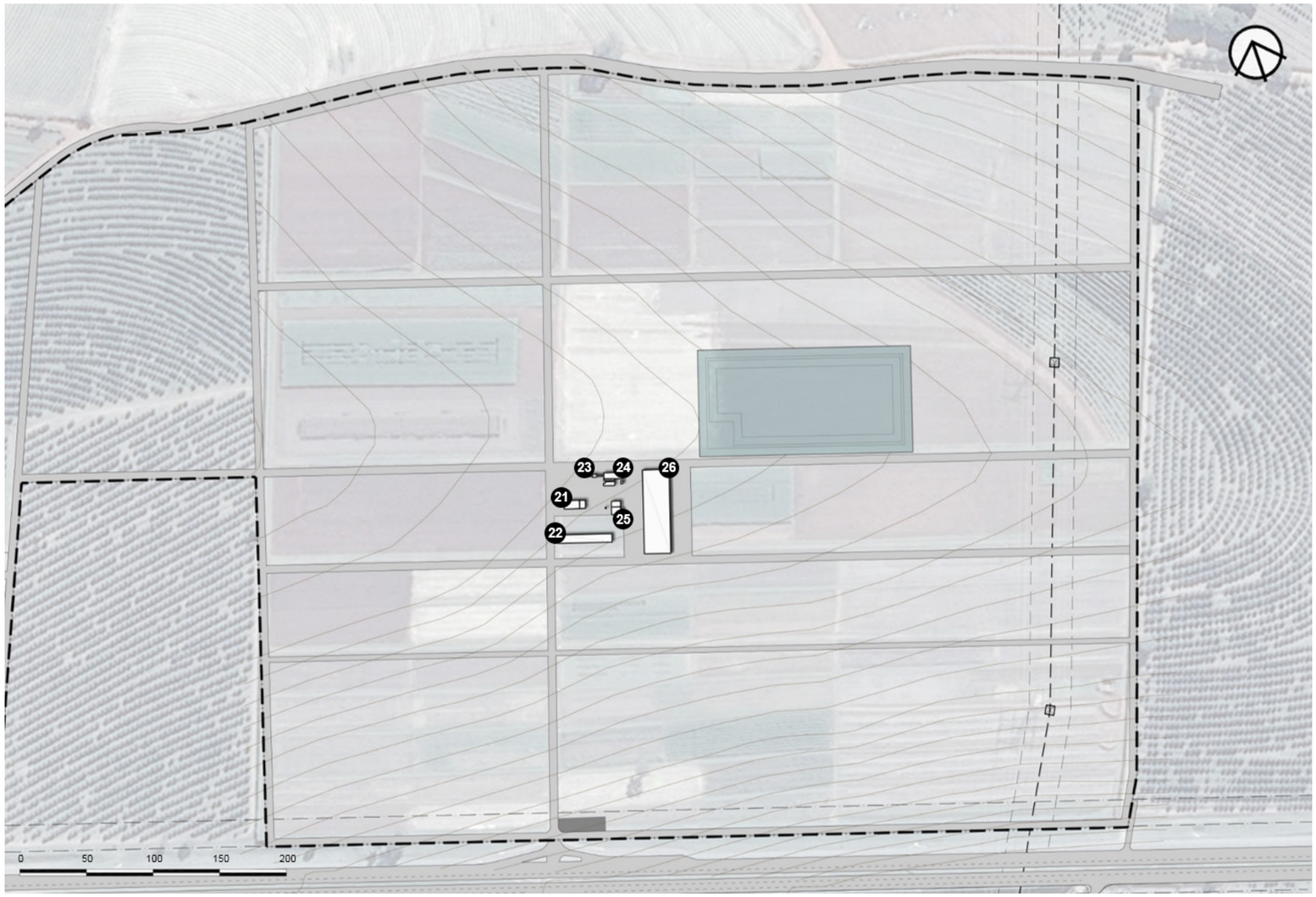
The vacant building south to TTC will be refurbished to house chemicals warehouse, which will centralize chemicals storage of the whole Site. The access to this building will be changed for the opposite side, to the south, in order to avoid odor dispersion around TTC. A new road will be paved to the south so as small trucks will be able to access the building.

The existing Hazardous Storage will be tailored to meet safety requirements. Since the existing facility is in a higher grade than the laboratory, a new Hazardous Storage will be built inside the new lab. Then, the exiting storage will be demolished.

The main building will be refurbished after the new laboratory is finished. The vacant compartments will be used for administrative activities and for locker rooms expansion.

The existing insects laboratory will be used for field equipment storage. The other buildings adjacent will be demolished due to poor conditions.

A solid waste storage will be built close to the existing fuel station. The new facility will have partitions to the different types of recyclable waste.



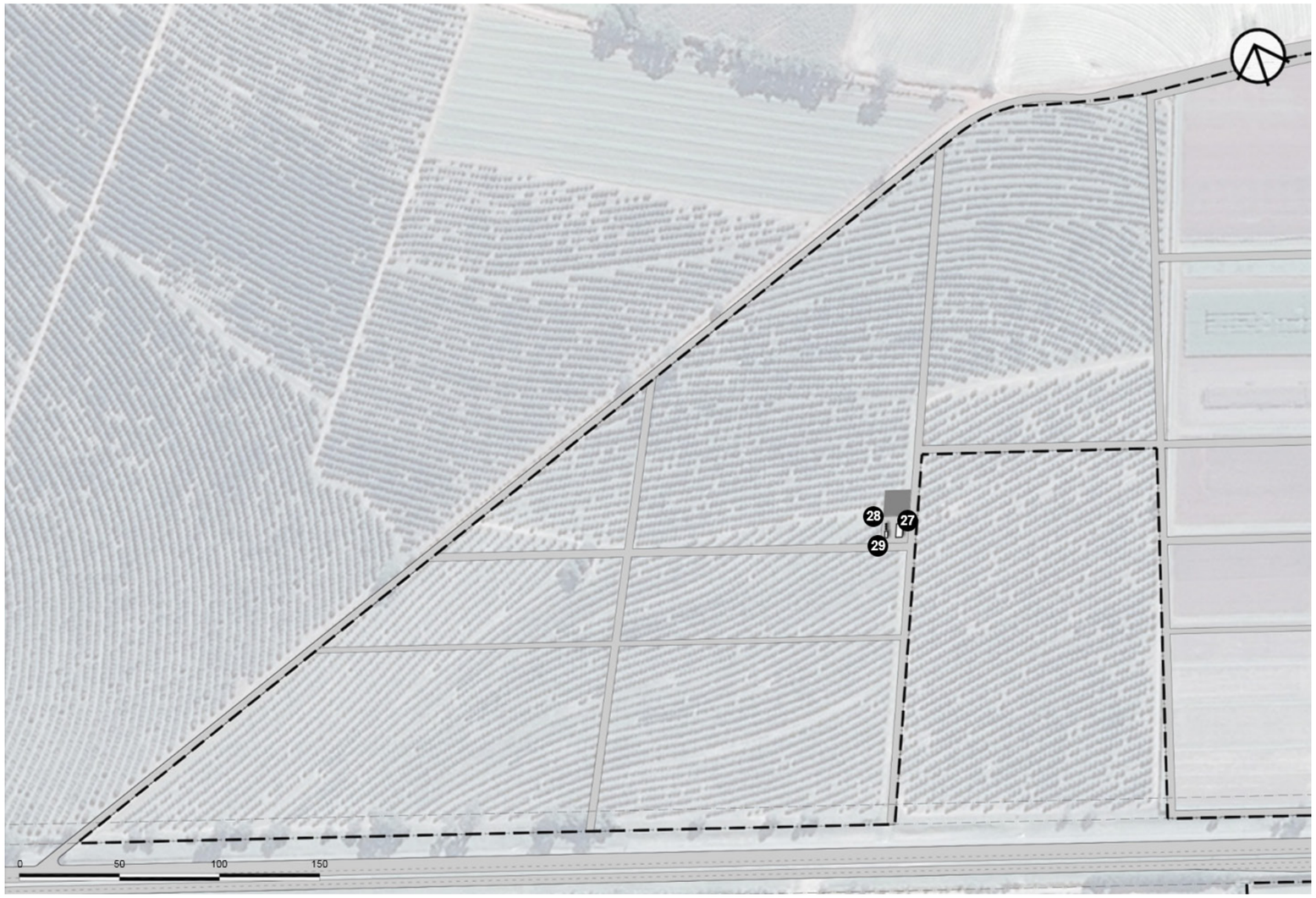
Legend

- Topography
- Hydrology
- Trees
- Preservation Area
- Site boundary
- Buildings
- Roads
- High-voltage lines
- Hydrology preservation area

- 21 Warehouse 1
- 22 Shadehouse 2
- 23 Drying tank
- 24 Chemicals storage & Laboratory
- 25 Fuel station
- 26 Equipment warehouse 4

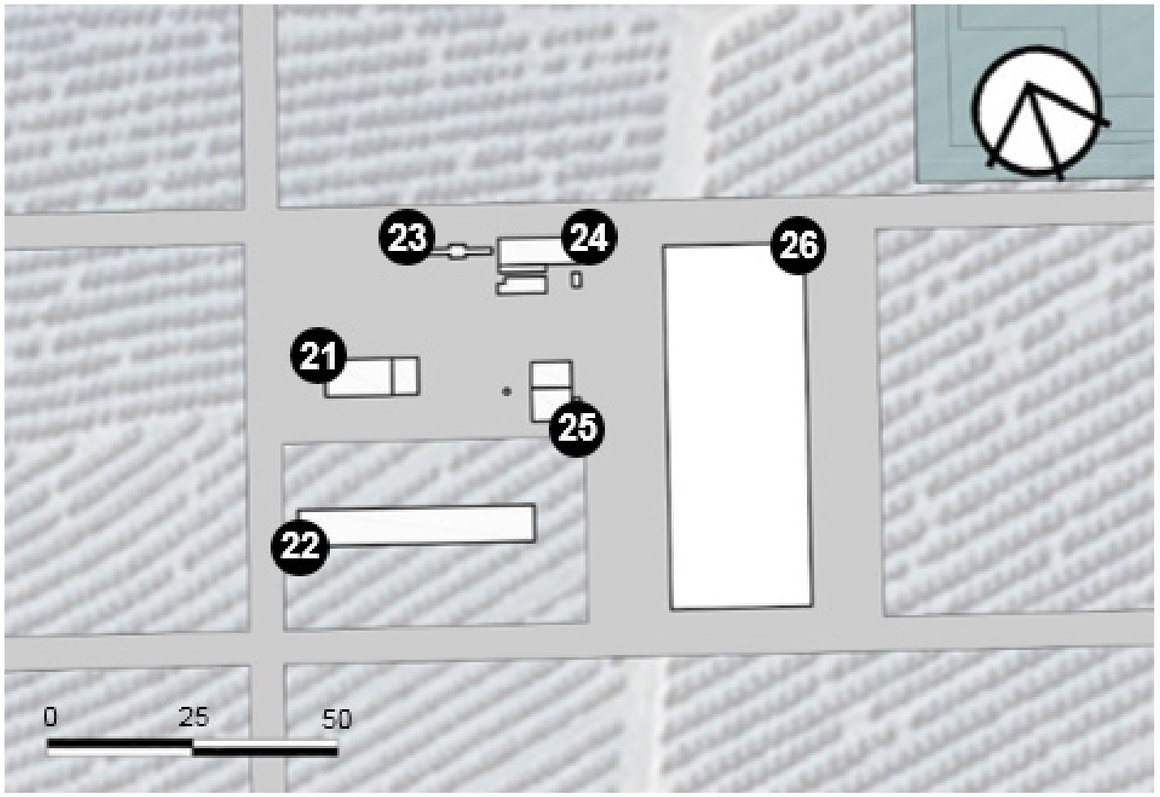
Map 3.2.6: Conceptual Master Plan – North A

