

Desalination Plant

Monterey, California

SCHEMATIC DESIGN

Cal Poly Architecture and Environmental Design
Graduate Research Studio

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MPWSP Desalination Plant
Monterey, CA

Produced by

CAL POLY
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John Kilpatrick

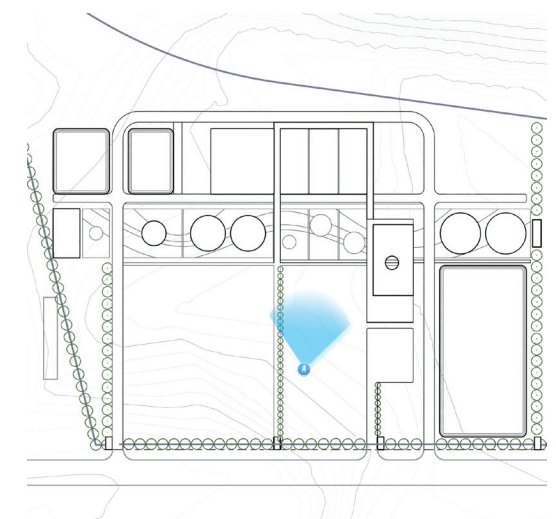
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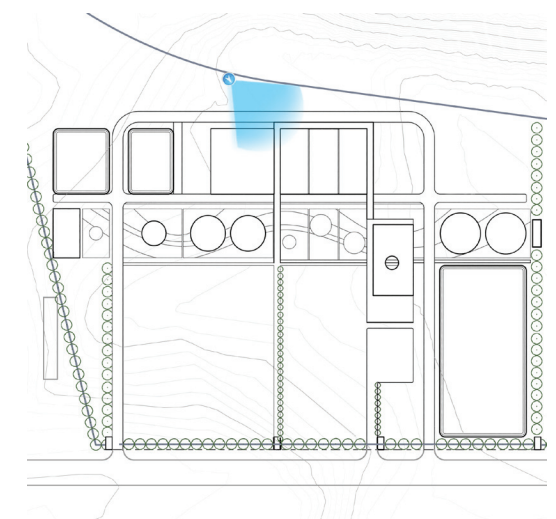
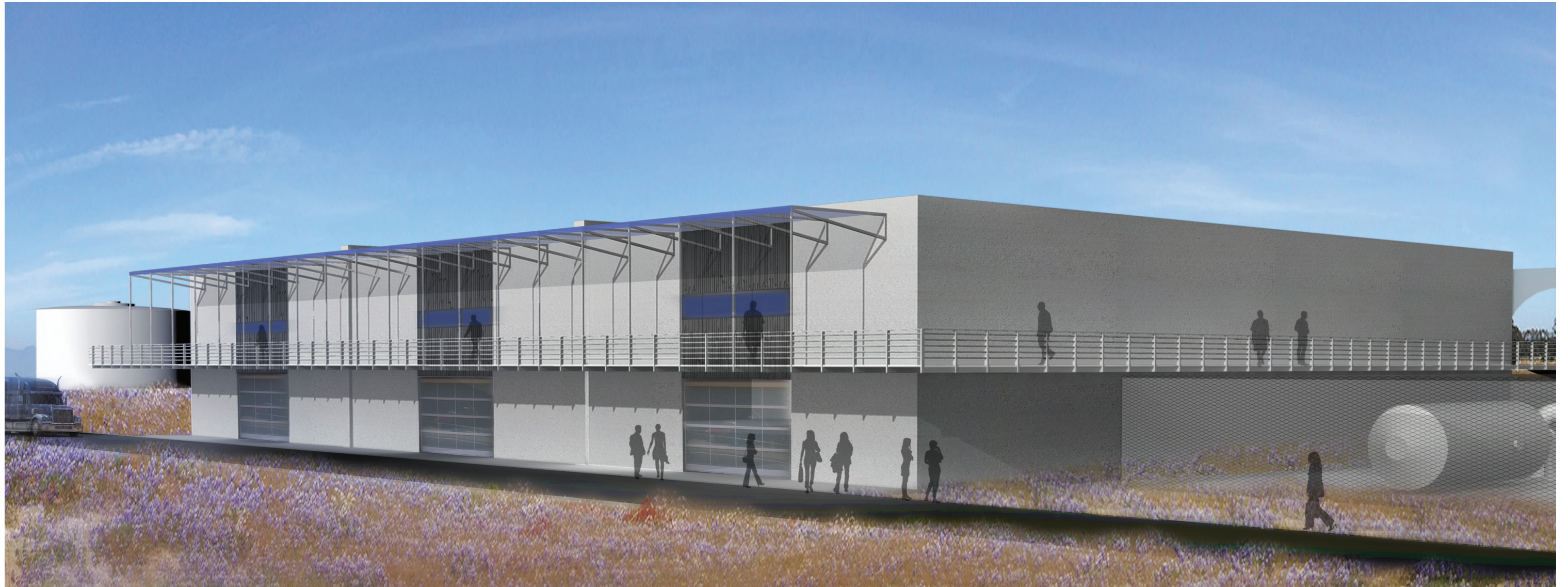
01 introduction

- Site Aerial View
- Site Plan
- Site Plan : Sustainable Features
- Graphic Project Summary



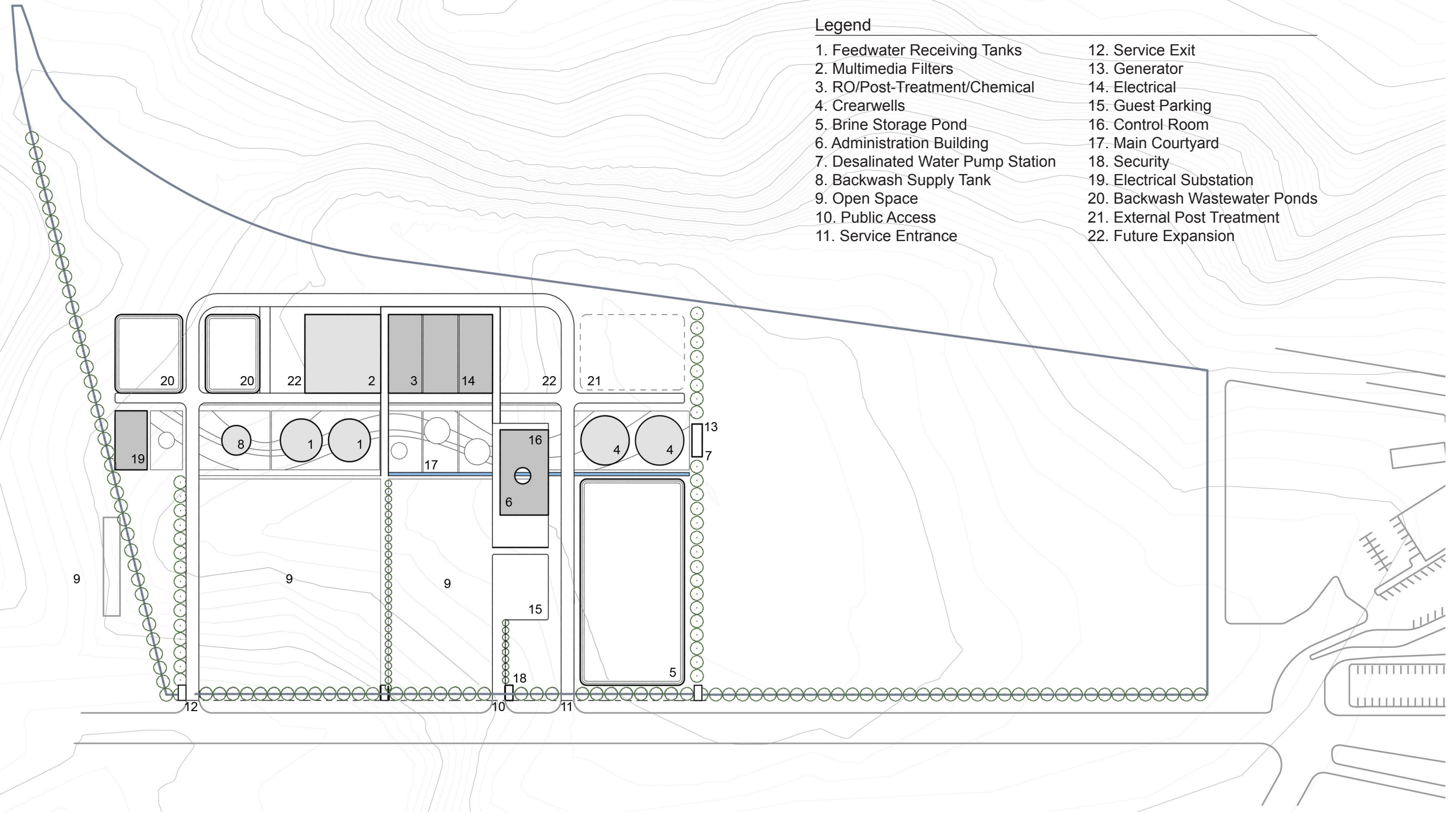






Legend

- | | |
|-----------------------------------|-------------------------------|
| 1. Feedwater Receiving Tanks | 12. Service Exit |
| 2. Multimedia Filters | 13. Generator |
| 3. RO/Post-Treatment/Chemical | 14. Electrical |
| 4. Crearwells | 15. Guest Parking |
| 5. Brine Storage Pond | 16. Control Room |
| 6. Administration Building | 17. Main Courtyard |
| 7. Desalinated Water Pump Station | 18. Security |
| 8. Backwash Supply Tank | 19. Electrical Substation |
| 9. Open Space | 20. Backwash Wastewater Ponds |
| 10. Public Access | 21. External Post Treatment |
| 11. Service Entrance | 22. Future Expansion |



Legend

● Utilized

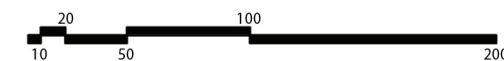
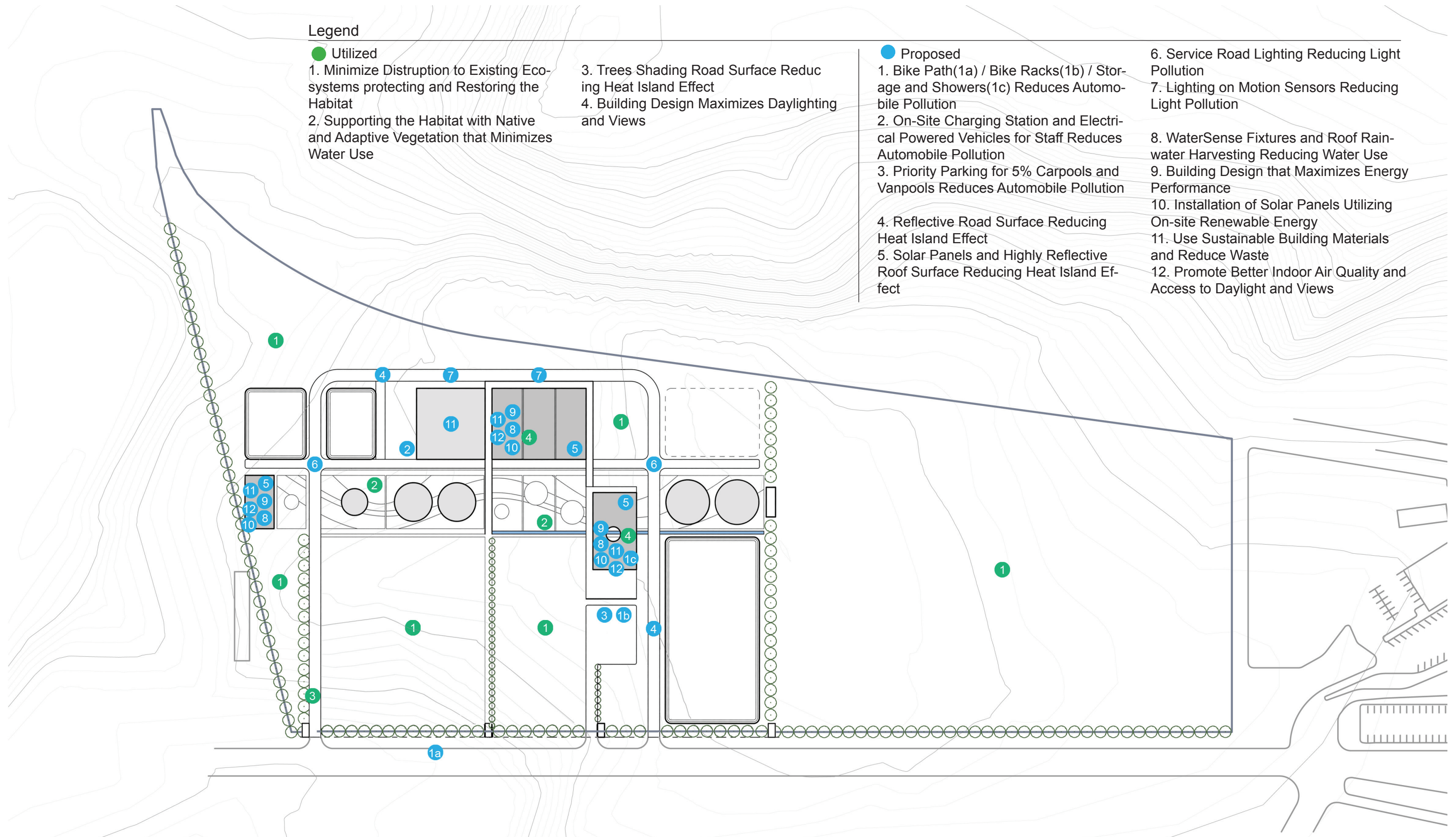
- 1. Minimize Distruption to Existing Eco-systems protecting and Restoring the Habitat
- 2. Supporting the Habitat with Native and Adaptive Vegetation that Minimizes Water Use

- 3. Trees Shading Road Surface Reducing Heat Island Effect
- 4. Building Design Maximizes Daylighting and Views

● Proposed

- 1. Bike Path(1a) / Bike Racks(1b) / Storage and Showers(1c) Reduces Automobile Pollution
- 2. On-Site Charging Station and Electrical Powered Vehicles for Staff Reduces Automobile Pollution
- 3. Priority Parking for 5% Carpools and Vanpools Reduces Automobile Pollution
- 4. Reflective Road Surface Reducing Heat Island Effect
- 5. Solar Panels and Highly Reflective Roof Surface Reducing Heat Island Effect

- 6. Service Road Lighting Reducing Light Pollution
- 7. Lighting on Motion Sensors Reducing Light Pollution
- 8. WaterSense Fixtures and Roof Rain-water Harvesting Reducing Water Use
- 9. Building Design that Maximizes Energy Performance
- 10. Installation of Solar Panels Utilizing On-site Renewable Energy
- 11. Use Sustainable Building Materials and Reduce Waste
- 12. Promote Better Indoor Air Quality and Access to Daylight and Views



Buildings at a Glance

Location:	Description:	Quantity:	Unit:
Site:	Charles Benson Rd. Marina, California	9.4 mi north of Monterey, CA	
Principal Use:	Site Undeveloped Agricultural and industrial within 1 mile		
Buildings:	Treatment Building	21,600	sq. ft.
	Administration Building	11,700	sq. ft.
Equip. Slabs/Screens:	Multi-media Filter Area	16,800	sq. ft.
	Identity Screen	10,900	sq. ft.

Energy Systems at a Glance

Electrical Substation	4,500	sq. ft.
Generator	2,100	sq. ft.
Switchgear, inside R.O.	1,800	sq. ft.

Energy Coordinated Systems at a Glance

Tanks:	Feedwater Tanks	2x500,000	gal.
	Clearwells	2x1,000,000	gal.
	Backwash Supply	200,000	gal.
Ponds:	Backwash Wastewater	30,000	sq. ft.
	Brine Storage	86,400	sq. ft.
Free-Standing Pumps:	Clearwell Pumps	1,500	sq. ft.

Security Features at a Glance

Perimeter Fence:	Project perimeter	4,690	lin. ft.
Roadway Gates:	Public and Service Entry	3	loc.
Security A/V:	Campus wide surveillance	Full Coverage	

Water Cycle at a Glance

Stage:	Description:	Additional Notes:	Destination:
1st pass:	Supply of feedwater Large sand filters Feedwater tanks Loop to backwash Catridge filters	Pumps at beach 40 ft. x 8 ft. dia Pumps to catridge filters Backwash waste to pond 5 microns or smaller	Up to site To feedwater storage Gravity filters to nano filters Backwash ponds to discharge To high pressure pumps
2nd pass:	First pass high pressure Second pass feed pump Loop to energy recovery	Pumps to R.O. or bypass Add pressure to 1st pass	To 2nd pass or bypass To membrane flush tank Out to brine discharge
3rd pass:	UV reactor Post treatment stage Clearwell storage Brine from 1st and 2nd	Disinfection stage Add appropriate components Finished product Collection from R.O.	On to post-stabilization Pump to storage To distribution Brine Pond and discharge

Educational Features at a Glance

Location:	Feature:	Description:
Treatment Builing:	Suspended walkway	View Filtration and R.O.
Administration Building:	Exhibition hall	Exhibits by owner
Main Courtyard:	Xeriscape exhibit	Landscape in contract
Identity Screen:	Facade of Treatment Building	Shows educational graphics
Water Feature:	Through Main Courtyard	Recycling of test water

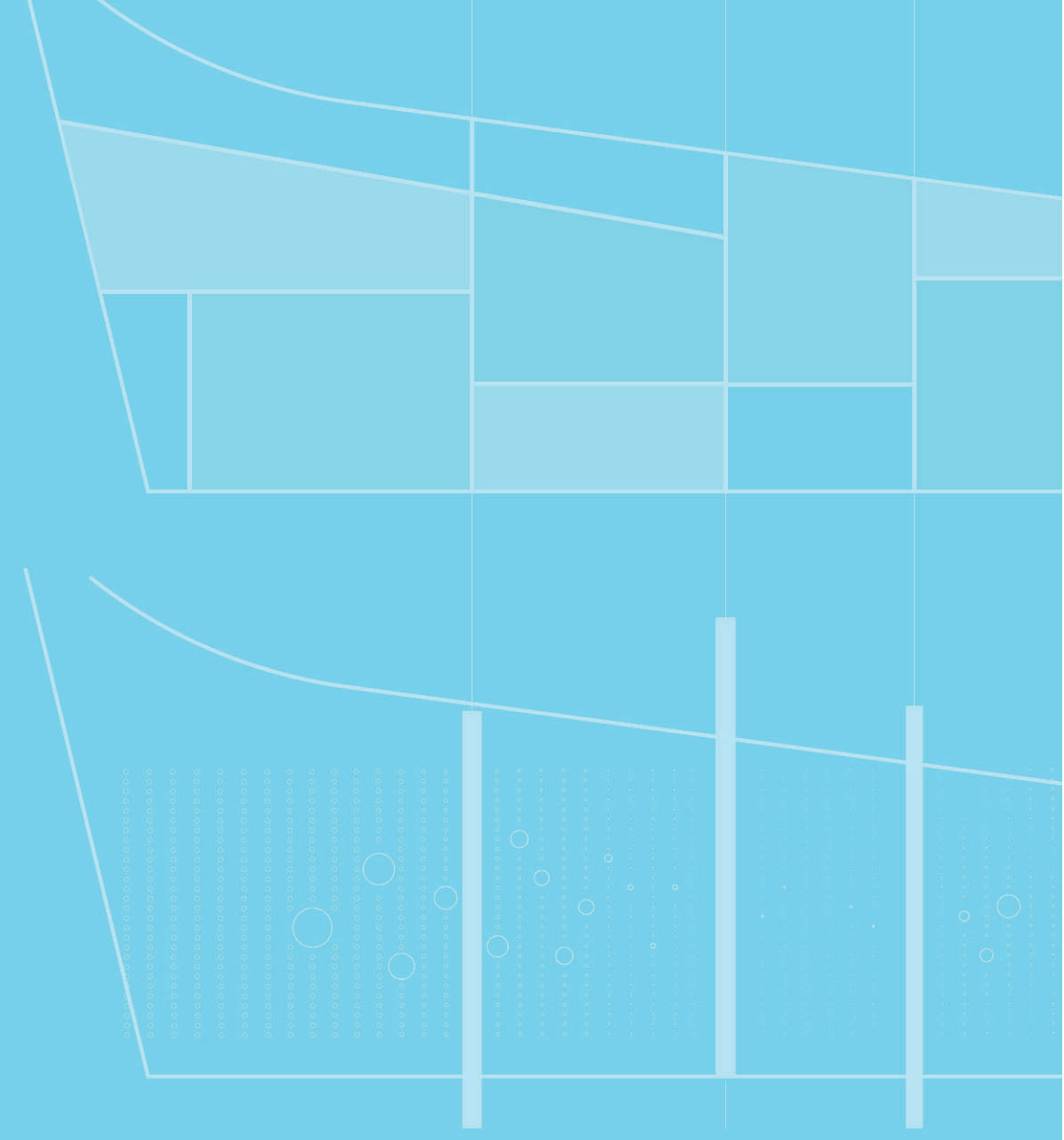
Key Sustainability Features

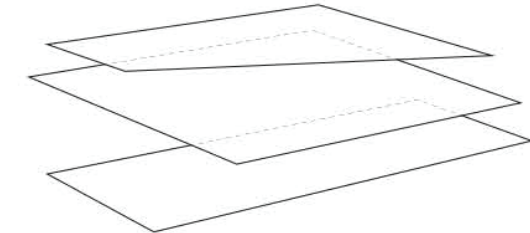
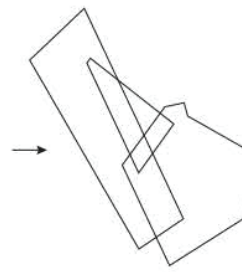
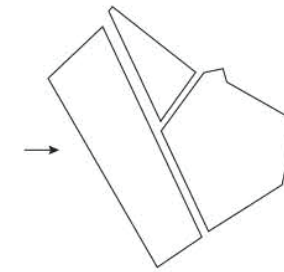
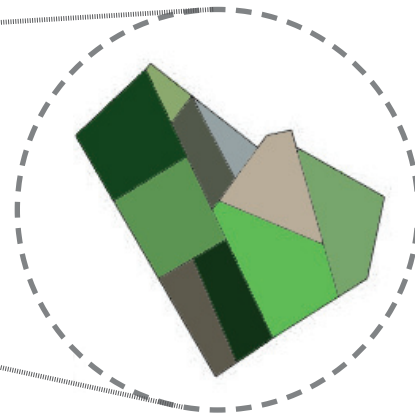
Rain harvesting:	Entire roof, all structures	Landscape establishment
Xeriscape landscaping:	No water after establishment	
Bioswales:	Bioswales at all road edges	Also, permeable paving
Reduce grading:	Build to contours	Reduce fill, balance site
Reduce footprint:	Organize by process	Maximize undisturbed site
Prepare for Solar:	Structural roof design	Layout and conduits for solar equip.

• Refer to RFP for Current Design info.

02 concept

- Agriculture Patchwork
- Desalting at the Molecular Level
- Concept Generation
- Landscape Concept and Design
- Site Plan Rendering
- Climate and Environment
- Relationship to Surrounding Areas/Context

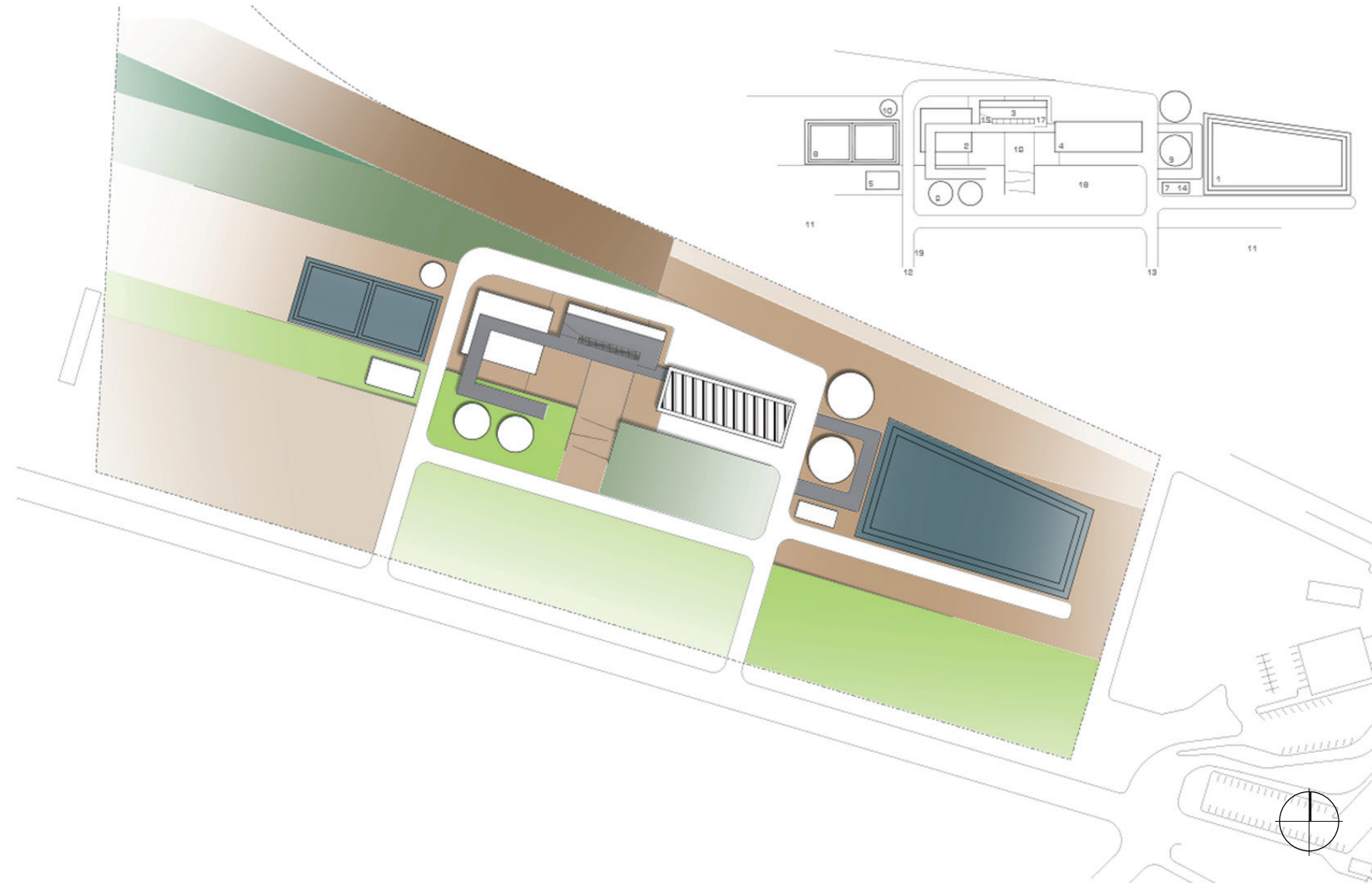




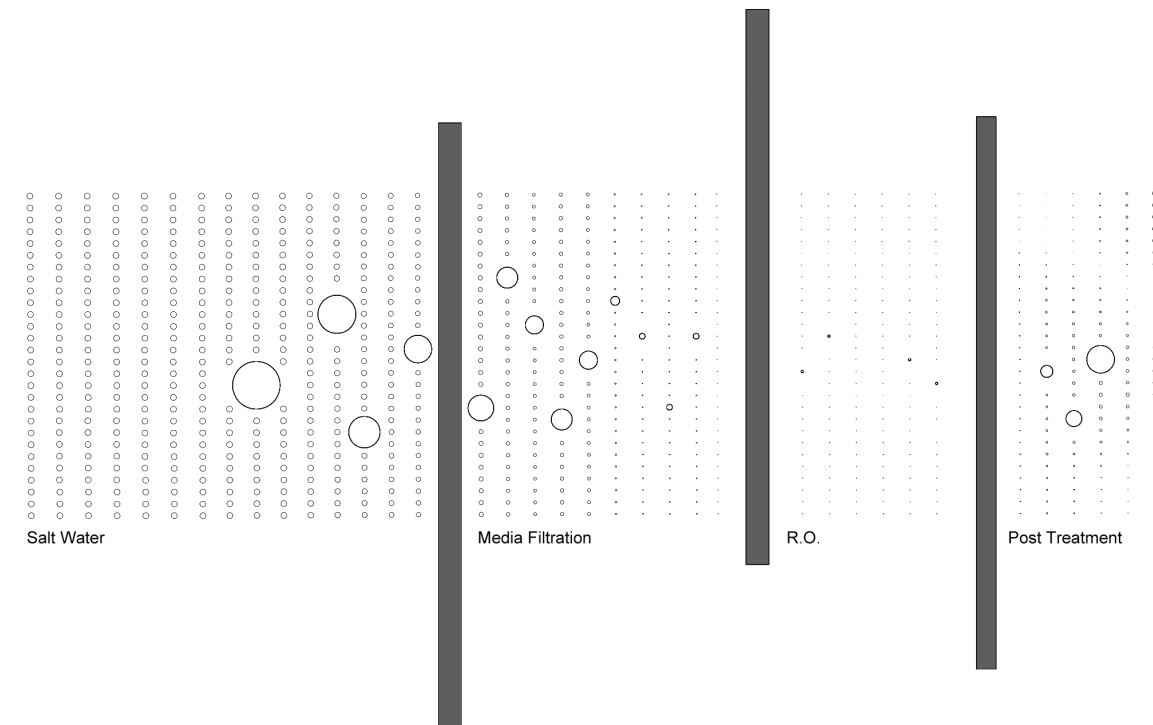
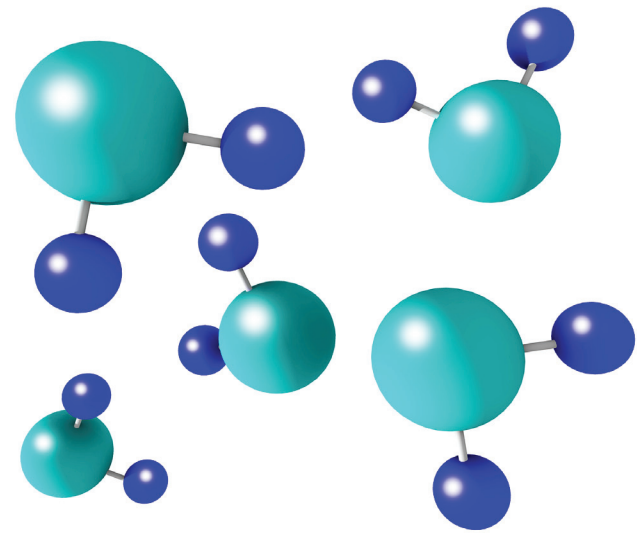
Patchwork

