EVERY LAST DROP

Water Use Efficiency Model For San Fernando, California

Master of Landscape Architecture Capstone Project
California State Polytechnic University, Pomona

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WATER USE EFFICIENCY MODEL FOR SAN FERNANDO, CA

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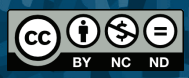

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Sahar Fazelvalipour

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TABLE OF CONTENTS

ABSTRACT.....IV

CHAPTER 1: RESEARCH & ANALYSIS.....1-26

INTRODUCTION.....2-4

LATINO URBANISM.....5

ENVIRONMENTAL ANALYSIS.....6-8

WATER RESOURCES.....9-15

RESIDENTIAL TYPOLOGIES.....16-25

CONCLUSION.....26

CHAPTER 2: COMMUNITY CONCEPT.....27-36

INTRODUCTION.....28

VISION STATEMENT.....29

GOALS, OBJECTIVES, & ACTIONS.....30-34

COMMUNITY ENGAGEMENT.....35

CONCLUSION.....36

CHAPTER 3: CALCULATOR TOOL AND SPATIAL DESIGNS.....37-77

MWELO MATE WATER BUDGET CALCULATOR.....38-41

FRONT YARD DESIGNS.....42-67

PARKWAY DESIGNS.....68-71

REFERENCES.....72

ABSTRACT

Like many communities in Southern California, the City of San Fernando is challenged with diminishing water resources and increasing state regulation. “Every Last Drop” leads the community toward front yard landscapes that are drought tolerant and are in compliance with California’s statewide Model Water Efficient Landscape Ordinance (MWELO). As students of landscape architecture, our knowledge concerning drought tolerant plants, low impact design, and culturally-responsive design can assist the community with the permitting process as it relates to MWELO and move them toward low water use front yard landscapes that retain San Fernando’s unique cultural identity.

Issues facing the City include challenges with yards that are out of compliance, drought and runoff concerns as well as socioeconomic challenges that make it difficult for many residents to implement low water use landscapes.

High single-family home ownership rates, consistent lot sizes and conditions, and San Fernando’s rich cultural heritage as a predominantly Latino community are some of the unique opportunities present. Existing rebate and grant programs are also available provide financial assistance to residents.

This project aims to position the City of San Fernando as a leader in low water use landscapes and climate change action by providing tools, designs, and educational resources that can serve as resources for the community. We achieve this by outlining goals such as managing residential stormwater runoff, educating residents on water use efficiency best practices, reducing residential water use, and enhancing the city’s unique cultural identity.

The report provides an intuitive spreadsheet-based calculator for estimating water use and evaluating compliance, prototypical front yard designs that illustrate compliant designs and planting plans for a large percentage of the community, and swale designs for the parkways to reduce runoff by capturing and treating runoff from the street and from residential properties. San Fernando’s Latino culture is incorporated into the design vision and goals to enhance the city’s unique cultural identity while addressing low water use best practices and compliance with state guidelines.

CHAPTER 1

RESEARCH & ANALYSIS

INTRODUCTION

Our community partners from the City of San Fernando have asked us to develop prescriptive compliance residential drought designs to meet statewide Model Water Efficient Landscape Ordinance guidelines. We recognize the opportunity to develop prominent residential front yard typologies while integrating cultural elements specific to the City of San Fernando into the design vision and goals.

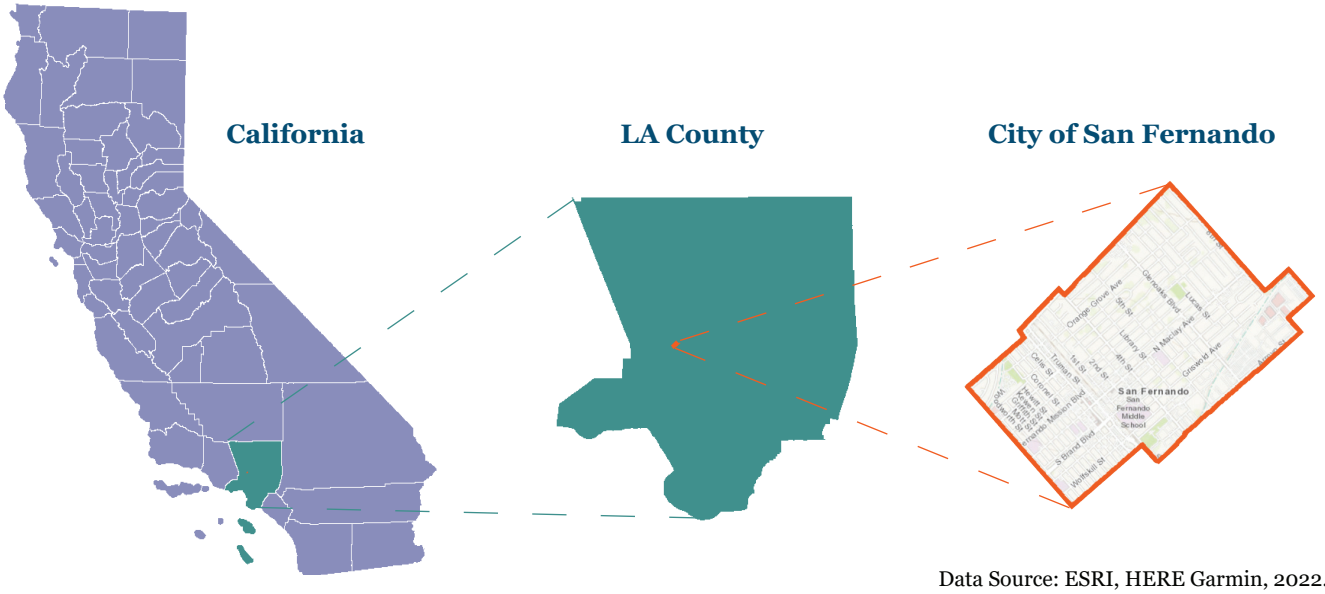
FIRST CITY OF THE VALLEY

The community of San Fernando was founded in 1874, making it the oldest city in the San Fernando valley. The city was officially incorporated in 1911. Its own water supply has enabled the city to stay autonomous from the City of Los Angeles, which surrounds it. According to 2020 Census, the city has a population of 23,946.

The City covers 2.37 square miles in the San Fernando Valley region close to the San Gabriel Mountains of Los Angeles County.

Lopez Adobe San Fernando, CA. Source: Jiyoon Kim

San Fernando Fiesta, 1930s.
Source: San Fernando Valley Historical Society

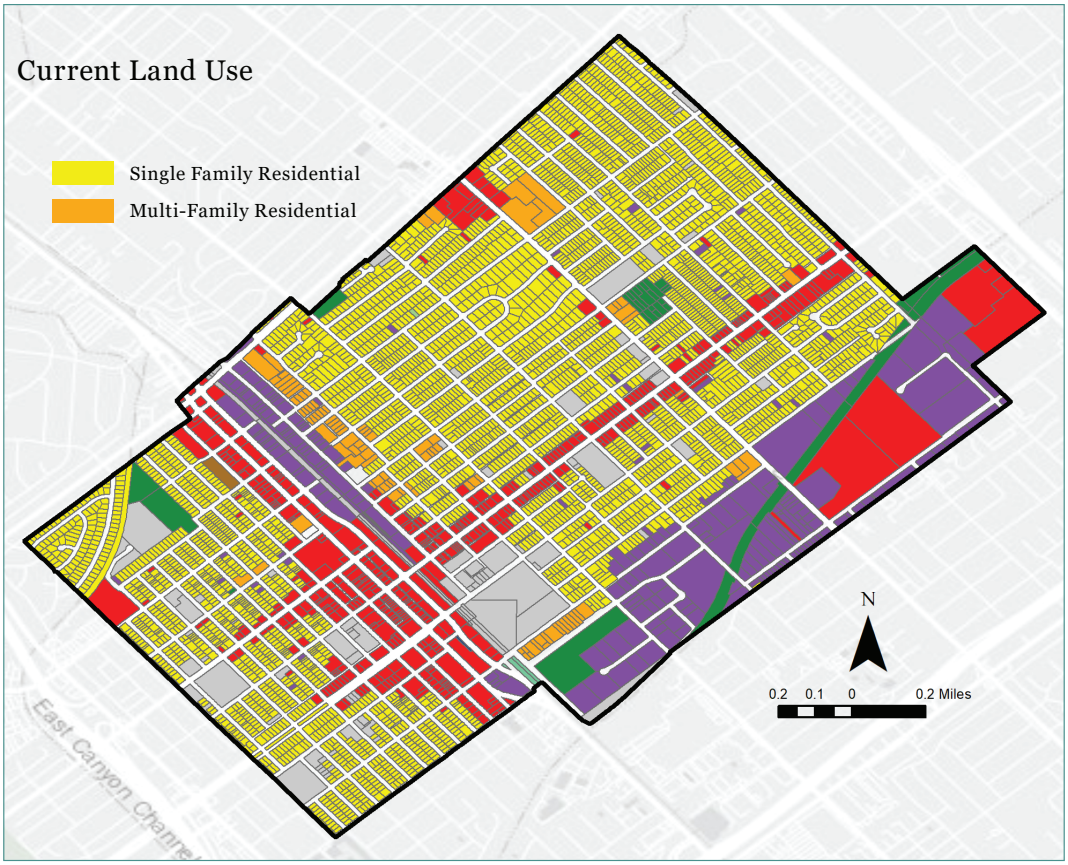


Data Source: ESRI, HERE Garmin, 2022.

SAN FERNANDO HOME OWNERSHIP

Owner-Occupied Housing
Data Source: U.S. Census Bureau, American Community Survey (ACS). 2021, 5 Year Estimate

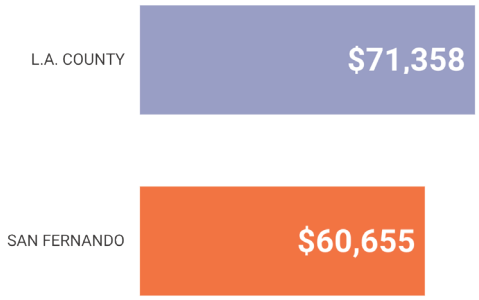
The majority of San Fernando households own their own home. The City has a higher homeownership rate than the Los Angeles County Average by more than 14%. This prevalence of high home ownership rates with the dominant housing types being single family with front yards, means that the project can have a positive impact on a large amount of the community.



Data Source: ESRI, HERE Garmin, 2022.

INCOME

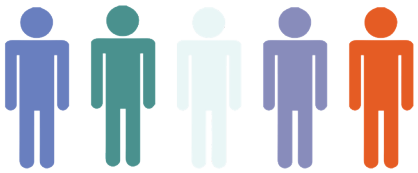
According to the U.S. Census Bureau, San Fernando's median household income is over $10,000 lower than the Los Angeles County Median. This suggests that household costs such as water and home improvements maybe a concern to many.

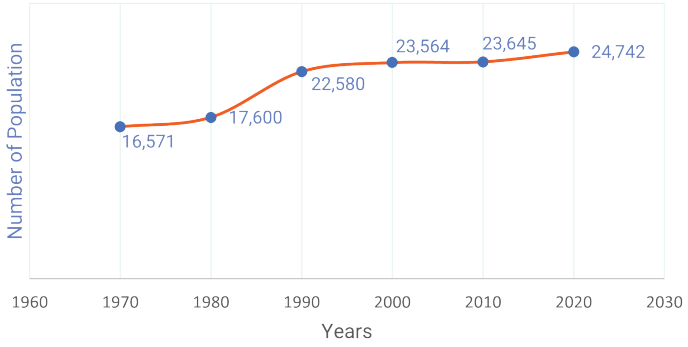


San Fernando Median Household Income
Source: U.S. Census Bureau, American Community Survey(ACS). 2021 5 Year Estimate

POPULATION AND ETHNICITY

The City of San Fernando 's population grew substantially in the 1980s to 1990s and displayed more moderate growth beginning in 2000.

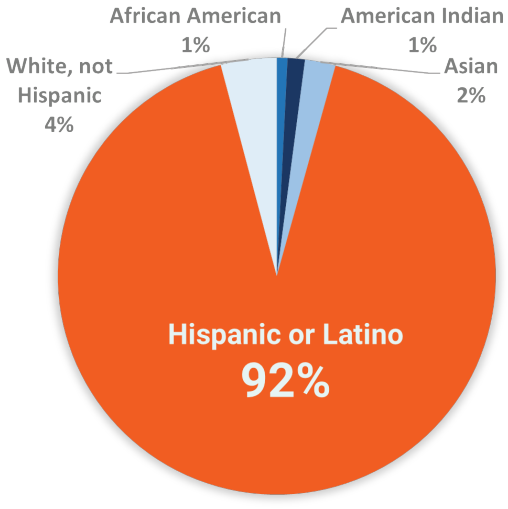




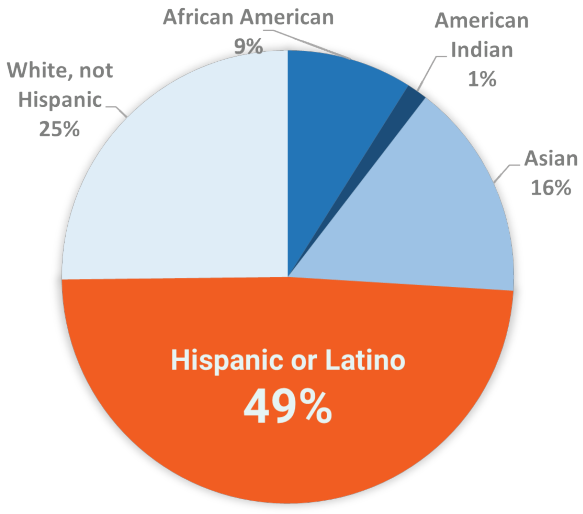
San Fernando Population Growth 1970-2020
Source: State of California Department of Finance(2022).

More than 90% of the population identifies as Hispanic or Latino. In Comparison,Los Angeles County Latino Population is less than half.

Due to the large percentage of the Latino Population, Latino culture plays a dominant role in the community.



San Fernando



Los Angeles County

San Fernando and Los Angeles County Race
Source: U.S. Census Bureau, American Community Survey(ACS). 2021 5 Year Estimate

LATINO URBANISM

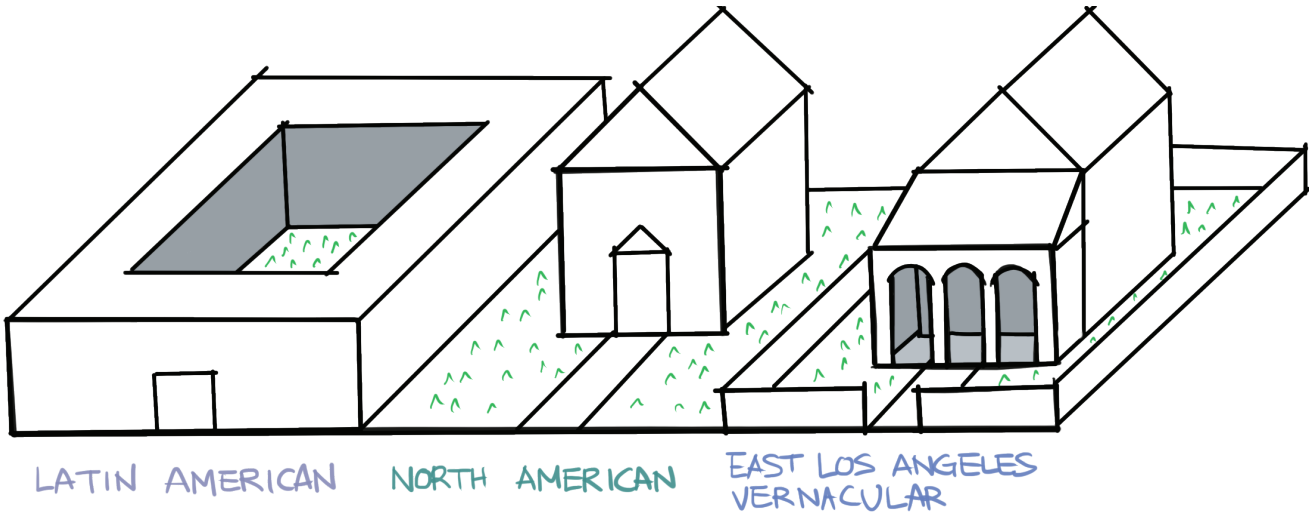
The significant majority of the Latino population in San Fernando suggests that Latino Urbanism may be a useful framework for considering the use and design of public and private space in the city

Latino Urbanism is based on the use potential and activation of a front yard as an extension of a living room. “Abuela or grandma gardens” in the design maximizes front yards by filling them with potted plants, fruit trees, and outdoor furniture. According to Los Angeles City Planning, Latino Urbanism is “a broad term used to categorize the multiple practices by which Latinos have created and contributed to the forms, functions, and cultural landscapes of American cities” (Rojas, 2021).

Latino housescape in East Los Angeles vernacular can be explained as a combination of both the courtyard in Latin America and the typical North American Single-Family Home with a manicured front yard often for visuals purpose. Latino housescape shows how the Latino Urban design evolved for cultural and social preservation. East Los Angeles Vernacular is representative of prevalent housing types in the City of San Fernando.

Typical Front Yard in San Fernando, CA.
Photo by Jiyoon Kim.

PLAZA + COURTYARD: LATINO HOUSESCAPE

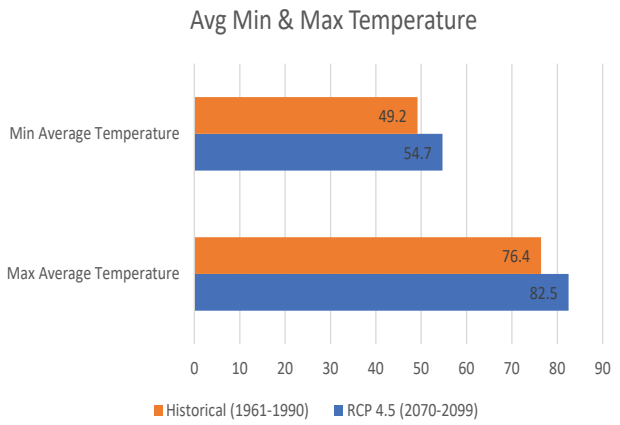


Adapted from: Rojas, J. T. (1991). The Enacted Environment

ENVIRONMENTAL ANALYSIS

TEMPERATURE

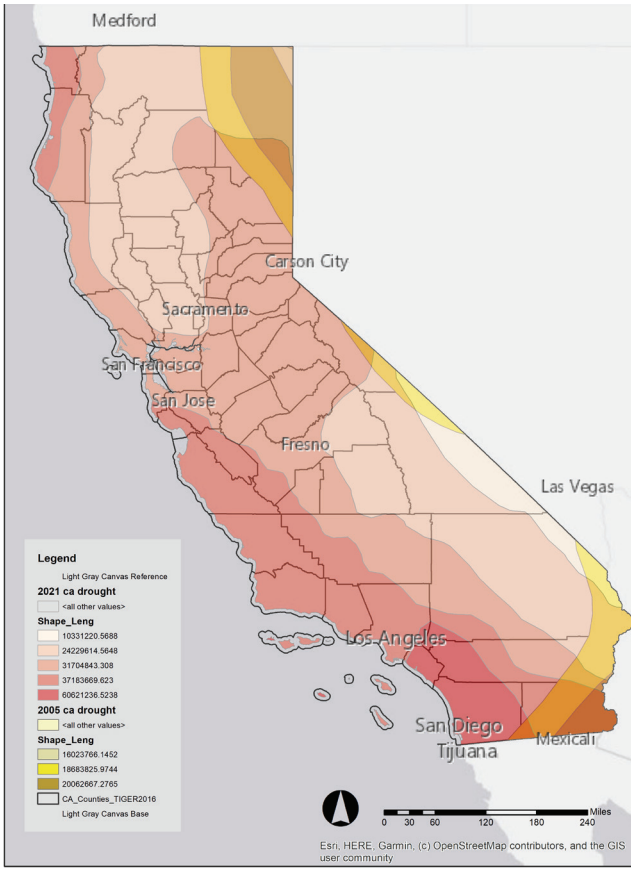
San Fernando has short, hot, and clear summers, and long, cold, wet, and partly cloudy winters. Over the year, the temperature fluctuates between 45°F to 92°F and is infrequently below 38°F. The average maximum temperature between 2070-2099 under a Medium Greenhouse Gas Emissions (RCP 4.5) Scenario will be 82.5°F, which rose from the historical average of 76.4°F. On the other hand, the minimum temperature will also increase from 49.2°F to 54.7°F. since the City of San Fernando is one of the warmest places in California, we need to minimize the risk associated with extreme heat and drought based on the expected temperature increase.



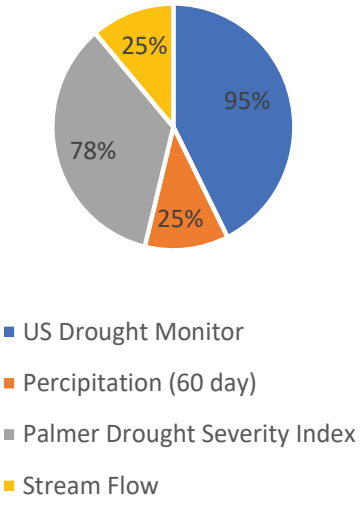
Temperature variation chart
Data Source: Cal-adapt, Annual Averages, 2022.

DROUGHT INTENSITY

Based on the information provided by National Integrated Drought Information System (NIDIS, 2022), the City of San Fernando, as part of Los Angeles County, is located in an area experiencing severe drought. This situation was predictable based on the temperature fluctuation shown for average minimum and maximum temperature.



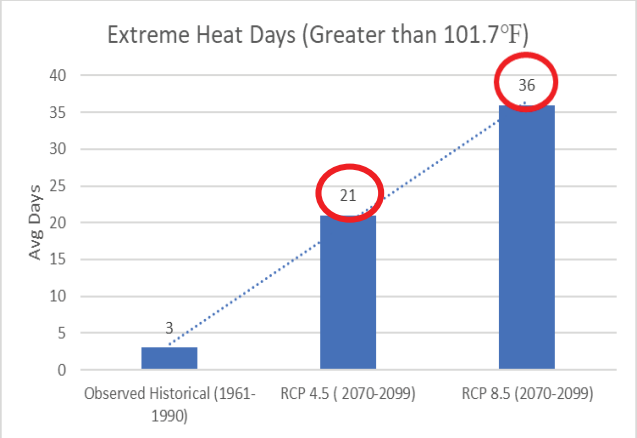
Drought impacts map
Data Source: National Integrated Drought Information System (NIDIS), 2022.



San Fernando drought intensity chart
Data Source: National Integrated Drought Information System (NIDIS), 2022.

EXTREME HEAT DAYS

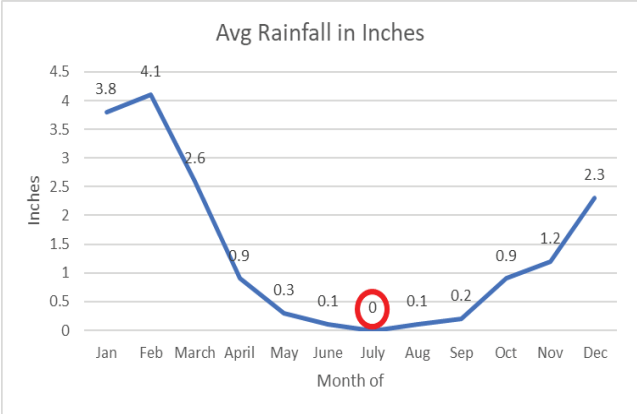
Temperatures are projected to rise substantially throughout this century as a result of climate change. During 1961- 1990, the average number of days with extreme heat above 101.7 °F was about 3. However, under a Medium Greenhouse Gas Emissions (RCP 4.5) Scenario the number of extreme heat days is projected to be 21 , and under the High Emissions (RCP 8.5) scenario the number of heat days may be 36. So, it is essential to have a plan to minimize the risk associated with extreme heat and drought.



Extreme Heat Days (Greater than 107.1 °F)
Data Source: Cal-Adapt, Extreme Heat Days, 2022.

PRECIPITATION

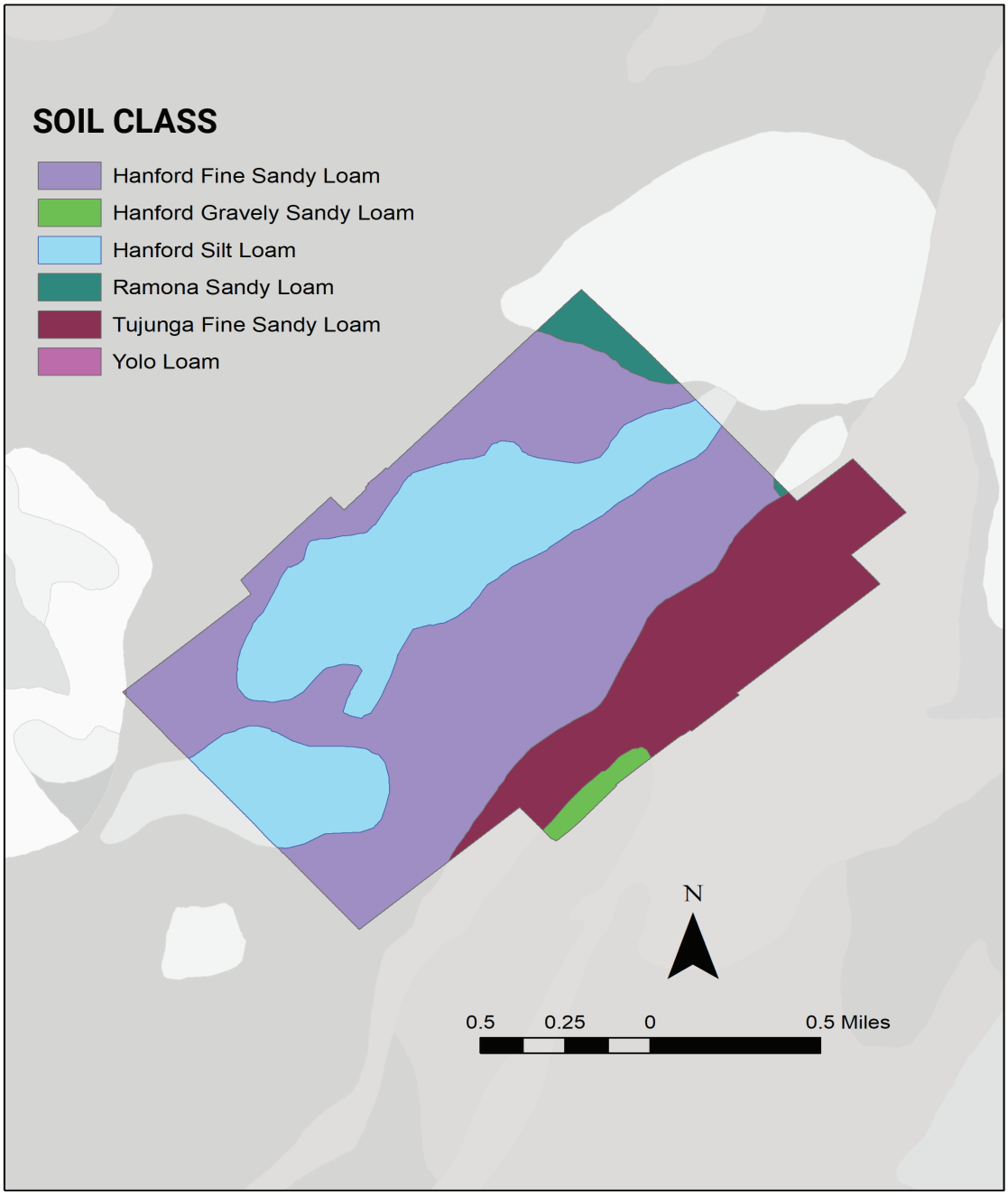
February is the wettest month in San Fernando, with 4.1 inches of rain, and the driest month is July, with an average of 0.0 inches. The wettest season is Spring, with 62% of yearly precipitation, and 1% occurs in the driest season in summer. The average rainfall in a typical year can be lower or higher than the average, leading to drought or flood events. For example, extreme precipitation events may lead to flooding, and other damaging events. So we need to go beyond sustainability to begin managing each property By paying attention to the garden's design, building soil, keeping rain on our properties, selecting climate-appropriate plants, and managing supplemental irrigation.



Average precipitation chart
Data Source: Cal-adapt, Annual average precipitation, 2022.