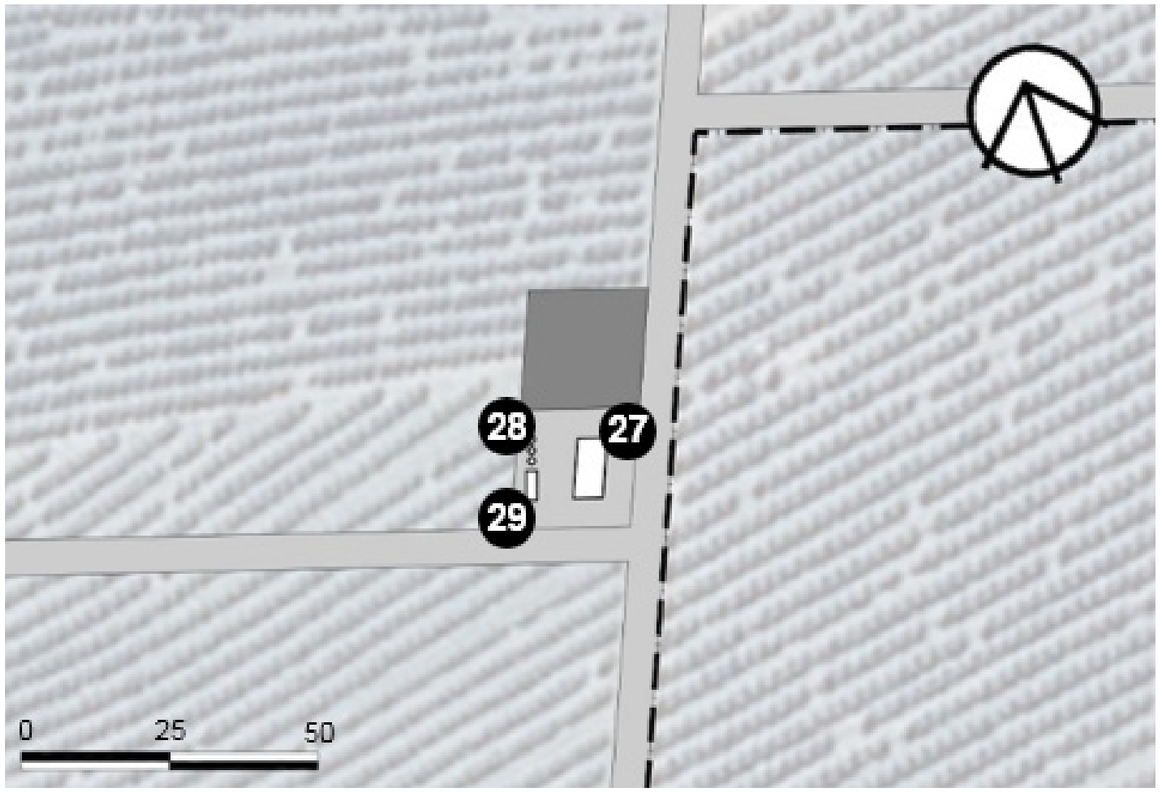
On North A Site a 1200 m² equipment warehouse is going to be built due to the highway duplication. The other facilities at UAE won´t have interventions. A 1,28 ha reservoir will be built to attend existing a new plantation area.



Map 3.2.7: Conceptual Master Plan – North B

North B Site will have a small building to support TTC activities (bathroom and rest area), parking lot and the minimum infrastructure required – water treatment and septic tank.





Legend

- Topography
- Hydrology
- Trees
- Preservation Area
- Site boundary
- Buildings
- Roads
- High-voltage lines
- Hydrology preservation area

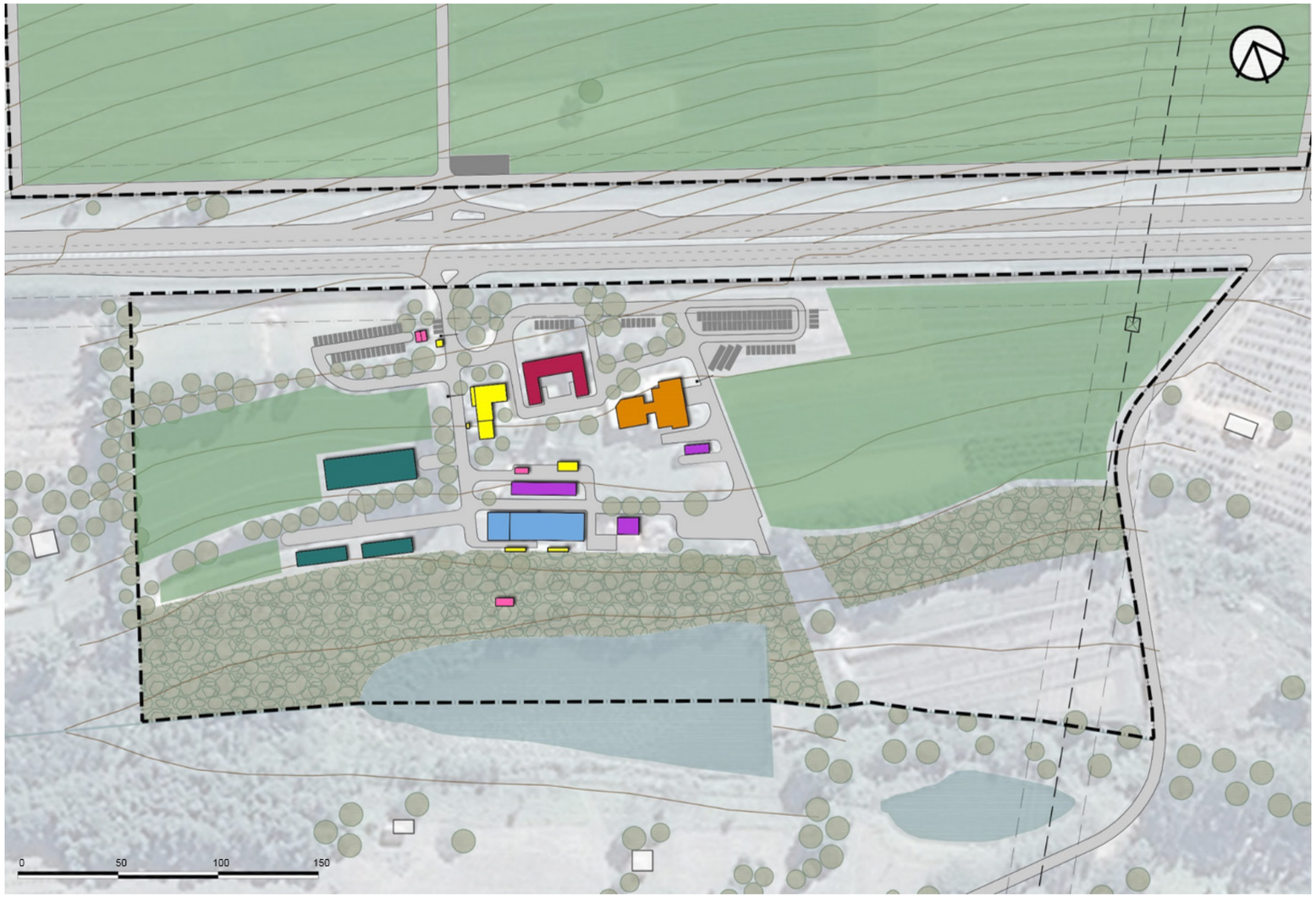
- 21 Warehouse 1
- 22 Shadehouse 2
- 23 Drying tank
- 24 Chemicals storage & Laboratory
- 25 Fuel station
- 26 Equipment warehouse 4

North A zoom buildings

- Hydrology preservation area

- 27 TTC Support area
- 28 Septic tank
- 29 Water treatment

North B zoom buildings



Map 3.2.8: Land Uses – South

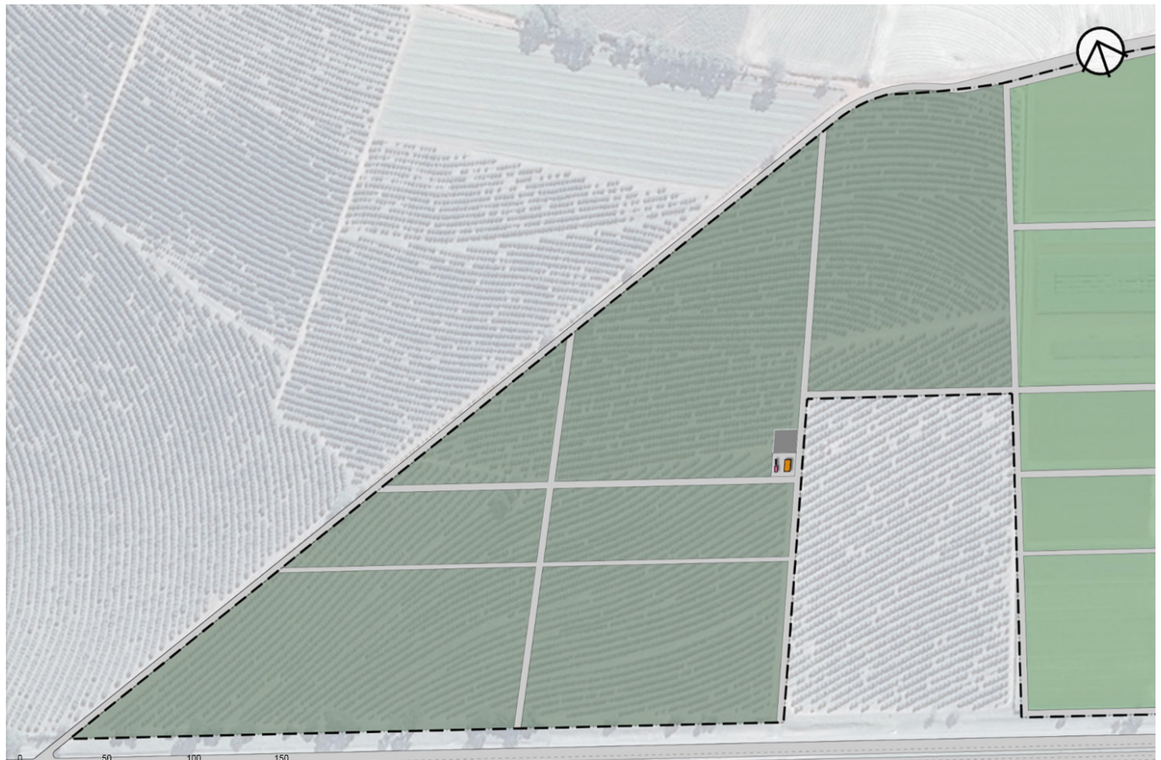
3.2.3 LAND USES

Land Uses were redistribute aiming to facilitate people flow between buildings, optimize process performance and day-by-day activities. Plantation areas were classified according to its main function – research and development and knowledge transfer. The following Figures show the proposed land uses.

Legend

- Topography
- Hydrology
- Trees
- Preservation Area
- Site boundary
- Buildings
- Roads
- High-voltage lines
- Hydrology preservation area
- Plantation
- Plantation TTC activities
- Adminstrative
- Laboratory
- Greenhouse / Shadehouse
- Production Support
- Support
- Leisure
- Visitation
- Infrastructure

Map 3.2.9: Land Uses – North A



Legend

- Topography
- Hydrology
- Trees
- Preservation Area
- Site boundary
- Buildings
- Roads
- High-voltage lines
- Hydrology preservation area
- Plantation
- Plantation TTC activities
- Adminstrative
- Laboratory
- Greenhouse / Shadehouse
- Production Support
- Support
- Leisure
- Visitation
- Infrastructure

Map 3.2.10: Land Uses – North B

Legend

- Topography
- Hydrology
- Trees
- Preservation Area
- Site boundary
- Buildings
- Roads
- High-voltage lines
- Hydrology preservation area

- Plantation
- Plantation TTC activities
- Adminstrative
- Laboratory
- Greenhouse / Shadehouse
- Production Support
- Support
- Leisure
- Visitation
- Infrastructure

Map 3.2.9: Land Uses – North A

Legend

- Topography
- Hydrology
- Trees
- Preservation Area
- Site boundary
- Buildings
- Roads
- High-voltage lines
- Hydrology preservation area

- Plantation
- Plantation TTC activities
- Adminstrative
- Laboratory
- Greenhouse / Shadehouse
- Production Support
- Support
- Leisure
- Visitation
- Infrastructure