Grouping

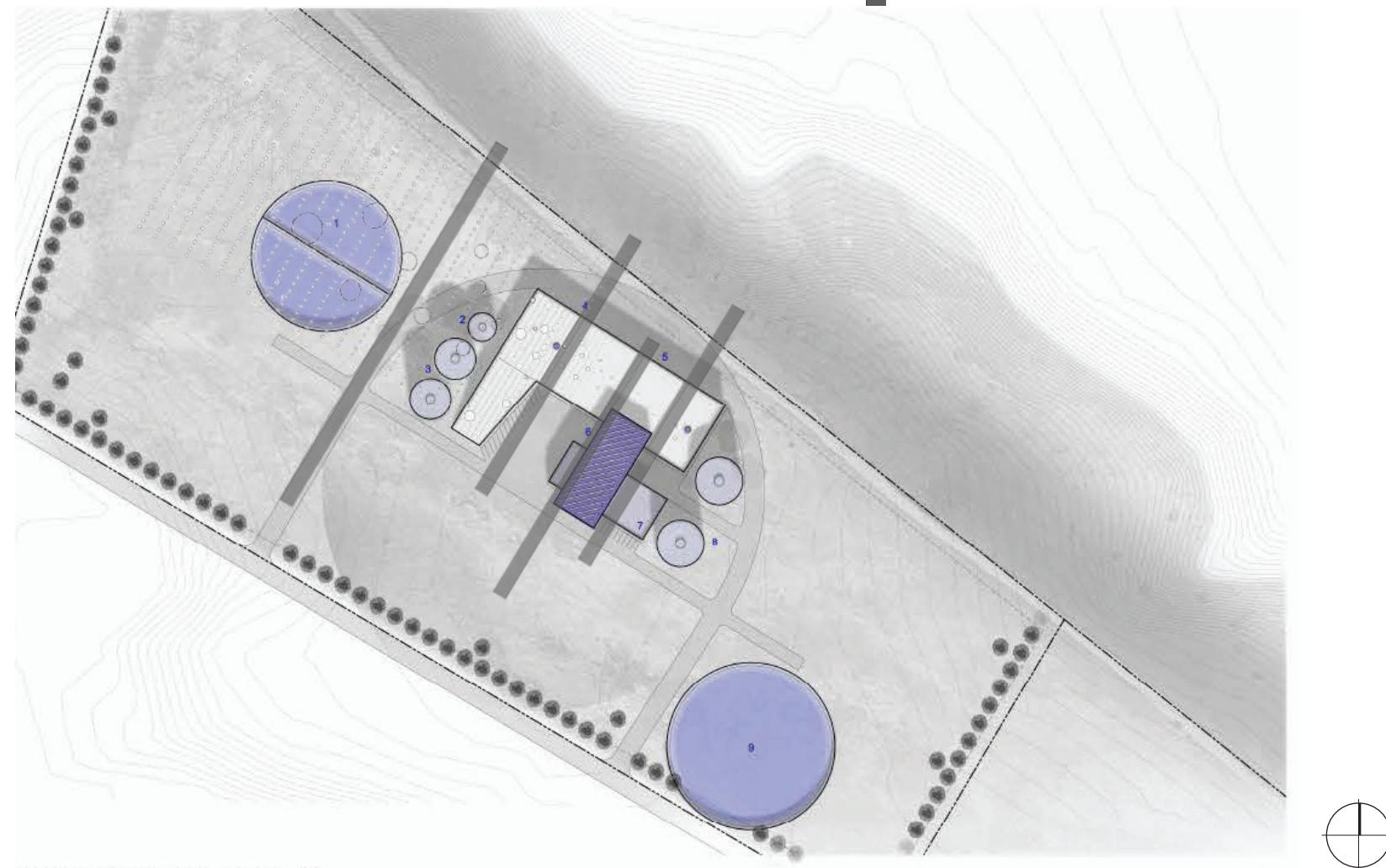
Layering

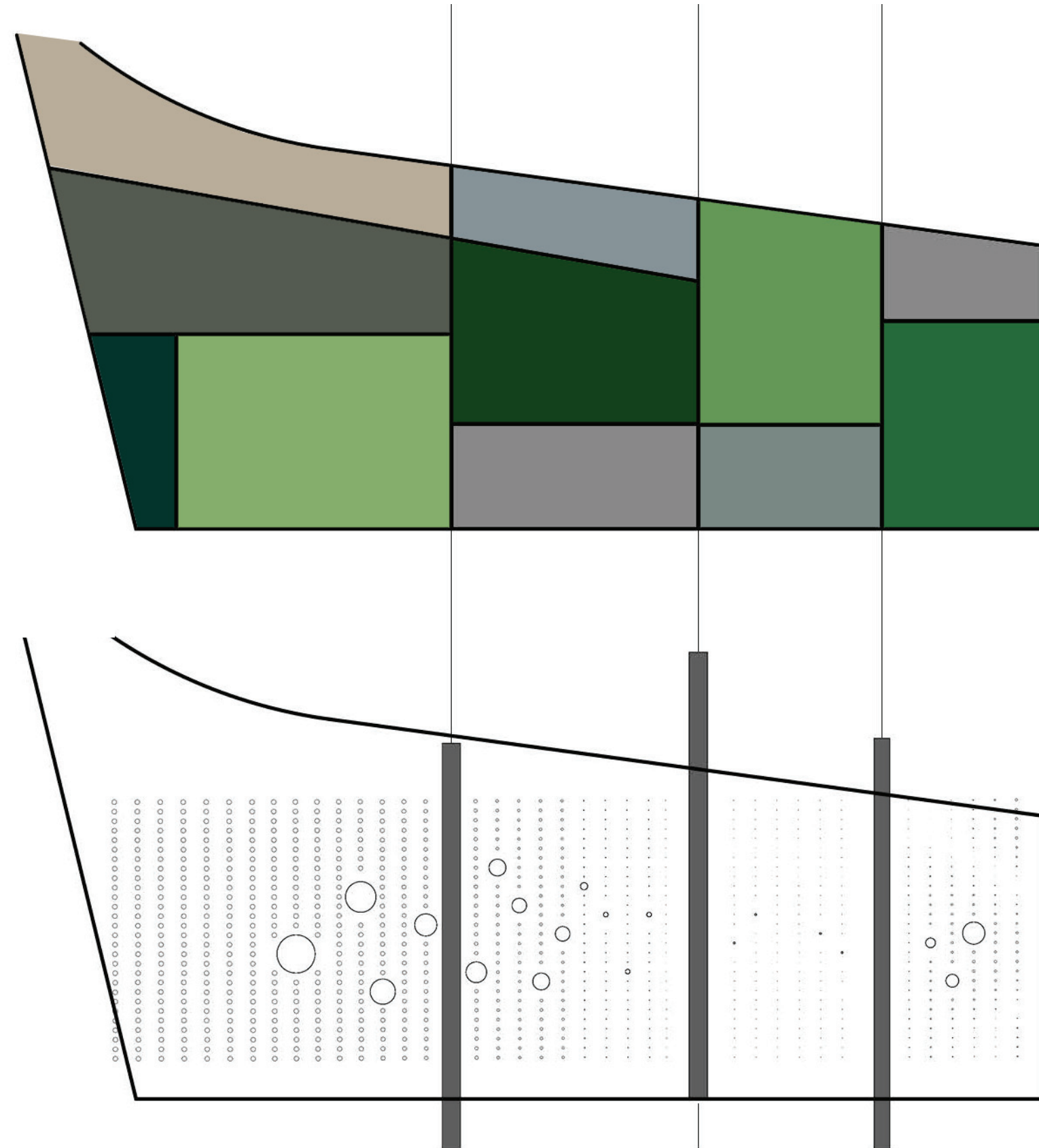


Aerial views and the view north from the site show the extremely rich Salinas River Valley filled with farms. The potential of integrating the geometric form of the surrounding agricultural fields was explored in one of the two initial schemes. Grouping and layering of these patchwork forms aided in the creation of building form and the surround landscape, while tying in with local environment's context.

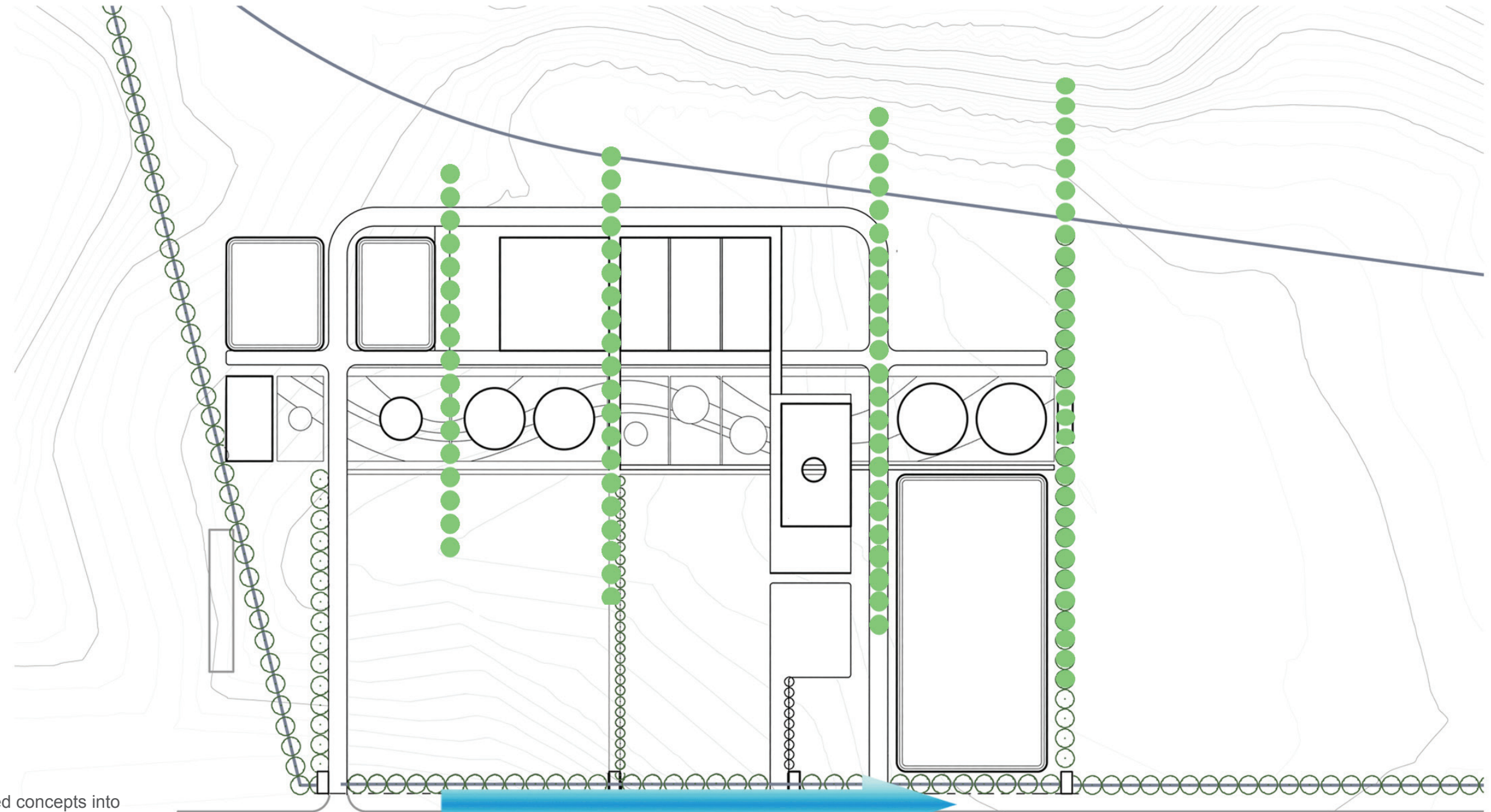


Displaying the flow of the incoming ocean water through the various filtration phases was explored in one of the two initial schemes. This simplifying of the process through this conceptual representation works as an education tool for visitors. Curved buildings, circular tanks and landscape forms combined with circle patterns along building facades represent these concepts.



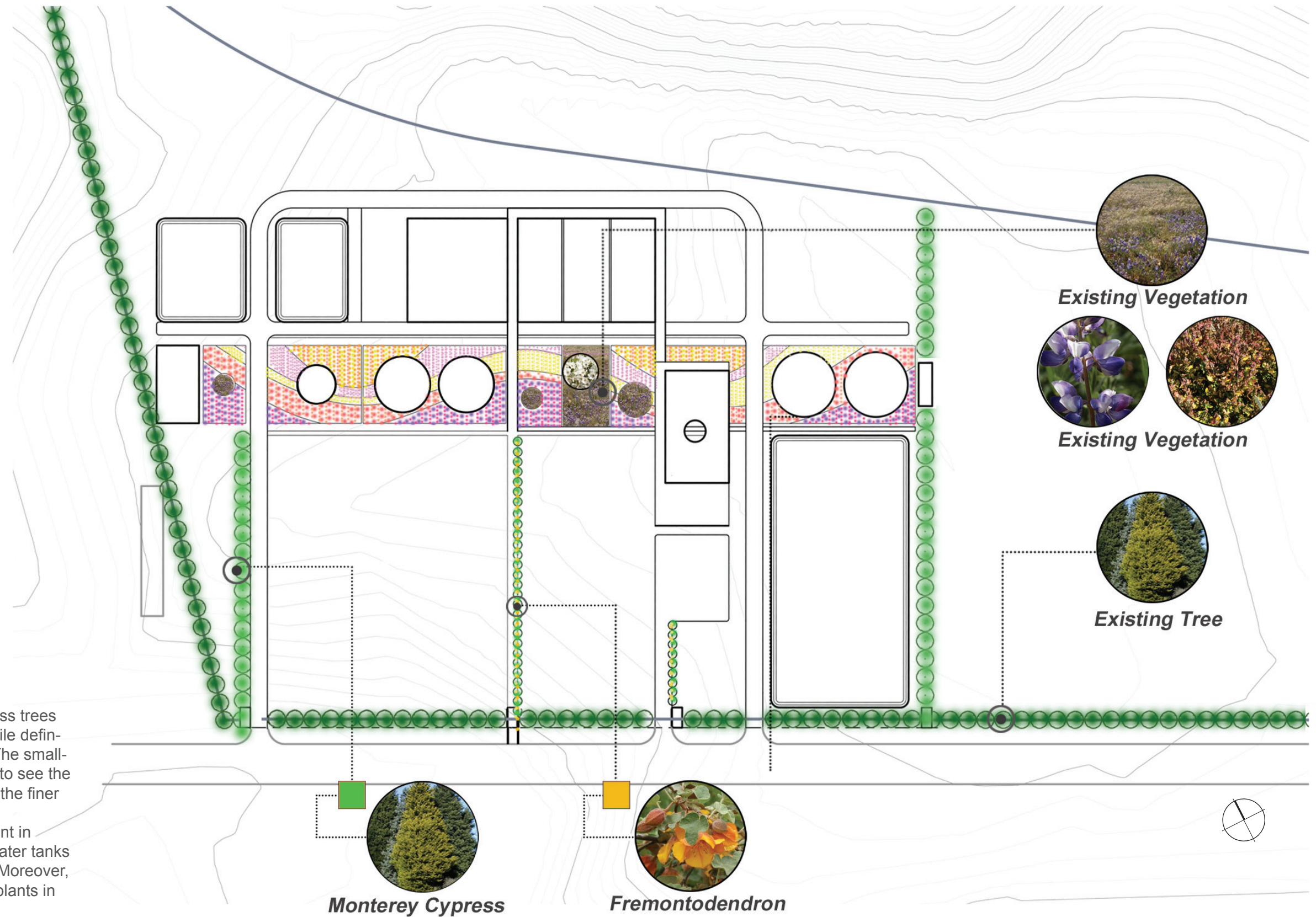


Dominant elements shown through both of the preceding approaches have been integrated into the final design. The use of lines of tree and plants in the final design reflect the lines perpendicular to the main road, while the loop road incorporated into both of the initial schemes has been utilized in the final design.

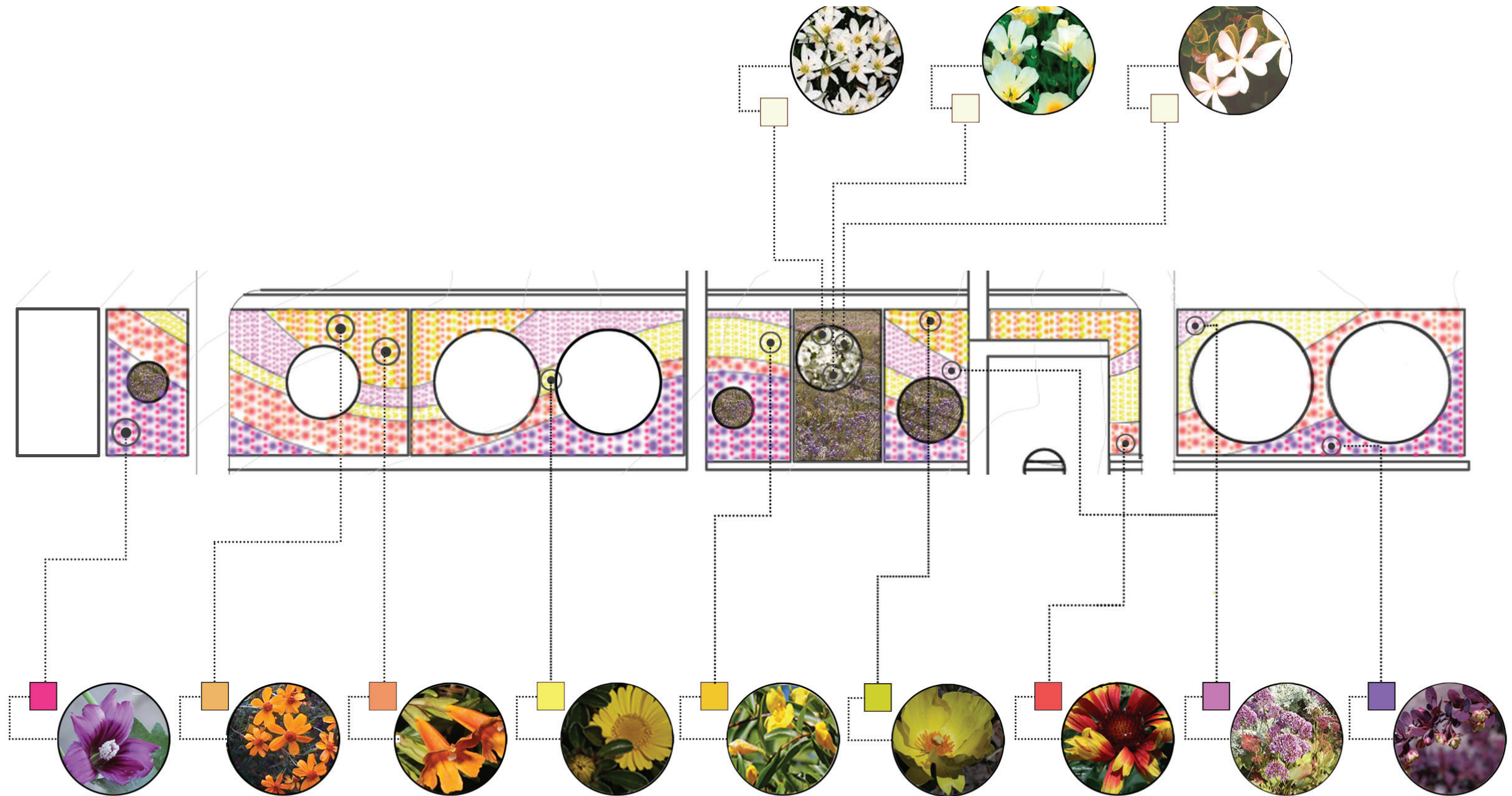


Bending elements of the combined concepts into the landscape is displayed. The image showcasing a spectrum of flower species and colors, which represents the array of elements in the incoming seawater. The following image of white flowers reflects the purity of the water after it has been treated by the filtration processes. Finally the single colored orange flower represents the natural balance being restored to the water through the process of post-treatment.

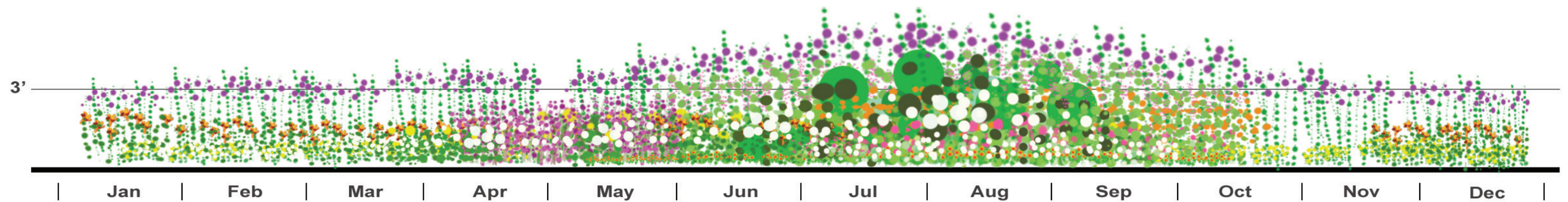




The line of larger native Monterey Cypress trees represent the initial filtration process, while defining the surrounding patchwork pattern. The smaller Fremontodendron trees allow visitors to see the whole facility upon entry and represents the finer RO filtration process. Original native plants are re-establishment in courtyards that do not have cylindrical water tanks in order to continue the circular pattern. Moreover, this integrates new native and adaptive plants in with the surrounding context.



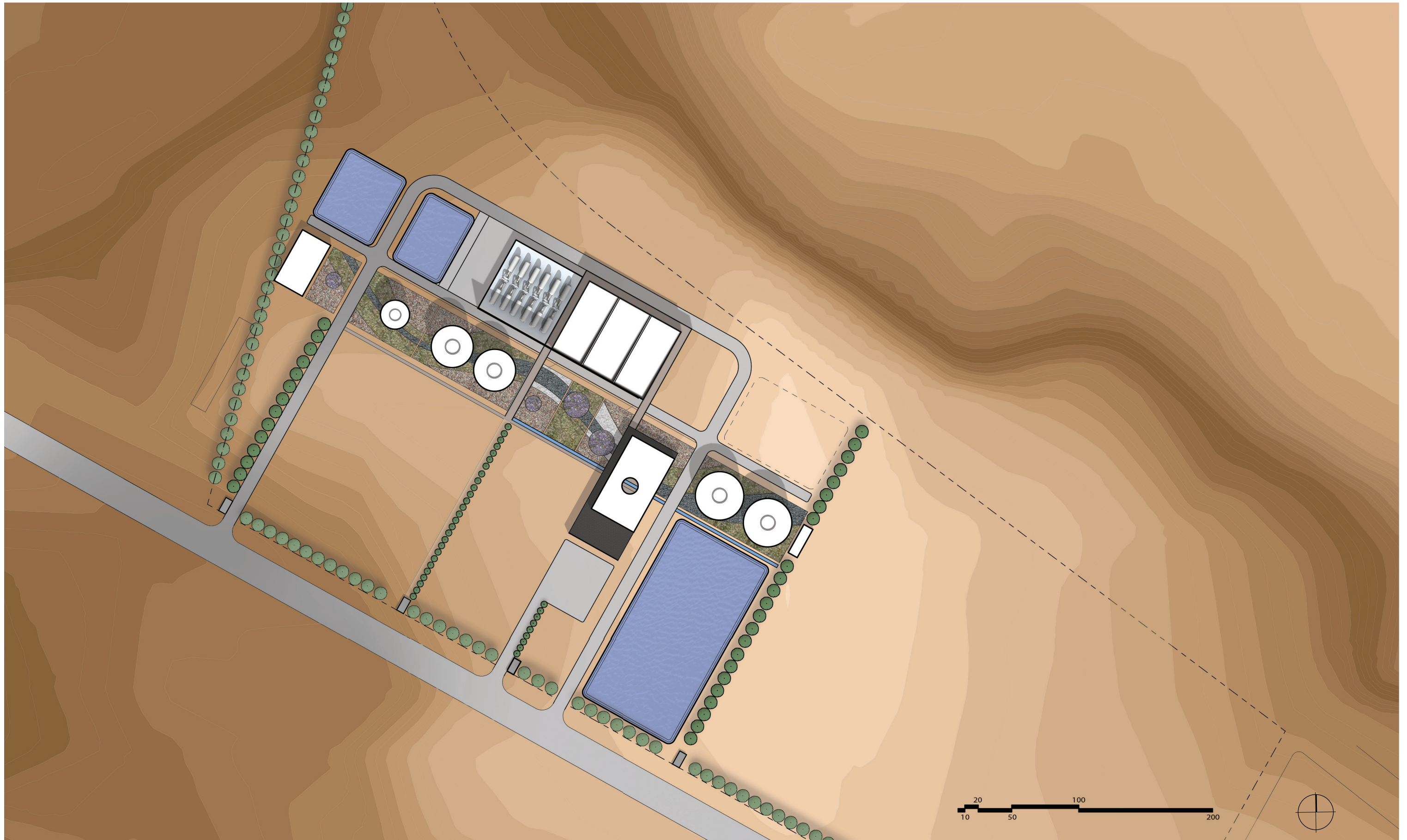
The courtyard's landscape forms and species selection are central feature of the education goals. Purity of the water that has passes through the RO process is reflected by the patch of landscape, which contains a circular patch of white flowers inside a rectangular patch of re-established native plants. The white flowers represent purity through color while the re-established native plants represent the purity of the natural environment.



Course of the year diagram

The simplified building design benefits hugely by the seasonal changes of the proposed landscape, which provides the project with an ever changing natural beauty. The multi-colored courtyards utilize a spectrum of native and adaptive plants, which require little to no irrigation.

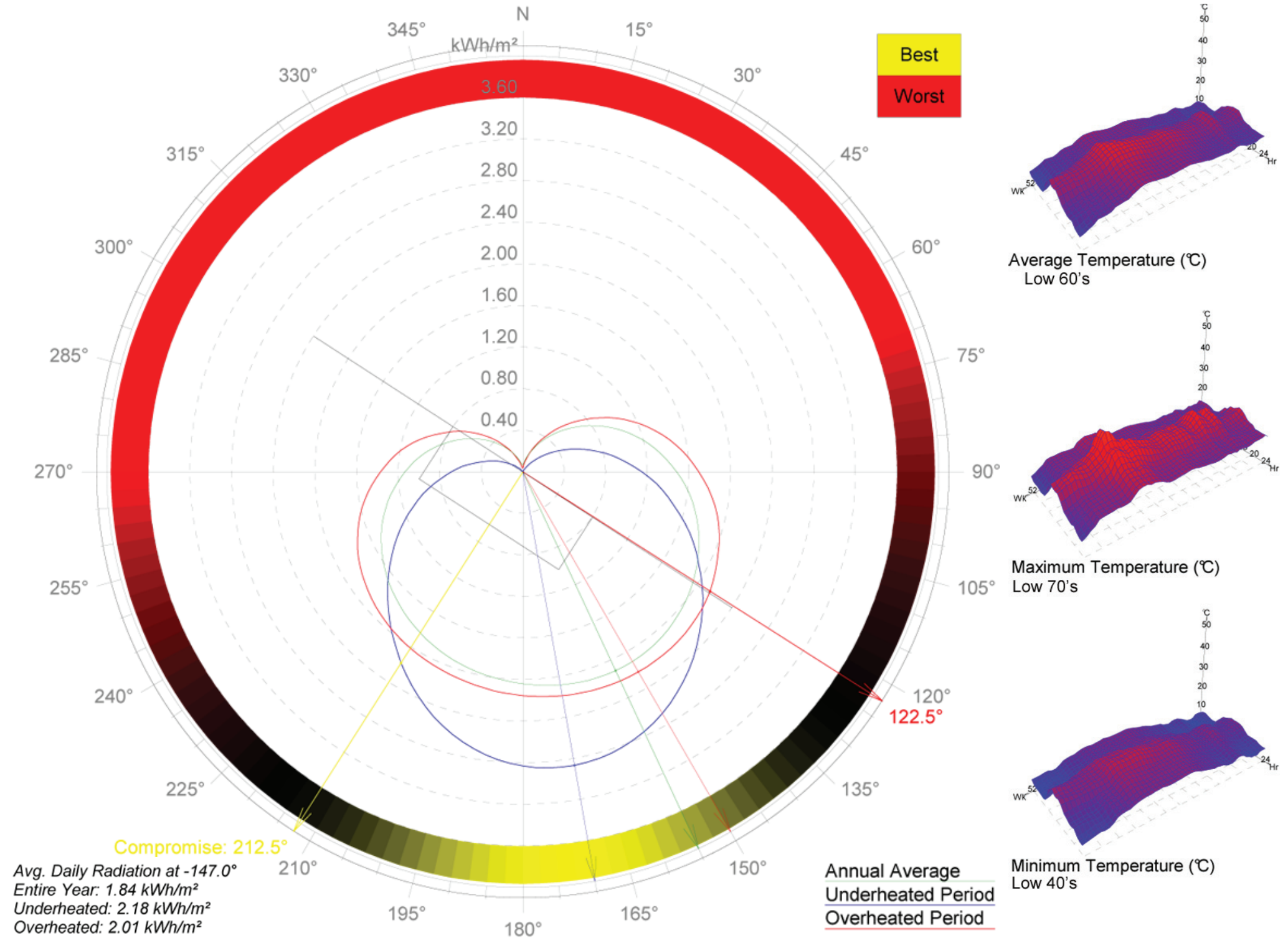
- | | | | | | | | |
|--|---|---|---|---|---|---|--|
|  | <i>Carissa macrocarpa</i>
Natal Plum |  | <i>Tagetes lemmonii</i>
Bush Marigold |  | <i>Fremontodendron</i>
Flannelbush |  | <i>Lavatera assurgentiflora</i>
Island Mallow |
|  | <i>Eschscholzia cal. W.Linen</i>
White Linen Cal. Poppy |  | <i>Mimulus flemingii</i>
Island Monkey Flower |  | <i>Hunnemannia fumariifolia</i>
Mexican Tulip Poppy |  | <i>Berberis thunbergii</i>
Red Japanese Barberry |
|  | <i>Zephyranthes candida</i>
Fairy Lily |  | <i>Gaillardia X grandiflora</i>
Blanketflower |  | <i>Asteriscus maritimus</i>
Sea Daisy, Sea Aster |  | <i>Limonium perezii</i>
Sea Lavender |



02

Optimum Orientation

Location : Monterey NAF. USA
 Orientation based on average daily incident radiation on a vertical surface.
 Underheated Stress : 758.3
 Overheated Stress : 1237.3
 Compromise : 212.5°
 © Weather Tool



