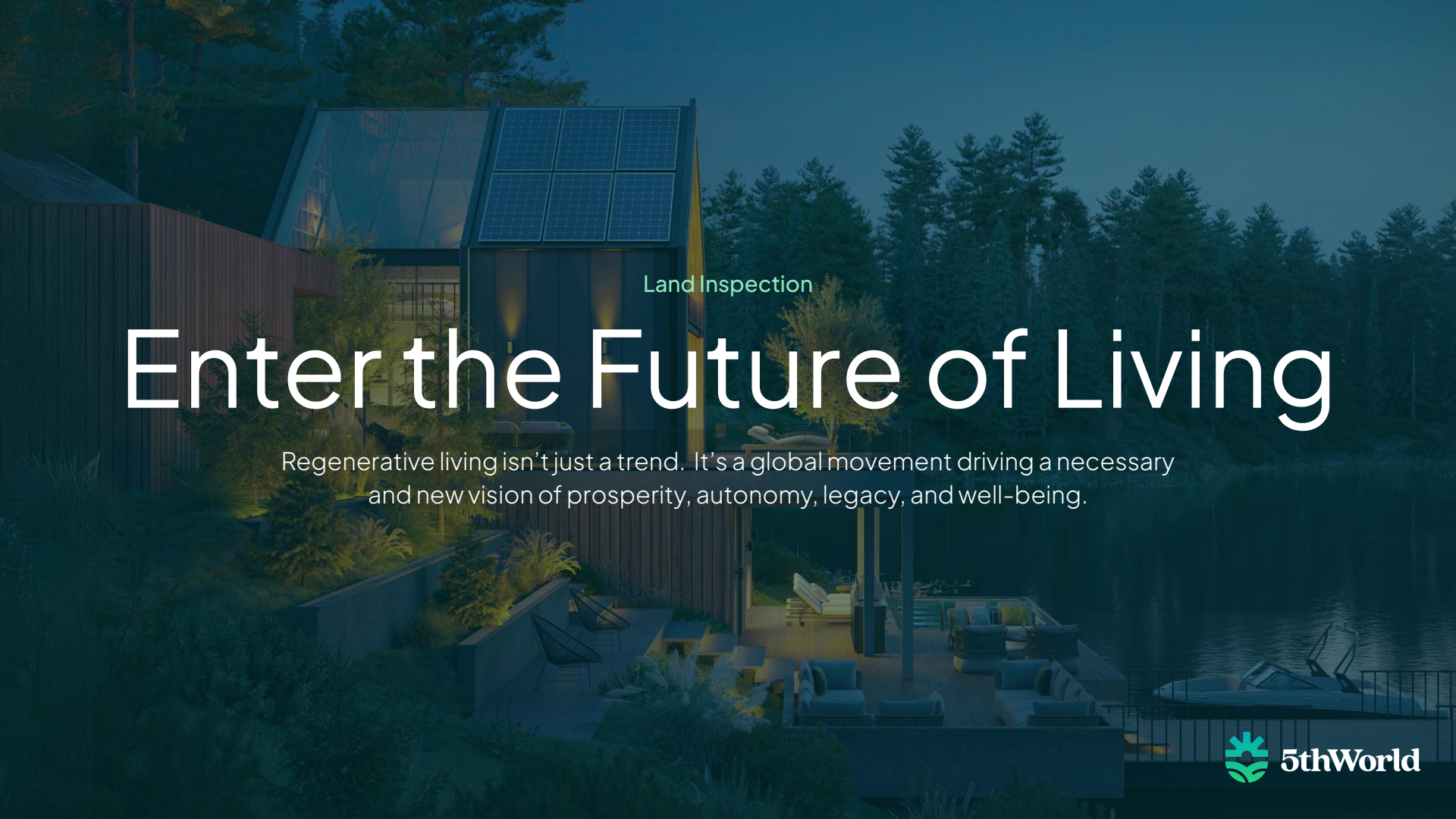




Land Inspection

Enter the Future of Living

Regenerative living isn't just a trend. It's a global movement driving a necessary and new vision of prosperity, autonomy, legacy, and well-being.

Land Inspection

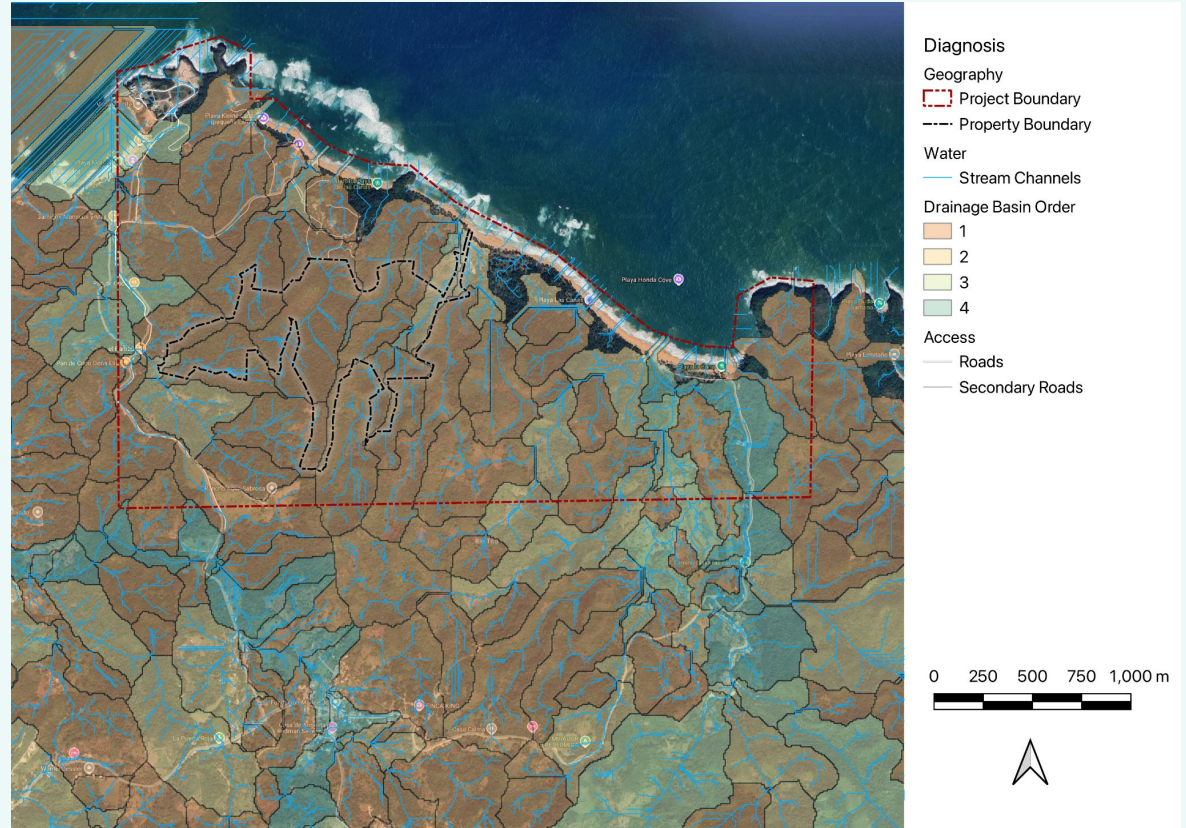
Site Background



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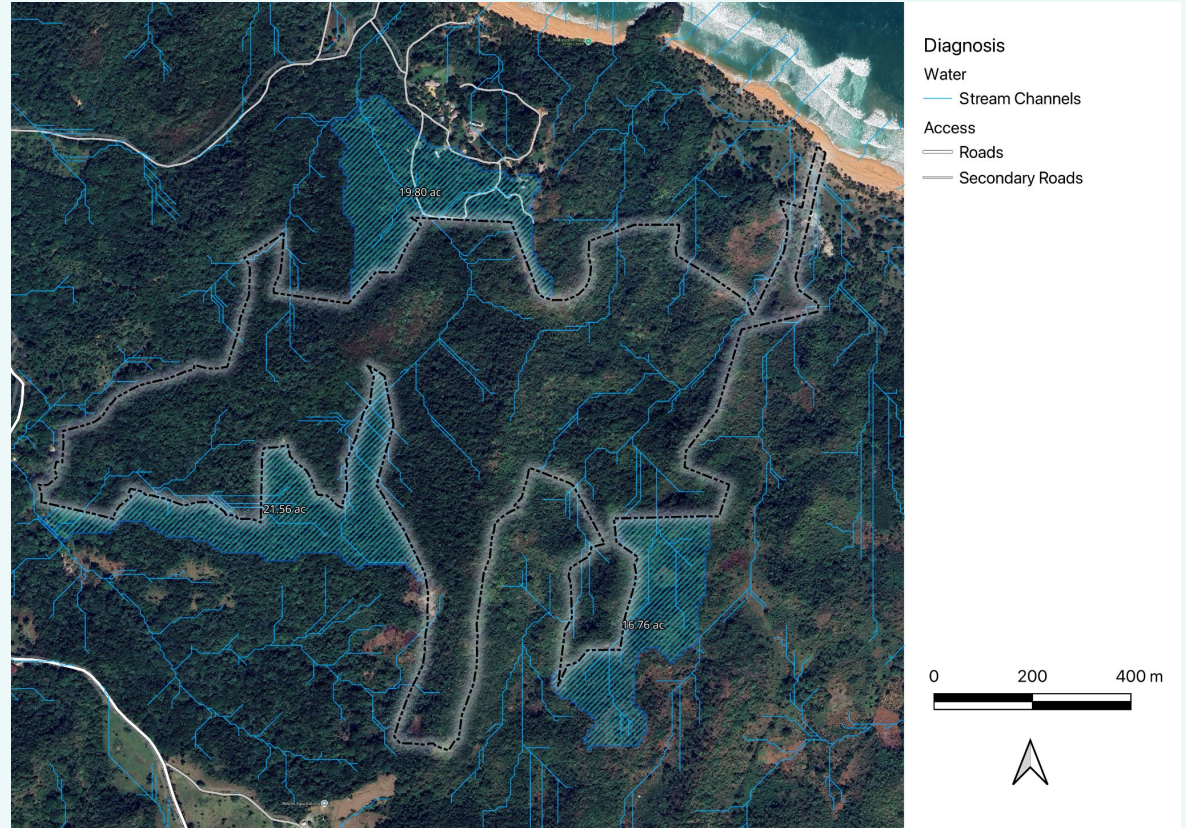
Watershed & Drainage

- The project area spans several subwatersheds that run across the property, some of which receive water from watersheds higher up slope.
- The Basin Drainage Order refers to the degree to which other drainage basins higher in the landscape are draining into a particular basin. The higher the number, the more that drainage basin is affected by water draining into it from higher basins, increasing its risk of flash flooding, but also its opportunity for receiving and storing water.