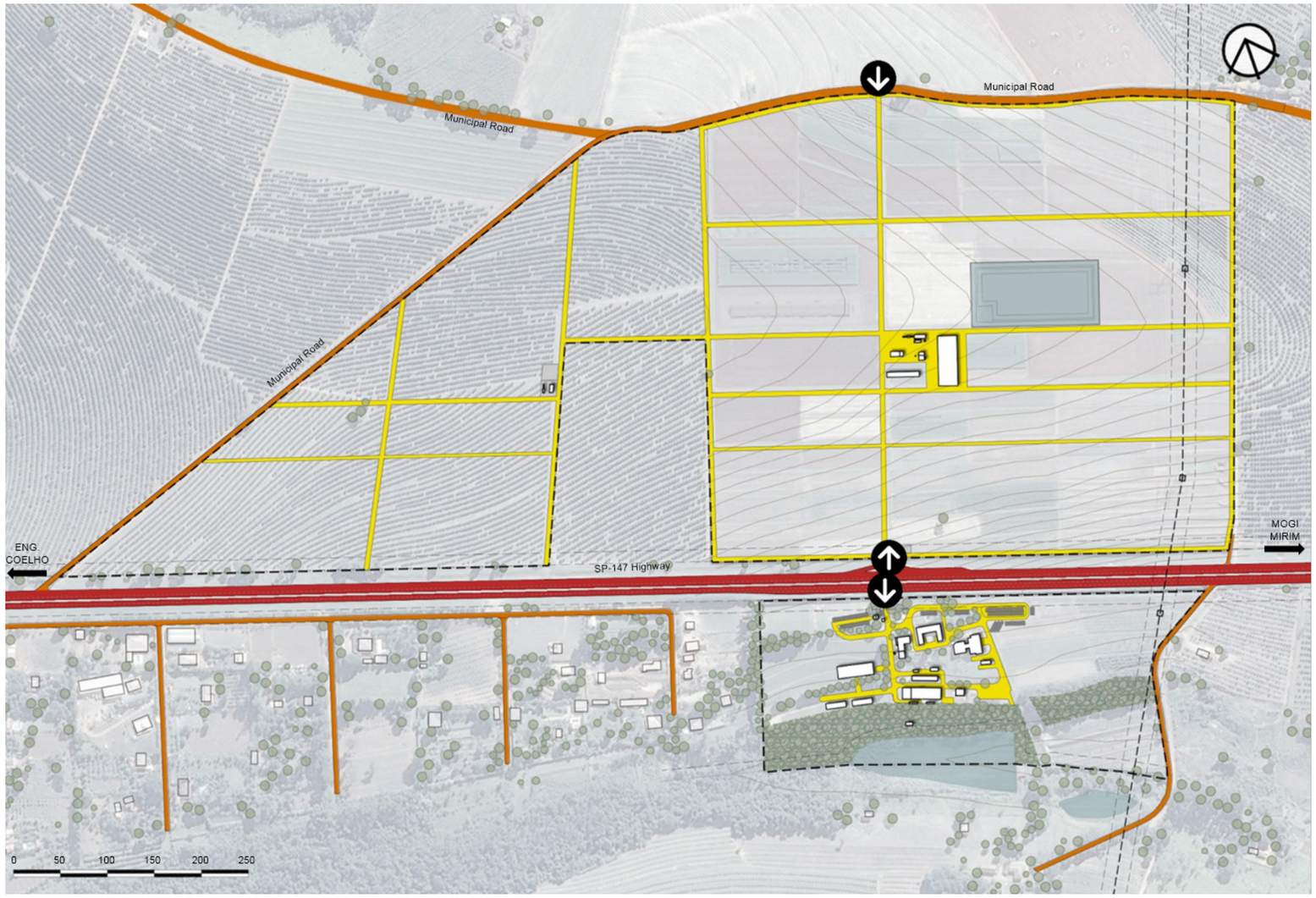
Map 3.2.10: Land Uses – North B

3.2.4 CIRCULATION

On the South Site the main entrance will be re-modeled due to highway duplication works. Therefor a new guardhouse should be built on the other site of the main road, avoiding the 15 meters from the highway limits.

Due to the TTC activities start and significant increase in visitors flow the Master Plan has considered relevant the separation between flows (visitors and employees).

The visitation activity will be concentrated in the north portion of the South Site to avoid and isolate visitors flow thru the site. For this purpose, a new internal road parallel to the highway will be built, connecting the main entry to TTC and the new visitor's parking lot. New gates will be installed to control vehicles flow within the site.

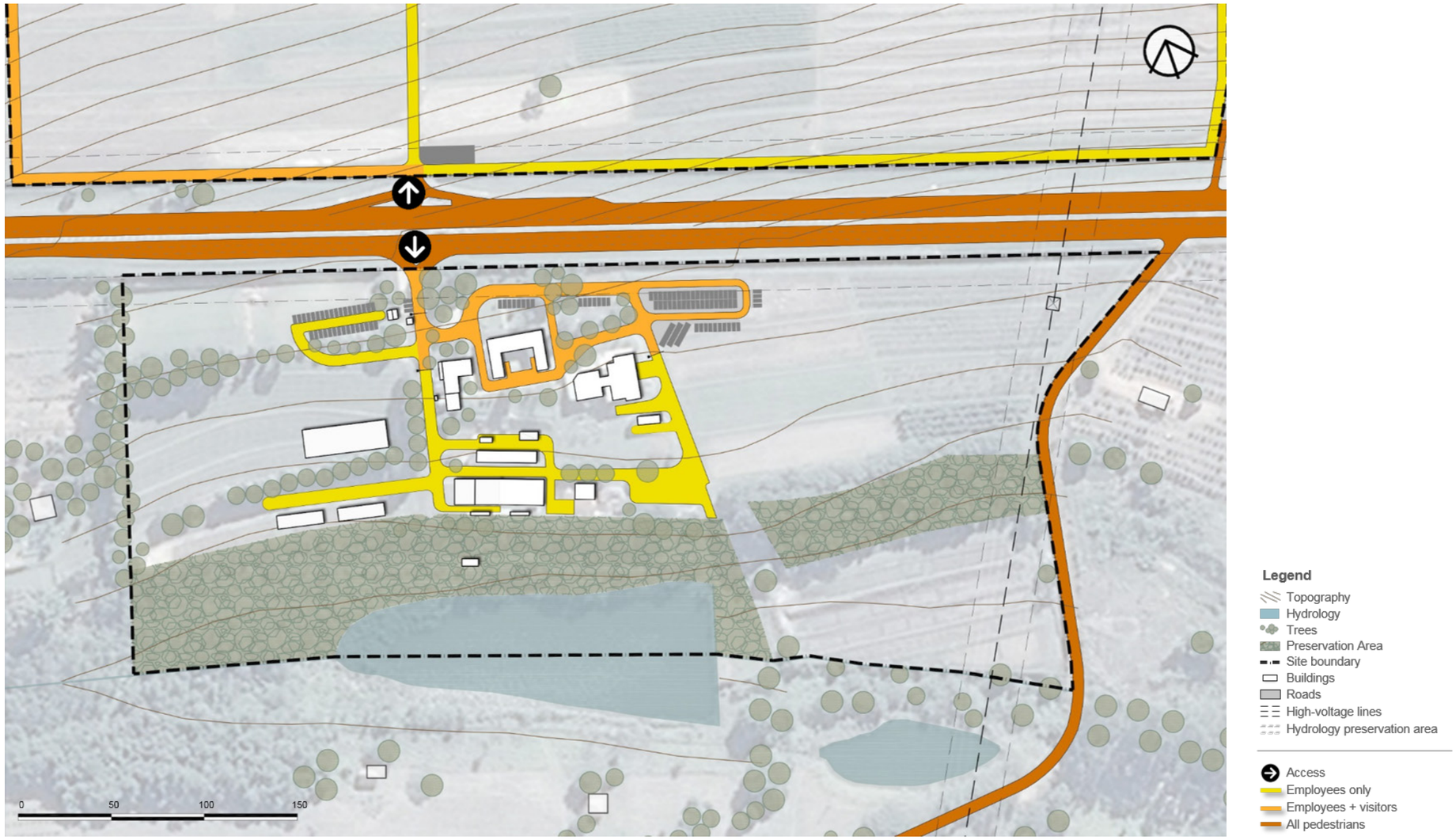


Legend

- Topography
- Hydrology
- Trees
- Preservation Area
- Site boundary
- Buildings
- Roads
- High-voltage lines
- Hydrology preservation area

- Access
- Employees only
- Employees + visitors
- All pedestrians

Map 3.2.11: General Circulation



Map 3.2.12: Circulation – South

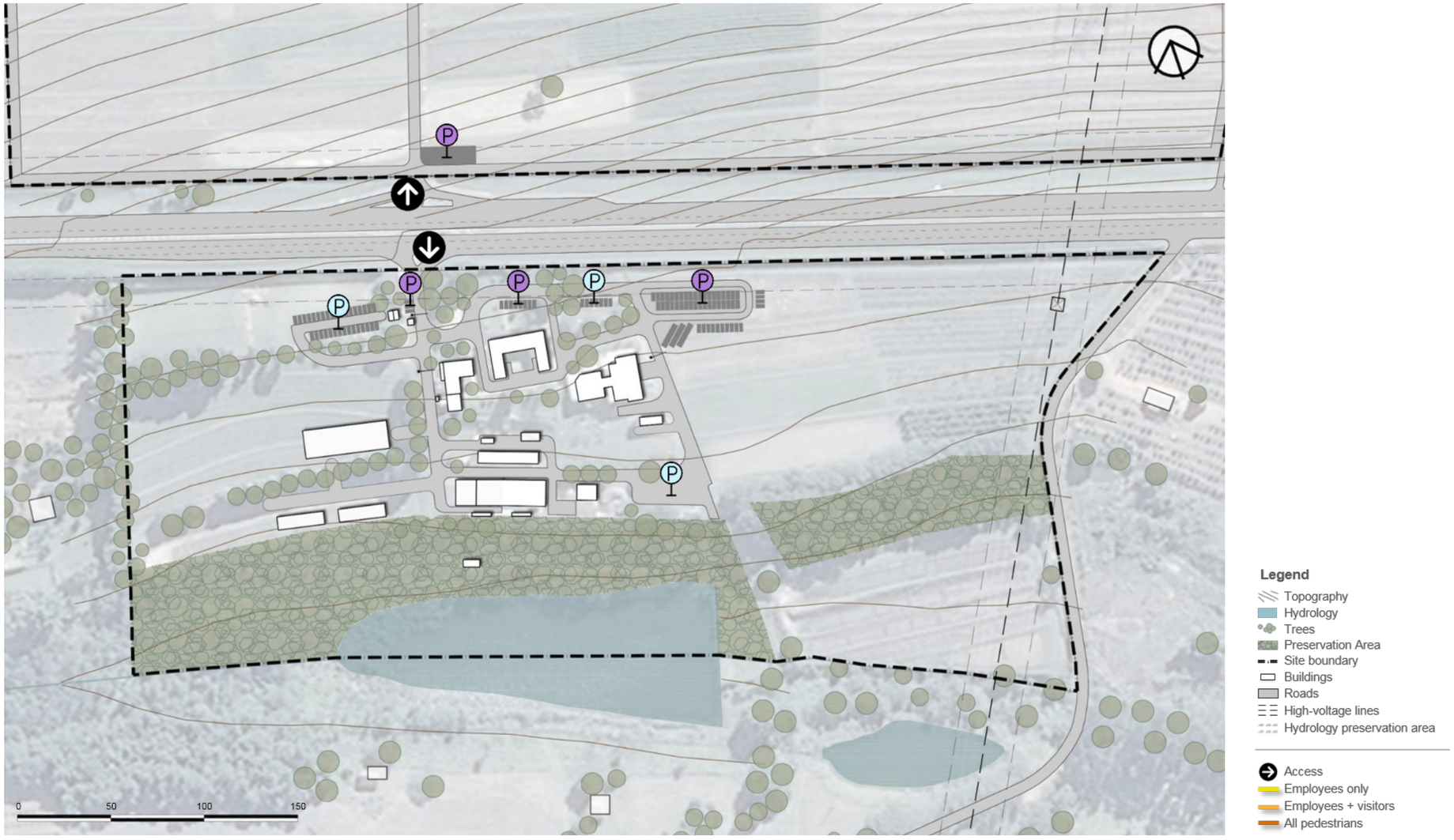
On the North A Site a new entrance will be built at the municipal road, in the opposite location of the current access. This second entrance will attend mainly DAS employees. The internal circulation will also attend DAS employees.