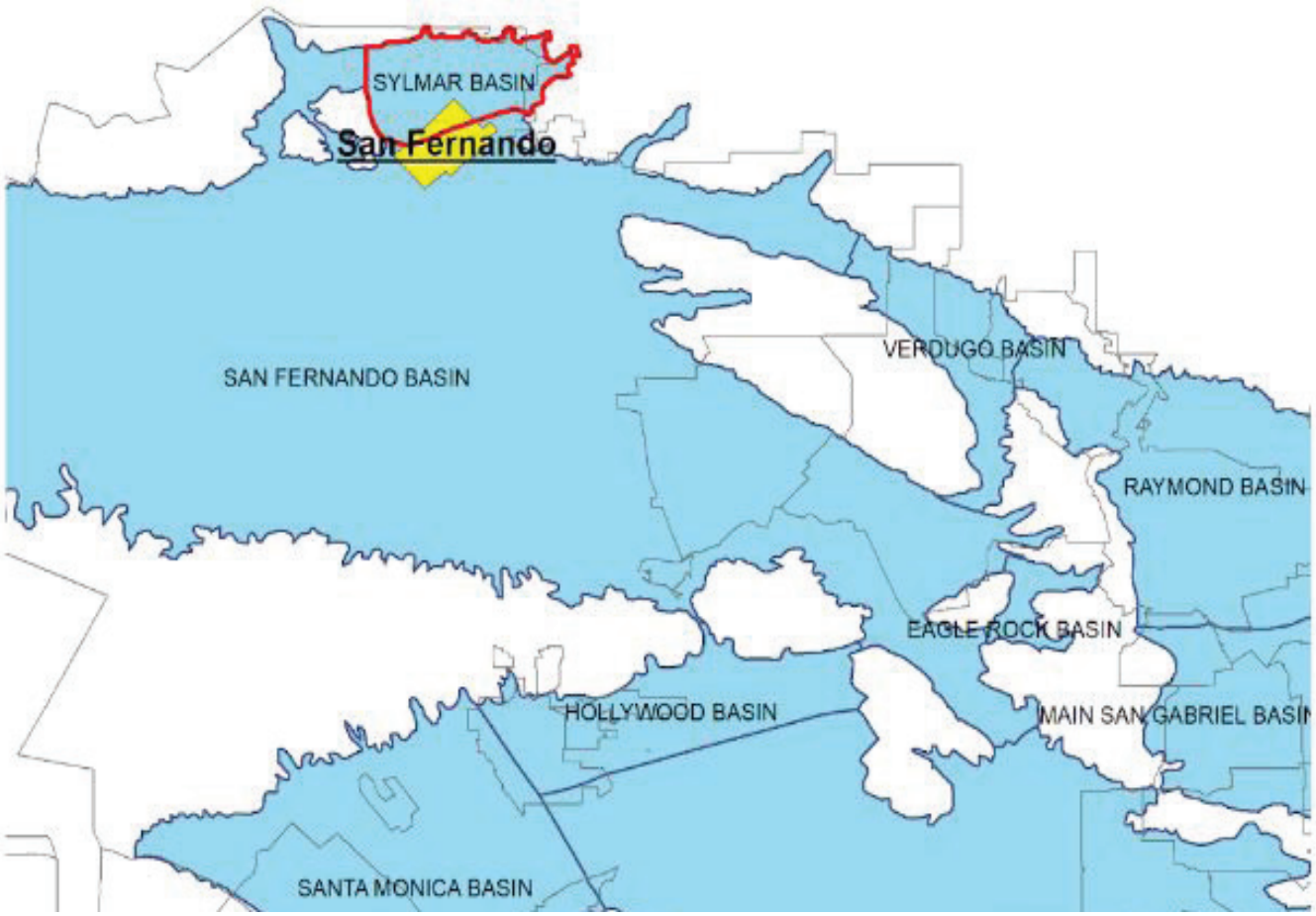
SOIL TYPE

According to the information provided by LA County, most of the San Fernando City soil is dictated by sandy loam followed by Silt Loam. Sandy soil can quickly drain water but does not hold significant amounts of water or nutrients for plants. Silt soils are fertile, fairly well-drained, and retain more moisture than sandy soils but can easily get compacted. These types of soil can easily be carried by flood. So, we need to apply an appropriate design strategy to control water flow and erosion.



San Fernando soil map
Source: EGIS, Soil Types Feature Layer, 2022.

WATER RESOURCES



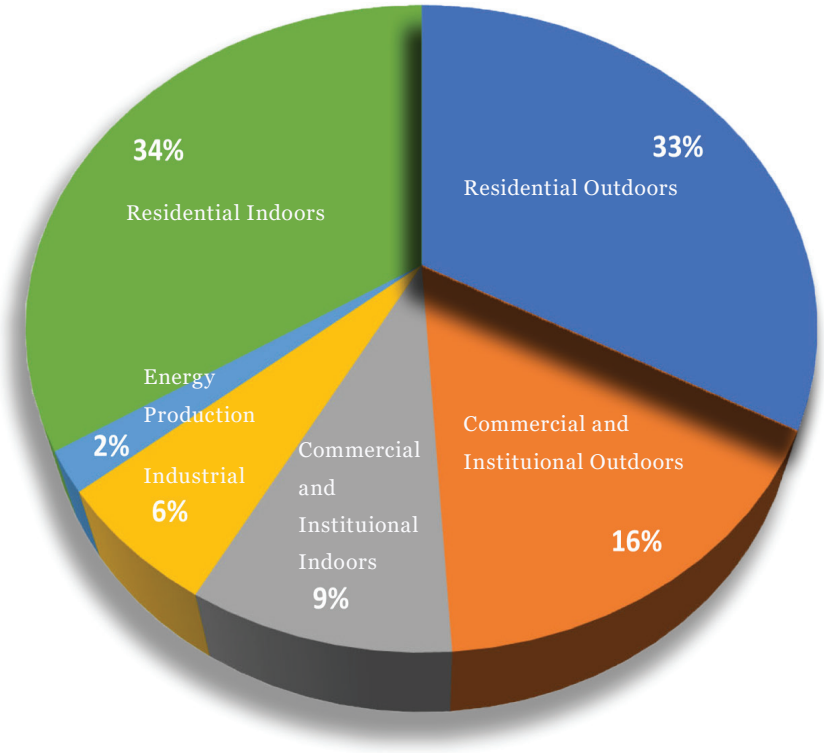
Sylmar Basin and Surrounding Ground Water Basins
Data Source: San Fernando City Urban Water Management Plan

The City of San Fernando is highly dependent on local groundwater wells for its water supply, making water conservation critical to ensuring a sustainable future. Recent water well shutdowns have affected the existing ground water supplies, and forced the city to resort in alternative sources.

Metropolitan Water District (MWD) allows constant connection to water when one of the wells in City of San Fernando happens to fail. However, the city limits the amount of water they would like to import and ultimately would prefer to avoid relying on external water supplies as it is more sustainable and cost effective. Droughts, earthquakes and power outages can hinder water agencies such as MWD to effectively deliver water during emergency.

Recent water quality and supply challenges have encouraged the City of San Fernando to redesign streets and parking lots to capture stormwater and reduce polluted runoff. In the event of rains, water picks up chemicals, waste, trash and other debris that can pollute rivers and oceans.

LANDSCAPING ACCOUNTS FOR ROUGHLY HALF OF URBAN WATER USE



Data Source: San Fernando City Urban Water Management

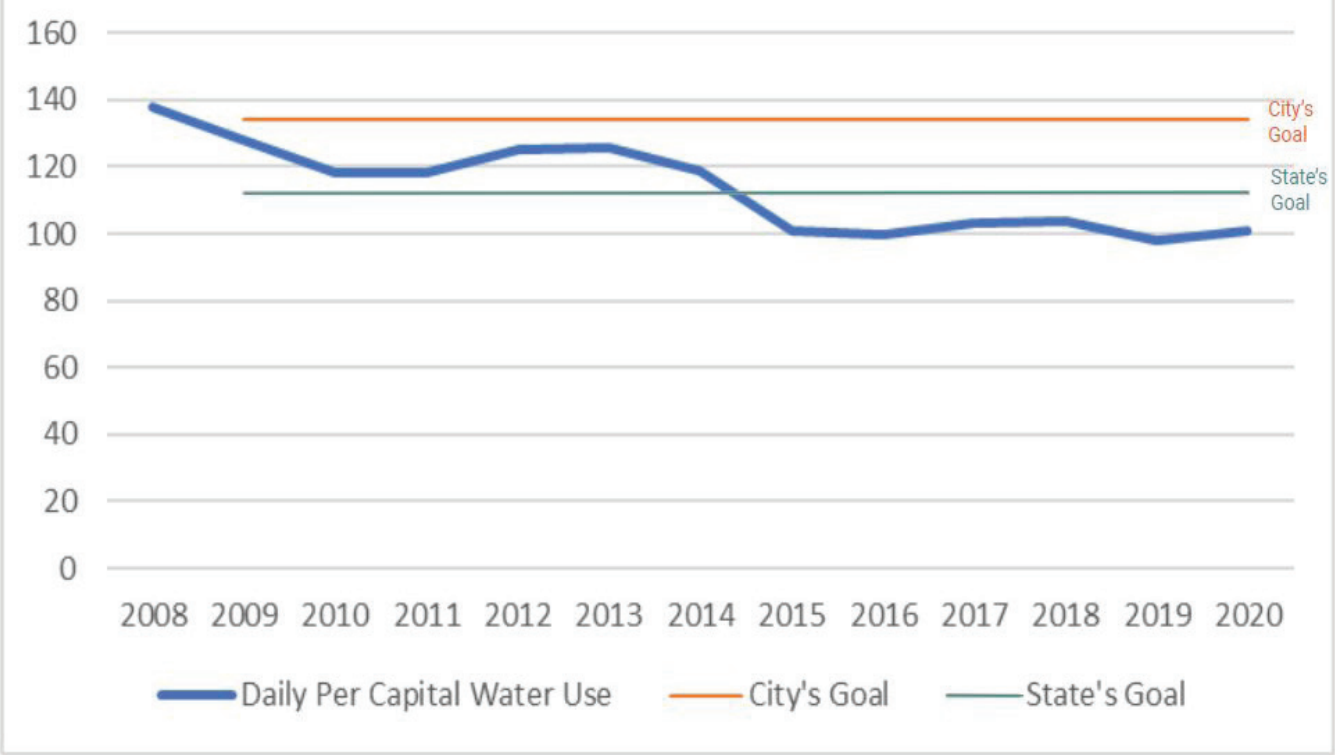
RESIDENTIAL WATER USE

According to City of San Fernando's Water use table, residents occupy more than 60% of water sales. Residents use as much water outdoors as they do indoors. In the City of San Fernando, residents alone used 1,862 acre feet of water per year. It is estimated at least 931 acre feet of water is used outdoor for landscaping. 931 acre feet of water is equivalent to 302.5 millions gallons of water.

Water-Rich Landscape
Photo by Atticus Lee.

Water-Rich Front Yard
Photo by Atticus Lee.

SAN FERNANDO DAILY PER CAPITA WATER USE



Data Source: San Fernando City Urban Water Management Plan

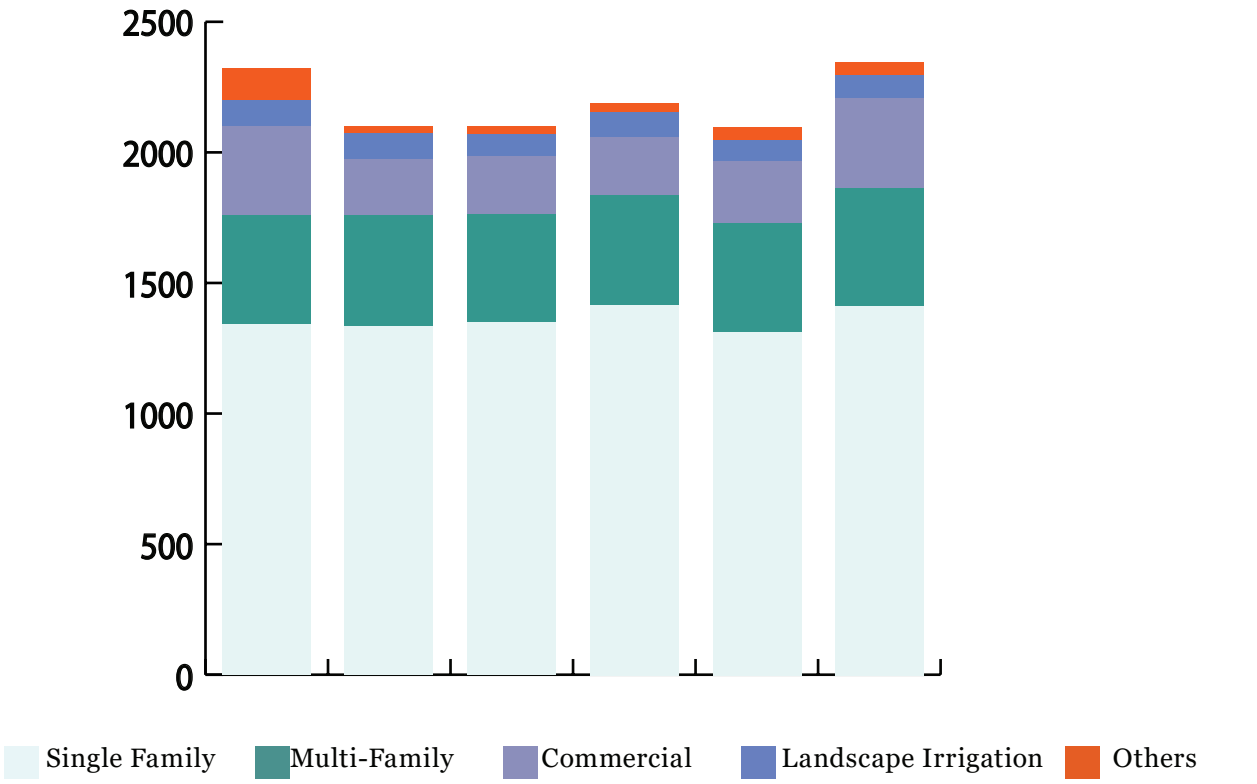
WATER CONSERVATION

The City of San Fernando chart indicates the amount of water used per day. Before 2009, City of San Fernando residents average use of 140 gallons per day (City of San Fernando, 2021). Later the state implemented SBX7-7. This bill required residents to reduce water use by 20%. However, City of San Fernando only require residents to reduce their water use by 5%. As indicated in the chart, residents have surpassed the state's and City of San Fernando's requirement.

The residents are able to reduce the water use is partly due to the ongoing city conservation measures, including but not limited to water saving plumbing fixtures and overall conservation awareness. Although, the city have met beyond the requirements of water conservation, it is important to continue to meet and remain below the water use table. Furthermore, due to the large amount of water being used by residential homes, the focus will continue to be residential rebate programs.

Water conservation is crucial because it is heavily impacted by climate change. Climate data allow the city to anticipate the various impact climate change can do to the city's water supplies. In the case of the city of San Fernando, where the average front yard size is 1,000 square feet, it is crucial to establish a target water usage of 48.5 gallons per household to ensure efficient and sustainable water management.

CITY OF SAN FERNANDO WATER SALES



Water Demand per Acre Feet Data
Data Source: San Fernando City Urban Water Management Plan

WATER SALES

Although the total water sales in the City of San Fernando have decreased since 2015, residential services have continued to increase in water sales.

The City projected population growth is estimated to be 1.7% every 5 years (City of San Fenando, 2021). The amount of water sales would increase along with the population. However, even if the population increase, the groundwater supply should remain the same in order to not deplete the supply for future generations.

In addition, the city's water has a limit to how much can be withdrawn from the underground basins. The city's ground water is shared with City of Los Angeles, so each have a right to receive the stored water in the Sylmar Basin. The natural safe yield is 7,140 acre feet per year. Therefore, the maximum allowed acre per year for City of San Fernando is 3,570 acre feet.

According to MWELO guidelines, San Fernando water target water use per square feet is 17.73 gallons per year. The gallons per square feet is provided by inputting San Fernando's ETo into the water budget formula. Base on the daily per capital water use chart, San Fernando currently uses 101 Gallons per day per household. It is assumed majority of the water is used for landscaping.

MWELO

Model Water Efficient Landscape Ordinance, also known as MWELO, is created in order to control the ever increasing demands of water. The state legislature have found water itself is limited in supply. In order for California's economy to continue growing, there needs to be a adequate supply of water for the future population to use. MWELO creates a simplified process and also serves as a checklist for applicants (typically homeowners) to understand basic landscape design, installation, and maintenance principles. Residential specific MWELO state guidelines (California, n.d.).

1. All plants within the hydrozone have similar water and sun needs.
2. Install water saving sprinklers
3. Avoid installing sprinklers within 2' of impervious surfaces
4. Direct roof runoff into vegetated areas
5. Incorporate rain gardens, cisterns, and rain barrels for use to water landscape
6. Minimize impervious areas like driveways
7. No turf allowed in planting areas less than 10 feet wide
8. 3 inches of mulch shall be installed in all non-turf planting areas, unless prohibited by fire code

WUCOLS

In order to comply with MWELO, homeowners are required to submit a landscape package to the city. Applicants generally are required to submit a water efficient landscape worksheet. This work sheet consists of hydrozone information and water budget calculations. The water budget calculations uses plant factors from Water Use Classification of Landscape Species, also known as WUCOLS.

Species factor is used to determine the amount of water needed to maintain the health and appearance of the type of vegetation (Finch,2023). Species factor ranges apply to all type of plants regardless of type. WUCOLS is able to categorize species such as tree, shrub, ground cover, vine and herbaceous.

- Very Low < 0.1
- Low 0.1 - 0.3
- Moderate 0.4 - 0.6
- High 0.7 - 0.9

WUCOLS plant water needs are determined from numerous amount of field observations. Different type of plant species are categorize in value ranges based on previous experience irrigating the particular species (Finch,2023).

MWELO achieves sustainability through specific requirements related to soil, plants, irrigation, stormwater, and non-potable water supplies (California, n.d.). It sets an upper limit for the water budgets of landscape projects. MWELO encourages landscapes with less water by driving water efficiency through the thoughtful selection of climate appropriate plants, organic soil amendments, water saving irrigation devices, and the use of alternative water supplies. Last but not least, it encourages the innovation of landscaping equipment, products, and materials that use less resources and create tools that are more efficient.

PLANT WUCOLS RATINGS

Legend	Legend
Very Low	Moderate
Low	High
Moderate	Not Rated

CITY APPROVED PLANT LIST

The following lists are the plants suggested by the City of San Fernando, and we categorized them by their WUCOLS rating. The gray shows many of the plants are not listed in WUCOLS, making the permitting process more difficult for residents.

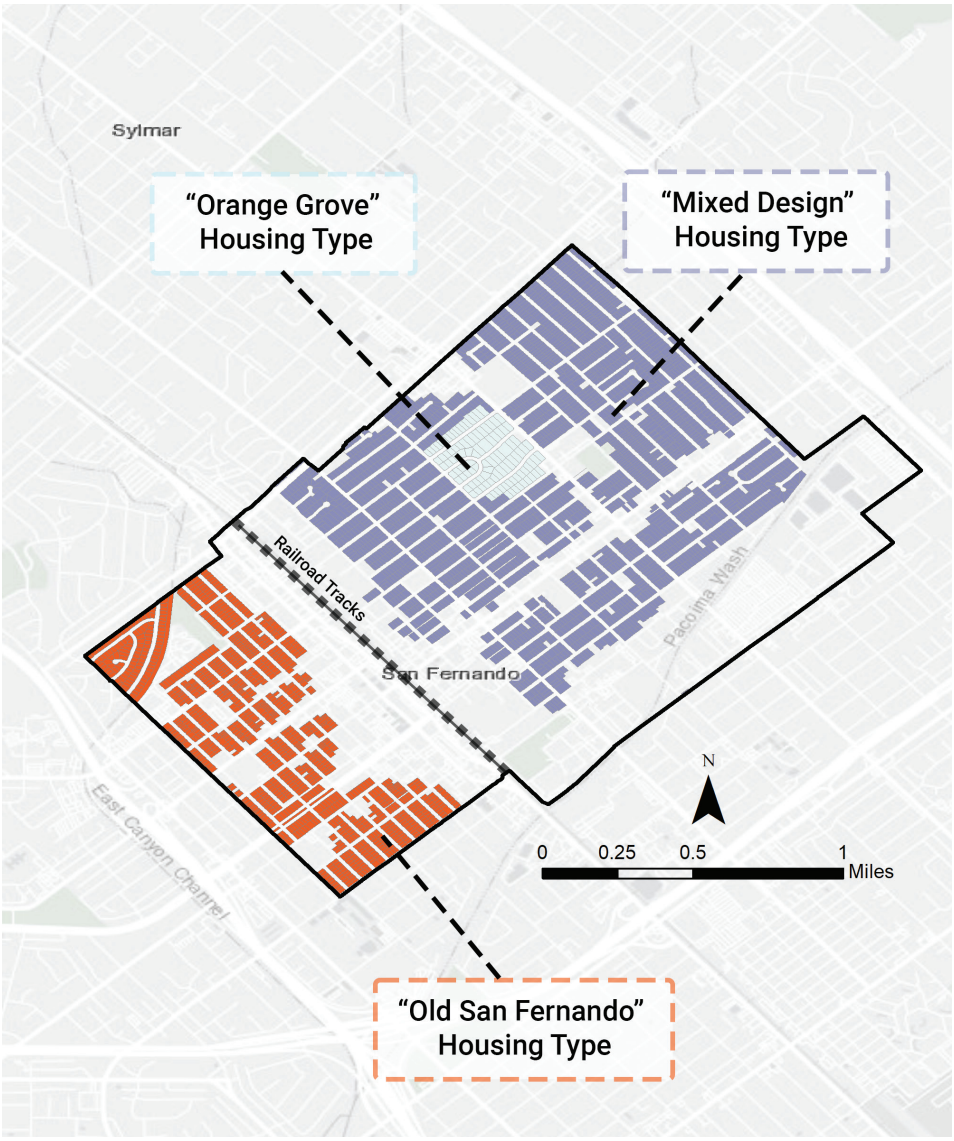
Latin Name	Common Name	Plant Type	Wulcos Rating
Cinnamomum camphora	Camphor Tree	Canopy Tree	Moderate
Pistachia chinensis	Chinese Pistache	Canopy Tree	Moderate
Platanus acerifolia	London Plane Tree	Canopy Tree	Not Rated
Platanus racemosa	California Sycamore	Canopy Tree	Moderate
Quercus agrifolia	Coast Live Oak	Canopy Tree	Low
Quercus engelmanni	Engelmann Oak	Canopy Tree	Not Rated
Tipuana tipu	Tipu Tree	Canopy Tree	Moderate
Ulmus parvifolia	Chinese Evergreen Elm	Canopy Tree	Low
Agonis fluxuosa	Peppermint Tree	Specimen trees	Low
Eucalyptus ssp	Eucalyptus	Specimen trees	Moderate
Ginkgo biloba	Maidenhair Tree	Specimen trees	Not Rated
Olea europaea	Olive Tree	Specimen trees	Not Rated
Pinus eldarica	Afghan Pine	Specimen trees	Not Rated
Schinus molle	California Pepper	Specimen trees	Low
Albizia julibrissin 'Rosa'	Silk Tree	Flowering trees	Low
Cassia leptophylla	Gold Medallion Tree	Flowering trees	Moderate
Cercis occidentalis	Western Redbud	Flowering trees	Low
Jacaranda mimosifolia	Jacaranda	Flowering trees	Moderate
Koelreuteria bipinnata	Chinese Flame Tree	Flowering trees	Moderate
Koelreuteria paniculata	Goldenrain Tree	Flowering trees	Not Rated
Lagerstroemia indica	Crape Myrtle-multi	Flowering trees	Not Rated
Malus 'Prairiefire'	Prairiefire Crabapple	Flowering trees	Not Rated
Pyrus kawakamii	Evergreen Pear	Flowering trees	Moderate
Prunus ssp	Prunus	Flowering trees	Very Low
Tabebuia impetiginosa	Pink Trumpet Tree	Flowering trees	Not Rated
Archontophoenix cumminghamiana	King Palm	Palm trees	Moderate
Phoenix spp.	Date Palm	Palm trees	Low
Washingtonia filifera	California Fan Palm	Palm trees	Low
Washingtonia robusta	Mexican Fan Palm	Palm trees	Low
Azalea ssp	Azalea	Shrubs	Not Rated
Arbutus unedo	Strawberry Tree	Shrubs	Low
Alyogyne heugelii & cvs	Blue Hibiscus	Shrubs	Low
Bamboo ssp.	Bamboo	Shrubs	Moderate
Buddleia davidii	Butterfly Bush	Shrubs	Not Rated
Camellia ssp	Camellia	Shrubs	Moderate
Cassia splendida	Golden Wonder Senna	Shrubs	Not Rated
Ceanothus var	Wild Lilac	Shrubs	Not Rated
Cistus purpureus	Orchid Rockrose	Shrubs	Not Rated
Cocculus laurifolius	Cocculus laurifolius	Shrubs	Moderate

Latin Name	Common Name	Plant Type	Wulcos Rating
Cotoneaster ssp	Cotoneaster	Shrubs	Not Rated
Echium fastuosum	Pride of Madeira	Shrubs	Low
Escallonia ssp.	Escallonia	Shrubs	Moderate
Euphorbia characias 'Wulfenii'	Euphorbia characias 'Wulfenii'	Shrubs	Not Rated
Euphorbia rigida	Euphorbia rigida	Shrubs	Low
Gardenia ssp	Gardenia	Shrubs	Moderate
Grevillia ssp.	Grevillia	Shrubs	Not Rated
Hibiscus rosa-sinensis	Chinese Hibiscus	Shrubs	Moderate
Myrtus communis	True Myrtle	Shrubs	Moderate
Osmanthus ssp	Osmanthus	Shrubs	Not Rated
Penstemon spectabilis	Showy Penstemon	Shrubs	Not Rated
Podocarpus ssp.	Podocarpus	Shrubs	Not Rated
Prunus caroliniana	Carolina Laurel Cherry	Shrubs	Moderate
Pyracantha ssp.	Firethorn	Shrubs	Moderate
Rosa ssp.	Rose	Shrubs	Moderate
Arctostaphylos hookeri	Monterey Manzanita	Groundcovers	Not Rated
Ceanothus griseus horizontalis	Carmel Creeper	Groundcovers	Moderate
Cistus spp.	Rockrose	Groundcovers	Very Low
Cotoneaster dammeri 'Lowfast'	Cotoneaster dammeri 'Lowfast'	Groundcovers	Not Rated
Lantana spp	Lantana	Groundcovers	Low
Lavandula spp.	Lavender	Groundcovers	Low
Liriope muscari	Big Blue Lily Turf	Groundcovers	Not Rated
Mahonia repens	Creeping Mahonia	Groundcovers	Low
Pelargonium ssp.	Pelatum	Groundcovers	Not Rated
Rosmarinus officinalis	Rosemary	Groundcovers	Moderate
Salvia spp.	Sage	Groundcovers	Moderate
Santolina chamaecyparissus	Lavender Cotton	Groundcovers	Low
Trachelospermum jasminoides	Star Jasmine	Groundcovers	Moderate
Verbena ssp	Verbena	Groundcovers	Moderate
Bougainvillea ssp.	Bougainvillea	Vines	Not Rated
Distictis buccinatoria	Blood-Red Trumpet Vine	Vines	Not Rated
Distictis laxiflora	Vanilla Trumpet Vine	Vines	Moderate
Distictis 'Rivers'	Royal Trumpet Vine	Vines	Moderate
Jasminum polyanthum	Jasmine	Vines	Moderate
Pyrostegia venusta	Flame Vine	Vines	Moderate
Rosa cultivars	Rose	Vines	Low
Thunbergia alata	Black-eyed Susan Vine	Vines	Not Rated
Aloe spp.	Aloe	Low accent plants	Not Rated
Hemerocallis hybrids	Daylily	Low accent plants	Not Rated
Iris spp.	Iris	Low accent plants	Moderate
Kniphofia uvaria	Red-hot Poker	Low accent plants	Not Rated

City of San Fernando Preferred Plant List
Data Source: City of San Fernando Design Guidelines, Volume 1: Single-Family Residential

RESIDENTIAL TYPOLOGIES

As we consider water use in the residential landscape, we identified different front yard types found within the City. During field observations and meetings with our community partner, three residential types were established by observing unique front yard characteristics, household income, and lot size. The “Orange Grove” and “Mixed Design” housing type reside in the census tract neighborhoods with the highest household income in San Fernando, $55,000 to $65,000, North of the train tracks. The “Old San Fernando” housing type is in the census tract with an average household income of $35,000 to $45,000 and falls south of the train tracks. Each has unique features that display the substantial existing cultural values of San Fernando.



San Fernando Residential Typologies Map
Source: ESRI, HERE Garmin, 2022.

RESIDENTIAL SURVEY

The team decided that the best way to further our understanding of the residential typologies was to investigate the three areas of interest within San Fernando to learn more about the average home.

Analysis was done in ArcGIS using Los Angeles County's assessor map (Hoffman, 2020) to study each typology and find information like average lot length and width, average 1st floor building footprint, and average angle of the lots, but we still wanted a more detailed picture, one that included average setbacks so we knew where to place the average home on the lot and other factors that could help us gain a more complete understanding of the homes in the community, finding a survey of single family homes to be the best way to paint that picture.

DATA COLLECTION

To gain insights for future design decisions that would apply to as much of the community as possible, we collected specific information regarding the front yard typologies.

1. **Front yard setback.** Finding the setback distance of the front yards would allow us to place the buildings at the correct location in our model.

2. **Existence of parkway.** This research would allow us to understand if parkways (a strip of landscape between the sidewalk and the street) should be included in the design.

3. **Driveway type.** Based on our field research, we concluded there were three driveway types in the city, driveways running through the side yard to the back of the property, attached garages and what we categorized as "other."