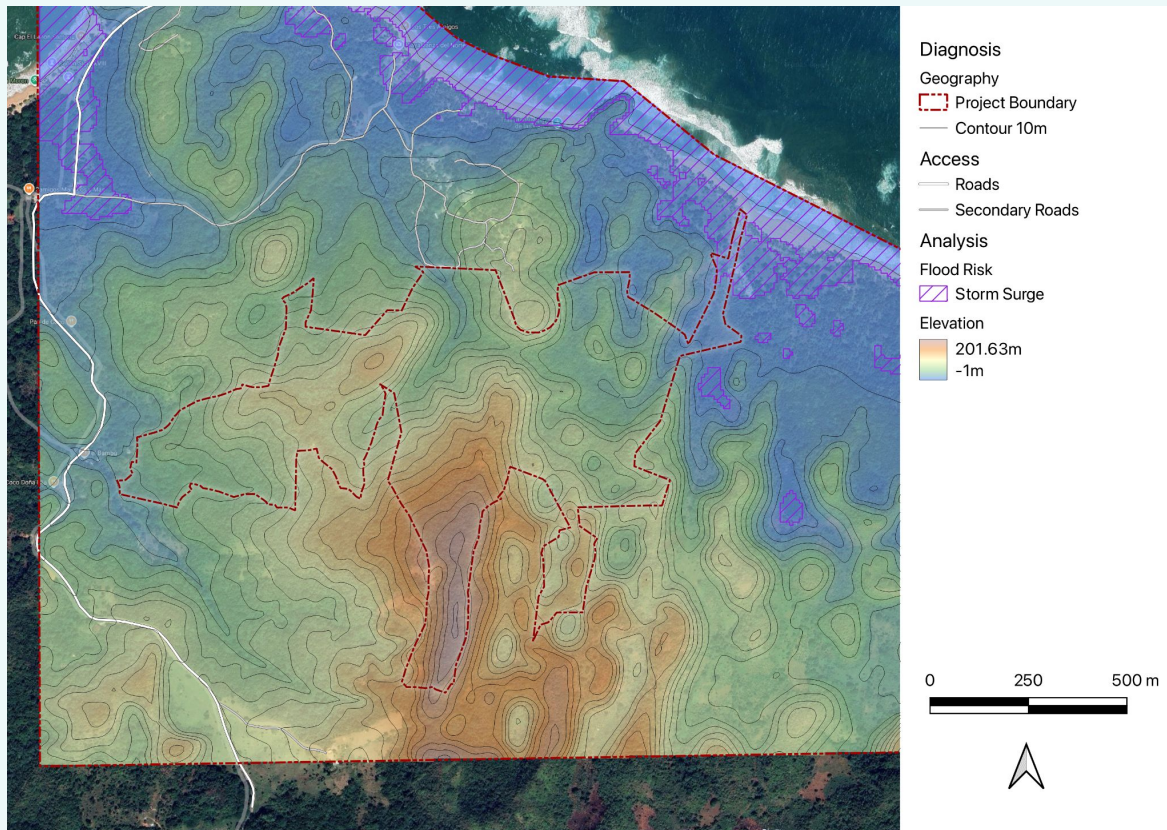
Influential Watershed

- The majority of this property is upland, where most overland water flow is in fact leaving the property downslope.
- However, there are some areas (as shown on the map) where overland flow does influence the property.



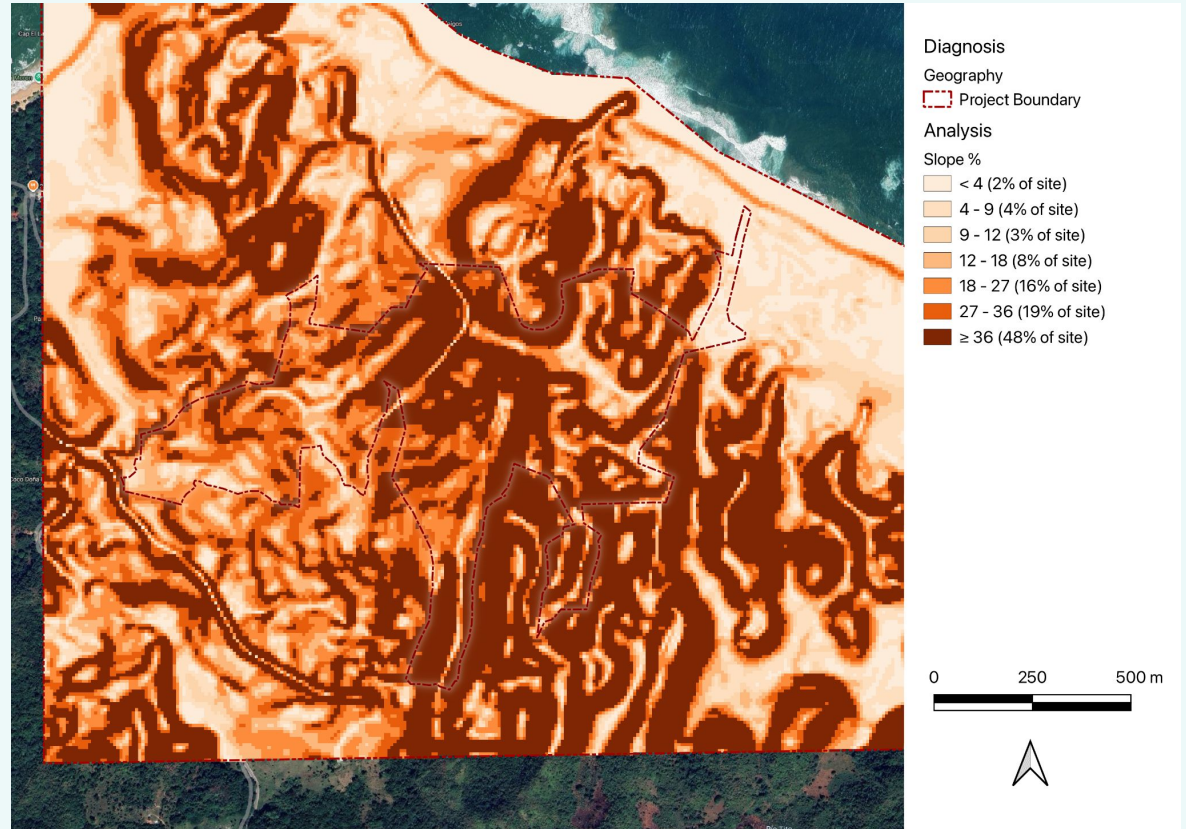
Elevation Relief

- There's approximately 202 meters of elevation difference across the site.
- We've denoted a storm surge/sea-level rise hazard elevation of 5 meters above sea level to account for storms and sea level rise.
- The riparian areas adjacent to the river have also been designated as a flood risk.



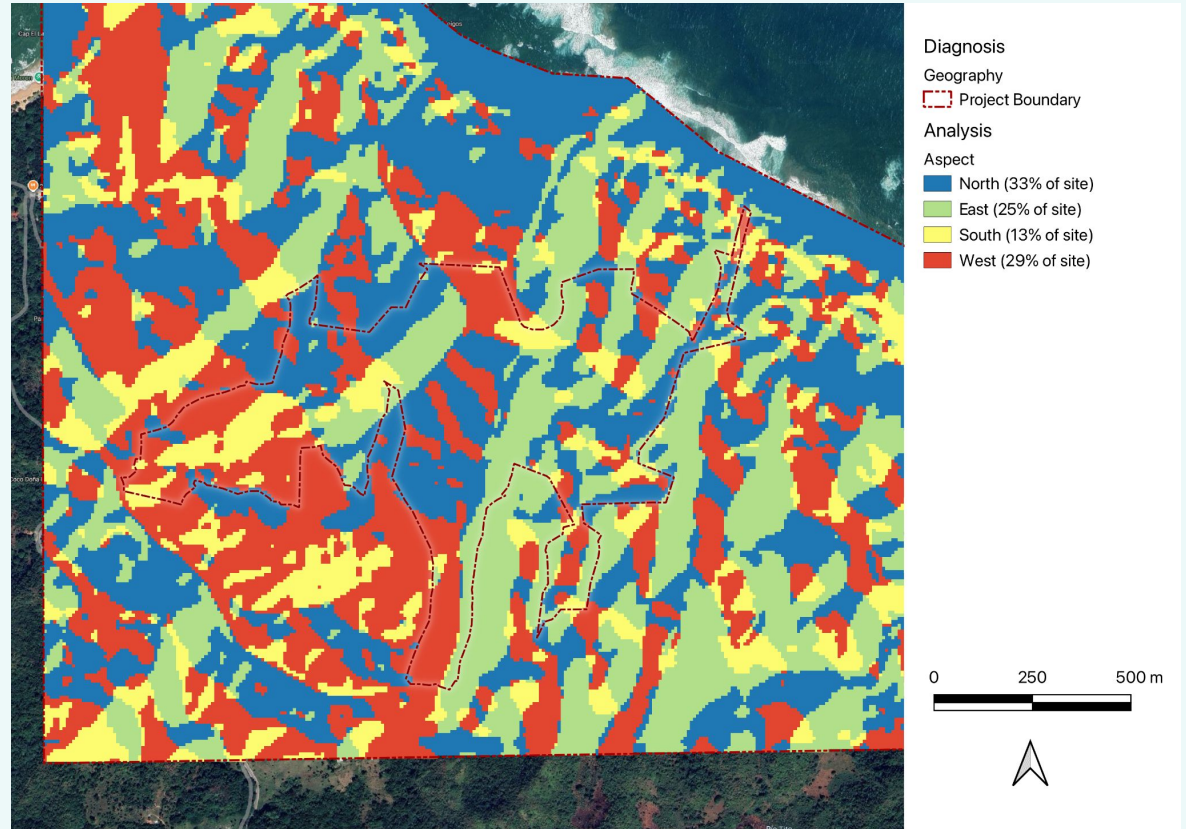
Slope

- The majority of this project area is moderately sloped, where approximately 9% of the property is at or below a 12% slope.
- The steepest slopes are found at the highlands throughout the property.