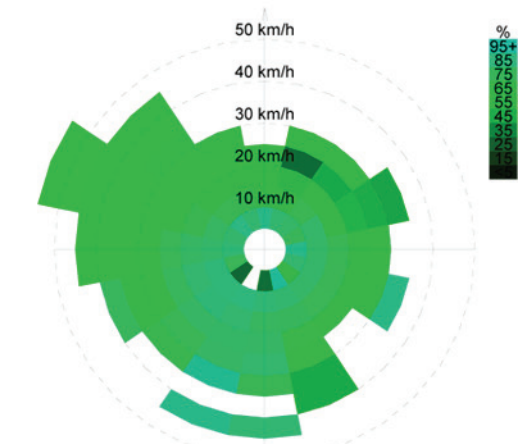
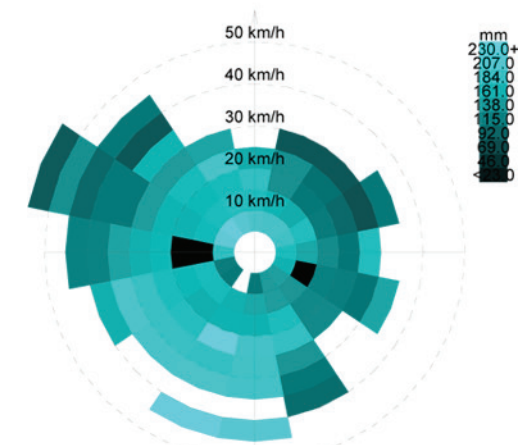
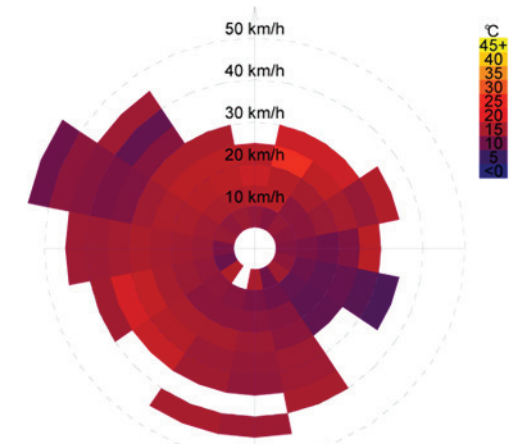
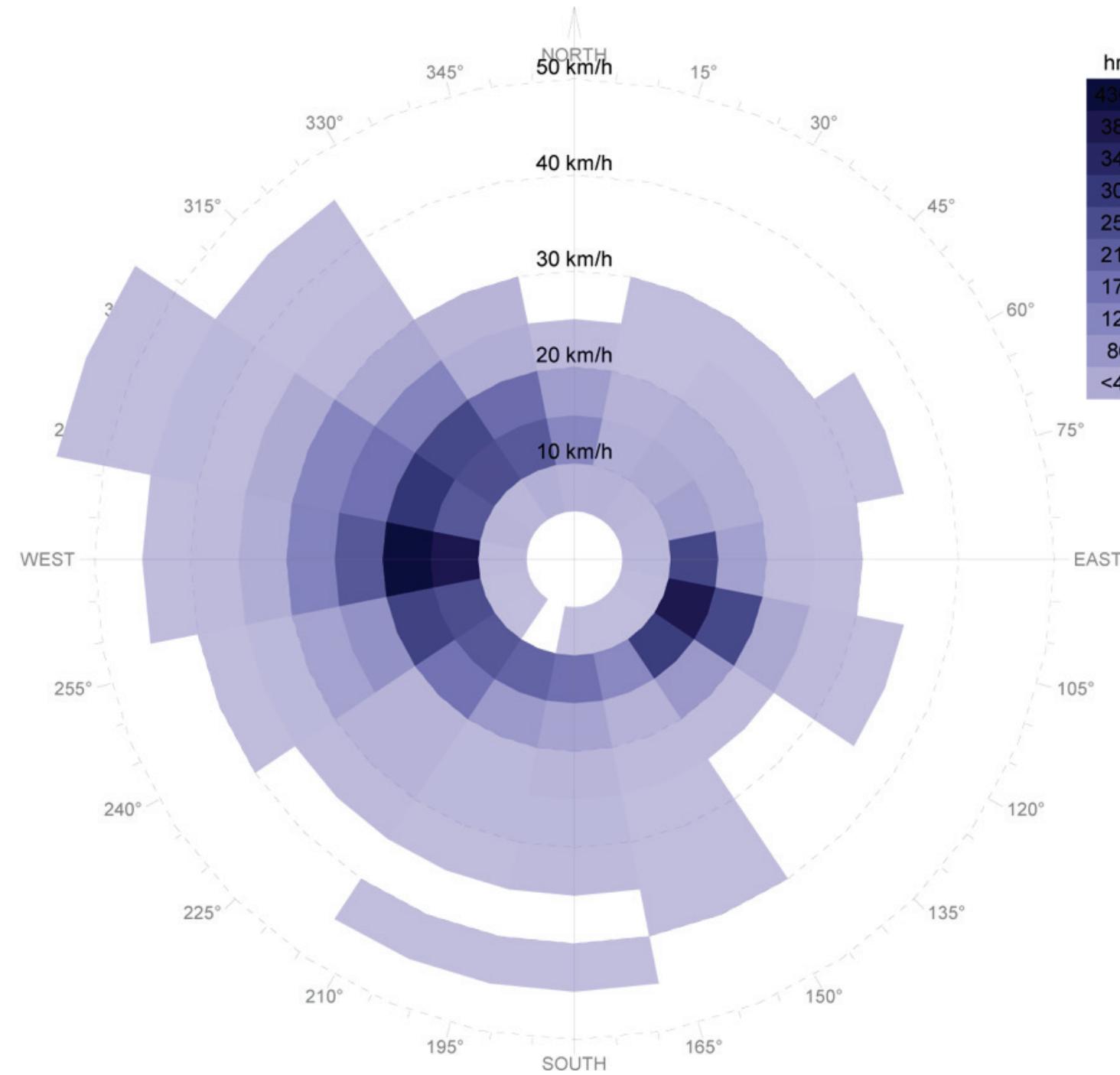
Solar Analysis

The graphs above were calculated with the climate analysis software Ecotect and represent the average yearly temperatures and optimal solar orientation for Monterey California. Monterey's average high temperature ranges from around 60° Fahrenheit in winter to 72° Fahrenheit during the summer months. Summers in Monterey are more likely to be cool and foggy. Optimal Solar orientation in 122.5 from west.

Annual Rain Fall Marina Ca. 15.12" / Year.

Wind Frequency(Hrs)

Location : Monterey NAF. USA(36.6° , -121.9°)
 Date : 1st January-31st December
 Time : 00:00-24:00
 © Weather Tool



Wind Analysis

The graphs above were calculated with the climate analysis software Ecotect and represent the average yearly wind speeds and directions for the Winter, Summer, Spring, and Fall in Monterey California. Generally, a cool prevailing wind is present from the North / North West direction with a speed of 6 to 18 mph.

- Desalination Proposed Site
- MRWMD
- MRWPCA

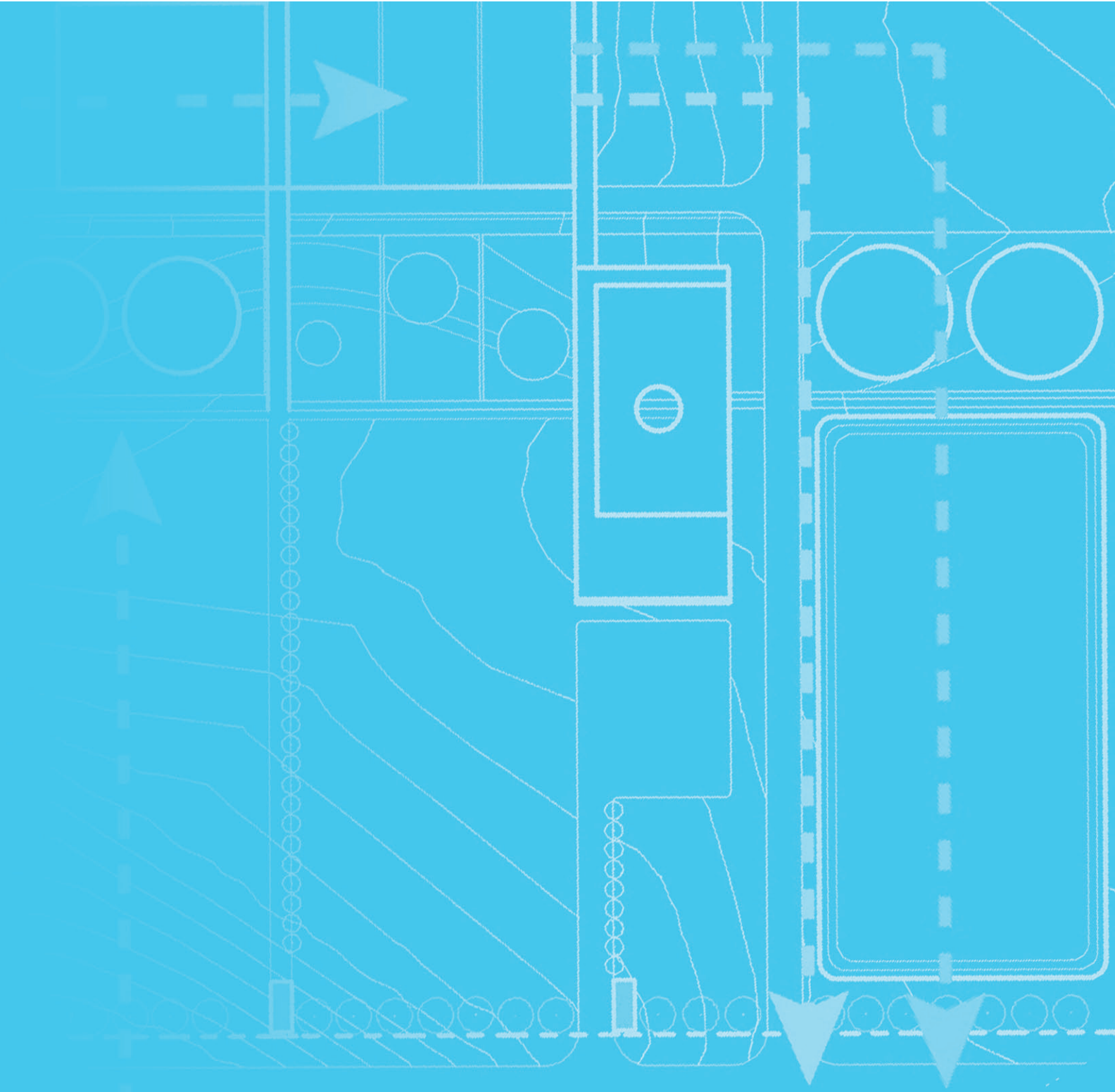
The site is near the ocean and two useful neighbors: The Monterey Regional Waste Management District (MRWMD) and the Monterey Regional Water Pollution Control Agency (MRWPCA.) The waste management district produces electricity and may provide a substantial amount of energy needed to operate the Desalination Plant.




Both industrial facilities take in a product seen as waste and create something of value. Likewise, the proposed desalination project will turn a product of little or no value into a commodity. Not only does the site location aid in the creation of a group or district of environmental friendly facilities but it offers great opportunity for the desalination plant to benefit by utilizing the adjacent waste management facility's reclaimed and recycled materials for construction and maintenance work. It also offers the extremely beneficial opportunity for the desalination plant to tap into the recycled water plant's outfall discharge pipeline. This will save the plant the large cost of building a completely new outfall line to the ocean.



03 water analysis

- Site Water Flow Diagram
- Desalination Process Diagram
- Water Use Reduction



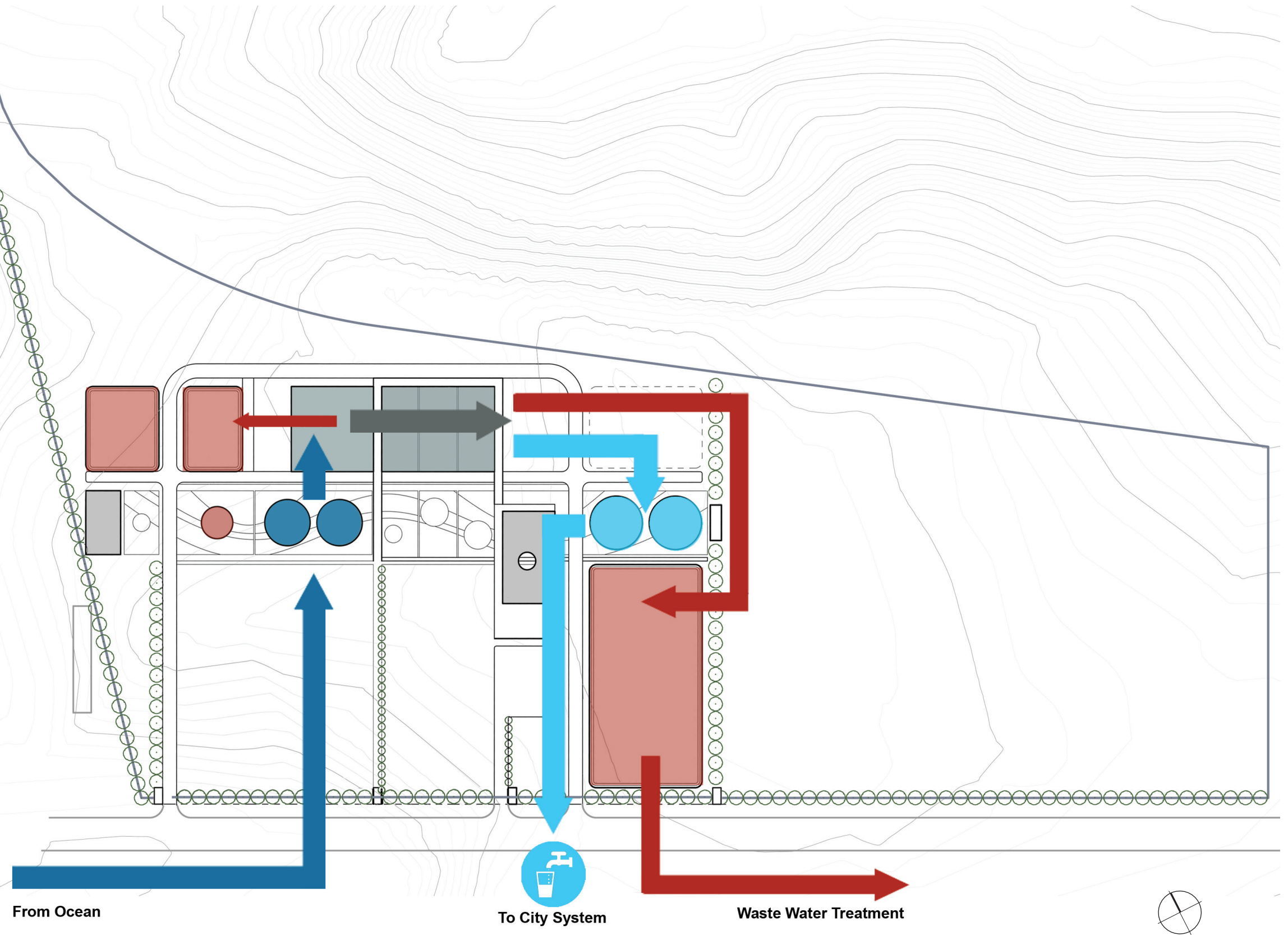
-  Seawater
-  Wastewater
-  Desalinated water

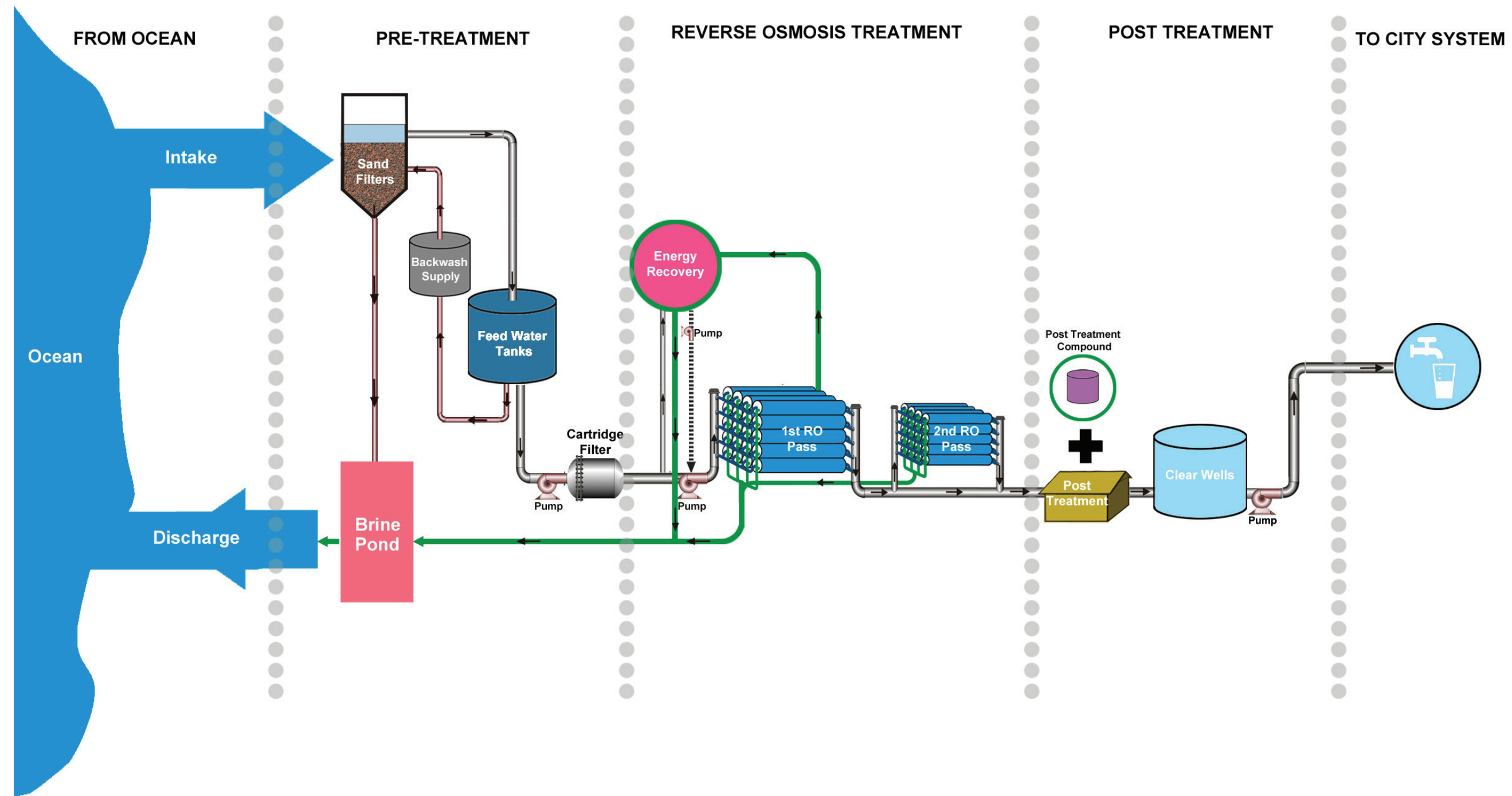
Water pumped from the ocean passes through MultiMedia filters that remove larger elements from the water. The bi-product is displaced into a set of two backwash ponds while the filtered water is stored in two large cylindrical tanks adjacent the treatment building. These tanks provide a constant supply of water to the treatment building and are located at a higher point on the site, taking advantage of gravity flow.

Water that passes through the first filtration phase continues through to the RO trains, which filter out the remaining elements.

After post-treatment the desalinated potable water is stored in two large cylindrical tanks outside the treatment building, while the bi-product / brine water is displaced into the brine pond. The desalinated water is distributed to consumers off-site while the brine water is set to the outfall, returning to the ocean.

The water flow diagram presented minimizes the length of water lines required. This plan also reduces the number of bends in the water lines, saving energy lost due to friction and turbulence.





1

Fixtures

WaterSense, a partnership program by the U.S. Environmental Protection Agency, seeks to protect the future of our nation's water supply by offering people a simple way to use less water with water-efficient products. Product and services that have earned the WaterSense label have been certified to be at least 20 percent more efficient without sacrificing performance. The outlined data showcases estimated savings that can be achieved if WaterSense fixtures are specified.



		Gallons (Per Flush)	Estimated Daily Flushes	Estimated Daily (Gallons)	Yearly Savings (Gallons)
Toilets	Conventional	1.60	10	16.0	N/A
	High Efficiency (WaterSense)	1.28	10	12.8	1168
	Ultra High Efficiency	0.80	10	8.0	2920

Urinals	Conventional	1.00	15	15.0	N/A
	High Efficiency (WaterSense)	0.50	15	7.5	2738
	Ultra High Efficiency (Pint)	0.13	15	1.88	4791
	Waterless Urinals	0	15	0	5475

		Gallons (Per Minute)	Estimated Daily Minutes		
Faucets	Conventional	2.20	13	28.6	N/A
	High Efficiency (WaterSense)	1.50	13	19.5	3322

Showerheads	Conventional	2.50	5	12.5	N/A
	High Efficiency (WaterSense)	2.00	5	10	913

Total Achievable Savings

12629

2

Landscape

By specifying native and adaptive plant species for the newly landscaped area, after establishment of plants over the first couple of years, irrigation will not be required for these plants to continue to thrive.

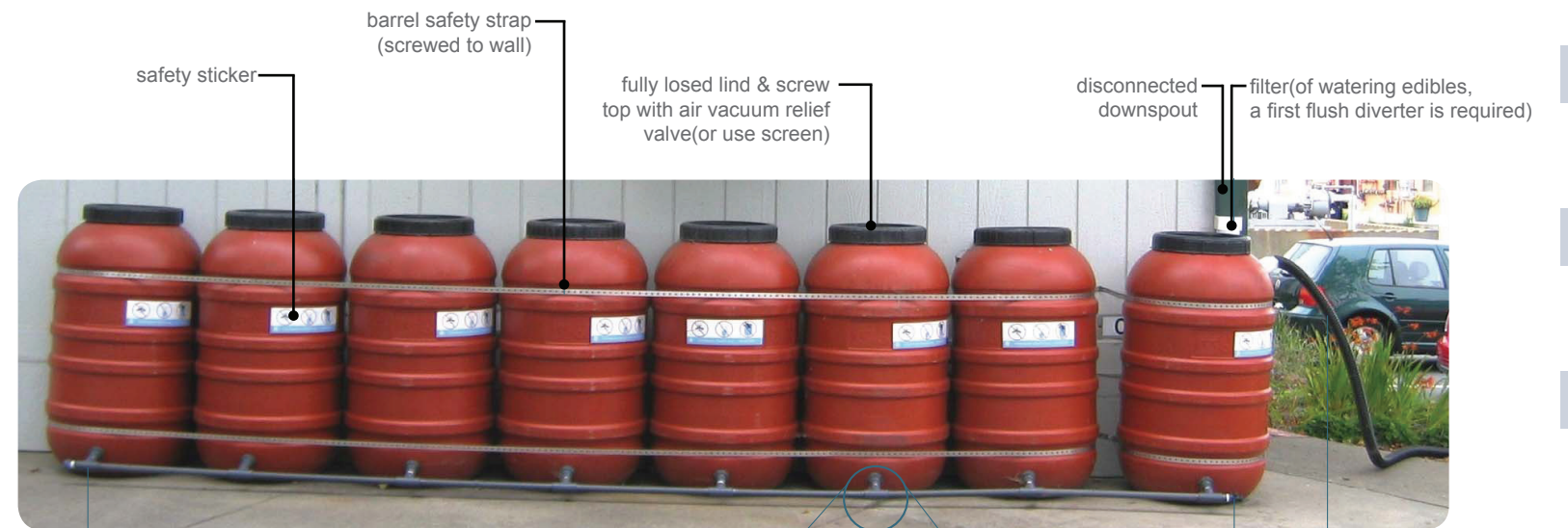


3

Rainwater Capture

Captured rainwater that falls on building roofs can be used for non-potable uses such as irrigation, toilet flushing and cleaning. This will reduce water usage. A simple low cost ways to achieve this goal is displayed on the photograph "Rainwater Harvesting".

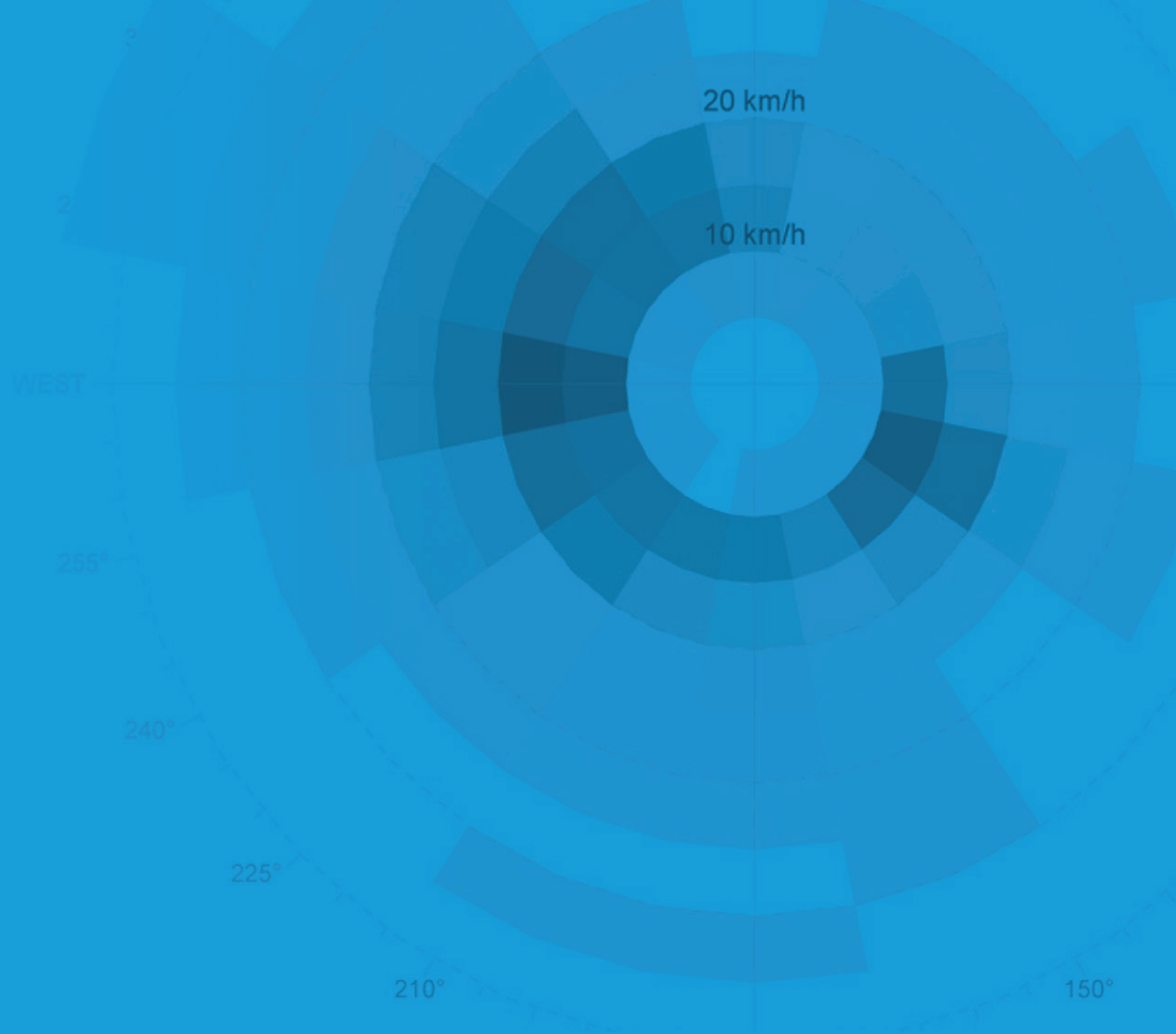
See Research Report Appendix for more details on rainwater harvesting.



