Imperial Beach Eco-City Report

Existing Conditions Report

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City Planning 675

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1 Introduction

1.1 Historical Analysis

Many of the ecological problems facing Imperial Beach today have their roots in history. As the city has evolved from an isolated beach resort to a sprawling suburb of San Diego, it has been shaped by time, context, and the interrelationships between economics, the environment and culture. Through a review of historic photographs, maps, and community archives, several themes emerged that illustrate the challenges of sustainable development in Imperial Beach: developing the landscape, moving people, and managing water. An understanding of the history of these issues is necessary to plan for a sustainable future.

Developing the Landscape

In 1887, the first American settlers came to the area now known as Imperial Beach. At the time, Southern California was in the midst of a land boom, and speculators filed for a subdivision and held a land auction with the hope of starting a new community in South San Diego. Yet, the real estate market went bust and while a few homesteads were built in subsequent years, it wasn't until 1903 that the first buildings appeared along present-day Seacoast Drive. Immediately, newcomers were faced with the problems of developing this remote outpost. The natural landscape of dunes and low-lying coastal plain with little vegetation provided few materials for construction and no protection from the sun. Water had to be transported from distant wells and in homes electricity was only used for lighting

The Edwards Wave Motor on the Imperial Beach pier reveals the history of looking for sustainable ways to generate energy for the community (San Diego Historical Center).

and ironing. Given the limited resources, builders gave little attention to tree planting and other beautification measures. Recognizing the need for local energy production (and hoping to attract visitors and financing to the beach), in 1912 the South San Diego Investment Company built a 'wave motor' at the end of the pier in order to convert the energy of the waves into electricity. Although the electric water wheel never worked, it shows how the desire for ecologically balanced development in Imperial Beach dates back to its inception. The early development of Imperial Beach highlights the long-standing challenge of planning for sustainable energy and resource use as well as creating a greener landscape.

Tent City cottages in Imperial Beach represent how reuse can generate new development in a sustainable way (South Bay Historical Society).

Befitting its isolated location, the first buildings in Imperial Beach were simple wooden structures. Many cottages were only used in the summer and had outdoor bathrooms and minimal electricity. The difficulty of transporting supplies further limited development; until 1933, the nearest paved road was in Chula Vista and materials were brought in by train and horse. Into the 1930s, Imperial Beach was mostly a cluster of buildings along the ocean surrounded by farmland, but two events that decade had an enduring impact on both the built environment and its identity. First, the Michigan Investment Company transported hundreds of cottages from Tent City, Coronado, a semi-permanent tourist community, to Imperial Beach, where they were assembled on lots and often added onto. Second, as part of the unincorporated area of San Diego County, Imperial Beach attracted people who were unwilling or unable to follow building regulations. This included both a small subculture of families living with nature along the Tijuana Slough as well as migrants coming to San Diego for defense industry jobs who were unable to afford housing and lived in temporary dwellings such as tents, trailers, and wooden shacks made from packing crates. While few of these structures are still in use today (and those that are have been remodeled several times), they remind us of how the city was shaped by informal building practices, the reuse of existing materials, and the need for affordable housing. Preserving affordability and promoting new building that touches the earth lightly remain important ecological issues in Imperial Beach.

Moving People

As the most south-westerly city in the United States, geographically closer to Tijuana than San Diego, access to Imperial Beach has always been an issue. Palm City, the closest railroad stop, was two miles to the east and regular flooding of the Tijuana River made dirt roads impassable for wagons. While early maps of the region show clean subdivision lines from the San Diego Bay to the Tijuana River, no one had established a consistent way to move people to and from Imperial Beach (an earlier rail line, built to connect the neighboring community of Oneonta to Palm City, was destroyed by floods). In 1910, however, E.A. Babcock, owner of the Hotel Del Coronado, dredged a canal through San Diego Bay and began operating a ferry connecting Coronado to South San Diego. Passengers arrived by boat at the bayside landing and then boarded a streetcar that took them south to Palm Avenue and west to the cottages along the ocean, allowing them to enjoy a

Early transportation by ferry and streetcar illustrate the importance of moving people between and within Imperial Beach (San Diego Historical Society).

relaxing trip to the beach. Although the ferry was abandoned when the canal was filled with silt after the floods of 1916, Babcock's vision offers a glimpse of a sustainable transportation model for Imperial Beach: a central external connection point with regular service to Coronado (and San Diego) linked to an electric-powered internal circulation system. As illustrated by this artifact, the problem of moving people into, out of, and within the community is embedded in the history of Imperial Beach.

Sprawling development results in a car-dependent society that is unsustainable (San Diego Historical Society).

The widespread adoption of personal automobiles and a national road building program in the 1950s ultimately solved Imperial Beach's access problem. By the end of that decade, new subdivisions of single-family homes with driveways filled in the former farmland between the coast and the new highway to the east. Yet, while residents could now easily reach the rest of San Diego County and Imperial Beach's new 'Miracle Shopping District' at 9th Street and Palm Avenue in their cars, this created new issues for the community. As more and more people drove to reach their destinations, planning for car travel became the most important priority. Traffic engineers widened roads to ensure swift vehicle movement, resulting in streets that are less safe for bicyclists and pedestrians. A photograph of Central Elementary School from 1955 shows hundreds of bicycles parked outside the school on a street with only a handful of cars; today the situation is the opposite. Furthermore, reliance on personal automobiles poses an environmental threat. Recent climate change reports show that while 2016 greenhouse gas emissions in California dropped below 1990 levels, emissions from personal automobiles are rising, a result of car-dependent development in cities such as Imperial Beach. Yet, Imperial Beach is a compact community of only four and a half square miles where most internal trips are less than a mile that could be made on foot or bike if better infrastructure were in place. The legacy of auto-centric planning, however, presents a challenge to increasing pedestrian and bicycle travel.

Managing Water

Imperial Beach is surrounded on three sides by water: San Diego Bay and the Otay River to the north, the Tijuana River Estuary to the south, and the Pacific Ocean to the west. From the beginning, water proved both an attraction and a destructive force. Oneonta, one of the earliest communities in the South Bay, was established as a fishing village on the north bank of the Tijuana River on what is today Ream Field. However, the town was ravaged by floods, first in 1895 and later in the historic flood of 1916 that destroyed most of the buildings in the village (the remaining outlying structures became part of the town of Imperial Beach). Meanwhile, construction of the pier in

A house floating in the Tijuana River during the Great Flood of 1916 demonstrates the need to plan for flooding and manage water runoff (San Diego Historical Society).

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1909 successfully enticed tourists to the area and development sprung up along First Street, which is now known as Seacoast Drive. Unfortunately, a major storm destroyed the original pier in 1948, and still today, flooding from tidal activity remains a persistent threat; Mayor Serge Dedina estimates that 30% of parcels and 40% of roads in Imperial Beach are vulnerable to flooding. As climate change brings about sea level rise, the danger of coastal flooding and shoreline erosion becomes even more pressing, calling attention to the issue of planning for sustainable land use.

A standoff between Mayor Brian Bilbray and environmentalists, including current mayor Sergio Dedina, highlights the challenge posed by sewage runoff from the Tijuana River to the ecological health of Imperial Beach (South Bay Historical Society).
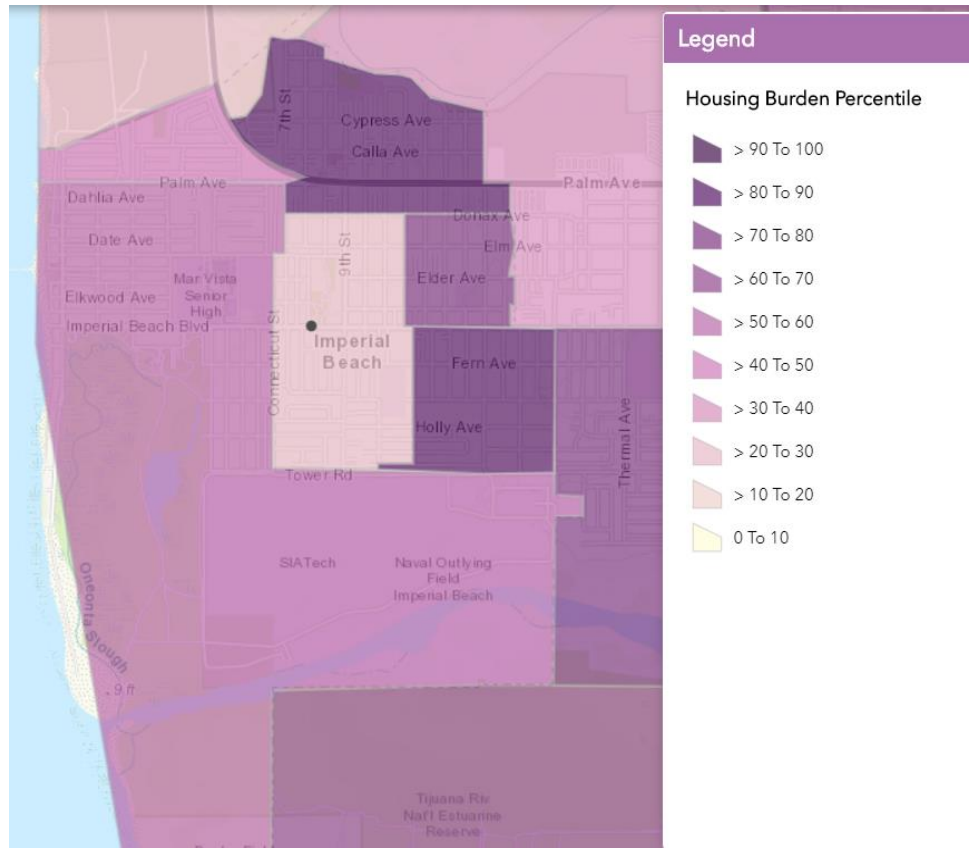
While some consequences of flooding and coastal erosion can be solved by developing outside of the floodplain, a new problem arose as a result of the growth of Tijuana, Mexico. As early as 1934, the International Boundary Commission investigated the issue of sewage flowing from Tijuana, a situation that only worsened as infrastructure failed to keep up with development that spread up the bare hills of the river valley and covered more ground with pavement. International efforts to treat or stop the sewage flow proved inadequate, prompting the City of Imperial Beach to take action; following heavy rain storms in 1980, millions of gallons of raw sewage poured down the Tijuana River, which led then-mayor Brian Bilbray to attempt to block the mouth of the river with a dike. Ultimately, his plan failed (due to environmental concerns), but his actions set the stage for Imperial Beach to take an influential role in managing water runoff, including its latest effort to sue the federal government over their failure to prevent sewage outflows for Tijuana. Although polluted water overspills from Mexico remains the biggest water quality problem in Imperial Beach, improving local stormwater management is also key to maintaining the health of the surrounding waterways. Previous auto-centric development increased the amount of impervious surfaces and eliminated natural drainage. With more hard surfaces unable to absorb precipitation, stormwater overburdened the conveyance system, causing erosion and sediment loss in brackish marsh waters, while concrete channels built to drain low-lying areas carry runoff directly into open water. With sources both locally and internationally, stormwater pollution has been a long-term problem for Imperial Beach.

- Timothy Briggs

Housing Affordability

Traditionally, the percent of income spent on household expenditures is used to measure housing affordability. In the United States, housing costs that exceed 30 percent of household income are considered an indicator of a housing affordability problem. In Imperial Beach, the average household in Imperial Beach spends about 29% of their income on housing, just shy of the 30 percent threshold. However, housing costs are not distributed equally across the population, and some households are housing burdened— they are both low income and have high housing costs. As measured by the percent of households making less than 80% of their county's median family income and paying greater than 50% of their income for housing costs, two of the six census tracts in Imperial Beach rank in the bottom 20% of the state for housing affordability with over a quarter of households considered housing burdened. Taken together, these indicators show that the community as a whole is at risk of becoming unaffordable, while the large percentage of housing burden households demonstrates the need to preserve and expand affordable housing for low-income households.

Map: CalEnviroScreen

-    Timothy Briggs

Air Quality

Much of Imperial Beach is currently rebounding from poor air quality. To accurately quantify air quality, ozone is used as an indicator as it is the main component of smog, where pollutants are caused by automobiles, industrial factories, and construction. At ground level, these pollutants react with oxygen-containing compounds and form ground-level ozone. Based upon monitoring done by the California Air Resources Board (CARB), collected data shows that ozone levels are improving and the average level of ozone is
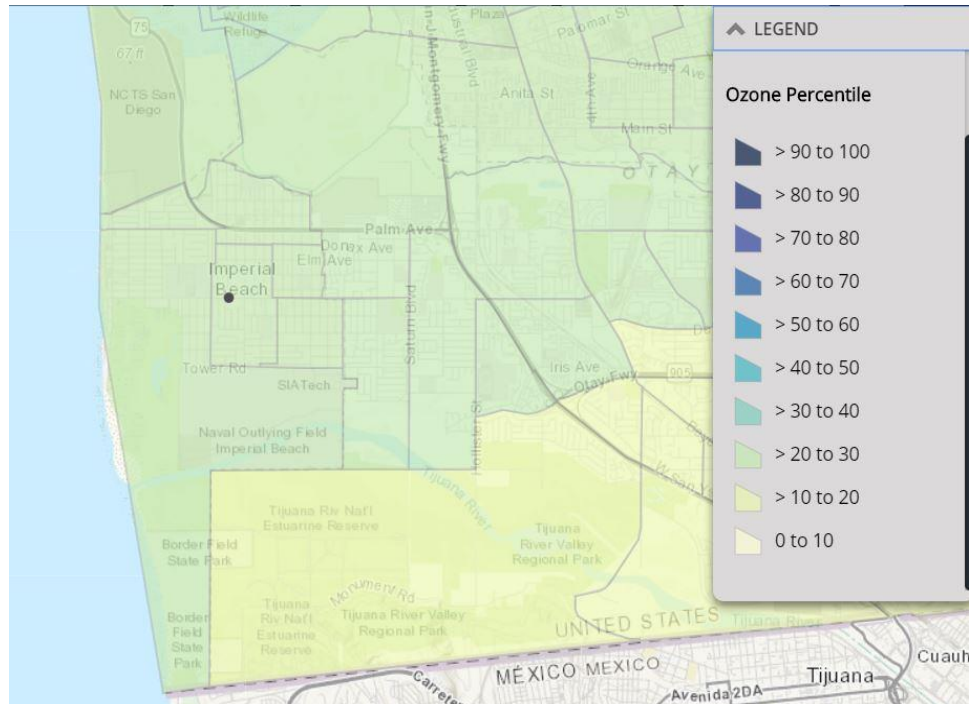
Map: CalEnviroScreen.

represented in the 22nd percentile in relation to other California census tracts. Notably, ozone is the most widespread and significant cause of air pollution health threats, contributing to health conditions such as irritation, inflammation, and chronic illnesses. Current asthma rates in Imperial Beach act as a snapshot in time of what air quality has been in the past, putting Imperial Beach at an averaged 67th percentile for asthma conditions compared to other California census tracts.

- Brittany Cabeje

Water Quality

Among many factors that involve the quality of water, one determining influence is the infrastructure that a city operates. Pollutants such as hazardous waste, gasoline, heavy metals and sometimes wastewater, can be leaked through poor infrastructure where contaminants have potential to pollute soil and groundwater from leaky storage tanks. Using the monitoring system provided by the State Water Resources Control Board, Imperial Beach scores an average of the 33rd percentile of groundwater threats compared to other California census block tracts. However, one should note that high scores in Imperial Beach exist, showing tracts that are in the 64th, 50th, 47th, 46th, and 43rd percentile. Most perilous though, is the Impaired Water Bodies indicator. These include streams, rivers and lakes that contain polluting contaminants that negatively affect aquatic habitats and wildlife, as opposed to the general population that is mainly affected by groundwater threats. Impaired waters put Imperial Beach at an averaged 65th percentile. It should be noted that the highest percentages fall around the southern border and throughout the City, where the Tijuana River runs including multiple 100th and 90th percentiles.

- Brittany Cabeje
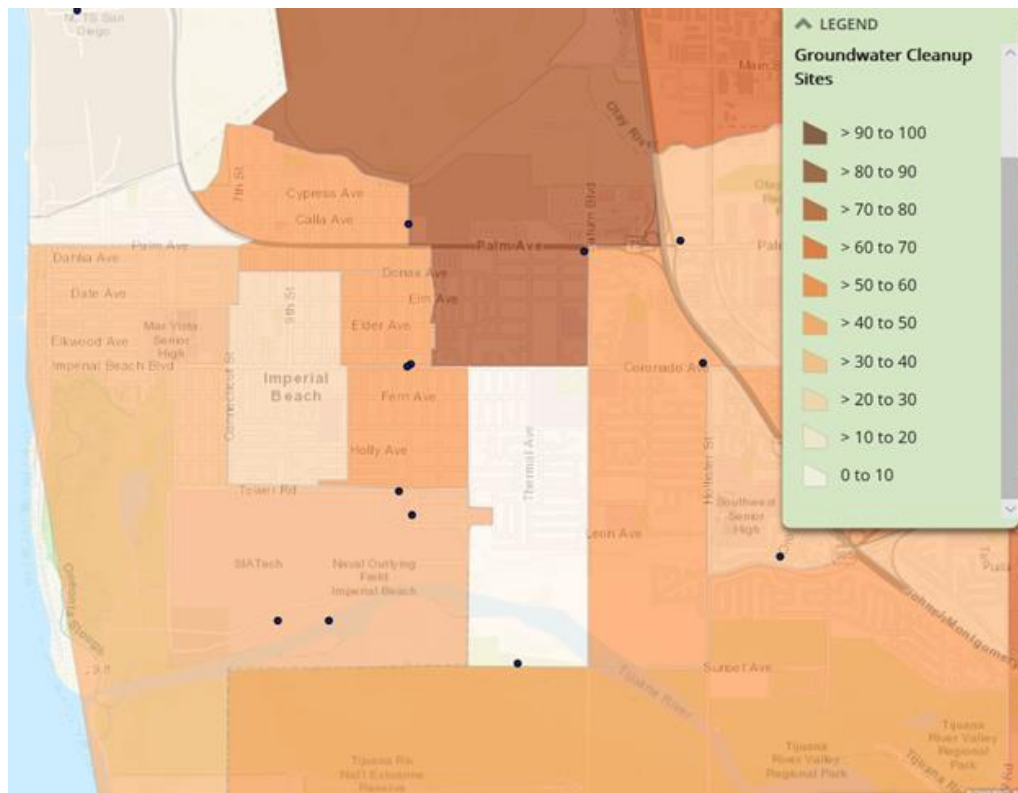
Map: CalEnviroScreen.

Vehicle Miles Travelled (VMT)

Prior to the adoption of Senate Bill 743, one of the metrics for a project's environmental impact under the California Environmental Quality Act (CEQA) was level of service (LOS). Due to the focus on congestion relief and increased throughput, LOS inadvertently encourages the construction of high-speed arterial roads and discourages infill development. With the bill's passing, however, CEQA guidelines have been updated so that a project's impact is measured instead by vehicle miles generated, also known as vehicle miles travelled (VMT). The shift to VMT as a metric presents an opportunity for cities to create more sustainable transportation systems, since it rewards projects that promote fewer and shorter vehicular trips. In Imperial Beach, each household drives an average of 22,733 miles annually which puts it slightly below the County average of 23,853 VMT. However, while the City's overall performance surpasses the region, Imperial Beach's travel patterns remain merely adequate and the results are inconsistent across the various census block groups (CBG). While most of the City has adequate-to-poor performance VMT scores, three of the 19 CBGs had satisfactory per-household averages of less than 20,000 VMT, including an area of Seacoast Drive between the Imperial Beach Pier and Palm Avenue. These indicators highlight the benefits of increasing walkability and the need to expand mobility options and reduce the need for vehicular trips.
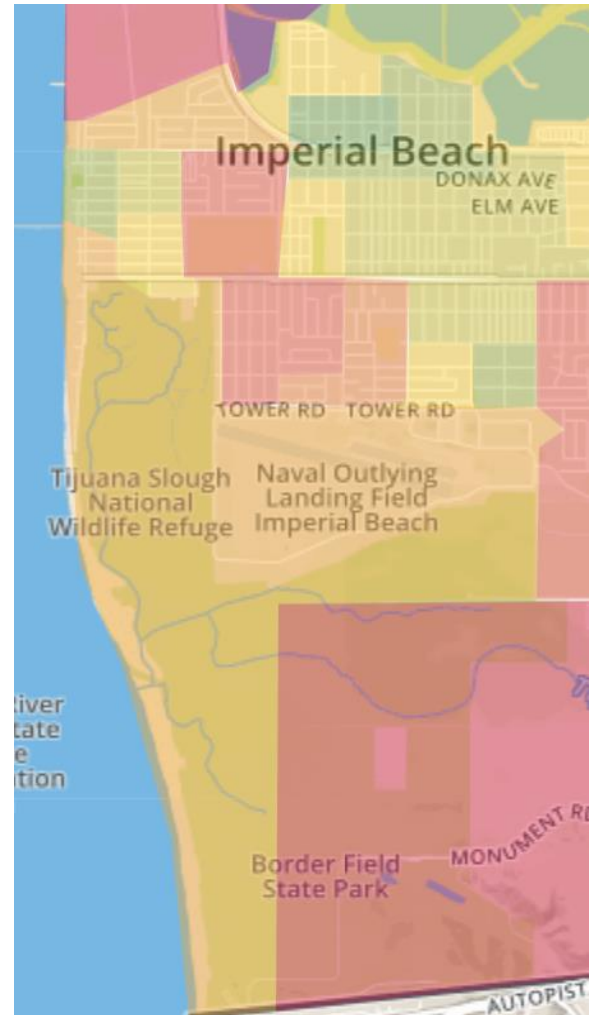
Map: Smart Growth Equity Calculator