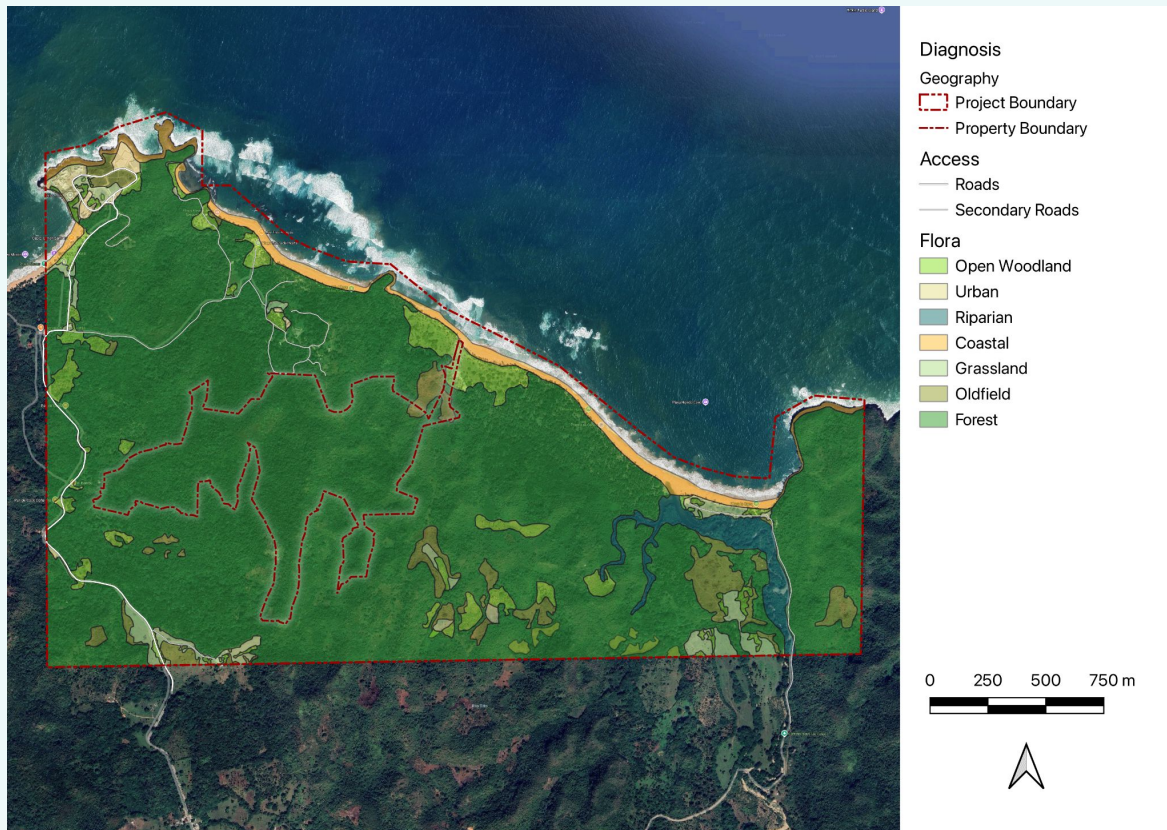
Topographical Aspect

- Slope aspect is the general direction a slope faces. The dominant aspect of this property is to the **north**, and secondarily to the **west and east**.
- West aspects offers warmer microclimates to be enjoyed in the shoulder seasons as well as evenings. On warm sunny summer days, these aspects can be very hot and relatively dry; factors that may have to be taken into account during site design.
- Given that this site is closer to the equator, this effect will be somewhat muted.



Vegetation Types

- On this map, 'oldfield' refers to the new regrowth and establishment of forest in previously non-forested patches.
- Forest is the dominant vegetation type on this property.
- Coastal vegetation types also withstand periodic salt water flooding events, sandblasting, and saltspray.



Land Inspection

Regenerative Living Solutions



Energy



Water



Food



Land

Land Inspection

Energy

Our regenerative energy solutions provide you with resilient,
clean power for enhanced peace of mind.



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Energy: Opportunities

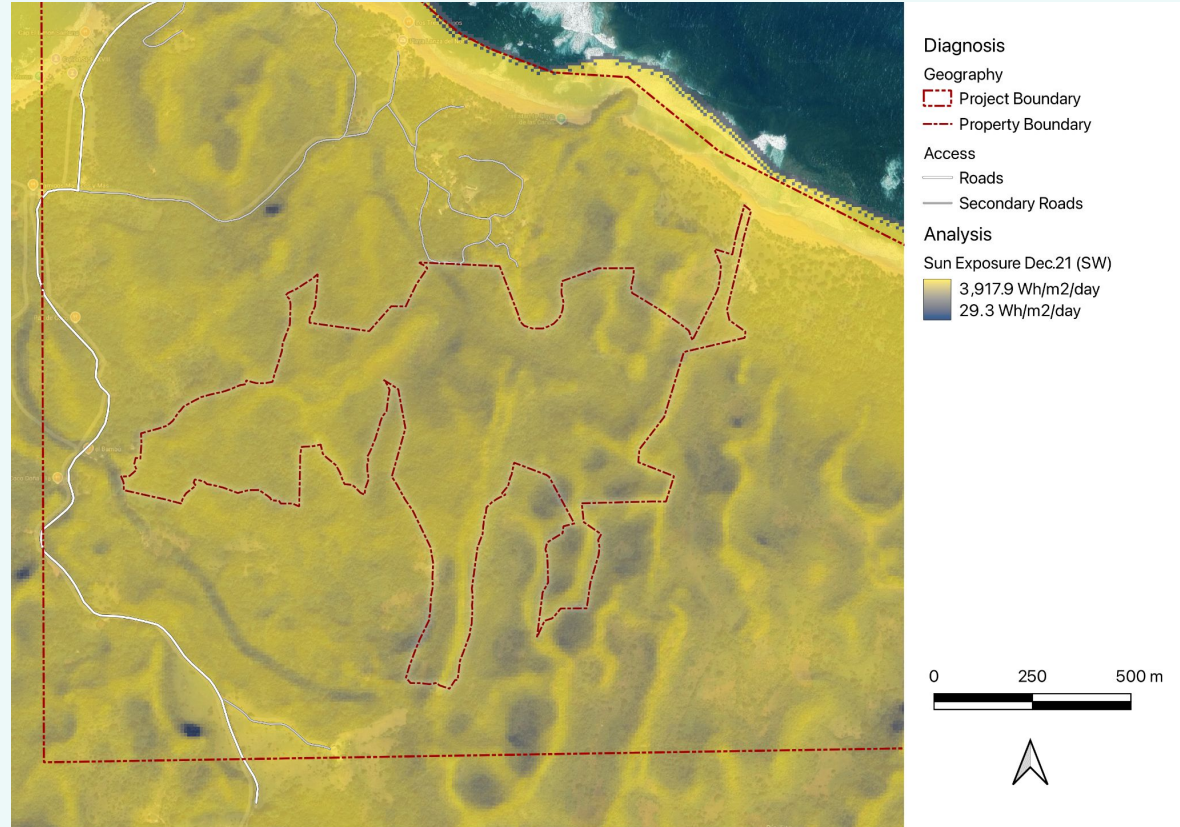
- Due to this site's relative southerly latitude, there is even distribution of solar energy availability throughout the seasons.
- This site benefits from a high degree of clear sky and insolation throughout the entire year.
- There is a significant portion of wind speed at or above 5 meters per second that affect this site, justifying further exploration for wind power generation.

Energy: Constraints

- This site is predominantly forested, where adequately-sized clearings will be required for unobstructed solar access (however, this location benefits from lower shadow ratio than more northerly locations).
- This site is regularly affected by strong windstorms including hurricanes, of which will impact supply lines and infrastructure potentially for significant periods of time.