Legend

- Topography
- Hydrology
- Trees
- Preservation Area
- Site boundary
- Buildings
- Roads
- High-voltage lines
- Hydrology preservation area

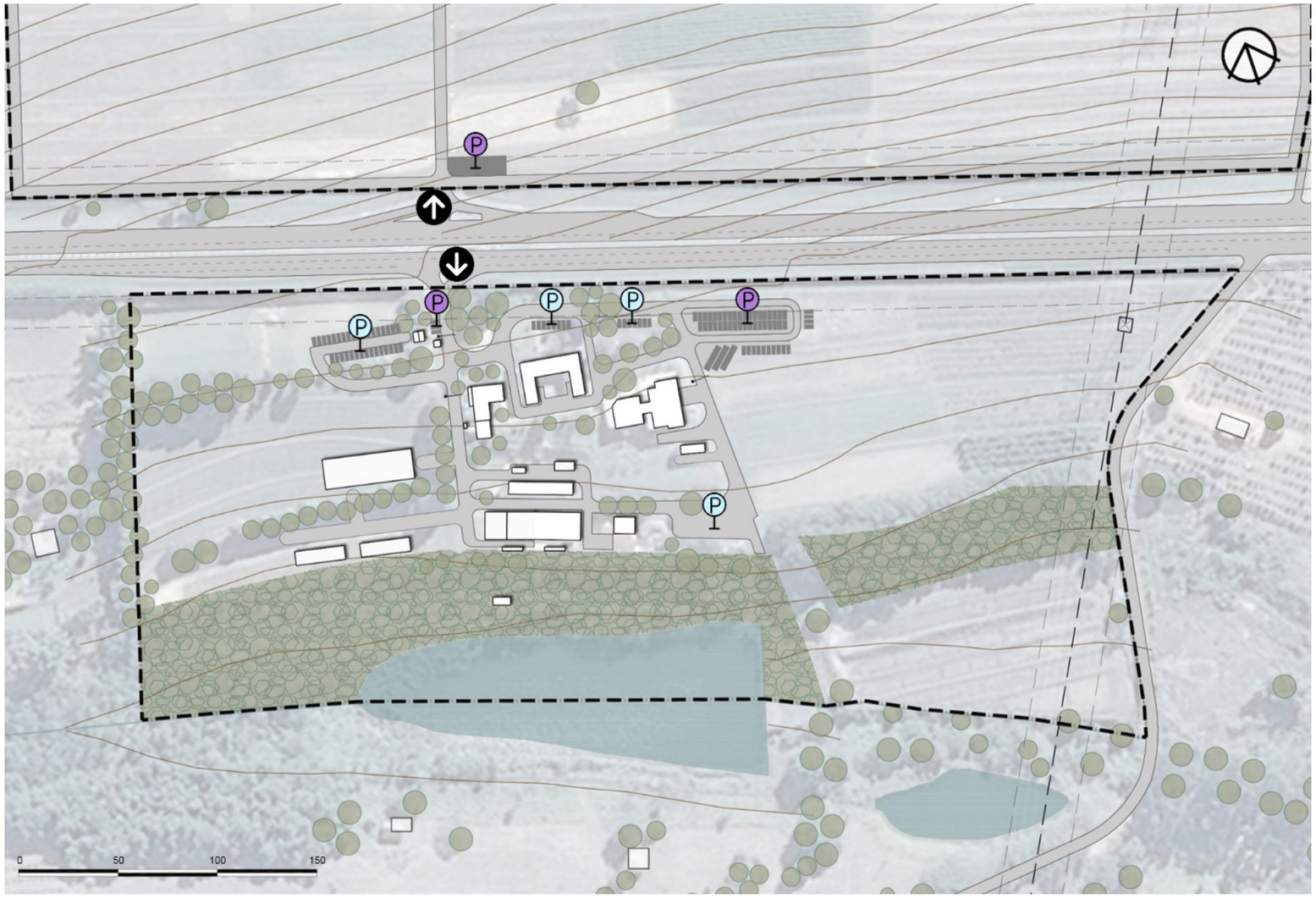
- Access
- Employees only
- Employees + visitors
- All pedestrians

Map 3.2.13: Circulation – Norte A



Map 3.2.14: Circulation – Norte B

The North B Site will receive both visitors and employees flow. The access will be done thru North A Site. If the plot between North A and B Sites is purchased, the internal road system can be easily adjusted to improve vehicles flow.

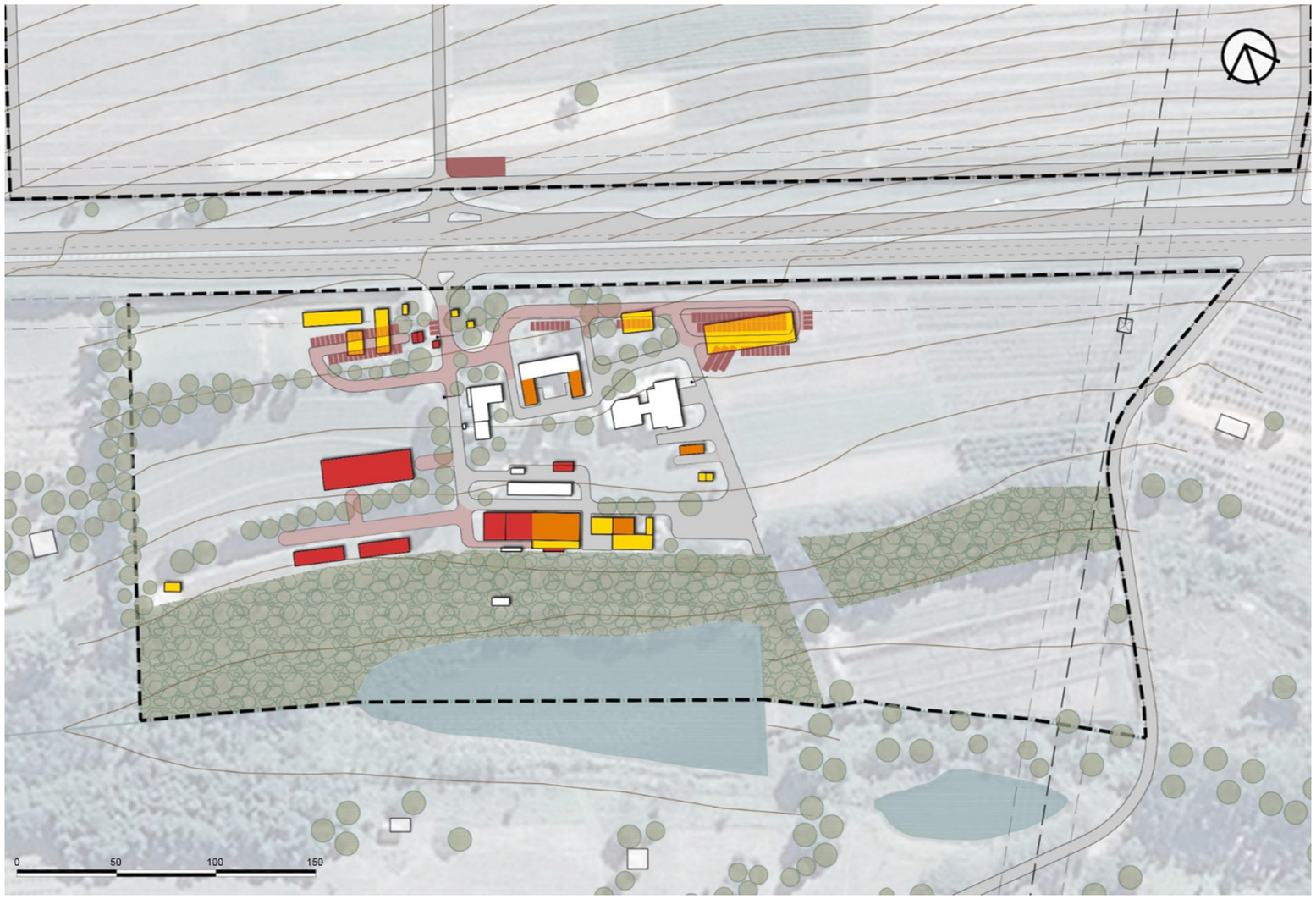


Map 3.2.15: Parking

In the current greenhouses area a new parking lot will be built for DAS employees. The other new parking lot will be built on the northeast side of South Site to attend visitor´s vehicles and buses. On the main entrance of the North A Site a parking lot will serve the vehicles to take visitors to North B Site.

3.2.5 INTERVENTIONS – ACTION PLAN

There are different types of interventions necessary to achieve the Master Plan completion. It is important to mention this is a high-level study, and additional studies should be done before starting the works. The following maps show the action plan forecasted at this stage.

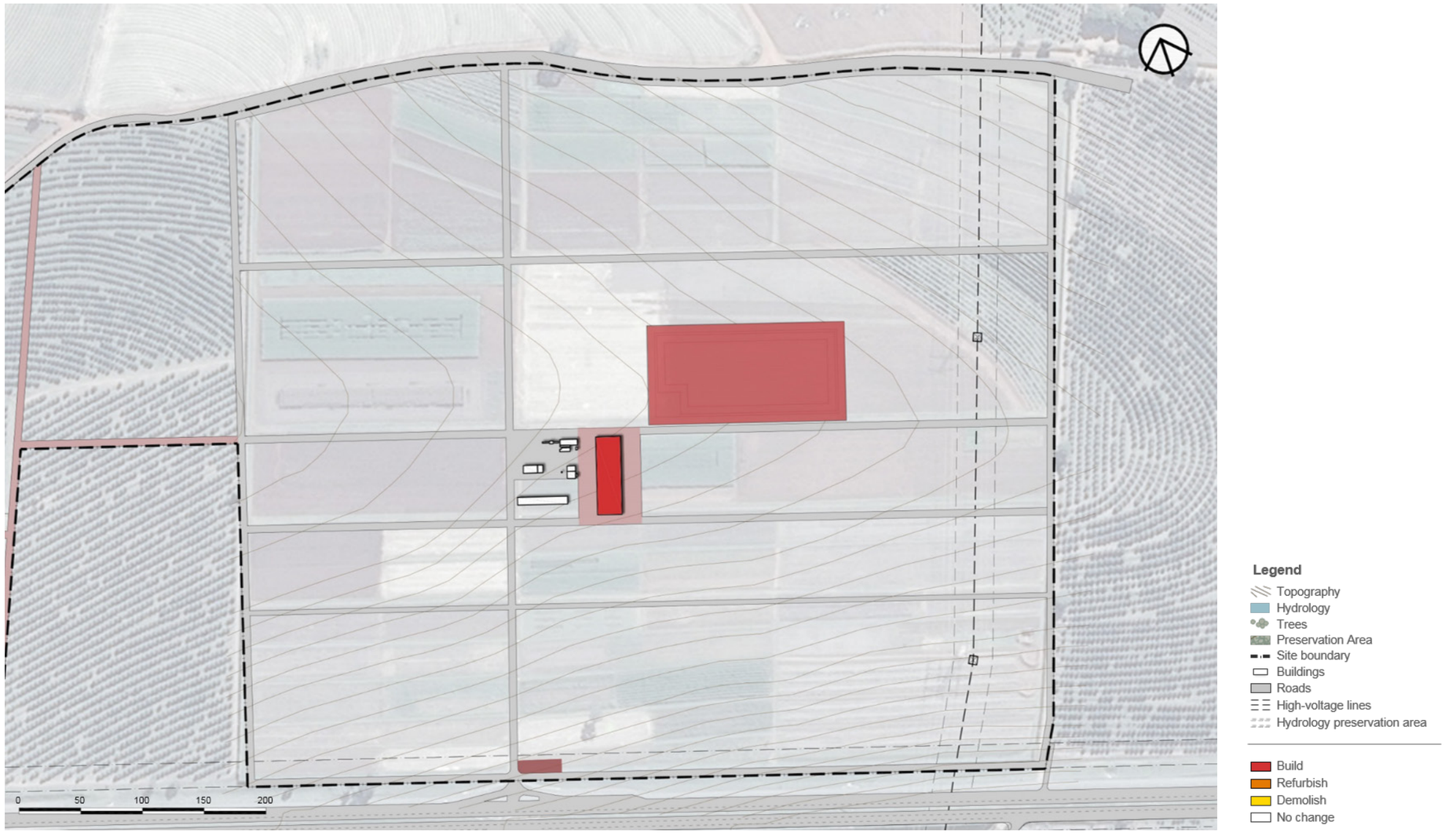


Legend

- Topography
- Hydrology
- Trees
- Preservation Area
- Site boundary
- Buildings
- Roads
- High-voltage lines
- Hydrology preservation area

- Build
- Refurbish
- Demolish
- No change

Map 3.2.16: Action Plan South



Map 3.2.17: Action Plan North A

Map 3.2.18: Action Plan North B

3.2.6 PHASING

CH2M has prepared two strategies for the Master Plan implementation: the first indicates all the interventions being done in one phase only, and the second one indicates the construction divided in phases. The phasing strategy considered the lower impact on site operation and daily activities and a feasible construction rationale and DAS planning for the site.