-    Jose R. Cervantes

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Walk Score

Imperial Beach's sustainability can be partially measured by walkability indicators. For example, according to the Walk Score website, Imperial Beach is considered "somewhat walkable" with a score of 64. Additionally, as the map demonstrates, areas along Palm Avenue and around the Intersection of Palm Avenue and Seacoast Drive have the highest degree of walkability. However, because the website is primarily a real estate tool, the metric is primarily derived from the number of restaurants, bars, and coffee shops within a five-minute walk. In addition, it fails to address conditions at street level that affect a person's mode choice, such as the need to cross a major arterial with few intersections. Another metric, the Smart Growth Equity Calculator, measured walkability based on the density of intersections amongst census block groups in an area. Given its history as a streetcar suburb, the prospects for a more walkable Imperial Beach are greater due to its grid layout and high density of intersections. Both models help inform efforts to increase walkability and improve the pedestrian experience by noting strengths and weaknesses in Imperial Beach's urban form.   -   Jose R. Cervantes
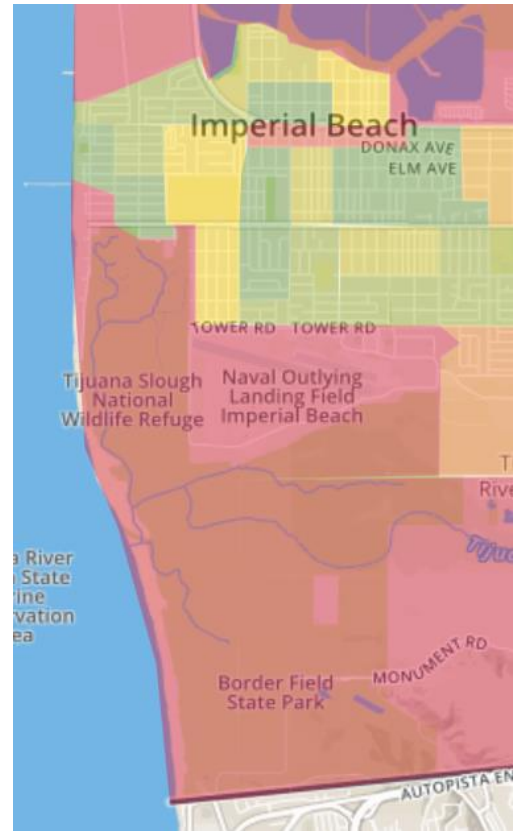
Walkability is lacking on Palm Ave/SR-75 (Map: Smart Growth Equity Calculator).
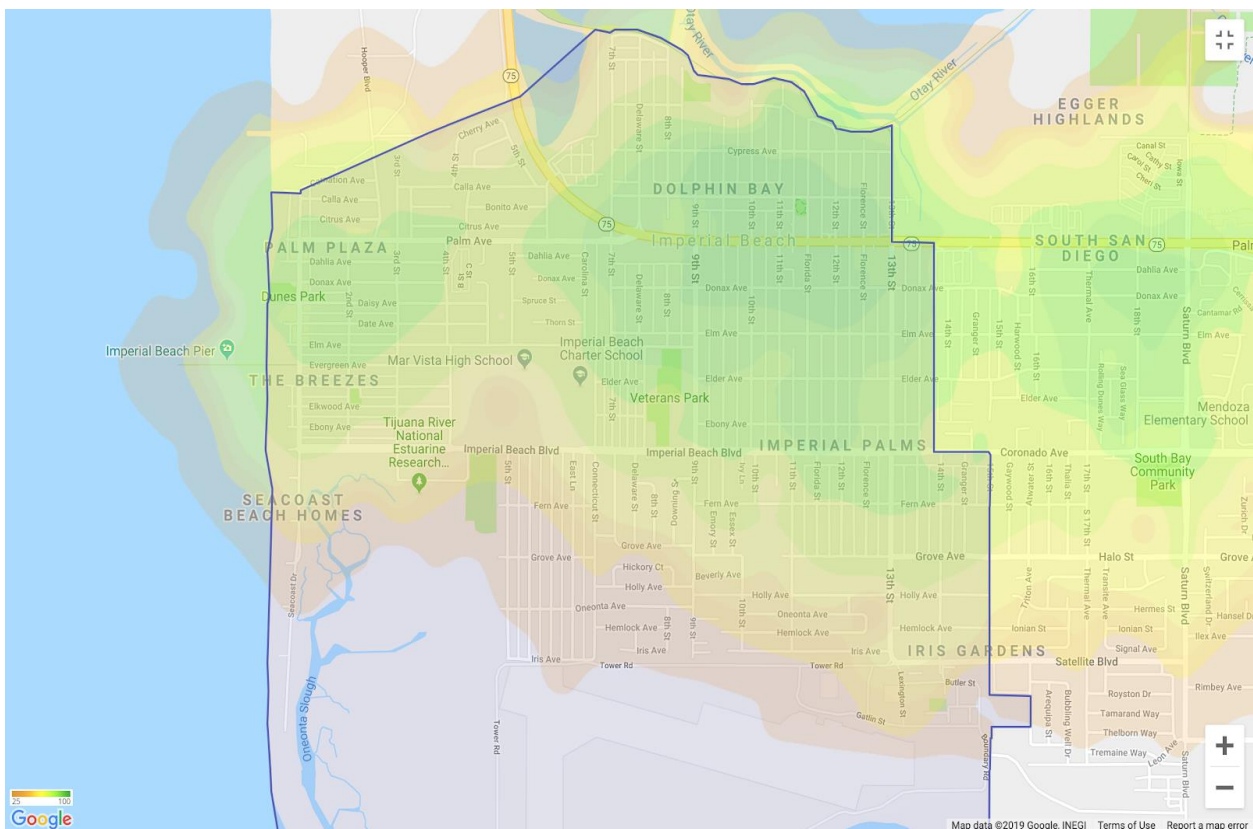
The map's indication of walkability along Palm Avenue demonstrates both the corridor's promise and the metric's deficiencies (Map: Walk Score).

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2   Stakeholder Analysis

Identifying interested parties and assessing their needs and interests is an essential step in the initial stages of a project.   Stakeholder analyses help determine what individuals, organizations, and institutions can impact or be impacted by the proposal. Additionally, the qualitative information gathered helps decision makers devise strategies for interacting with potential stakeholders and supports the implementation process. The direction Imperial Beach decides on will have impacts on a wide variety of bodies. The United States Navy, for

Ream Field (Map: US Department of Defense).

example, is a major employer in the region and Naval Outlying Landing Field Imperial Beach, also known as Ream Field, occupies a large swathe of land along the City's southeastern borders. Given its use of the Imperial Beach's streets and its control of portions of the Tijuana River Valley, the Navy has a vested interest in any changes that might affect its operations.

Other important stakeholders include environmental agencies, advocacy groups, and other government bodies. Due to its important natural assets, several environmental agencies are invested in Imperial Beach, including the National Oceanic & Atmospheric Administration (NOAA) and US Fish & Wildlife Services. Also, because of its proximity to the Mexican border, issues related to water pollution are often of bilateral concern and require coordination between various federal, state, and foreign agencies. Non-profit organizations, such as Surfrider Foundation, San Diego Coast Keeper, and Wildcoast, are among the groups who keep a close eye on the water quality of Imperial Beach. Other political entities, such as the San Diego Port District, the County of San Diego, and the State of California, administer parks and open spaces in Imperial Beach and often collaborate with the City on outreach efforts related to projects on sites they own or lease from the City.

-   Jose R. Cervantes & Reyna Ayala

Chart 2-1: Stakeholder Analysis

Interest	
• Residents • Environmental Groups • SANDAG • MTS • Tribal Representatives	• City of Imperial Beach • CA Coastal Commission • Port of San Diego • Environmental Agencies
• Historical Society	• United States Navy • City of San Diego • City of Tijuana

Power
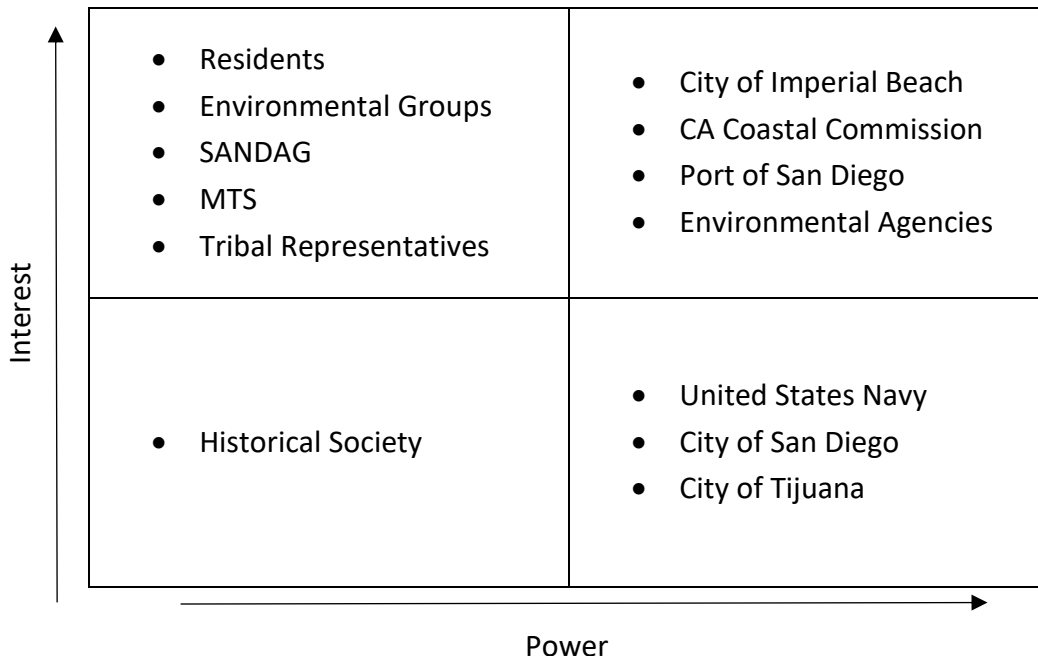
3 Eco-City Zoning

Ecocity zoning is a tool to encourage more density and infill in specific locations while preserving and restoring natural habitat in outlying areas. The goal of an ecocity zoning map is to identify walkable centers and create areas of higher intensity use in order to recover sprawling landscapes for agricultural or natural purposes. While it does not represent an official zoning of Imperial Beach, the ecocity zoning map can be used to guide development in a sustainable manner.

Local and Natural History Map

The natural and cultural history of Imperial Beach provides a starting point for ecologically balanced growth. Much of the western portion of Imperial Beach lies on top of alluvial beach deposits, and such ground conditions can be eroded by moving water. As such, restoration of the natural dunes to protect against coastal flooding is an important consideration for future development. Furthermore, natural features such as original marshes and vernal pools that have been built over are high priorities for restoration. One such seasonal pond on the present site of Mar Vista High School is located along a traditional animal migratory route used by sheep to travel from the North Island of Coronado to the Tijuana River Estuary. Early human settlements also point toward locations for sustainable growth. In addition to the cluster of buildings along Seacoast Drive, other notable early building sites include the first hotel in Imperial Beach at the corner of 9th and Calla Streets, the ferry landing at the head of 10th Street, and the one-time community of Oneonta on the north bank of the Tijuana River. While there is no trace remaining of the rail line connecting Oneonta to Palm City, the historic rail corridor along the San Diego Bay survives today as a bike path. Taken together, the historic and environmental features in Imperial Beach point the way toward areas for future restoration and development.

Figure 3-1: Local Natural History

MAP #1: LOCAL NATURAL HISTORY

KEY
- Seasonal pond
- Original marsh
- Marine sand + silt
- Alluvium + beach deposits
- Historic rail line
- Historic streetcar route
- Historic building site
- Game Trail

Map: Tim Briggs

Walkable Centers

Reversing car-centric patterns and creating a pedestrian-friendly environment requires identifying centers to concentrate growth. The intersection of Seacoast Drive and Evergreen Avenue at the foot of the pier is the nucleus of higher density and a mixture of uses within the community. Although located in an ecologically sensitive coastal zone, Seacoast Village represents the most developed center in present-day Imperial Beach. Further to the west, the retail core at Palm Avenue and 9th Street symbolizes the potential for sustainable, centers-oriented development in the future. Both the site of the first building in Imperial Beach and the pioneering shopping center that inspires its name, the Miracle District can be expanded from a commercial zone to a mixed-use hub. Lastly, in the southeast corner of the community, the intersection of Iris Avenue and 13th Street sits at the entrance to Naval Outlying Landing Field Imperial Beach. Supporting both employees at the base and nearby residents, Aviation Center is a prospective smaller, neighborhood center in the same location as the historic community of Oneonta. From these three locations, concentric circles radiate outward indicating the distance from the center and corresponding to the intended intensity of development. In the zones closest to center, representing between a fifth and a third of land area, density will increase, while in zones farthest from the center, between ½ and ¾ of land area, there will be less density in the future. By calling for the concentration of development within compact centers, ecocity zoning lays the groundwork for a walkable Imperial Beach.

Existing conditions at future walkable centers at Seacoast Village (top), Miracle District (middle), and Aviation Center (bottom). (Photos: Tim Briggs)

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Figure 3-2: Walkable Centers

MAP #2: WALKABLE CENTERS

KEY

— 1/8 mi
— 1/4 mi
— 1/2 mi.
— 3/4 mi
— 1 mile

N   1:2,000

Map: Tim Briggs
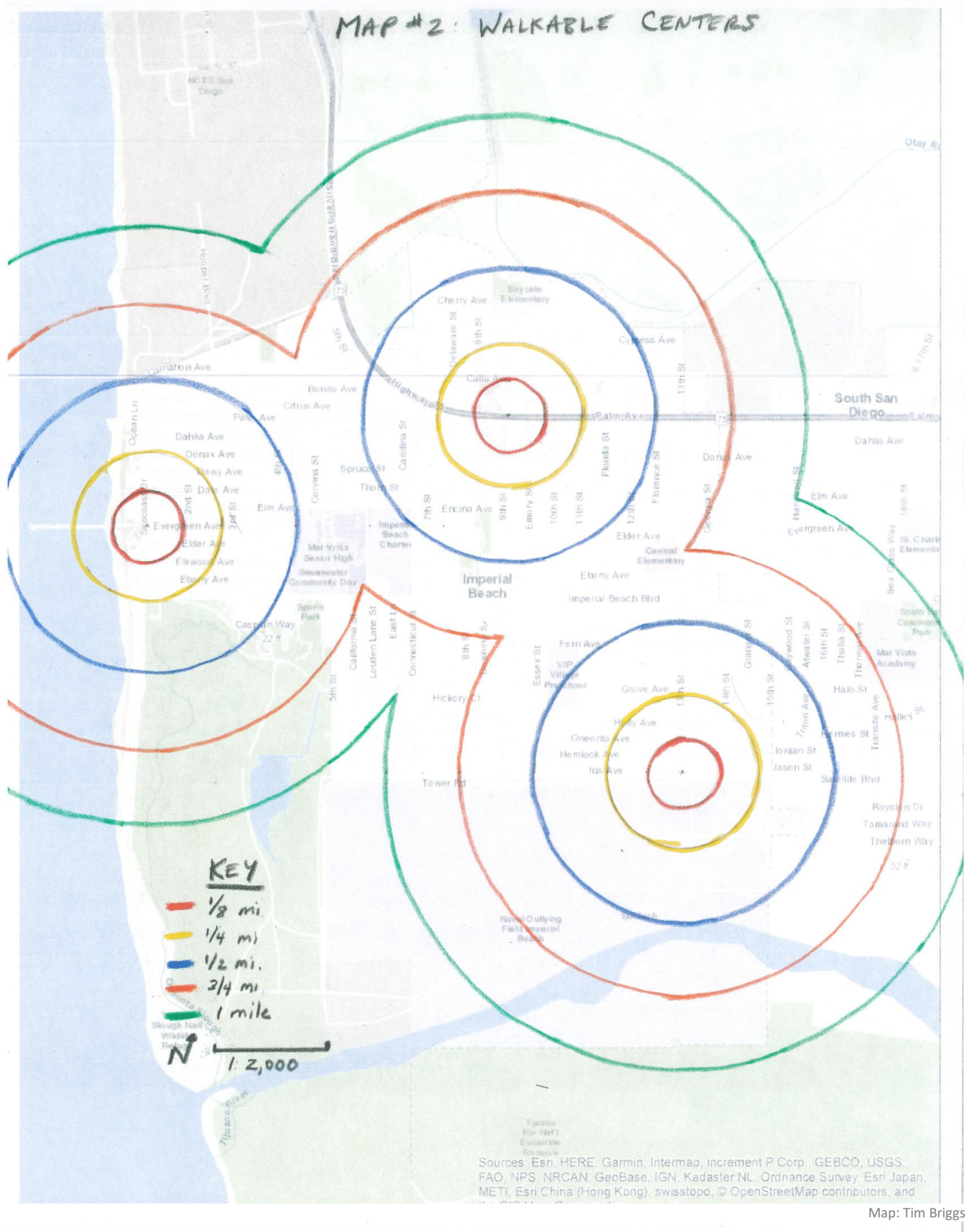
Ecocity Concept

The local and natural history map and walkable centers map create the conceptual basis for ecocity zoning. At Seacoast Village, the center excludes the coastal zone to the west of Seacoast Drive and the northern portion of the Tijuana Slough to restore these natural landscapes. Furthermore, since the areas of overlap between the concentric circles cut off natural connections between the centers, their edges are adjusted to allow for corridors and agricultural areas. For the Imperial Beach ecocity concept, the area of convergence between Seacoast Village and the Miracle District, corresponding to the location of vernal pools and an animal migratory route, is compressed at the edges to establish a nature corridor. Similarly, the western edge of Aviation Center is reduced in order to return land to agriculture use as shown in aerial photographs from the 1950s. With the edges established, higher intensity development occurs within a ¼ mile of the center, while a minimal change area extends outward ½ mile, followed by reduced density and areas designated for de-development at intervals of ¾ mile and 1 mile, respectively. Other adjustment necessary to complete the ecocity zoning concept include allowing for higher density along streets that connect centers and identifying links to rail right of ways.

Figure 3-3: Ecocity Concept Map
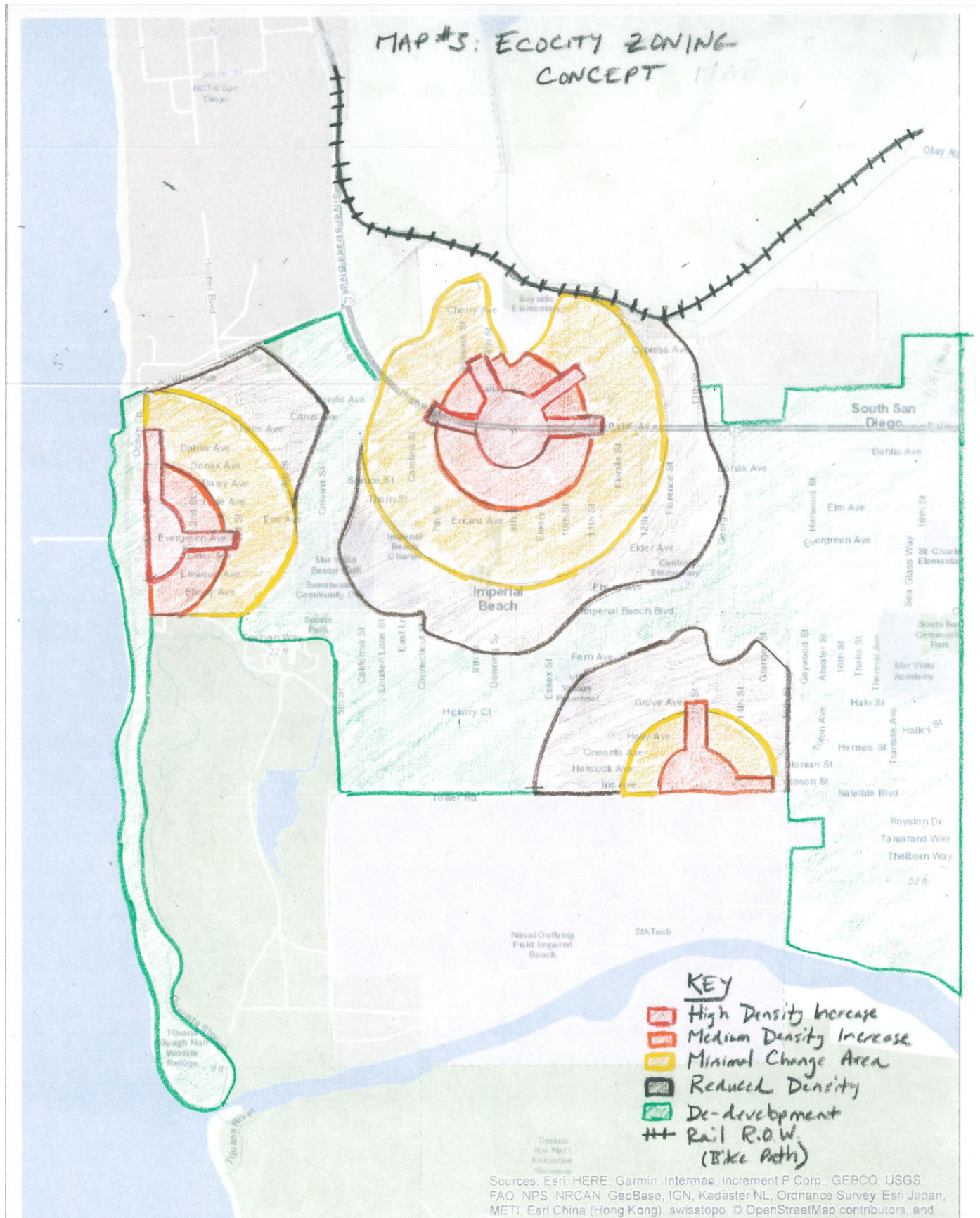
Map: Tim Briggs

Ecocity Zoning Detail

The final ecocity zoning overlay calls for refinement of the concept map along the corridors. In addition to building at the highest intensity along the roads leading into the center, development should be extended behind the corridors in order to provide the density needed to generate customers for ground floor retail and services. Since denser development will block access to the natural landscape, however, the ecocity zoning detail creates keyhole plazas to take advantage of natural view at each center; Seacoast Village looks west to the Pacific Ocean, while the Miracle District opens onto San Diego Bay, and Aviation Center offers views of the mountains to the east. Lastly, the final map

A proposed keyhole plaza would provide views to the mountains east of Aviation Center. (Photo: Tim Briggs)

adds pathways to connect nature corridors to centers. Overall, ecocity zoning presents a broad outline that encourages centers-oriented development in Imperial Beach and prioritizes reinstating land to its natural state.