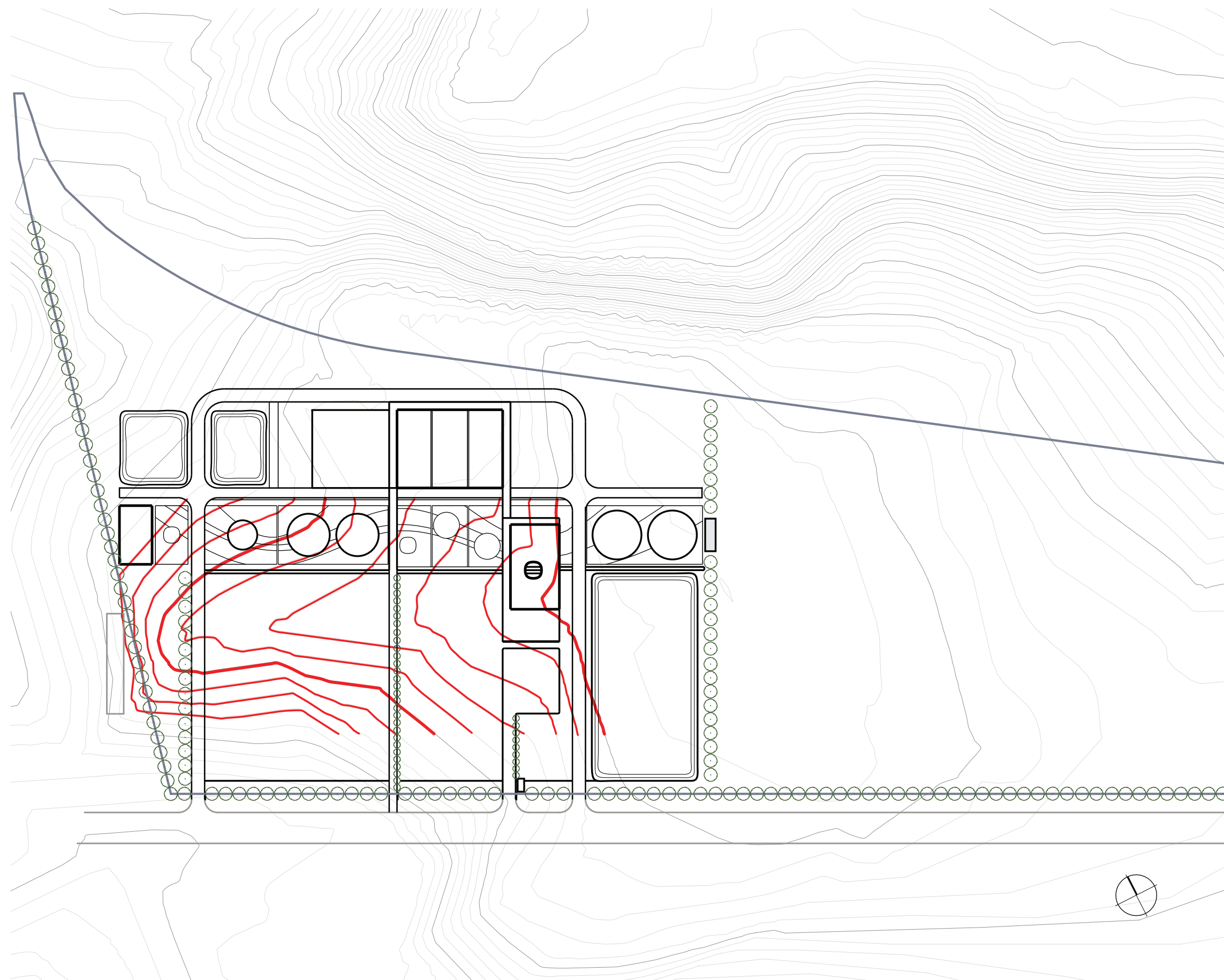
Rainwater Harvesting

04 site analysis




- Site Placement A/B/C
- Access Diagram
- Security Diagrams
- Truck Delivery & Crane Diagram
- Future Expansion
- Undisturbed Areas Diagram
- Disturbed Areas: Cut and Fill Plan
- Disturbed Areas: Cut and Fill Sections

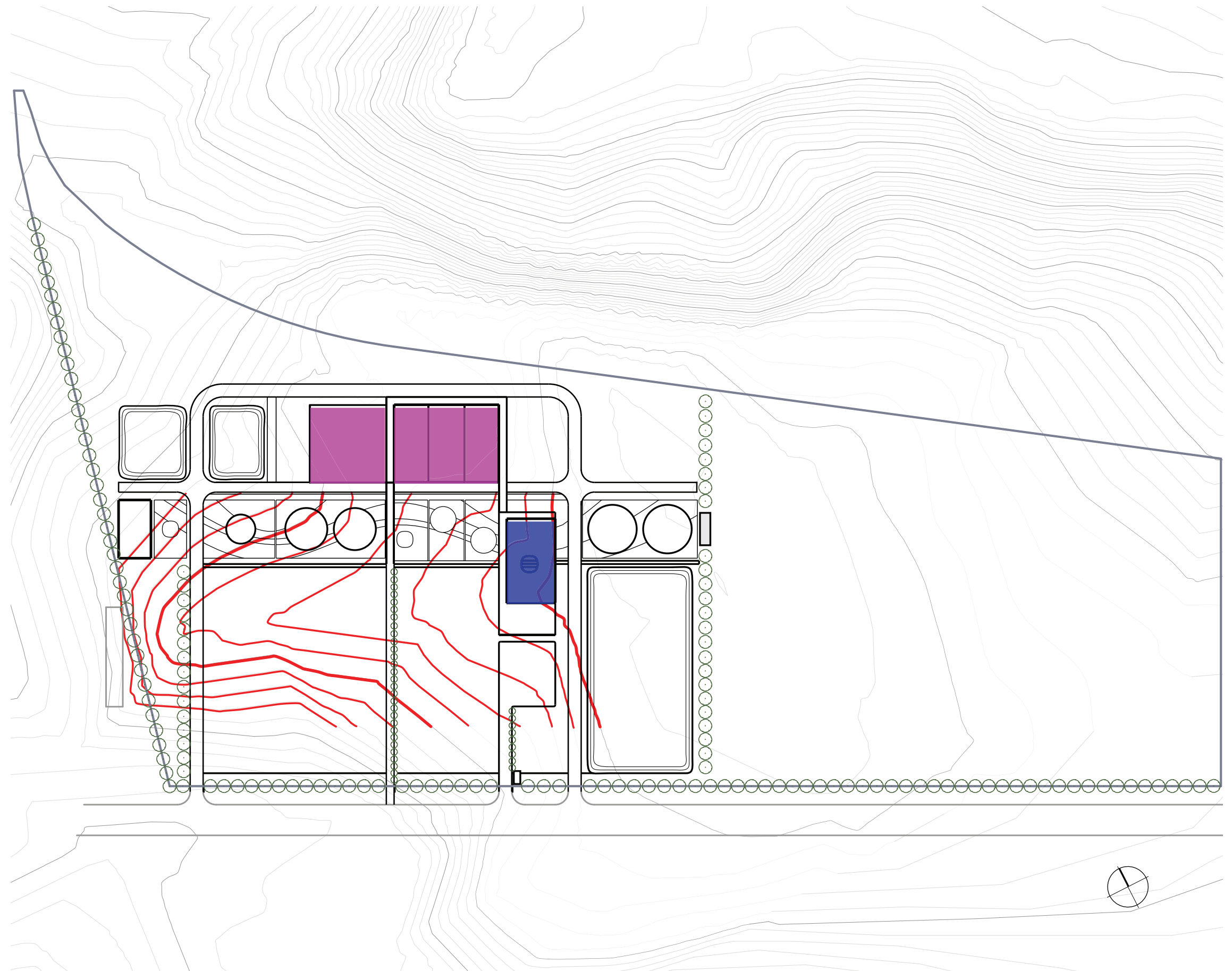


 - Ridge Topography Highlighted







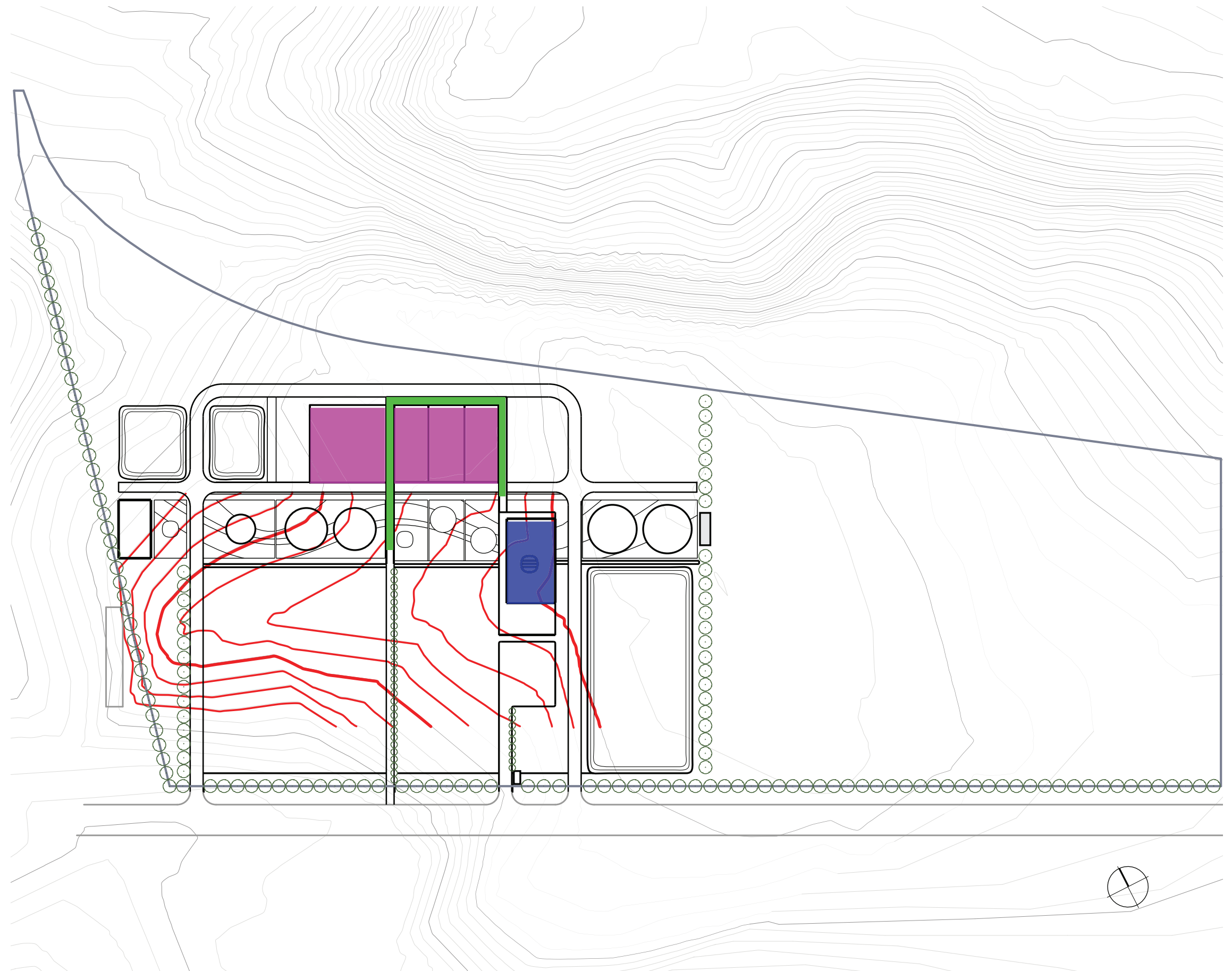
When considering placement of the buildings on the site, first the existed topography was evaluated. A slight ridge was apparent and the location of the landscaping features as well as buildings, storage tanks, and even roadways was placed in such a way that it relates to this existing ridge.

-  Ridge Topography Highlighted
-  Administration Bldg on Ridge
-  Treatment Bldg below Ridge



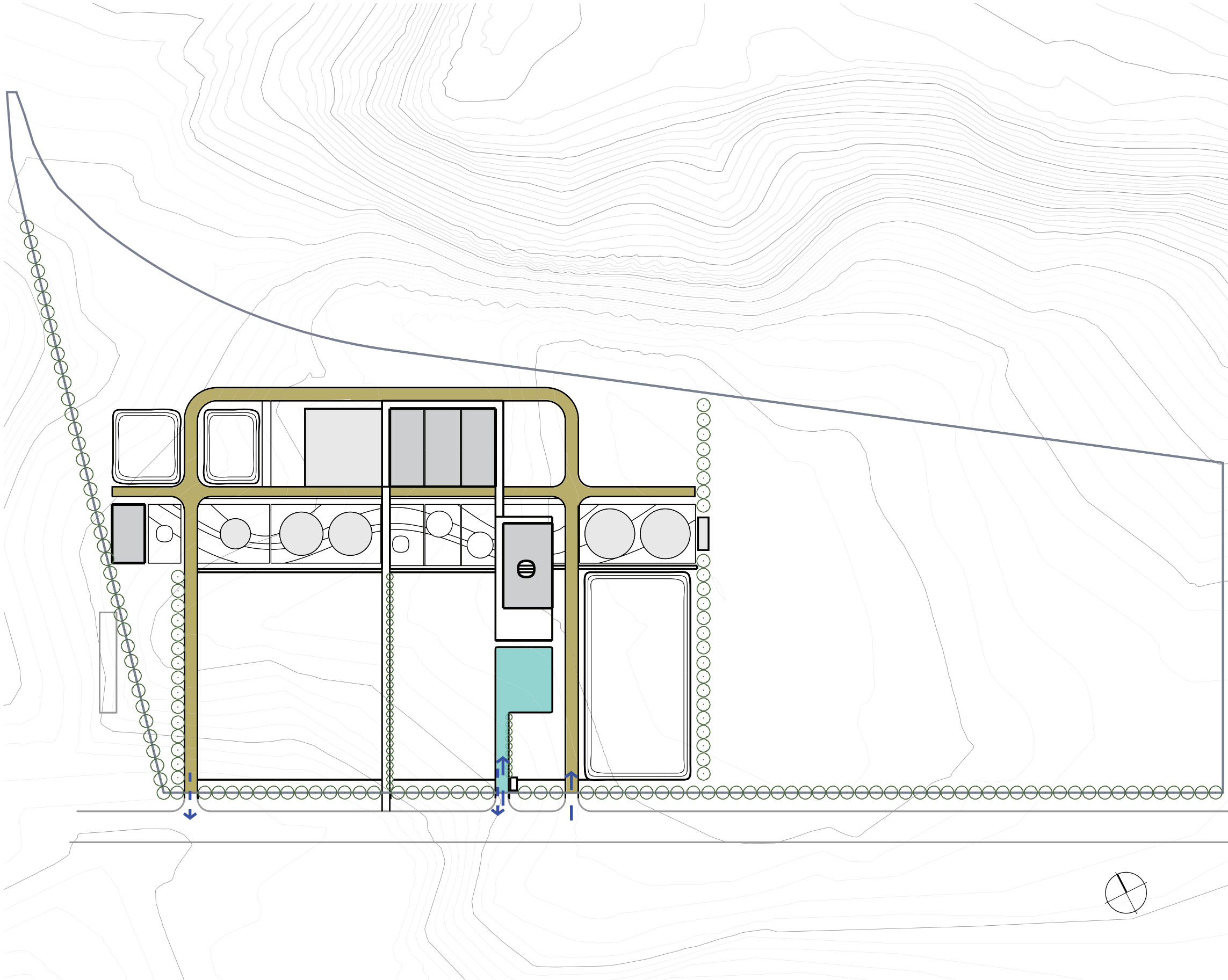
The Administration building was located on the ridge and was intended to be the dominant building on the site from the entry perspective. The Treatment building was lowered to the bottom of the ridge, so that during entry it appears very low on the horizon and steps down with the existing topography.

-  Ridge Topography Highlighted
-  Administration Bldg on Ridge
-  Treatment Bldg below Ridge
-  Elevated Pathway







The elevated pathway was created as a unifying element between the viewing area of the Treatment building and the upper portion of the ridge, where the Administration Building is and where visitors would first experience the site. This pathway acts as an education loop and by taking advantage of the grade change, it has a very gently slope that is also handicap accessible.

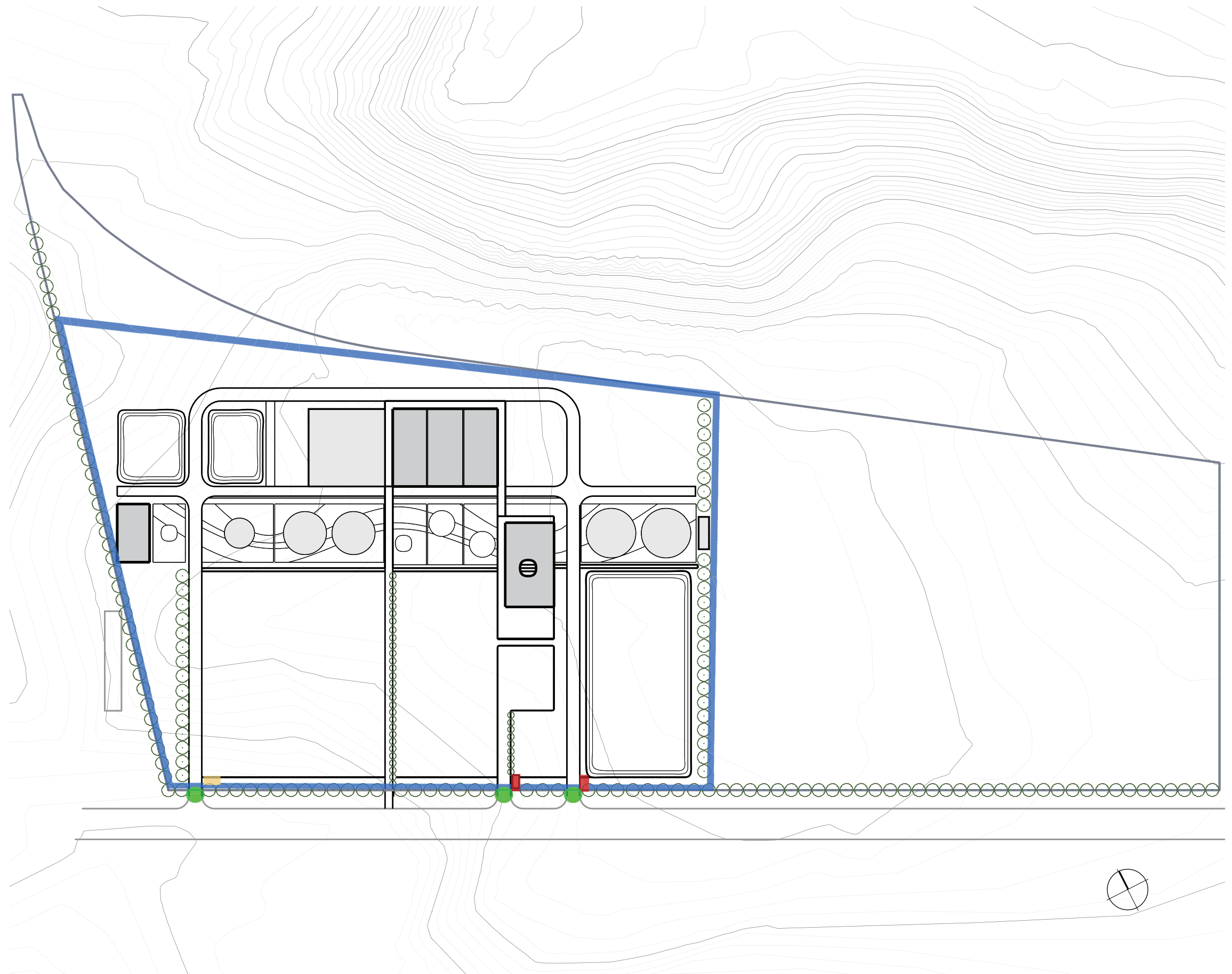
- Service Access Route
- Public Access Route
- Entrance/Exit Direction







The roadways were designed to keep public access and service access separate. By doing this paving is kept to a minimum. The public access is wide enough for entrance and exit at the same point as the vehicles will be smaller than the typical delivery truck. This road will likely have the busiest access as it also contains the only long-term parking spaces on the site.

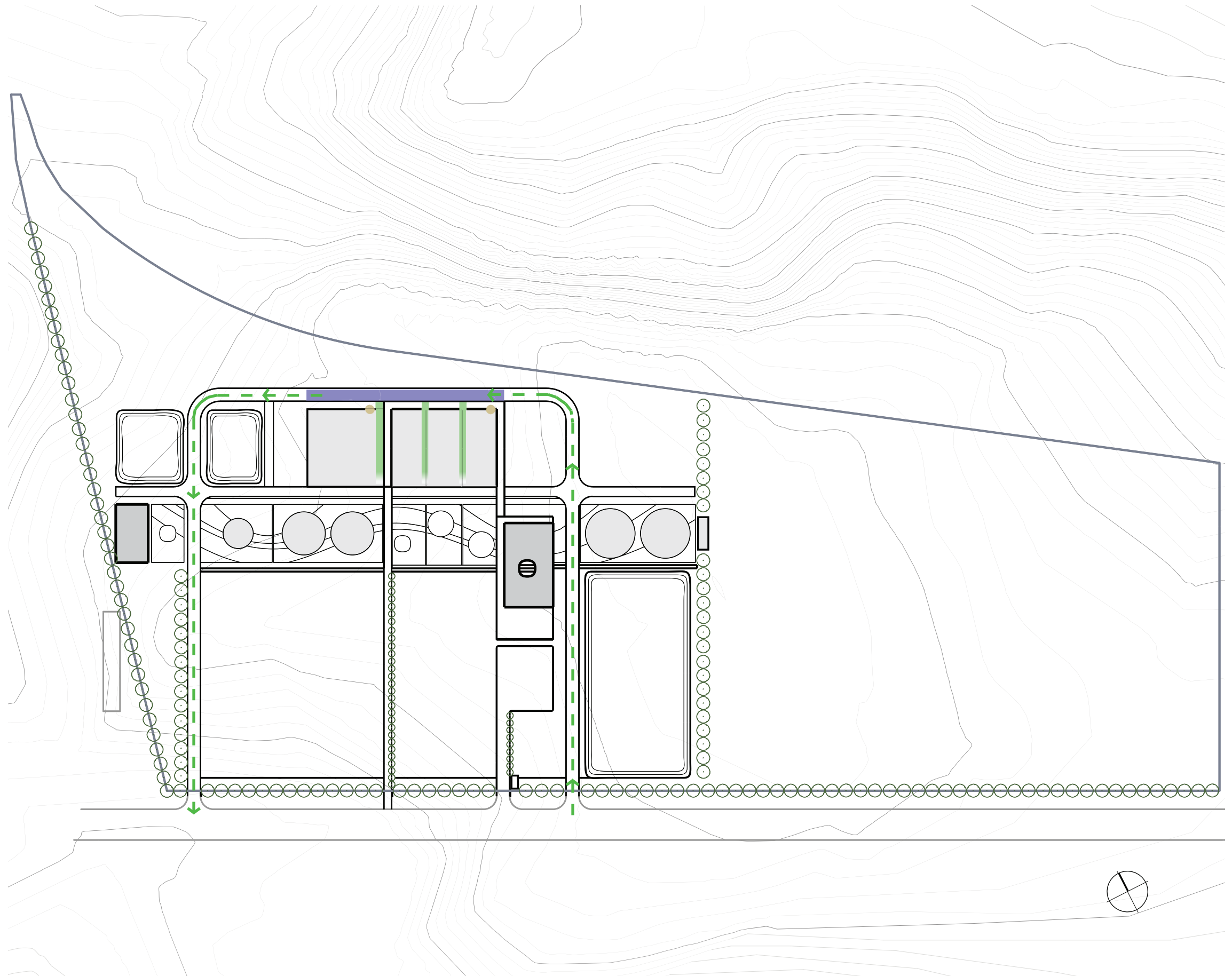
The service access has a separate entry and exit point as the vehicles using this road will be larger and have a much wider turning radius. By keeping the traffic to a loop, the need for turning around is reduced. The service road in the middle and the dead end roads on either end are for less frequent use and for emergency access to all buildings.

-  Fence
-  Automated Sensor for Exit
-  Intercom/Code Panel for Entry
-  Location of Gate



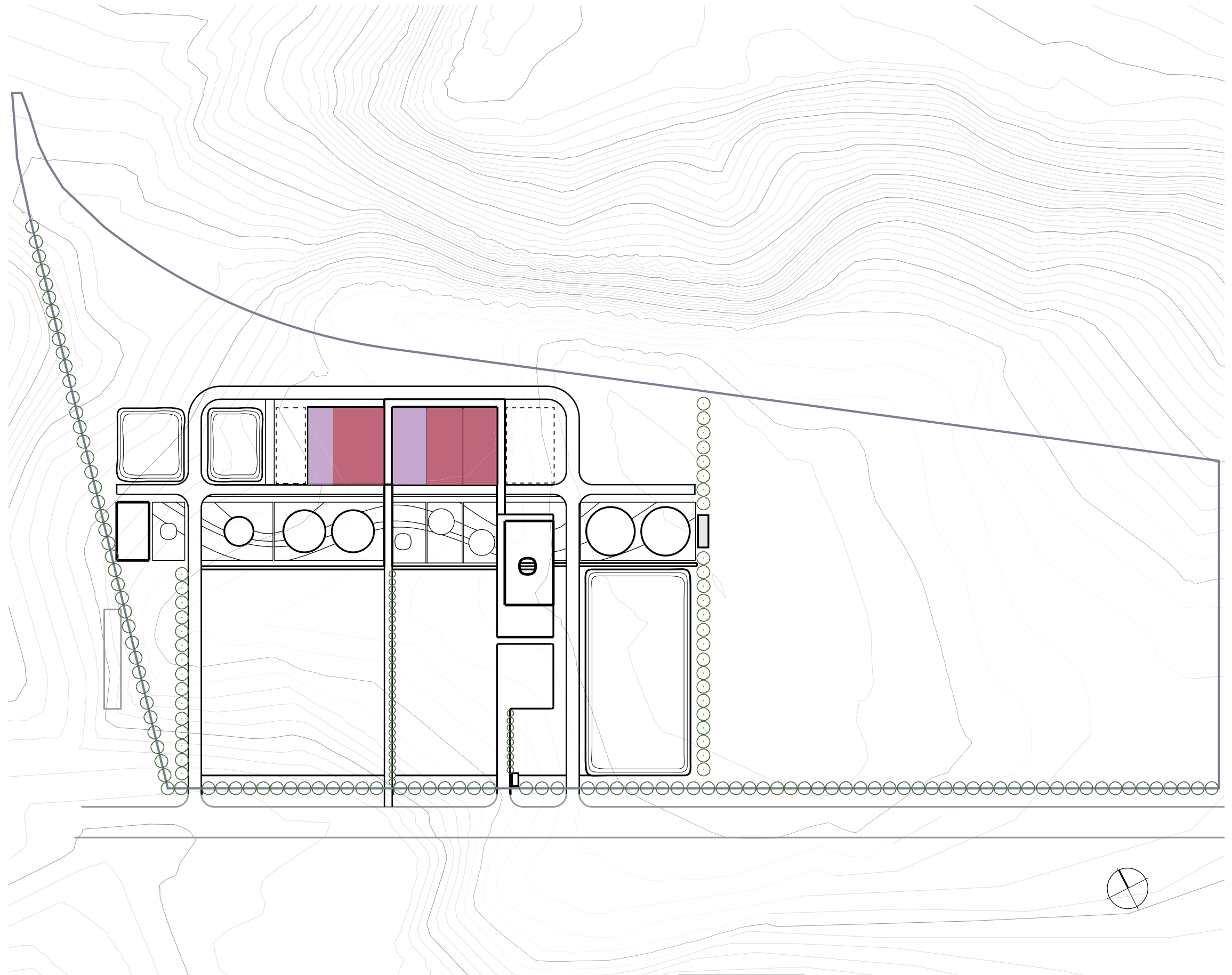
There are various means of security that need to be considered and this diagram attempts to highlight which options are available and where they should be located. The fence location is approximate.

-  Delivery Route
-  Concrete Zone with Spill Drainage
-  Loading or Crane Access Path
-  External Chemical Access Point



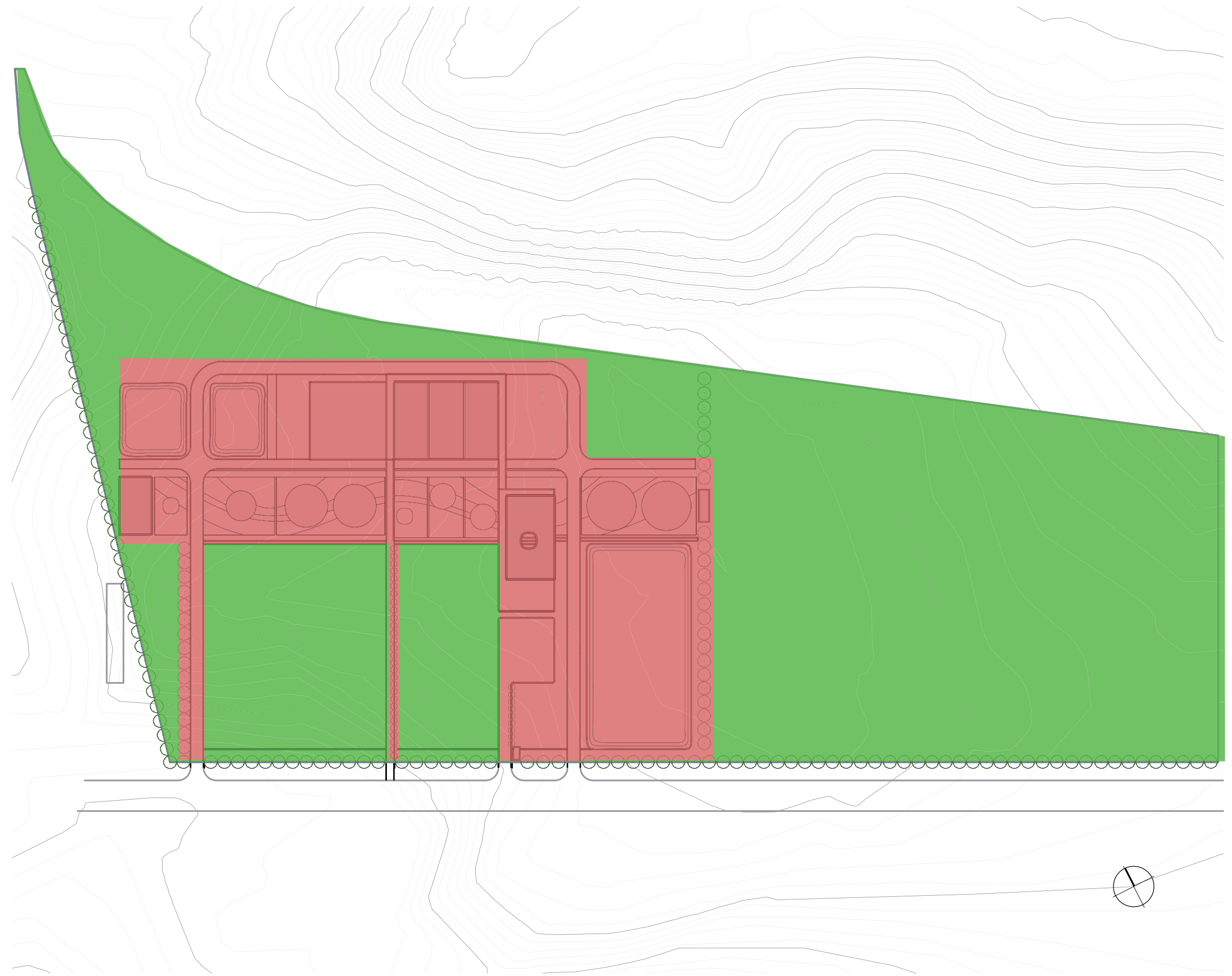
In addition to easing congestion, the route of travel for trucks is designed this way so that the drivers pull to the building on their side. Many trucks place chemical access points on the driver side. By arranging the path in this way the drivers can easily exit the vehicle on their side and have access without having to even walk around the vehicle. This also reduces the need for turn around space.

- 6.4 MgD Plant
- 9.6 MgD Plant(Including 6.4 MgD)
- Future External Expansion




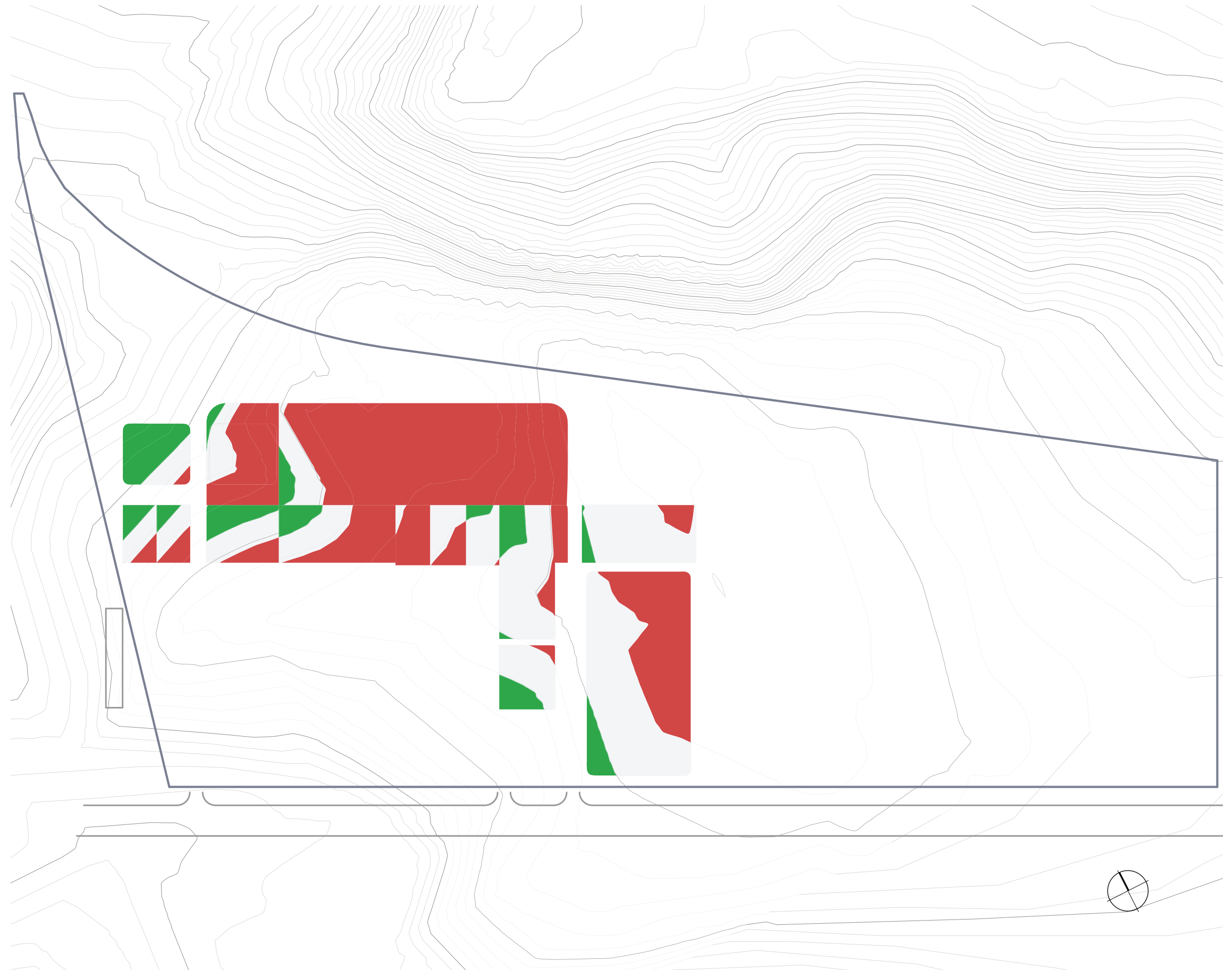
This proposal was designed with the 9.6 MgD Plant in mind. However, a 6.4 MgD option should also be considered. The smallest zone is the 6.4 MgD design. The area of the 9.6 MgD should also include the area of the 6.4 MgD. Please defer to the Treatment Building plan for a comparison between the two options. In addition to the two separate plans, it should be noted that there should be a relatively level and unobstructed space to the west and east sides of the Treatment Building. This area could be used for future expansion.