PHASING	ITEM	ACTION	SITE
1	Barbecue Area	Demolish	South
	Earth Movement	Earthworks	South
	New Guardhouse	Build	South
	Guardhouse	Demolish	South
	Greenhouse 1	Build	South
	Greenhouse 1	Demolish	South
	Greenhouse 2 (relocate)	Build	South
	Shadehouse (relocate)	Build	South
	Concrete Water tank	Other items	South
	Equipment Warehouse	Build	North (UAE)
	Water treatment	Other items	North (UAE)
	Sewage system	Other items	North (UAE)
	Update Power Infrastructure	Other items	North (UAE)
	Warehouse 3	Demolish	South

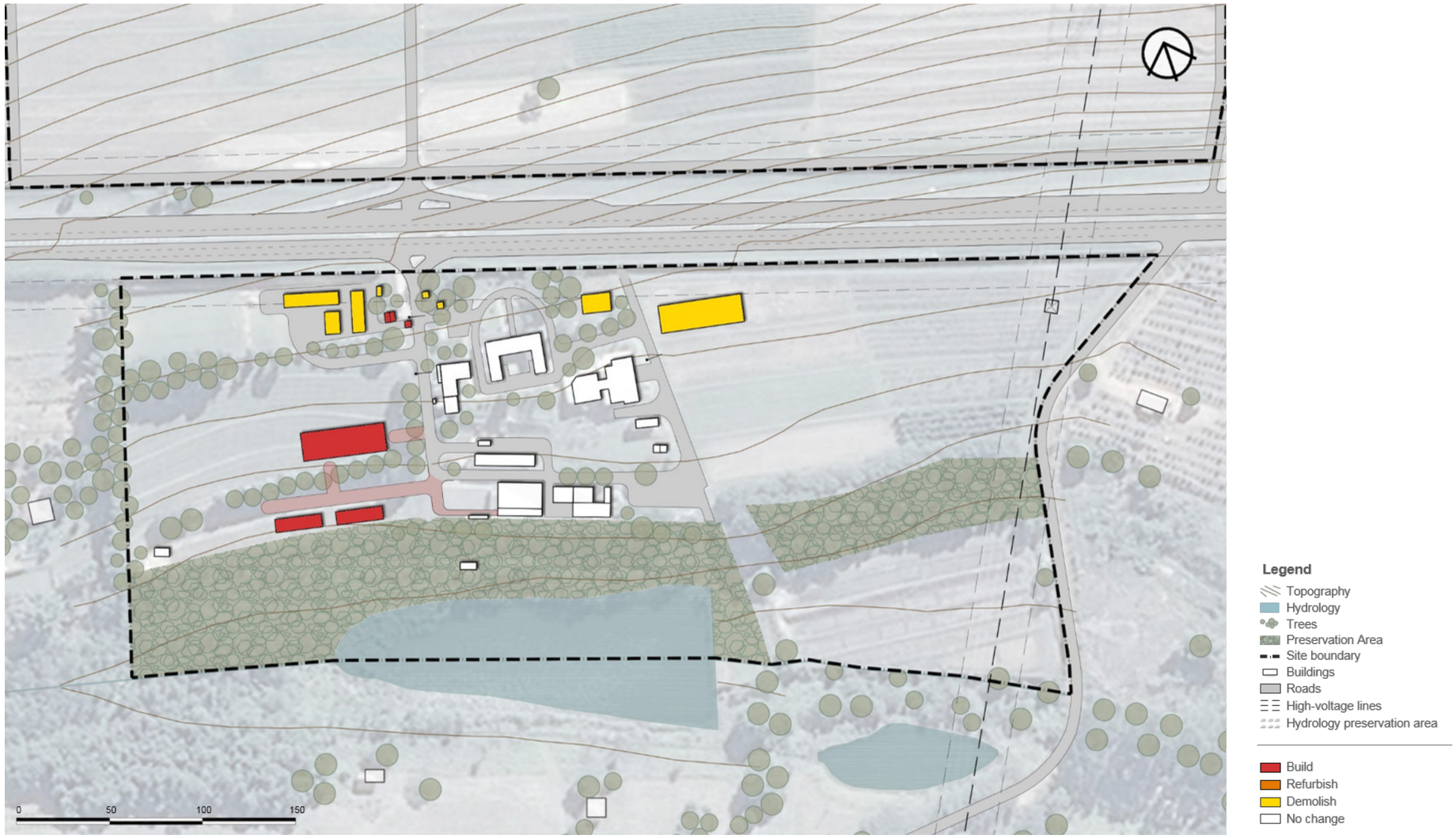
Table 3.2.1: Phase 1

	ITEM	ACTION	SITE
2	New Road to visitor Parking Area	New road	South
	Parking lot 2 along new road to TTC	Parking lot paving	South
	Visitor Parking Area	Parking lot paving	South
	New fence	Fence	North (new plot)
	Parking lot on north site entrance	Parking lot paving	North
	TTC Support Area	Build	North (new plot)
	New visitation support area	Paving	North (new plot)
	Parking lot for TTC Support Area	Parking lot paving	North (new plot)
	Water treatment	Other items	North (new plot)
	Sewage system	Other items	North (new plot)
	Update Power Infrastructure	Other items	North (new plot)
	Solid waste storage	Build	South
	New Chemicals storage (Vacant)	Refurbish/build	South
	Equipment warehouse area	Paving	North (UAE)
	Irrigation system	Other items	North (new plot)

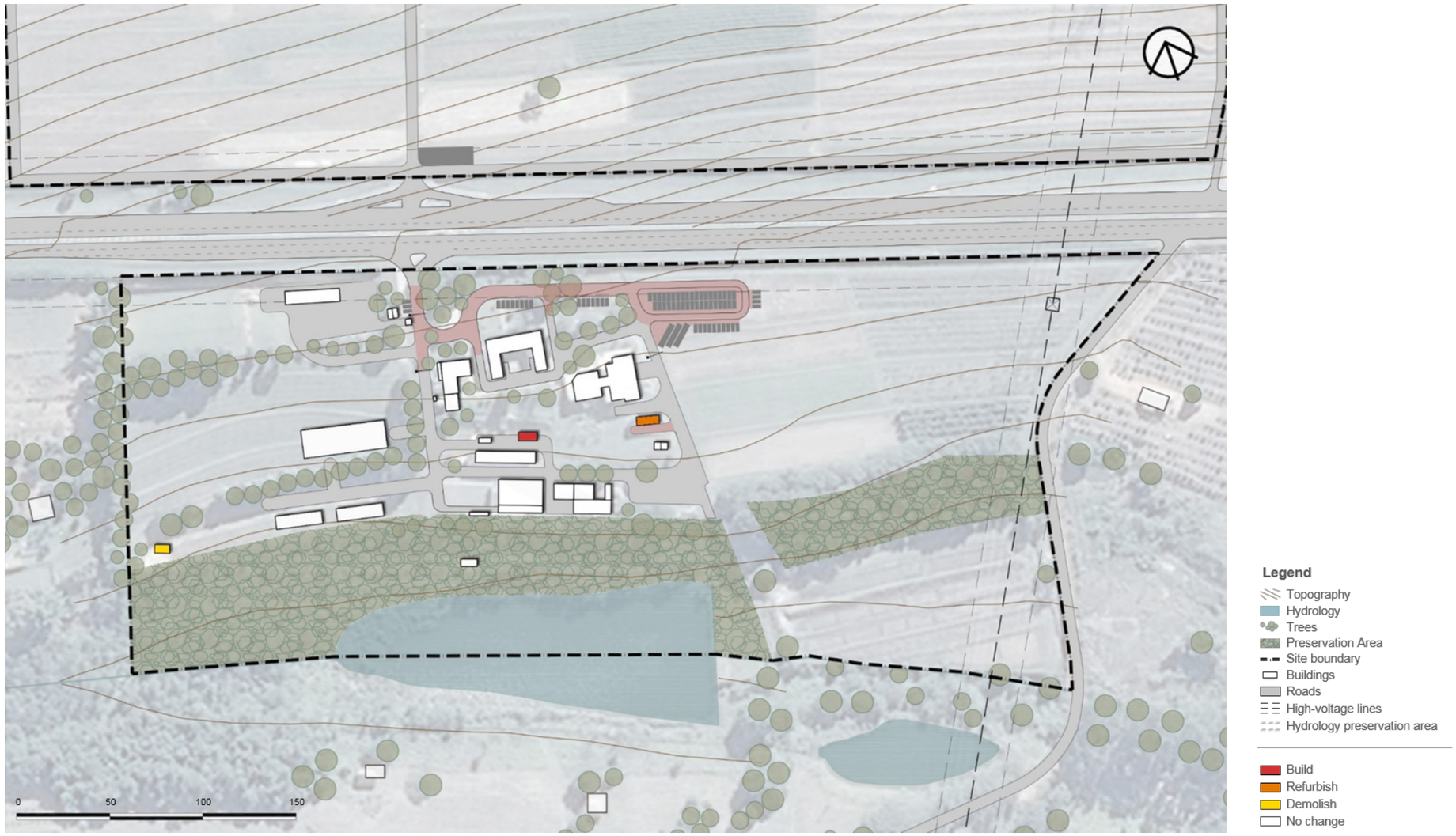
Table 3.2.2: Phase 2

	ITEM	ACTION	SITE
3	Due/mist chamber	Build	South
	New Lab	Build	South
	New Lab (Warehouse 1)	Refurbish	South
	New Harzadous storage (Lab)	Build	South
	Telheiro atrás Warehouse 1	Demolish	South
	Harzadous storage	Demolish	South
	Sewage system - new septical tank for new Lab	Other items	South
	Update Power Infrastructure - for new Lab	Other items	Souvth
	Road to employees parking lot	Paving	South
	Employees Parking Lot	Parking lot paving	South
	Main building	Refurbish	South
	New Field equipment warehouse (Insects Lab)	Refurbish	South