Figure 3-4: Ecocity Zoning Detail

Map: Tim Briggs
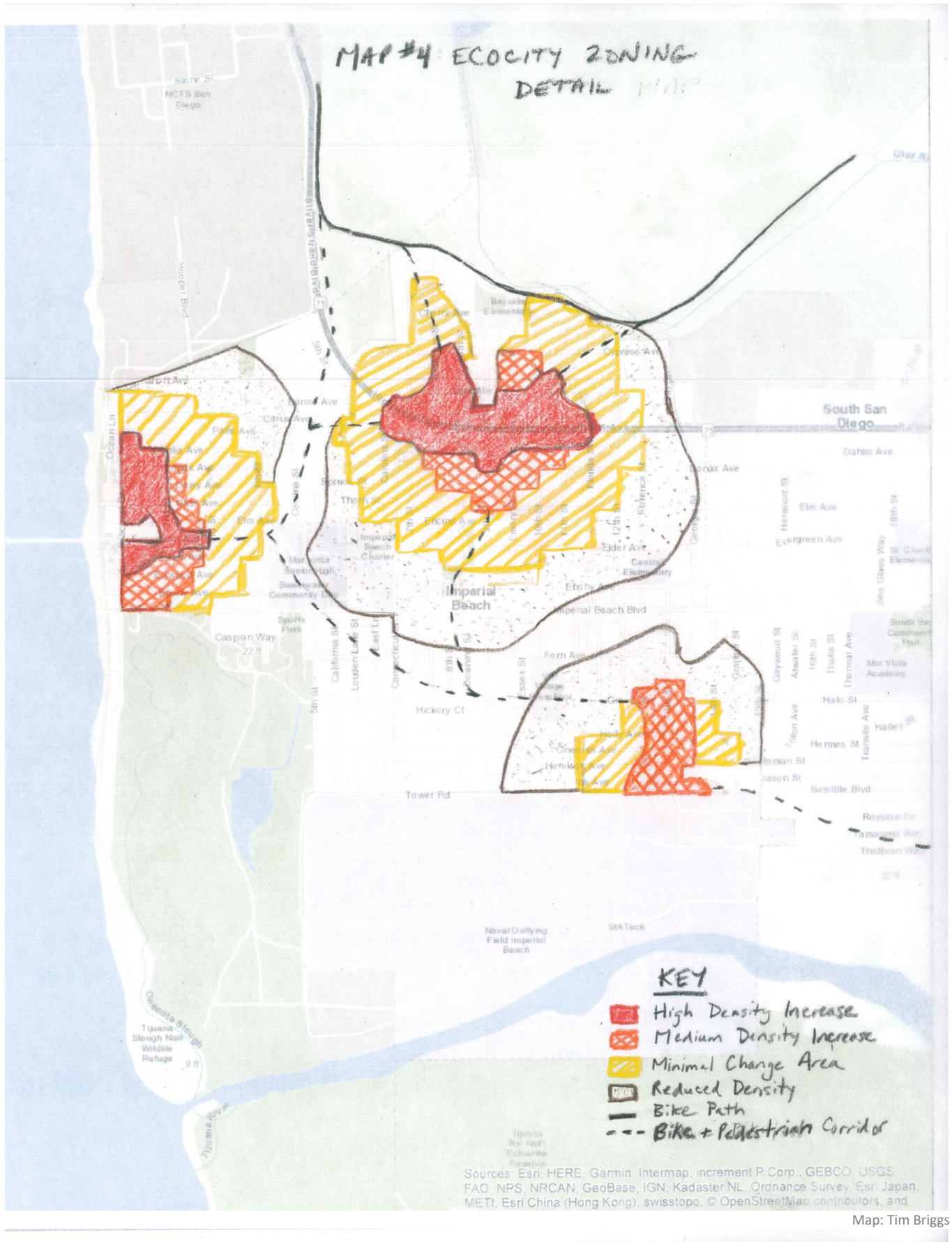
Conclusion - Where to Build

At its core, zoning encompasses the issues of where to build and what types of uses are allowed in a given location. These questions are a major concern for the smart growth movement, and are embodied in best practices for sustainability, such as the LEED Neighborhood Development Guide's smart location and linkage criteria. In essence, the ecocity zoning map aligns with these guidelines, calling for growth to occur in previously developed sites that are sensitive to the natural setting and connected to other development through transit and pedestrian pathways. Having addressed the question of where to build, we can discuss what to build when we develop these locations.

- Timothy Briggs

4 Adapting the Landscape

4.1 Neighborhood Pattern & Design

4.1.1 Ecological Audit

The Citizen's Guide to LEED for Neighborhood Development (LEED-ND) provides guidelines for how to build sustainable communities. One way to tell if a community is smart and green is the neighborhood pattern and design— what activities take place there, what it looks like, and how it feels to walk around it. Several elements contribute to neighborhood design: compact development, mixed-use neighborhood centers, walkable streets, a connected and open community, and mixed-income diverse communities. These criteria can be used to evaluate whether development in Imperial Beach follows a sustainable pattern.

Compact Development

Compact development uses land and resources more efficiently and facilitates trips by walking, biking, and public transportation. With most of its growth occurring in the 1950's and later, development in Imperial Beach is dispersed, rather than compact. Single family tract homes comprise most of the land use in neighborhoods and compared to an LEED-ND minimum density of seven dwelling units per acre for residential areas, Imperial Beach averages just eight dwelling units per acre. Similarly, single-story retail strips and shopping centers dominate the landscape along Palm Avenue, the major commercial corridor in Imperial Beach. With large amounts of space dedicated to parking, these retail areas fall short of the recommend minimum .50 floor-area ratio for non-residential districts. A notable exception to the sprawling development pattern is the area along Seacoast Drive adjacent to the Pacific Ocean, the historic heart of Imperial Beach. Higher density residential and commercial uses have replaced most of the original one-story storefronts and cottages, illustrating how future compact growth in Imperial Beach can occur.

Single family homes and shopping strips are characteristic of the sprawling development pattern in Imperial Beach. (Photos: Tim Briggs)

Mixed-Use Neighborhood Centers

A mixture of residential, commercial, and employment uses clustered together reduces the need for vehicle travel and supports a high quality of life. Currently, Seacoast Drive is the most developed neighborhood center with a moderately dense mix of housing, retail, and hotels within walking distance of each other. Seacoast Drive also connects several oceanfront public spaces including a plaza in front of the fishing pier. Yet, there are several parking lots and vacant land uses within the center, illustrating the possibility for more infill development. Beyond the oceanfront, there is potential for two other neighborhood centers in Imperial Beach. At the intersection of Palm Avenue and 9th Street, several retail centers provide shopping, service, and dining options for residents and visitors. This commercial district is separated from housing, however, and public facilities are lacking, highlighting the need for integration of other uses to create a true center. In addition, the entrance to Ream Field at the south end of 13th Street could be expanded into a small neighborhood hub by adding more commercial options and denser housing to take advantage jobs at the base within walking distance. Like Palm Avenue however, there is a need for public spaces and civic buildings to create a sense of place at this center.

Mixed use development on Seacoast Drive supports a neighborhood center, but there is still much potential for infill development on underutilized land. (Photos: Tim Briggs)

Retail forms the beginning of a neighborhood center at Palm & 9th, but the inclusion of housing and public space is needed. (Photos: Tim Briggs)

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Walkable Streets

A safe and pleasant atmosphere for pedestrians compliments a compact, mixed-use neighborhood design. On Seacoast Drive, crosswalks are painted to provide visibility and clearly marked with signs instructing drivers to stop for pedestrians. Small storefronts face the street with their windows decorated and doors open to attract customers. One can hear and smell the ocean, yet, even in this inviting environment, poor design detracts from the pedestrian experience. Blank walls face the street, cars dart in and out of small parking lots, and driveways extend right to the edge of the sidewalk. Moving east from Seacoast Drive and past 3rd Street, streets become less walkable in more recently developed neighborhoods. In addition to empty walls and frequent driveway interruptions, garage doors are the dominant feature of residential streets, and building entrances in commercial districts open to the parking lot rather than the public street. While there is sidewalk coverage and street parking in most areas of Imperial Beach, the development pattern of wide streets lined with single story structures falls short of the 1 to 3 building-height-to-street width-ratio recommended by LEED-ND. All this evidence suggests that, consistent with its history, Imperial Beach is far better designed for driving than walking.

Blank walls facing the street are common in commercial and residential areas of Imperial Beach.(Photos: Tim Briggs)

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Connected and Open Community

In addition to being walkable, streets must connect destinations within a neighborhood and to the surrounding community. Cul-de-sacs and wide, heavily trafficked streets impede access, while frequent crossings as measured by the number of intersections per square mile create a linked network of pathways for pedestrians. In Imperial Beach, neighborhoods mostly follow a rectangular grid with regular intersections that facilitate street connectivity. East of 3rd Street, however, several small subdivisions deviate from the grid pattern with dead-ends and cul-de-sacs that close off the community from adjacent areas. Large shopping centers, including the new Breakwater Town Center at Palm Avenue and 8th street, also disrupt the regular street network. Instead of opening to the neighborhood, the Town Center presents a blank wall to the community that blocks pedestrian entry. Furthermore, difficult-to-cross streets such as Palm Avenue, Imperial Beach Boulevard, 9th Street and 13th Street separate neighborhoods from each other. These barriers need to be addressed to better connect communities within Imperial Beach.


Dead-ends and cul-de-sacs create barriers to an open and connected community. (Photos: Tim Briggs).

Mixed-Income Diverse Communities

A community with a range of housing types supports people of all ages and incomes. Overall, Imperial Beach offers diverse housing options consistent with the other cities in the region; compared to San Diego, Imperial Beach has roughly the same proportion of single and multi-family housing units, although more of its single-family units are multiple homes on one lot (see chart). Notably, mobile homes comprise a relatively high number of housing units in Imperial Beach, and they provide inexpensive housing, especially for seniors. As the affordability sustainability indicator shows, however, providing housing of different sizes may not be enough to ensure affordability. There are only 165 designated affordable housing units in Imperial Beach, representing less than 2% of the total dwellings. Furthermore, while an estimated 900 new multi-family homes are expected to be added between 2020 and 2030, if current trends continue, then the number of low-income housing units added will be insufficient. The city's 2018 Housing Element Annual Progress Report compares the number of housing units permitted to the number of units necessary to meet the community's housing needs at different levels of affordability. From 2013 to 2018, Imperial Beach added 3 of 63 needed very low-income units and 32 of 48 low-income units. Furthermore, zero very low and low-income units were permitted since 2014, while 215 above moderate units were approved in the same period, indicating a shift away from producing affordable levels of housing.
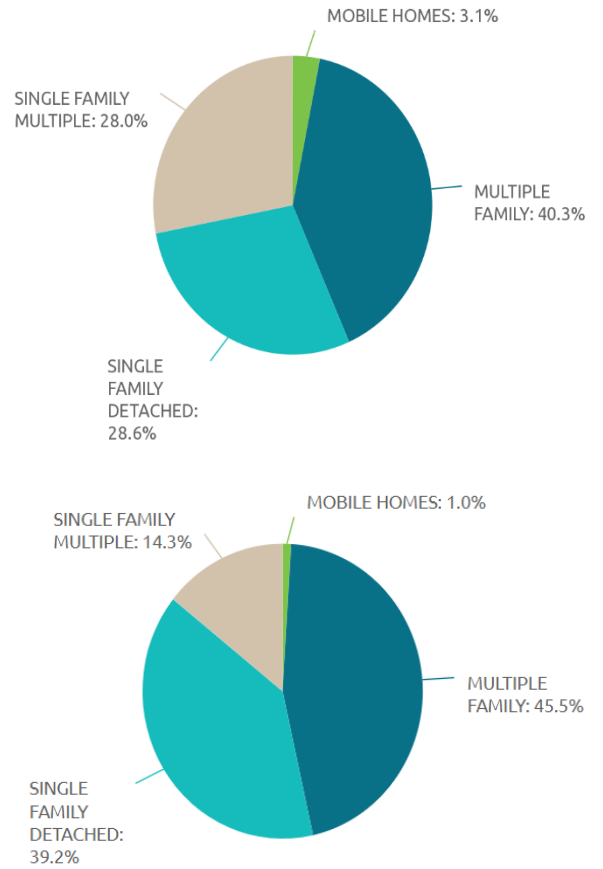
Housing Units by Type in the City of San Diego (top) and Imperial Beach (bottom). (Source: SANDAG 2016 Estimates)
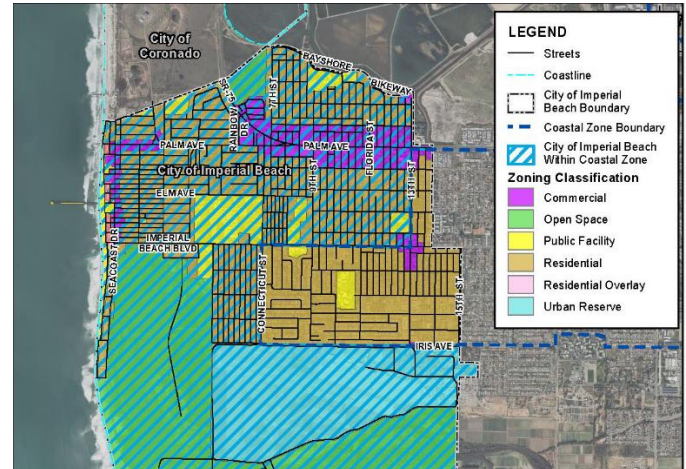

Affordable housing in Imperial Beach consists of designated units such as the American Legion Post and informal units like mobile home parks. (Photos: Tim Briggs)

Creating walkable, diverse, mixed-use neighborhoods that use land efficiently requires a long-term vision as embodied in the General Plan. The land use, design, and housing elements of the Imperial Beach plan provide a framework for future development and determine whether neighborhood patterns will be sustainable.

Land Use Element

Overall, the land use element seeks to balance retaining the small-town character of Imperial Beach while promoting tourism and economic growth in infill locations. The plan prioritizes sustainable development through mixed-use, transit-oriented development and preservation of open spaces such as the Tijuana River Estuary. Specifically, the commercial and mixed-uses areas section highlights policies to concentrate growth along major corridors, especially Seacoast Drive and Palm Avenue. Such policies encourage higher-intensity infill development to create mixed-use districts and an active streetscape with ground floor commercial uses

The land use element supports development along corridors rather than in compact centers. (Source: Imperial Beach General Plan)

and improvements to lighting and street design (IBGP 2.2.4 & 2.4.6c). While these guidelines support neighborhoods designed to be integrated and walkable, they fall short of creating compact centers necessary to facilitate trips by walking and public transit. A neighborhood pattern of dense corridors adjacent to single family neighborhoods will not generate enough activity support robust commercial options or high-frequency transit. Further, land use designations strictly limit the high and intensity of development to 3-4 stories and 43 units per net acre (IBGP Section 2.1). This may be appropriate in the coastal zone along Seacoast Drive but is inadequate for centers-oriented development elsewhere. To achieve a more sustainable neighborhood design, the land use element should give greater consideration to high density development behind the corridors at established centers as opposed to protecting single family neighborhoods.

Design Element

The general plan recognizes the importance of the built environment to sustainable growth as outlined in the design element. In addition to preserving the city's beach-town character, this section emphasizes the role that the terrain and the Pacific Ocean play in creating a sense of place in Imperial Beach. The design element also reinforces the land use goals by providing guidelines to support walkable, mixed-use development. Policies require that new development coexists with the existing physical and natural environment and incorporates a mixture of uses at a pedestrian-friendly scale (IBGP 8.1.3,

New civic buildings in Imperial Beach embody high quality design, but design standards as a whole lack specificity. (Photo: San Diego County News Center)

8.1.14). While the design element highlights the role that civic buildings, such as the new Imperial Beach Library, can play in promoting sustainable design, the plan lacks specific recommendations for private development to adhere to. Language such as "strive for excellence and diversity in design" fails to provide detailed standards for building setbacks, variety in height and materials, street frontages, landscaping, and parking (IBGP 8.1.4, 8.3.4). Although design guidelines that enhance the pedestrian experience are encouraged, the plan generally upholds the existing low-density, auto-centric community pattern. Developing walkable neighborhoods with a well-defined character will require more precise design standards for future construction.

Housing Element

To provide for a variety of home types, densities, and sizes, the housing element outlines programs to support housing preservation and development in Imperial Beach. These programs address the need to meet future housing demands for people of all ages and incomes. As such, actions that add new multifamily housing units and conserve or expand affordable housing are important to promoting diverse communities. Several land use and design policies already assist the development of housing in mixed-use zones, but other housing programs encourage multifamily housing by amending the zoning ordinance to facilitate lot consolidation and to allow for

The redevelopment of the Bernardo Shores RV park into Bayside Landing Homes illustrates the need to protect low-income housing like mobile home parks from market pressure. (Photo: Tim Briggs)

greater density when affordable housing is included on site (Housing Element Annual Progress Report, programs 10, 11, & 12). Although Imperial Beach monitors the status of its designated low-income units and coordinates with developers to take advantage of affordable housing incentives (programs 4 & 6), the housing element contains no specific actions to guarantee that existing affordable housing is maintained or additional units are added. Furthermore, as demand for housing increases across the region, low-income housing stock is at risk of being acquired and upgraded to market rate. In 2017, the Bayside Landing Homes replaced the Bernardo Shores RV park, a process that could be repeated at other mobile home sites in Imperial Beach. While protections exist to protect tenants of at-risk units if they need to relocate, housing programs are needed to create additional affordable units to ensure a mixed-income community.

4.1.3   Policy Recommendations

The 2019 update to the City of Imperial Beach General Plan establishes a vision for walkable, mixed-use neighborhoods that take advantage of the community's natural resources. While the plan calls for high-quality pedestrian-oriented design and concentration of development, it falls short of instituting guidelines for activated street frontages within compact centers. In addition, housing programs fail to meet the need for affordable units through the protection and creation of low-income homes throughout Imperial Beach. The policies listed in the table below illustrate best practices for sustainable development to address these shortcomings.

Table 4-1: Pattern & Design Policies

General Plan Element	LEED-ND Principle	Policies

Land Use	• Compact Development
	• Mixed -Use Neighborhood Centers
		1. Prepare Specific Area Plans for Seacoast Village, Miracle Mile District, and Aviation Center to coordinate infill development.
		   a. Within centers, create a Sustainable Development "Overlay Zone" to promote sustainable development in alignment with LEED-ND standards.
		2. Encourage infill development in existing shopping centers that reduce the visual prominence of parking lots, improves the pedestrian realm, reduces visual clutter from signage, and enhances the character of street frontage.
		   a. Allow for liner buildings (minimum 20 feet deep) around the edges of parking lots to hide parking from view of pedestrians on the streets.

Design	• Walkable Streets
	• Connected & Open Community
		3. In mixed-use areas, include public-facing building entries, building heights appropriate to street widths, continuous sidewalks, and limited garage entries. Specifically, development should incorporate:
		   a. Public-facing building entries (onto any public space except a parking lot) on 90% of building frontage.
		   b. Frequent building entries (at least every 75 feet).
		   c. A minimum "building-height-to-street width-ratio" of 1 to 3 (1 foot of building height for every 3 feet of street width) along 30% of street length.
		   d. A street or pathway into the project at least every 400 feet.
		   e. Driveway crossings along no more than 10% of sidewalk length.
		4. In residential areas, houses should have garage doors along no more than 20% of street length.

Housing	• Mixed-Income Diverse Community	5. Require at least 10 percent affordable housing units in multi-family housing developments larger than 10 units. a. Increase inclusionary zoning requirement to 20% in the Sustainable Development Overlay Zone. 6. Designate existing mobile home parks as sites for low-income housing and require that new development replace units on a 1:1 basis.

- Timothy Briggs

4.2 Green Infrastructure

In 1994, the State of Florida coined the term "green infrastructure" to describe its wetlands, rivers, dunes, and forest habitats. Along with the Florida Green Waste Commission, the State was seeking a way to describe all the vegetation within its jurisdiction and help the Governor to understand and draw the conclusion that green infrastructure is a part of all infrastructure. They argued that green infrastructure should be managed and mapped, similar to the way cities map and manage roads, sewer systems, and utility lines. To support this claim, they created a model of all the intact habitat in the State and explained their function and benefits. The State then used approved funds to conserve all their green infrastructure either through conservation or recreation purposes. In 2006, the Environmental Protection Agency (EPA) discovered the term and decided to apply it to Best Management Practices (BMPs) such as rain gardens, green rooftops and permeable pavements, adding these elements to the definition. The latter BMPs are referred to as "constructed green infrastructure", while the former State of Florida definition encompasses solely the "natural green infrastructure" in a city, state or community.

At the surface, natural green infrastructure brings value to a City by creating habitats for wildlife and a place for humans to recreate. Green infrastructure, however, is not just about a particular habitat or wetland or forest. Natural green infrastructure in a city is about how the green spaces connect because connectivity helps the ecosystem of an area and promotes biodiversity. A healthy, connected, natural green infrastructure system allows plants, seeds, and animals including humans, to move across a landscape.

Green infrastructure is often lost through current planning process due to the ways in which developers often clear all vegetation from a site, then construct green infrastructure to attempt to recuperate functionalities that have been lost. A leading principle that supports green infrastructure is the idea that we should conserve first then mitigate. If we first conserve what exists, less resources will be spent on engineering methods that will only partially recover the functionalities lost upon the disruption of the natural environment. As such, City's should have a plan and guidelines that protect and maintain green infrastructure. Doing so will make a City more diverse and therefore more resilient and sustainable.

Trees are one important component of a City's green infrastructure. Trees in the urban environment provide such a remarkable breadth of health, environmental, and economic benefits for residents who live under their canopy, that they are integral to the concept of sustainability, livability, and equity within a City. Among numerous other benefits, trees improve air quality, reduce heat island effects, sequester carbon, mitigate stormwater runoff, improve property values, help reduce blight, and contribute to our sense of well-being and relationship with nature. To ensure everyone within a community has equal access to their urban forest, City's must plan for the cultivation and management of the native or introduced trees and related vegetation in urban areas (California Urban Forestry Act of 1978). Not planning for the urban forest results in negative environmental implications, including health inequities among residents.

Following is an assessment and recommendation for various components that currently contribute to the green infrastructure of Imperial Beach, including its parks, open space, tree canopy and trees in the public right-of-way.

Parks and Open Space

The City of Imperial Beach has abundant natural green infrastructure found in thousands of acres of parks and open space. There is pride in the community about the amount of open space the City has and for this reason, the City has begun to link their tourism with conservation in an effort to promote themselves as an ecotourism destination. As shown in Chart 4-1 and 4-2, over 53% of the City's 2,842 land acres are zoned as open space, urban reserve, or public park. Of the 1,500+ acres dedicated to parks and open space, the City owns 22 acres, which make up its 9 public parks. Other agencies who own land in Imperial Beach reserved for parks or open space include the County of San Diego, the State of California, and the Port of San Diego. Figure 4-1 shows the location of parks and open space in Imperial Beach by ownership.