- Undisturbed Area
- Disturbed Area



The site lends itself to development of the western end of the site. The sustainable goal of limited development fits with cost savings in this program diagram. We have intentionally left as much of the site undeveloped as possible. During construction, considerable effort must be used to protect the site. Temporary fencing, runoff capture, defined lay-down areas for contractors will be needed.

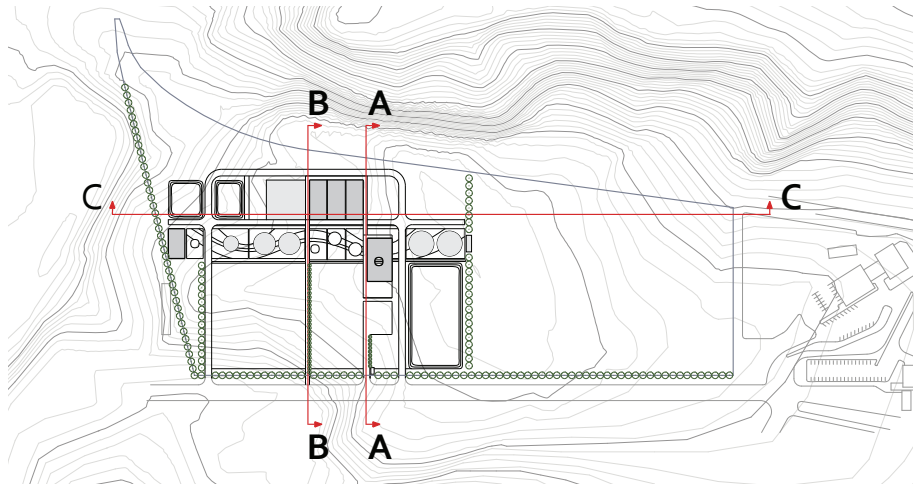
-  Cut
-  Level
-  Fill



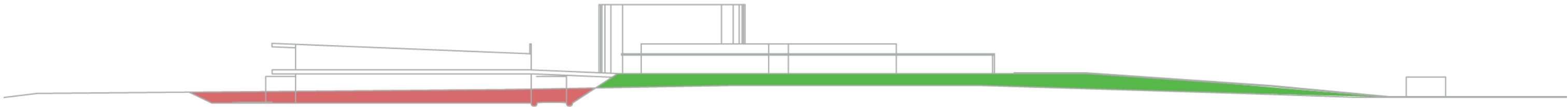
The cut and fill is design in such a way so as to have a balanced relationship between the cut and the fill. This leads to decrease need for soil from elsewhere and it also allows for use of a majority of the cut soil. This means less moving of dirt on and off site. This is an approximation and an actual survey will need to be conducted to create the most accurate cut and fill plan. Additionally any areas that are shown as level are areas that merely have neither a drastic cut or a drastic fill.

Disturbed Areas : Cut and Fill Sections

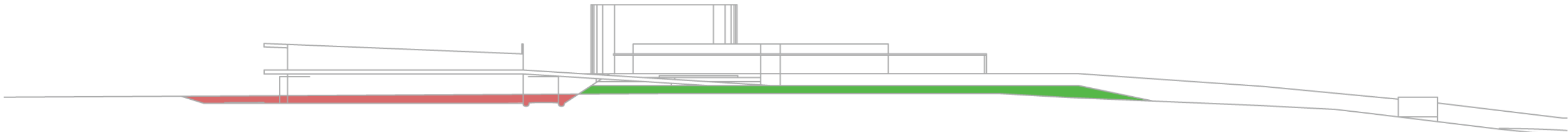
- Cut
- Level
- Fill



Cut and Fill Section A-A (East)



Cut and Fill Section B-B (East)



Cut and Fill Section C-C (North)

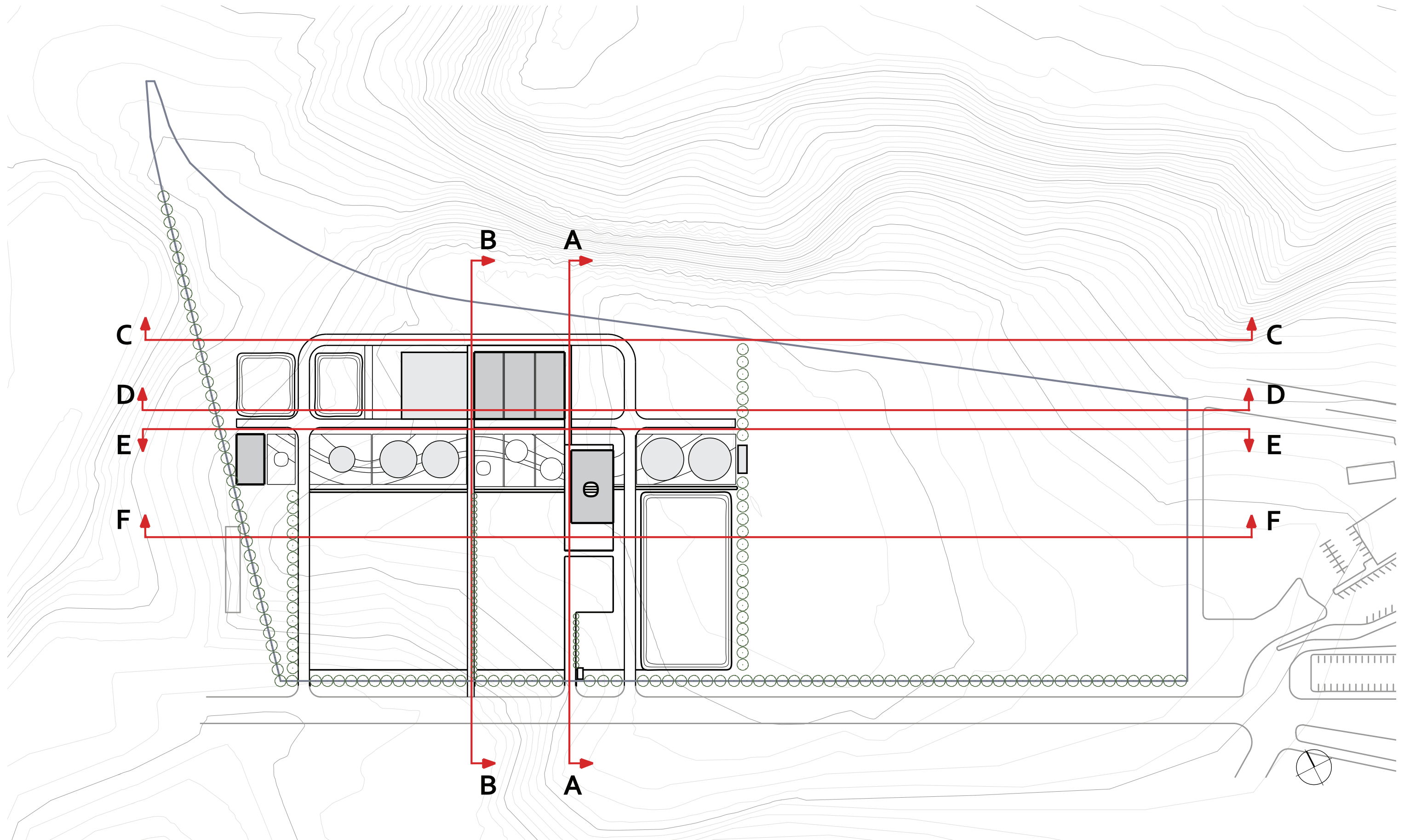


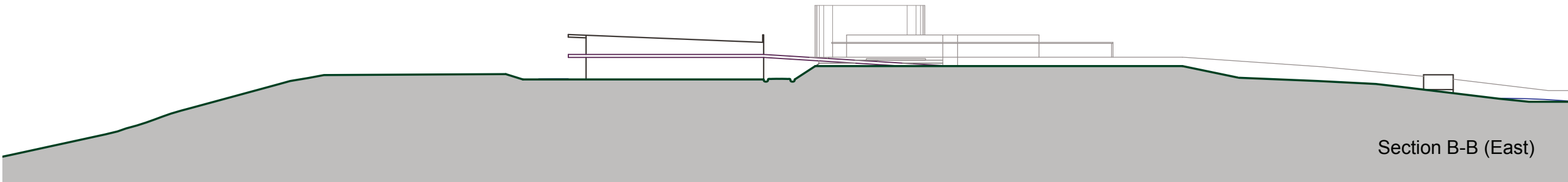
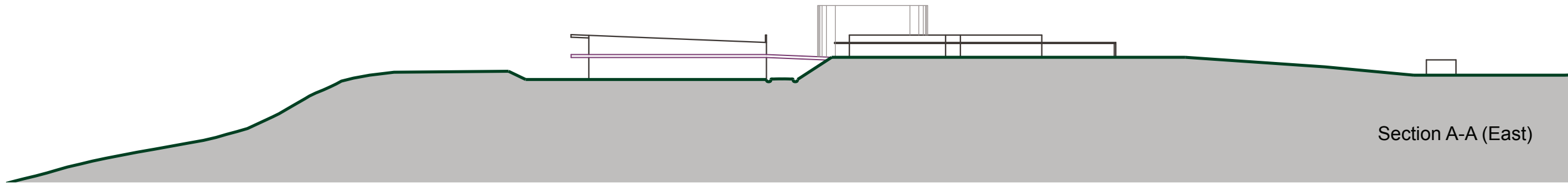
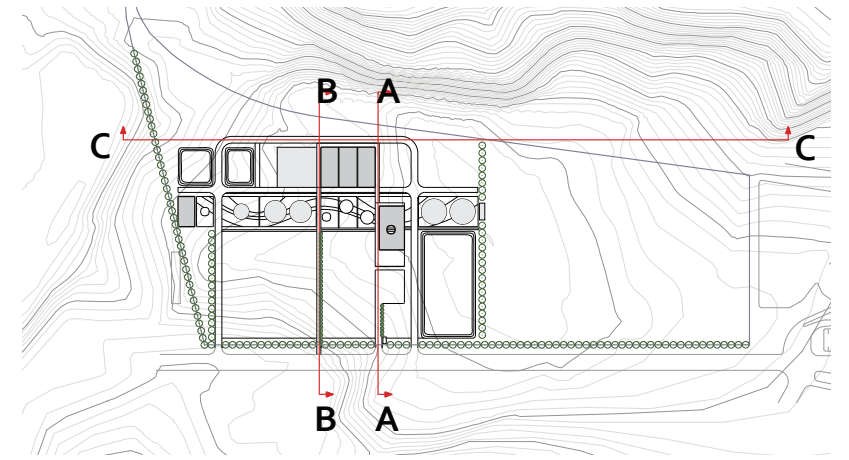
Note: These diagrams are intended solely for a rough approximation of cut and fill in a given cross-section.

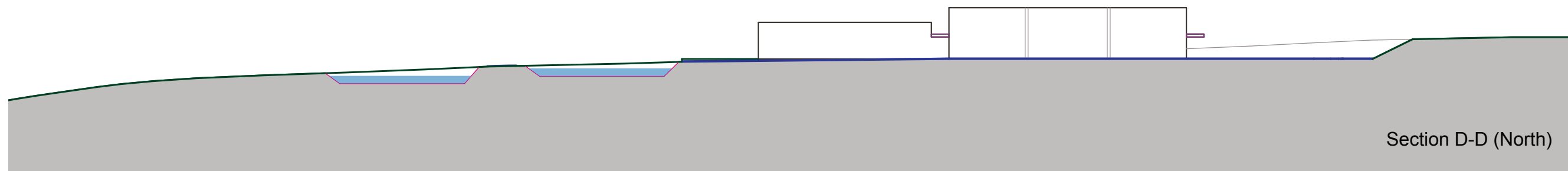
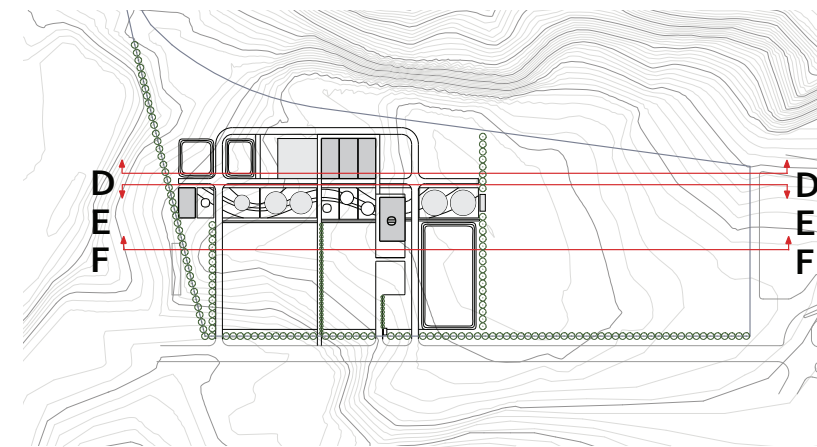
05 site sections

- Site Section Full Page Key Plan
- Sections
- Detail Sections with Dimensions

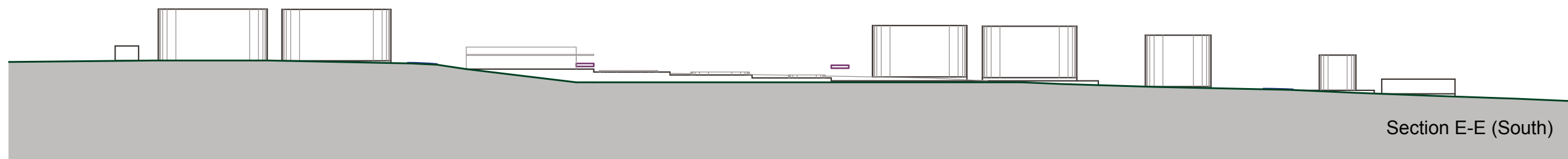




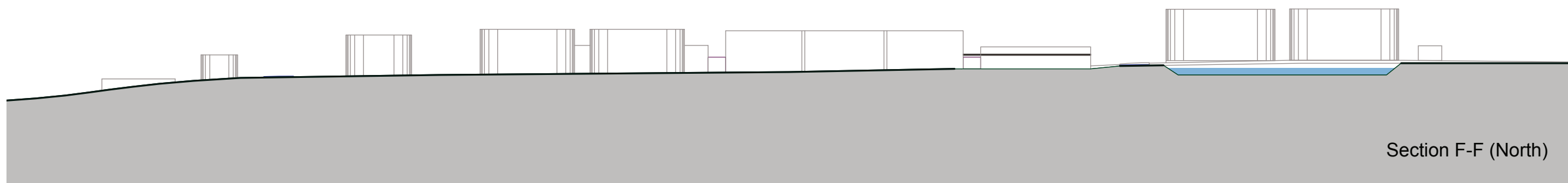




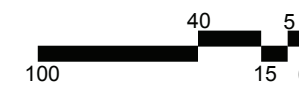
Section D-D (North)



Section E-E (South)



Section F-F (North)





06 education

- Visitor Circulation Diagram
- Education Program
- Screen Explanation/Diagram
- Landscape Education

Points of View

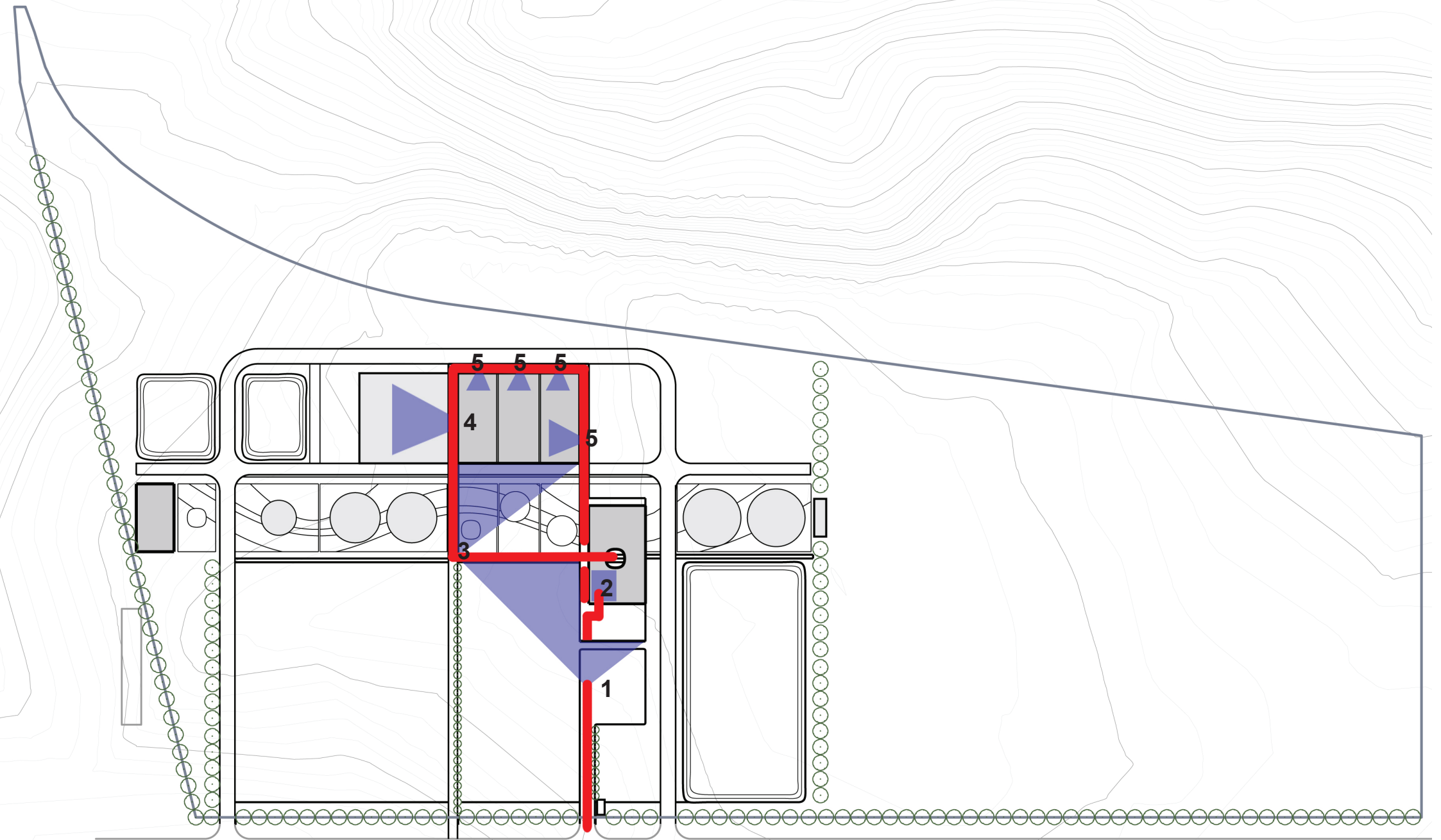
1. Arrival - Visitors park their vehicle at this parking lot that promotes sustainable practices including porous paving and carpool priority parking spaces.

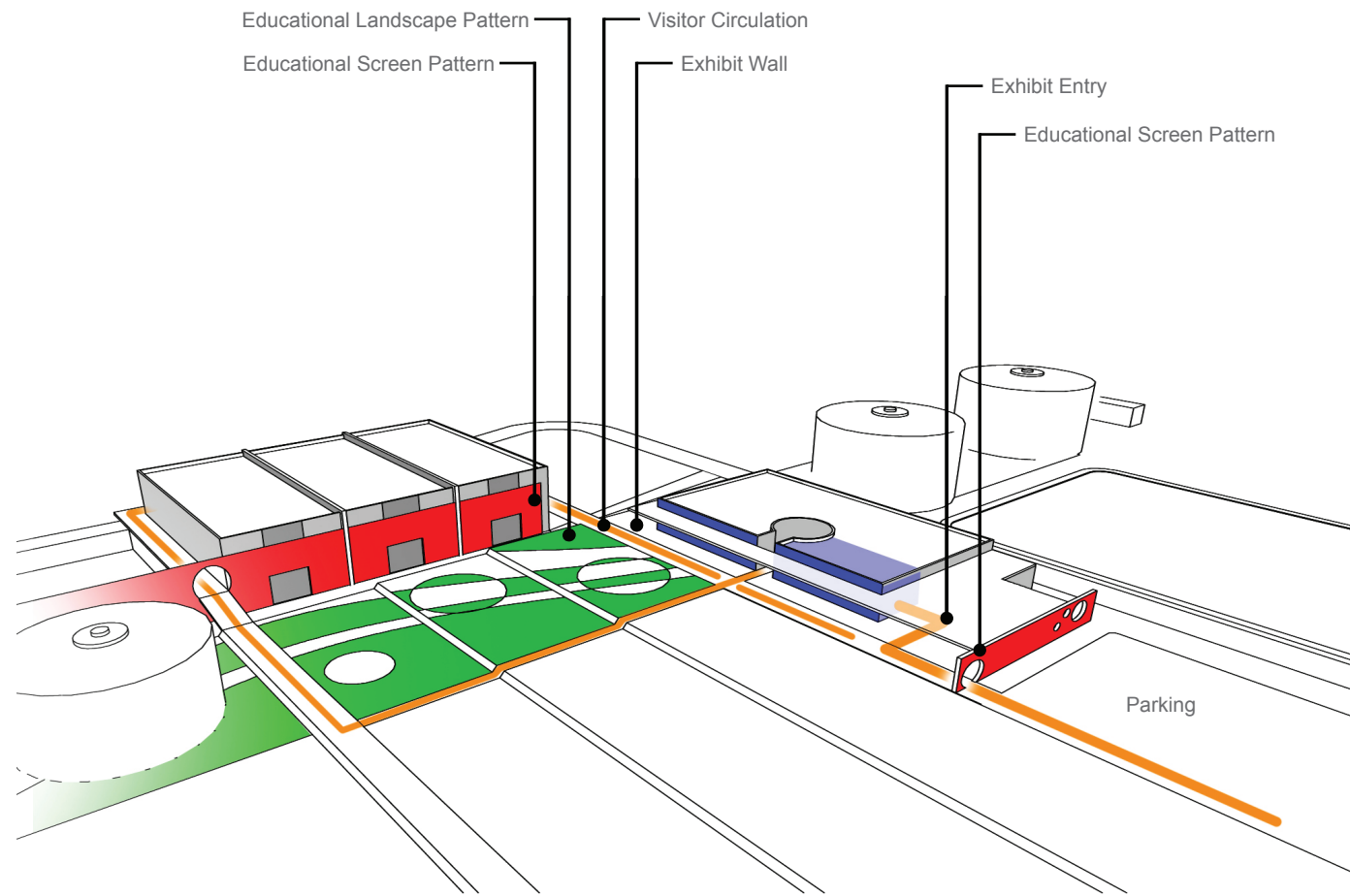
2. Education Exhibition - Visitors walk through a circular opening in the front facade. This facade's openings, which take advantage of plumbing pipe used in the design and construction of the facility are an abstract representation of the elements filtered out of the seawater through the desalination process. The Administration Building houses a space that displays information on the importance of quality drinking water, the desalination process and sustainable features worked into the project's design.

3. Tour Begins/Screen View - Once visitors leave the exhibition, a water feature directs them from the central building courtyard along the edge of the newly landscaped area in front of the treatment building. Visitors see an abstract representation of the desalination process in the landscape and screen wall that lines the front of the treatment building.

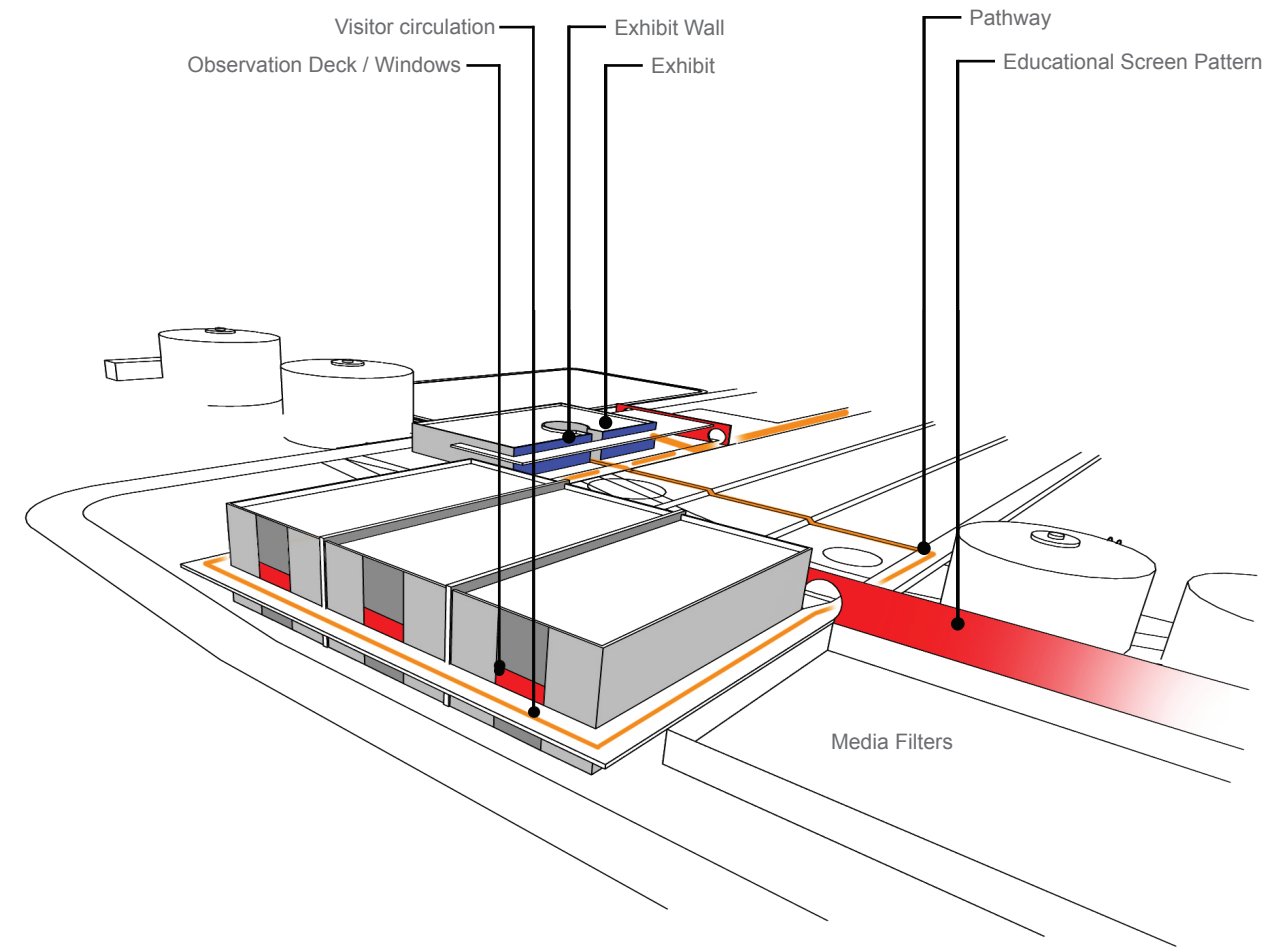
4. Media Filter View - Visitors walk along the path towards the treatment building, where they cross over a service road between the landscaped area and the treatment facility. Visitors will see the first filtration phase (MultiMedia filter tanks) of the process to their left as they continue along this path.

5. RO/Post Treatment View - Before visitors turn the corner at the back of the building they will see an amazing view of the river valley below. To the right visitors can peer through windows at the RO trains and other equipment, while to on other sides the beautiful valley will be seen below. In front of windows lining the treatment building visitors will have the opportunity to read display boards outlining exactly what is being observed. Once visitors have taken everything in, they can return to the Administration Building to conclude the tour.