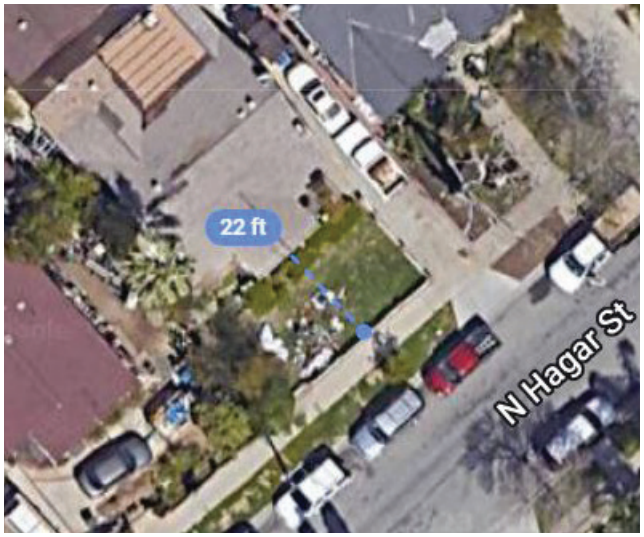
4. **Existence of lawn.** Because grass lawns in are a major component of this project, we focused on their existence to better understand existing conditions of the three typologies.

5. **Existence of front yard fences or walls.** Through our field visits and research on the culture of San Fernando we found that many homes had front yard fences or walls. We wanted to understand their prevalence and distribution of the three typologies.

6. **Corner lot.** Because corner lots sit differently on the property, we wanted to understand how often this applied to single family homes.

We were able to conduct a survey of each of the three typologies via Google My Maps to scan for the existence of the factors listed above and to measure the front yard setbacks. This, combine with information derived from ArcGIS, was used to create a representation an average home for each typology.

Sample sizes were determined based on the number of homes within each typology area in order to produce results with +/- 5% accuracy with 95% confidence in the Old San Fernando and Mixed Design areas. Because in the Orange Grove area we were dealing with a much smaller sample size, all of the homes of that type were surveyed. This left us with a total of 724 single family homes that we surveyed within the city of San Fernando.



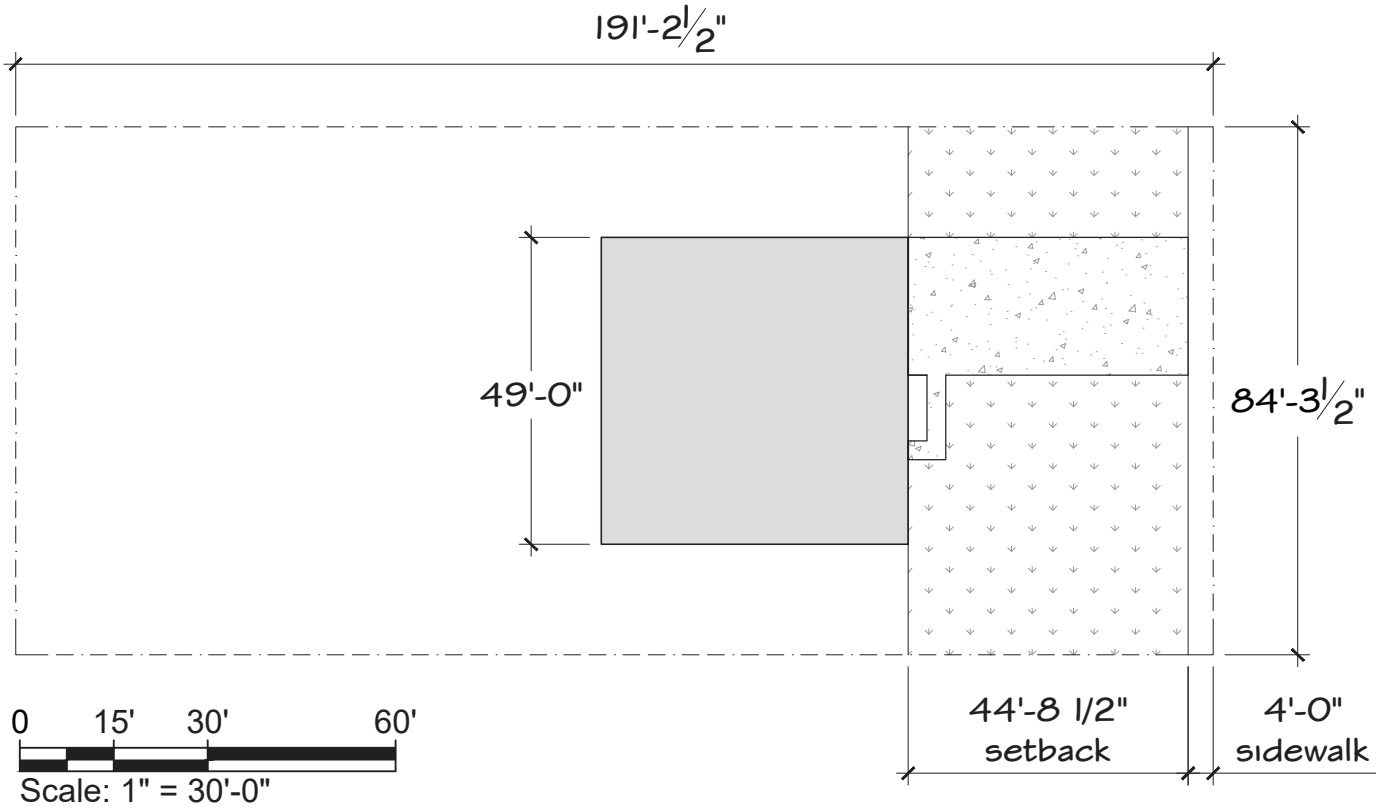
Front Yard Setback Measurement, Google MyMaps, 2022

Orange Grove Housing Type Map
Source: ESRI, HERE Garmin, 2022.

ORANGE GROVE HOUSING TYPE

The “Orange Grove” housing type is located in the center of San Fernando in the “Orange Grove” neighborhood. The Orange Grove type is positioned north of the train tracks, which indicates an increase in household income. This area spans the blocks of Orange Grove Avenue, Huntington Street, Fermoore Street, and Workman Street, between 5th Street and Glenoaks Blvd. During our field observations, we noticed homes were generally much larger, well-maintained, and indicative of a traditional American single family suburban home. There was a large presence of houses with manicured lawns, long setbacks from the sidewalk, and fruit trees plantings lining the streets. A noticeable consistency within the housing type is the absence of fencing in front yards, which gives a very open and vast feeling to neighborhood.

Orange Grove Front Yard in San Fernando, CA.
Photo by Atticus Lee.



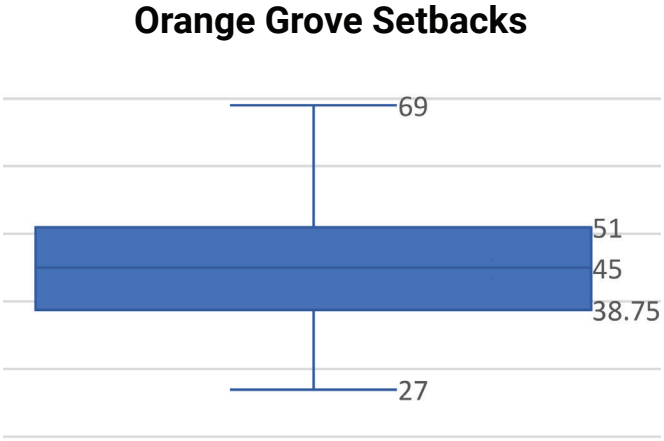
Orange Grove Survey Results Visualized in AutoCad

ORANGE GROVE SURVEY

- Average setback 44'-8 ½"
- 57% had attached garage
- 95% had lawns
- 88% had no fence
- 57% had no parkway
- 11% were corner lots

This typology had the largest home footprint lot size, and set back, especially when an attached garage was added to the 1st floor footprint. Nearly all of the properties had lawns and most did not have a fence or a parkway in the front.

Our analysis led us to believe our project could have a major impact on this typology based on high water use, the larger amount of space, and their proclivity toward ornamental gardens.



Orange Grove Setback Standard Deviation, Box & Whiskers Chart

Using AutoCAD, we created a 2d representation in order to visualize the distribution of space on three different single family homes of each typology within San Fernando.

Mixed Design Housing Type Map
Source: ESRI, HERE Garmin, 2022.

MIXED DESIGN HOUSING TYPE

The “Mixed Design” housing type is comprised of the neighborhoods surrounding the perimeter of “Orange Grove” type but stops at the north end of the train tracks. This housing type neighbors the commercial and industrial districts of San Fernando. During our field observations, we noted lot sizes shrinking in comparison to “Orange Grove” type. In terms of front yards, a mixture of design styles populated the “Mixed Design” type, from design yards and lawns to a mixture of hardscape and soft scape and dirt yards. As this housing type is geographically the largest zone in our residential typology, this level of variance was expected. However, the relative lot size felt consistent during our field trips and meetings. A prominent component of the “Mixed Design” was the relative presence of front yard fencing opposed to the lack of fencing seen in “Orange Grove”.

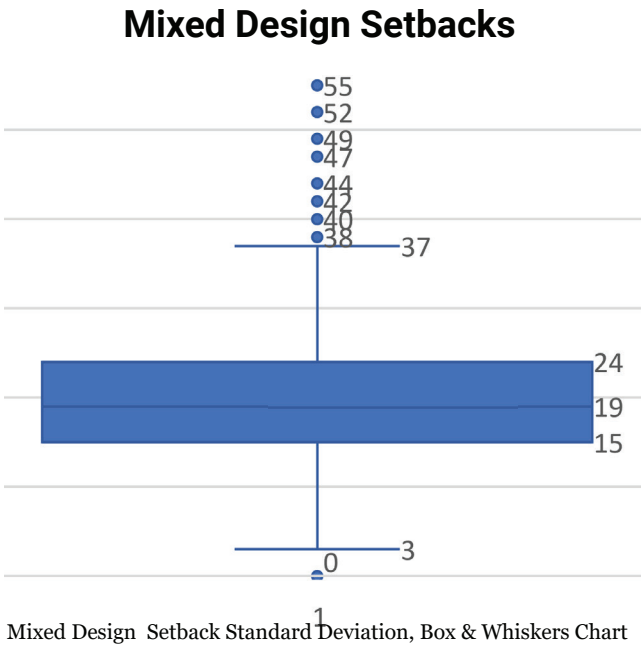
Mixed Design Front Yard in San Fernando, CA.
Photo by Atticus Lee.

MIXED DESIGN SURVEY

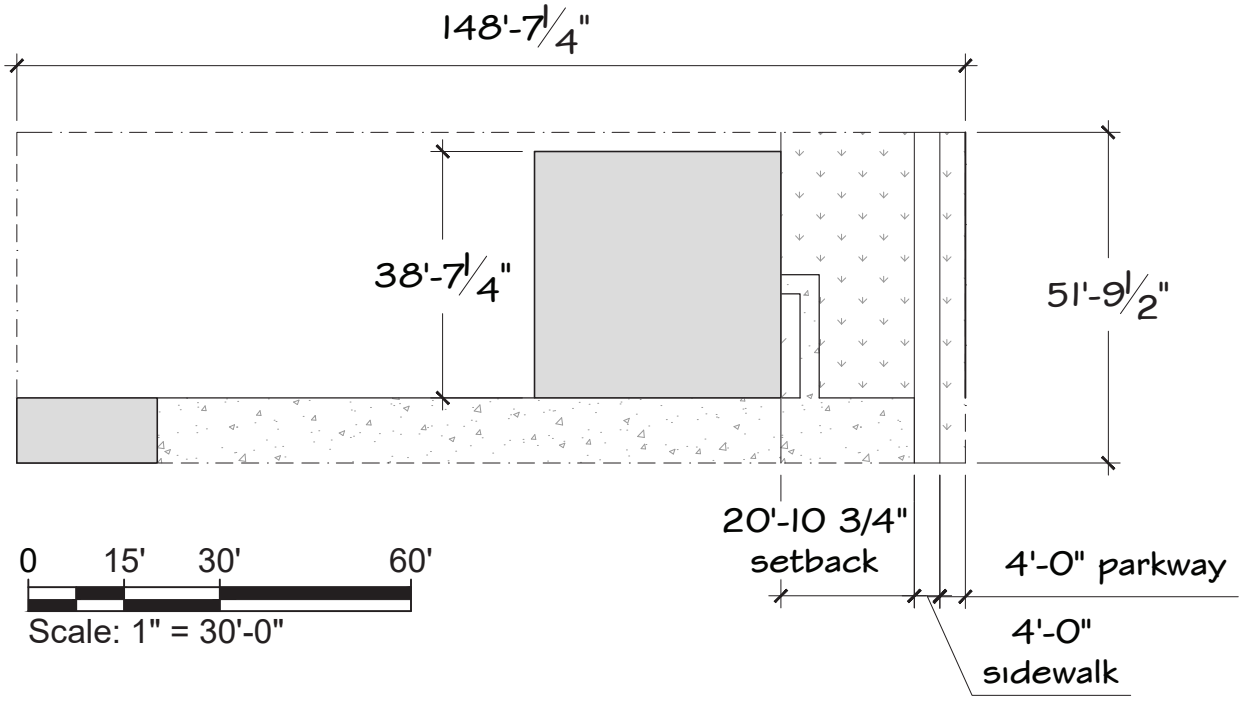
- Average setback 20’-10 3/4”
- 44% had a side yard driveway, 43% had an attached garage
- 74% had a lawn
- 82% had a wall or fence
- 92% had a parkway
- 16% were corner lots

Results showed a lot size and home size slightly larger than Old San Fernando and much smaller than Orange Grove. There was near equal distribution of homes with side yard and attached driveways. Unlike Orange Grove, a large number of properties had a wall or fence and a parkway.

These results highlight the importance of considering designing a space with a fenced front yard. The high prevalence of parkways also provides an opportunity for planting, canopy, and catching stormwater runoff from the property and the adjacent street, which could help compensate for a smaller plantable area do to smaller setback,



Mixed Design Setback Standard Deviation, Box & Whiskers Chart



Mixed Design Survey Results Visualized in AutoCad

Old San Fernando Housing Type Map
Source: ESRI, HERE Garmin, 2022.

OLD SAN FERNANDO HOUSING TYPE

The "Old San Fernando" housing type is located south of the train tracks and commercial district in San Fernando. This area was described as the "old" San Fernando by our community partner, which is evidenced by the older housing stock and the presence of elderly residents. During our field observations we noticed a smaller lot size, more potted plants, an abundance of hardscape, and ample outdoor seating in front yards. Green space and lawns were not as prominent in the "Old San Fernando" type compared to the front yards in both the "Orange Grove" and Mixed Design" neighborhoods. The "Old San Fernando" housing type felt the most active, as we noticed residents using their front yard as a living room, whether they were relaxing, recreating, or gathering. These field observations align with the programming elements discussed in Latino Urbanism.

Old San Fernando Front Yard in San Fernando, CA.
Photo by Atticus Lee.

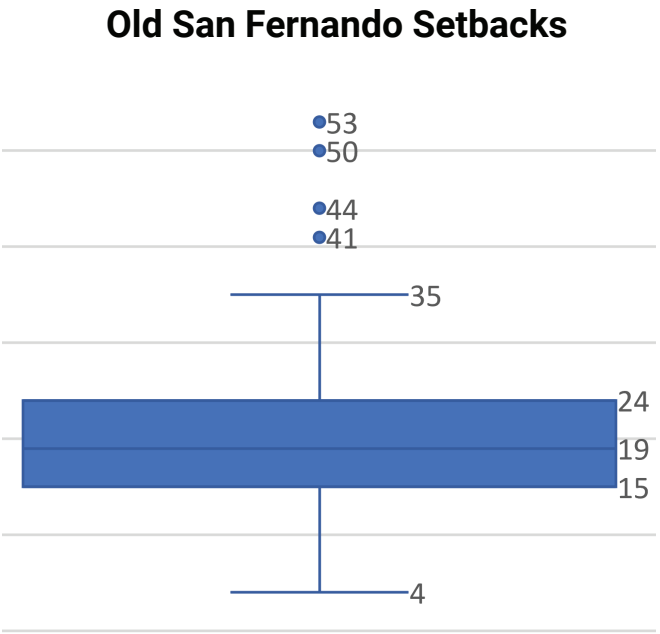
OLD SAN FERNANDO SURVEY

- Average setback 19'-8 ½"
- 44% had side yard driveway, 38% attached garage 18% other
- 79 % had a lawn
- had a wall or fence
- 92% had a parkway
- 14% were corner lots

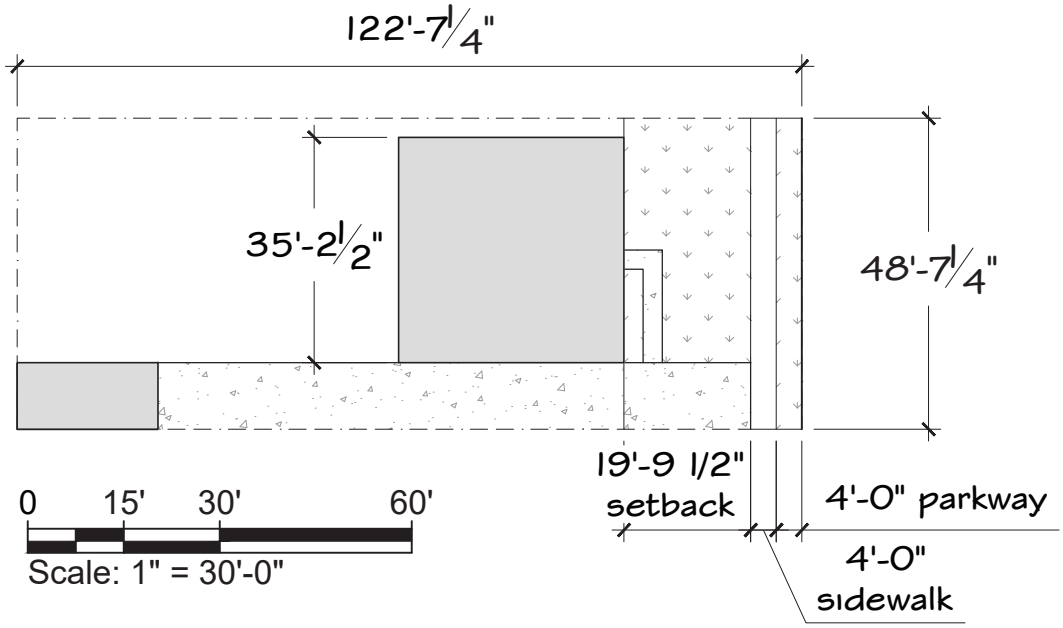
Results in Old San Fernando were similar to the Mixed Design, with a high prevalence of wall or fences, parkways, and lawns. This area had slightly smaller lot size, home footprint, and setback than the Mixed Design area.

The most notable result was the 18% other concerning the driveway type, as a higher percentage of homes within this typology have no garage and may be the front yard for parking.

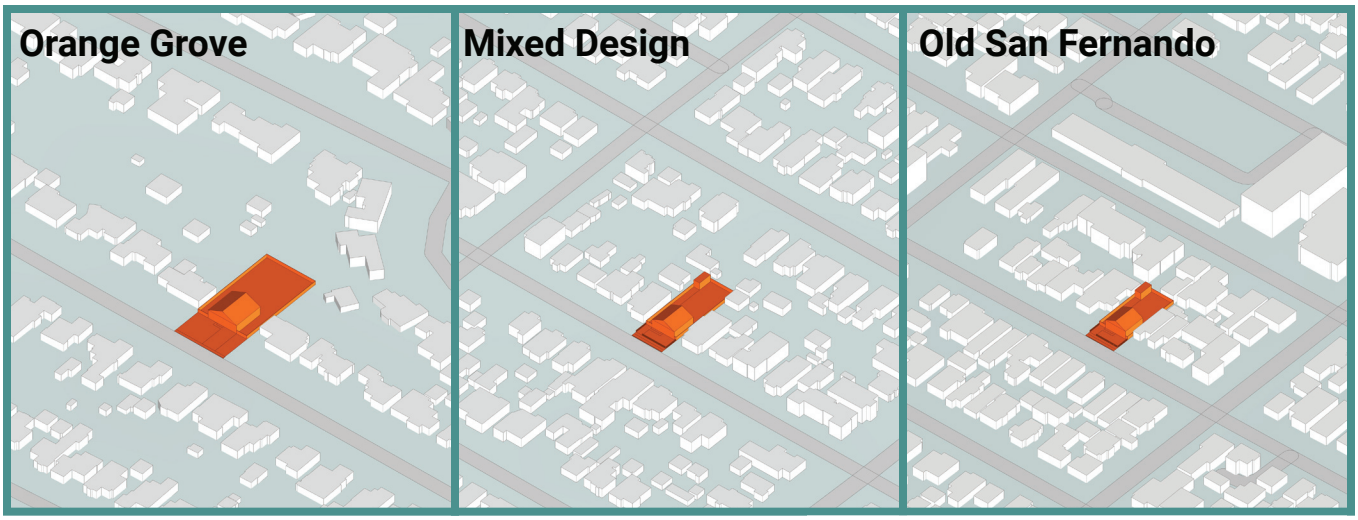
This area will pose a challenge for infiltration because of use of the front yard as a living room and/or parking area, however this could be mitigated by the high prevalence of parkways.



Old San Fernando Setback Standard Deviation, Box & Whiskers



Old San Fernando Survey Results Visualized in AutoCad



Survey Results Visualized in Rhino.
Context Source: CAD Mapper, 2023.

ANALYSIS

Once we built the 2d design of the average single family home in AutoCAD, we were able to further our understanding and confirm our results by building out 3D lots in the program Rhino 3D and placing them in their respective areas by finding neighborhood context in via CAD Mapper.

We were able to confirm, anecdotally, that our survey produced accurate results by looking at how each of our models fit into the neighborhood context. The models fit well with the setback in the neighborhoods and the lots fit in with the surrounding lot sizes, leading us to believe that our results were relatively accurate and would provide a foundation for future analysis and could be used by residents to approximate a high percentage of homes within San Fernando.

Building the model with this information also gave us the ability to perform more detailed analyses that could influence future design decisions.

RUNOFF ESTIMATES

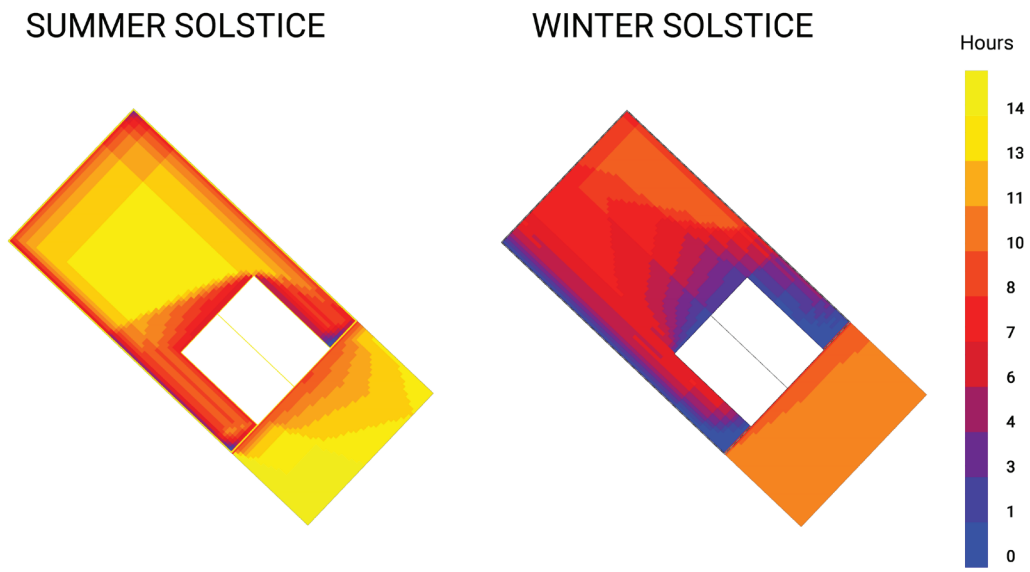
Using the estimates from our modeled single family lots, we took half of the roof and the square footage of the front yards to do some simple runoff modeling on each of the models.

Using “Schuler’s Shortcut Method” (Dines & Brown, 2002) we found a 1” rain event would generate 596 cubic feet of runoff in Orange Grove, 219 cubic feet in Mixed Design and 190 cubic feet in Old San Fernando.

The larger roof size and larger setback of Orange Grove caused a substantially larger amount of runoff than in the other areas.

This amount of runoff would be equivalent to a 99’ long 3’ deep 2’ wide swale in Orange Grove, a 37’x3’x2’ swale in the Mixed Design area and a 32’ long, 3’ wide, 2’ deep swale in Old San Fernando, however this poses a problem in each of the areas. In Orange Grove, the lot is not 99’ long, therefore other measures, like rain barrels, cisterns or other runoff capturing methods would need to be implemented to capture all of the water from a 1” event.

In the Mixed Design area and Old San Fernando, the use of the outdoor space as a living room and presence of walls and hardscape may limit opportunities for swales and present design challenges when it comes to retaining water. However the high instance of lawns within all three of our typologies, lead us to believe that there is a large amount of space to create meaningful design interventions in any area of the city.



Orange Grove Sun Hours Generated with Ladybug and Grasshopper in Rhino

ORANGE GROVE NEIGHBORHOOD SE LOT

SUN SHADE ANALYSIS

Working 3D models also gave us the ability to do environmental modeling using Energy Plus data in the Ladybug plugin in Grasshopper. Each typology was analyzed for sun and shade at the winter and summer solstice to understand how the sunlight hours were distributed across the three typologies at the different angles the lots most commonly appear throughout the city, one example of which is above.

Winter and summer solstice is provided as the light distribution in summer may be helpful for certain plant types, such as a more tropical palette, whereas winter sun can be used for native or Mediterranean palette.

This analysis will be used in the design to help the team understand where to place the different hydrozones, as required by MWELO and help residents understand the distribution of light over their space and how to design for plant health.

IMPLICATIONS FOR DESIGN

These initial analyses can help inform our design process and also provide some insight into evaluating the impact of the designs once completed.

For instance, once we better understand the amount of planting, hardscape and retention elements in our design, we will be able to perform more detailed and accurate estimate of runoff. Likewise, once we understand where trees may be placed on the sight or where our building sits within the surrounding context of the neighborhood, we will be able to better understand the distribution of sun and shade.

CONCLUSION

Our group identified opportunities and constraints as we aimed to fulfill the city of San Fernando's request for a prescriptive compliance residential drought tolerant design that meets state guidelines while integrating cultural significance. Themes of rich culture, the prominence of single-family households with analogous front yards, stormwater management potential, and educational endeavors were found in the list of opportunities. On the other hand, themes of ongoing drought concerns, limited ground water levels, existing parcels out of compliance, and cost gaps were seen as prominent constraints in our work. These opportunities and constraints act as guiding blocks to shape the vision of a water conscious San Fernando.

CONSTRAINTS

1. Drought is a prevalent concern in the present and future environmental conditions of San Fernando.

2. San Fernando has a set amount of water that can be pumped in order to keep the groundwater table sustainable.

3. Existing residential landscapes are out of compliance with state residential water use guidelines (MWELO).

4. Current residents build without permits and are not notified or cited when they make changes to their yards that are out of compliance with state and local guidelines.

5. The impacted socioeconomic status of San Fernando residents leads to cost gaps in implementing drought tolerant landscapes.

6. Existing single family homes without front yard lawns use hardscape or artificial turf, which limits the ecological benefits of lawn removal.

7. Current San Fernando homes do not implement best practices for low-water use landscapes including irrigation, planting, mulching and low impact development.

OPPORTUNITIES

1. The high home ownership rates and prevalence of single family homes with front yards in San Fernando enables this project to influence a large amount of residential community facing space.

2. The relative similarities between homes in the community allows us to create templates that could assist a large percentage of residents with compliant designs.

3. San Fernando has a distinct and rich culture that can help guide our design process and ensure that the unique identity of the community remains intact.

4. The large percentage of single family homes fronted by existing residential parkways provides an opportunity to mitigate runoff with low impact stormwater systems.

5. Existing rebate and grant programs could offer San Fernando residents financial assistance to meet City guidelines.

6. Educational opportunities about low-water use best practices and design could guide residents through the prescriptive compliance process.

CHAPTER 2

COMMUNITY CONCEPT

INTRODUCTION

Taking into consideration the goals of our community partners at the City of San Fernando and our subsequent research, we derived a list of goals, objectives, and actions in order increase water use efficiency.