California State Parks tracks park access across the State. A view of their map revealed that only 3% of residents in Imperial Beach live further than a half mile from a park or open space, while 74% of residents of Imperial Beach live in areas with less than 3 acres of parks or open space per 1000 residents. Furthermore, an analysis of parks and open space by ownership shows that there is a disproportionate distribution of parks within the City. Effectively, there are no parks located on the east or south side of the City, where property values are lower and densities are higher.
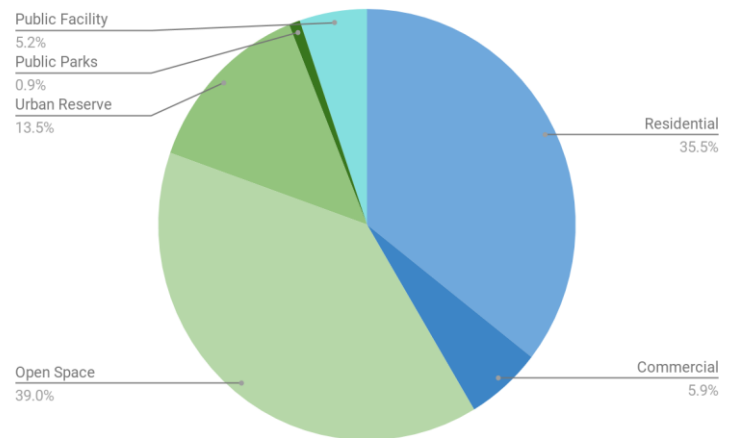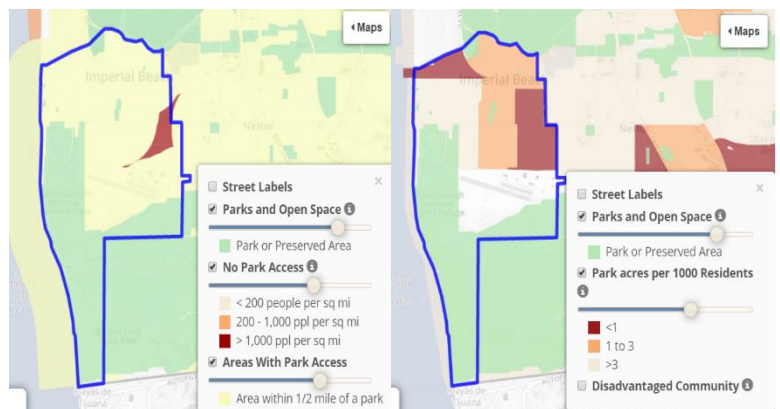
Chart 4-1: Land Designation Acreage

Chart 4-2: Park & Open Space Ownership
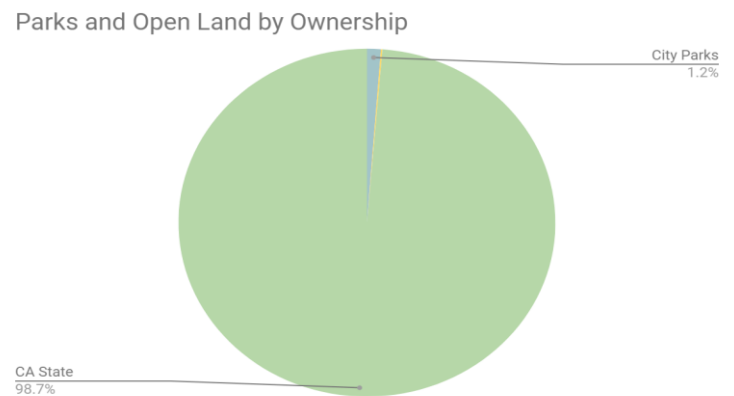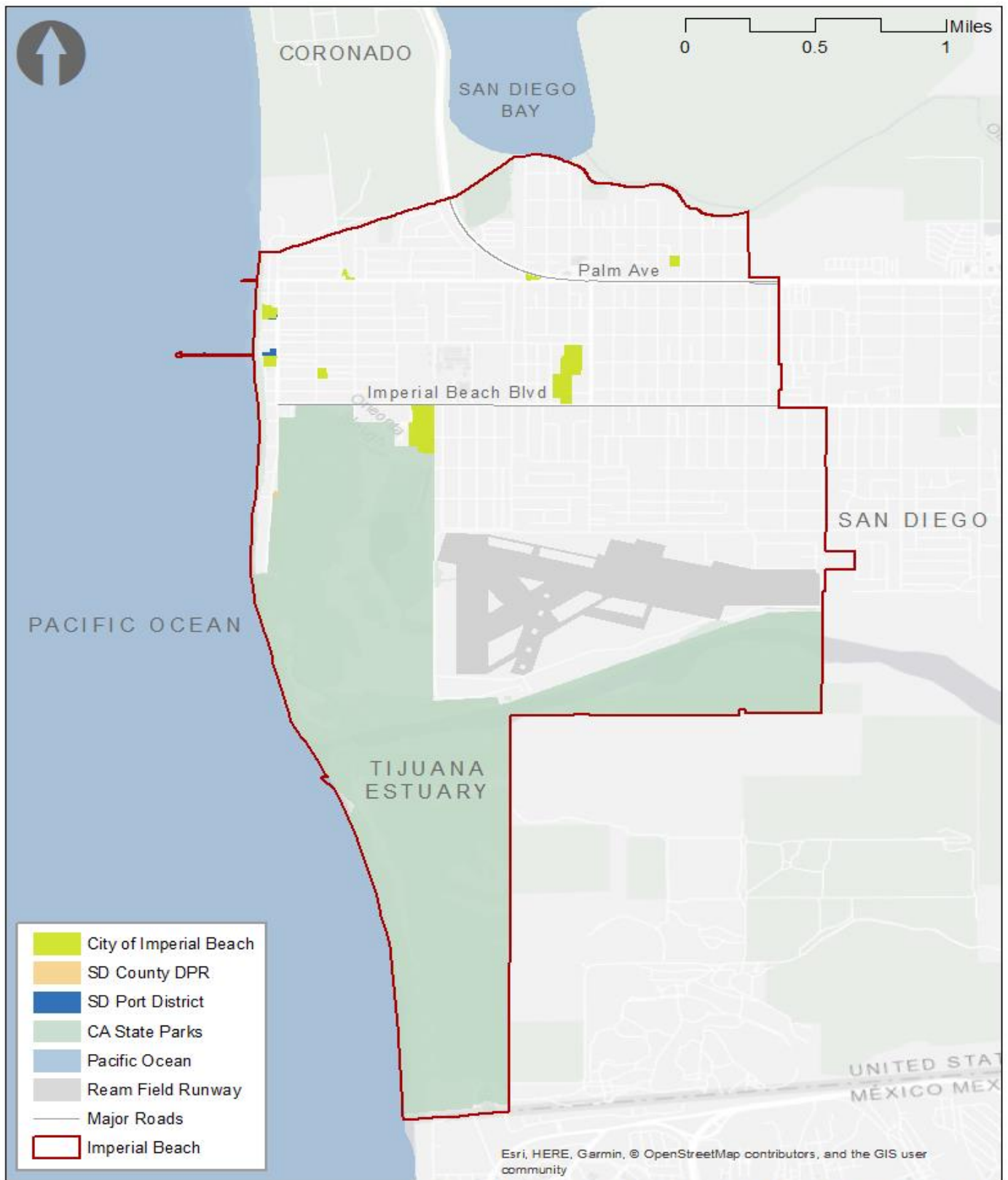
Parks and Open Land by Ownership

"Percent of Residents within a ½ mile from a Park Park Access per 1000 Residents"

Figure 4-1: Imperial Beach Park Ownership

Parks and Open Space in Imperial Beach by Ownership
SANDAG 2019

Map: Reyna Ayala.

Urban Tree Canopy

A 2015 study by the University of Vermont Spatial Analysis Laboratory, in cooperation with the City of San Diego, used Laser Identification Detection and Ranging (LIDAR) technology, which revealed that the City of Imperial Beach has the lowest tree canopy coverage, 6%, of the 18 surveyed cities in the county. A map of tree canopy coverage percent by jurisdiction for the County of San Diego is shown below. Consideration for the wetlands in the city was given and a calculation of the tree canopy percent for urbanized areas in Imperial Beach was made,

Seacoast Drive demonstrates the limited shade palm trees provide.

which brought the tree canopy percent up to 9%. Given the consideration, Imperial Beach still ranks second lowest for tree canopy coverage percent compared to all the communities located within the City of San Diego. Table 4-2 shows a list of several communities in the City of San Diego with similar land acreage or proximity to the coast. An evaluation of the City's General Plan, programs, and policies revealed one glaring factor contributing to Imperial Beach's dwindling tree canopy cover percent - the City lacks a plan or program geared toward the planting of new trees in the public right-of-way or public facilities. In addition, the City's land use policies do not currently compel developers or residents to plant new trees on private property.

Chart 4-3: Top Tree Species
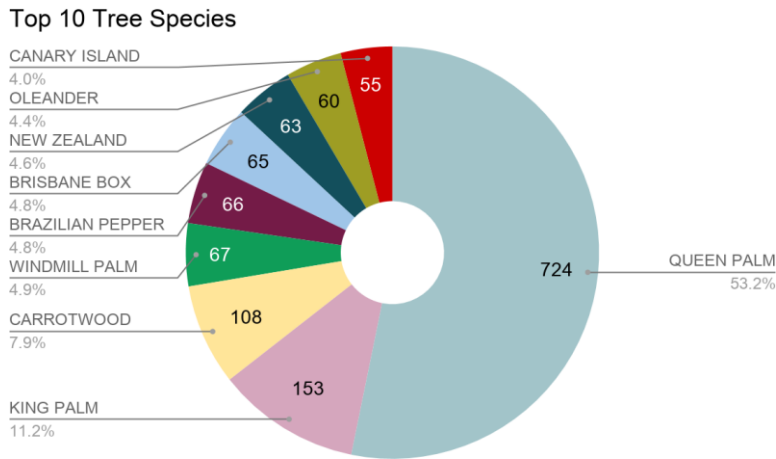
The City's current budget is limited and allocating funds toward the cultivation of an urban forest is unlikely. In the history of Imperial Beach, an Urban Forest plan has never been developed. In addition, the City lacks guiding documents for the selection of new tree plantings when residents or developers chose to do so. The City currently allocates funds for tree maintenance by contracting Arbor Access, a company that provides tree preservation specialists and tree removal experts. In 2017, Arbor Access was funded to inventory of all the trees growing in the City right-of-way and public parks. A full description of the methodology used to inventory trees is provided in Appendix A. Figure 4-3 displays the inventory collected by Arbor Access and illustrates the distribution of the City's canopy coverage.

An analysis of the data used to create the map demonstrates that many of the trees in the city are a variation of a palm species. Palms are known to provide less tree canopy coverage, absorb stormwater at lower rates,

and some palms, including those in Imperial Beach, are invasive or disrupt the natural ecosystem. Of the 4,709 tree sites that were counted by Arbor Access, 3,183 are trees in the public right-of-way. Of these, 1,956 are palm trees. Collectively, they constitute 61% of all trees in the City. Below is a chart, which illustrates the top ten tree species in Imperial Beach.

Table 4-2: Tree Canopy Coverage

Community	Land Acreage	Tree Canopy Acreage	Percentage Tree Canopy
Imperial Beach	2,842	159	6%
- Urban Area	1,349	122	9%
La Jolla	5,719	1,361	24%
Mid-City	2,936	406	14%
Mission Bay Park	4,293	206	5%
Mission Beach	220	17	8%
Navajo	9,087	1,198	13%
North Park	2,254	368	16%
Ocean Beach	641	92	14%
Otay Mesa-Nestor	5,368	481	9%
Pacific Beach	2,609	448	17%

Figure 4-2: Tree Canopy by Jurisdiction
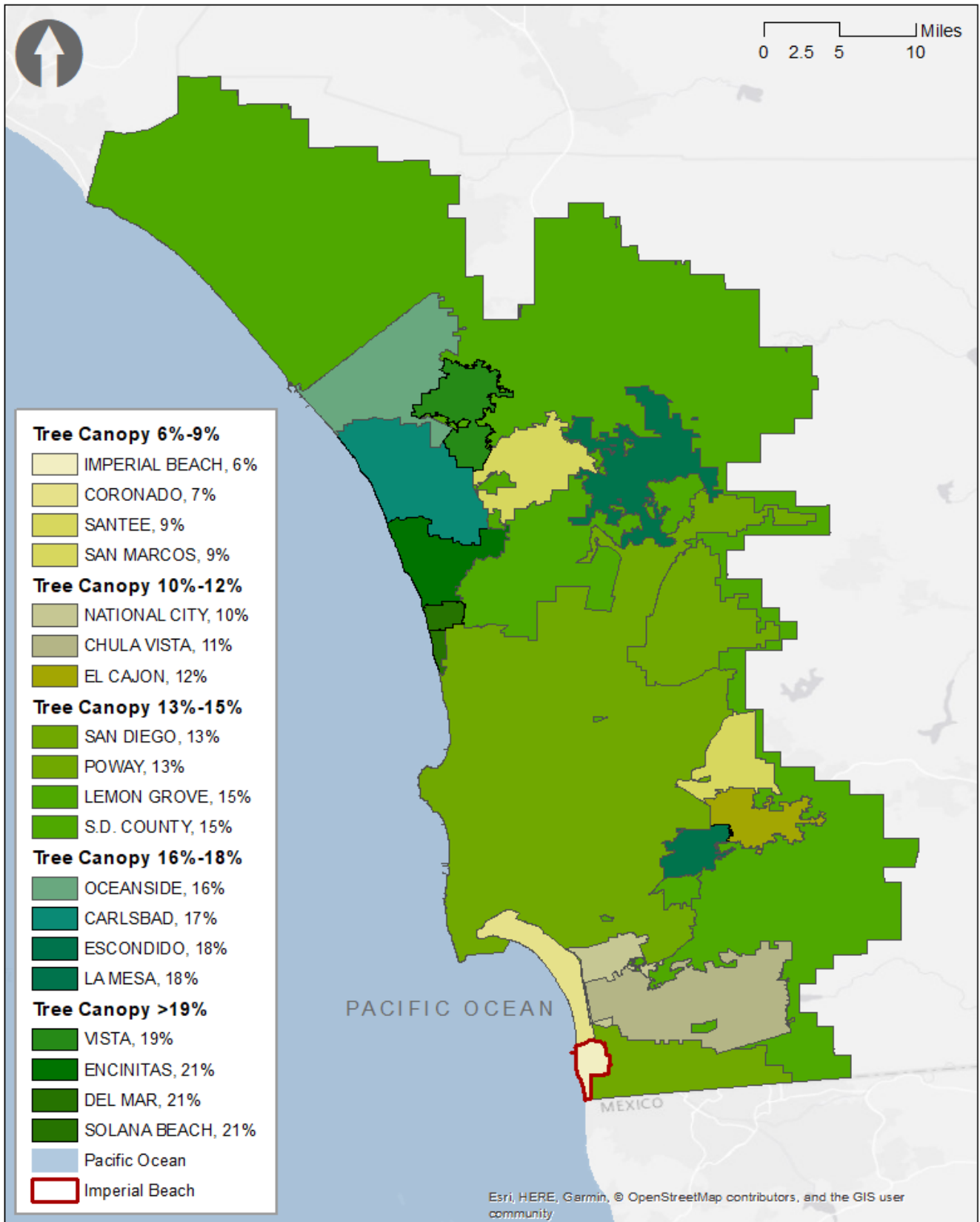
Tree Canopy Cover by Jurisdiction
SANDAG 2019

Map: Reyna Ayalas

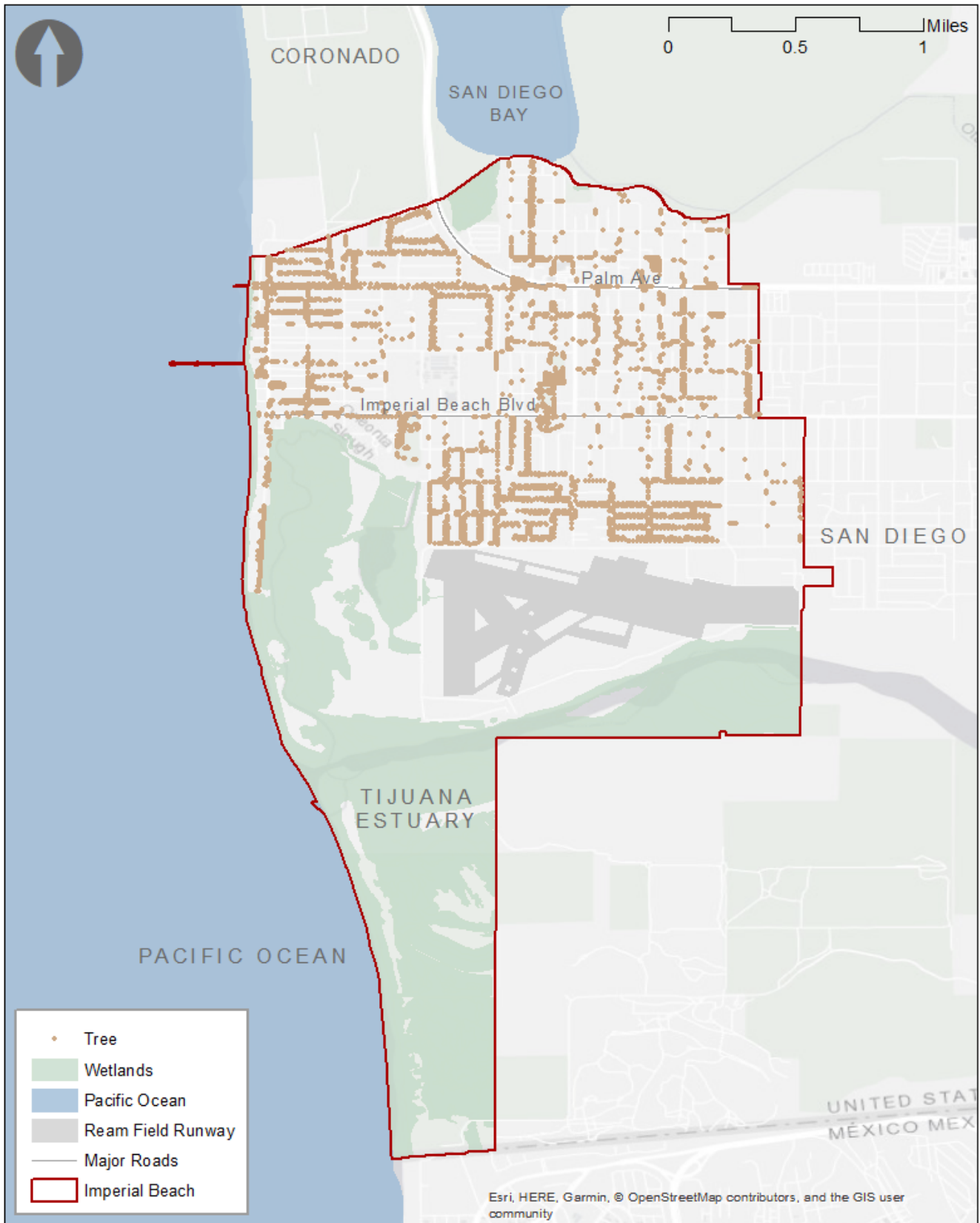Figure 4-3: Imperial Beach Urban Tree Canopy
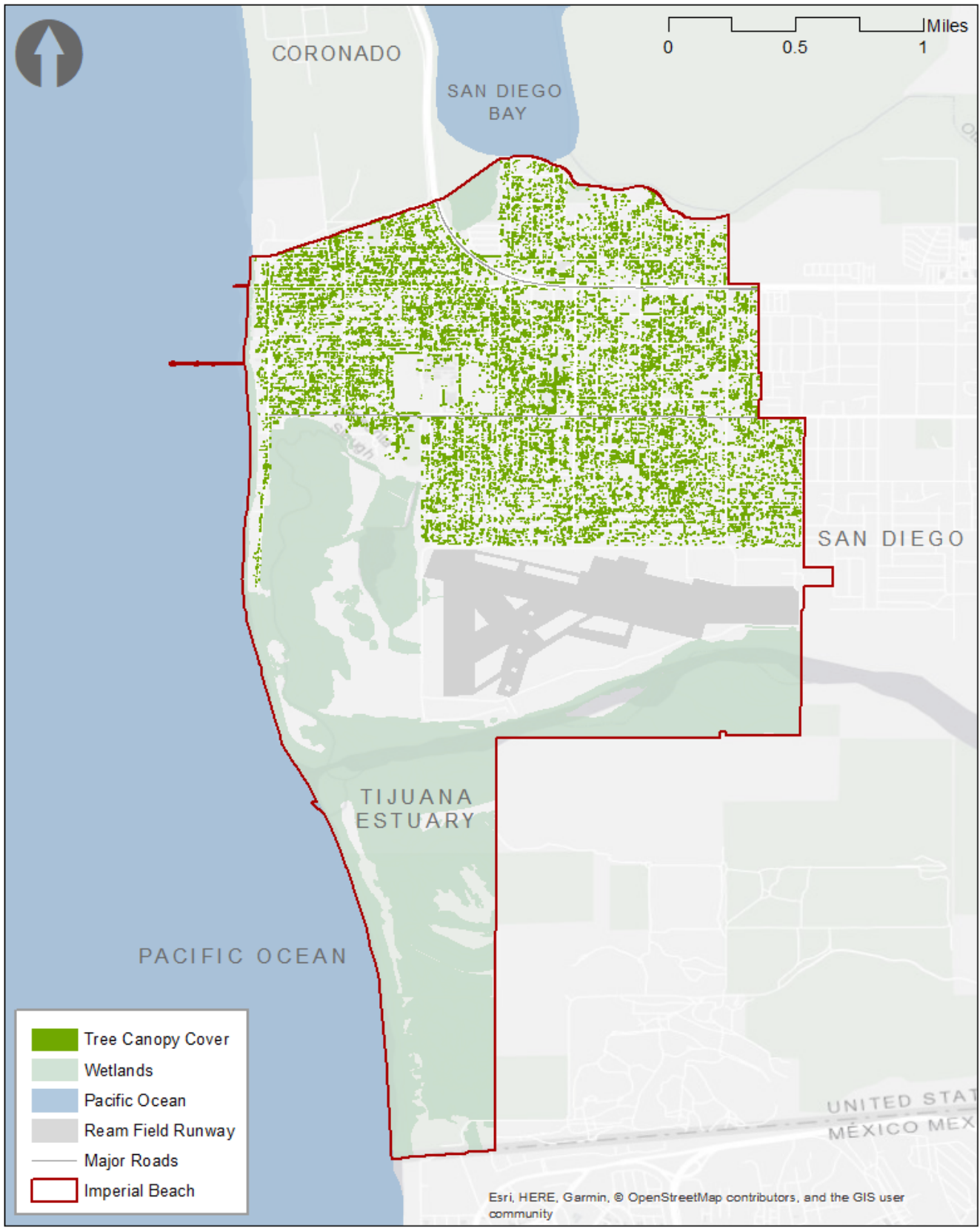
Tree Canopy Cover in Urbanized Areas of Imperial Beach
SANDAG 2019