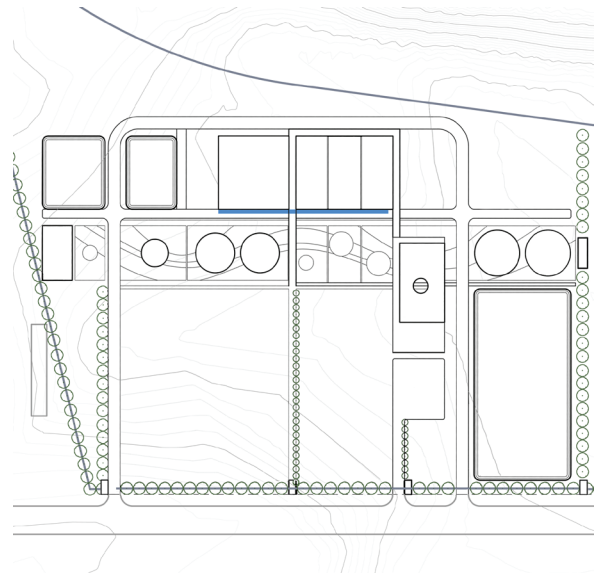




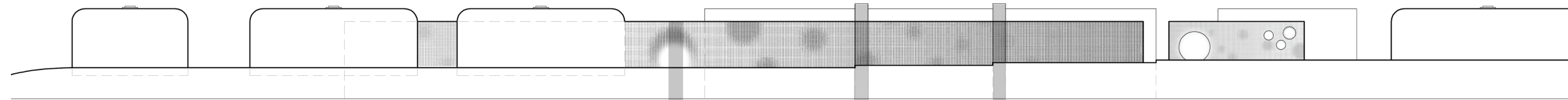
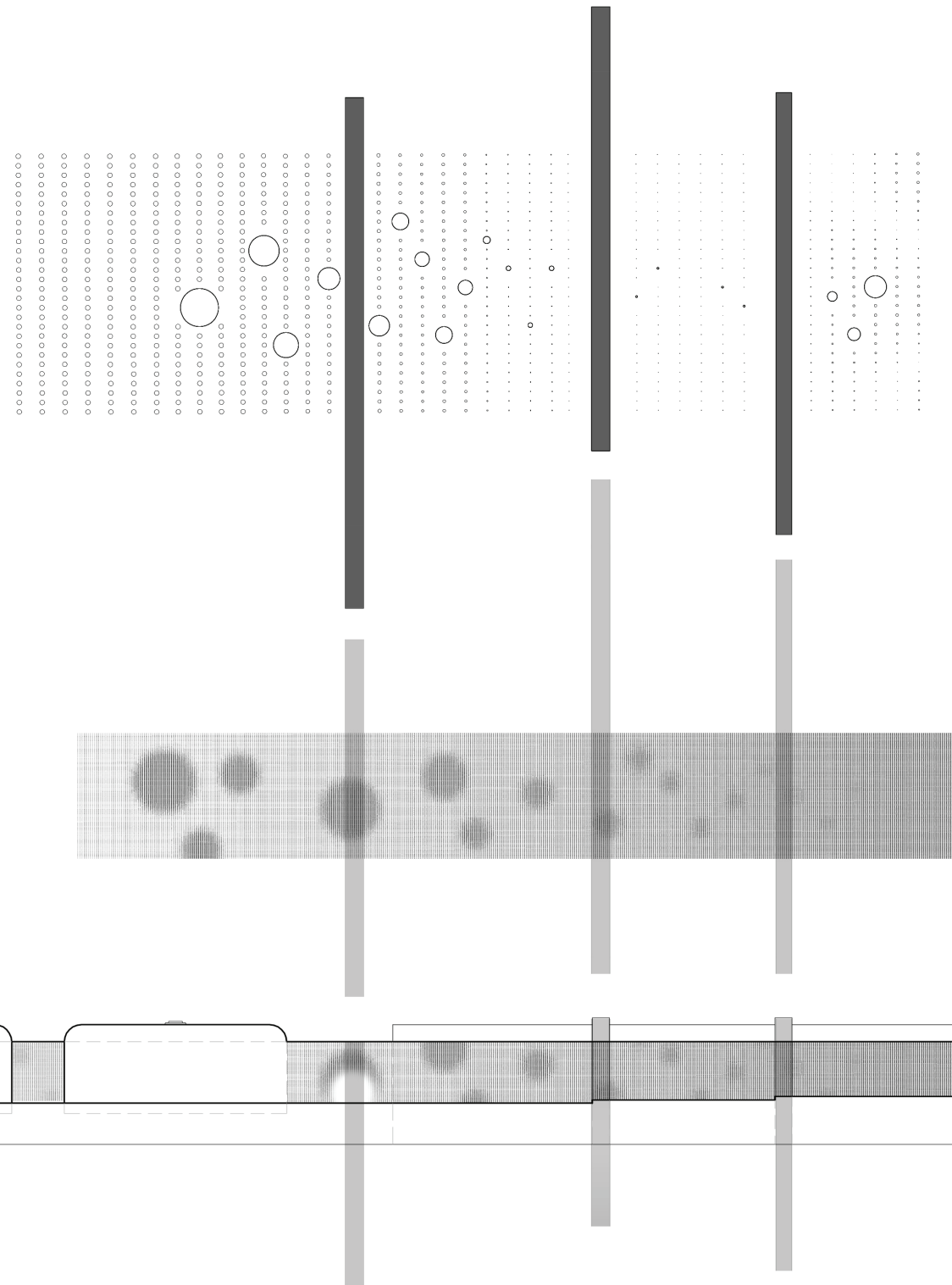
Front View



Rear View



The screen that lines the front of the treatment building represents desalination process. The larger circles on the left of the screen represent the larger elements in the sea water that is pumped into the facility from the ocean. The size and quantity of elements are filtrated out in two phases (MultiMedia and RO). The third step in the process reintroduces minerals back into this extremely pure water to create a balanced potable water product.



A-1 : Water Molecular

White flowers represent the purity of the water after it has been treated by the filtration processes, while the surrounding array of flowers represent the range of elements in the water prior to treatment.

A-2 : Xeriscape

The multi-colored courtyards utilize a spectrum of native and adaptive plants, which require little to no irrigation.

A-3 : Restore and Improving the Local Habitat

The original native plants are re-established in selected areas after grading has occurred, while invasive species are not.

B. Bio-retention Swales

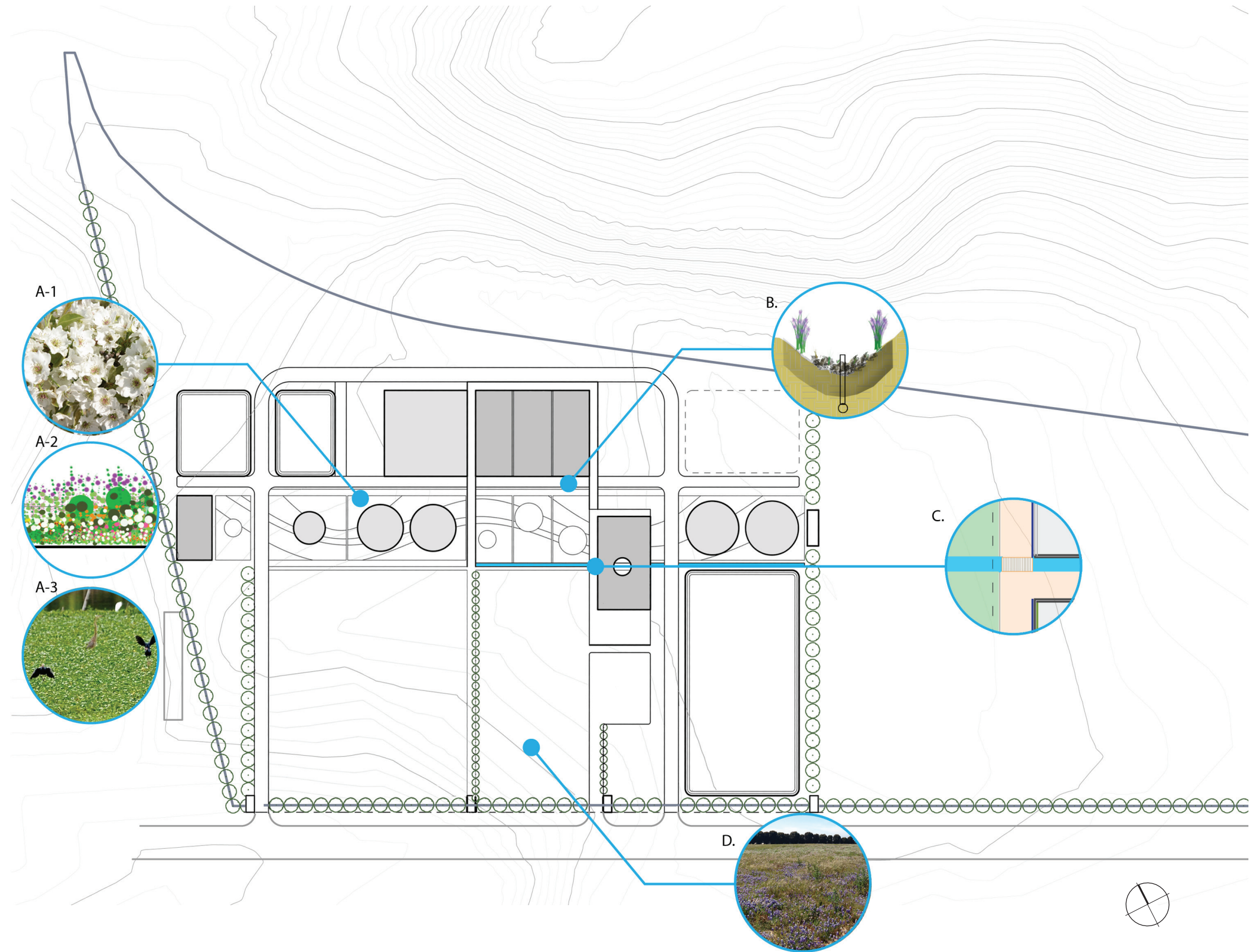
Roads are pitched towards swales that capture rainwater, allowing water to infiltrate back into the natural aquifer. This practice reduces water runoff, which leads to soil erosion and the pollution of surrounding water bodies.

C. Water Feature

A water feature that runs along the edge of the landscaped courtyards uses captured rainwater from the adjacent Administration Building and Water from treatment facility tests sinks, which continuous run to provide accurate sampling.

D. Undisturbed area

Preserving and protecting the maximum amount of open space promotes natural flora and fauna to co-exist with the built project.



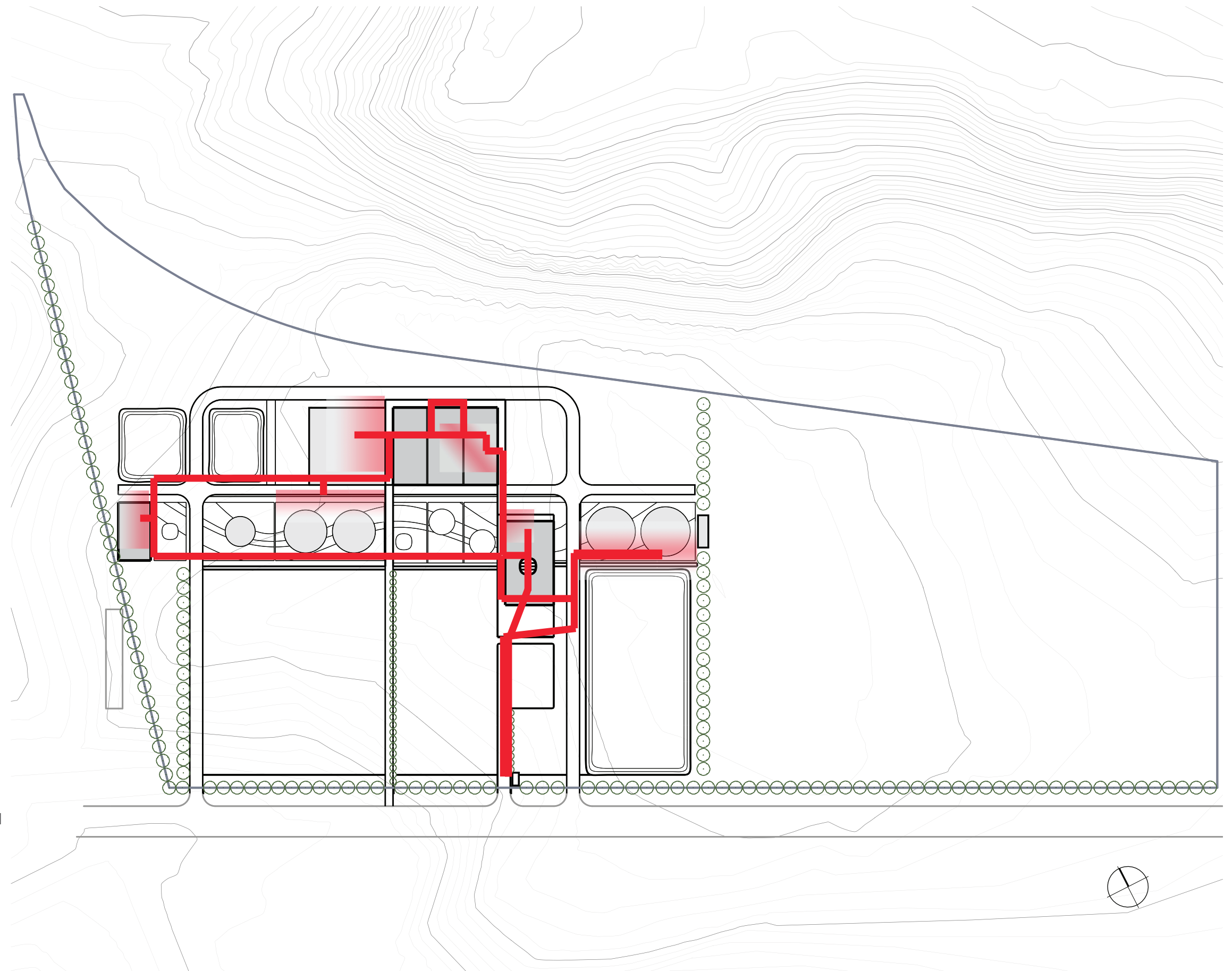
07 scenario planning



- Professional Visitor Diagram
- Typical Visitor Diagram
- Engineering Staff
- Office Staff
- Delivery Person
- Scenarios Composite

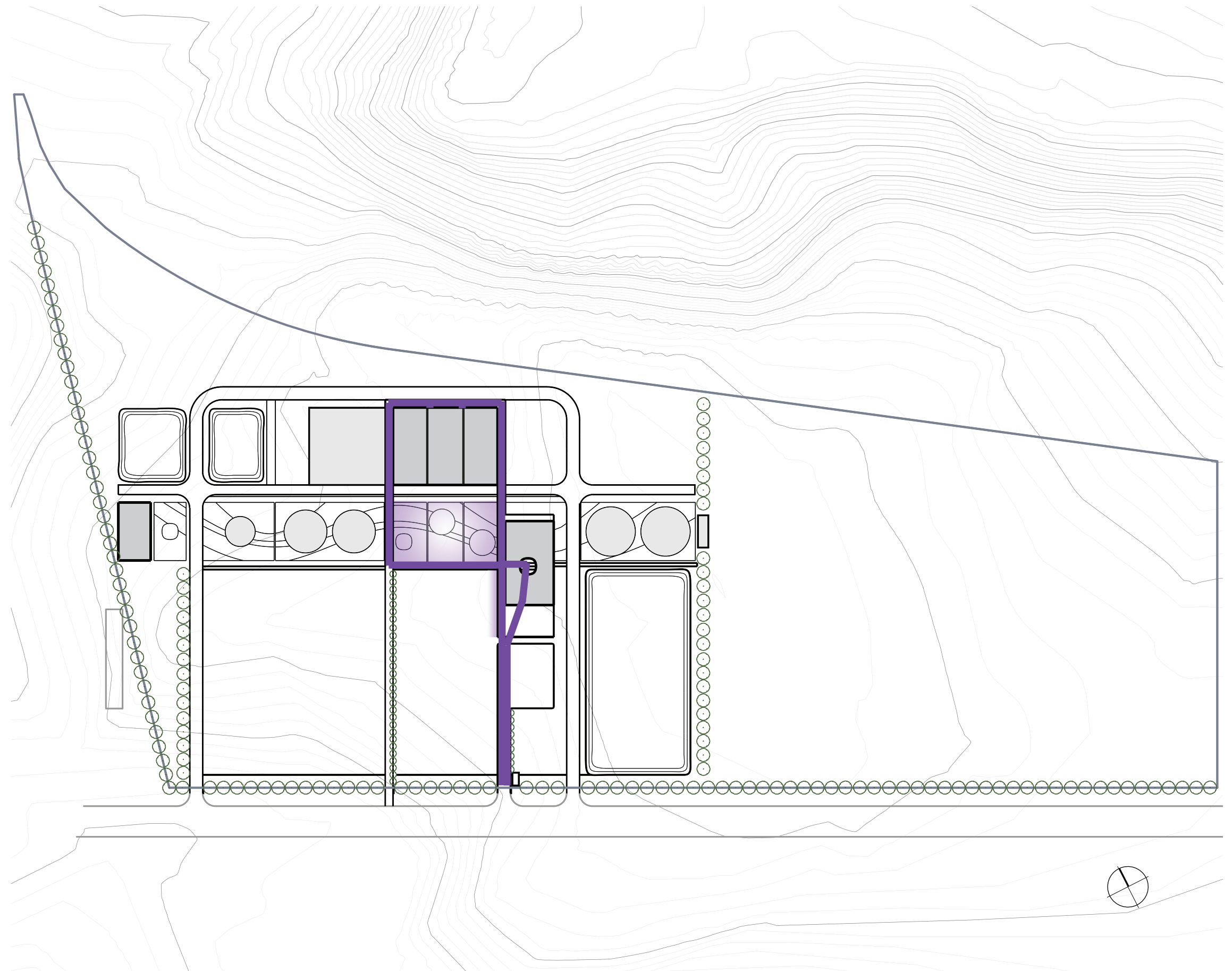
- Prof. Visitor Primary Route
- Prof. Visitor Secondary Areas

Scenario Planning was used in this project to be sure that the arrangement of the building program was created with all the users of the site in mind. While the number of people using the site is small, we still wanted to be sure that all our design moves would make that users experience convenient and movement throughout the site as direct as possible.

The professional visitor is someone with expertise or knowledge of water treatment processes. That visitor would explore not only the main exhibition area but also the offices and control room in the administration building. Additionally, the professional visitor would gain access to the Treatment Building floor as well as to all external facilities and tanks. The tour of these areas of the facility would necessitate the use of safety equipment on the tour. This distinguishes it from the tour a typical visitor may receive.



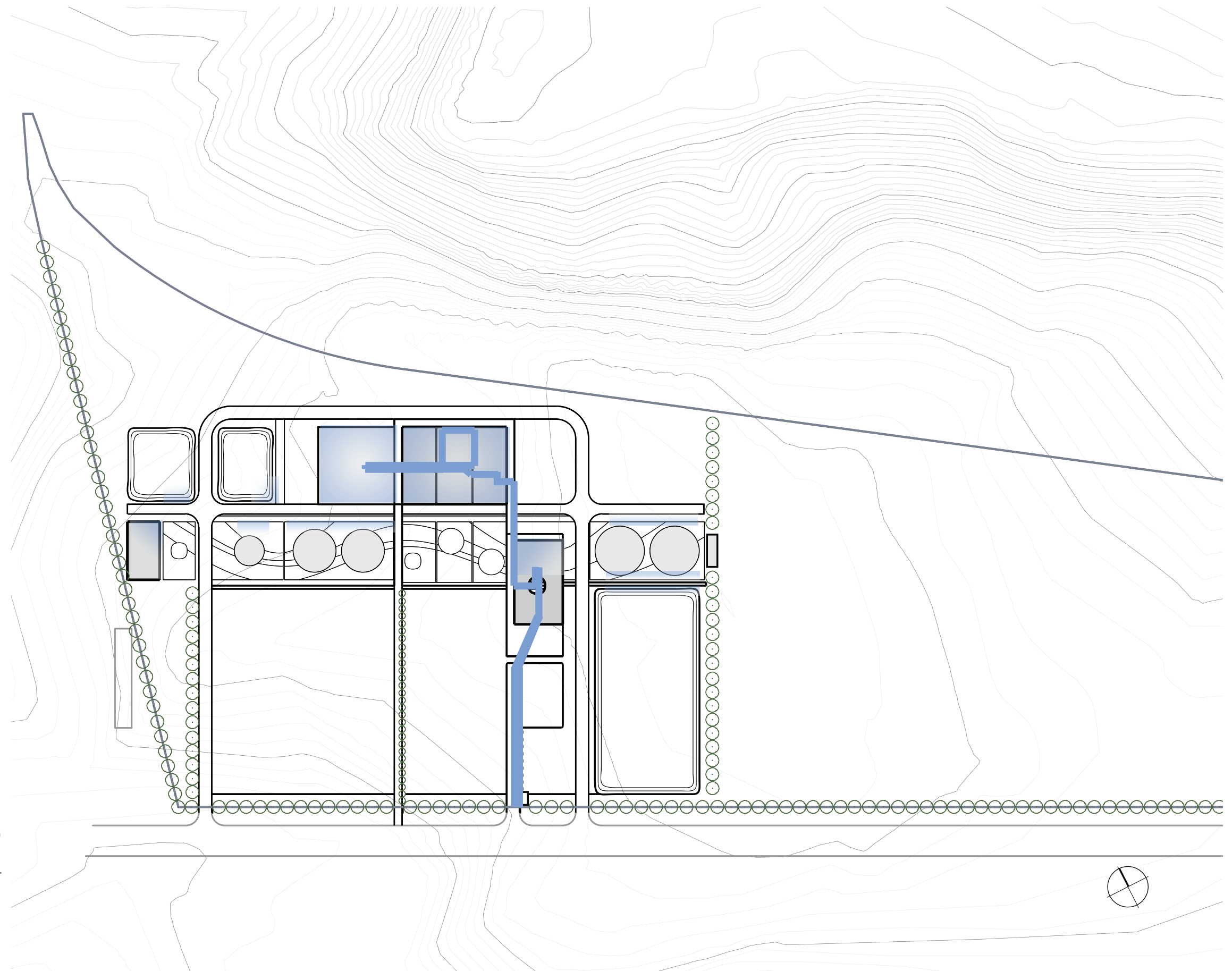
-  Typ. Visitor Primary Route
-  Typ. Visitor Secondary Areas



The typical visitor is someone with little to no expertise or knowledge of water treatment processes. That visitor would explore the main exhibition area and primarily stay to the elevated pathway that goes around the Treatment Building.

From the elevated pathway, the visitor would gain views into the Media Filter Area, The R.O. area and even the control room without the need for any safety equipment. This visitor would simultaneously experience views of the site unique to this perspective. This tour is ideal for student groups and is highlighted in the education section of this book. This visitor may also explore the landscaped courtyard for more educational experiences and a chance to experience the natural landscape.

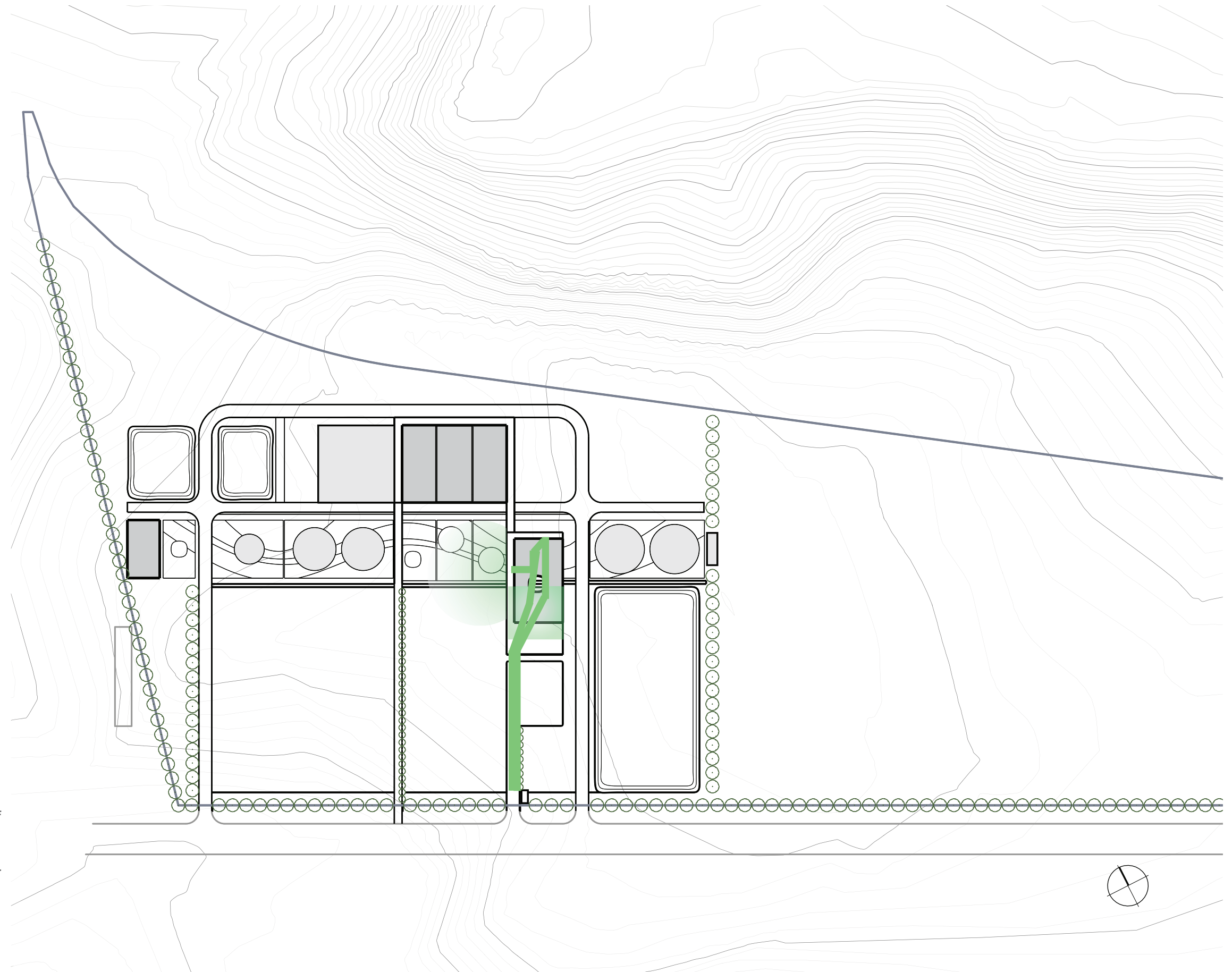
- Eng. Staff Primary Route
- Eng. Staff Secondary Areas



The engineering staff has access to the entire site. However, in a typical day they do not need to access all points of the site physically. Very often, they can access the information they need from multiple facilities by using a computer wirelessly or in the control room. Most of their primary use of the site is simple to check and inspect daily systems.

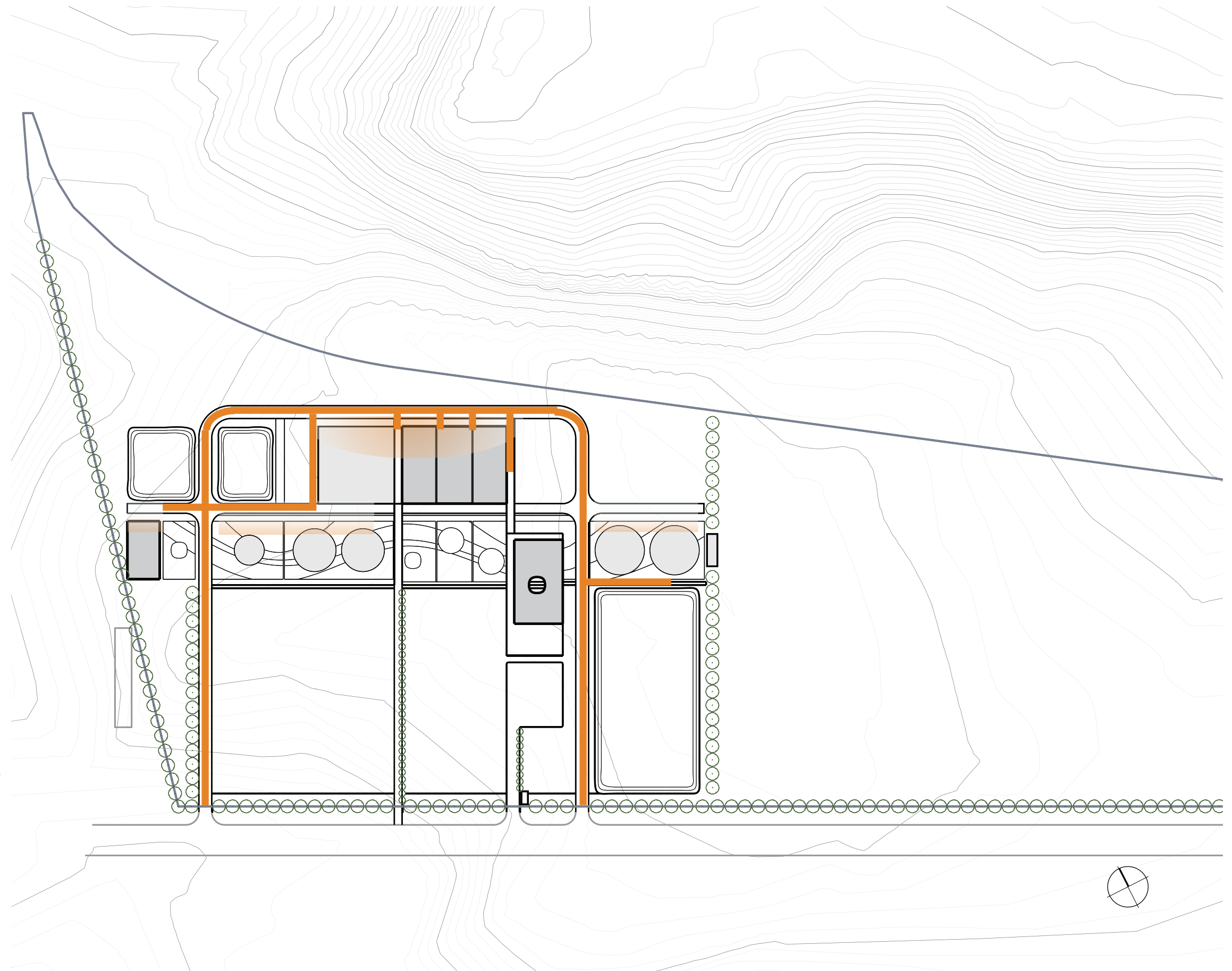
Beyond the main Treatment Building and the Administration office, the engineering staff would also visit more remote areas of the site in emergencies or if something seems incorrect with the data readings on the computer.

- Office Personnel Primary Route
- Office Personnel Secondary Areas



Anyone that s solely office personel will likely stay in the Administration building throughout the day. If they decide to stay on the facility during their lunch break and the weather is nice, it is likely that they will eat in the landscaped area directly next to their building.