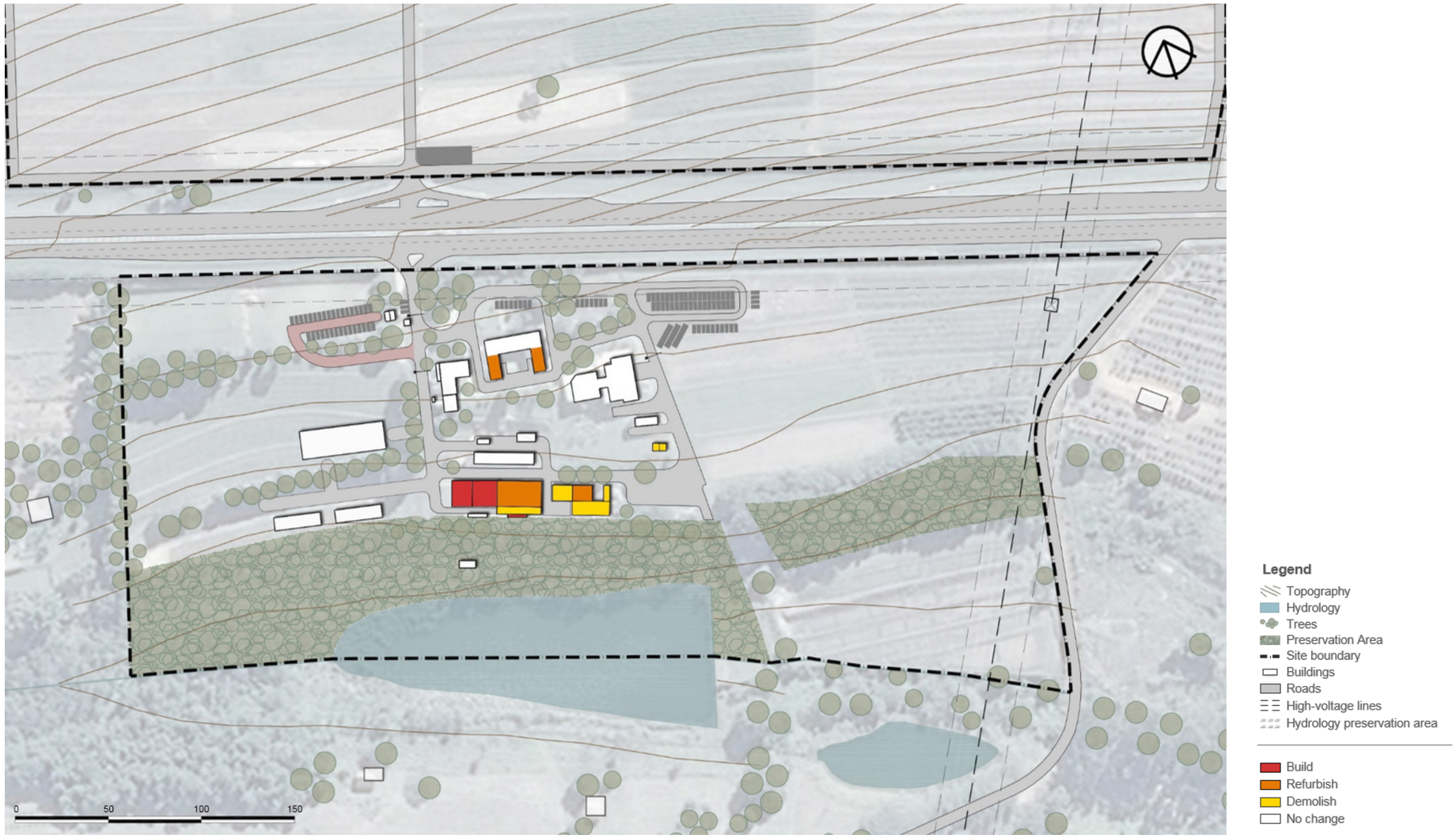
Table 3.2.3: Phase 3



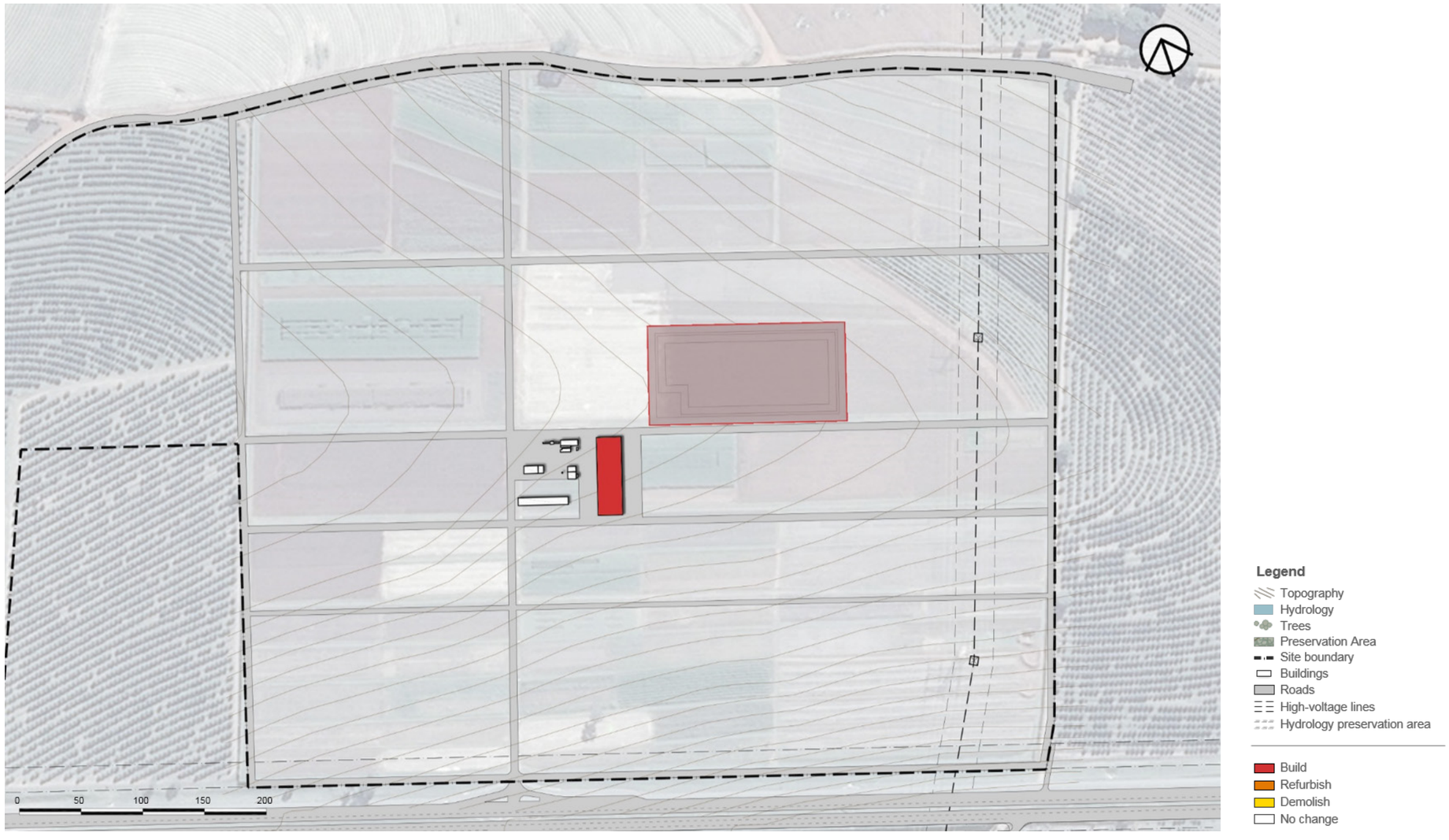
Map 3.2.29 Phasing – South Phase 1 - Rev 03



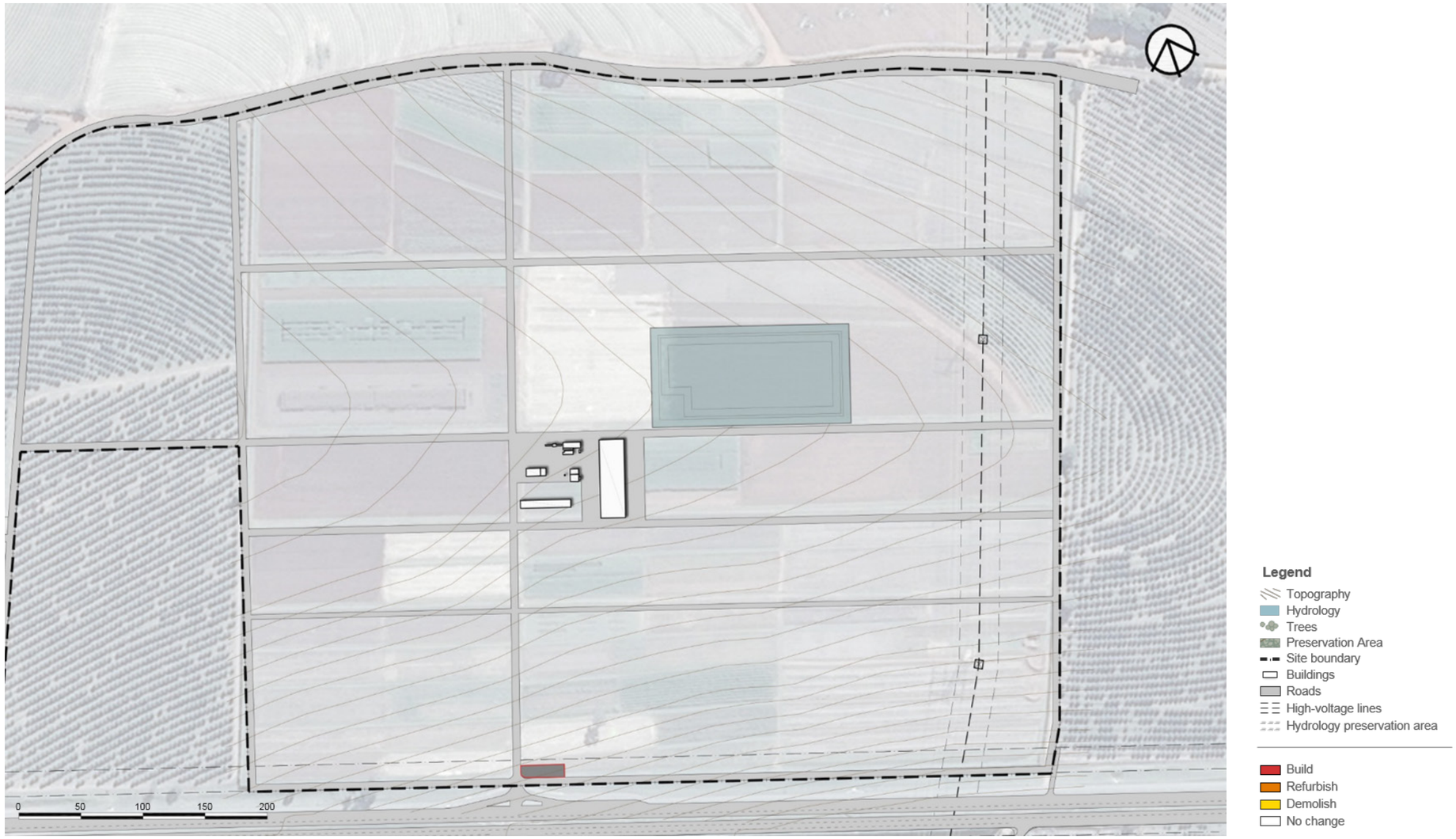
Map 3.2.29 Phasing – South Phase 2 - Rev 03



Map 3.2.31 Phasing – South Phase 3 - Rev 02



Map 3.2.32 Phasing – North A Phase 1 - Rev 02



Map 3.2.32 Proposal Phasing – North A Phase 2 - Rev 02

Map 3.2.32 Proposal Phasing – North B Phase 2 - Rev 02

4.

PROBABLE COST

4.1 COST ESTIMATE CLASSIFICATION

This cost estimate is considered a Class 4 or Schematic Cost Estimate as defined by AACE International, the Association for the Advancement of Cost Engineering (AACE). It is considered accurate between -15% to -30% on the low range side and +20% to +50% on the high range side. The availability of labor, materials and/or equipment may change on very short notice due to events outside our control and this may result in significant changes to the estimate pricing and assumptions. The cost estimates shown has been prepared for guidance in project evaluation and implementation from the information available at the time of the estimate.

The final cost of the project will depend upon the actual labor and material costs, competitive market conditions, final project costs, implementation schedule and other variable factors. As a result, the final project costs will vary from the estimates presented herein. Because of this, project feasibility and funding needs carefully reviewed prior to making specific financial decisions to help ensure proper project valuation and adequate funding.

4.2 BASE-DATE & EXCHANGE-RATE

The date-base established for the target construction cost of material, equipment, labor pricing and subcontractors is April 2015.

The price lists shown have been prepared for guidance in project evaluation and implementation from the information available at the time of the estimate. Pricing at time of order of materials will depend upon the actual material costs, competitive market conditions and other variable factors at the time of ordering.

For the purpose of converting the values of quoted supplies or works into Dollars, the following exchange-rate parities have been defined: 1 US$ = R$ 3,00.

The Cost Estimate is expressed in Reais (R$), the price was converted to US Dollars (USD) and it does not include Tax (VAT) or money remittance.

Costs were calculated with take-offs supplied by CH2M and units costs calculated to such an effect taken from CH2M data base of recent projects.

South site view

4.3 PHASING STRATEGY

CH2M has prepared two separate tables: one indicating the construction being done in one phase only, and the second one indicating the construction divided in phases. The phasing strategy considered the lower impact on site operation and daily activities and a viable construction rationale.

PHASE 1	
TOTAL PHASE1	
BRL	US$
R$ 19,858,511.42	R$ 6,619,503.81

	SUB-TOTAL PHASE1	$13,790,632.93
BUILDINGS	TOTAL COST	$4,936,149.53
	Laboratory building	$800,000.00
	Lab support building - due/mist chamber	$800,000.00
	Guard house	$152,000.00
	Green house - x2	$620,000.00
	Shade house	$78,000.00
	Solid waste warehouse	$92,389.76
	Electrical room	$53,759.77
	Equipment warehouse - north	$2,250,000.00
	Ttc support area - north	$90,000.00

REFURBISH	TOTAL COST	$3,154,000.00
	Lab (warehouse)	$1,505,000.00
	New chemical storage room - (vaccant)	[illegible]
	Main office building	[illegible]

DEMOLITION	[illegible] COST	$446,000.00
	Roof [illegible] to w[illegible]house 1	$23,750.00
	[illegible]arzadous storage	$7,250.00
	Insect lab & other buildings	$89,250.00
	Warehouse 3	$51,750.00
	Greenhouse 1	$38,000.00
	Greenhouse 2	$24,000.00
	Shadehouse 1 (desmontar)	$168,750.00
	Barbecue area	$38,750.00
	Guardhouse	$4,500.00

ROADS & PARKING	TOTAL COST	$2,600,025.00
	All roads on new plot - gravel	$257,500.00
	Parking lot 2 along new road to ttc	[illegible].00
	Visitor parking area	$471[illegible].00
	Parking lot for ttc [illegible]port [illegible] - g[illegible]	$10[illegible].00
	Parki[illegible]t [illegible]orth [illegible] - [illegible]el	[illegible],500.00
	[illegible] pa[illegible]g lo[illegible]	$241,200.00
	New ro[illegible]o la[illegible]arking lot	$406,800.00
	[illegible]ew road to visitor parking area	$1,071,000.00

GENERAL COSTS	TOTAL COST	$6,067,878.49
	Construction management	$2,344,407.60
	A/e services	$1,654,875.95
	Contingency	$2,068,594.94

SITE IMPROVE-MENT	Total cost	$2,654,458.40
	Water tank and treatment	$153,000.00
	New fence north - ml	$51,500.00
	Sewege sistem	$111,361.75
	Update power infrestructure	$1,670,426.18
	Water distribution	$111,361.75
	Earth movement	$556,808.73