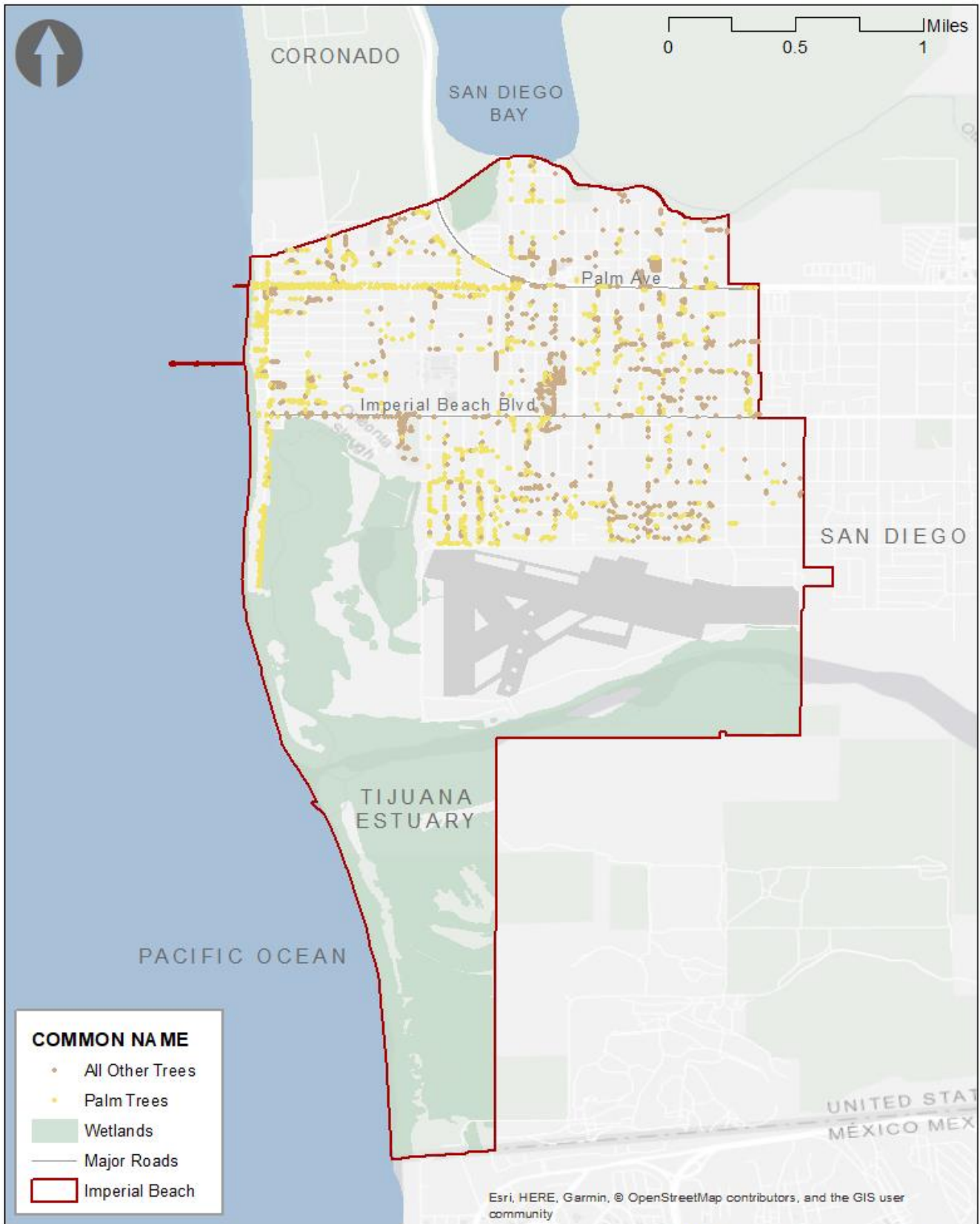Map: Reyna Ayala

Figure 4-4: Tree Canopy on Public Land

Trees in Public Right of Way and Public Facilities in Imperial Beach
Source: Arbor Access 2019

Map: Reyna Ayala

Figure 4-5: Palm Tree Distribution

Palm Trees in Imperial Beach
Source: Arbor Access 2019
Map: Reyna Ayala

Parks & Open Space

The City's most recent Local Coastal Plan dedicates an element to Parks, Recreation, and Coastal Access. While it is depicted that parks are a priority for Imperial Beach, the City does not currently have a Parks and Recreation Department nor is funding allocated to develop one. The community plan emphasizes and promotes access to its beaches alongside parks to meet the recreation needs of the community. While the concept that the City is rich with a coastline leverages its natural resources, the lack of access to these amenities for residents on the east and south sides of Imperial Beach is only exacerbated. In other words, the disproportionate distribution of parks and open space becomes more evident. Currently, the City has found a solution partnering with the Boys and Girls Club to offer activities within the city's parks.

The city's plan discusses the need to develop a park system (LCP 5.1.11) and states that it strives for equity (LCP 5.1.12). Aside from fostering existing and potential partnerships, the new Local Coastal Plan does not propose methods to fund a park system.

Trees

The City of Imperial Beach addresses tree plantings and tree canopy throughout several documents. The updated Local Coastal Plan (LCP) dedicates a section of their Conservation and Ecotourism element to Urban Forestry and the Design Element addresses trees through a Public Realm and Public Facilities section. In addition, the LCP update allows for municipal code updates to occur, as such, updated codes will mandate tree plantings on new commercial and residential developments upon adoption of the LCP. The existing and updated codes are show in the table below.

Table 4-3: Code Updates

Existing Code	Updated Code
IBMC 19.50.030 Open Space and Landscaping. Commercial. • Not less than fifteen percent of the total site shall be landscaped and permanently maintained	• One tree is required per dwelling unit and one tree per every 3 parking spaces. The trees may be provided on or off site • Tree planting should not locate where visibility or other safety issues may occur • Existing trees shall remain unless removal is authorized by the City
IBMC 19.50.050 Open Space and Landscaping. Residential. • Not less than fifty percent of the required front yard and street side yard setbacks shall be landscaped and permanently maintained. The remainder of the required yard may be used for driveways and walkways	• Within the street front yard or street side yard setbacks, for each 50 feet of frontage or increment thereof, there shall be provided at least one 20" box tree. • Tree planting should not locate where visibility or other safety issues may occur • Existing trees shall remain unless removal is authorized by the City

In addition, the Climate Action Plan outlines ways in which trees will contribute to its Emission Reduction Target. The carbon sequestration category, shown in the Table 4-4, outlines that the planting of 866 trees by 2030 will result in the reduction of 31 MT CO_2 emissions, which will account for 0.5% of the local emission reduction target. The strategy relies heavily of trees planted on private property through the development of new commercial and residential projects. The strategy does not outline a plan to address the trees (300) that are slated for planting in the public right-of-way.

Table 4-4: Climate Action Plan Goals

Climate Action Plan	Goal
• Carbon Sequestration Strategy • Reduction of 31 MT CO_2 Emissions • <1% of Local Emission Reduction Target	• Plant 866 Trees by 2030 (300 in Public ROW, 566 from new residential and commercial development) • 79 trees/year for the next 11 years (City ~27 trees/year)

4.2.3 13th Street Corridor Specific Plan

According to the City's Local Coastal Plan, the 13th Street Corridor is the neighborhood serving business district of Imperial Beach. Providing a mix of commercial and mixed-use development the area should provide goods and services primarily for the residents of Imperial Beach and employees and visitors to NOLF IB/Ream Field in a pedestrian-oriented format, L-10. Several policies in the LCP reference the cultivation of a pedestrian-oriented 13th Street corridor and as such the street was evaluated by using LEED


South end of 13th Street shows no trees in the public right-of-way.

Neighborhood Design Criteria, for its presence of trees. According to LEED Neighborhood Design Criteria, trees help contribute to the concept of walkable streets. It is stated that frequent, well-established street trees can make pedestrians more comfortable by providing shade and contact with nature. In addition, trees promote active transportation by providing shade for pedestrians and reducing heat island effects. In fact, a study by the Local Government Commission found that wide streets without a tree canopy to be 10 degrees warmer on hot days than nearby narrow, shaded streets. In addition to creating discomfort for pedestrians and health risks for vulnerable populations and manual laborers, heat islands can also create difficult growing conditions for plants and increase irrigation demand (LEED Neighborhood Design). Table 4-5 compares LEED Neighborhood Design Criteria for walkable streets and the Imperial Beach's 13th Street. It was found through this audit and is displayed in Figure 4-6 that there are only four trees planted in the public right-of-way along 13th Street, three of which are palms.

Table 4-5: 13th Street Conditions

LEED Neighborhood Design Criteria	13th Street Conditions
Lines 60% of street length w/ non-invasive trees (spaced an average of at least every 40 feet from trunk center to trunk center)	Four trees total along 580-feet corridor
Provides noon-time shade along at least 40% of sidewalks.	No shade
Preserves all heritage trees and most noninvasive trees, especially larger ones. Preserves a proportion of previously undeveloped land (10% to 20%) on the project site.	No heritage trees identified

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Figure 4-6: 13th Street Canopy
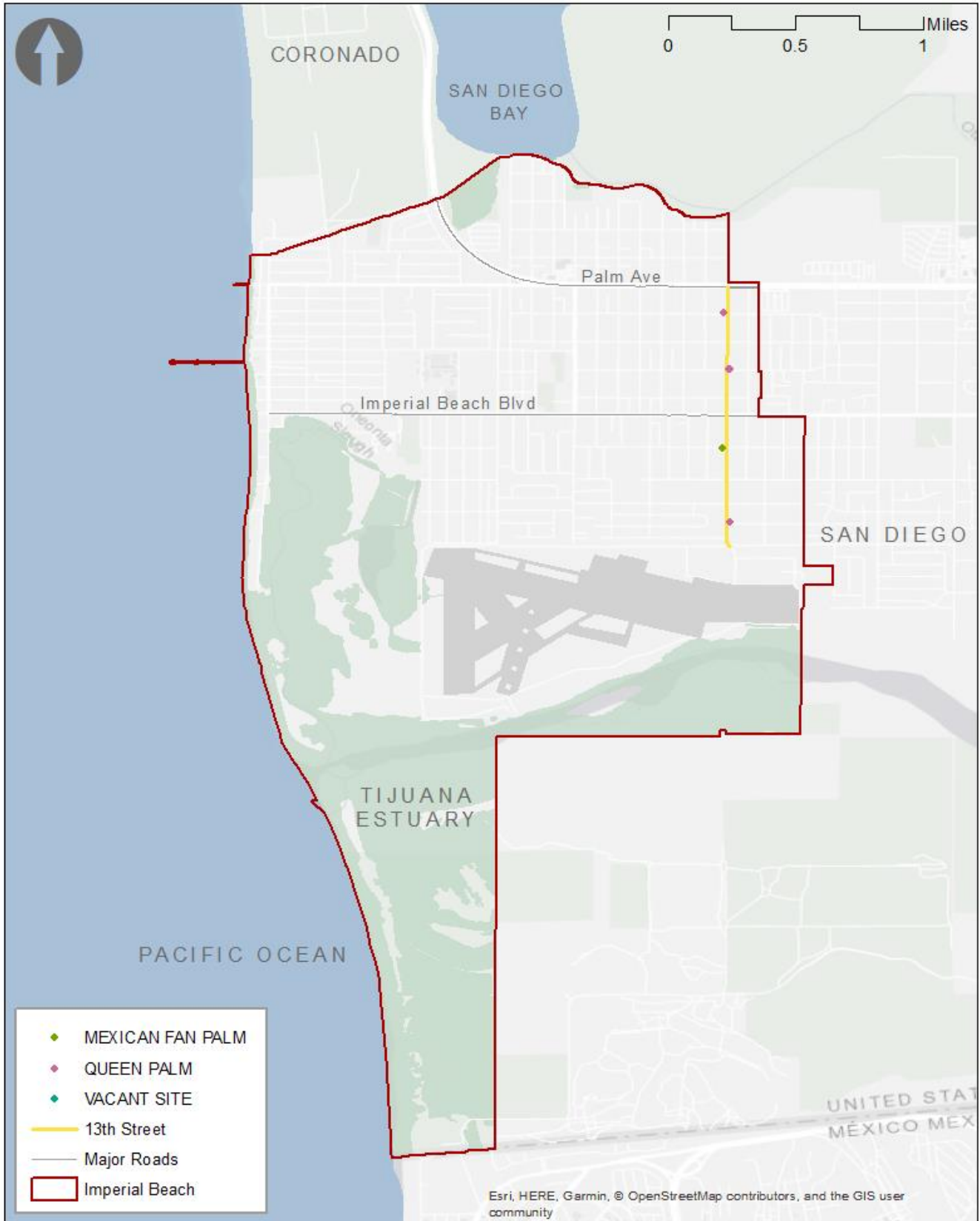
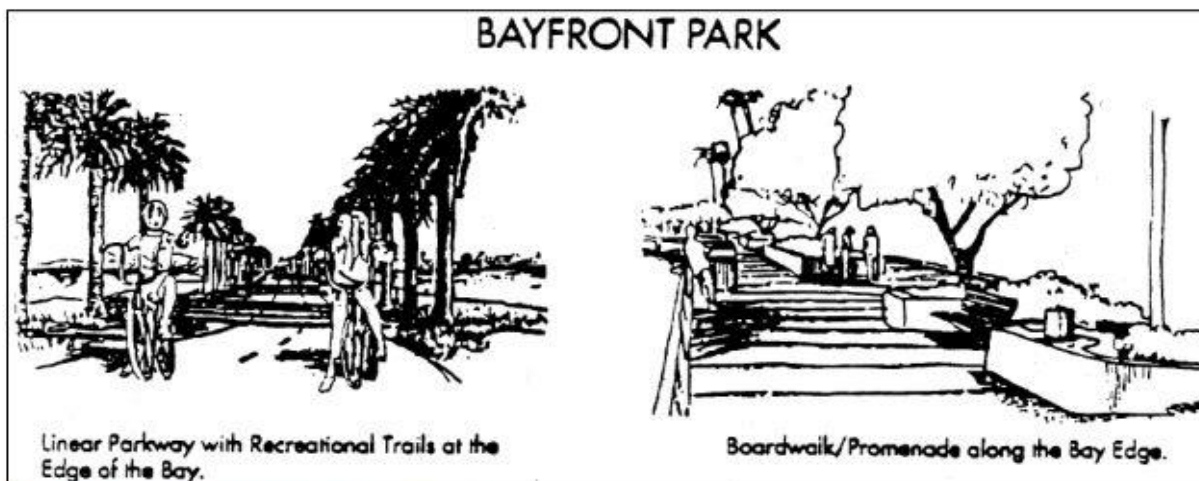13th St. Imperial Beach CA
Source: Arbor Access 2019
Map: Reyna Ayala

4.2.4 Recommendations

Parks & Open Space

To create more equitable park and open space access and increase the acreage of parks and open space, it is recommended that the City prioritize the development Bayfront Park. The State of California currently is offering grant funds for the creation of new parks in disadvantaged communities, which Imperial Beach classifies as. The potential Bayfront Park site is on the north end of Imperial Beach where the current public works facilities are located, which abut the salt ponds. The park faces the San Diego Bay and would encompass the 24-mile Bayshore Bikeway. According to past and current General Plans, the Bayfront activation is a longstanding City goal reflected in its new coastal related uses policy (LCP 2.5.1, 2.5.4, 5.1.10).

Funding is a major barrier preventing the City from developing its parks and open spaces. Grants, donations, fundraisers, and taxes should be explored as a means to obtain funds for a park system and city recreation programs. While land is limited in urbanized areas of imperial beach, these funds could be utilized to create pocket parks in vacant lots on the northeast and southeast portions of the City.

BAYFRONT PARK

Linear Parkway with Recreational Trails at the Edge of the Bay.

Boardwalk/Promenade along the Bay Edge.

Bayfront activation is a longstanding City goal.

Tree Canopy

Based on the criteria provided by the City, West Coast Arborists identified vacant sites that are suitable for planting trees. Identification of vacant sites during the inventory collection will allow the City to expand the urban forest and may assist in obtaining additional grant funding (Arbor Access). Vacant site listings from the inventory can be generated to create work lists and utilized for budget projections. One foreseen barrier is that the City will need to obtain commitment from residents to water and maintain trees planted in front of their property (Arbor Access).

Since the City recently underwent a Local Coastal Plan update where new policies for urban forest management were developed, recommendations in this document focus on policy implementation. Table 4-6 outlines the City's new policies and suggests programs that will help further Urban Forestry goals. As shown in the images below, Solana Beach in North County has a 21% tree canopy cover. The images serve as an example for Imperial Beach as to the environment the city could create through the planting of new trees.
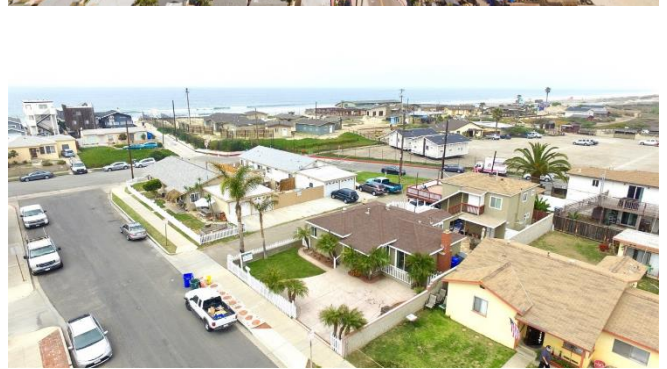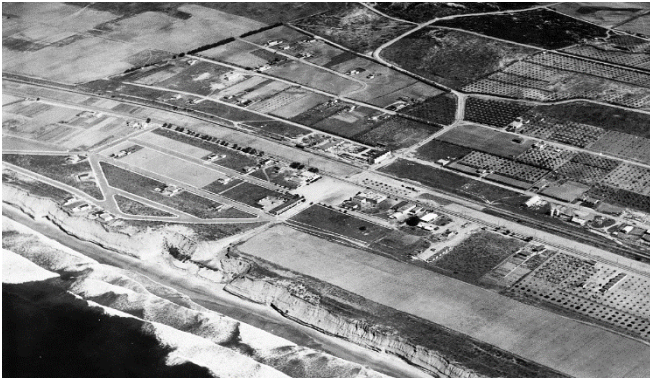
Solana Beach

Shopping, night life, restaurants

Beach

Train Station

IHA Partnership - Res

Table 4-6: Program Recommendations

Updated LCP Policy	Program Recommendation
4.2.1 Increase the City's urban tree canopy cover and maximize the benefits of trees.	• Tracking of tree planting and tree canopy coverage • Heritage Tree Inventory/Conservation Program • Memorial Tree Planting Program • Arbor Day Celebration
4.2.2 Require the planting of trees through the development permit process, and consider tree planting as mitigation for carbon emissions, storm water runoff, and other environmental impacts as appropriate.	• Develop approved street tree list for constituents • Identify tree bank sites • Information on helping trees survive drought
4.2.3 Support public outreach efforts to provide information on the environmental and economic benefits of trees	• Expand Park and Recreation Committee Responsibilities to include Street Tree Planting
4.2.4 Develop and maintain an active civic landscaping plan for all public landscaped areas under City management to promote the urban forest.	• Diversify tree species and age of trees by requiring large canopy trees are planted and not palms. • Develop Tree Planting Work Plan

-    Reyna Ayala

5   Managing Water

5.1   Ecological Audit

The City of Imperial Beach is unique to other cities in that it is surrounded by three natural water bodies, all of which have great impact on the health and infrastructure of the community. Having the San Diego Bay to the north, the Pacific Ocean to the west, and the Tijuana River Estuary to the south, management of water is increasingly important for the sustainability of the small beach-town community. Living in ways to enhance water quality, mitigate storm water pollution, address sea level rise, and gain binational federal support of waste water management from Tijuana River are all indicators

Storm drain at Bayfront Park. Photo: Brittany Cabeje.

of sustainability, and should work to address future development and policies surrounding water management of Imperial Beach. The relation to these topics should be understood in further detail in order to appropriately determine sustainability of water management.