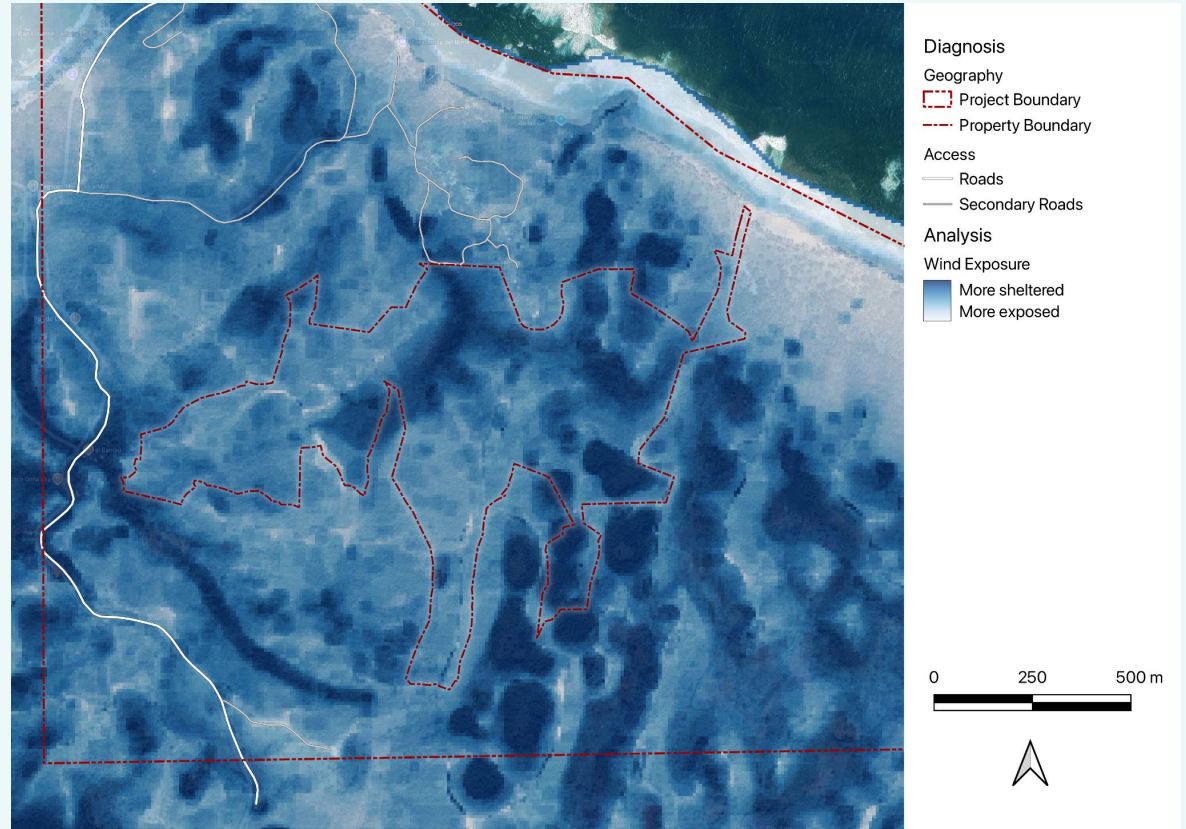
Solar Energy

- This map expresses solar energy in terms of total available shortwave radiation (SW) on the winter solstice.
- The areas that are bright yellow indicate the locations that have the highest SW availability.
- We consider 375 Wh/m²/day as a minimum for interpreting an adequate solar gain for site selection purposes.
- Note, this analysis doesn't distinguish forested areas, and is based on the ground-level landform and therefore doesn't reflect additional shade caused by vegetation.



Wind Energy

- The areas of highest wind exposure are found along the coastal portions of the project area.
- Further investigation is required to validate the potential of implementing wind turbines as a reliable source of power production.
- Note, this analysis doesn't distinguish forested areas, and is based on the ground-level landform and therefore doesn't reflect additional shelter caused by vegetation.



Land Inspection

Water

Regenerative water solutions gift you an abundance
of the cleanest water on Earth.

Water: Opportunities

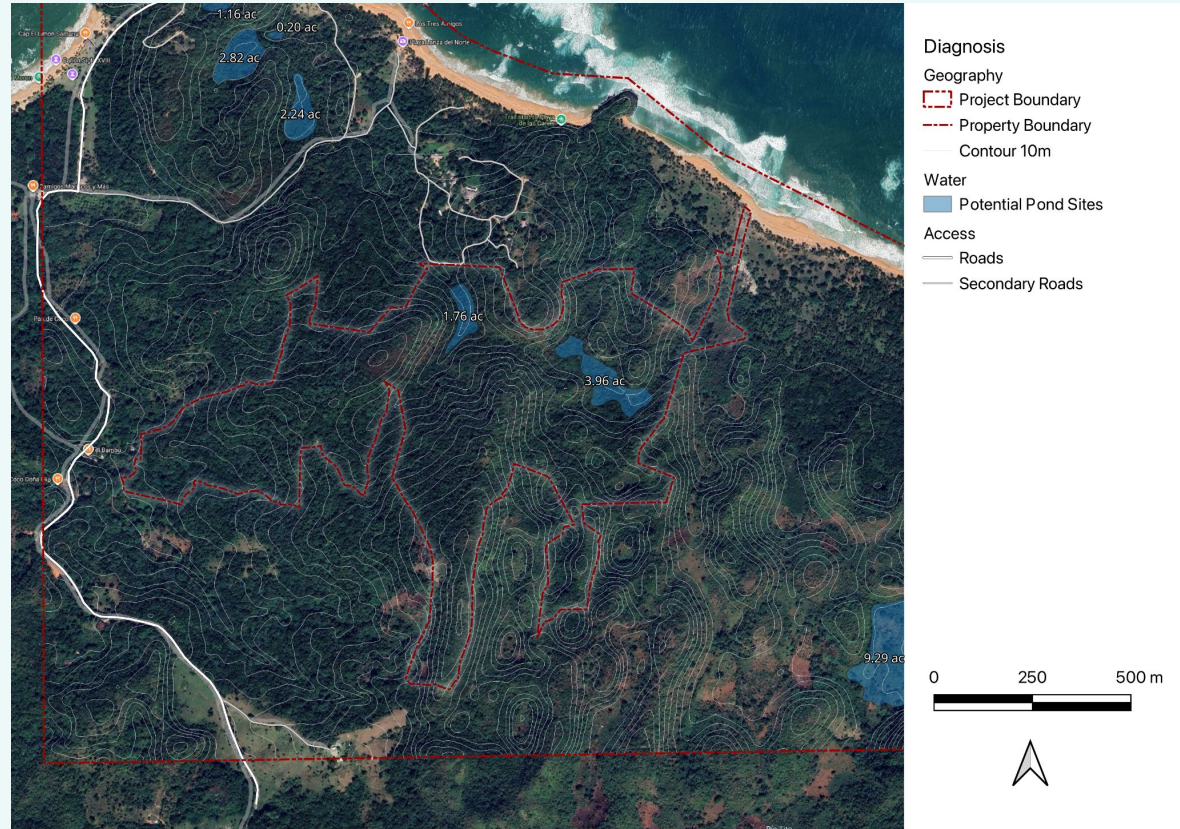
- There are several drainage valleys on the property, which offer potentially good locations for higher elevation ponds. Feasibility is relative to local soil conditions. Soil data available was not granular.
- While the majority of annual precipitation is received during the summer and fall, the availability of average precipitation is well distributed throughout the year.
- While the site receives approximately 70 mm of rainfall per month, extreme rainfall events occur regularly, and represent an opportunity to even out water available to storages if a site design allows for it. Designing to capture and store water in the soil and in ponds for passive irrigation is an important opportunity.
- The watershed supplying the river that flows onto the site is well forested, which should positively moderate the water level, and even out the flow rate between dry and wet periods.

Water: Constraints

- Pond sealing may be difficult in this area, and soils will have to be tested for the feasibility of sealing naturally. It's expected that the soils on site will have clay only in deeper layers. Synthetic liners may potentially be required.
- While on average, rainfall is available near evenly throughout the year, droughts of near zero precipitation can and reliably happen in this area, raising the possibility of water shortages and fire. Site design to capture and store water will help attenuate water shortages.

Water Availability

- This map shows the location of potential water sources and storages that serve as potable water, irrigation water, and potentially for fire fighting.
- The feasibility of these potential pond sites depends on the ability to seal them, as well as the site preparation required, which would need to be determined through a site visit.
- Note, DSM data was not of high resolution thus pond recommendations need better data or ground truthing.



Land Inspection

Food

Regenerative food solutions grow a bounty of
delicious, nutrient-dense food right on your property
for your convenience.



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Food: Opportunities

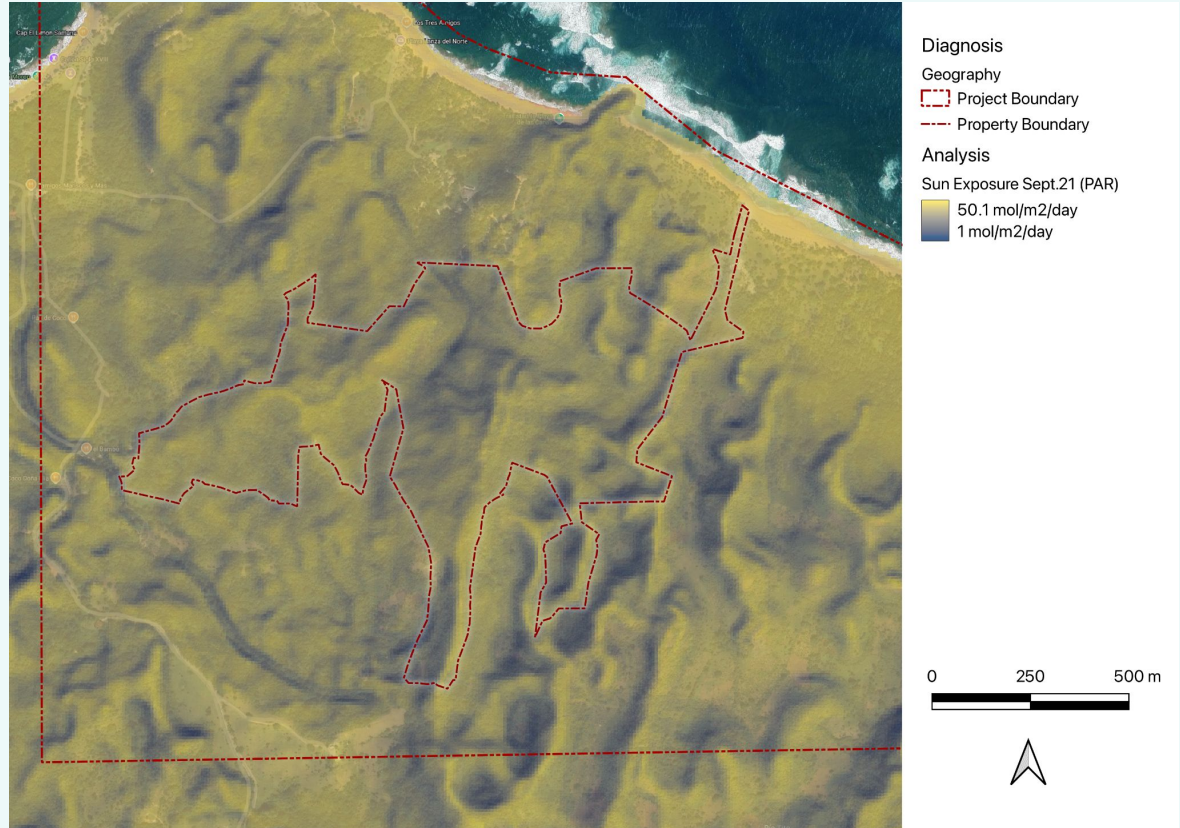
- While a significant portion of the site is forested, significant open areas exist, which offer unobstructed solar gain for a variety of crop types for agriculture and gardens.
- This site has a variety of different slope aspects, which maximizes the ideal niches available for various crop types throughout the site.
- Water availability for crops is, on average, provided evenly by the climate, where the winter is slightly more dry than the summer and fall.
- While the soils on this site exhibit some fragility, perennial and polyculture crop systems are expected to thrive. This site contains a multitude of ecosites that will provide vast habitat opportunities for varied plant types.