- **Goals**

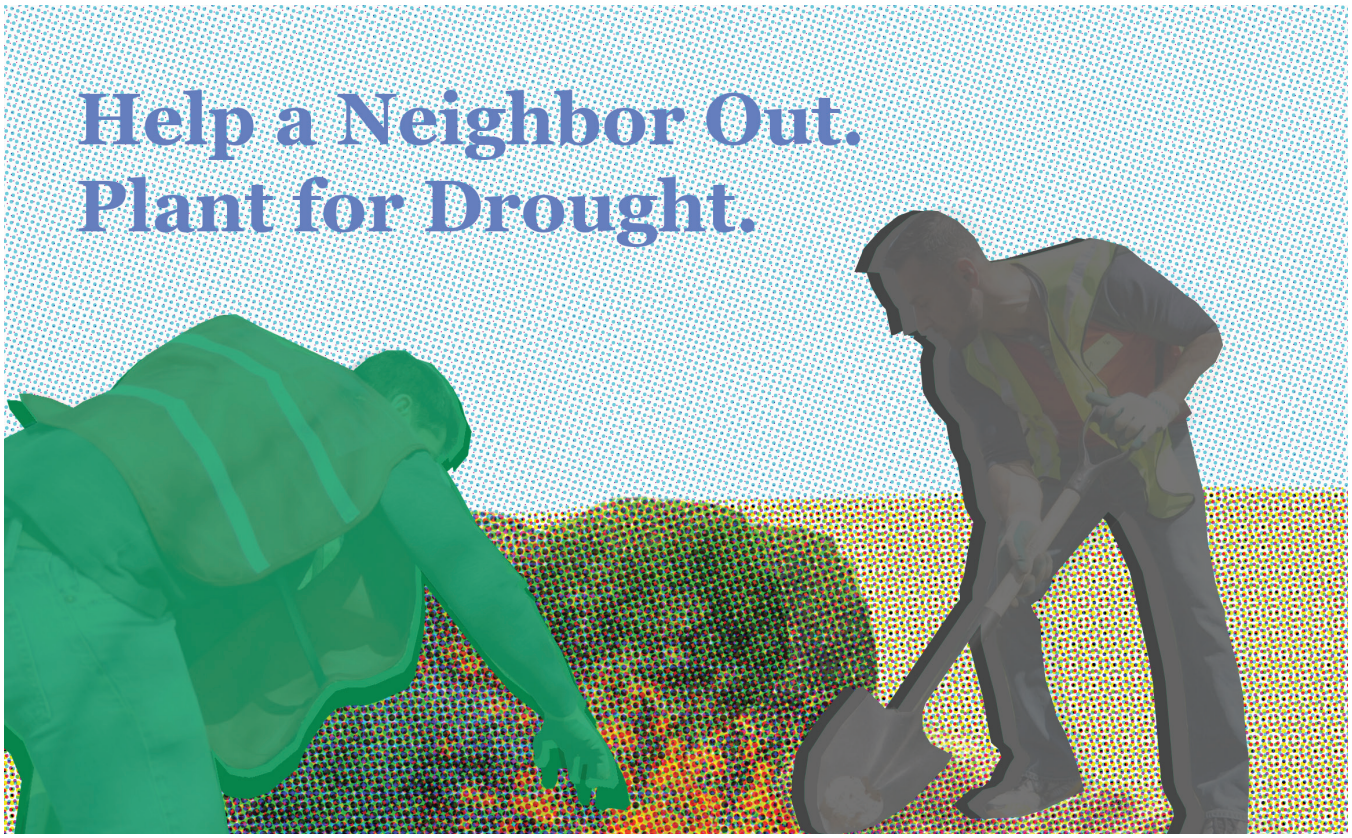
  These were identified by looking at the overall vision of the project, creating drought tolerant, MWELO compliant landscapes that reflect the culture of San Fernando, and what the major and overarching means of accomplishing those goals.

- **Objectives**

  Objectives were determined by analyzing necessary components of accomplishing our identified goals to ensure that there were clear means to achieve our desired outcomes.

- **Actions**

  The final piece to the puzzle, actions were identified as direct and clear items that could be addressed in the design process or by the city in order to achieve each of the objectives.



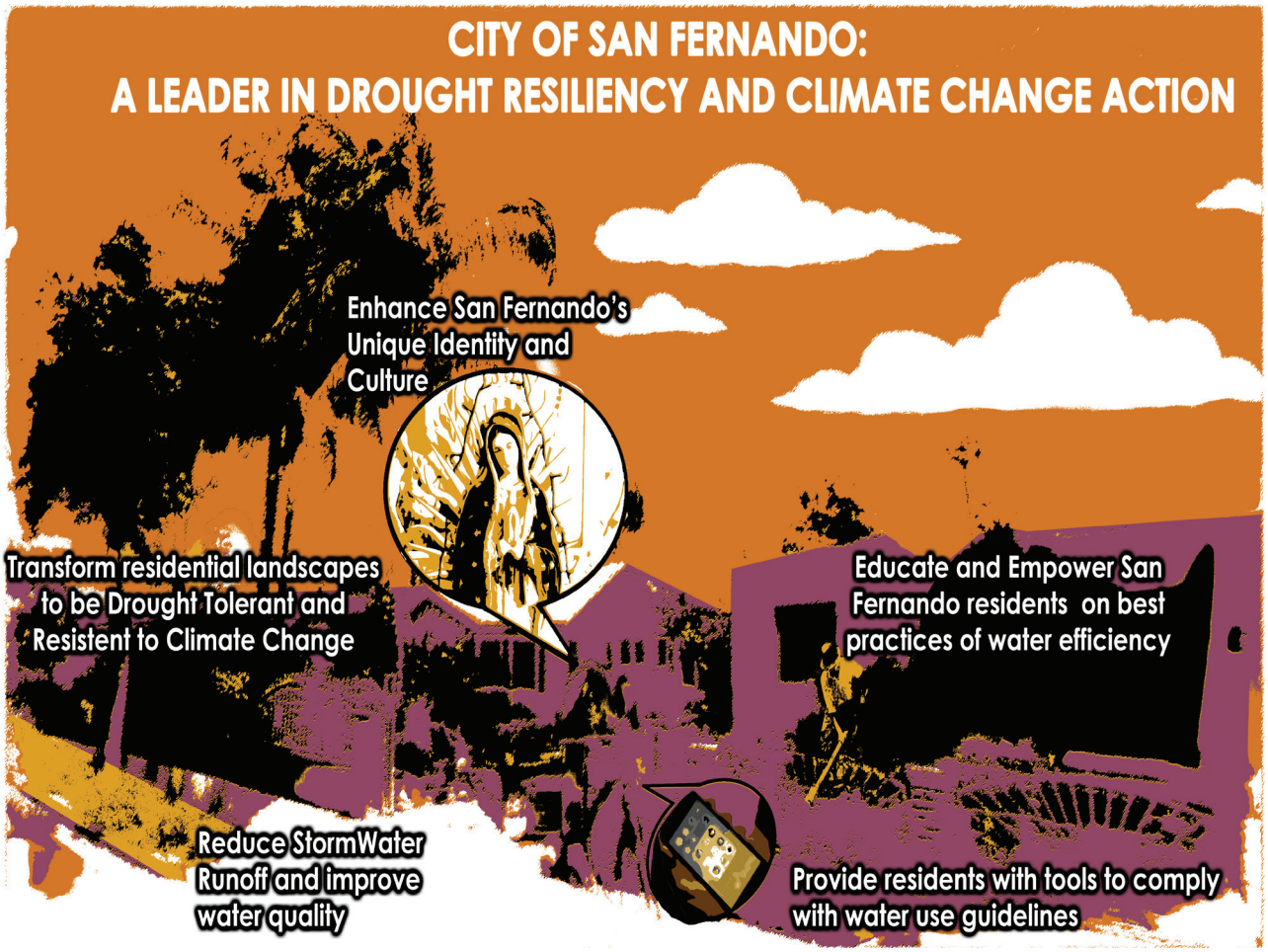
Educational Graphic
Context Source: Atticus Lee

VISION STATEMENT

Our vision is for San Fernando to be a leader in drought resiliency and climate change action by providing the community with tools, concepts and educational resources to transform residential neighborhoods into water efficient landscapes. Our work aims to guide the city toward continued compliance with state guidelines while preserving San Fernando's rich cultural identity.

GOALS

1. Reduce residential water use to address drought concerns and a changing climate.
2. Provide residents and administrators of San Fernando with tools to comply with California Water Use Guidelines.
3. Enhance the identity of San Fernando inspired by its unique culture.
4. Manage residential stormwater runoff to improve water quality and reduce runoff quantity.
5. Educate and empower San Fernando residents to implement best practices of water efficiency.



Vision Graphic
Context Source: Clarence Vong

GOALS, OBJECTIVES, & ACTIONS

GOAL 1 Reduce residential water use to address drought concerns and a changing climate.

Objectives	Actions
#1 **Prescribe the use of drought tolerant and climate resistant plant species in residential landscapes**	A. Provide prescriptive front yard designs for different types of residential landscapes that prioritize drought tolerant and climate resistant species. B. Group plants in prescriptive designs based on water needs to reduce irrigation demand. C. Approve drought tolerant and climate resistant plant lists for use by residents.
#2 **Reduce annual residential landscape water use by an average of 17.7 gallons per square foot.**	A. Create an easy tool for calculating proposed landscape water usage. B. use grass or artificial turf on a limited basis, only for play areas or small gathering spaces. C. Promote drip irrigation for most of residential landscapes. D. Promote rainwater harvesting at homes to reduce city water use.
#3 **Provide flexibility and diversity for drought tolerant and climate resistant front yard designs.**	A. Provide multiple prototype designs for each zone to illustrate the different conditions, such as orientation, corner lots, different front yard uses, etc. B. Provide residents with plant layout templates for planting plans. C. Provide residents with tools and resources to propose their own designs and easily evaluate them for compliance.

GOAL 2 Provide residents and administrators of San Fernando with tools to comply with California Water Use Guidelines.

Objectives	Actions
#1 **Provide prototypical designs as examples and inspirations for residents in different situations.**	A. Identify common typologies of residential sites in Type 1 - Type 3. B. Generate designs for each typology to illustrate compliance with MWELO while accommodating different use and site conditions. C. Provide calculations for each design to demonstrate MWELO compliance. D. Provide typical construction details. E. Provide pre-designed modular plot plans for residents
#2 **Provide an easy to use spreadsheet calculator for residents and staff to assess compliance for proposed designs.**	A. Identify water consumption target for residential landscapes in the calculator. B. Incorporate WUCOLS data on water needs of plants to model consumption. C. Provide clear indicators for users when their proposed design is in compliance or not D. Provide a list of plant in the spreadsheet with images corresponding to the plant name.
#3 **Design tools and resources for inexperienced users and make them easily accessible.**	A. Provide a link to toolkit with sample designs on city's website. B. Provide a "How To" guidebook and instructions on using the toolkits and calculator. C. Consider app development for easy access and usage for everyone in the future. D. City to translate tools and resources in Spanish.

GOAL 3 Enhance the identity of San Fernando inspired by its unique culture.

Objectives	Actions
#1 **Encourage front yard use and provide a sense of place within the community.**	A. Create design options to encourage residents to use their front yard as an extension of their living room for activities such as gathering, playing, and sitting. B. Provide ways residents can better utilize their front yard space in supporting and preserving their unique culture. C. Design front yard spaces to maintain visibility and connection with the street and sidewalk, to promote interactions with neighbors.
#2 **Incorporate culturally appropriate planting as well as plants native to San Fernando.**	A. Produce a list of drought tolerant and climate resistant cooking herbs,edible plants and fruit trees. B. Provide a list of California native and non-native plants regionally appropriate for the City of San Fernando. C. Maintain a process for adding species to approved plant lists, tools are resources, as requested by community members.
#3 **Develop a process of revealing cultural identities of residents in San Fernando.**	A. Conduct community engagements to better understand the needs and wants of the residents of the city. B. Develop a workshop or an activity for residents can use as inspiration in their front yard spaces. C. Provide toolkit to turn their front yard to drought tolerant and culturally unique landscape.

GOAL 4 Manage residential stormwater runoff to improve water quality and reduce runoff quantity.

Objectives	Actions
#1 **Capture the first inch of rainwater onsite for treatment and infiltration, resulting in the storage of over one million cubic gallons.**	A. Provide opportunities for storage of water for future use like rain barrels, cisterns. B. Design for infiltration of stormwater with rain gardens, swales and drywells. C. Direct roof water runoff to storage devices, plantings, swales, and gardens beds instead of streets. D. Encourage permeable paving to help infiltrate stormwater. E. Use mulch and soil amendments to allow for infiltration and to increase storage capacity.
#2 **Clean stormwater runoff.**	A. Filter roof and street water through rocks, grass, mulch and other planting. B. Capture, hold and slow down the movement of water before it runs to the street to prevent pollution.
#3 **Intercept and infiltrate stormwater runoff through parkway design.**	A. Use curb cuts to channel water from adjacent streets into parkways. B. Incorporate drywells, swales, and rain gardens and detention basins in parkways to infiltrate water. C. Provide information about how to create and maintain drywells, swales, rain gardens, and detention basins.

GOAL 5 Educate and empower San Fernando residents to implement best practices of water efficiency

Objectives	Actions
#1 **Provide tools and resources that enable residents to understand the importance of water efficiency and assists their efforts to reduce water consumption.**	A. Educate residents on best low water use practices through prescriptive designs. B. Encourage residents to share knowledge and labor to implement designs. C. Inform residents on drought tolerant design through interactive community workshops. D. Provide a drought tolerant plant list and palettes on the city website.
#2 **Increase awareness and access to assistances programs and resources to help pay for landscape changes.**	A. Provide a drought tolerant plant list and palettes on the city website. B. Produce list of local nurseries and free gardening & landscape resources. C. Provide external links to existing governmental rebate and grant programs.
#3 **Support community exploration and development of unique community identity.**	A. Hold community workshops that engage residents with the San Fernando landscape. B. Inform residents on Latino Urbanism and drought tolerant design through community talks and interactive workshops.
#4 **Make all resources available in English and Spanish language.**	A. Produce informational mailable flyers with links to online city resources. B. Ensure access to MWELO resources on the city website. C. Provide external links to existing governmental rebate and grant programs.

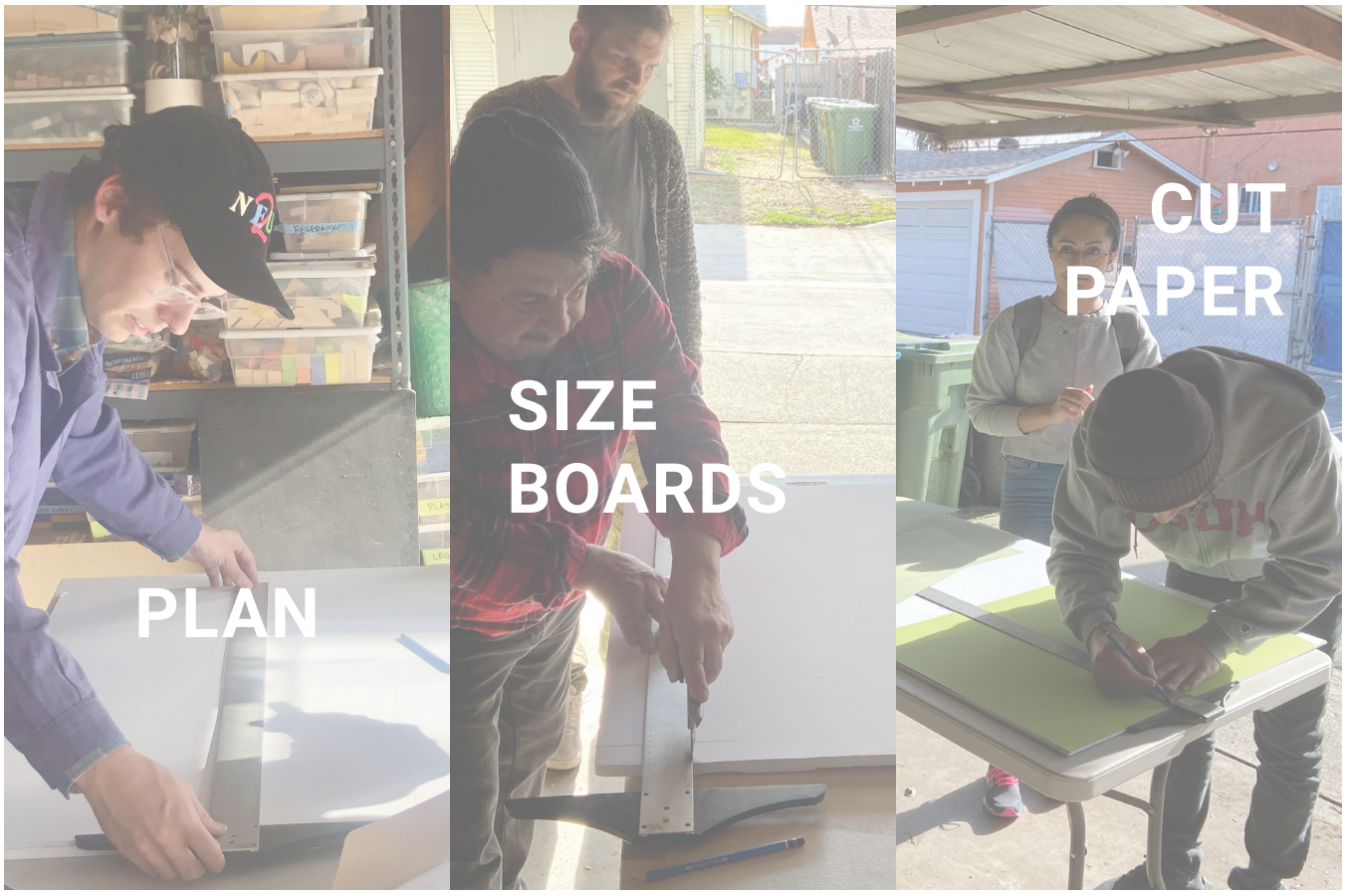
COMMUNITY ENGAGEMENT

Community engagement is a crucial factor when designing vernacular space for residents of San Fernando. During our analysis phase we investigated Latino Urbanism and formed a relationship with James Rojas. James Rojas is a prominent researcher in Latino Urbanism and a strong advocate for facilitating community engagement in the form of "place it" workshops as described in his book *Dream, Play, Build* (Rojas & Kamp, 2022). Our group had the opportunity to meet James and develop an educational streetscape model based on the goals and objectives of the project. James guided the process of building a physical model that can be easily transported to the location of a community engagement meeting in San Fernando.

MODEL BUILDING

During the model building process with James, we had to consider the audience, context, areas of variance, and the streetscape elements of the typical San Fernando street. As the focus of this exercise is to engage residents in the imagination of what their neighborhood could look like, we decided on a ratio of 1/3 streetscape elements like roads, bike lanes, sidewalks, and parkways, and 2/3 front yard space.

1. **Plan the Street**
2. **Size the Boards**
3. **Cut Materials**
4. **Glue Materials**
5. **Layout & Assemble**



Process of Model Making with James Rojas
Content Source: Atticus Lee

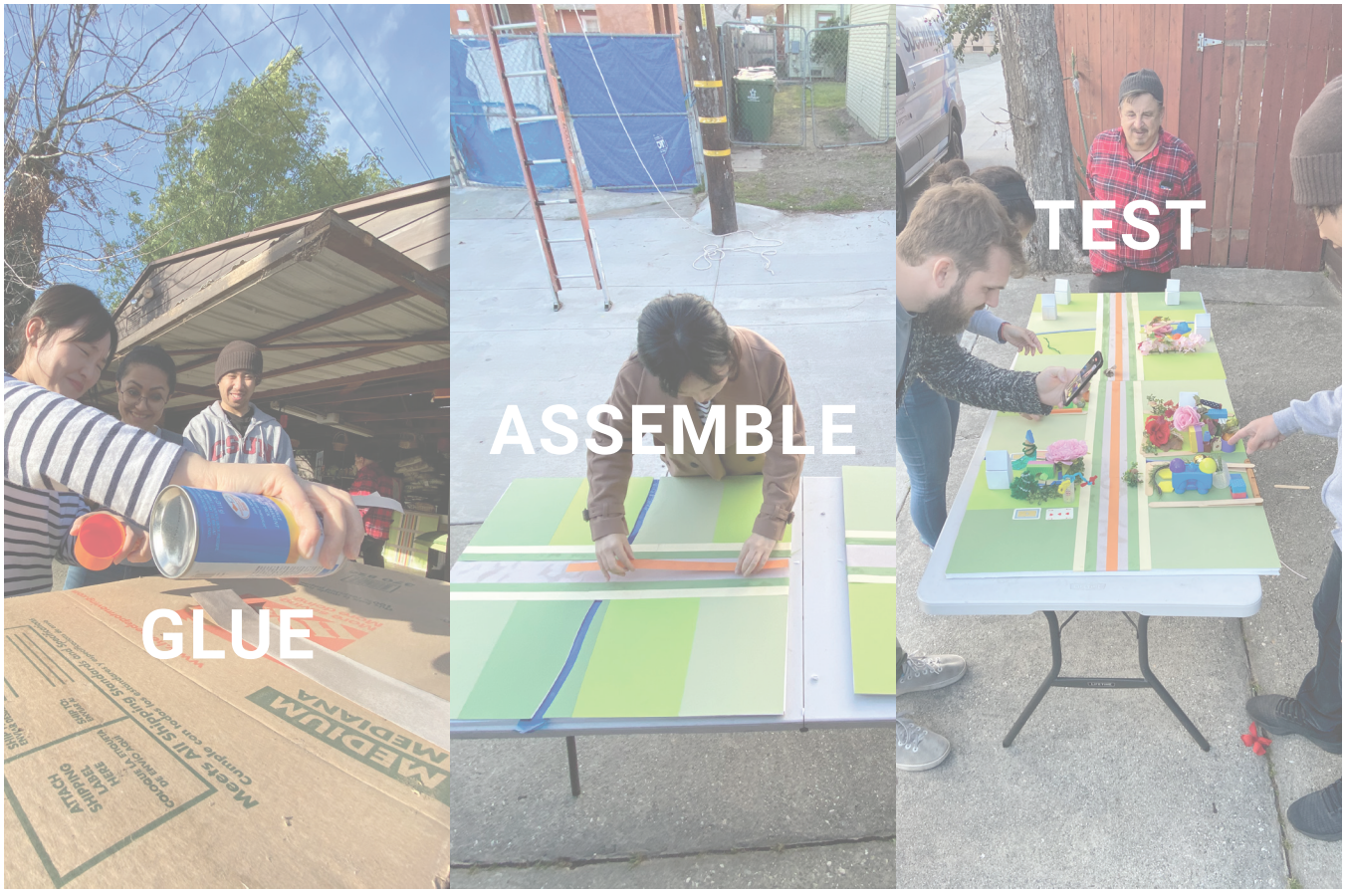
CONCLUSION

Based on the goals, objectives and actions outlined in this plan, we have developed a number of detailed elements that are presented in the following chapter:

1. An easy-to-use calculator tool for use by staff and residents to estimate water usage and evaluate compliance.

2. Multiple prototypical front yard designs that illustrate compliant landscapes for varying use and site conditions.

3. Sample parkway designs for capturing and treating stormwater runoff.



Process of Model Making with James Rojas
Context Source: Atticus Lee

CHAPTER 3

CALCULATOR TOOL AND SPATIAL DESIGNS

MWELO MATE

WATER BUDGET CALCULATOR

The goal of this design tool is to help residents in understanding the amount of water they should use for their landscape and how much water their dream yard would intake. In addition, they should be able to explore a variety of designs and understand how each design may fit into their yard.

Currently, there are few yards in San Fernando complying to MWELO water guidelines. MWELO's guidelines can be intimidating to residents unfamiliar with the codes. Due to local water supply condition and climate change, many governing agencies have adopted MWELO to achieve higher water savings. MWELO focuses on the sustainability, resiliency and affordability.

Thus, began the creation of the tool, MWELO MATE. It is a calculator created using formulas in the Microsoft Excel spread sheet. It aims to tackle common plan review comments. In addition, the calculator will come with instructions on how to use it. It is intended for city and residential use and will be covering both residential and commercial landscapes within City of San Fernando.

Using MWELO MATE is easy and straightforward, as long as users follow the instructions and fill out the required cells highlighted in blue. For example, here is a step-by-step guide on how to use the tool:

Step 1: Identify if the property is residential or commercial. Select the appropriate option by clicking on the cells.

Step 2: Measure the landscape area's width and length and multiply them together to get the landscape square footage. Enter this number in the " Landscape Sq. Feet" cell highlighted in blue.

Step 3: If there are any existing special landscape features, such as edible plants, water features, or recreational areas, enter the square footage of these features in the " Special Landscape Sq. Feet" cell highlighted in blue. If there are no existing special landscape features, leave this cell blank.

Step 4: Under the "Plant" Column, select the plants from the drop down menu. If the plant is not listed, select a placeholder plant (Plant Test A ~ Plant Test D) that matches the WUCOLS rating of your intended plants.

Step 5: Under the "Irrigation Method" column, select the appropriate method to water the plant. The options are drip, spray, temporary irrigation, and water feature.

Step 6: Enter the square footage of each plant in the corresponding cell in the " Square Footage" column. Calculate the square footage by squaring each plant's maximum width. If a plant's width is 4' , the square footage shall be 16'.

Step 7: Enter the square footage of any new special landscape area or plants. If there are no new special landscape plants or water features, leave the cells blank.

Step 8: Finally, verify that the total estimated water use is less than the maximum allowed water allocation. If the estimated water use is higher than the maximum allowed water allocation, adjust the plant selection or irrigation method until it meets the required limit.

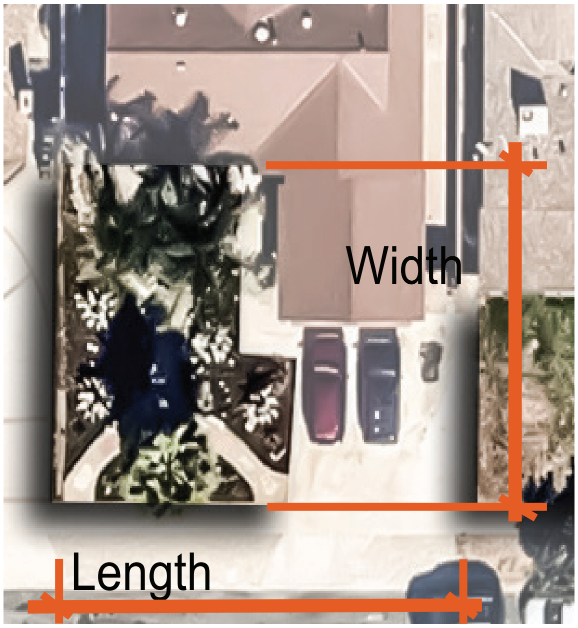
By following these 8 steps, users can easily and accurately calculate the estimated water use and maximum allowed water allocation for their landscape. The tool takes the guesswork out of water usage and ensures that users are using water efficiently and responsibly.

STEP BY STEP INSTRUCTIONS

Step 1.

Is This a Residential Project?	YES

Step 2.



Step 3.

ETAF	0.55	SPECIAL LANDSCAPE SQ. FT.	

Step 4.

Plant Description	Water Use (WUCOLS Website)	Plant Factor
Select Plant from Menu (If choice of plant is not available, use Plant A~D with Wucols rating)		

Step 5.

Irrigation Method	Irrigation Efficiency	**ETAF** (Evapotranspiration Adjustment Factor)
Select Type of Watering Method		

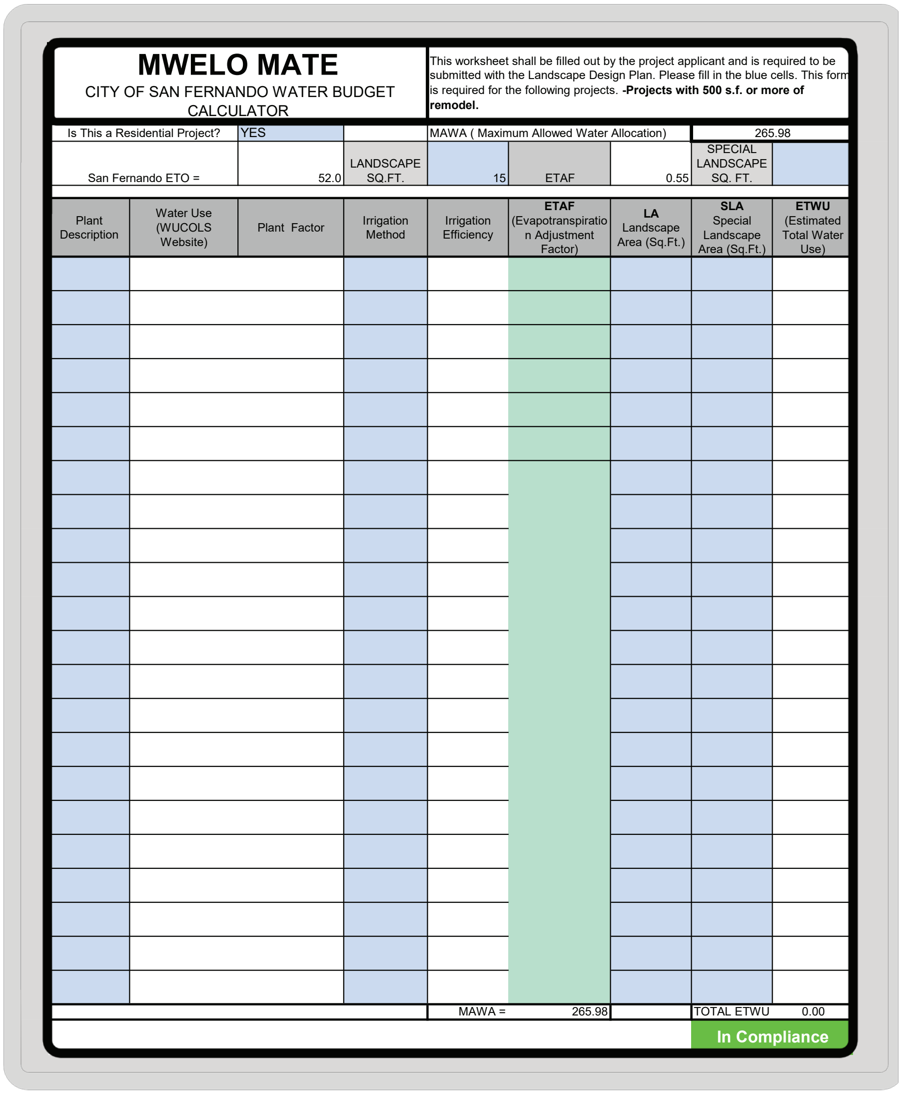
Step 6. Step 7.