Water Quality

Ecosystems and natural habitat of Imperial Beach are greatly affected by water quality, where poor water quality puts these delicate ecosystems and the public health at risk. The Conservation and Ecotourism Element addresses the concern for water quality through the commitment to preserve and enhance the San Diego Bay and Tijuana River Estuary. Despite conservation efforts, both the Tijuana River and Tijuana River Estuary are listed as a State 303d Impaired Water Body under the California Water Quality Act as a Category 5 Impaired Water Body, meaning that the health of the body is in the 100th Percentile, nationally. Based on 2019 data provided by the Environmental Protection Agency, pollutant indicators include bacteria, lead, low dissolved oxygen, nickel, pesticides, thallium, and trash, all of which have a source point of urban or wastewater runoff. In this regard, of the eight habitats in the estuary, the only habitat that is not consistent with historical conditions is brackish marsh habitat, as it is dependent on urban runoff. The estuary is influenced by both marine and river waters, so during wet-rainy seasons, urban runoff remains a primary threat to water quality in addition to cross-border drainage issues at the Tijuana River.
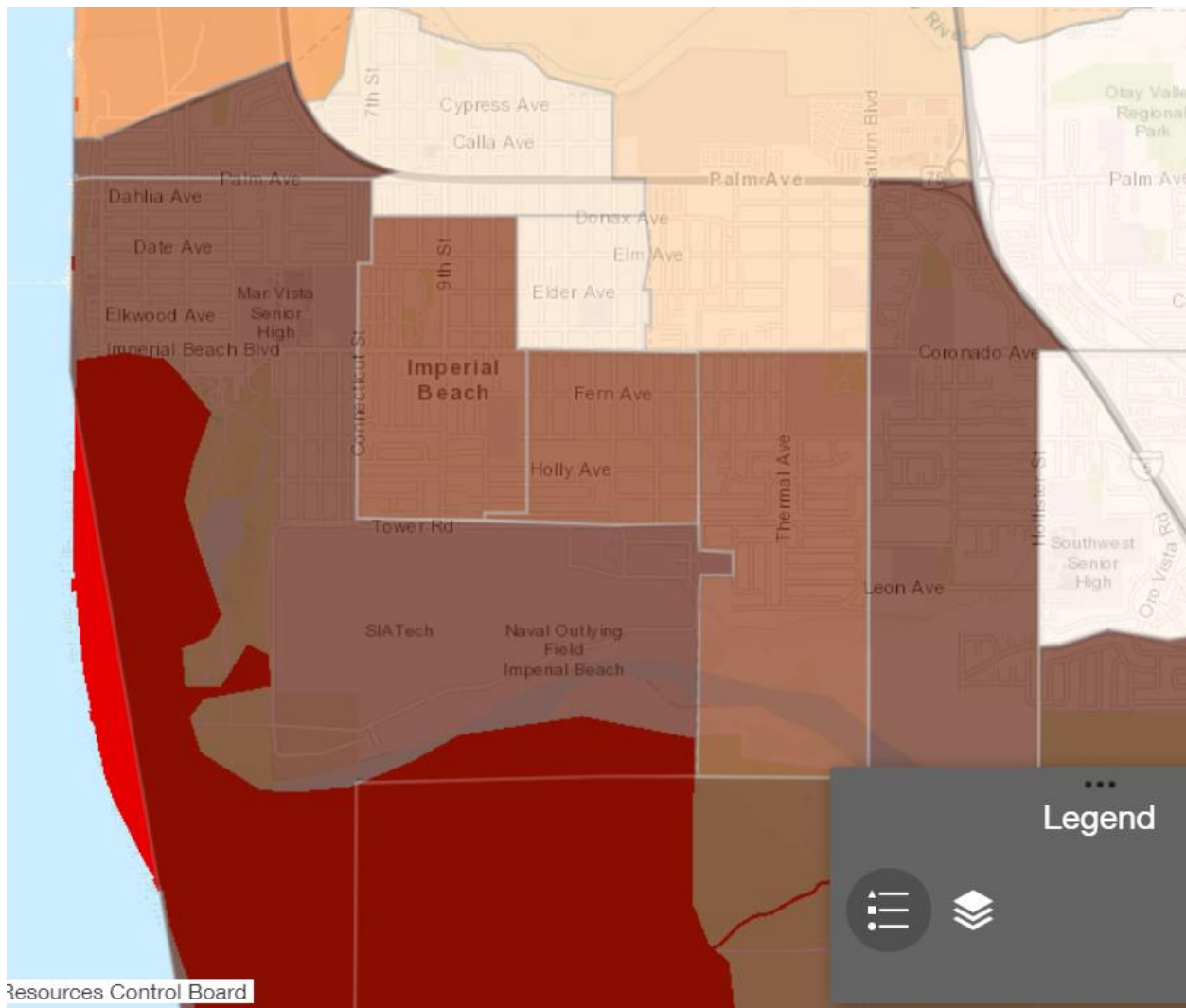

Impaired Water Bodies Percentile where red indicates Category 5 (Map: CalEnviroScreen).

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Stormwater Pollution

For a community to be sustainable, development should have the very least impact on natural processes, including how rainwater reacts with the environment. Imperial Beach is primarily made of clay soils having low infiltration potential, which during a storm event causes high volumes of runoff to enter the storm drain conveyance system. As development continues, as does the percent of impervious surfaces, which leads urban runoff to the underground storm drain system, as opposed to the natural process of ground absorption.

Percent impervious surface by land use type.

Without this natural process, there is an increased risk of flooding and contamination by rainwater that collects and carries pollutants, such as diesel, oils, pesticides and trash into the storm drain conveyance system, and then to be discharged directly into the surrounding waters without any filtration. Having high volumes of stormwater per drain system also runs the risk of eroding existing infrastructure especially as runoff increases along with development. To clearly indicate where the storm drain conveyance system was burdened or no longer adequate due to a growing population and continuous development, a 2010 Storm Drain Study was completed by the City of Imperial Beach. The analysis included hydrology models to assess storm drain capacities for a 2-year, 5-year and 10-year storm. The amount of impervious surface was used for runoff factor, where high percentage of impervious surface included Roadways, Mixed Use, Commercial, and City's Yard respectively, where stated land use all contain 80% or more of impervious surface. The results of 2010 study showed that four of the five drains that cannot accommodate a 2-year storm directly discharge into natural water bodies, leaving these bodies at risk for increased stormwater pollution as flooding increases. The Conservation and Ecotourism Element has addressed much of stormwater pollution through the use of the Jurisdictional Regional Management Program (JRMP), which are extensive practices that include enforcement to hold developers accountable for stormwater pollution management through the use of Site Design of Low Impact Development (LID). The LID requires extensive and technical planning for lessening development impact through use of permeable surfaces, native planting, and stormwater Best Management Practices. In addition to increased risk of pollution during storm events, high tides also have an impact on pollution, as they can create flooding from waves that push water back into drainage system and eventually flood the system.
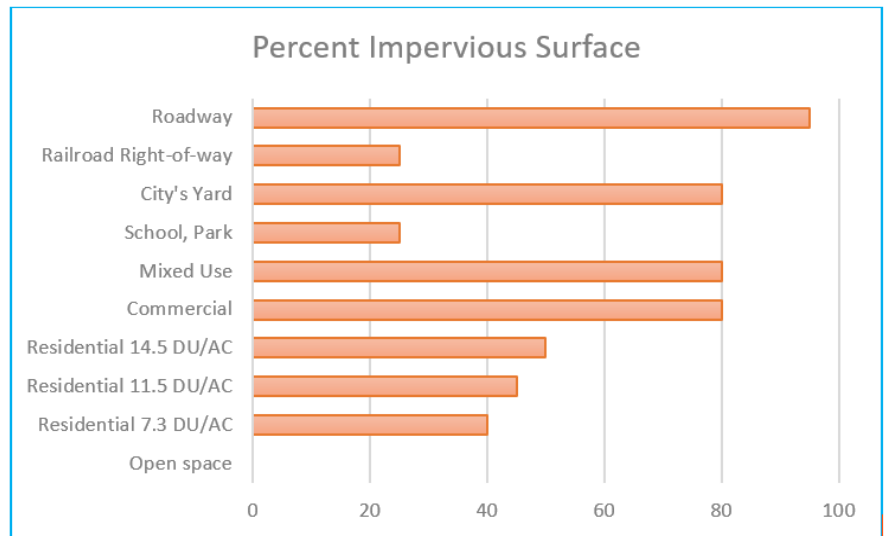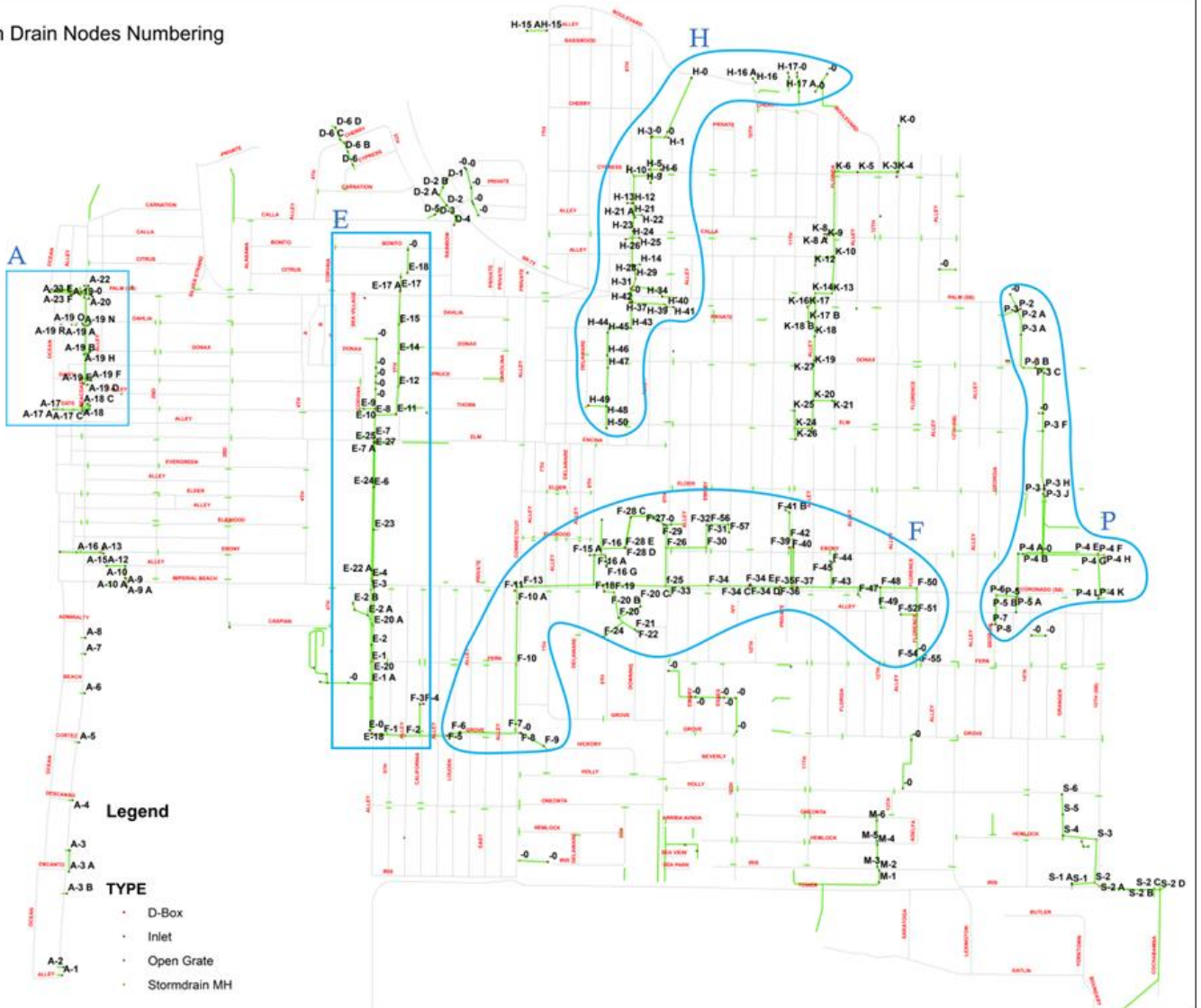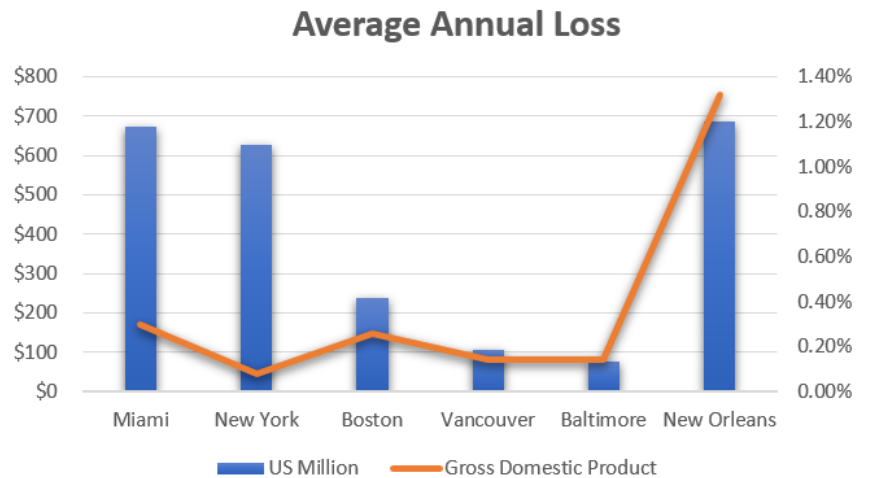
Storm Drain Conveyance System where highlighted drains will not accommodate 2-year storm.
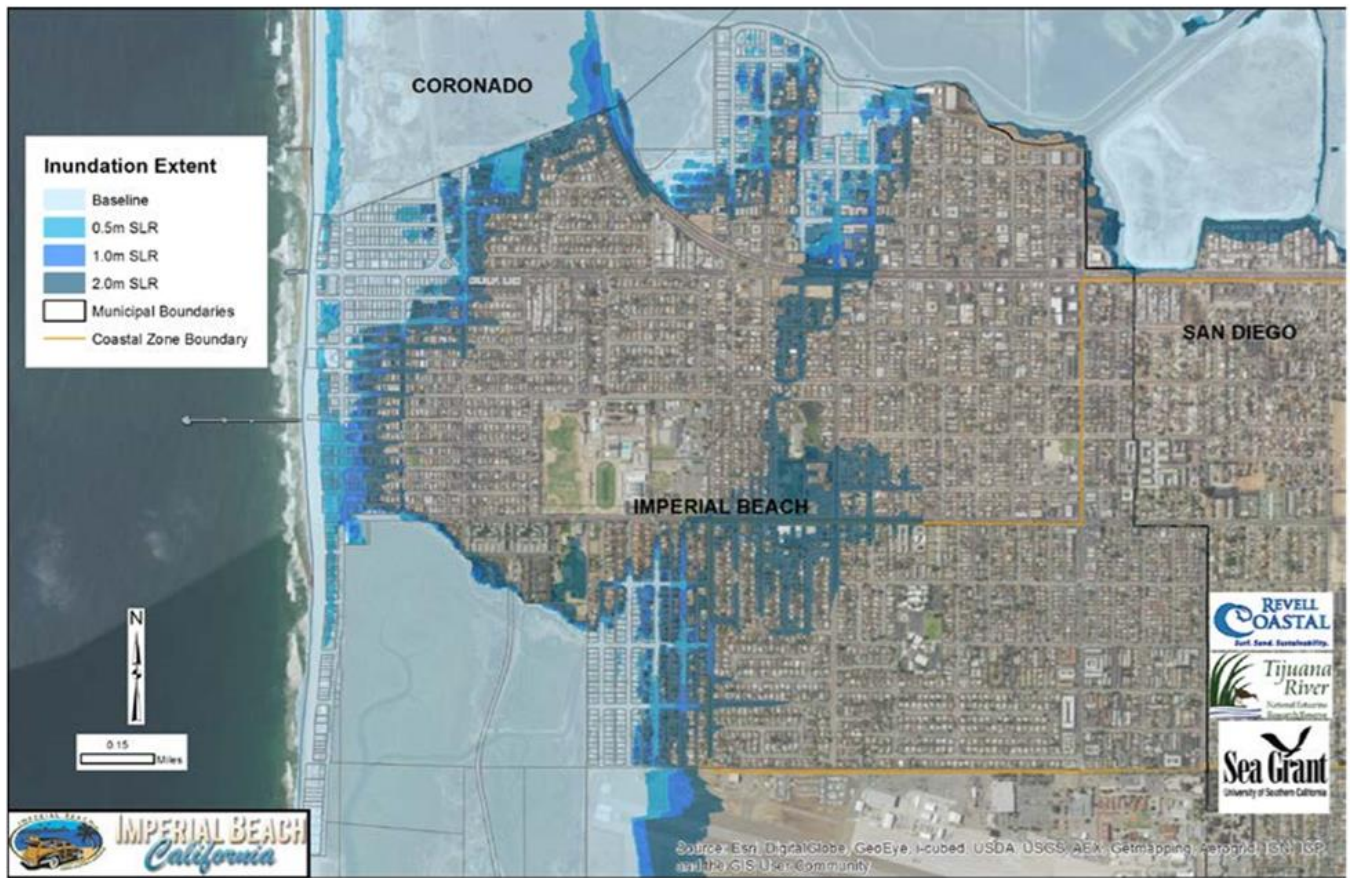
Sea Level Rise

Resiliency from disaster is also another indicator of sustainable practices and how the community prepares for the future, by using little resources as possible, or, by touching the land lightly. Sea Level Rise is projected to be a costly burden, especially among many coastal communities. A study published by the Proceedings of the National Academy of Science of the United States of America, concludes that major port cities can expect an average annual revenue loss due to Sea Level Rise flooding at upwards of $600 million, with

Average annual losses due to sea level rise flooding.

some cities spending 1.15% of their Gross Domestic Product on cost of sea level rise. Concerns of flooding and community resiliency has prompted the California Coastal Commission to require coastal communities start taking action on addressing Sea Level Rise. In response the City of Imperial Beach completed a 2016 Sea Level Assessment, which used digital elevation modeling, or a Coastal Light Detection Ranging (LIDAR) method. To properly include Sea Level Rise in the planning process, this study aimed to recognize vulnerabilities such as roads, public transportation, wastewater and stormwater and to analyze adaption methods. To fully understand the impacts, tidal inundation mapping was observed, which included using a 100-year tide level with sea rise estimates. As tidal inundation can be described as inundation flooding of the storm drain system due to recurring, predictable high tides, it is a standard tool used when studying Sea Level Rise. In addition, nuisance flooding was also projected, where nuisance flooding can be described as flooding that is impacted by high tides, in addition to impact from stormwater runoff. Findings considered historical tide data from 1991 to 2015, which showed that tides exceeding 4.3ft of elevation 18% of the time would be flooded 81% of the time with an additional 1.0m of Sea Level Rise. Adaptation planning was discussed, and concluded that armoring, such as using barriers at properties, leads to beach recreational loss and has the lowest net benefit. A managed retreat land use plan was encouraged, as it led to the highest yield benefit, but due to political opinions of residents, was not adopted in the 2019 Local Coastal Plan.

Tidal Inundation model using 100-year tide by use of LIDAR.
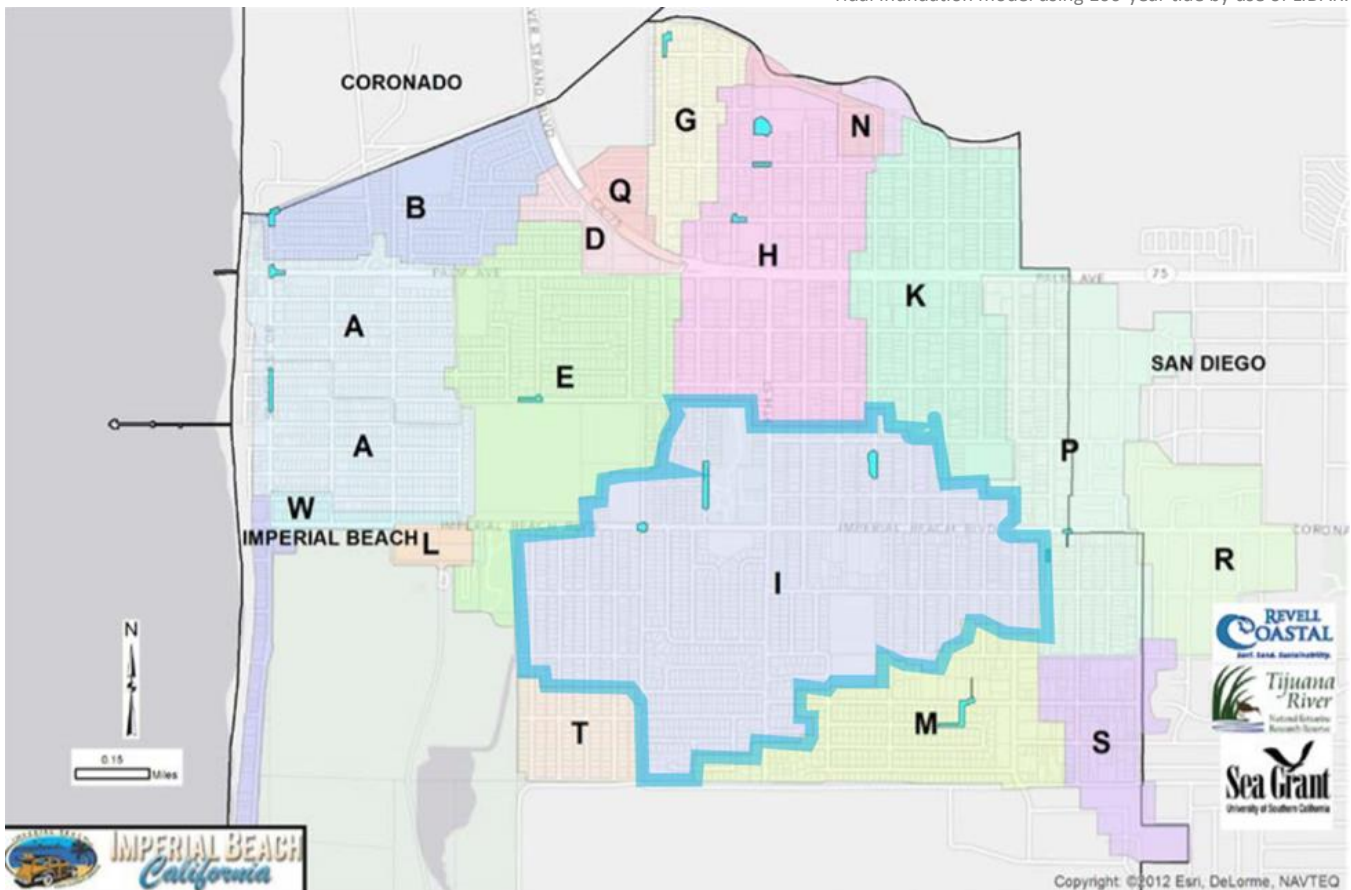
Storm Basin "I" to experience 81% flooding with 1.0m of Sea Level Rise