Food: Constraints

- The predominant lixisol soil type on this site is potentially prone to 'slaking,' a process where swollen clay particles can rupture the soil's beneficial structure, rendering it vulnerable to erosion.
- The soils are also potentially deficient in key nutrients that may affect the efficacy of producing annual vegetable crops. Landscape stewardship processes that increase the degree of soil organic matter are strongly encouraged to protect and even improve the soils' ability to supply nutrients and regulate moisture content.
- This site lies in an area that has a heavy tendency to succeed to a forest vegetation type, which will require some sort of disturbance regime to keep sections where required in a non-forest state, such as browsing animals, mowing, gardening, etc.
- This site receives significant prevailing winds, which may require protection for crops in more exposed areas through careful site planning.

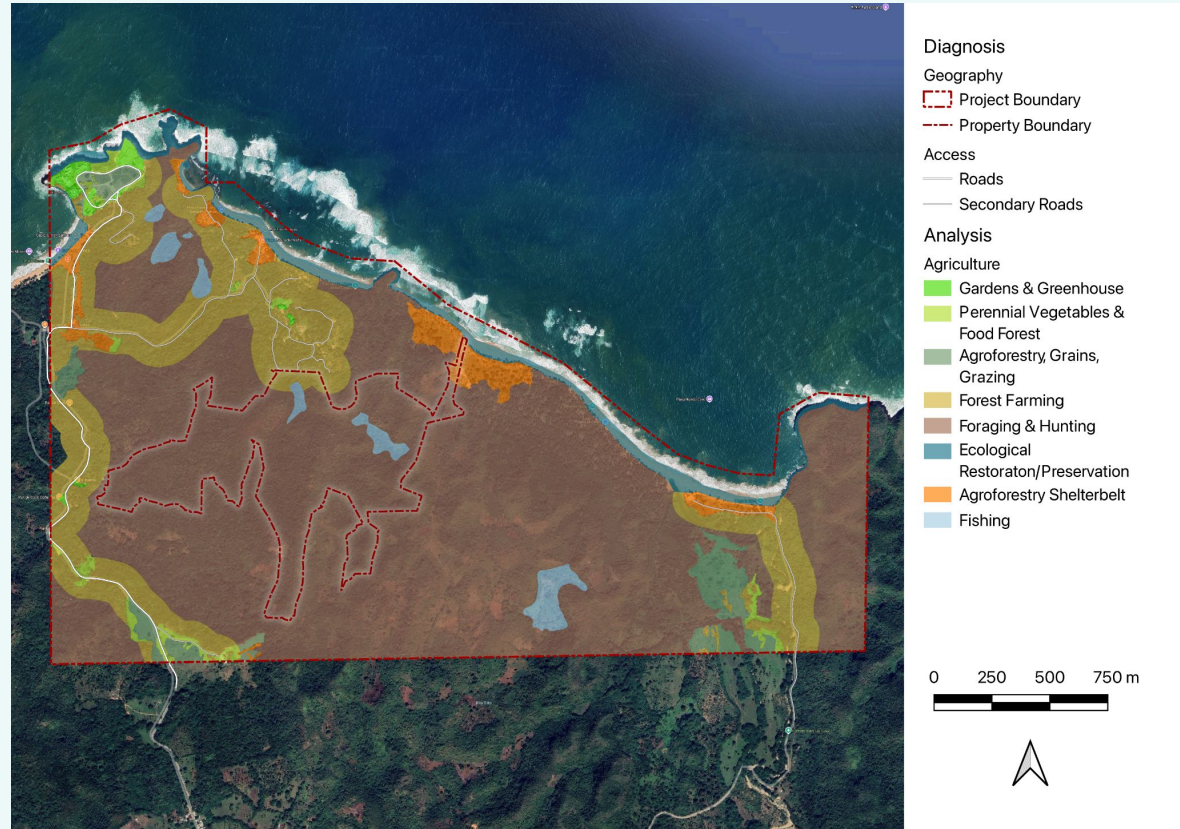
Sun Exposure

- This map shows total available photosynthetically available radiation (PAR) for growing crops. The equinox is chosen to conservatively constrain the opportune areas.
- The majority of this property receives over 15 mol/m²/day of solar radiation for full-sun crops, excepting the areas that are shadowed by the foothills.
- The wooded portions will also be shaded, however these present a niche for other types of forest farming and wildcrafting crops.
- Note, this analysis doesn't distinguish forested areas, and is based on the ground-level landform and therefore doesn't reflect additional shade caused by vegetation.



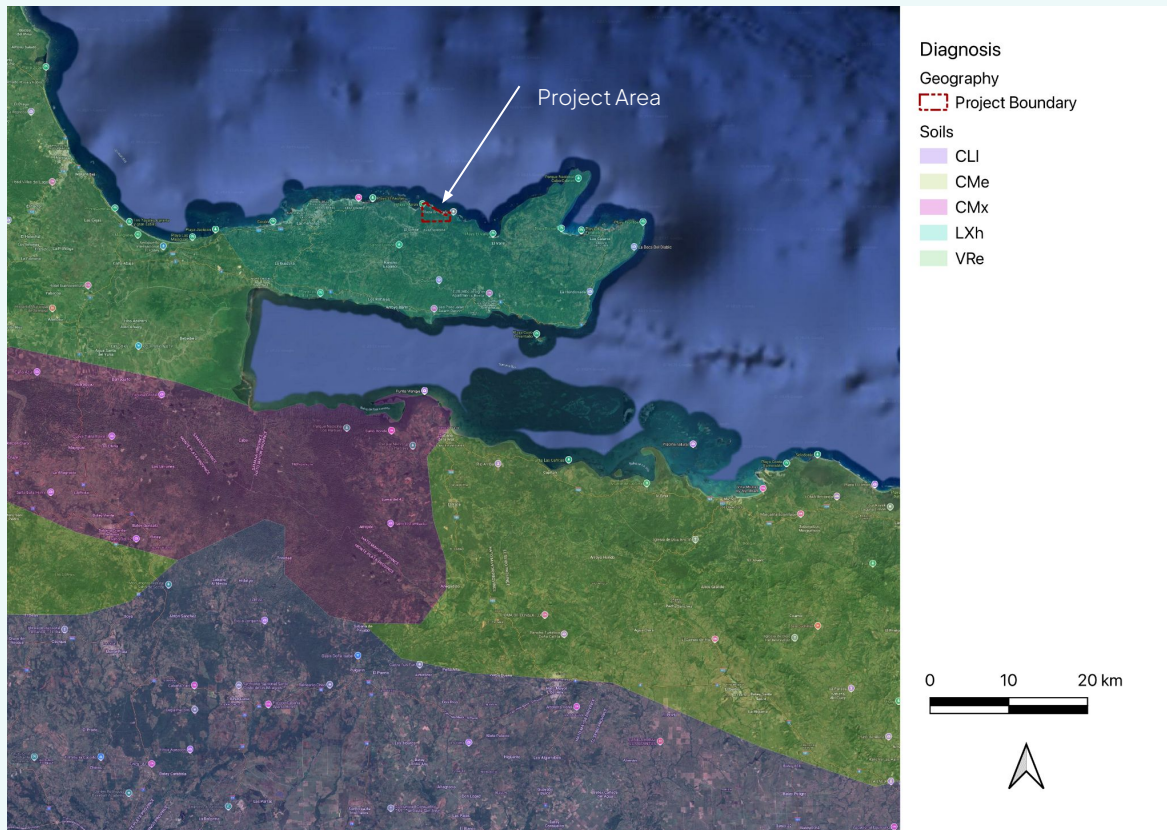
Agriculture Types

- Shown in this map are opportunities for how the land could be used to produce food.
- These designations are based on how many trips would be required from the dwelling areas to reduce time and energy for that type of agriculture.
- The designations are also based on the nature of the site, how energy influences the site, and the existing vegetation and land use types on the site.



Soils

- The dominant soil type of the project area and the majority of the Samana peninsula is a **Haptic Lixisol**.
- Lixisols are a soil type that are heavily and historically weathered, where fine clay particles have been transported to deeper soil horizons.
- These soils generally are most suited to perennial crops and pasture. Intensive annual crop production systems can potentially exacerbate the fragile characteristics of this soil type, particularly its tendency to 'slake' and erode.



Land Inspection

Land

Regenerative land solutions leverage data insights to plan, track, and improve your property's ability to generate resources and grow value.