LA Landscape Area (Sq.Ft.)	**SLA** Special Landscape Area (Sq.Ft.)	**ETWU** (Estimated Total Water Use)
Enter Front Yard Landscape Area Square Feet only.		

Step 8.

MAWA =	265.98		TOTAL ETWU	0.00

In Compliance



MWELO MATE CITY OF SAN FERNANDO WATER BUDGET CALCULATOR	This worksheet shall be filled out by the project applicant and is required to be submitted with the Landscape Design Plan. Please fill in the blue cells. This form is required for the following projects. **-Projects with 500 s.f. or more of remodel.**

Is This a Residential Project?	YES			MAWA (Maximum Allowed Water Allocation)			265.98	
San Fernando ETO =	52.0		LANDSCAPE SQ.FT.	15	ETAF	0.55	SPECIAL LANDSCAPE SQ. FT.	
Plant Description	Water Use (WUCOLS Website)	Plant Factor	Irrigation Method	Irrigation Efficiency	**ETAF** (Evapotranspiration Adjustment Factor)	**LA** Landscape Area (Sq.Ft.)	**SLA** Special Landscape Area (Sq.Ft.)	**ETWU** (Estimated Total Water Use)
				MAWA =	265.98		TOTAL ETWU	0.00
							In Compliance	

MODULAR BLOCKS

Another tool developed to aid residents in designing their front yard is the Modular blocks. This system is inspired by the popular game, Tetris. So the modular blocks will consist of shapes derived from the game, such as the L, Square, Straight, T and Skew. These blocks have been predesigned and extracted from given design examples.

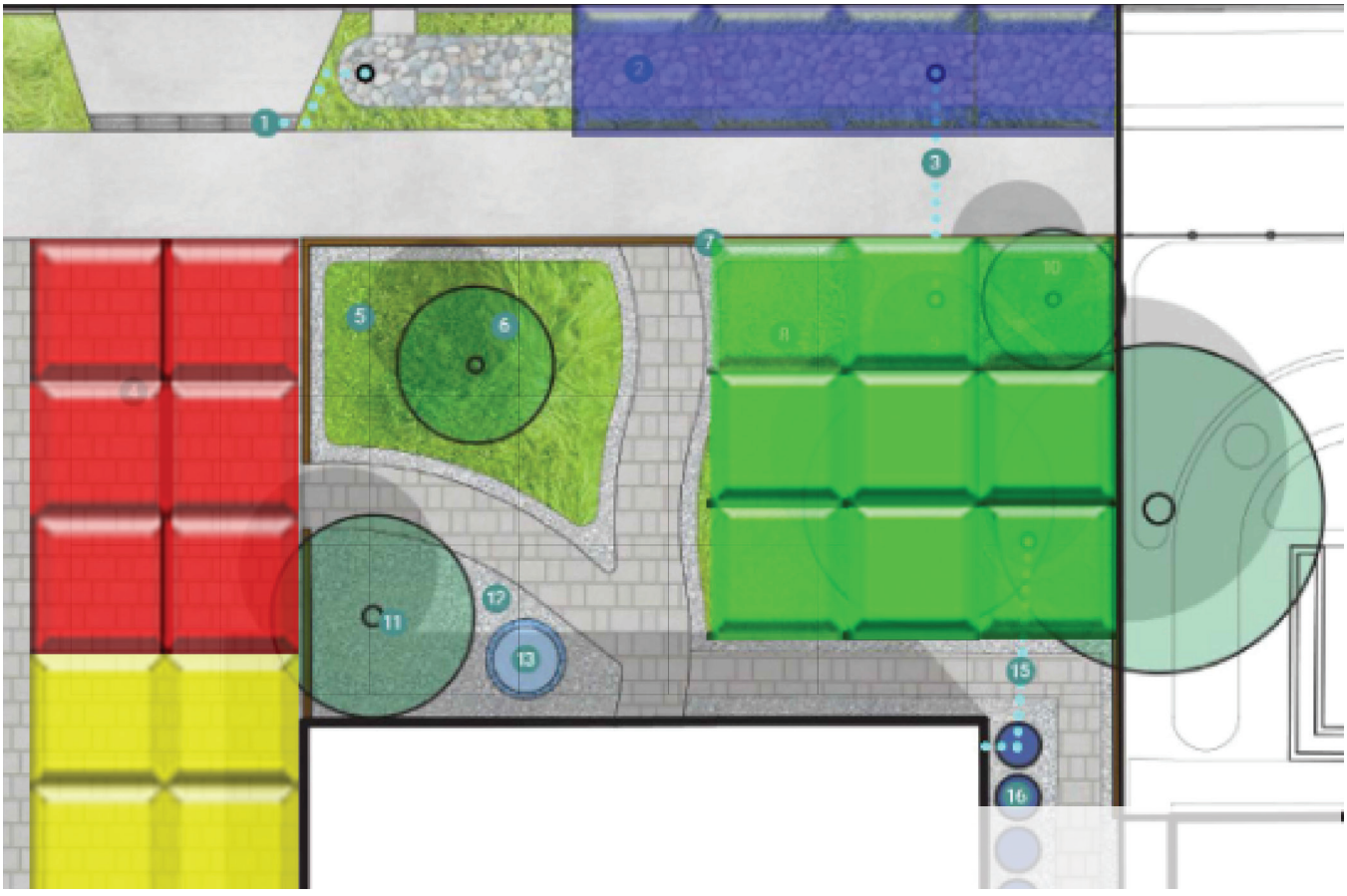
Through the use of these modular blocks, residents do not need to worry about plant spacing , because it has been taken care of in the pre-designs.
In addition, the modular blocks already have existing hydrozones for each plants and shall be in compliance with the MWELO guidelines for water use.

How does Modular Blocks fit for all yards in City of San Fernando?

Due to the data compiled in the research and analysis portion, we have the average lot size for each of the zones. Those information is used to create the average modular block dimensions. For example, if the average lot size is 40’ x 30’ , the average block size shall be provided in 10’ x 10’ increments. The maximum overall shape shall be 30’x30’, whether it be L , T or Skew shape. These dimensions will insure the blocks fits in each yard when rotated or flipped.

Blocks will encompass design elements. The blocks will then be categorize according to shape. Ultimately, there shall be a database for each block category with a variety of shapes to use.

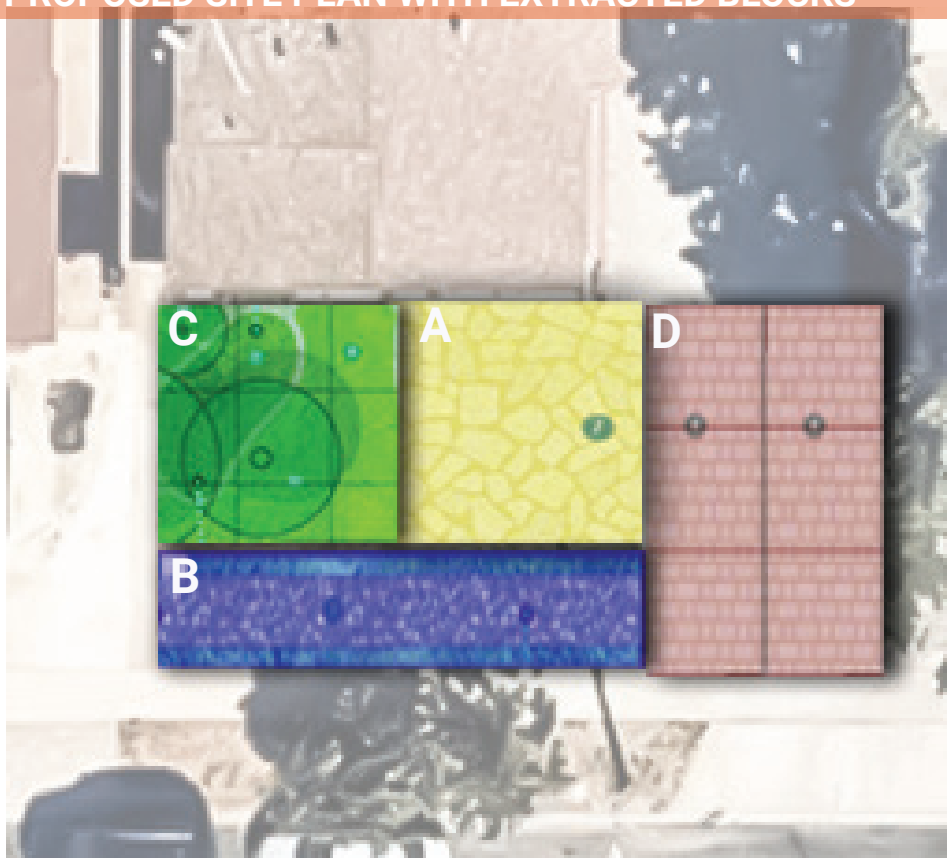
Blues (Vegetated Barrier, Fencing, Swales)
Reds (Pathways, Permeable paving, Pea Gravel)
Yellows (Open space, Play Area, Gathering Area)
Greens (Shade, mulch, beds, planting area)

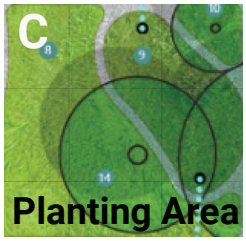


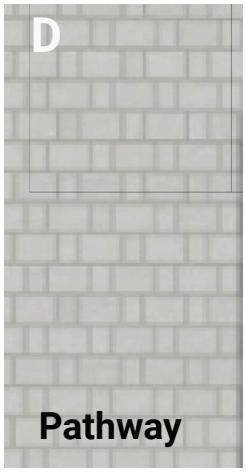
Modular blocks extracted from landscape design samples and color coded by design elements

EXISTING SITE PLAN BEFORE IMPLEMENTING MODULAR BLOCKS

PROPOSED SITE PLAN WITH EXTRACTED BLOCKS







FRONT YARD DESIGNS

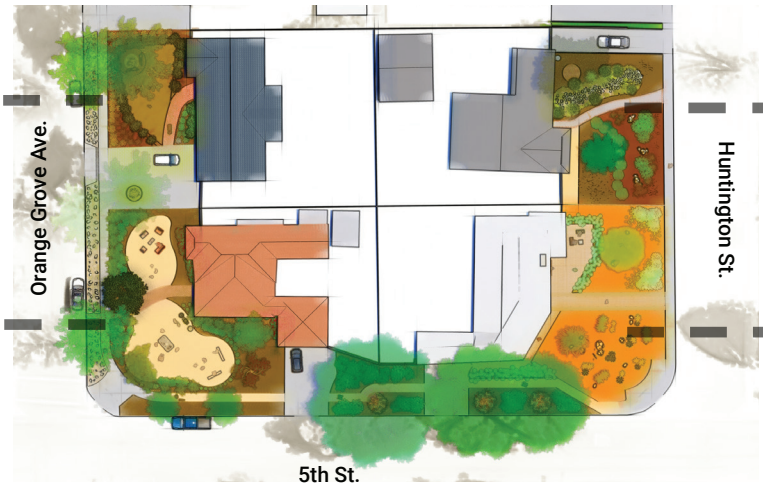
Our multiple prototypical front yard designs illustrate compliant landscapes for varying use and site conditions present in San Fernando today. Sets of four existing properties were selected from the “Orange Grove”, “Mixed Design”, and “Old San Fernando” housing typologies to be re-designed into climate compliant front yards. Each set of 4 lots considers the existing site conditions of sun and lot orientation to allow for variance among the designs. Every front yard design uses a planting guide developed through Calscape (Calscape, 2023), Tree People’s vetted “City of Los Angeles Approved Street Tree List” (Tree People, 2023), and Plant Master (Plant Master, 2023) and included with MWELO MATE as resources to the city. All of the provided designs are approved via our water use calculator to meet MWELO standards.

San Fernando Prototypical Front Yard Design Site Map

“ORANGE GROVE” HOUSING TYPE: SITE MAP

LOT A:
Family/Kid Oriented Front Yard

LOT C:
Mediterranean Large Gathering Front Yard



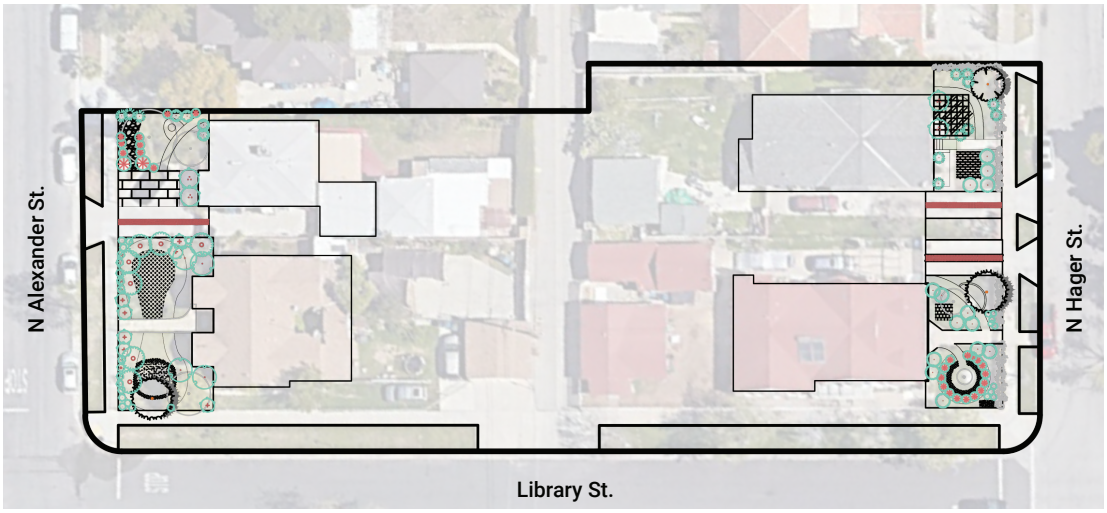
LOT B:
Spotlight Native & Riparian Front Yard

LOT D:
Desert Style Small Gathering Front Yard

“MIXED DESIGN” HOUSING TYPE: SITE MAP

LOT E:
Unique Culture Garden

LOT G:
Children’s Play Garden



LOT F:
Family Gathering Front Yard

LOT H:
Native Habitat Garden

“OLD SAN FERNANDO” HOUSING TYPE: SITE MAP

LOT I:
Garden Style

LOT K:
Mission Style

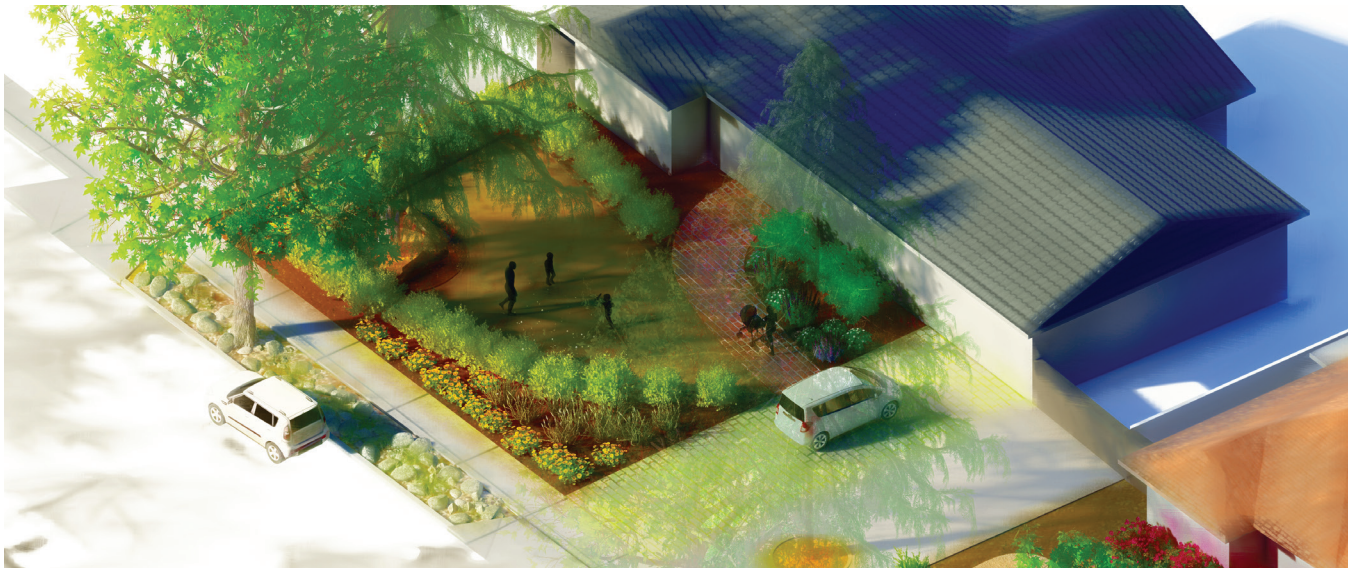
LOT J:
Native Style

LOT L:
Desert Style

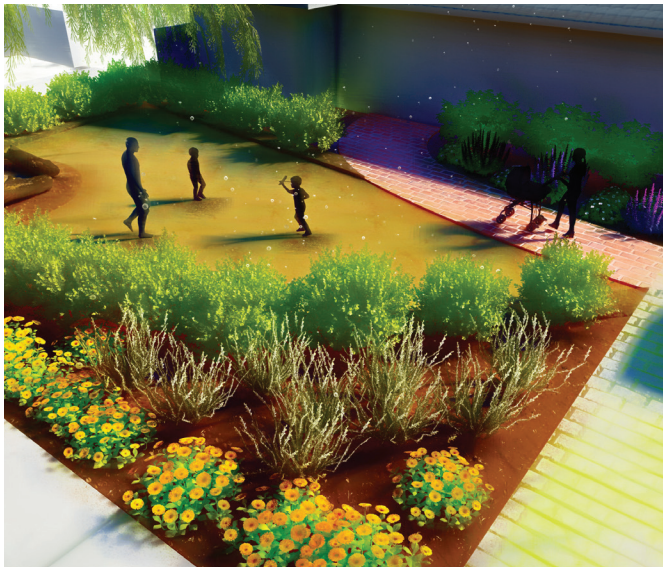
ORANGE GROVE TYPE

LOT A - FAMILY ORIENTED YARD

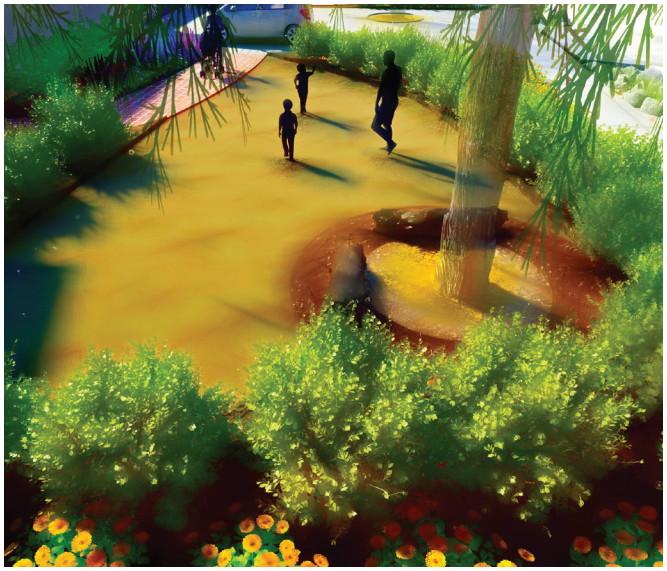
Lot A sits on Orange Grove Avenue, which is thought of as a model street of San Fernando. The current design of the site is predominately maintained lawn. Lot A is a family oriented front yard with ample space for children to play safely. The row of native hedging provides both a sense of privacy and security when children play freely in this yard. The wood chip ground cover provides a drought tolerant alternative to a traditional lawn. An assortment of drought tolerant plants like California Sagebrush and poppies provide a pop of color to sidewalk facing planting areas. Two existing mature Deodar Cedars and two Liquid Amber trees provide this yard with partial to full shade during the day. A proposed permeable paver driveway replaces half of the current existing driveway footprint and aims to slow down and capture stormwater runoff from the roof. As well a trench drain at the foot of the driveway will capture leftover and channel it into the proposed parkway bioswale.



Rendering of a drought-tolerant family oriented front yard

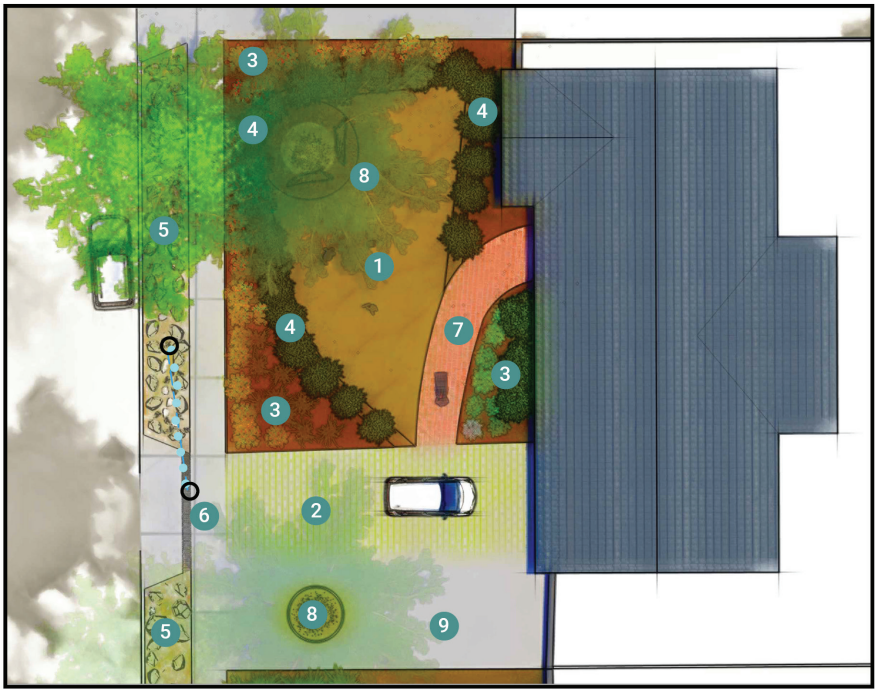


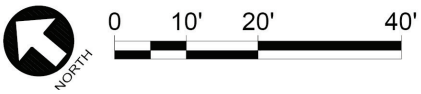
Rendering of a drought-tolerant family oriented front yard



Rendering of a drought-tolerant privacy hedging and play space

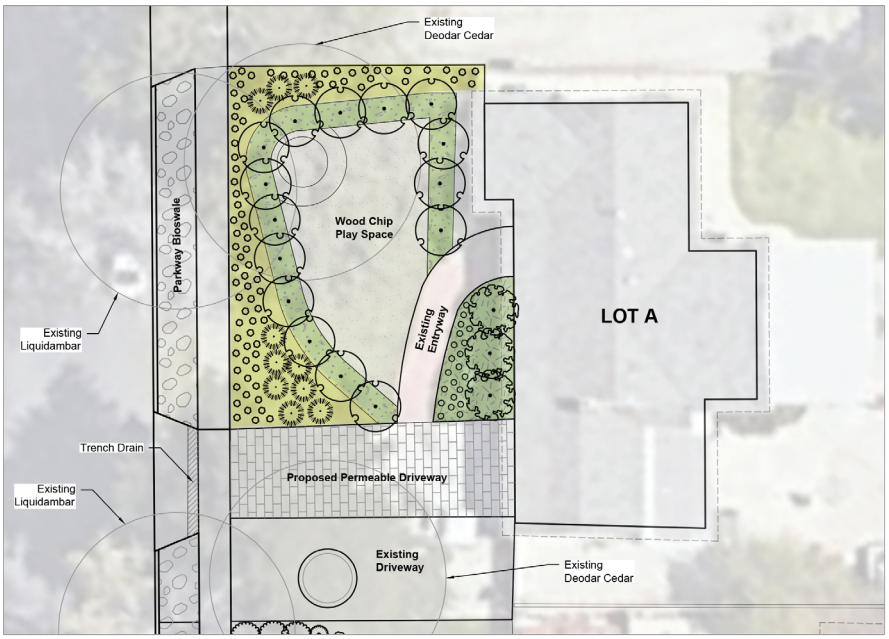
SITE PLAN

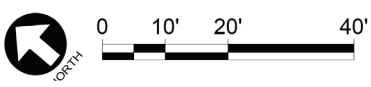




1. Wood Chip Play Area
2. Permeable Paver Driveway
3. Mulched Planting Area
4. CA Native Hedge Planting
5. Parkway Bioswale
6. Trench Drain w/ Pipe to Swale
7. Existing Brick Entryway
8. Existing Trees
9. Existing Driveway

PLANTING & HYDROZONE PLAN





WUCOLS Rating: VERY LOW

WUCOLS Rating: LOW

PLANT SCHEDULE LOT A

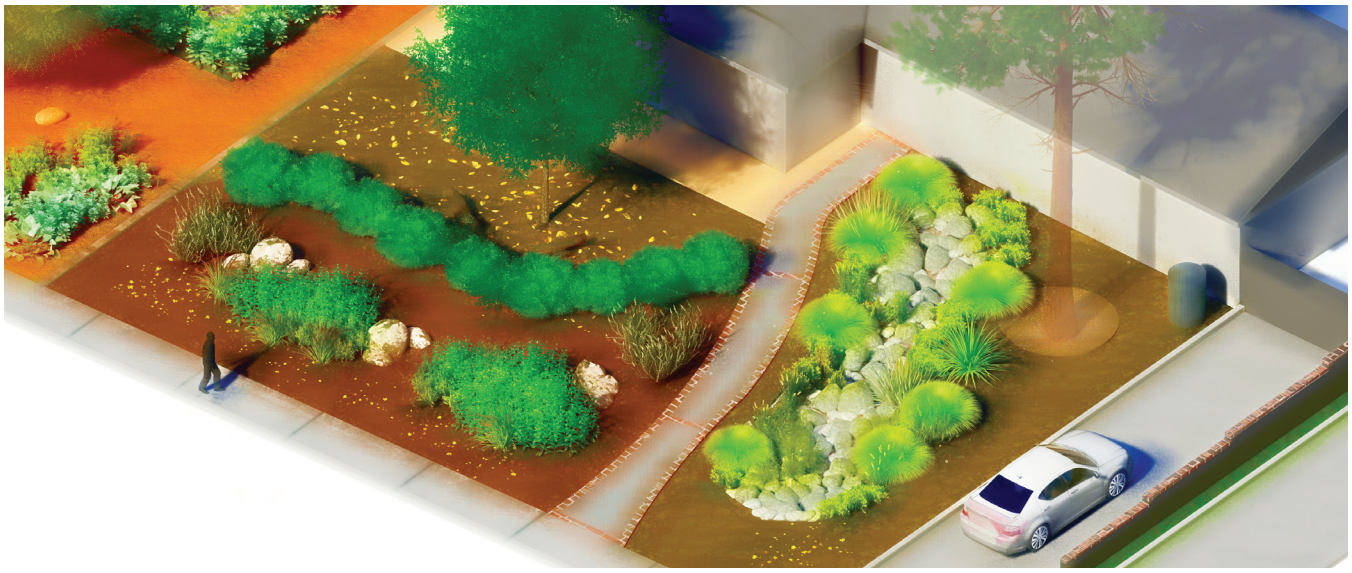
SHRUBS	CODE	BOTANICAL NAME	COMMON NAME	QTY
	ART CAL	ARTEMISIA CALIFORNICA	CALIFORNIA SAGEBRUSH	10
	BAC PIL	BACCHARIS PILULARIS	COYOTE BRUSH	3
	ESC CAL	ESCHSCHOLZIA CALIFORNICA	CALIFORNIA POPPY	81
	FRA CA3	FRANGULA CALIFORNICA	CALIFORNIA COFFEEBERRY	15
	LUP SUC	LUPINUS SUCCULENTUS	ARROYO LUPINE	21

MAWA (Maximun Allowed Water Allocation)	**69,012.94 gal**
ETWU (Estimated Total Water Use)	**36,435.50 gal**

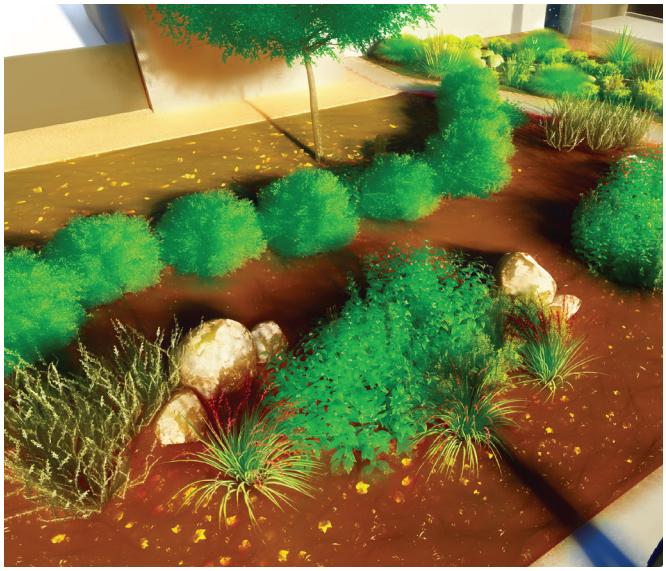
MWELO MATE Compliant

LOT B - CALIFORNIA NATIVE YARD

Lot B resides on Huntington Street. The existing site is comprised of maintained lawn with a brick entryway and old growth pine tree. Lot B is a spotlight California native and drought tolerant front yard. This yard has two sections, one being a California native garden and the other a riparian vegetated swale. The California native garden includes a variety of low water drought tolerant shrubs like California Buckwheat and Sagebrush, along with a curvilinear row of Chaparral Whitethorne, and a Coast Live Oak to provide shade and privacy to the house. The riparian swale is located under the roof's storm water drainage pathway. The swale aims to capture and slow water during a storm event, while also playing as an aesthetic feature to encourage others to implement drought tolerant designs.