Wastewater Services

Reuse of materials is an important practice to adopt when approaching an eco-city. A circular metabolism of energy output should flow through as many systems as possible. However, the City of Imperial Beach still operates on a linear metabolism, where wastewater currently is sent away for treatment. The existing sewerage system contains 11 pump stations and 36 miles of sewer lines that collect sewage locally. Sewage is then sent to Point Loma Wastewater Treatment Center. Some portions of the sewer line are up to 40 years old with a life expectancy of 75 years. In addition to inadequate storm drain systems and a rise in sea level, flooding also puts the sewage system at risk from stormwater and seawater intrusion, where water enters the sewer system from the groundwater table, or seawater intrudes as a result of tidal waves infiltrating storm drains. This can lead to contaminated groundwater, given that Imperial Beach has a high content of dissolved solids and high sulfate levels with multiple cleanup sites. As the Tijuana population steadily grows, along with the inability to expand infrastructure improvements, there will continue to be a threat of drainage issues at the southern border. Due to these drainage issues, it is estimated that the Tijuana sloughs are closed about 60% of the time from Public Health Beach Closures.
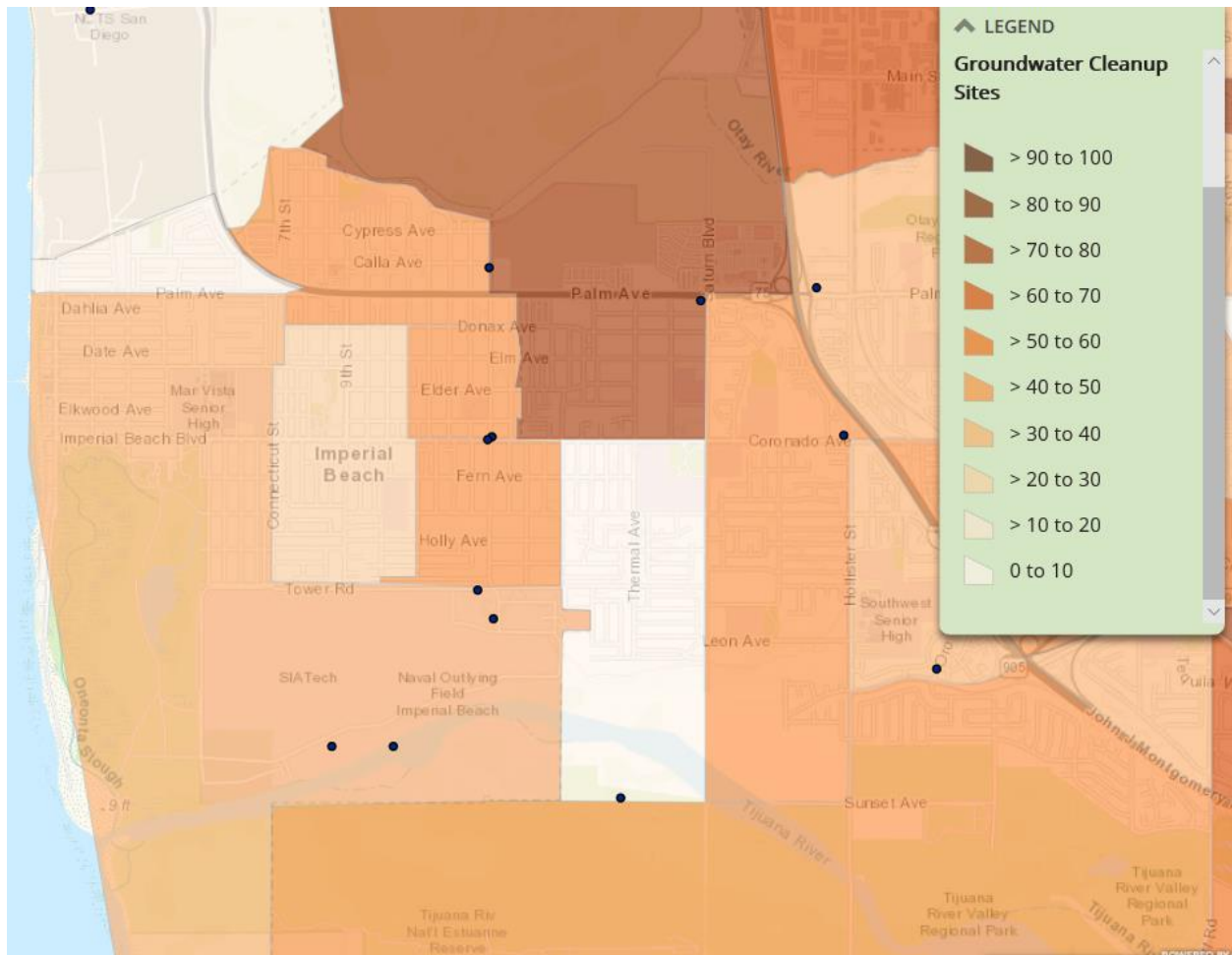
Groundwater threats and percentiles provided by Office of Environmental Health Hazard Assessment

The City of Imperial Beach has demonstrated a comprehensive framework for managing waters that is dedicated to environmental protection and restoration, water quality and conservation, sea level rise, flood management and wastewater management. The adopted plan has demonstrated that the City has effective policies and programs consistent with meeting state and regional goals for reducing greenhouse gas emissions, improving water quality, restoring and enhancing coastal resources and being sea level rise ready. Imperial Beach is home to three important water resources including the San Diego Bay, the Pacific Ocean, and the Tijuana River Estuary Reserve which all have impacts on coastal habitats and residents of Imperial Beach. Threats of sea-level rise and climate change greatly intensify the need to plan for future flooding, safety, water quality, and water conservation. Many policies adopted in the General Plan are well-structured for the sustainability of water management in Imperial Beach. However, there are areas in the community that can be strengthened through the adoption of practices and policies in specific sites of Imperial Beach.

Conservation

Imperial Beach works with various stakeholders, such as the National Oceanic and Atmospheric Administration and California State Parks, to work on protecting and restoring the Tijuana River National Estuarine Research Reserve (TRNERR). A "Comprehensive Management Plan" has been delivered and supports the Tijuana Estuary Tidal Restoration Program which works to restore 500 acres of restoration by removing sediment from the watershed to the ocean. This plan is significant for the reduction of greenhouse gas emissions, as wetlands are highly effective for carbon sequestering. However, of the eight habitats that exist within the TRNERR, attention to brackish marsh habitats would benefit the ecosystem, as this habitat is directly dependent on urban runoff. For example, Policy 4.3.3 seeks to "Minimize urban runoff into the Tijuana River Estuary and San Diego Bay", however, there are no such programs that are directed to these site-specific areas of high impact for restoring water quality in the TRNERR.

Stormwater Pollution

Goals in the Conservation and Ecotourism Element include the protection of the natural and coastal water bodies, reduced greenhouse gas emissions, improved water quality and restored or enhanced resources. To support much of the City's policy on water quality, the General Plan relies on the San Diego Regional Water Quality Control Board (RWQCB) to ensure water quality protection, through use of The Municipal Storm Sewer System (MS4) Permit that ensures that all development and redevelopment projects implement site design practices to minimize pollutants by using the Structural Stormwater Best Management Practices (BMPs). Furthermore, The City works to comply with the National Pollution Discharge Elimination System (NPDES) Permit, since the storm water conveyance system directly channelizes waters into the San Diego Bay, Tijuana Estuary, and the Pacific Ocean. In response, adoption of the Imperial Beach Jurisdictional Runoff Management Program (JRMP) ensures to prohibit non-storm water discharges into the storm water conveyance system and to reduce discharge of pollutants. Strategies in the JRMP are extensive and include enforcement and Site Design of Low Impact Development (LID) where applicable and feasible in order to best retain or treat pollutants in stormwater runoff at maximum. The strategies are applied to each project through the development review phase. To minimize stormwater runoff, under the LID Site Design BMPs, projects must

minimize impervious footprint, maintain natural areas encouraging landscaping of native plants, direct flow from impervious areas to landscaped areas, and other practices. Project applicants are also required to submit a Storm Water Management Plan or an equivalent Storm Water Pollution Prevention Plan. Additionally, the JRMP also contains a retrofitting and rehabilitation areas of existing development, and has established the successful projects like the Bayshore Bikeway Access Bio Swale at 10th Street and the City Hall xeriscape, which were retrofitted through incentive programs with support from EDCO Community Grant Program and California American Water, led by the Public Works Department. This completes the Storm Water Management Program that will prioritize reducing pollutants and ensuring water quality and best management practices for new development. In summary, the community plan for future development is comprehensive in minimizing stormwater runoff and pollutants, but can be strengthened through adoption of site-specific retrofit programs where storm drain systems have been deemed as inadequate during a 2-year storm.

Sea Level Rise and Flood Management

Tidal inundation and nuanced flooding are both exacerbated during sea level rise and increased stormwater runoff, and pose a risk for eroding infrastructure. The 2016 Sea Level Rise Vulnerability Assessment found that infrastructure including pump stations and manholes would be exacerbated if sea levels continue to rise. To address this, the General Plan promotes that "flood proof retrofits of pump stations, pipes, and manholes" could decrease vulnerabilities of flooding, runoff pollution and sewage seepage. The 2010 Storm Drain study provided specific drainage systems that could not withstand a 2-year storm, concluding that tides would inundate the storm system leading to flooding and an overburdened storm system. In addition, the Facilities and Services Element contained policy addressing drainage issues and surface runoff risk where green infrastructure should be adopted. Stated, "Policy 6.1.5: Considering green infrastructure such as planting trees and blue carbon capture as an overall climate mitigation and strategy". Overall, policy lessens the burden on storm drains and flooding, therefore reducing stormwater runoff risk. Still, with these policies in place, sea level rise continues to pose risk for future flooding and inundated storm water systems. Currently, there are no plans for adopting a sea level rise stormwater management system such as underground basins that were recommended in the 2010 Storm Drain Study. In the 2015 Community Plan Update, a "Managed Retreat Approach" plan was proposed, where the city would strategize to relocate and remove existing development out of hazardous areas. This would have included creating zoning ordinances that would encourage building in less hazardous areas, however, with public discernment of property rights, the updated plan in 2019 omitted this adaptive approach and instead focuses on armoring, which was shown to have the least net benefit. Proper community engagement and education should be a primary focus to implement an adaptive approach to sea level rise that yields the highest benefit to community. The Sea Level Rise Assessment is detailed, informative, precise and offers different approaches and should be given more power to leverage the community during an informed decision-making process for adapting to sea level rise.

Wastewater Management

Geographical location has given rise to much binational news surrounding the impacts of untreated sewage disposal and industrial pollution from the southern border, causing grave concern for the health of the ecosystems, residents and tourists of Imperial Beach. Currently, Imperial Beach has no infrastructure for

wastewater management and relies on other agencies to dispose of the city's solid waste. However, the General Plan addresses this and will "Develop whatever agreements are necessary with San Diego Area Wastewater Management District", as well as "Encourage federal, state, and other responsible agencies to address the problems of drainage, sewage and beach pollution". Again, these are strong policies that serve as a call to action, however, it is best that the City adopt future plans of development that instill sustainability practices that can mitigate effects of sea level rise on the current infrastructure of water management system. Solutions involving innovation and binational support can be effective at educating environmental problems caused by human impact coupled with lack of infrastructure. This would serve as a monumental moment that would practice real sustainability at a binational level of involvement.

5.3   Bayfront Park Specific Plan

Bayfront Park has recently been popularized as a major attraction by recreational open-space. Although there are some challenges with design as noted in the ecological audit, there are abundant opportunities to create a sustainable water management system that can serve as a pilot project for future sustainable water management practices and policies.

Ecological Audit

The efficient management of water is critical to maintaining a proper sustainable system to support the health of ecosystems and public health of a community. Bayfront Park was observed to identify specific areas of concerns and opportunities. The LEED-ND point system was applied to determine the functionality of water specific site in Imperial Beach. Weaknesses of Bayfront Park mostly include design, as the points given were minimal. The park was mostly accessible by bike and residential streets were not often inviting or complete. However, the 24-mile continuous stretch did account for one point for urban design as it connected Imperial Beach to surrounding communities. Other design features such as Green Building, received no points, as the developed building was dark in color and lacked shade trees. No points were received on compact development, as the park is surrounded by single-family housing, being a barrier to dense compact urban form. Strengths of the park included water management and soils restoration. Points were given for working with California State Fish

Urban Design	
Access by Proximity	2
Green Building	0
Compact Development	1
Bio Geo Physical Conditions	
Air	0
Water	3
Soil	3
Material Resources	0
Energy	0
Food	0
Socio Cultural Conditions	
Culture	1
Community Capacity	1
Economy	0
Well Being	2
Ecological Imperatives	
Biodiversity	1
Carrying Capacity	0
Ecological Integrity	2

Ecological Audit by LEED-ND point system

and Wildlife Program for protecting endangered species by creating a buffer between the species and human impact. Points were also given for development being further than 50 feet of wetlands with minor improvements including a bicycle pathway that was no more than 12 feet wide. An additional point was given

for biodiversity, where the restoration of habitat ensured the hydrology and restoration of native plants and wildlife. Missed opportunity was noted here, since there was no material reuse, or water recapture for harvesting for use of food production which limited the carrying capacity of the area. Socio-Cultural Conditions was evident, but not strong, as there was a strong sense of community for cyclists, however it was inclusive to cyclists and did not meet the needs of entire community such as pedestrians. The economic value was also limited, in that there was a cyclist retail store and coffee shop, but again, was not diverse enough to support the rest of community.
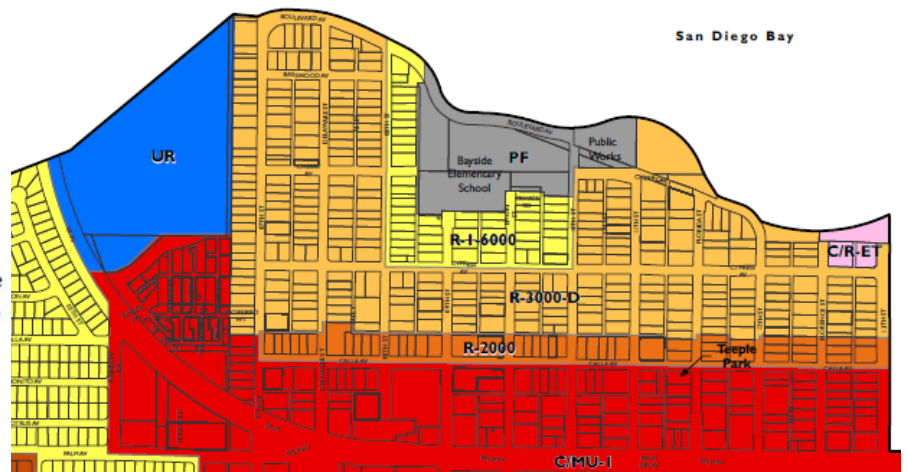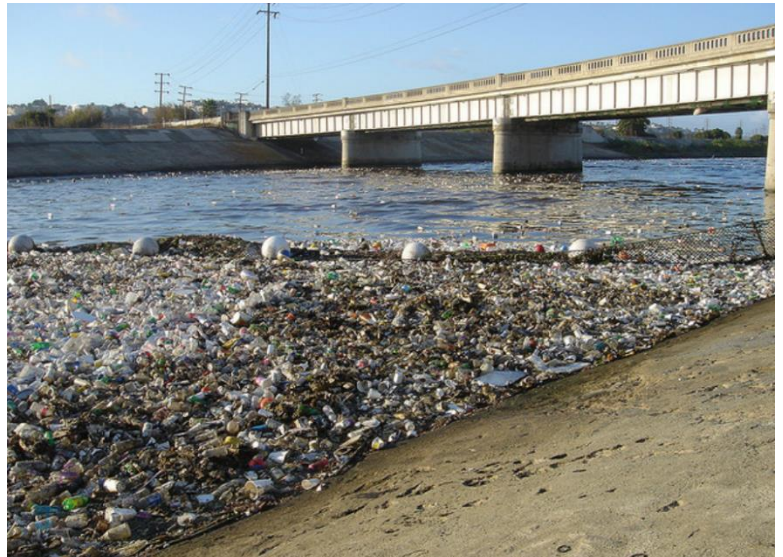

Bayfront Park by Land Use

Stormwater Runoff

According to the storm drain study, storm drain "K" deposits at the Bayfront Park site can accommodate a 2-year storm, however it was recommended to alleviate trash pollution problem.

Based upon findings, storm drain conveyance system "H" will not accommodate a 2-year storm. To successfully plan for Sea Level Rise and mitigate nuisance flooding, rainwater must be captured or utilized to reduce volume of water at "H" storm drain conveyance system.

Case Study – Los Angeles

To restore impaired water bodies, the Environmental Protection Program has recommended that localities adopt a Total Maximum Daily Load (TMDL) Permit to assist the National Pollution Discharge Elimination System (NPDES) permit which will capture trash before it enters the storm drain system and United States water body. Los Angeles adopted this permit in 1996 under the Clean Waters Act and has successfully retrofitted a total of 38,000 catch basins, costing the City $75 million. In 2016, the City reached it's 0% trash from stormwater

Los Angeles River Trash Capture Device

source point goal, eliminating the historical 2.5 million pounds of annual trash from storm water source point.

Case Study – San Francisco

The City of San Francisco has successfully implemented a "Green Infrastructure in their Watersheds Program" that minimizes the volume of water that enters the stormwater system. In 2018, a green corridor was completed in Wiggle Neighborhood that included 3.9 acres of permeable surfaces, accountable for managing 1.2 million gallons of water through green infrastructure per year. Green infrastructure included rainwater gardens, bioswales, and some rainwater capture installments.

This can be specifically important in problem areas such as the drainage "E" basin which includes 152 acres of impermeable surface that discharges into TNERR. According to the storm

San Francisco Green Infrastructure Corridor

drain study, Elm Avenue floods the heaviest when runoff exceeds the capacity of storm drain system because of the low elevation. It was here that the study recommended the drain system needs to increase, or the city shall construct underground retention basin at park.

Adoption of TMDL and green infrastructure would strengthen Bayfront Park, as it would restore water quality through elimination of pollution source point from stormwater, and alleviate volume of water in storm drain system. Benefits to design are robust, where adoption of these methods have potential to increase walkability through community openness through use of green traffic-calming measures such as green bulb outs and attractive streetscapes. Rainwater harvesting should also be adopted to alleviate volume of stormwater runoff, for reuse of materials. The city can adopt an easement program for water capture and urban agriculture in historical and projected flood areas. Managing waters is a multi-pronged approach and should involve many departments addressed by multiple elements in the community plan. A focus on restoring water quality shall be implemented at major flood concern areas that are known to cause pollution such as commercial runoff and inundated storm water drainage systems. It is recommended that the City enhance water quality and ecological restoration not by observed linear metabolism of resource management, but by planning a well-weaved sustainable approach to serve the health of ecosystems, residents and tourists of Imperial Beach.

Bioswale (top) and rainwater harvesting (bottom) are examples of green infrastructure.

Green Infrastructure Includes:

• Bulb-out Bioswales

• Rain Gardens

• Rain harvesting captures for vertical or community gardens

• Trash capture devices at storm drains

• Retention basins

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5.4 Recommendations

Table 5-1: Policy Recommendations

| General Plan Element	LEED-ND Principle	Policies
Land Use	• Access by proximity • Green building • Compact development	1. Prepare Specific Area Plans for Bayfront Park and other drain impacted areas to coordinate with infill development and adoption of a Green Infrastructure Retrofit Program.
Design	• Walkable streets • Connected and open community	2. Encourage Walkability by use of Green Infrastructure Traffic Calming Methods. a. This should be coordinated through Department of Public Works and Transportation.
Conservation & Ecotourism	• Water conservation • Water reuse • Food production	3. Prepare Urban Agricultural Overlay Zone, specifically at drains impacted by Sea Level Rise and recurring stormwater flooding. Rainwater harvesting should be incentivized to alleviate volumes of water entering storm drain system and will support local food production. Easements for water capture should be explored to support Agricultural Overlay Zone.
Facilities & Services		4. Adopt a Total Maximum Daily Load Permit Program to restore Impaired Water Bodies by reduction of trash pollution from stormwater source point. Regular maintenance will be expected to fully engage in program.

Green bulb-out at Bayfront Park Residential. Illustration: Brittany Cabeje.

Bioswales collect pollutants and rainwater. Illustration: Brittany Cabeje.
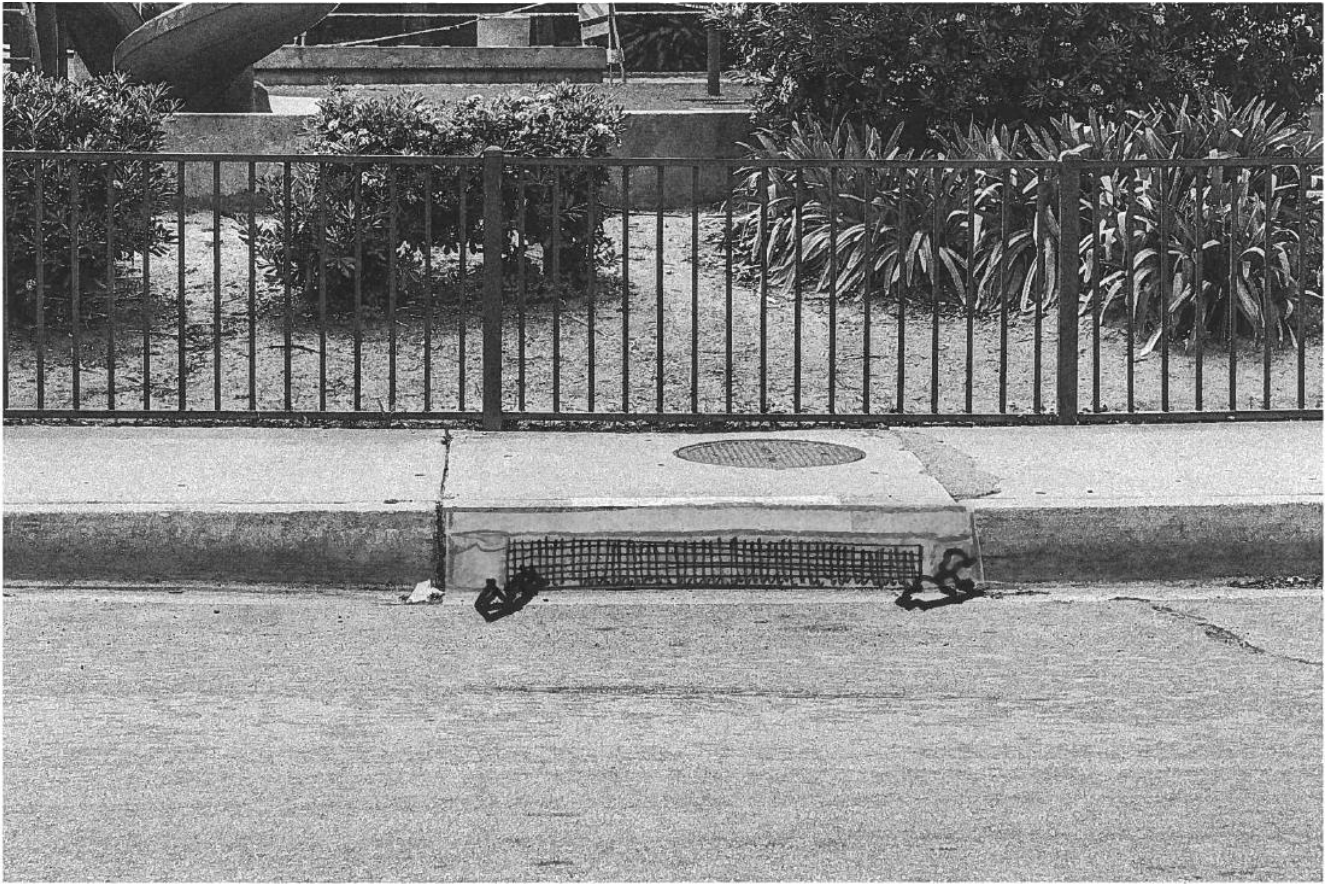
Trash Capture Device. Illustration: Brittany Cabeje.