Land: Opportunities

- Both fire risk and pollution risk are suspected to be mainly low on this site, however the risk is elevated somewhat along the south and east boundaries due to the combination of southerly and easterly slope aspects combining with east and south easterly prevailing winds, which could guide fire into the project area.
- The surrounding landscape is well forested with non-managed forest, and a minimum of monoculture cropland. Herbicide/pesticide overspray concern is expected to be very low.
- The majority of the forest appears undisturbed, providing a multitude of wildlife habitat and effective ecological services.
- The variety of slope aspects of this site offers a multitude of energizing and comfortable living and being environments, suited for different seasons.
- This site contains most of the major habitat types, from coastal headlands and beach, open field, forest, and riparian wetlands and stream courses, supporting multiple forms of serenity, ecological value, as well as land uses.
- This site is relatively close to urban centers.

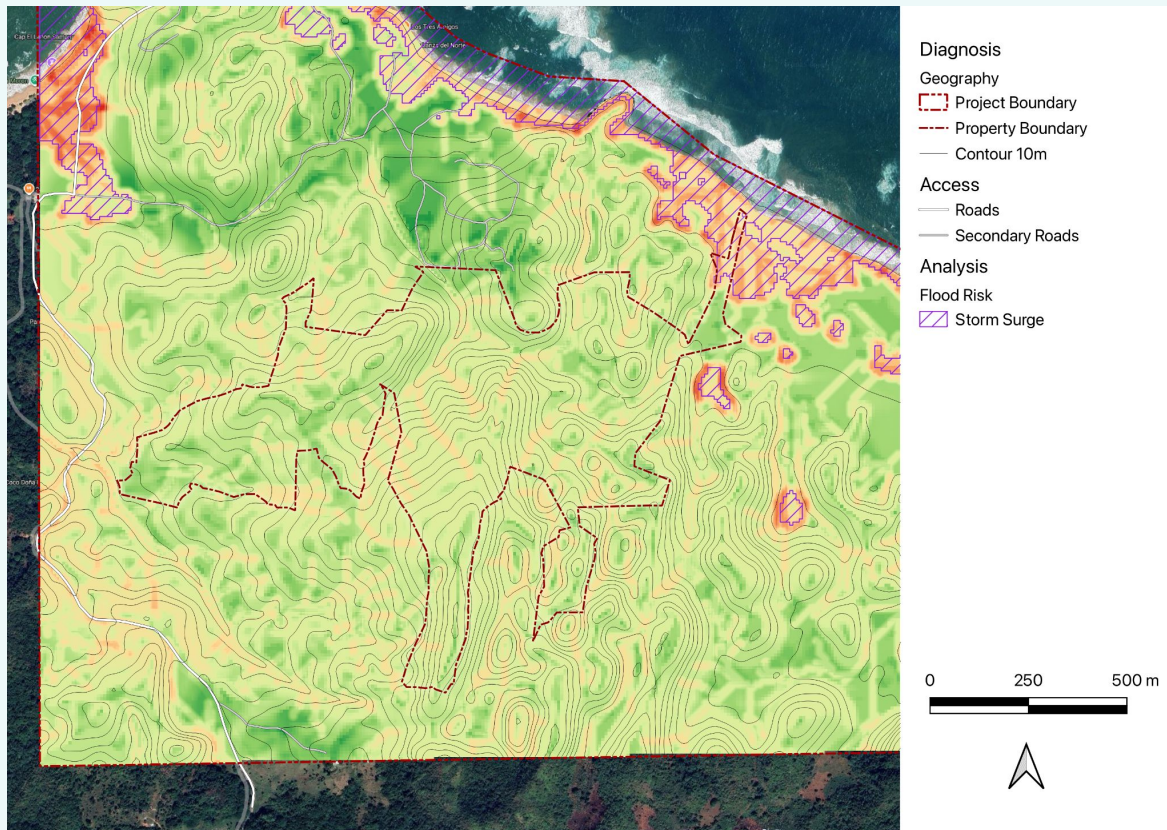
Land: Constraints

- The soils in this area may be prone to erosion, especially where extreme rainfall combines with steeper slopes and disturbed land that is cleared of woody vegetation.
- Access into the interior of the site will be relatively difficult, as there is little in the way of roadways through the hilly and forested terrain. Pronounced drainage channels and steep topography, amount to the need for careful access planning and design into interior portions.
- There are large portions of lowlands on this site that will be vulnerable to flooding during storm surges of increasing intensity, requiring careful choice of land uses.

Dwelling Suitability

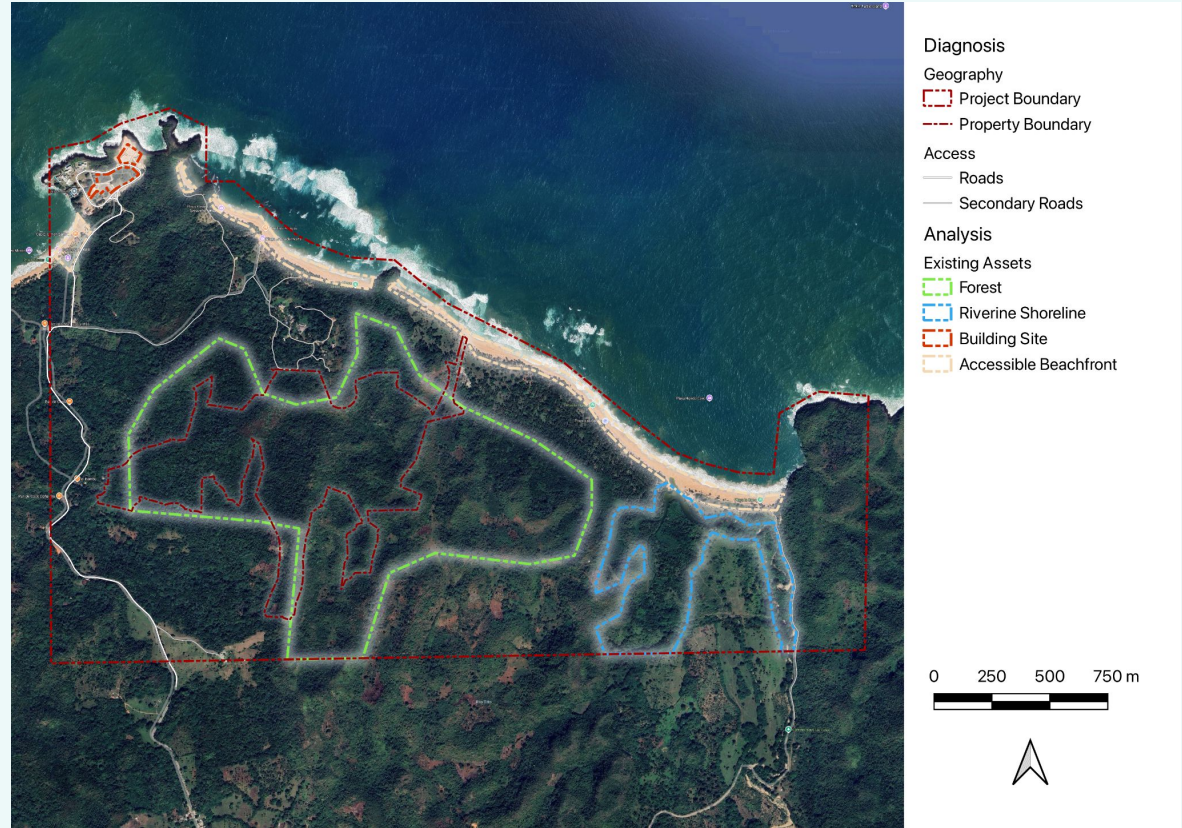
Factors considered favourably in this analysis include:

- Optimal distance from main roads
- Proximity to secondary roads
- Optimal distance from forest edges
- Reasonable distance from project boundary
- Critical distance from stream channels and ponding areas
- 5 meter sea-level rise & storm surge elevation zone above sea level
- South facing aspects for passive energy capture
- Slope less than 10% favoured
- Areas receiving solar gain in the winter
- Degree of existing shelter from wind