TO BE DEFINED

Table 4.3.1: Probable Cost

PHASE 1	TOTAL PHASE 1	
	R$ 8,222,034.01 (BRL)	R$ 1,497,638.25 (US$)
	SUB-TOTAL PHASE 1	R$ 4,492,914.76

BUILDINGS	TOTAL COST	$3,192,389.76
	GUARD HOUSE	$152,000.00
	GREEN HOUSE - x2	$620,000.00
	SHADE HOUSE	$78,000.00
	SOLID WASTE WAREHOUSE	$92,389.76
	EQUIPMENT WAREHOUSE - North	$2,250,000.00

DEMOLITION	TOTAL COST	$212,000.00
	Shadehouse 1 (desmontar)	$168,750.00
	Barbecue Area	$38,750.00
	Guardhouse	$4,500.00

ROADS & PARKING	TOTAL COST	$1,08 25.
	Parking lot for TTC Sup re grav	$10,
	Parking orth site av	$7,500.00
	Roa visitor P ng A	$1,071,000.00

GENERAL COSTS	TOTAL COST	$2,740,678.00
	Construction Management	$1,096,271.20
	A/E Services	$822,203.40
	Contingency	$822,203.40

SITE IMPROVEMENT	TOTAL COST	$988,441.25
	Sewege sistem	$44,929.15
	Update Power infrestructure	$673,937.21
	Water distribution	$44,929.15
	Earth movement - buildings	$224,645.74

PHASE 2	TOTAL PHASE2	$1,461,380.40
	INFLATION	$108,250.40
	SUB-TOTAL PHASE 2	$719,750.00

BUILDINGS	TOTAL COST	$90,000.00
	TT PP T AP - North	$90,000.00

DEMOLITION	TOTAL COST	$113,750.00
	Warehouse 3	$51,750.00
	Greenhouse 1	$38,000.00
	Greenhouse 2	$24,000.00

ROADS & PARKING	TOTAL COST	$606,000.00
	Parking lot 2 along new road to TTC	$135,000.00
	Visitor Parking Area	$471,000.00

GENERAL COSTS	TOTAL COST	$475,035.00
	Construction Management	$175,619.00
	A/E Services	$131,714.25
	Contingency	$167,701.75

SITE IMPROVEMENT		$158,345.00
	Sewege sistem	$7,197.50
	Update Power infrestructure	$107,962.50
	Water distribution	$7,197.50
	Earth movement - buildings	$35,987.50

TO BE DEFINED

Table 4.3.2: Phasing Probable Cost

PHASE 3	TOTAL PHASE 3	$8,812,798.24
	INFLATION	$652,799.87
	SUB-TOTAL PHASE 3	$4,177,259.77

BUILDINGS	TOTAL COST	$1,653,759.77
	Laboratory building	$800,000.00
	Lab support building - due/mist chamber	$800,000.00
	Electrical room	$53,759.77

REFURBISH	TOTAL COST	$1,505,000.00
	LAB (WAREHOUSE)	$1,505,000.00

DEMOLITION	TOTAL COST	$113,000.00
	Roof/Structure next to Warehouse 1	$23,750.00
	Insesct Lab & other buildings	$89,250.00

ROADS & PARKING	TOTAL COST	$905,[illegible].00
	Lab Parking Lot	$2[illegible].00
	New Road to lab parking lot	$40[illegible].00
	All roads on new [illegible] gr[illegible]	$257[illegible]

GENERAL COSTS	TOTAL CO[illegible]	$2,859,241.45
	Construction Management	$1,060,151.38
	A/E Services	$795,113.54
	Contingency	$1,003,976.53

SITE IMPROVEMENT		$1,123,497.15
	Sewege sistem	$41,772.60
	Update Power infrestructure	$626,588.97
	Water distribution	$41,772.60
	Earth movement - buildings	$208,862.99
	Water Tank and Treatment	$153,000.00
	New fence North	$51,500.00

PHASE 4	TOTAL PHASE 4	$3,005,100.00
	INFLATION	$222,600.00
	SUB-TOTAL PHASE 4	$1,656,250.00

BUILDINGS	TOTAL COST	$-

[illegible]RBIS	TOTAL COST	$1,649,000.00
	New [illegible] storage room - (vaccant)	$81,000.00
	Main office building	$1,568,000.00

DEMOLITION	TOTAL COST	$7,250.00
	Harzadous storage	$7,250.00

ROADS & PARKING	TOTAL COST	$-

GENERAL COSTS	TOTAL COST	$927,500.00
	Construction Management	$371,000.00
	A/E Services	$278,250.00
	Contingency	$278,250.00

SITE IMPROVEMENT		$198,750.00
	Sewege sistem	$16,562.50
	Update Power infrestructure	$165,625.00
	Water distribution	$16,562.50
	Earth movement - buildings	$-

TO BE DEFINED

(Cont.) Table 4.3.2: Phasing Probable Cost

4.4 EXCLUSIONS

- Noise mitigation.
- Safety at site work.
- Governmental permission and licenses.
- Construction all risk insurance.
- Delay in Start-up insurance.
- DAS financial expenses.
- DAS overhead costs.
- DAS Capital Interest.
- Premium time (overtime, shift work, etc.).
- Salary Bonus.
- Escalation.
- Risk Analysis.

4.5 ASSUMPTIONS & QUALIFICATION

• We assume that the exchange rate Real / Dollar stated hereinabove is constant.

• Site has no contains hazardous material or toxic gases or archaeological material that can change the schedule of the Project.

• Availability of qualified labor at site.

• Availability of drinking water and electricity for the Contractors.

• Contractor delivery on time.

ITEMS NOT INCLUDE IN THE COST ESTIMATE:

- Demolitions
- Relocations (gas tanks, etc.)
- Topographic survey
- Testing and characterization of soil (Soil Boring)
- Geotechnical consulting
- Jobsite temporary installation and maintenance
- Security
- Site cleaning and disposals.

Internal road

5.

LEGAL ISSUES

5.1 MUNICIPAL ZONING

All work done at the Mogi Mirim site will be required to be designed under NBRs (Brazilian Standards) from ABNT (Brazilian Association of Technical Standards) and local codes. The plots in the south side are in urban and rural areas (Figure 5.1.1) and building permits are required for all new construction, remodeling, structural changes or upgrades in the urban parcel.

Special inspections are required for footings, framing, insulation, plumbing, and electrical wiring. However Fire Marshal design criteria should be followed and a final inspection is required before occupancy.

The permits and approved constructed areas need to be updated in the municipality. Some constructions need to be recognized by municipality records and a new process of document regularization is needed.

Site planning review and permit is required by the City of Mogi Mirim.

Fees are based on the local codes and building valuation data with occupancy and type of building, square footage.

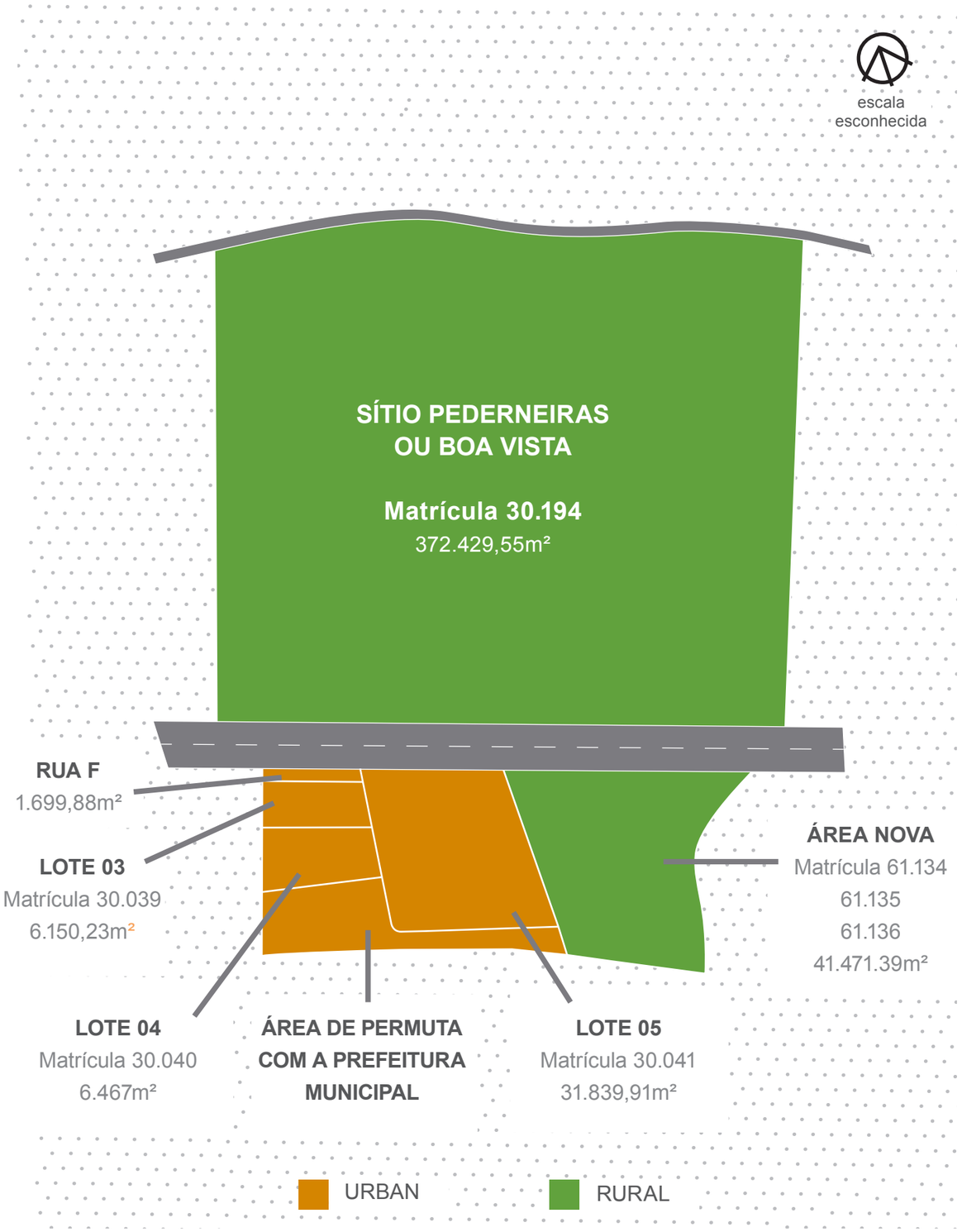


Figure 5.1.1: Registration Property Division

REGISTRATION PROPERTY NUMBER *MATRÍCULA*	CITY *CIDADE*	STATE *ESTADO*	ENTITLEMENT (REGISTRED COMPANY NAME) *TITULARIDADE (RAZÃO SOCIAL)*	LEGAL ENTILY REGISTRATION NUMBER *CNPJ DO TITULAR*	PROPERTY DESCRIPTION AND REGISTRATION HISTORY *DESCRIÇÃO DO IMÓVEL E HISTÓRICO DA MATRÍCULA*	PROPERTY CLASSIFICATION IMÓVEL *RURAL, URBANO OU INDUSTRIAL*	PLOT SIZE (ACCORDING TO REGISTRATION) *TAMANHO DA ÁREA (CONFORME MATRÍCULA)*	BUILT UP AREA *ÁREA CONSTRUÍDA*	URBAN TAXPAYER NUMBER *Nº DO CONTRIBUINTE (IPTU)*	URBAN FEE *VALOR IPTU (R$)*
30.039	Mogi Mirim	SP	Dow Agrosciences Industrial Ltda	47.180.625/0001-48	Lote nº 3, Qd F do Loteamento Chácaras Boa Vista	Urban *Urbano*	6,150.23 m²	Doesn´t have building *Não tem edificação*	4.356.440.971-001/41	10.543,84
30.040	Mogi Mirim	SP	Dow Agrosciences Industrial Ltda	47.180.625/0001-48	Lote nº 4, Qd F do Loteamento Chácaras Boa Vista	Urban *Urbano*	8,467.48 m²	2,371.15 m² - IPTU	4.356.440.971-001/41	Exempt from tax *Isento*
30.041	Mogi Mirim	SP	Dow Agrosciences Industrial Ltda	47.180.625/0001-48	Lote nº 5, Qd F do Loteamento Chácaras Boa Vista	Urban *Urbano*	31,839.91 m²	It has buit up area *Tem área construida*	4.356.440.971-001/41	Exempt from tax *Isento*
30.194	Mogi Mirim	SP	Dow Agrosciences Industrial Ltda	47.180.625/0001-48	Gleba de Terras Pederneiras/Boa Vista - Fazenda Experimental	Rural *Rural*	372,429.55 m²	Doesn´t have building *Não tem edificação*	N/A	N/A
61.134	Mogi Mirim	SP	Dow Agrosciences Industrial Ltda	47.180.625/0001-48	Parte ideal da Gleba de Terras A do Sitio Bela Vista	Rural *Rural*	6,293.60 m²	Doesn´t have building *Não tem edificação*	N/A	N/A
61.135	Mogi Mirim	SP	Dow Agrosciences Industrial Ltda	47.180.625/0001-48	Parte ideal da Gleba de Terras B do Sitio Bela Vista	Rural *Rural*	4,753.27 m²	Doesn´t have building *Não tem edificação*	N/A	N/A
61.136	Mogi Mirim	SP	Dow Agrosciences Industrial Ltda	47.180.625/0001-48	Parte ideal da Gleba de Terras C do Sitio Bela Vista	Rural *Rural*	30,424.52 m²	Doesn´t have building *Não tem edificação*	N/A	N/A

Table 5.1.1: Registration Property Division

5.2 ENVIRONMENTAL CONSIDERATIONS & PERMITTING

As a preliminary evaluation of potential applicability of the following environmental permitting programs to the DAS project in Mogi Mirim, São Paulo:

- Construction Storm Water
- Air Quality
- Industrial Storm Water
- State Environmental Policy Act

Other environmental regulatory programs or permitting programs that have not been evaluated based on the preliminary project definition include the following:

- Environmental site due diligence or actions stemming from any Phase Environmental Site Assessment work including soil or groundwater remediation activities or asbestos or other hazardous materials abatement;
- The existence of or impacts to wetlands or other “water bodies”;
- The existence of or impacts to rare, threatened, endanger species, or significant historical/ archeological/ paleontological resources;
- Solid or hazardous waste management or permitting;
- Water rights permits;
- Ground water discharge permits;
- Drinking water system approvals;
- Industrial wastewater discharge permits.