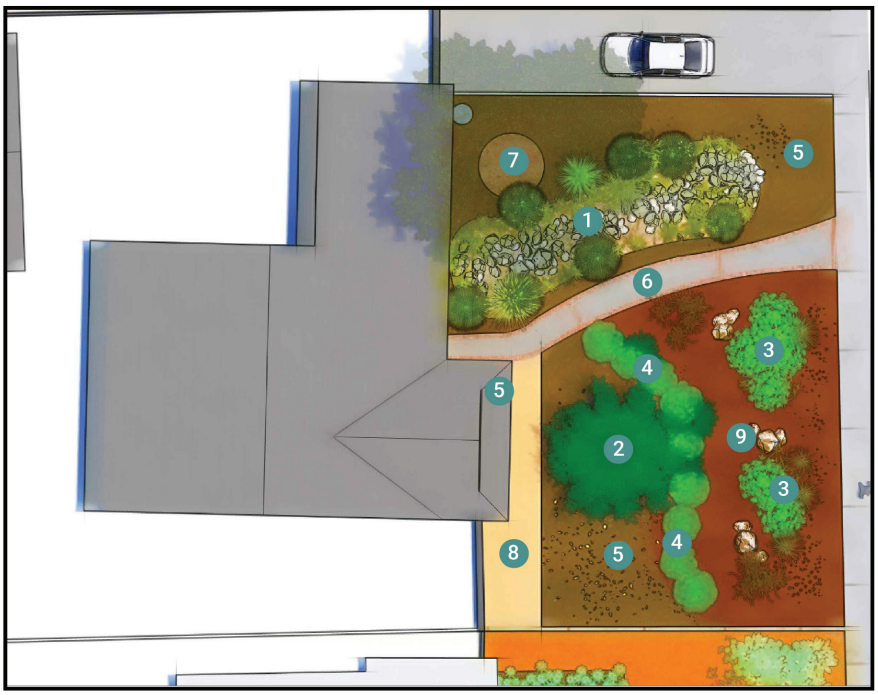
Rendering of a drought-tolerant California native style front yard

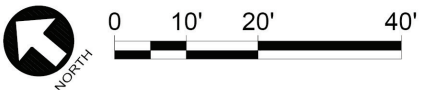


Rendering of a drought-tolerant California native garden

Rendering of a riparian swale

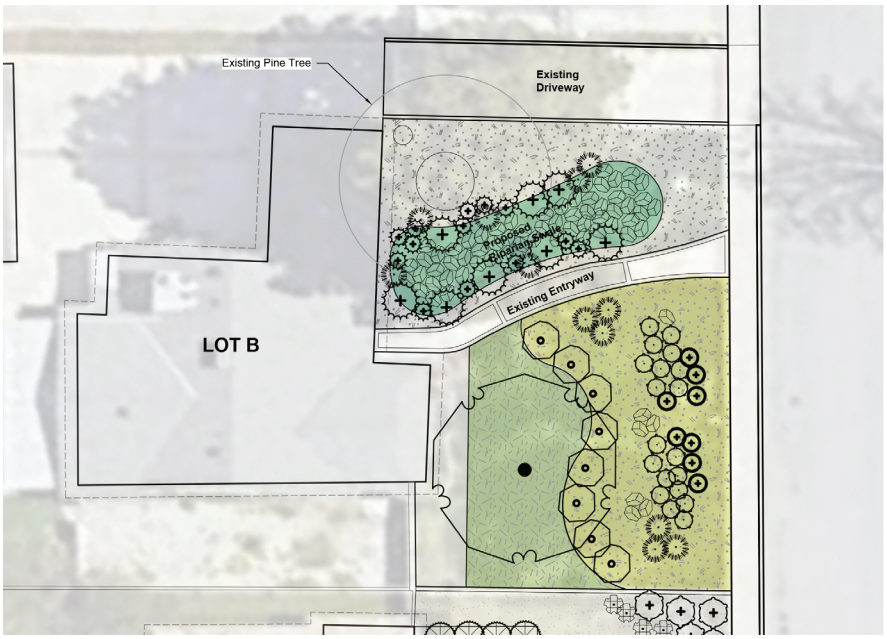
SITE PLAN

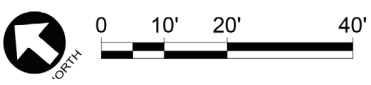




1. Vegetated Riparian Swale
2. Shade Bearing Tree
3. Mulched Planting Area
4. CA Native Hedge Planting
5. Mulch
6. Existing Entryway
7. Existing Trees
8. Decomposed Granite Pathway
9. CA Native Style Garden

PLANTING & HYDROZONE PLAN





WUCOLS Rating: VERY LOW

WUCOLS Rating: LOW

WUCOLS Rating: MODERATE

PLANT SCHEDULE LOT B

TREES	CODE	BOTANICAL NAME	COMMON NAME	QTY
	QUE AGR	QUERCUS AGRIFOLIA	COAST LIVE OAK	1
SHRUBS	**CODE**	**BOTANICAL NAME**	**COMMON NAME**	**QTY**
	ARI PUR	ARISTIDA PURPUREA	PURPLE THREEAWN	13
	ART CAL	ARTEMISIA CALIFORNICA	CALIFORNIA SAGEBRUSH	12
	CEA LEU	CEANOTHUS LEUCODERMIS	CHAPARRAL WHITETHORN	8
	ERI FAS	ERIOGONUM FASCICULATUM	CALIFORNIA BUCKWHEAT	19
	MUH RIG	MUHLENBERGIA RIGENS	DEER GRASS	8
	PEN CEN	PENSTEMON CENTRANTHIFOLIUS	SCARLET BUGLER	8

MAWA (Maximun Allowed Water Allocation)	**81,143.08 gal**
ETWU (Estimated Total Water Use)	**16,464.37 gal**

MWELO MATE Compliant

LOT C - LARGE GATHERING YARD

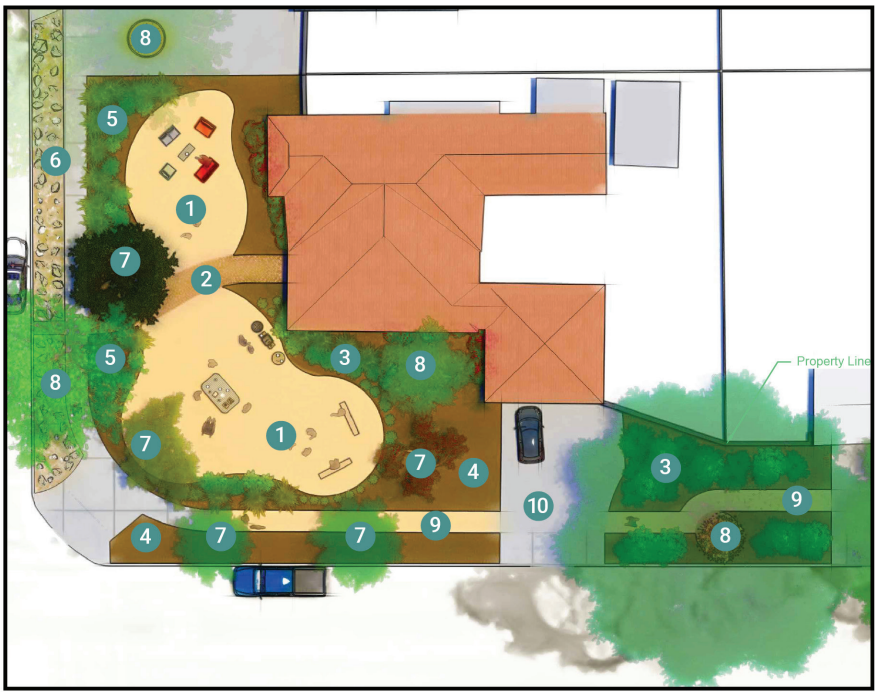
Lot C sits on the corner of Orange Grove Ave and 5th Street and acts as the start of the “Orange Grove” neighborhood. During holiday events like Halloween this street attracts many visitors from San Fernando and the surrounding neighborhoods. The existing yard is comprised of lawn and an informal pathway down 5th Street lined with mature Coast Live Oaks trees. Lot C is a front yard designed for large gatherings in a Mediterranean style. The predominant footprint of lawn in this lot is being re-purposed into a decomposed granite flex space meant for holding parties, outdoor furniture, and people. Two European Olives trees and a Lemon Bottlebrush tree provide shade for the otherwise full sun front yard. A mixture of aromatic shrubs and herbs line the flex gathering spaces to create a buffer from the sidewalk. A new extended decomposed granite sidewalk will formalize the informal existing pathway and provide residents a comfortable pathway to access 5th street. The formation of this new pathway also allows for more Coast Live Oaks to be planted to provide shade on both the pathway and the yard.

Rendering of a drought-tolerant Mediterranean style front yard

Rendering of the flex space holding a large gathering party

Rendering of the flex space holding a large gathering party

SITE PLAN



1. DG Flex Space
2. Permeable Paver Entryway
3. Mulched Planting Area
4. Mulch
5. Mediterranean Style Garden
6. Parkway Bioswale
7. Shade Bearing Trees
8. Existing Trees
9. DG Sidewalk Extension
10. Existing Driveway

PLANTING & HYDROZONE PLAN

WUCOLS Rating: LOW

PLANT SCHEDULE LOT C

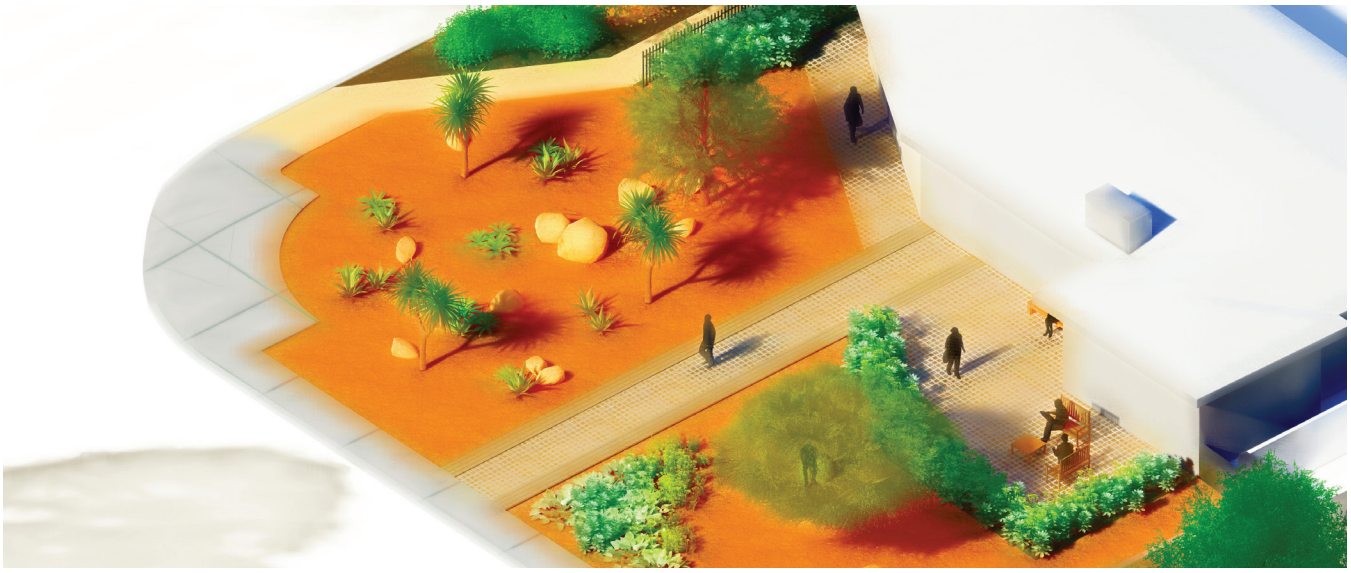
TREES	CODE	BOTANICAL NAME	COMMON NAME	QTY
	CAL CIT	CALLISTEMON CITRINUS	LEMON BOTTLEBRUSH	1
	OLE EUR	OLEA EUROPAEA	EUROPEAN OLIVE	2
	QUE AGR	QUERCUS AGRIFOLIA	COAST LIVE OAK	2
SHRUBS	**CODE**	**BOTANICAL NAME**	**COMMON NAME**	**QTY**
	BOU BRS	BOUGAINVILLEA BRASILIENSIS	BOUGAINVILLEA	10
	CEA CON	CEANOTHUS X 'CONCHA'	CONCHA WILD LILAC	7
	LAV ANG	LAVANDULA ANGUSTIFOLIA	ENGLISH LAVENDER	16
	SAL PU3	SALVIA LEUCOPHYLLA	PURPLE SAGE	20
	SAL SPA	SALVIA SPATHACEA	HUMMINGBIRD SAGE	20
	WES FRU	WESTRINGIA FRUTICOSA	COAST ROSEMARY	20

MAWA (Maximun Allowed Water Allocation)	**149,888.60 gal**
ETWU (Estimated Total Water Use)	**64,893.95 gal**

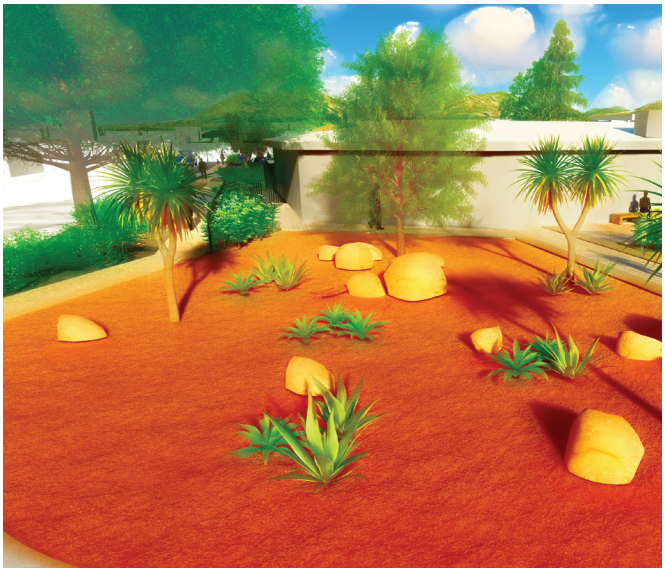
MWELO MATE Compliant

LOT D - SMALL GATHERING YARD

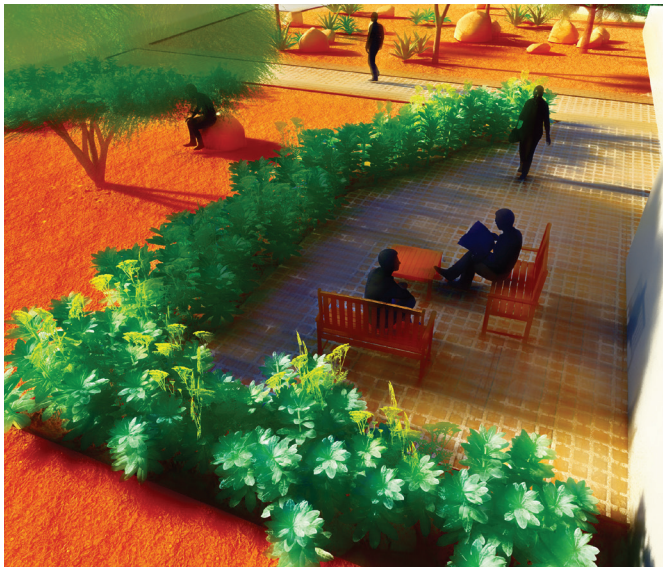
Lot D resides on the corner of Huntington Street and 5th Street. The current design of the yard has an abundance of lawn, narrow entry pathway, continuation of the informal 5th pathway with mature Coast Live Oak trees. The existing lot is highly prone to full sun site conditions due to the NW lot orientation, where sun is seen on the lot during most daylight hours. Lot D is a Desert style front yard designed for private small gatherings. The full sun condition allows for a thriving desert planting palette. The main desert garden is comprised Yucca and Agave plantings with a Desert Willow to cast shade on the house. The new permeable paving pathway is wider and leads people into the semi-private patio space hedged in by Brittlebush planting and shaded by a Palo Verde tree. The proposed decomposed granite sidewalk from Lot C will continue into Lot D and connect back to the existing sidewalk at the corner of 5th and Huntington. The pathway utilizes the Coast Live Oak shade cover and incorporates a row of Ceanothus shrubs to guide pedestrians through the space.



Rendering of a drought-tolerant Desert style front yard

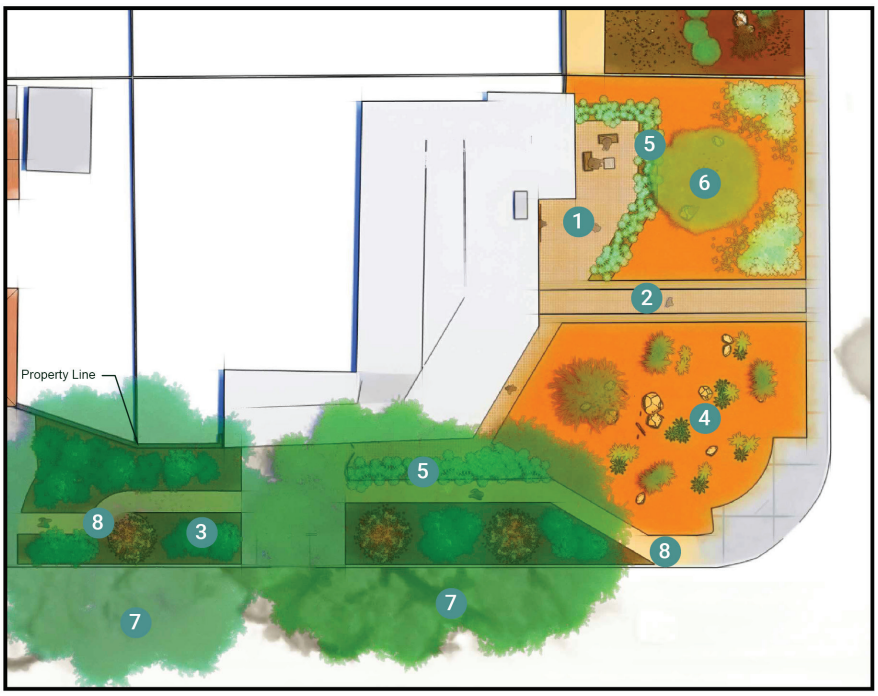


Rendering of a drought-tolerant desert style garden



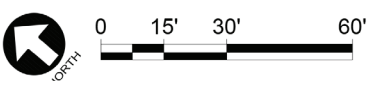
Rendering of a permeable paver patio with privacy hedging

SITE PLAN



1. Permeable Paver Patio
2. Permeable Paver Entryway
3. Mulched Planting Area
4. Desert Style Garden
5. Desert Style Hedge Planting
6. Shade Bearing Tree
7. Existing Trees
8. DG Sidewalk Extension

PLANTING & HYDROZONE PLAN



WUCOLS Rating: VERY LOW

WUCOLS Rating: LOW

PLANT SCHEDULE LOT D

TREES	CODE	BOTANICAL NAME	COMMON NAME	QTY
	CHI LIN	CHILOPSIS LINEARIS	DESERT WILLOW	1
	PAR DES	PARKINSONIA X 'DESERT MUSEUM'	DESERT MUSEUM PALO VERDE	1
SHRUBS	**CODE**	**BOTANICAL NAME**	**COMMON NAME**	**QTY**
	AGA AME	AGAVE AMERICANA	CENTURY PLANT	8
	AGA ATT	AGAVE ATTENUATA	FOXTAIL AGAVE	10
	BAI MUL	BAILEYA MULTIRADIATA	DESERT MARIGOLD	18
	CEA CON	CEANOTHUS X 'CONCHA'	CONCHA WILD LILAC	5
	ENC FAR	ENCELIA FARINOSA	BRITTLEBUSH	22
	SAL API	SALVIA APIANA	WHITE SAGE	12
	YUC ALO	YUCCA ALOIFOLIA	ALOE YUCCA	3

MAWA (Maximun Allowed Water Allocation)	**139,391.25 gal**
ETWU (Estimated Total Water Use)	**56,224.97 gal**

MWELO MATE Compliant

MIXED DESIGN TYPE

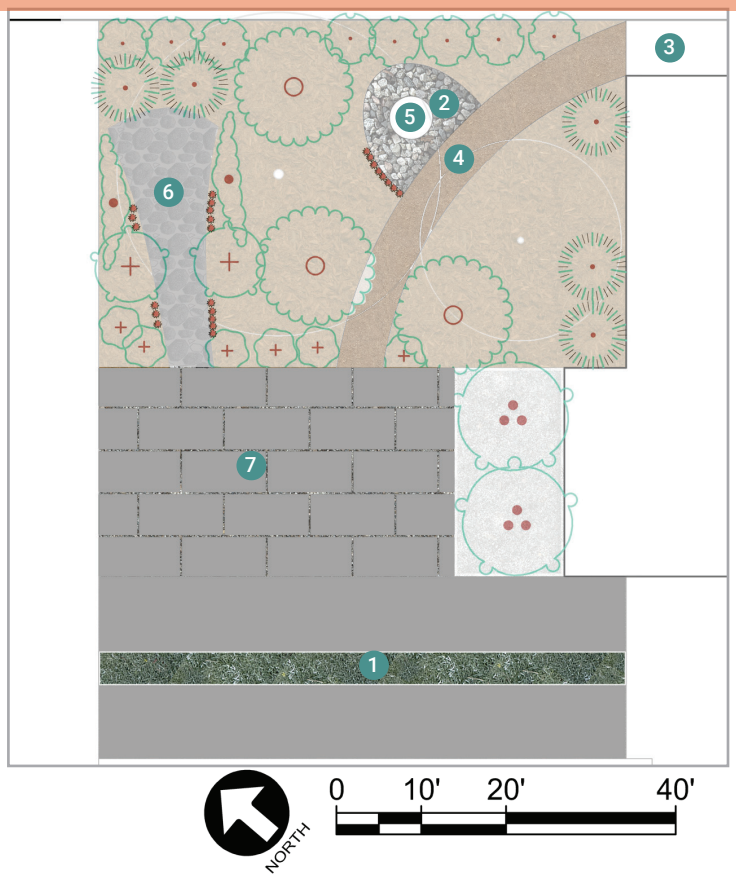
LOT E -CULTURAL GARDEN

The City of San Fernando has a prevalence of Latino population that resulted in a unique culture of their own. This garden was designed to dedicate space for celebrating their culture and various holidays by decorating to include the Latino Urbanism design components such as displaying a religious element in the yard. For instance, Our Lady of Guadalupe is a powerful symbol of Latino identity and faith, image associated with motherhood to feminism to social justice. Another notable design component is a sacred water element. Historic significance of water being sacred in Latino culture stem from religious connections and water scarcity. This inspired the front yard design to include several water features such as a rain garden, a rain barrel and a fountain.

San Fernando Mural
Photo by Jiyoon Kim.

Rendering of a drought-tolerant cultural garden

SITE PLAN



1. Ribbon Driveway
2. Rain Garden
3. Rain Barrel
4. Decomposed Granite Walkway
5. Fountain
6. Sitting Area/Decorative Space
7. Permeable Paver Walkway

PLANTING & HYDROZONE PLAN

WUCOLS Rating: Very Low

WUCOLS Rating: Low

PLANT SCHEDULE

SHRUBS	BOTANICAL NAME	COMMON NAME	QTY
	Agave attenuata	Foxtail Agave	2
	Artemisia californica	California Sagebrush	5
	Baccharis pilularis 'Pigeon Point'	Pigeon Point Coyote Brush	3
	Ceanothus leucodermis	Chaparral Whitethorn	8
	Dymondia margaretae	Silver Carpet Dymondia	17
	Echeveria x 'Violet Queen'	Violet Queen Echeveria	24
	Rosa californica	California Wild Rose	2
	Salvia apiana	White Sage	2
	Salvia leucophylla	Purple Sage	6

MAWA (Maximun Allowed Water Allocation)	**13536.08 gal**
ETWU (Estimated Total Water Use)	**7427.14 gal**

MWELO MATE Compliant

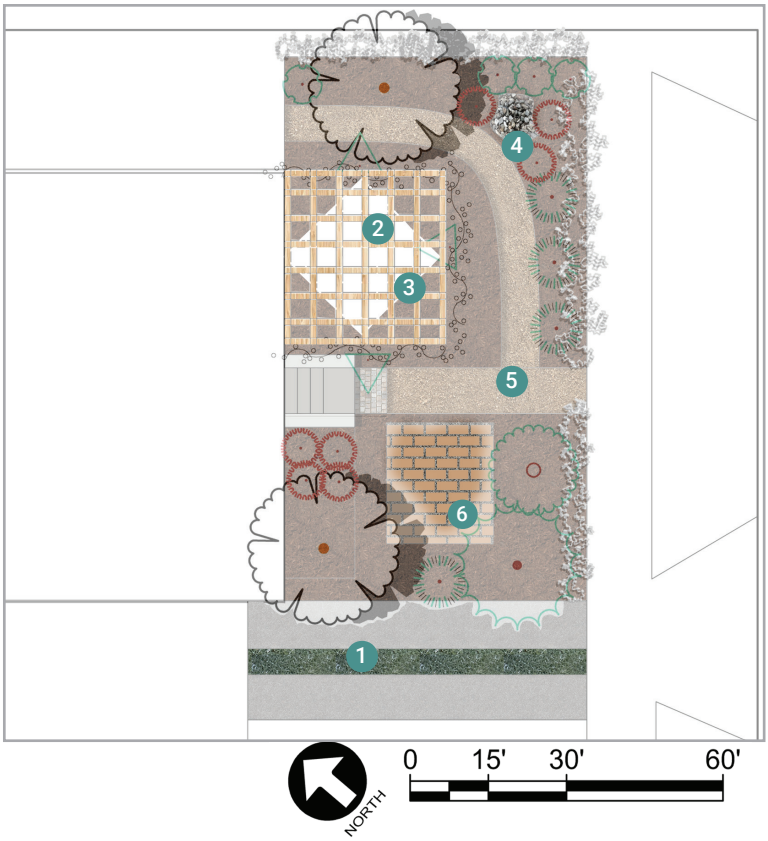
LOT F - FAMILY GATHERING

This garden supports a function of the front yard as extension of living room, providing a family and friends gathering space. Dedicated sitting area with pergolas extending from the house provides comfortable shades from Island Morning Glory (*Calystegia macrostegia*) planted on and around the structure. Paved area was designed to either provide stable ground to place outdoor kitchen area with grills or work as an additional sitting movable furniture to be placed during a larger family gathering. Herbs were planted in the front yard to complement the design to cater to family gatherings that involve dining. To block out sound that can be generated from gatherings, dense plants were strategically placed against the neighboring fences.