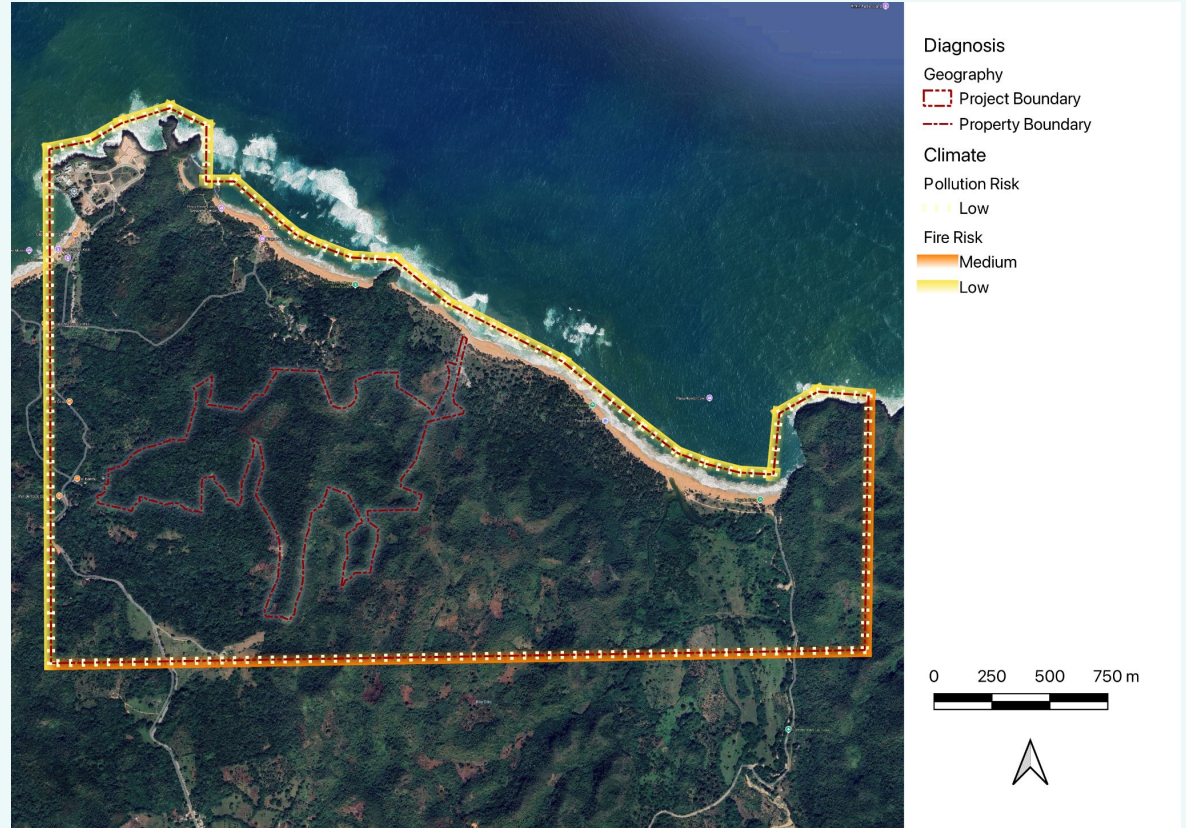
Existing Assets

- The project area contains sites that have been cleared and prepared for construction, and are already served by secondary roads.
- The site is dominated by intact natural forest, which provides numerous ecological services, such as water purification, erosion control, slope stability, critical habitat, and serenity, among others.
- Several streams and a river flow and associated riparian forest in the eastern side of the project area offer habitat, flood attenuation, and a water source.
- The western and eastern sides of the project area each have a small network of secondary roads that provide access to parts of the area. A main road provides access to the project area from the southwest corner.



Influential/Hazardous Sectors

- Fire risk on this project area is predominantly low to moderate. In the moderate areas, we anticipate the higher risk level primarily due to the combination of southerly and easterly slope aspects combining with east and south easterly prevailing winds.
- Given the isolated and rural nature of this site, it's likely that little to no sources of air pollution significantly affect the site.



Land Inspection

Climate



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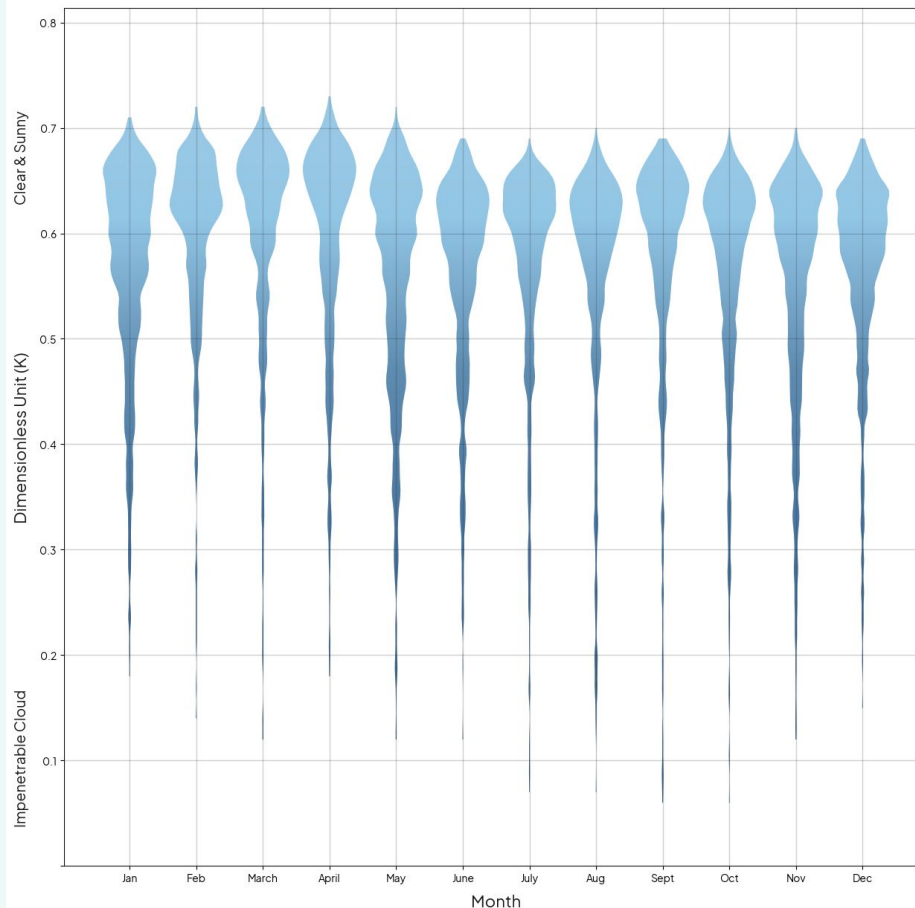
Solar Insolation

The Insolation visualization provides a detailed representation of the Mean Clear Sky Insolation Index over a span of 30 years. Insolation refers to the amount of solar radiation received in a given area. This visualization employs violin plots for each month, allowing users to understand the distribution of insolation values.

Here are some guidelines on how to read this plot:

- The shape of the violin plot captures the distribution of insolation values, with the widest parts indicating the most frequent values and the narrowest parts highlighting less common insolation amounts. In this sense, you can see which months a site receives plenty of sunshine, and months where a site is cloudy, or in between.
- The width of the violin plot at any given value indicates the frequency of days that received that amount of insolation. A wider section signifies a higher number of days with that insolation value.
- The colour gradient within each violin plot transitions from darker at the bottom to lighter at the top. This gradient is mapped to a custom colour scale, ranging from "Impenetrable Cloud" (very low insolation values) to "Clear & Sunny" (very high insolation values).

These data were obtained from the NASA Langley Research Center (LaRC) POWER Project, funded through the NASA Earth Science/Applied Science Program.



Precipitation

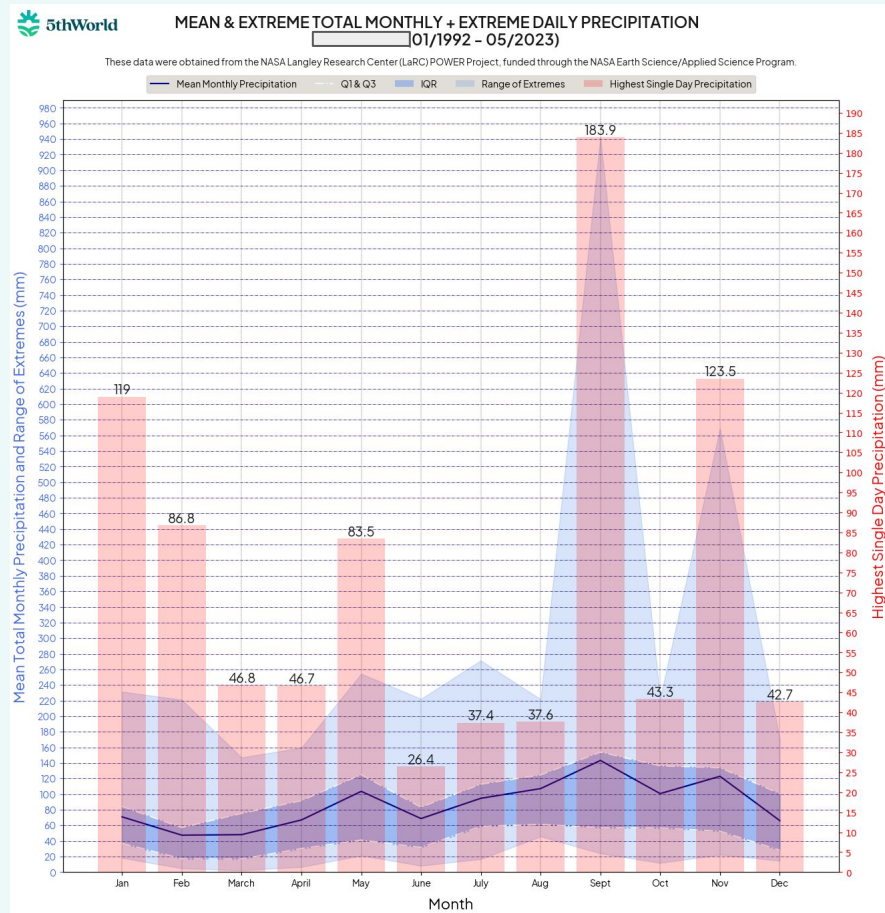
The Precipitation visualization offers a dual perspective on 30 years of monthly precipitation data. On one hand, it showcases the monthly qualities of precipitation statistics, including mean total monthly precipitation, the interquartile range (IQR), and the range of extremes. On the other hand, it presents the highest single-day precipitation for each month, allowing the viewer to gauge both average and extreme rainfall patterns. Here's a more comprehensive breakdown:

Monthly Qualities of Precipitation:

- At its core, this perspective centres around the mean monthly precipitation, represented by the navy blue line. This line offers a continuous view, month by month, of the average rainfall experienced.
- Surrounding this mean line are shaded regions that depict the variability and spread of the data. The interquartile range (IQR), shown in a darker shade of blue, represents the middle 50% of the precipitation data. It captures where most of the monthly totals lie, offering insights into the typical range of precipitation for each month.
- Extending beyond the IQR is the range of extremes, illustrated in a lighter shade of blue. This range spans from the minimum to the maximum monthly totals, providing a comprehensive view of the extremes in cumulative precipitation your area of interest has experienced in a given month over the past 30 years.

Highest Single-Day Precipitation:

- This perspective shifts focus from monthly averages and distributions to pinpoint the most intense rainfall events. For each month, a red bar rises to indicate the maximum amount of rainfall recorded in just a single day.
- These bars are crucial for understanding potential extreme weather events or anomalies. In regions where sudden, heavy downpours can lead to issues like flash floods, this perspective becomes especially vital.