Further discussion and recommendations related to the above types of activities should be coordinated with DAS corporate environmental management staff.

South View from the Main Building

6.

NEXT STEPS

6.1 INFORMATIONAL NEEDS FOR NEXT DESIGN PHASE

For the project next phase a detailed design for the new and refurbished buildings, infrastructure and systems is necessary.

STRUCTURAL AND ARCHITECTURAL OVERVIEW

Evaluations of existing buildings are qualitative at this stage due to lack of as-built drawings. As a result, provisions for building self-weight and collateral loads, and expected wind forces are not known.

The rationale is that the existing buildings could be repurposed for new functions with some minor adaptations.

Therefore, the work and cost needed to be evaluate to suite existing buildings in potential new functions.

New loads on the existing structures (insulation and architectural finishes, mechanical and electrical equipment, plumbing and fire protection piping, etc.) may be limited by available capacities and should be considered.

It is assumed that the building's foundations contain adequate systems to support major renovations; however, this should be further evaluated should the conceptual mater plan design emphasize the repurpose of the existing buildings.

TOPOGRAPHIC SURVEY AND GEOTECHNICAL REPORT

A Topographic survey and geotechnical evaluation of the site will be required.

In addition to the typical items required, Civil will need percolation tests completed for the design of the proposed septic system.

AS-BUILT STRUCTURAL SURVEYS FOR EXISTING BUILDINGS

As-built surveys and engineering analyses will be necessary to determine available load capacities. For all existing buildings.

DOMESTIC WATER PRESSURE AND FLOW TESTING

As no hydraulic design was provided existing pressure/flow information and pipe locations are unknown. Onsite testing should be performed to validate the information provided.

ROAD DUPLICATION AND NEW ENTRANCE STUDY

Due to road duplication the main entrance and Gatehouse will need to be redefined and for this purpose some information is necessary from the concessionary:

- Updated project, including plant, cross sections, altimetry, topographic survey, planned works, location of returns (both directions);
- Proposed relocation for tunnel and guardhouse;
- DAS access drainage project for the new tunnel area;
- Geometrical solution for the site new access;
- Road project design speed.

From DAS it is necessary to have the following information:

- Information about Vehicles to be used in the site (dimensions and maximum ramp capacity – Gators, Buses, Vans, Tractors)
- Topographic survey

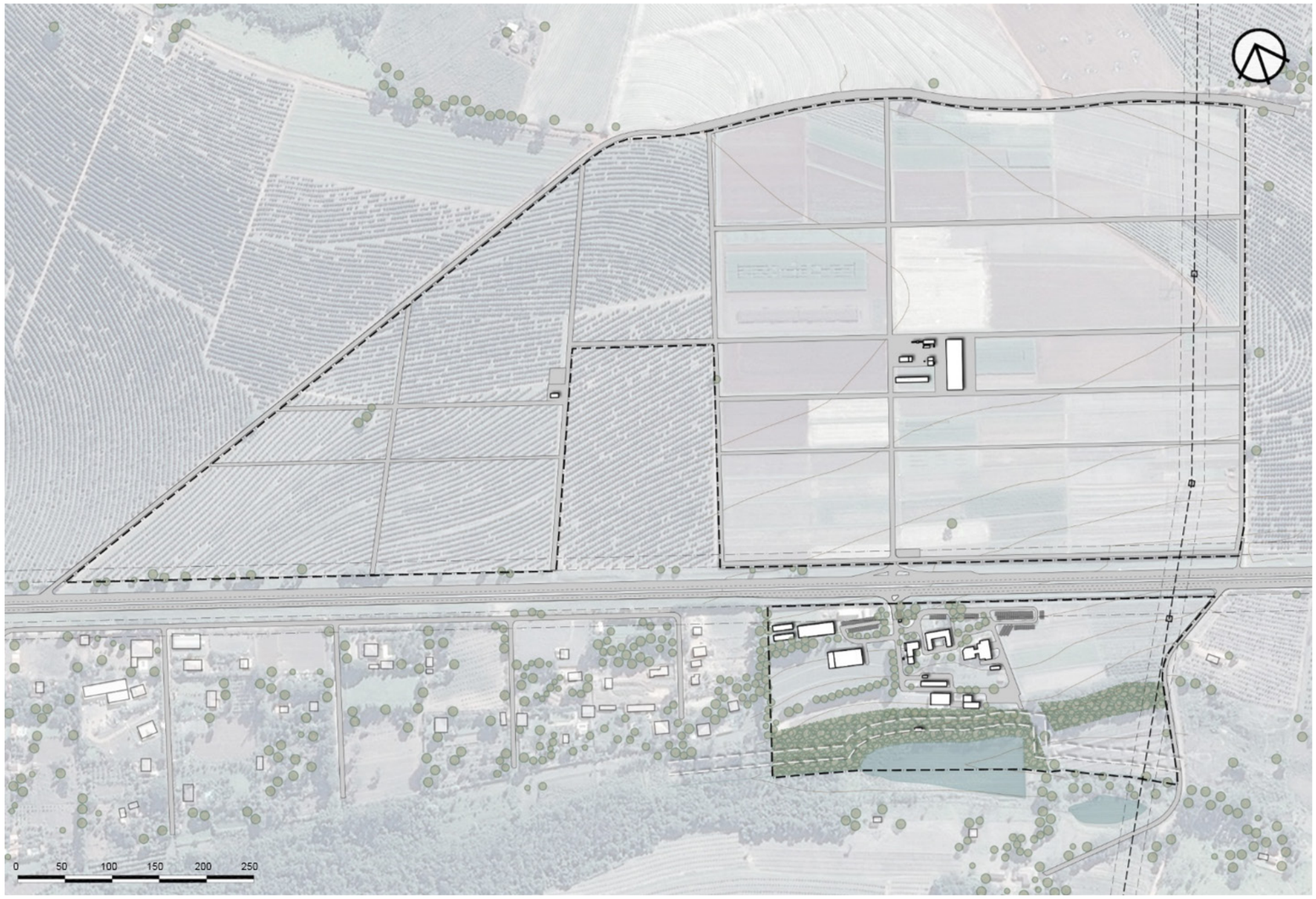
Highway Duplication Works

APPENDIX

Three alternatives were considered for Site Development. The following diagrams represent the options not developed, included for reference.

I - ALTERNATE MASTER PLAN - OPTION 2

Option 2 considered the flat lane available on the northeast portion of the South Site to locate greenhouses and shadehouse. An area from the grape field would be occupied by the new laboratory, with direct access to green and shadehouses. This option was not considered because of the occupation of the area close to the right-of-way.



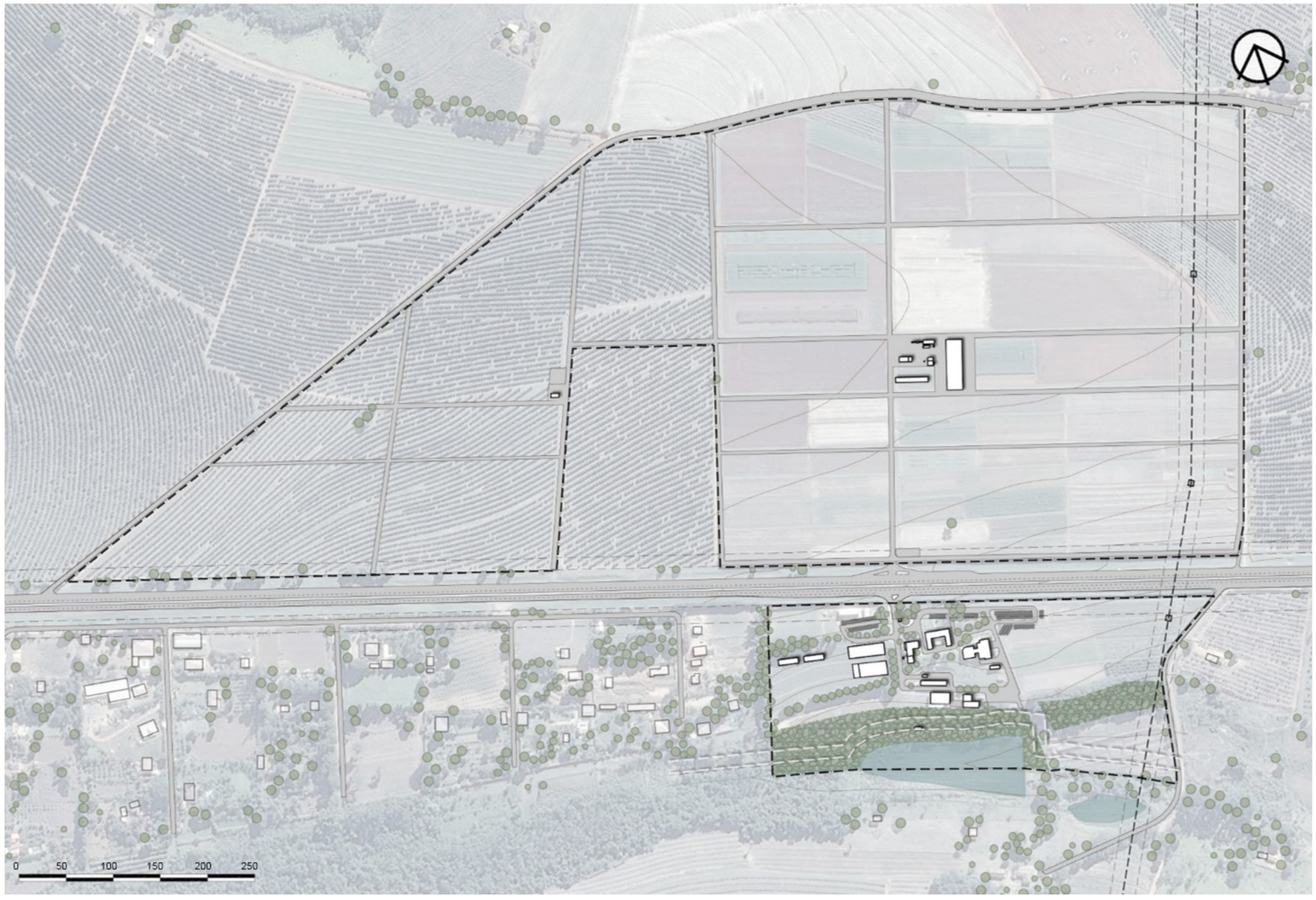
Legend

- Topography
- Hydrology
- Trees
- Preservation Area
- Site boundary
- Buildings
- Roads
- High-voltage lines
- Hydrology preservation area

MAP Proposal 2

II - ALTERNATE MASTER PLAN - OPTION 3

Option 3 considered the occupation of the grape field. Greenhouses, shadehouse and the new laboratory would be built there. This option was not considered because of the steep topography and associated increase in building costs.



Legend

- Topography
- Hydrology
- Trees
- Preservation Area
- Site boundary
- Buildings
- Roads
- High-voltage lines
- Hydrology preservation area

MAP Proposal 3

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