Latino family BBQ rendering by Midjourney

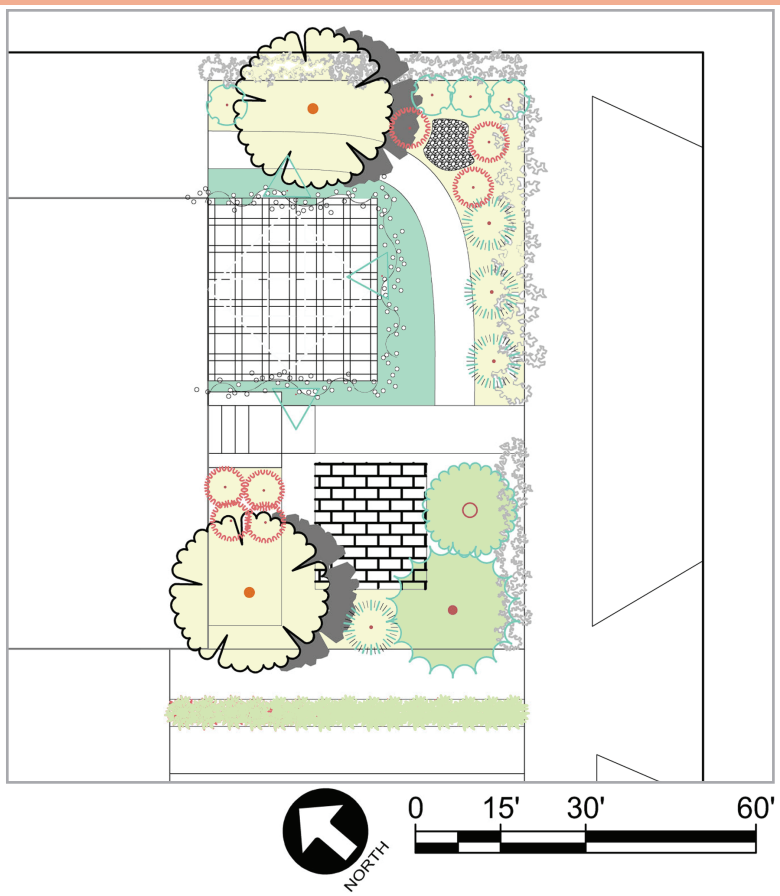
Rendering of a family gathering garden

SITE PLAN



1. Ribbon Driveway
2. Permeable Paved Sitting Area
3. Pergola
4. Rain Garden
5. Decomposed Granite Walkway
6. Permeable Paved Outdoor Kitchen

PLANTING & HYDROZONE PLAN



WUCOLS Rating: Very Low

WUCOLS Rating: Low

WUCOLS Rating: Moderate

PLANT SCHEDULE

TREES	BOTANICAL NAME	COMMON NAME	QTY
	Arctostaphylos glauca	Bigberry Manzanita	2
SHRUBS	**BOTANICAL NAME**	**COMMON NAME**	**QTY**
	Artemisia californica	California Sagebrush	4
	Baccharis pilularis 'Pigeon Point'	Pigeon Point Coyote Brush	1
	Calystegia macrostegia	Island Morning Glory	3
	Ceanothus leucodermis	Chaparral Whitethorn	4
	Dymondia margaretae	Silver Carpet Dymondia	15
	Eriogonum fasciculatum	California Buckwheat	7
	Westringia fruticosa	Coast Rosemary	1

MAWA (Maximun Allowed Water Allocation)	**19754.87 gal**
ETWU (Estimated Total Water Use)	**6424.12 gal**

MWELO MATE Compliant

LOT G - CHILDREN'S PLAY GARDEN

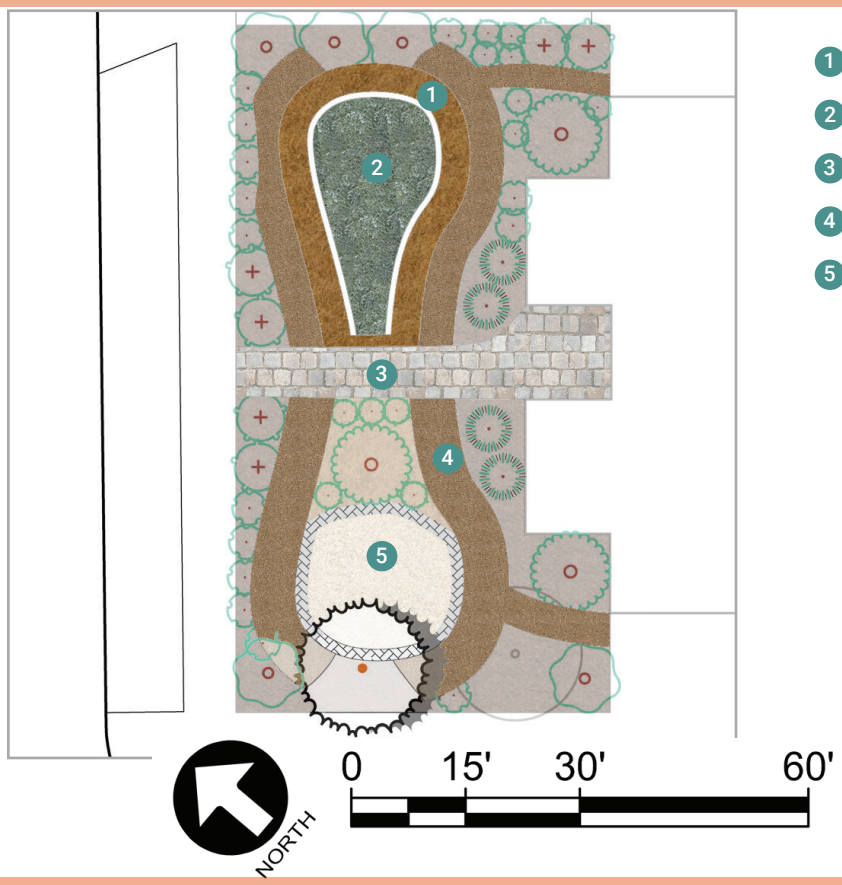
The open and spacious front yard areas of this house with toys and slides were inspirations to design this lot as a children's play garden. Sand play area was built next and under an existing tree to benefit from the shades provided by it so children can play comfortably while chaperoning adults can rest under the shades as well. An additional tree will be planted with similar water requirement to provide an additional shade. To spark and engage children's visual and tactile interest, plants such as mountain mahogany(*Cercocarpus betuloides*) were placed near the play area. Area that faces the street were designed to have tall plants to block out the street noise and to provide privacy and protection for children to play outdoors. Engineered wood fiber playground

Play space garden
Photo by Jiyoon Kim.

flooring will be installed to provide an area to play sports but also to act as infiltration dry swale in the rain event to retain storm-water within the site.

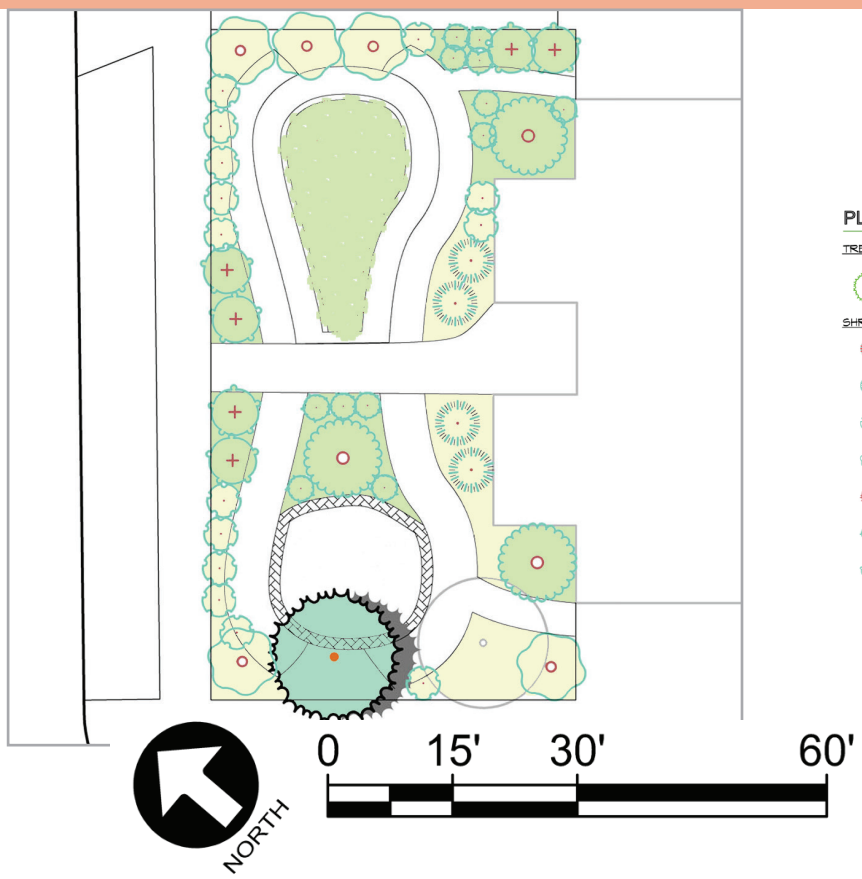
Rendering of a drought-tolerant children's play garden

SITE PLAN



1. Engineered Wood Flooring
2. Children's Playground
3. Permeable Paver Walkway
4. Decomposed Granite Walkway
5. Sand Play Area

PLANTING & HYDROZONE PLAN



WUCOLS Rating: Very Low
WUCOLS Rating: Low
WUCOLS Rating: Moderate

PLANT SCHEDULE

TREES	BOTANICAL NAME	COMMON NAME	QTY
	Umbellularia californica	Bay Laurel	1
SHRUBS	**BOTANICAL NAME**	**COMMON NAME**	**QTY**
	Artemisia californica	California Sagebrush	4
	Baccharis pilularis 'Pigeon Point'	Pigeon Point Coyote Brush	3
	Ceanothus leucodermis	Chaparral Whitethorn	14
	Cercocarpus betuloides	Mountain Mahogany	5
	Dymondia margaretae	Silver Carpet Dymondia	40
	Penstemon barbatus	Beardlip Penstemon	12
	Salvia apiana	White Sage	6

MAWA (Maximun Allowed Water Allocation)	**35376.40 gal**
ETWU (Estimated Total Water Use)	**13676.13 gal**

MWELO MATE Compliant

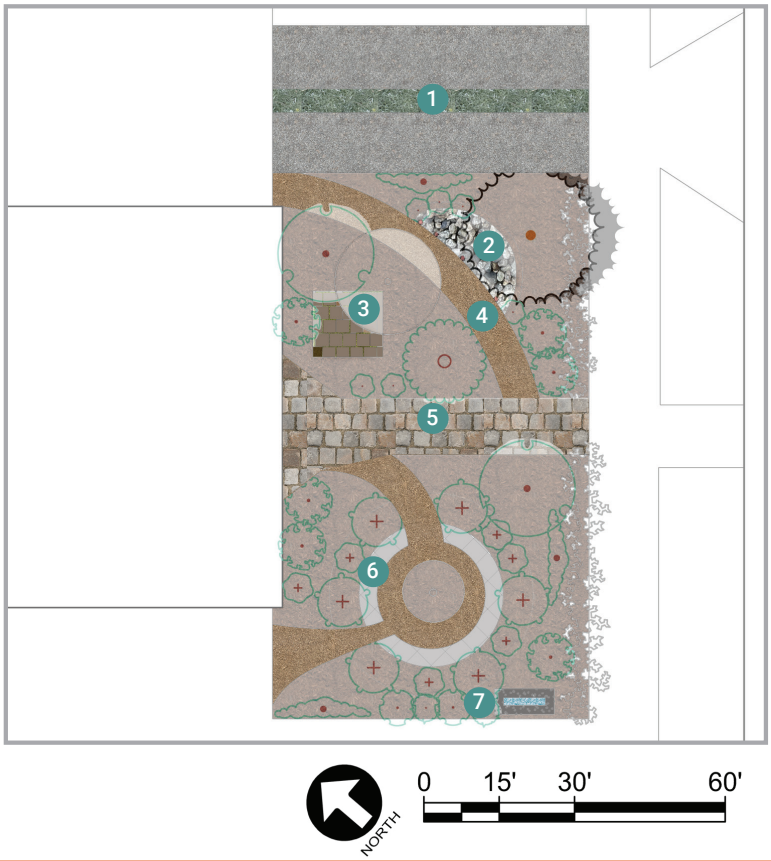
LOT H - NATIVE HABITAT GARDEN

A native garden is designed to provide habitat and food for pollinators; butterflies, bees and birds. Hummingbird sage (*Salvia spathacea*) will attract hummingbirds and California Coffeeberry (*Frangula californica*) will provide food to the native species. To provide serene and healing environment, tall and dense plants were planted against the property lines against the streets. The water feature will be installed against the property line to drown out the outside noise. A circular sitting area was built to have enclosed feeling within the nature in the front yard. The sitting area was placed against the house looking out to the garden to fully enjoy the beautiful garden with native species of flora and fauna.

California Native Pollinator Plants
Photo by Jiyoon Kim

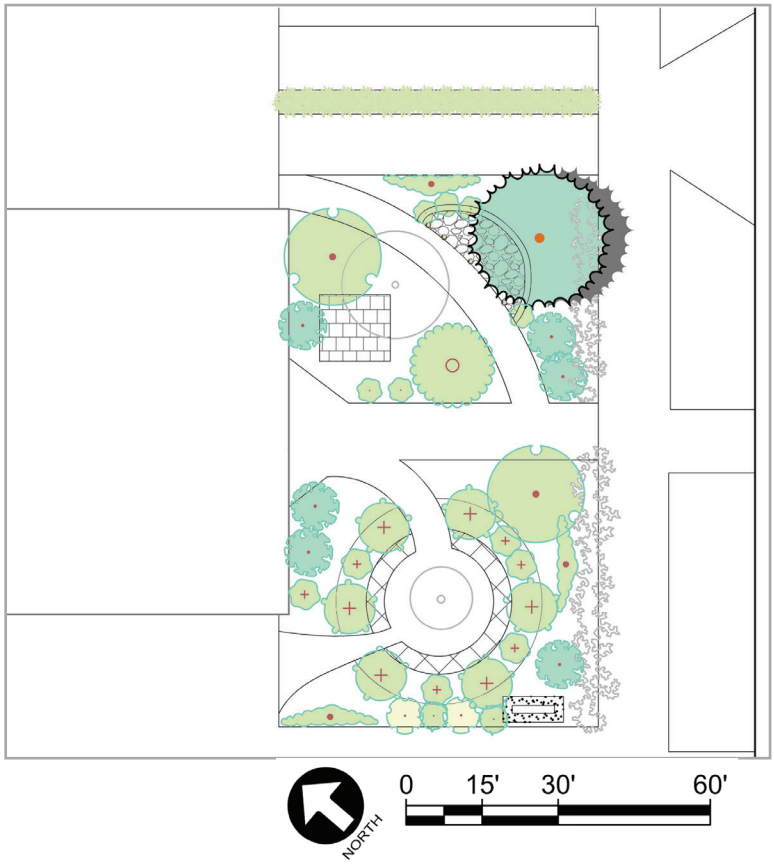
Rendering of a drought-tolerant California native garden

SITE PLAN



1. Ribbon Driveway
2. Rock Garden
3. Permeable Paved Sitting Area
4. Decomposed Granite Walkway
5. Permeable Paver Walkway
6. Sitting Wall
7. Water Feature

PLANTING & HYDROZONE PLAN



WUCOLS Rating: Very Low

WUCOLS Rating: Low

WUCOLS Rating: Moderate

PLANT SCHEDULE

TREES	BOTANICAL NAME	COMMON NAME	QTY
	Umbellularia californica	Bay Laurel	1
SHRUBS	BOTANICAL NAME	COMMON NAME	QTY
	Achillea millefolium	Common Yarrow	6
	Baccharis pilularis 'Pigeon Point'	Pigeon Point Coyote Brush	1
	Ceanothus leucodermis	Chaparral Whitethorn	2
	Dymondia margaretae	Silver Carpet Dymondia	16
	Echeveria x 'Violet Queen'	Violet Queen Echeveria	4
	Frangula californica	California Coffeeberry	2
	Penstemon barbatus	Bearded Penstemon	2
	Rosa californica	California Wild Rose	3
	Salvia dolosa	White Sage	6
	Salvia eusophylla	Purple Sage	6
	Salvia spathacea	Hummingbird Sage	6

MAWA (Maximun Allowed Water Allocation)	**23730.91 gal**
ETWU (Estimated Total Water Use)	**14790.60 gal**

MWELO MATE Compliant

OLD SAN FERNANDO TYPE

LOT I - COTTAGE STYLE

This yard showcases the garden style, using a selection of California native plants regularly employed in a garden setting. This front yard landscape was designed specifically for plant lovers, who itch to spend time in the yard.

Fencing has been replaced from a concrete wall, which is not permitted in the San Fernando because of the restriction of drainage, to a wood split rail fence and concrete paving has been replaced by permeable quarry stone.

Water features on this site include rain barrels that attach to a downspout from the roof gutters to catch roof water. When the rain barrels overflow or drain, they enter the rain garden, a sunken area of the garden planted with higher water use plants and a drain on the other side of the rain garden enters the roadside swale. As in all of the designs, the French drain at the driveway drains additional water into the roadside swale, which also intercepts street water via a curb cut.

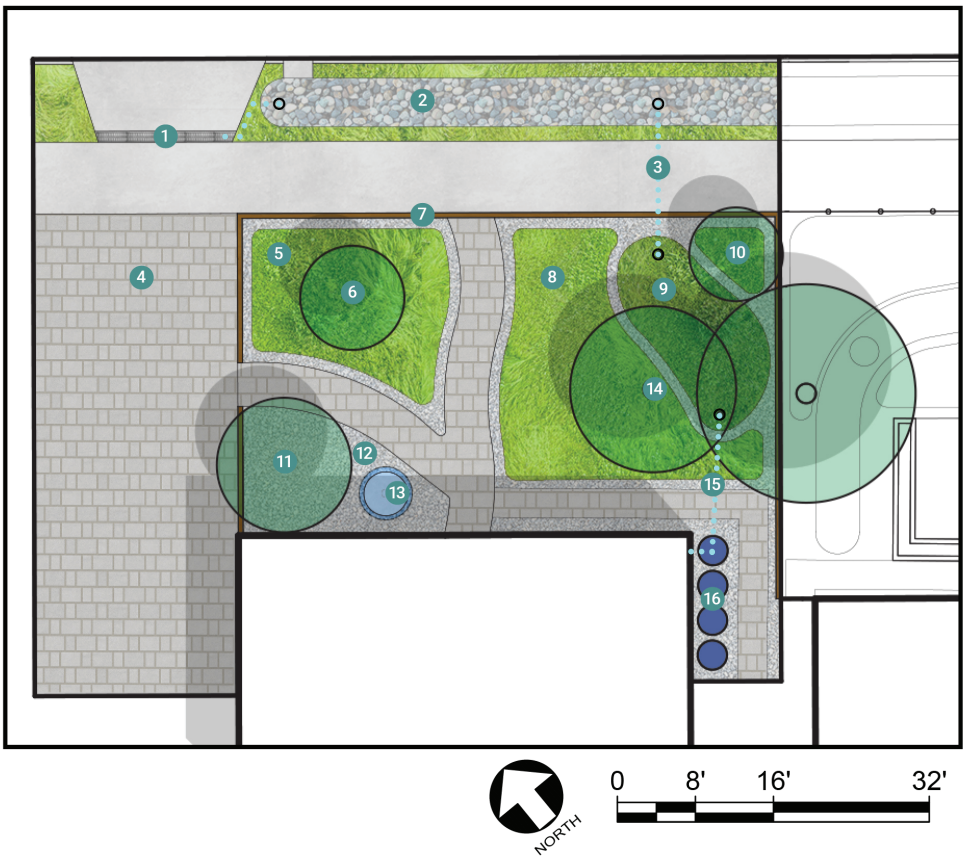
A small water feature in the entry area offers a chance for birds to bathe and for people inside the house and out to enjoy the soothing sounds of running water.

Pea gravel lines the paths and mulched planting areas keep the soil healthy and capture and store additional water.

Planting includes showy garden favorites like Western Redbud, California Lilac, California Fuchsia, and Matilija Poppy. The rain garden uses higher water use plants that tolerate shade, because of there location, using Hummingbird Sage and Douglas Iris. Arroyo Lupine seeded throughout the planting beds ensures beautiful and dramatic spring blooms.

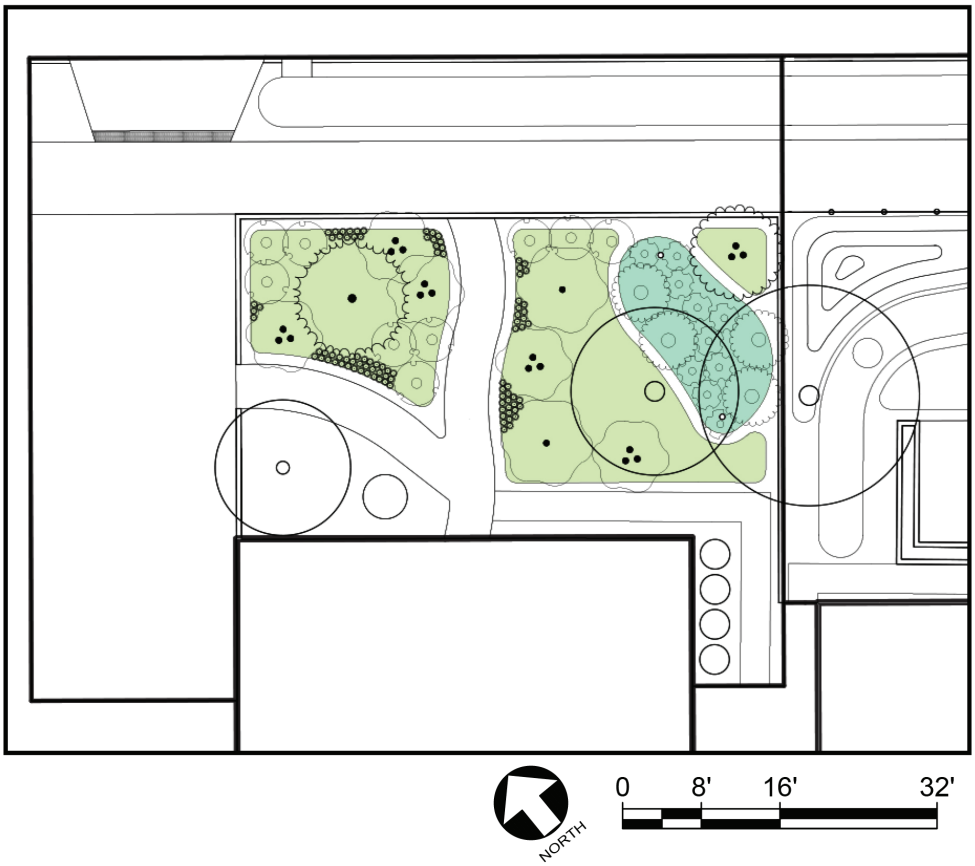
Rendering of a drought-tolerant cottage style front yard

SITE PLAN



1. French Drain to Swale
2. Vegetated Swale
3. Pipe from Rain Garden to Swale
4. Permeable Quarry Stone
5. Mulched Planting Area
6. New Ornamental Tree
7. Split Rail Fencing
8. Planting Area
9. Rain Garden
10. New Ornamental Tree
11. Existing Fruit tree
12. Pea Gravel
13. Water Feature
14. Existing Fruit Tree
15. Pipe from Rain Barrel to Rain Garden
16. Rain Barrels

PLANTING & HYDROZONE PLAN



WUCOLS Rating: Med

WUCOLS Rating: Low

PLANT SCHEDULE

TREES	CODE	BOTANICAL NAME	COMMON NAME	QTY
	CER OC2	Cercis occidentalis	Western Redbud	1
	HET AR2	Heteromeles arbutifolia	Toyon	1
SHRUBS	**CODE**	**BOTANICAL NAME**	**COMMON NAME**	**QTY**
	CEA CON	Ceanothus x 'Concha'	Concha Wild Lilac	5
	EPI HUM	Epilobium canum	California Fuchsia	9
	IRI IRI	Iris douglasiana	Douglas Iris	10
	LUP SUC	Lupinus succulentus	Arroyo Lupine	seeded
	ROM COU	Romneya coulteri	Matilija Poppy	2
	SAL SPA	Salvia spathacea	Hummingbird Sage	4

MAWA (Maximun Allowed Water Allocation)	**23725.42 gal**
ETWU (Estimated Total Water Use)	**6095.75 gal**

MWELO MATE Compliant

LOT J - NATIVE STYLE

The orientation of this yard directly into the sun, suggested that sun loving natives would be best applied to this lot. Hyper-local California natives, local to San Fernando were selected for their ease of maintenance and availability as well as their means of providing habitat to the birds, bugs, bees, and butterflies of the region.

The wall that formerly lined the yard is replaced by framed cattle panel fencing, allowing island morning glory to climb up. Concrete is replaced with permeable recycled concrete, which can simply be cut or broken and reused on site.

Stormwater features include rain barrels and a planted swale. A berm as well as mulching throughout the site would capture add store additional water.

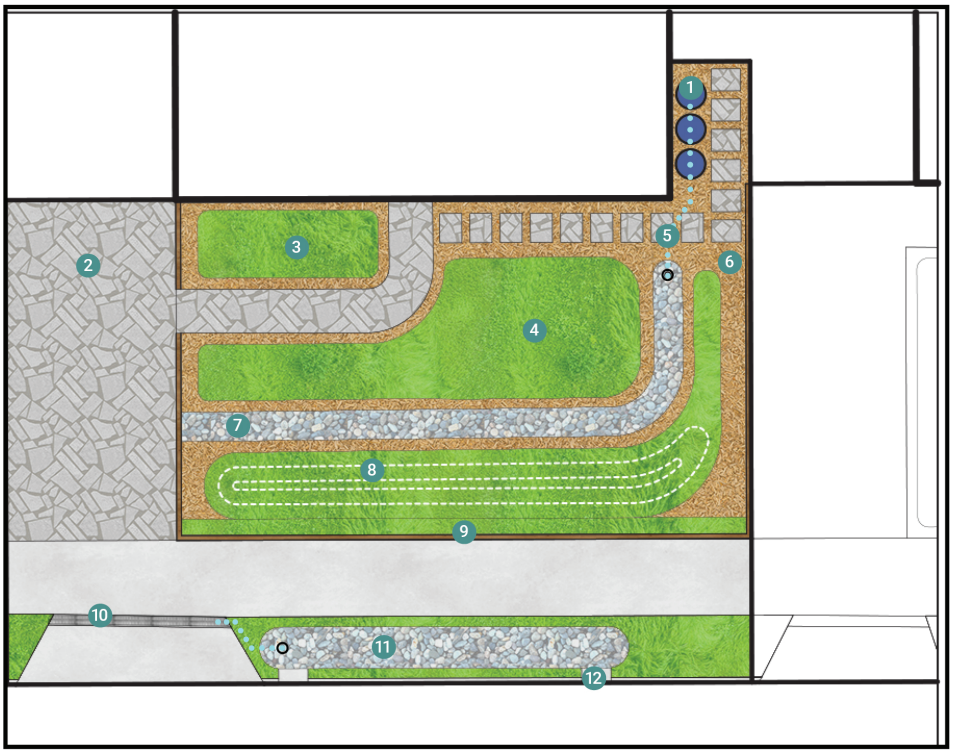
Plants are adapted to the region and need very little summer water, in fact, too much summer water can harm these plants. Planting beds are all rated very low water rating by WUCOLS and around the swale and fencing, planting areas are rated medium. Grass in the swale should already benefit from additional water from the swale but island morning glory along the fence would benefit from additional water.

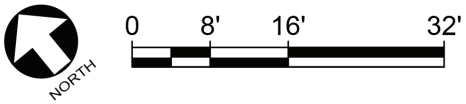
A small lawn was considered for this site, however, the designer wanted the community to consider the possibility of children playing in a garden, rather than considering it a place that should not be touched or stepped on, planting can provide opportunities for play, interaction with nature, and stimulation from the smells, textures, and colors that would be present year round.

Native manzanita, buckwheat, deer grass and California poppy (the state flower), and coffee berry would position this yard as a crucial piece of habitat that could help create a mosaic to shepherd native species across the urban landscape.

Rendering of a drought-tolerant native style front yard

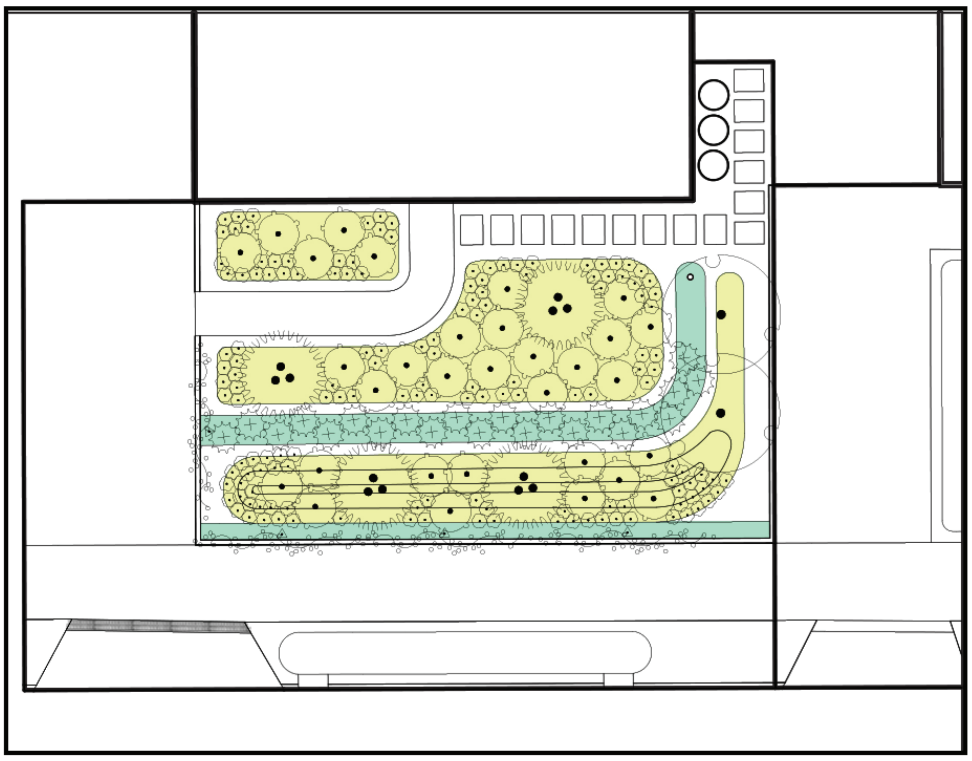
SITE PLAN

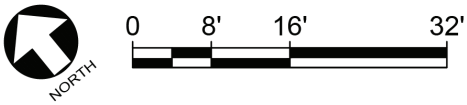




1. Rain Barrel
2. Permeable Recycled Concrete
3. Mulched Planting Area
4. Mulched Planting Area
5. Pipe from Rain Barrel to Swale
6. Mulch
7. Vegetated Swale
8. Mulched Berm
9. Wood Fence w/ Mounted Cattle Panel
10. French Drain w/ Pipe to Swale
11. Vegetated Swale
12. Curb Cut

PLANTING & HYDROZONE PLAN





WUCOLS Rating: Med

WUCOLS Rating: Very Low

PLANT SCHEDULE

SHRUBS	CODE	BOTANICAL NAME	COMMON NAME	QTY
	ARC GLA	Arctostaphylos glauca	Bigberry Manzanita	2
	CAL ISL	Calystegia macrostegia	Island Morning Glory	4
	ERI FAS	Eriogonum fasciculatum	California Buckwheat	31
	ESC CAL	Eschscholzia californica	California Poppy	seeded
	FRA CA3	Frangula californica	California Coffeeberry	2
	MUH RIG	Muhlenbergia rigens	Deer Grass	22

MAWA (Maximun Allowed Water Allocation)	**21916.75 gal**
ETWU (Estimated Total Water Use)	**4280.76 gal**

MWELO MATE Compliant

LOT K - MISSION STYLE

Influenced by the nearby San Fernando Mission, this Mediterranean style garden features a patio to accommodate up to six people, a small water feature and small raised beds for planting culinary herbs.