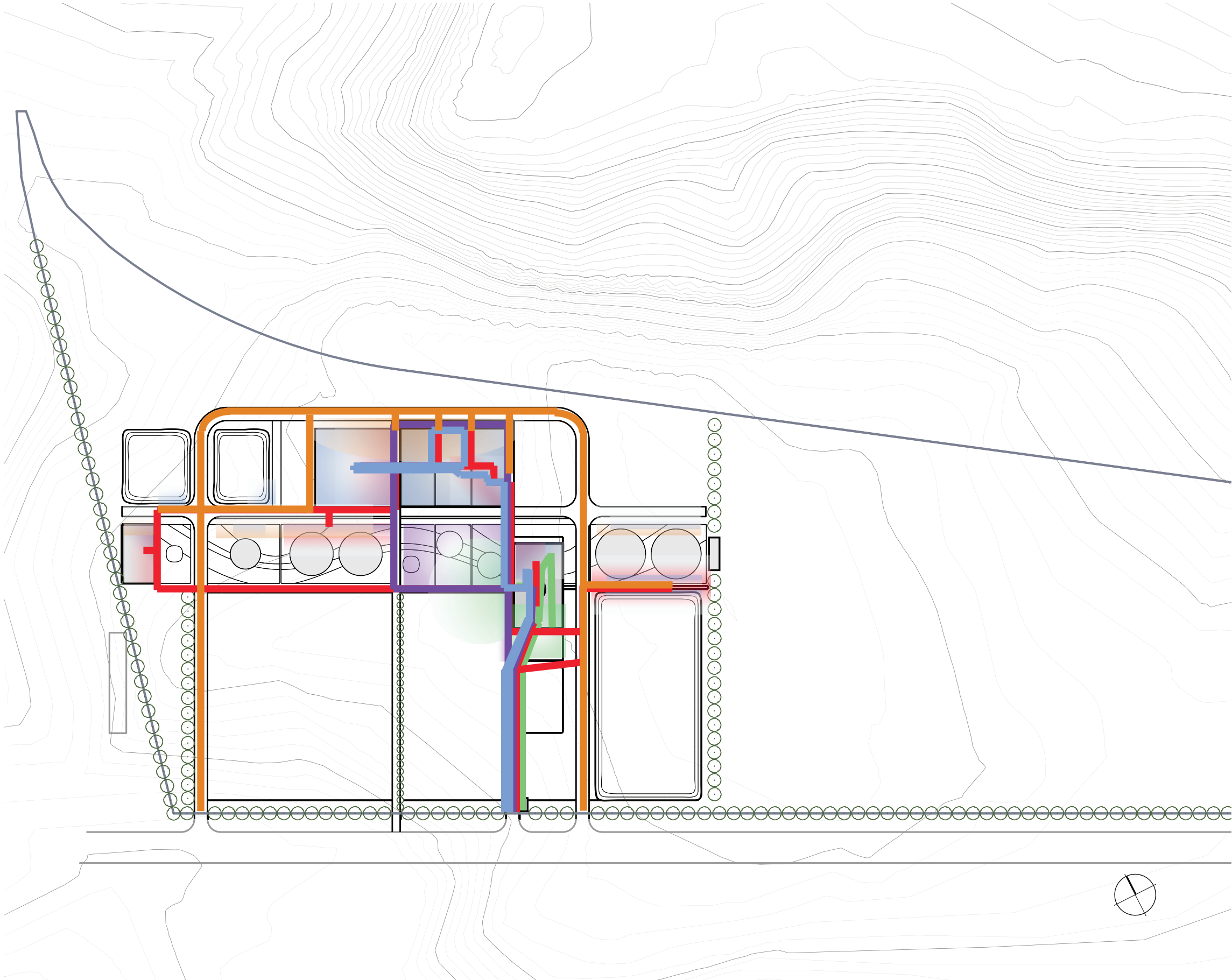
- Delivery Person Primary Route
- Delivery Person Secondary Areas



The delivery person has access to a great deal of the site. However, in a typical day they do not need to access all points of the site. Most of their primary use is the loading, drop off/pick up area as well as the use of chemical access on the northern side of the Treatment Building.

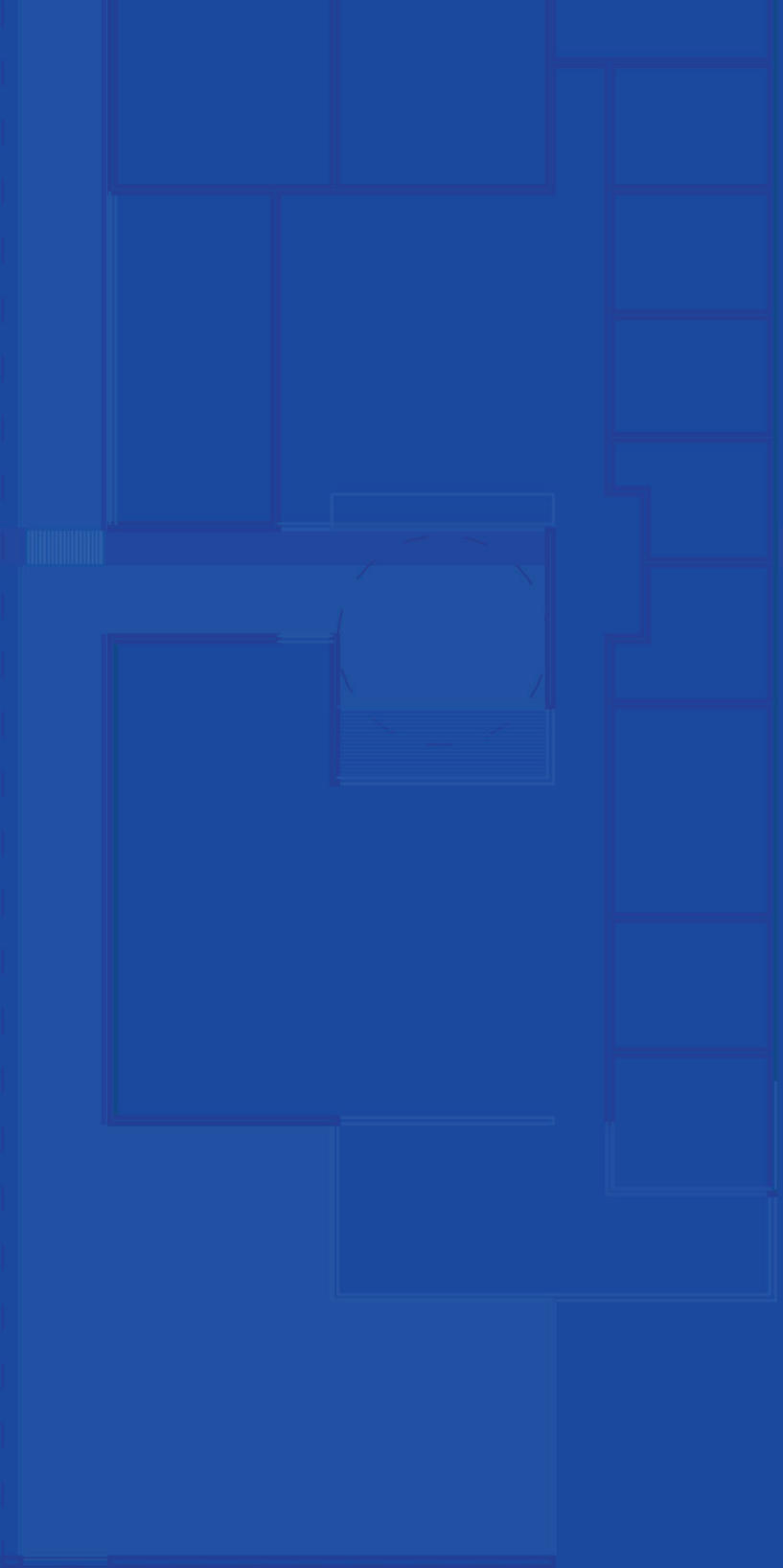
Beyond the main Treatment Building, a delivery person may need to access the tanks or more remote area of the site.

- Delivery Person Primary Route
- Delivery Person Secondary Areas
- Office Personnel Primary Route
- Office Personnel Secondary Areas
- Eng. Staff Primary Route
- Eng. Staff Secondary Areas
- Typ. Visitor Primary Route
- Typ. Visitor Secondary Areas
- Prof. Visitor Primary Route
- Prof. Visitor Secondary Areas



By overlaying all the different scenarios in one composite, the patterns become clear and few spaces on the site seem untouched or seldom visited.

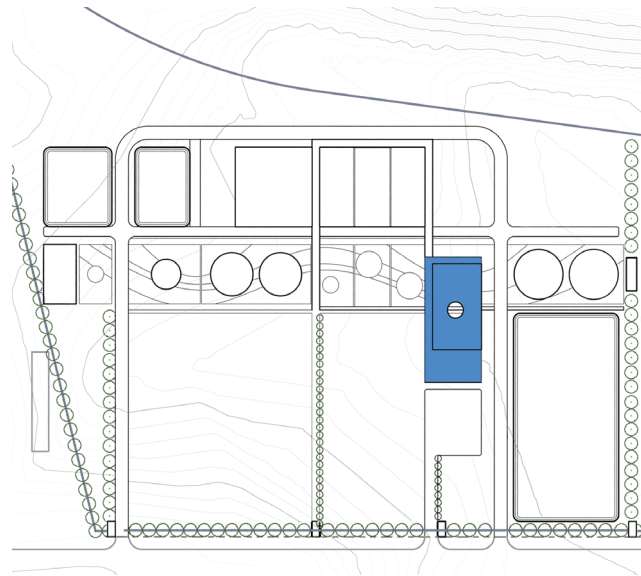
Additionally and not surprisingly, the core of the site which features the Administration building and the Treatment Building is where most of the activity revolves. Also the distinction between areas that could potentially be more dangerous and those designed for visitors or office personnel are kept separate. This is a safer model than has been seen in previous designs of Desalination that we have studied. Planning was used in this project to be sure that the arrangement of the building program was created with all the users of the site in mind.



08

Interior plans

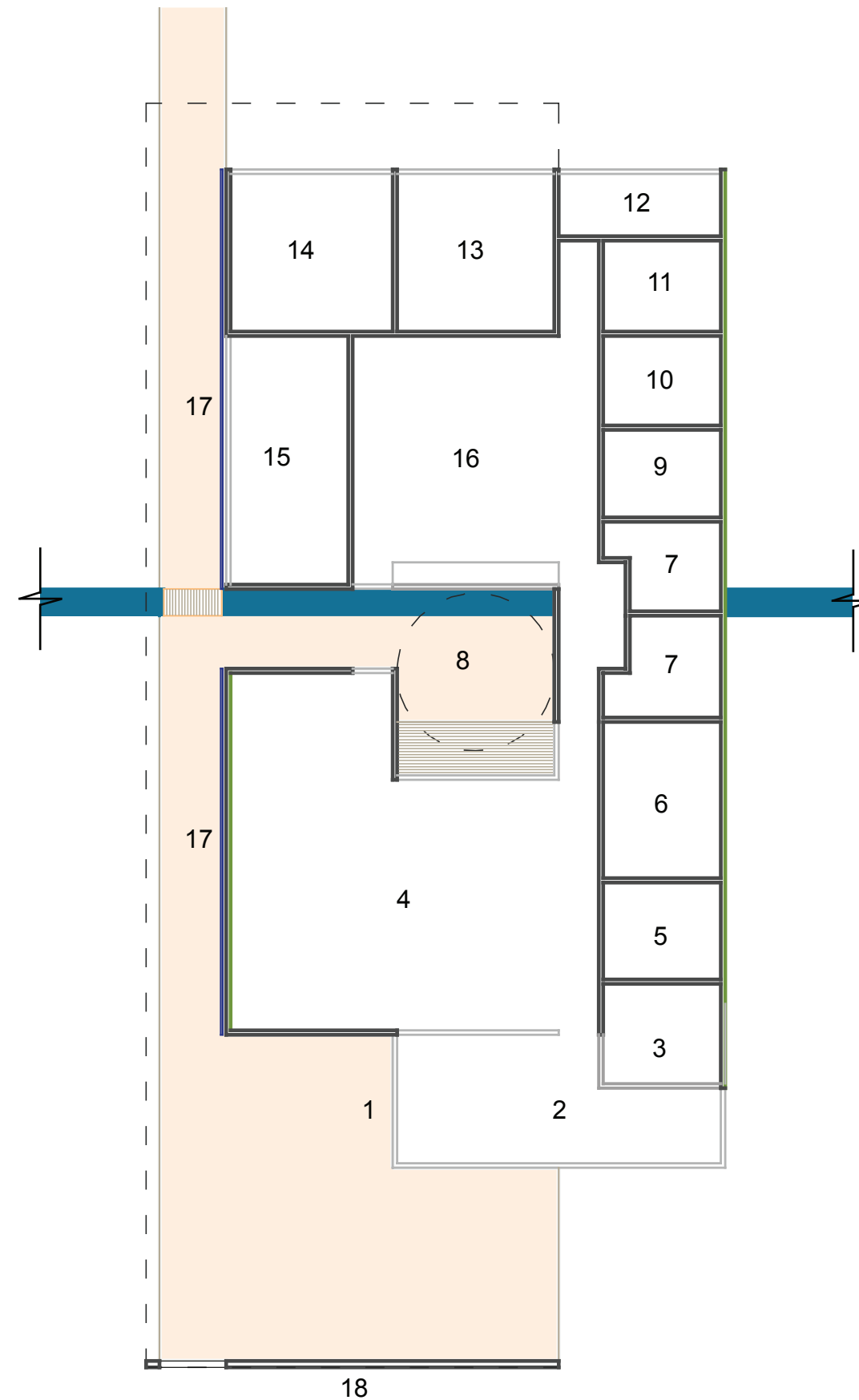
- R.O. and Multi-media 9.6 MGD
- R.O. and Multi-media 6.4 MGD
- R.O. 9.6/6.4 MGD Column Plan
- Administration Building Plan



Legend

- 1 - Main Entrance
- 2 - Lobby
- 3 - Visitor Reception
- 4 - Exhibition Area
- 5 - Exhibition Storage
- 6 - Additional Office Space
- 7 - Bathroom w/ Lockers
- 8 - Exterior Courtyard
- 9 - Equipment and Tool Storage
- 10 - Telecom Room
- 11 - Maintenance Supervisor
- 12 - Plant Manager
- 13 - Laboratory
- 14 - Control Room
- 15 - Breakroom
- 16 - Open Office Space / Cubicles
- 17 - Educational Screen
- 18 - Entry Wall

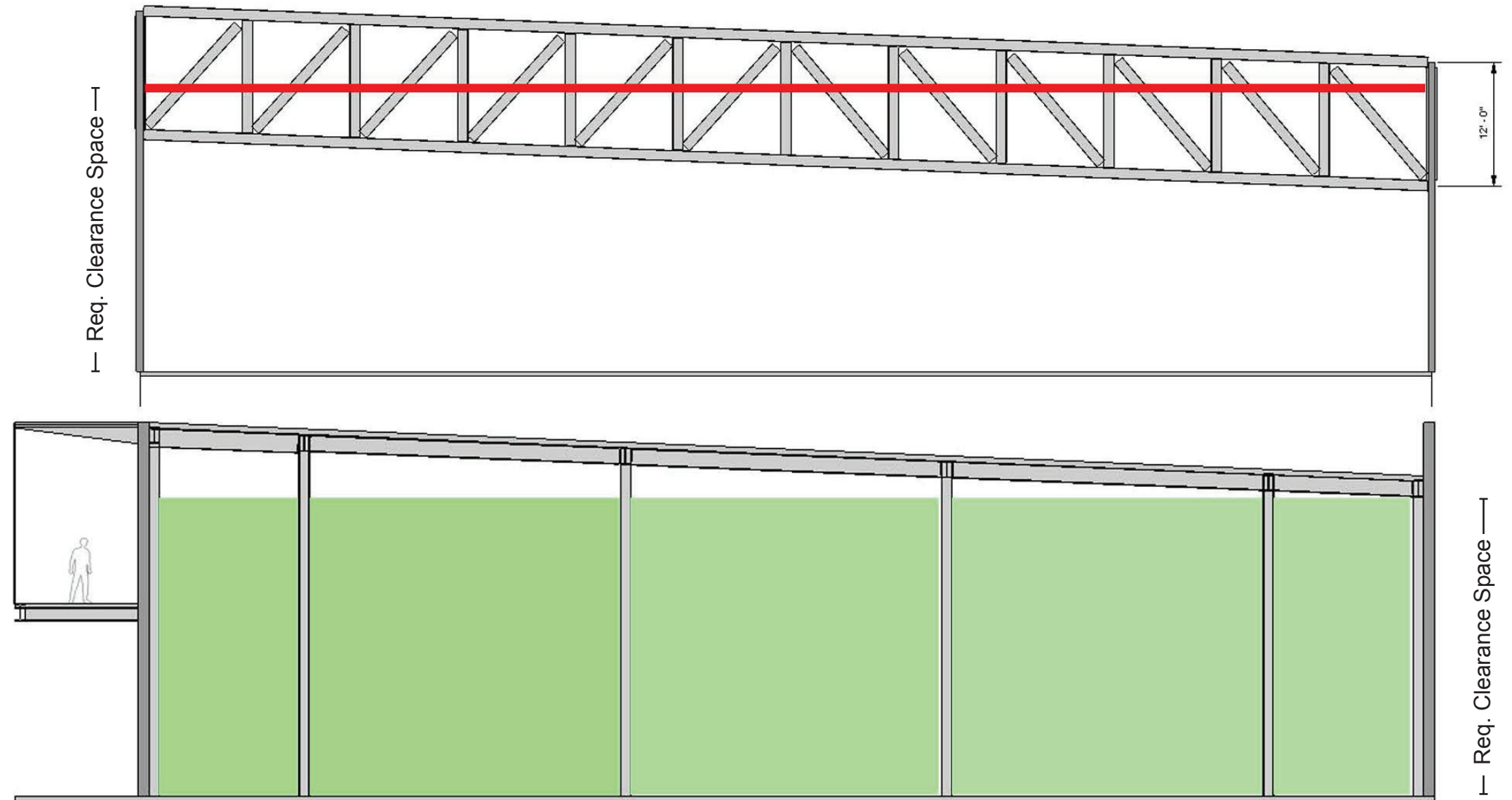
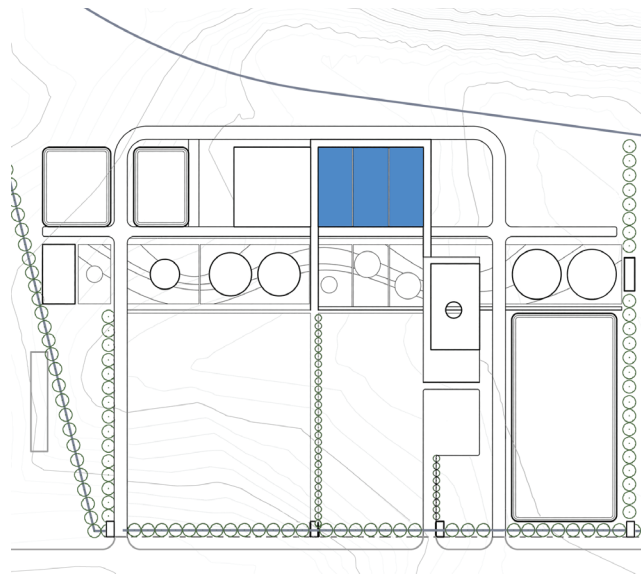
The administration plan is an approximation of the information provided in the RFP. This plan is to demonstrate how those spaces could be arranged for the easiest access as well as the most consistent flow between spaces. This plan design also incorporates a relationship with the water feature that runs into the landscape and ties into the elevated pathway.





09 structure

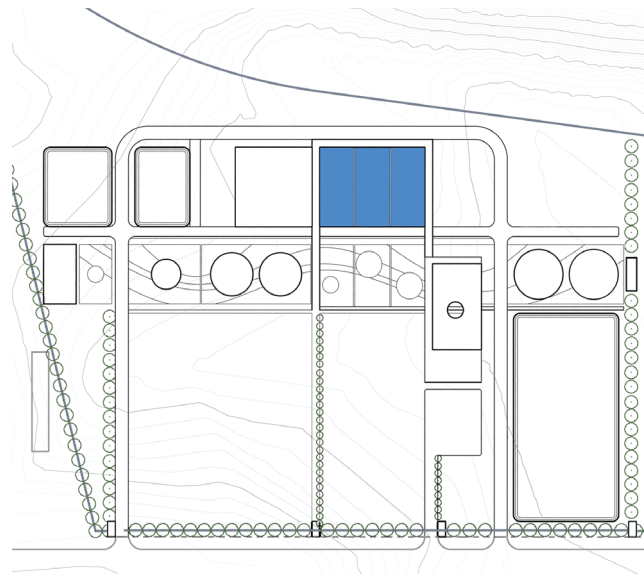
- Proposed Structure Diagrams
- Detail of Walkway Section
- Detail of Screen



Open Span Girders vs. Distributed Columns

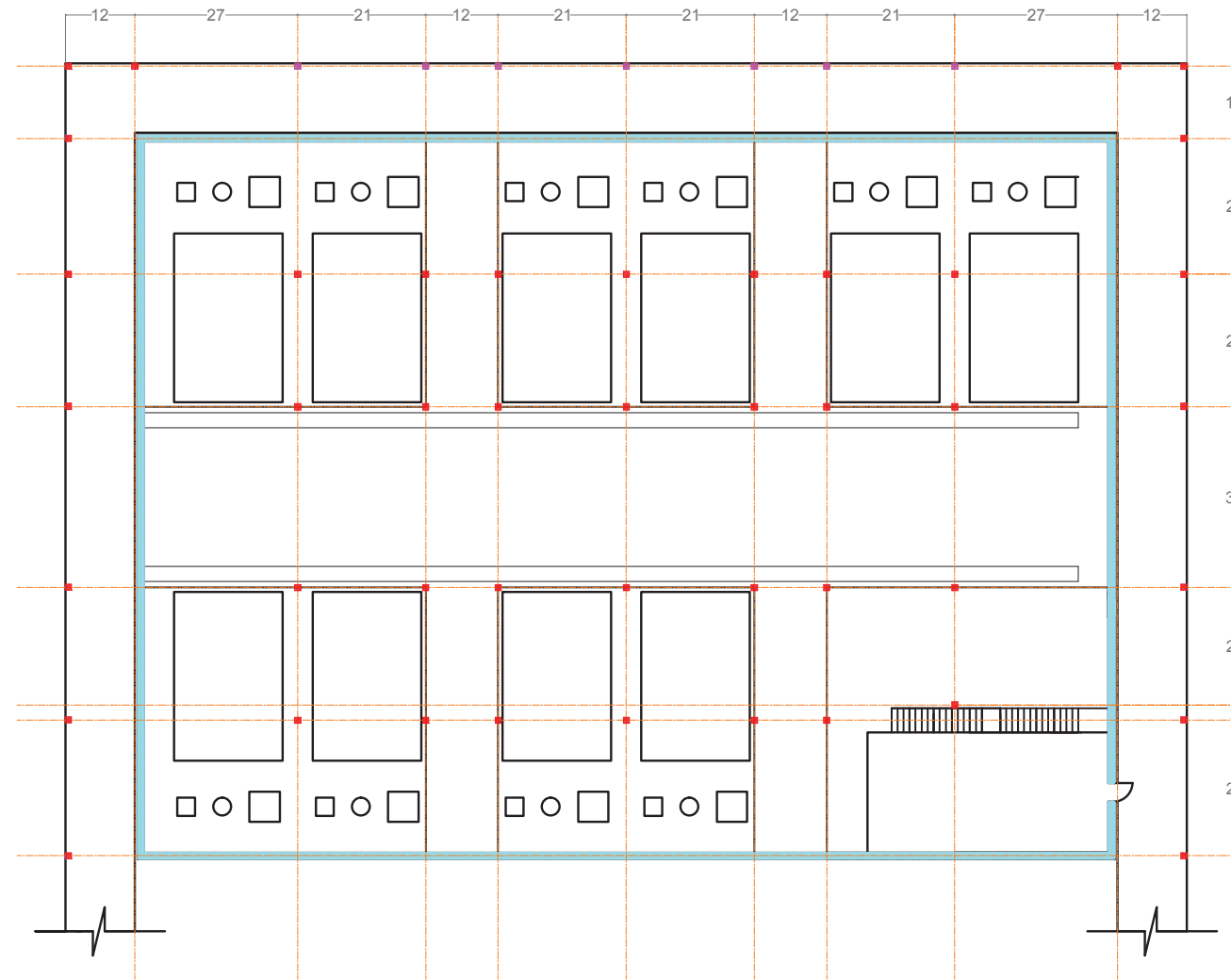
An open span for the width of the treatment building would require extremely deep girders. This approach might interfere with the clear ceiling height needed to build and work on the desalination equipment.

A distribution of columns throughout the treatment building will support roof loads, yet still allow many different equipment configurations and allow clearance for operations that might need lifting equipment.



9.6 MGD Treatment Facility -Column Layout

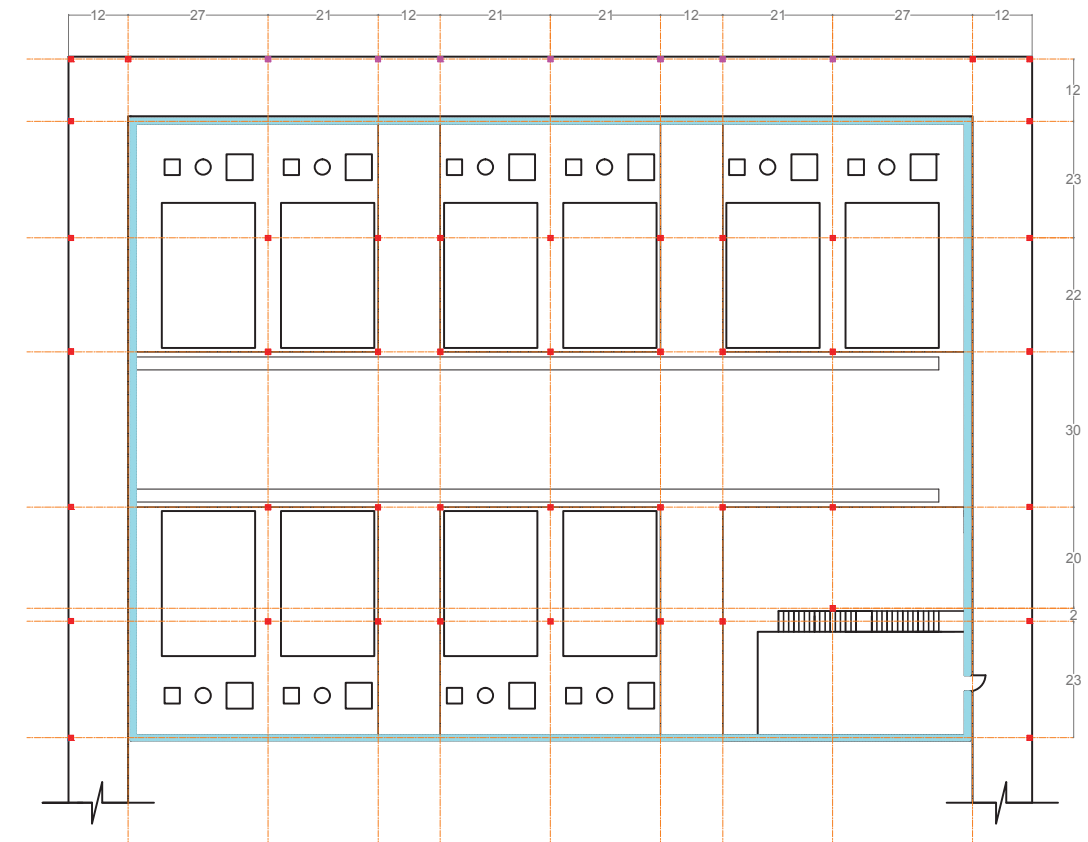
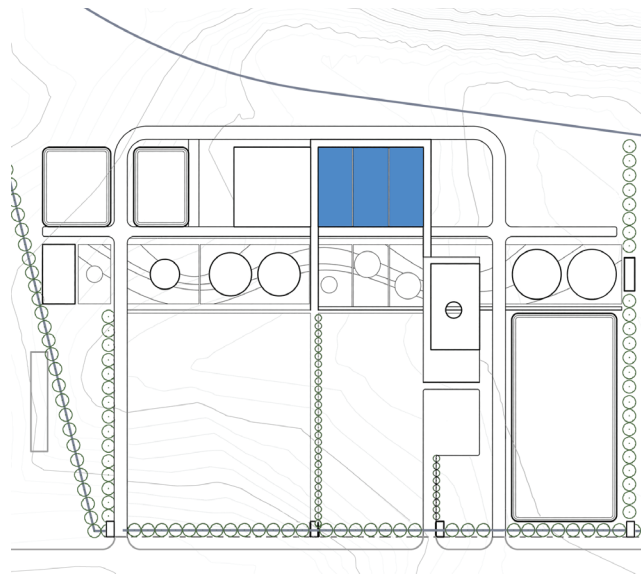
- Columns
- Overhead Walkway Support



Column Layout Flexibility

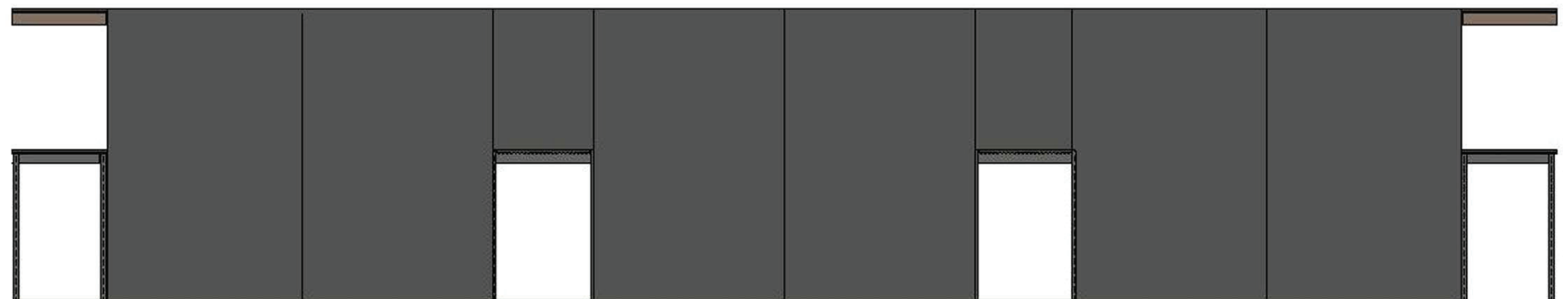
The 3D drawing is a diagrammatic representation showing how columns can be laid out to support the walkway and the building's roof load. For more details see the facility floor plans. There is great flexibility in how columns can be laid out in the building. The structural engineer that provides the future engineered design can locate columns just about anywhere outside the marked circulation paths where space is available around equipment installation and operations footprints.