Temperature

The Temperature visualization provides a comprehensive view of 30 years of daily temperature data. By segregating the data into mean, maximum, and minimum temperatures, this visualization enables you to discern patterns, extremes, and general temperature trends for each month of the year.

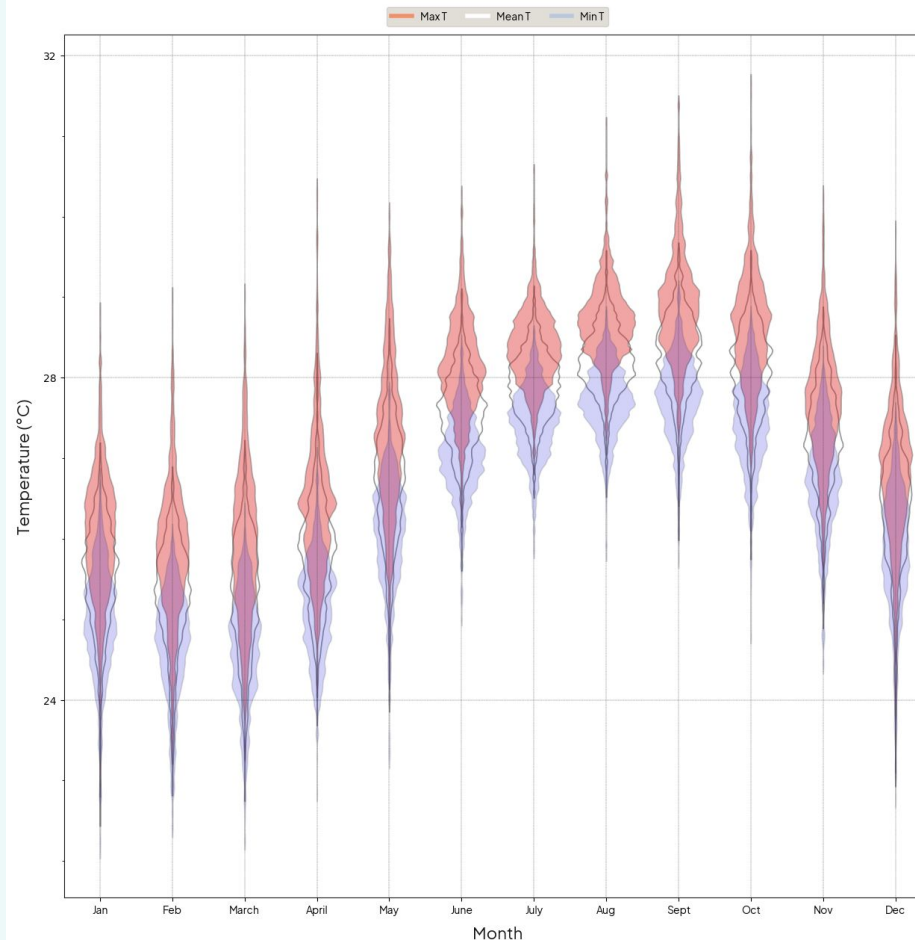
How to read the temperature plot:

- X-axis: Represents each month of the year.
- Y-axis: Denotes the temperature in Celsius (°C).

You will notice three distinct types of 'shapes' or 'distributions' on the plot, each corresponding to a temperature type:

- White Violin Plot: Represents the mean daily temperature for each month.
- Red Violin Plot: Shows the maximum daily temperature for each month.
- Blue Violin Plot: Depicts the minimum daily temperature for each month.

The wider a section of a violin plot, the more days in that month had temperatures around that particular value. This gives a sense of how consistent or variable the temperatures were during a particular month over the last 30 years. On the flip side, the ends of each violin plot depict the range of observed temperatures for that category (either mean, max, or min). The top end of the violin indicates the highest observed temperature, while the bottom end indicates the lowest. This range provides an understanding of the extremes a month can experience. If the ends of the violin plot are far apart, it suggests a larger variation in temperatures for that month, while closer ends indicate a more consistent temperature range.

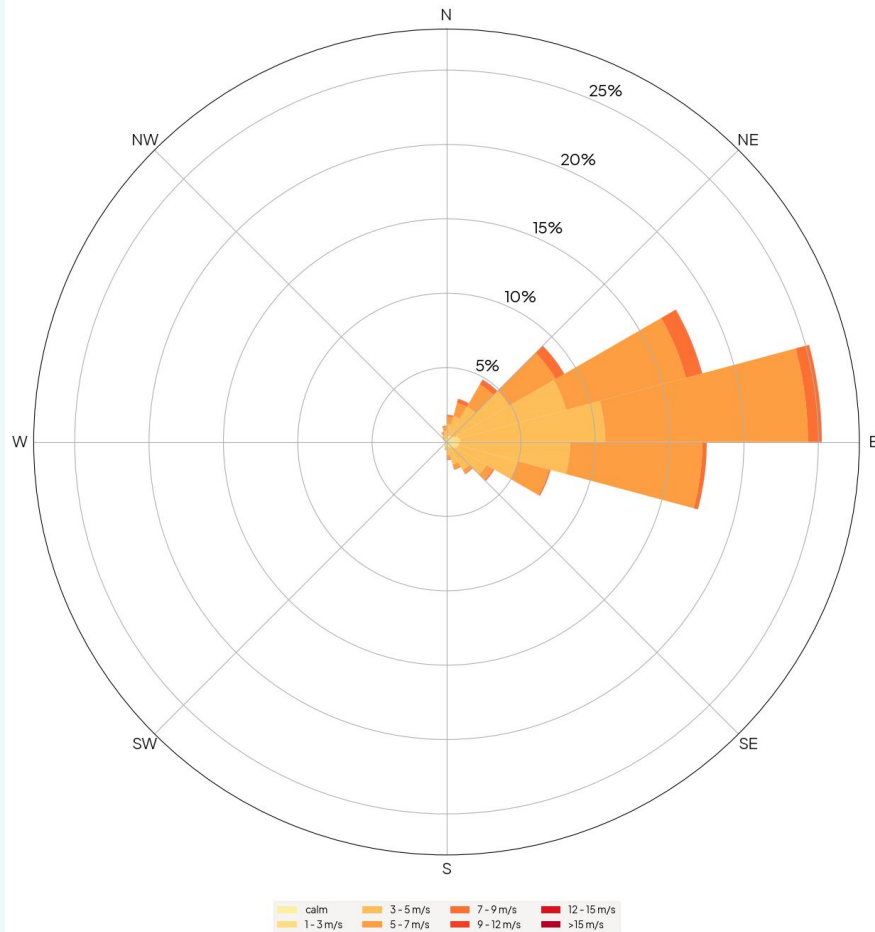


Wind by Season

A seasonal breakdown of the wind rose provides a more detailed view of how wind patterns vary throughout the year. This granularity is beneficial for multiple applications:

- **Seasonal Windbreaks and Shelterbelts**
Wind patterns can vary significantly from one season to the next. Knowing the primary wind direction for each season can guide the placement of deciduous and evergreen windbreaks to offer protection when it's most needed.
- **Microclimate Optimization**
Some areas might benefit from warmer winter winds or cooling summer breezes. By understanding seasonal variations, it's possible to create specific microclimates that capitalize on or mitigate seasonal winds.
- **Water Management Across Seasons**
Seasonal wind variations might influence the effectiveness of evaporation ponds, snow fencing, rainwater harvesting systems, or other water infrastructure. Adjustments can be made to optimize their utility year-round.





Wind Combined

The wind rose offers essential insights into the prevailing wind patterns of a location, which has various applications:

- **Windbreaks and Shelterbelts**

If a predominant segment points towards the North, it indicates that strong winter winds come from this direction. Establishing windbreaks or shelterbelts on this edge can protect crops, reduce soil erosion, and create beneficial microclimates. Understanding the prevailing summer winds can help in positioning elements to capitalize on cooling summer breezes while mitigating the effects of harsher, drying winds.

- **Microclimate Creation**

Recognizing the direction and intensity of prevailing winds allows for the creation of microclimates. For instance, strategic placement of dense vegetation in the wind's path can protect vulnerable areas or generate warmer zones in their lee.

- **Structural and Zone Placement**

Structures like greenhouses can be sited to be shielded from strong, cold winds while still benefiting from milder breezes for ventilation. Wind patterns can also guide the placement of composting toilets, livestock housing, or other elements that might produce odors to ensure they're carried away from primary living or activity areas.

- **Pollination and Pest Control**

Wind patterns can be useful in deciding where to plant crops that rely on wind for pollination. Conversely, understanding these patterns can help place barriers or redirect winds that might introduce unwanted pests or diseases.

- **Fire Safety**

In areas at risk of wildfires, understanding prevailing wind directions is crucial for designing zones or barriers that can act as firebreaks.

Temperature Trends

This visualization presents a 30-year analysis of temperature trends, highlighting seasonal variations in minimum and maximum temperatures. By plotting historical data for each season, it provides insight into long-term temperature changes and potential climate shifts at the site.

How to Read the Chart:

- X-Axis: Represents the last 30 years.
- Y-Axis: Denotes temperature in Celsius (°C).
- Left charts (Blue): Displays trends in minimum temperatures. Right charts (Red): Displays trends in maximum temperatures.

Each season has three plotted temperature series:

- Lightest Line: Highest recorded temperature for that category (e.g., max of daily minima).
- Middle Line: Mean temperature for that category.
- Darkest Line: Lowest recorded temperature for that category (e.g., min of daily minima).

Trend Indicators:

Dashed lines represent trend significance:

- Red dashed lines indicate an increasing temperature trend.
- Blue dashed lines indicate a decreasing trend.
- The intensity of the color shows the significance level, stronger hues represent more statistically significant trends.