Stormwater management features include a vegetated swale with drywells and permeable terracotta pavers for paving, including the driveway, pea gravel lining and mulched planting beds, making the yard 100% permeable. The French drain along the driveway will catch additional water, channeling it into the parkway swale.

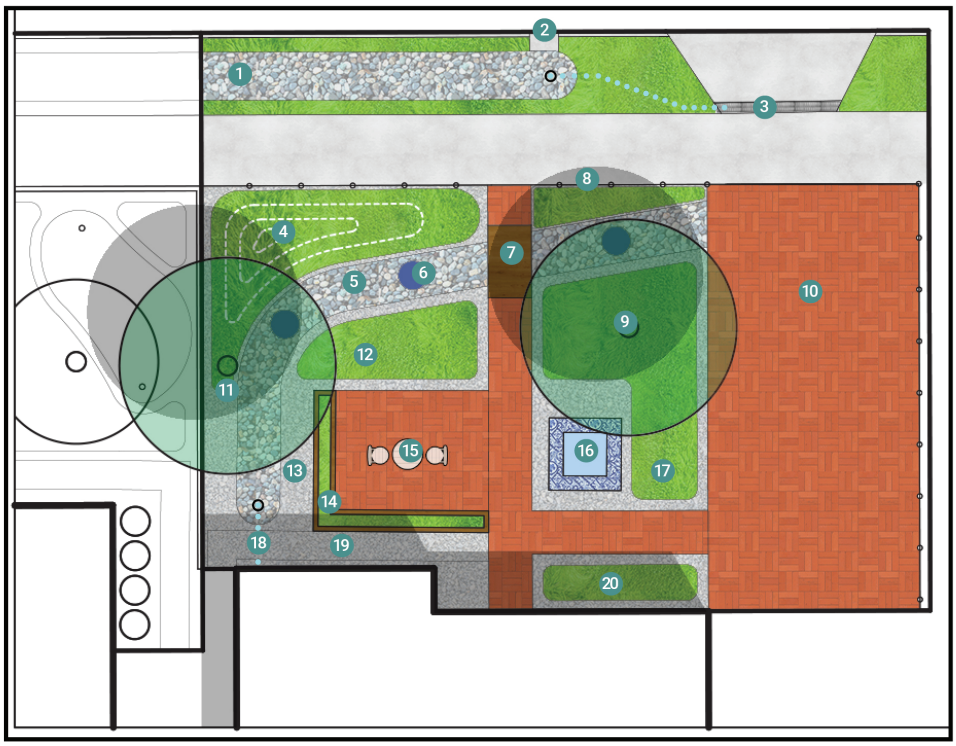
Planting was selected to reflect a Mediterranean style of planting popular in Southern California including English lavender along the paths, bougainvillea around the fencing, purple three awn in the swale, purple sage and coast rosemary to fill out the planting beds, and a specimen olive tree to provide some shade and visual interest.

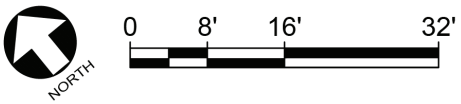
These design elements should allow for reduced water use by selecting plants that thrive with little summer water and by capturing more of the existing water that moves over the property, while retaining the unique cultural use of front yard space as a living room extension and reflecting the cultural history of San Fernando as a mission city.

Site plan includes explanation of new and existing elements to provide residents with tools to assist in front yard transformations and the planting and hydrozone plan serves as an example of the kind of plan that needs to be submitted for the SoCal WaterSmart rebate or an MWELO compliant design.

Rendering of a drought-tolerant Mediterranean style front yard

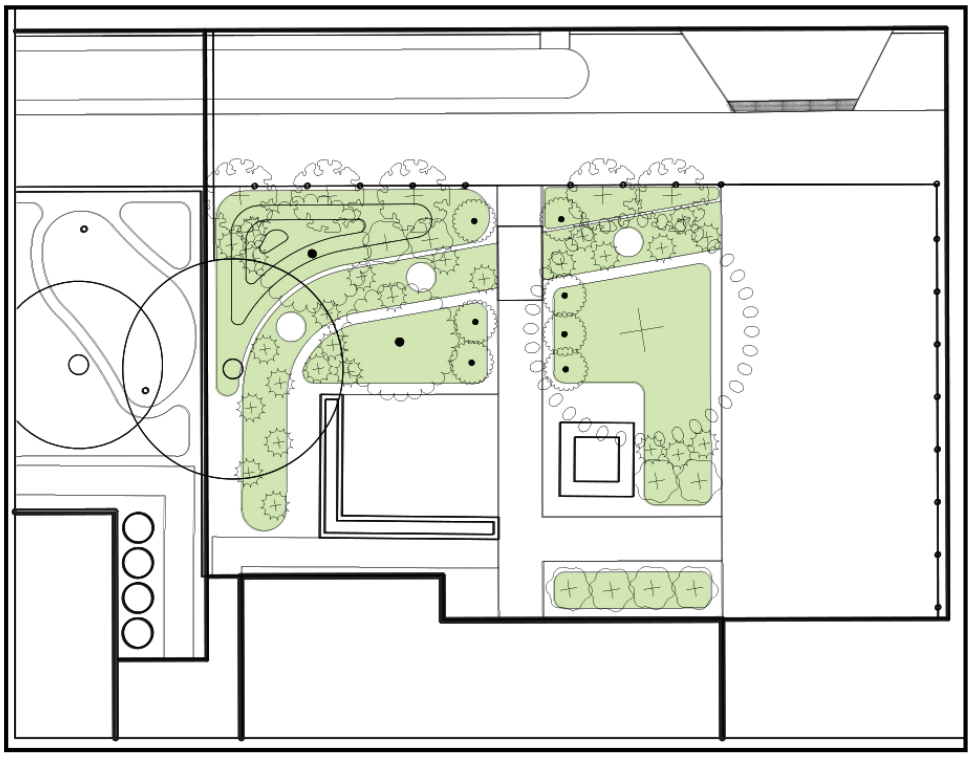
SITE PLAN

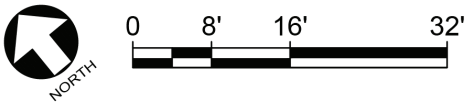




1. Vegetated Swale
2. Curb Cut
3. French Drain w/ Pipe to Swale
4. Mulched Berm
5. Vegetated Swale
6. Drywell
7. Foot Bridge
8. Steel Fence
9. New Ornamental Tree
10. Permeable Terracotta Pavers
11. Existing Tree
12. Mulched Planting Area
13. Pea Gravel
14. Raised Herb Bed
15. Bistro Dining Set
16. Water Feature
17. Planting Area
18. Pipe from Rain Gutter to Swale
19. Pea Gravel Path
20. Planting Area

PLANTING & HYDROZONE PLAN





WUCOLS Rating: Low

PLANT SCHEDULE

TREES	CODE	BOTANICAL NAME	COMMON NAME	QTY
	OLE EU2	Olea europaea	European Olive	1
SHRUBS	**CODE**	**BOTANICAL NAME**	**COMMON NAME**	**QTY**
	ARI PUR	Aristida purpurea	Purple Threeawn	26
	BOU BRS	Bougainvillea brasiliensis	Bougainvillea	5
	LAV ANG	Lavandula angustifolia	English Lavender	7
	SAL PU3	Salvia leucophylla	Purple Sage	8
	WES FRU	Westringia fruticosa	Coast Rosemary	2

MAWA (Maximun Allowed Water Allocation)	**25427.69 gal**
ETWU (Estimated Total Water Use)	**3494.66 gal**

MWELO MATE Compliant

LOT L - DESERT STYLE

This Spanish style home facing into the sun was a prime candidate for the final design presented here, the desert style.

This front yard space was designed to accommodate large family gatherings, parties, and events, with a large wood bench that surrounds permeable flagstone, replacing all of the concrete on site.

With the use of front yard space as a living room extension as an important cultural use of space in San Fernando, this design provides space for that, while still achieving MWELO compliance and allowing for visual interest and even some habitat.

The stormwater features on this site include a large cistern, rather than rain barrels. Cisterns, while more expensive, hold much more water, and look striking when used in the right context. This cistern drains into a small planted swale, which then drains into the parkway swale and is carried off-site.

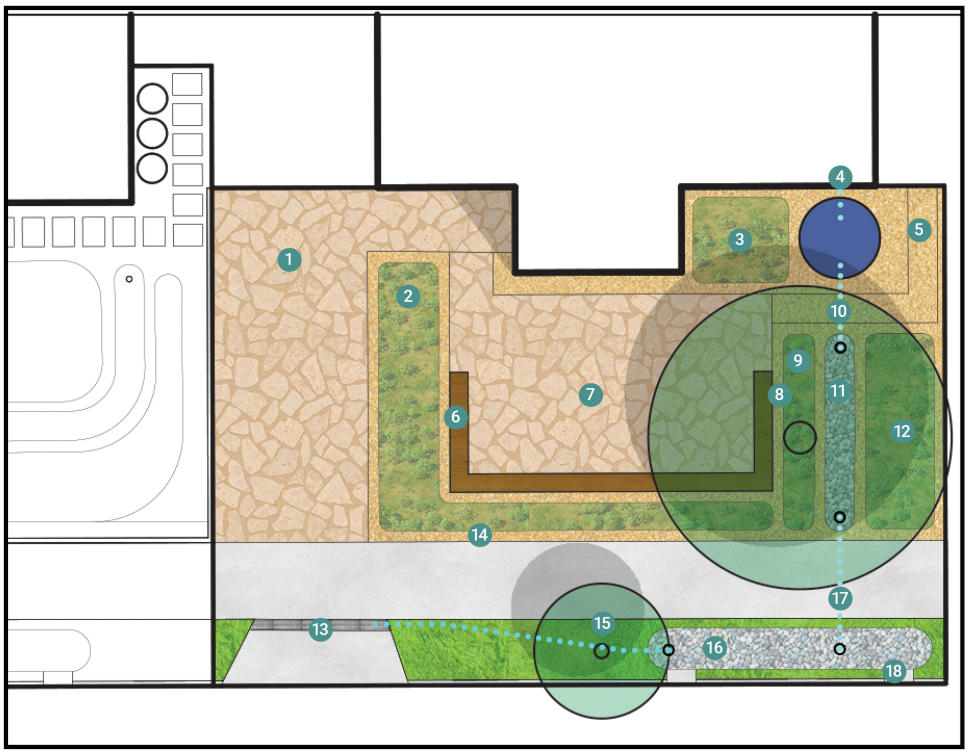
The desert planting palette in this yard is inspired by the California desert as well as popular application of the hot-dry garden style. These are extremely drought-tolerant gardens, needing very little additional water. The areas with low WUCOLS ratings surround the swale, planted with white sage, chaparral yucca, succulents, and a specimen blue palo verde tree. Very low planting beds include Spanish bayonet, agave attenuata, and coast prickly pear.

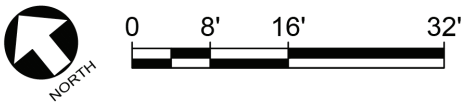
Decomposed granite is used to line paths and fill between the permeable pavers, while planting beds are mulched, again, allowing for greater retention of water.

All of the designs presented here are meant to be used as tools, mixed and matched by the community to provide the components they need to enjoy their space in a way that works best for their individual needs.

Rendering of a drought-tolerant desert style front yard

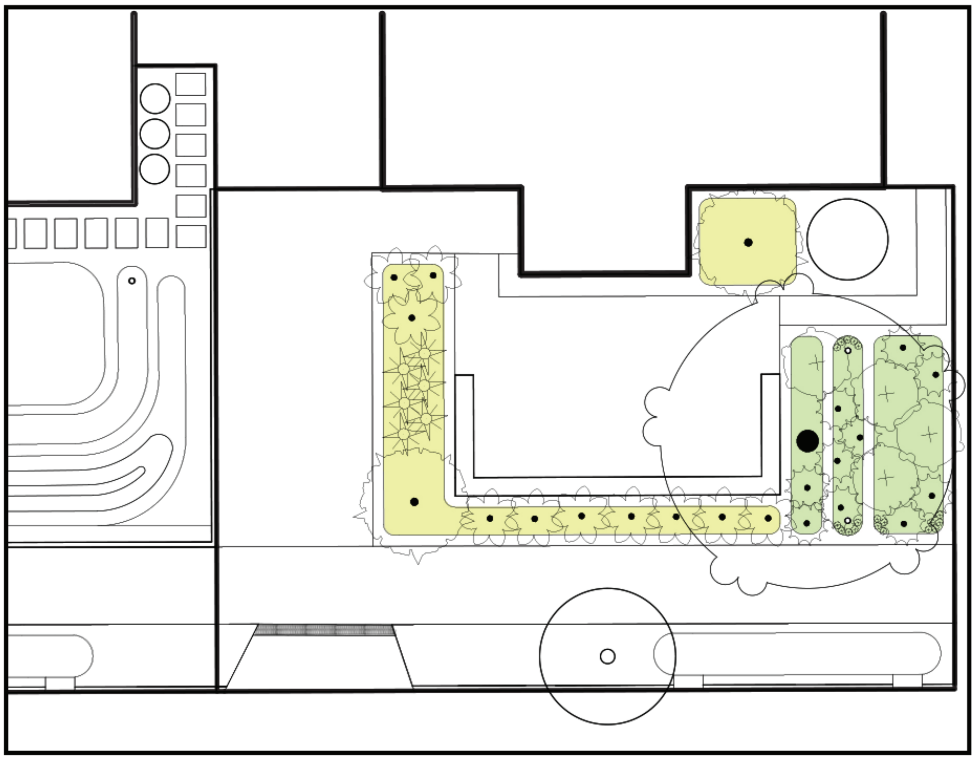
SITE PLAN

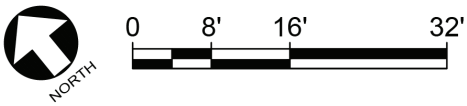




1. Permeable Flagstone Paving
2. Mulched Planting Area
3. Mulched Planting Area
4. Gutter to Galvanized Steel Cistern
5. Decomposed Granite Path
6. Wood Bench Seating
7. Gathering Area
8. New Shade Tree
9. Planting Area
10. Pipe from Cistern to Swale
11. Vegetated Swale
12. Planting Area
13. French Drain to Swale
14. Decomposed Granite
15. Existing Tree
16. Vegetated Swale
17. Pipe from Swale to Swale
18. Curb Cut

PLANTING & HYDROZONE PLAN





WUCOLS Rating: Low

WUCOLS Rating: Very Low

PLANT SCHEDULE

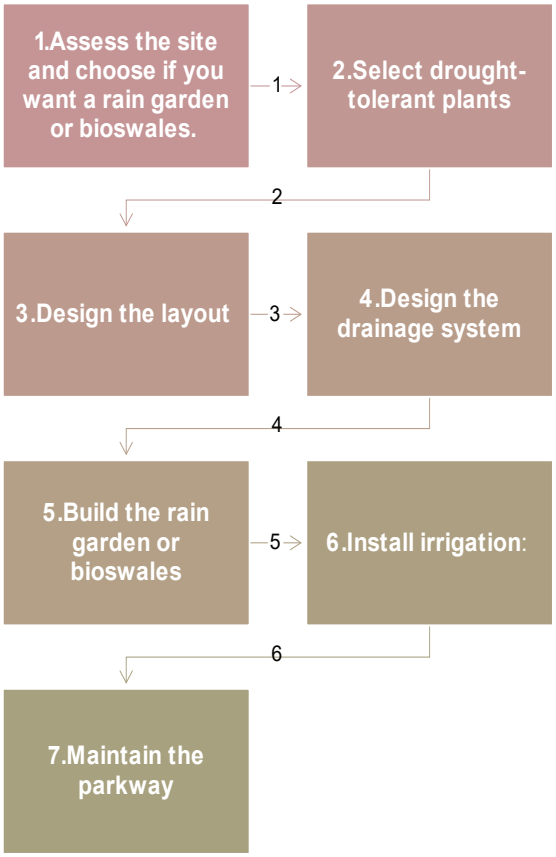
TREES	CODE	BOTANICAL NAME	COMMON NAME	QTY
	PAR DES	Parkinsonia x 'Desert Museum'	Desert Museum Palo Verde	1
SHRUBS	**CODE**	**BOTANICAL NAME**	**COMMON NAME**	**QTY**
	AGA ATT	Agave attenuata	Foxtail Agave	10
	DUD PUL	Dudleya pulverulenta	Chalk Lettuce	19
	HES WHI	Hesperoyucca whipplei	Chaparral Yucca	10
	OPU XMA	Opuntia x 'Mandarin Sunrise'	Mandarin Sunrise Optunia	6
	SAL API	Salvia apiana	White Sage	4
	YUC ALO	Yucca aloifolia	Aloe Yucca	2

MAWA (Maximun Allowed Water Allocation)	**20327.96 gal**
ETWU (Estimated Total Water Use)	**1384.33 gal**

MWELO MATE Compliant

PARKWAY DESIGNS

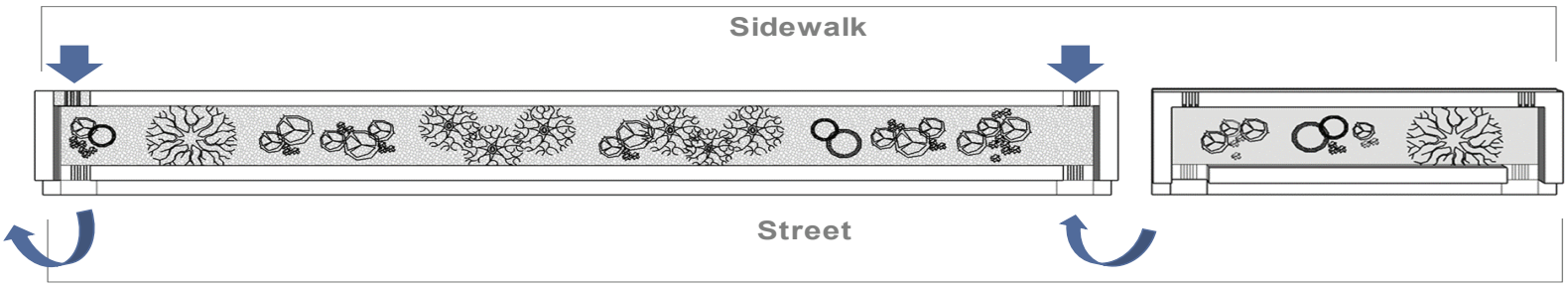
The strip of public land between the street and walkway, known as the parkway, plays a critical role in urban landscapes by providing soil volume for street trees, collecting stormwater and irrigation runoff, and enhancing the city's visual quality. However, conventional grass parkways require high levels of supplemental water and fertilization, contributing to a significant carbon footprint. To address this issue, this parkway design project aims to promote the transformation of conventional grass parkways into drought-tolerant and sustainable ones. To achieve this goal, we have developed a planting design that simplifies the transformation process. The proposed planting design focuses on the use of low-water-use plant species that can thrive in a variety of environmental conditions, while also improving the parkway's aesthetic appeal. By implementing this sustainable parkway design, property owners can contribute to the reduction of their carbon footprint and enhance the overall quality of the urban environment.

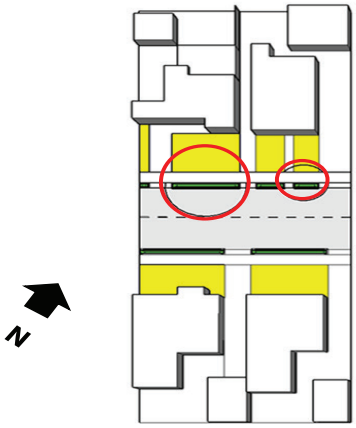


A Step-by-Step Process for Bioswales creation with Drought-Tolerant Plants and Efficient Drainage Systems.

3D Visualization of a Drought-Tolerant Parkway Design.

SITE AND PLANTING PLANS

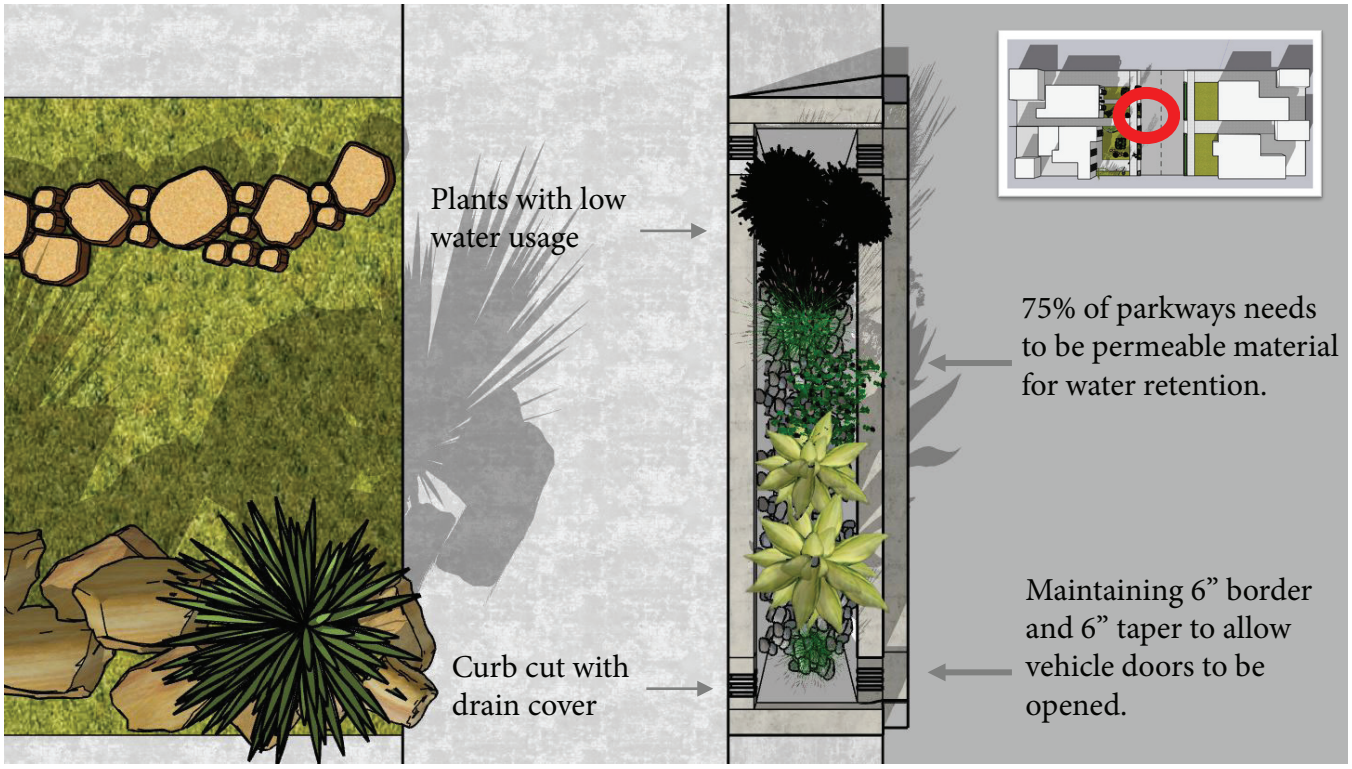




Plant List

- Western Redbud
- Seaside Daisy
- Fox Tail Agave
- Canyon Gray Sagebrush
- Our Lord's Candle

DETAIL PLAN



A Close-Up View of a Drought-Tolerant Detailed Design

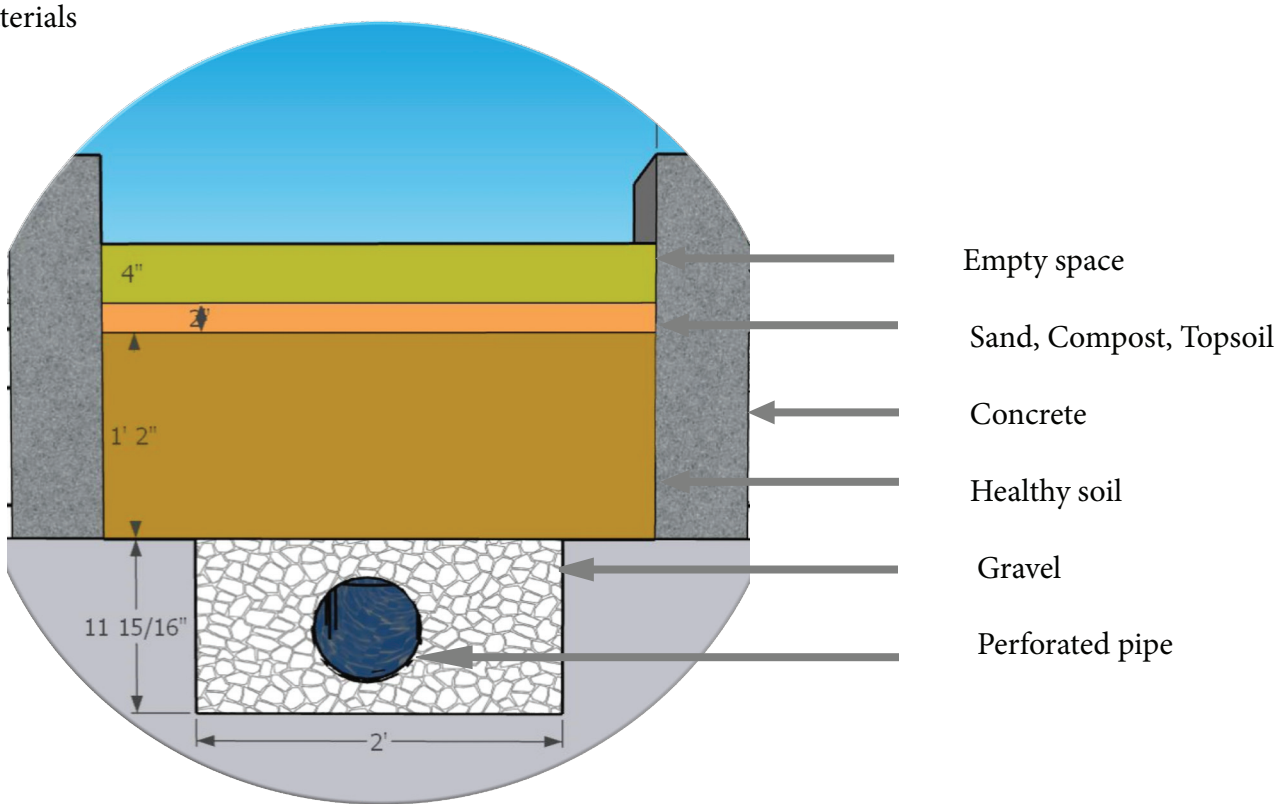
The drought-tolerant parkway design features a list of resilient plant species adaptable to limited water resources, such as Lord's Candle, Seaside Daisy, Canyon Gray Sagebrush, Fox Tail Agave, and Western Redbud. It also incorporates sustainable water management strategies, including curb cuts with drainage leading water into the bioswale, creating a self-sustaining water system. The design aims to create a beautiful and resilient parkway that reduces water usage and encourages the growth of a healthy and diverse ecosystem. The parkway design features curb cuts with drain covers placed in strategic locations to facilitate water flow into the bioswale.

such as gravel or porous concrete, allowing water to infiltrate the soil and promoting healthy plant growth. To ensure functionality, a 6" border and 6" taper are incorporated into the design, allowing vehicle doors to be opened without damaging the landscaping. Furthermore, the design adheres to the requirement of having no more than 50% of the parkway dedicated to landscaping for practical and efficient use of space.

BIOSWALE DETAIL

The bioswale design promotes efficient water management and healthy plant growth using a prepared soil mixture consisting of sand, compost, and topsoil. A perforated pipe is installed to ensure effective drainage and divert excess water The design includes 75% permeable materials

to a basin or stream outlet, encouraging water infiltration into the bioswale.



Nature's Filter: A Bioswale in Action

GUIDELINES FOR PLANTING TREES IN STREETS

Proper spacing is crucial when planting trees in streets. Large trees should be spaced 30-35 feet apart, while smaller trees should be spaced 20-25 feet apart to allow their canopies to touch when fully grown.

Resilient and Sustainable: A 3D View of San Fernando's Drought-Tolerant Parkway Neighborhood

PARKWAY PROPOSED IMPROVEMENTS

Sustainability of the Community through Drought-Resistant Parkway Landscaping
Front yard view, Google maps, 2022.

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