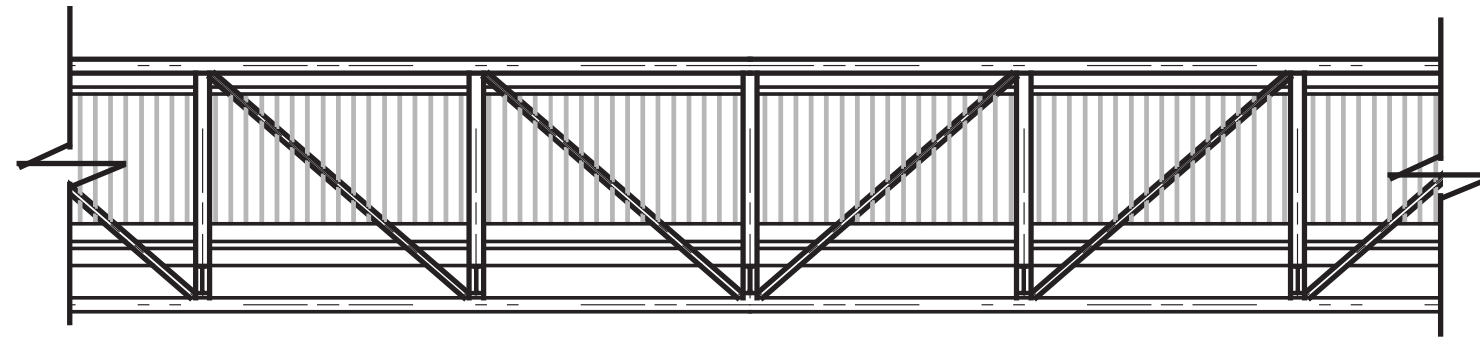
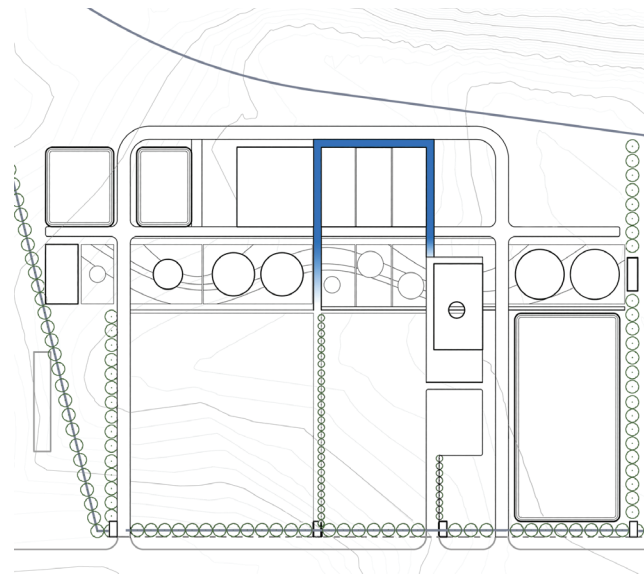




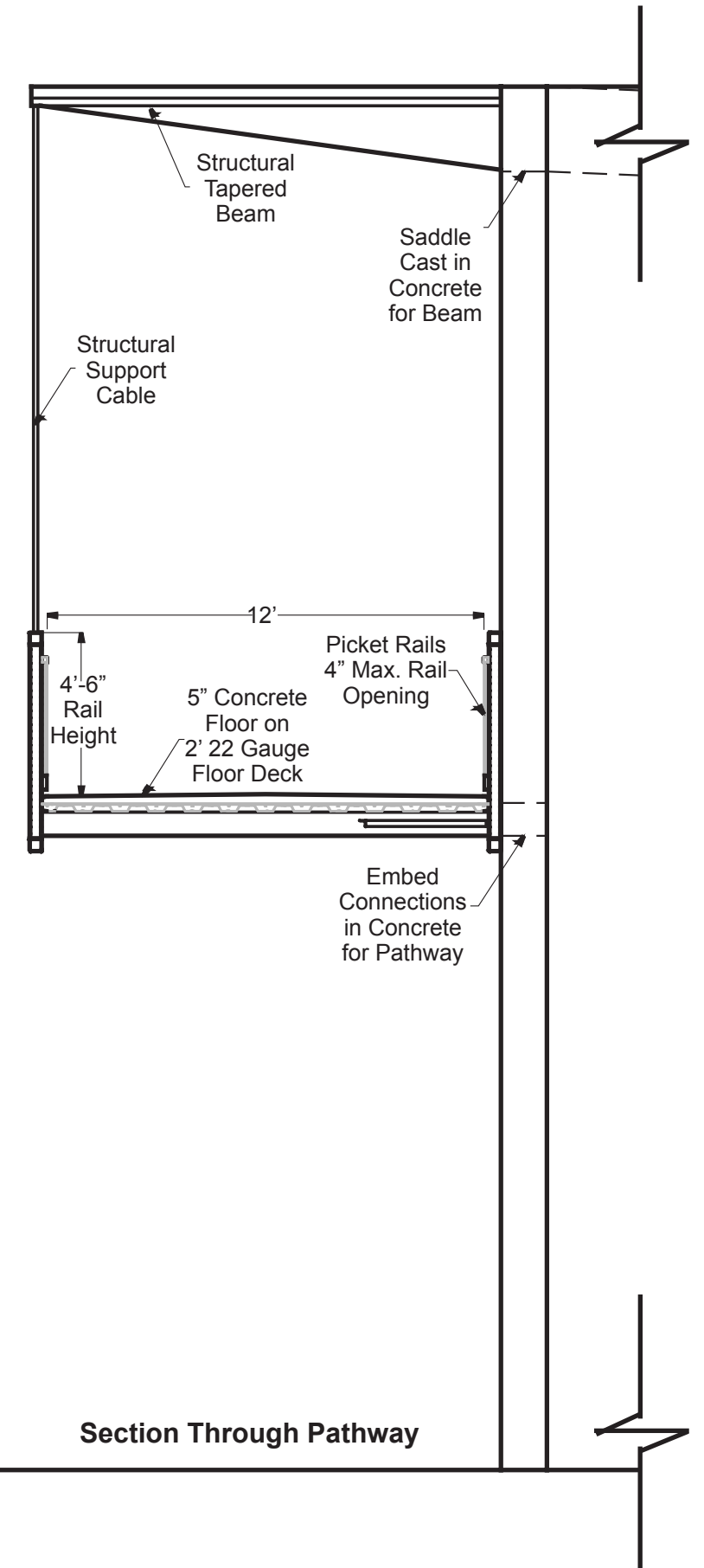
Tilt-up Construction

It is proposed that concrete tilt-up panels are used for the treatment building's exterior walls. This wall construction method is economical and promotes construction speed. A combination of textured and smooth panels will be cast on site. Smooth panels can be set to line up with the screen and landscape elements that represent the purist water in the desalination process, which is directly after Reverse Osmosis. Texture panels will make up the remaining panels. This texture will represent the range of elements and minerals in the seawater and the desalinated water.





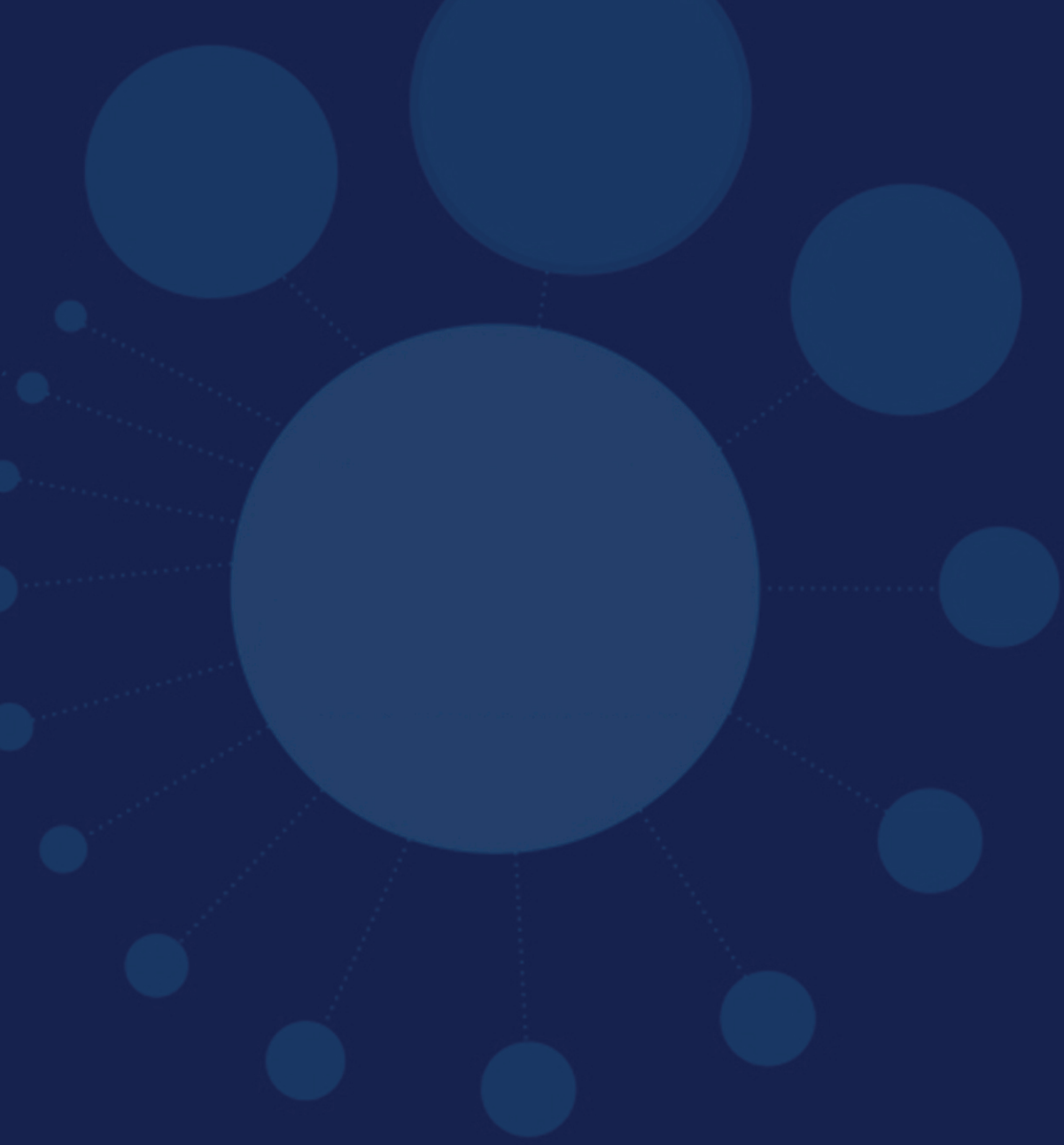
Elevation of Pathway



Section Through Pathway

This detail is an approximation of the elevated pathway and how it could be attached to the facade of the Treatment Building. By including a Saddle and an Embed in the concrete for the structural elements the concrete will retain strength and will not need to be additionally altered upon being tilted up.

Corrugated aluminum roofing is to rest on top of structural beams if desired by client. As such, there will be a need to account for drainage. Additionally, emergency ladders or stairs may need to be added according to code requirements.



10

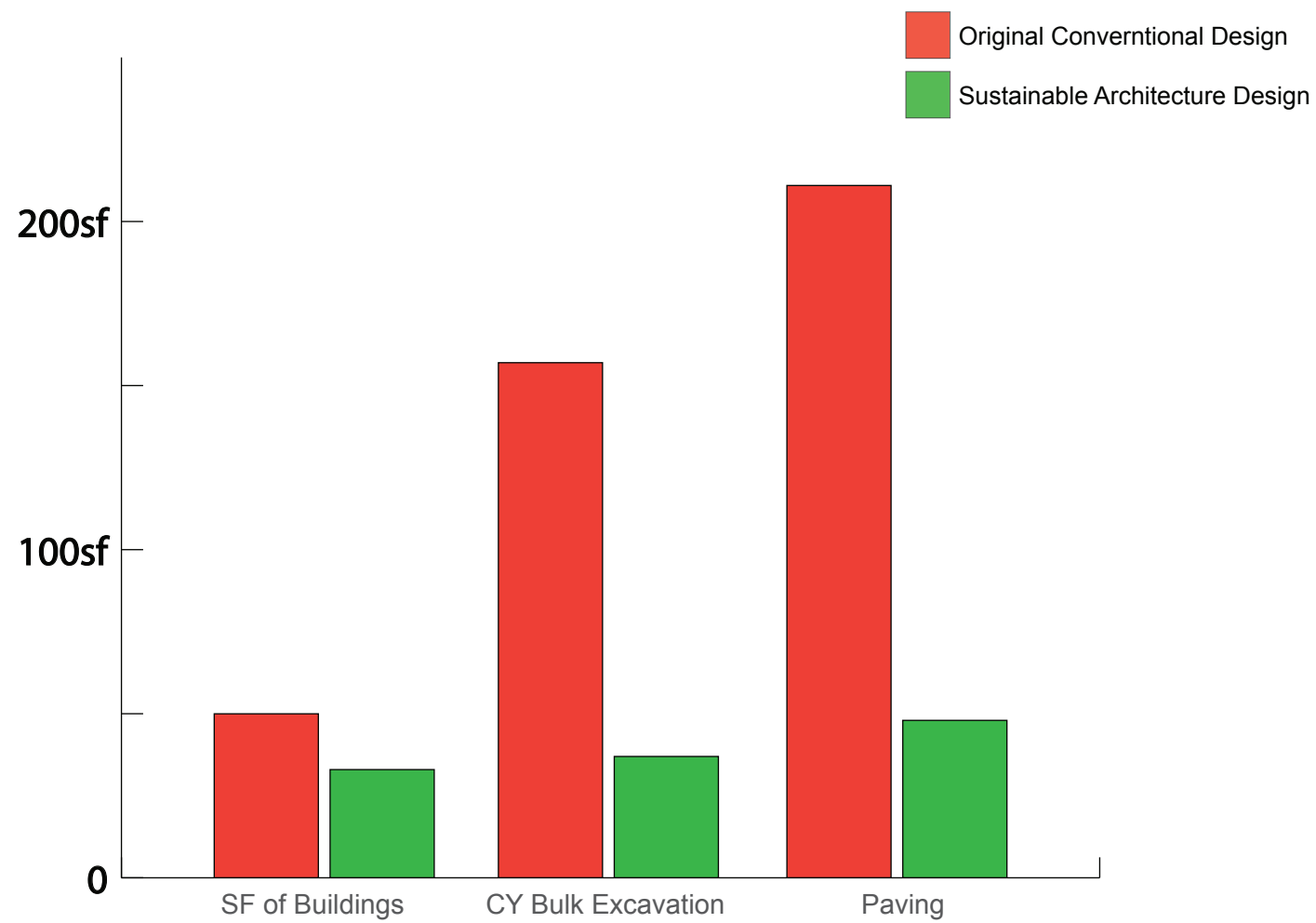
quantity summary

• Cost Model Summary

Partial Quantity Survey

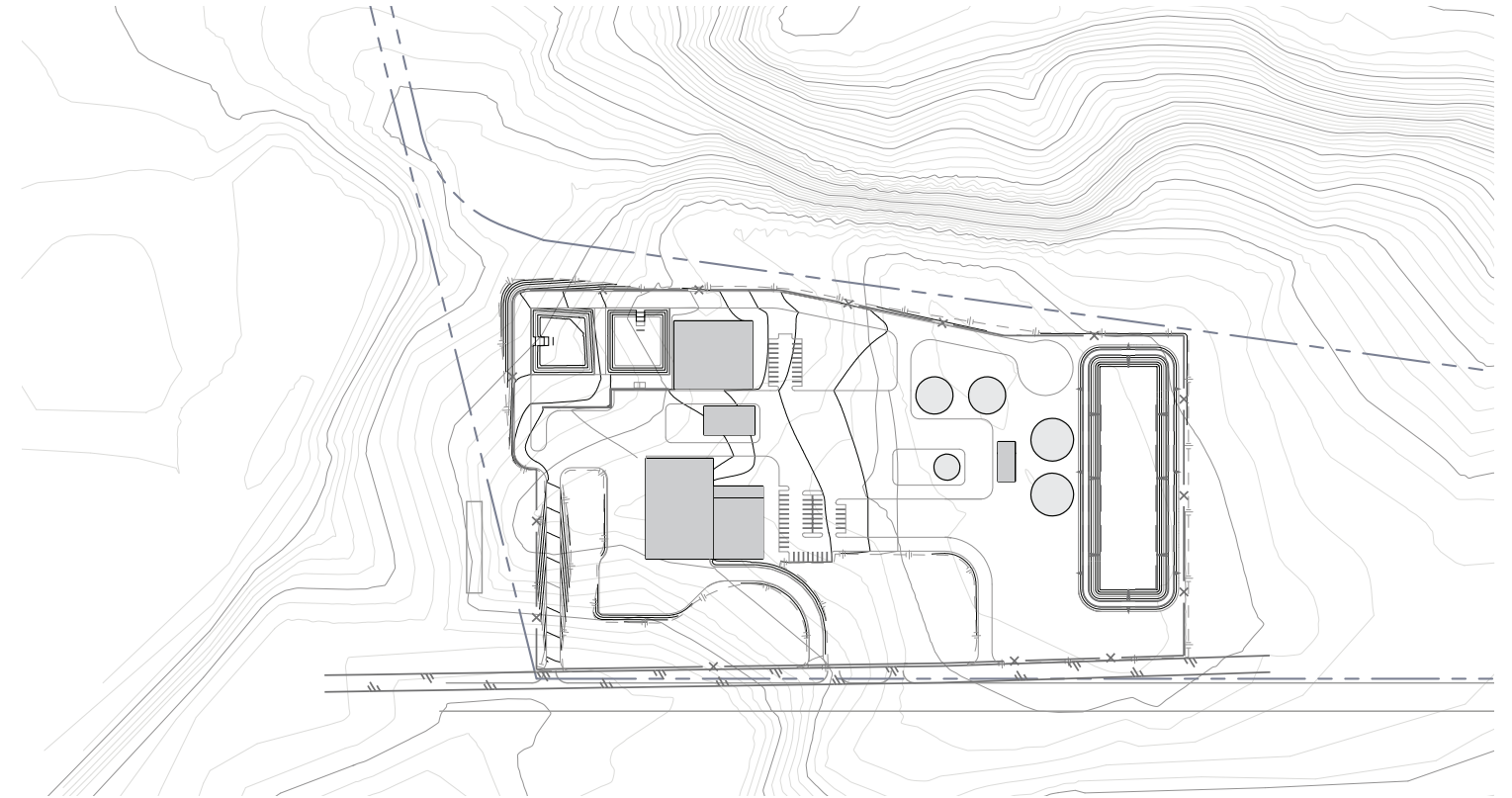
	CSI	Feature	Length	Width/ Scope	Buildings	Add'l Slab Flrs	Ponds	Paving	Note	Other
1	01560	Open Space	150	250					1	Protection of natural condit.
2	02230	Grub, clear, grading	37	kCY					2	Refer to Soils Rept.
3	02660	Brine Storage Pond	180	480			86,400		3	HDPE w/ concrete skirt
4	02660	Bckwsh Wstwtr Ponds (2)	250	120			30,000		4	HDPE w/ concrete skirt
5	02750	Guest parking	50	75				3,750	5	Passenger car Paving
6	02750	Roadway paving	2145	20 & 18				41,692	6	Full traffic load, service road
7	02750	Concrete Paving	321	20				6,420	7	At chemical delivery loc.
8	02815	Water feature	766	4					8	766 LF Concrete w/ equip
9	02820	Perimeter Fence	4690	LF					9	6 ft Chain link.
10	02820	Public / Service Entrance / Exit	3	Loc.					10	Gate, sign, security
11	02860	Identity screen	545	20					11	10900 SF mesh screen
12	02930	Main Courtyard	789	90					12	49,285 SF Xeriscape
13	02930	Large trees	43	ea.					13	Save (e) trees. Add trees.
14	02930	Small trees	40	ea.					14	New drought-tolerent
15	03300	Feedwater tanks (2)	65	dia ea.		6,434			15	Fndn for 2 x 0.5 MG tanks
16	03300	Multi Media Filtr Area	120	140		16,800			16	Slab w/ trench & pipe cover
17	03300	Clearwells (2)	75	dia ea.		8,602			17	Fndn for 2 x 1 MG tanks
18	03300	Desal Clearwell Pumps	30	50		1,500			18	Incl U/G service
19	03300	Backwash Supply Tank	45	dia.		1,520			19	2 x 0.2 MG tank
20	03300	Generator	30	70		2,100			20	Incl U/G service
21	03300	Electrical Substation	90	50		4,500			21	Slab, ducts, screen
22	05530	Suspended walk, bridges	678	6					22	4068 SF Walkway
23	13700	Security	Site	All					23	3 gates, call boxes, AV.
24	Mix	RO / Treatment Bldg	180	120	21,600				24	8 x 272 Overhang roof.
25	Mix	Admin Bldg.	90	130	11,700				25	8 x 190 Overhang roof.
26	Mix	Electrical Switchgear	90	20					26	1800 SF Inside RO building
27		APPROX SF			33,300	41,456	116,400	51,862		

SF of Buildings	50,100 sf	33,300sf
CY Bulk Excavation	157,357cy	37,100cy
Paving	211,400sf	48.112sf

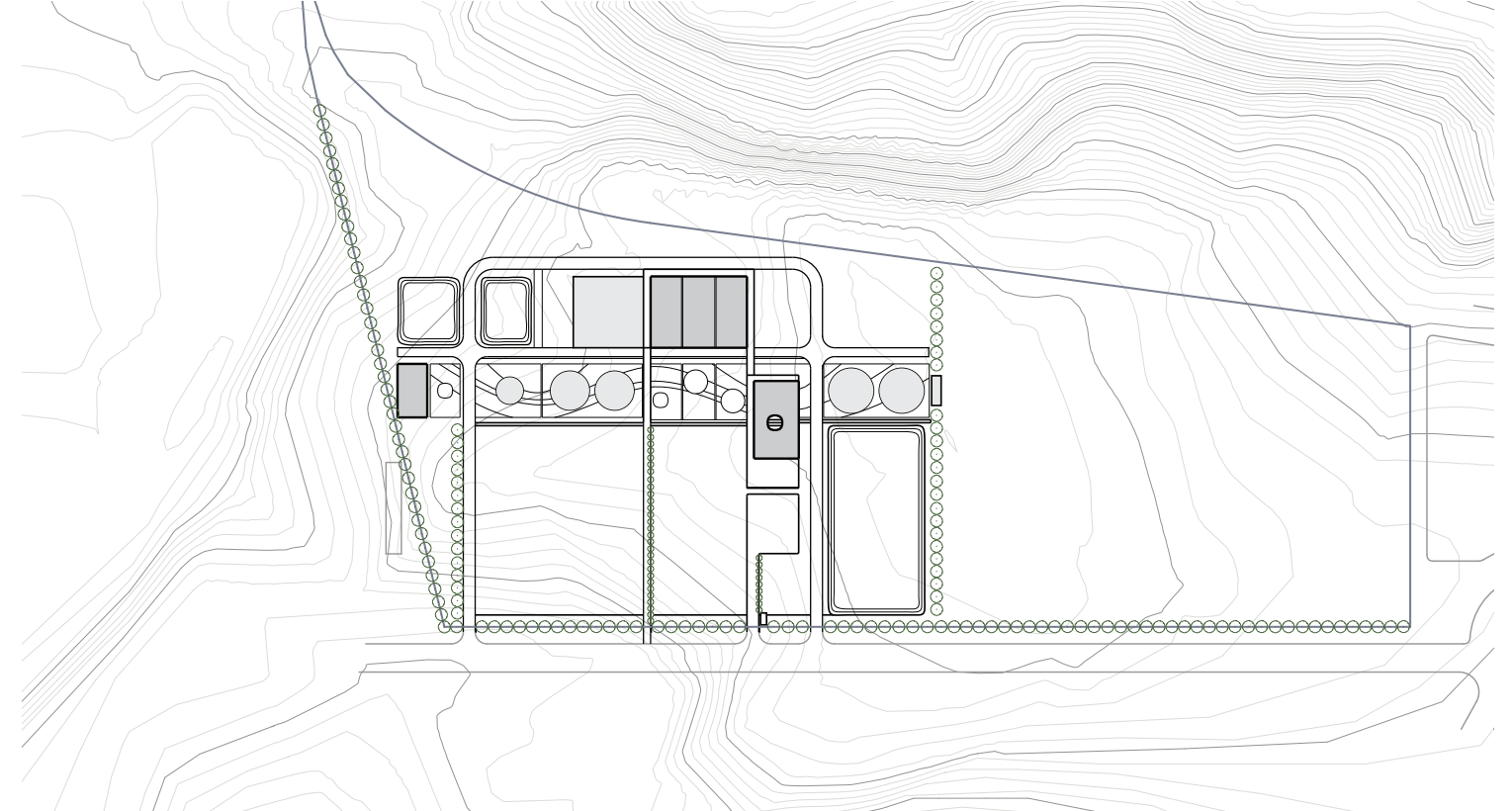


Scope Comparisons Diagram

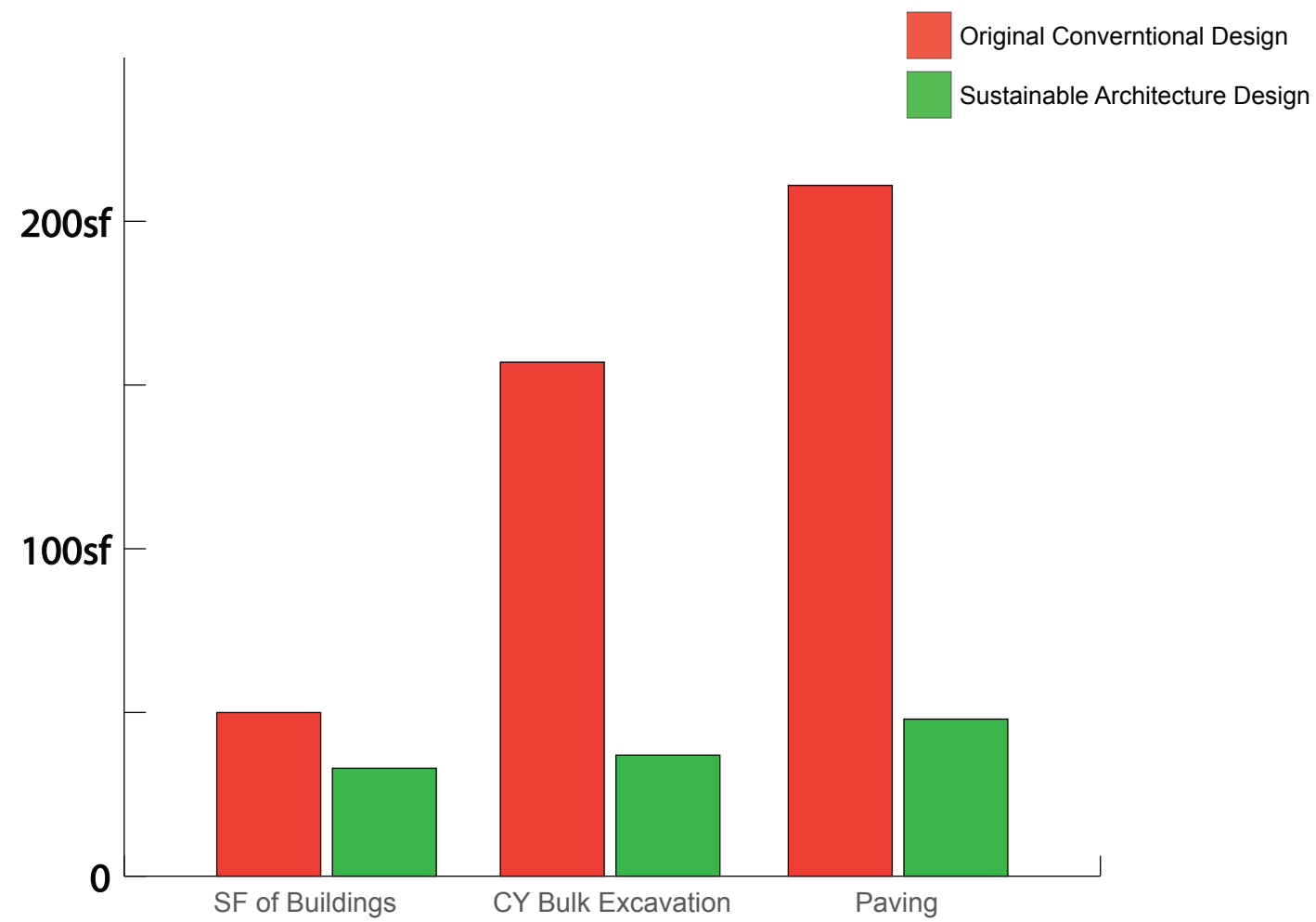
Original Conventional Design



Proposed Sustainable Design



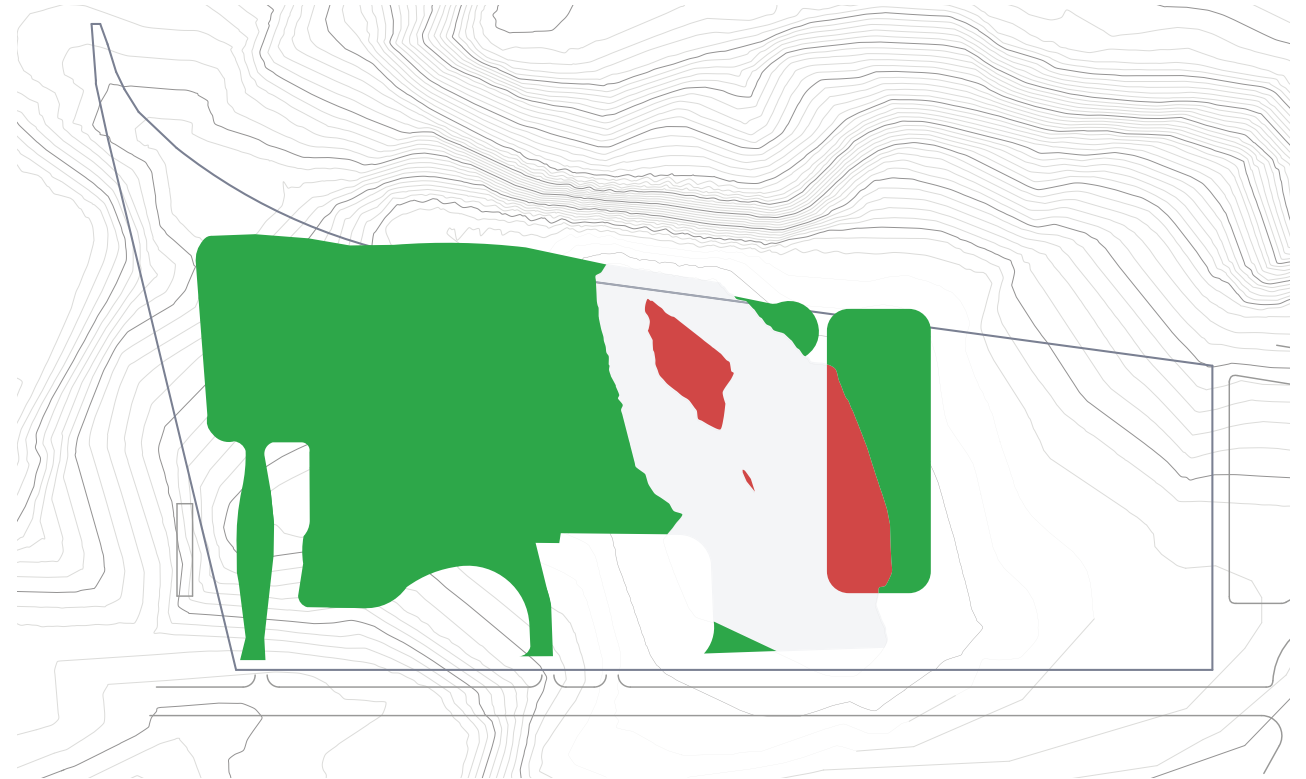
SF of Buildings	50,100 sf	33,300sf
CY Bulk Excavation	157,357cy	37,100cy
Paving	211,400sf	48.112sf



Scope Comparisons Diagram

- - Cut
- - Level
- - Fill

Original Conventional Design



Proposed Sustainable Design