- Brittany Cabeje

6   Moving People

6.1   Ecological Audit

The efficient movement of people and goods is critical to a well-functioning city. Environmental and public health concerns are motivating cities to promote alternate modes of transportation. Like much of the region, Imperial Beach is an auto-centric community. As shown in Table 6-1 and Chart 6-1, nearly 85% of residents drive to work and, although the city's share is lower than the regions, nearly three-quarters of commuters drive alone. Additionally, only three percent walk or bike to work. Public transit use, however, is more widespread in Imperial Beach with the share of people who take public transit to work at 7% – over double the regional average. In addition, nearly half of households in Imperial Beach own one car or less as indicated by Chart 6-2. Relatively high transit use and low vehicle ownership demonstrate a need for alternative modes of transportation. Additionally, it demonstrates challenges and opportunities regarding municipal efforts to reduce VMT and encourage public transit and active transportation.

Table 6-1: Mode Share Summary

Mode	Commuters	Percentage
Drive	10,238	84%
• Single-Occupant	8,903	73%
• Carpool	1,335	11%
Public Transit	825	7%
Active Transportation	376	3%
• Bike	119	1%
• Walk	257	2%
Other	692	6%
Total:	12,131	100%

Chart 6-2: Household Vehicle Ownership

- No Vehicle: 12%
- 1 Vehicle: 36%
- 2 Vehicles: 35%
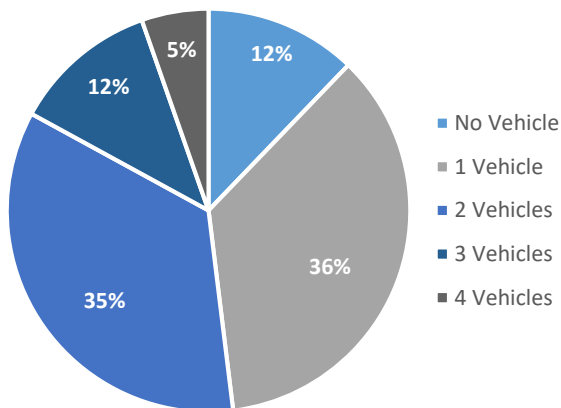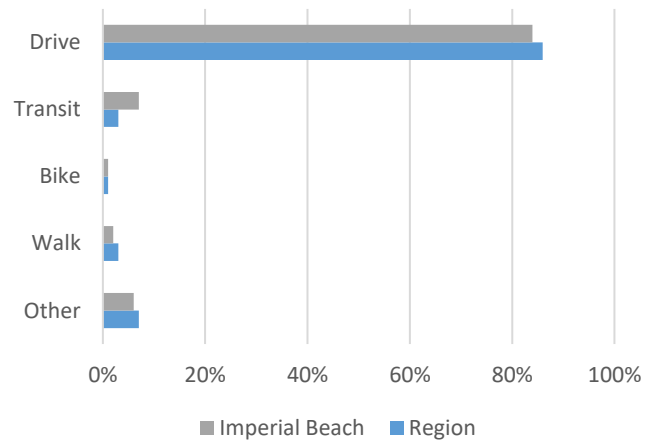- 3 Vehicles: 12%
- 4 Vehicles: 5%

Chart 6-1: Mode Share Comparison

Imperial Beach   Region

Pedestrian Facilities

Although Imperial Beach enjoys mild and sunny weather year-round, active transportation constitutes a small share of commuter travel patterns. Narrow sidewalks are common and commercial areas, such as Palm Avenue and Imperial Beach Boulevard, are dominated by cars making them uninviting to pedestrians. However, while only 2% of residents walk to work, the city's spatial structure is conducive to walking. Imperial Beach benefits from having a grid layout with high intersection density. These advantages are especially evident along Seacoast Drive and the western end of Palm Avenue which have a diversity of land uses.

In addition, there are positive developments throughout Imperial Beach. The City has steadily implemented traffic calming measures and improved pedestrian-friendly facilities around the community. On 13th Street between Imperial Beach Boulevard and Palm Avenue, high-visibility continental crosswalks and bulb-outs have been installed near Central Elementary School. Along Seacoast Drive, bulb-outs, "stop for pedestrian" signs, and pavement treatments at intersections serve as visual cues to drivers that they are in a pedestrian zone. Lastly, while walkability on Palm Avenue between 7th Street and Seacoast Drive is adversely affected by inadequate street activation, bulb outs and locally-inspired seating and street design elements contribute to a pleasant pedestrian experience.

Traffic calming measures and pedestrian safety features on Seacoast Drive (top-left), 13th Street (top-right), and Palm Avenue (bottom images). (Photos: Ricky Cervantes and Brittany Cabeje)

Bicycling

Given the relatively small size of Imperial Beach and its largely flat terrain, the city has an opportunity to promote cycling within the community. Also, by increasing the number of people cycling, the City can improve public health, reduce air pollution, and combat climate change. However, while Imperial Beach has made noticeable improvements recently, cycling currently makes up 1% of commuter mode share.

Photo: Brittany Cabeje.

As shown in Figure 6-1, Imperial Beach's bicycle network suffers most from a lack of connectivity. The only link between bikeways in the east and ones in the west is the Bayshore Bikeway, a regional bike corridor on the City's northern border that extends around San Diego Bay. Another major issue is bikeway classifications. Table 6-2 provides a summary of the different bikeway classifications commonly employed. Imperial Beach's network is largely made up of Class II and Class III bikeways. Bike routes and sharrows might be tolerable on residential streets but they are inadequate on high-volume streets such as Seacoast Drive. Lastly, buffered bike lanes on 13th Street are a promising development, but their configuration still forces cyclists to contend with moving traffic and the possibility of being "car-doored" (see image).

Table 6-2: Bikeway Classifications

Class I Bike Path	Class II Bike Lane	Class III Bike Route	Class IV Cycle Track
Provides an entirely separate right of way exclusively for cyclists and pedestrians with minimal crossflow	Provides a striped land for one-way bike travel on a street or highway adjacent to auto travel lanes; some are buffered bike lanes	Provides for shared use with motor vehicle traffic; also referred to as "sharrows"	Provides exclusive right of way for cyclists, physically separated from motor traffic with a vertical feature

64

Figure 6-1: Existing Bicycle Facilities
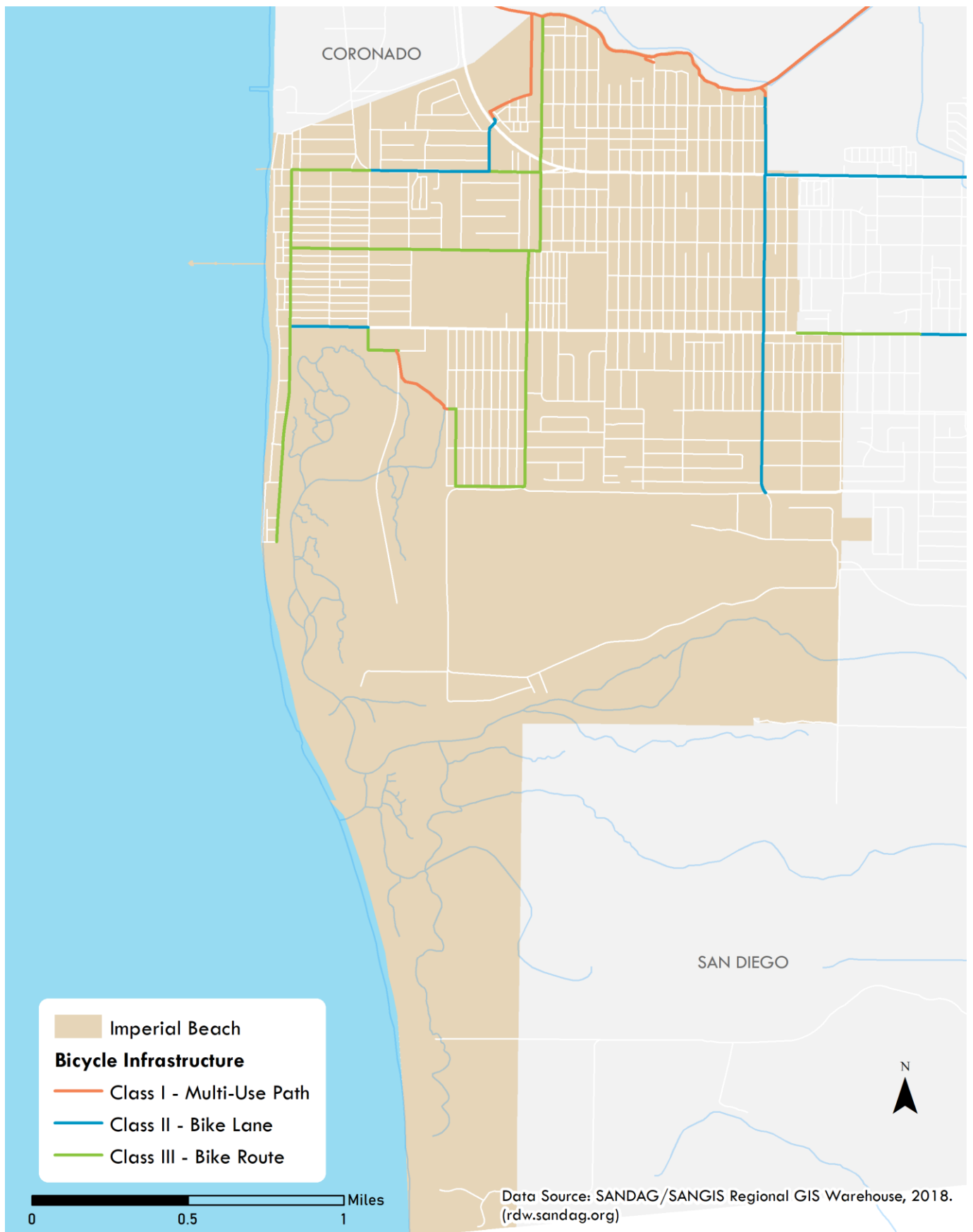
Public Transit

Active transportation is crucial to advancing a more sustainable transportation network and meeting state-mandated emission targets but, for longer distances, public transit is essential. As a space and energy efficient mode of conveyance, it is an important tool in greenhouse gas reduction efforts and, as a public service, it is a vital link for vulnerable populations.

As shown in Figure 6-2, Imperial Beach is served by two bus routes and ridership is strongest along Seacoast Drive, Palm Avenue, and 13th Street near Ream Field. Bus route 901 connects Imperial Beach to Downtown San Diego and the Iris Avenue Transit Station while bus route 933/934 operates along a loop between Imperial Beach and Ocean View Hills. Buses with the head sign 934 runs clockwise while those with a 933 head sign run counterclockwise. The route was the 8th highest performing in 2018. As shown in Table 6-3, both routes have 15-minute headways at peak times but the 901 has a base frequency of 30 minutes. The 933/934 also connects Imperial Beach to the two closest trolley stations, Iris Avenue and Palm Avenue. Regional transit access is provided by the Blue Line which is the most frequently used trolley line with over double the avg. weekly ridership of the Orange Line.

Lastly, public transit is important to advancing equity in access. Many elderly and low-income residents depend on it. Furthermore, the Blue Line and both bus routes are considered "minority routes" by the Federal Transit Administration (FTA). At least a third of their routes run through census block groups with a percentage of minority population that higher than the percentage within MTS' transit service area.

Table 6-3: Local Route Information

Route	Estimated Hours of Service		Frequency		Transit Center Connections
	Earliest	Latest	Peak	Base	
901	4:30 am	12:15 am	15	30	Iris Avenue 12th & Imperial
933/934	4:45 am	12:45 am	15	15	Iris Avenue Palm Avenue
Blue Line	4:30 am	1:00 am	7.5	15	Iris Avenue San Ysidro 12th & Imperial

Figure 6-2: Existing Public Transit

Transit Stop
by Ridership

- Under 25
- 26 - 50
- 51 - 75
- 76 - 100
- Over 100

Bus Routes

— 901

— 933 & 934

Data Source: SANDAG/SANGIS Regional GIS Warehouse, 2019.
(rdw.sandag.org)

Map: Ricky Cervantes

CORONADO

SAN DIEGO

N

Miles

0   0.5   1
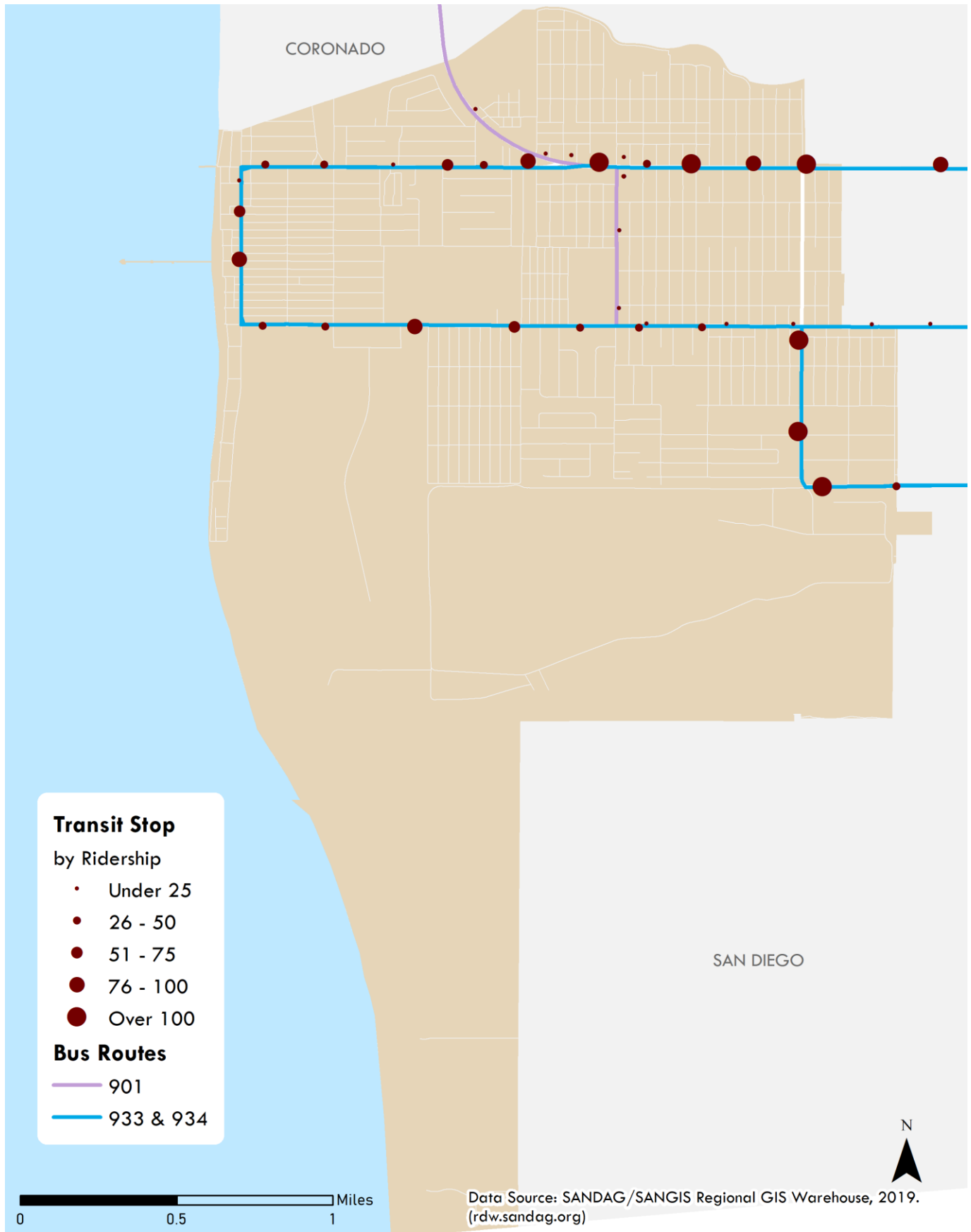
Streets and Freeways

With such a large percentage of resident commuting by vehicle, the conditions of its street network are important to residents and policy makers. Imperial Beach has a grid layout and is served by a combination of arterials, collectors, and residential streets. As shown in Figure 6-3, the Palm Avenue/SR-75 corridor running between Imperial Beach's border with the Otay Mesa-Nestor community and the City of Coronado is the highest capacity right-of-way with a 6-lane prime arterial between 7th and 14th Street and a 4-lane major street north of 7th Street. Otherwise, Imperial Beach's road network is largely characterized by 2 or 3-lane collectors. The city has implemented road diets or land reductions along Imperial Beach Boulevard and 13th Street in recent years to reduce vehicular speeds and accommodate all users. As shown in Figure 6-4, all the major roadways are currently under capacity. This demonstrates an opportunity for the City to continue pursuing further land reductions.

The City lacks direct freeway access which is both a benefit and a challenge. For example, its relative isolation shields it from the public health impacts and land use planning challenges that communities near highways face. However, the lack of direct freeway access also means that its surface roads are impacted. Regardless, regional connectivity is provided by Interstate 5 and State Route 905 through San Diego's Otay Mesa-Nestor community.

Looking north on 13th Street. Photo: Brittany Cabeje

Figure 6-3: Existing Street Classifications

Map: Ricky Cervantes

Data Source: SANDAG/SANGIS Regional GIS Warehouse, 2018.(rdw.sandag.org)
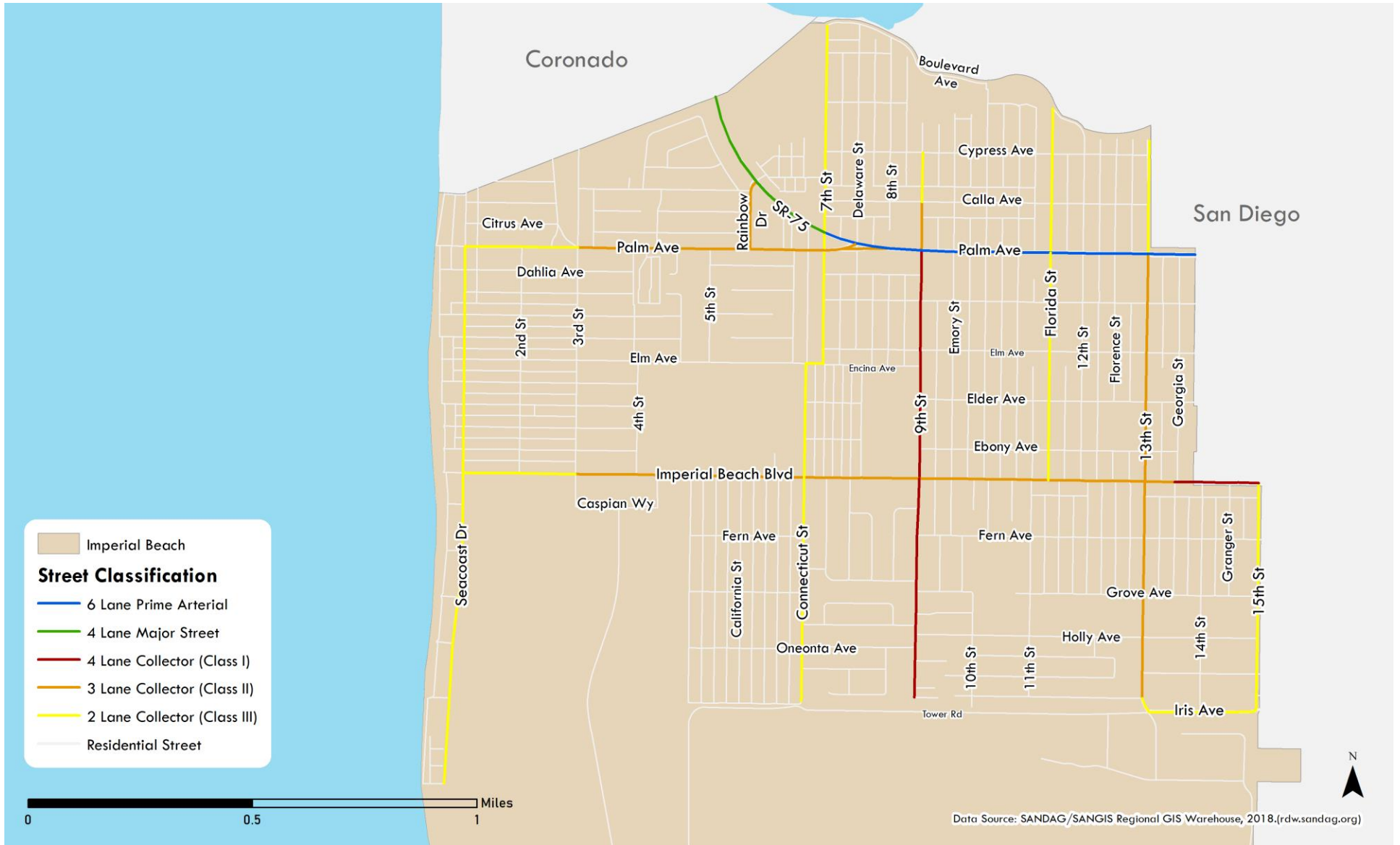
Figure 6-4: Existing Level of Service

Legend:

ImperialBeach

Level of Service
— Under Capacity
— Near Capacity
— At Capacity
— Over Capacity

CORONADO

SAN DIEGO

N

0   0.5   1   Miles

Data Source: SANDAG/SANGIS Regional GIS Warehouse, 2018. (rdw.sandag.org)
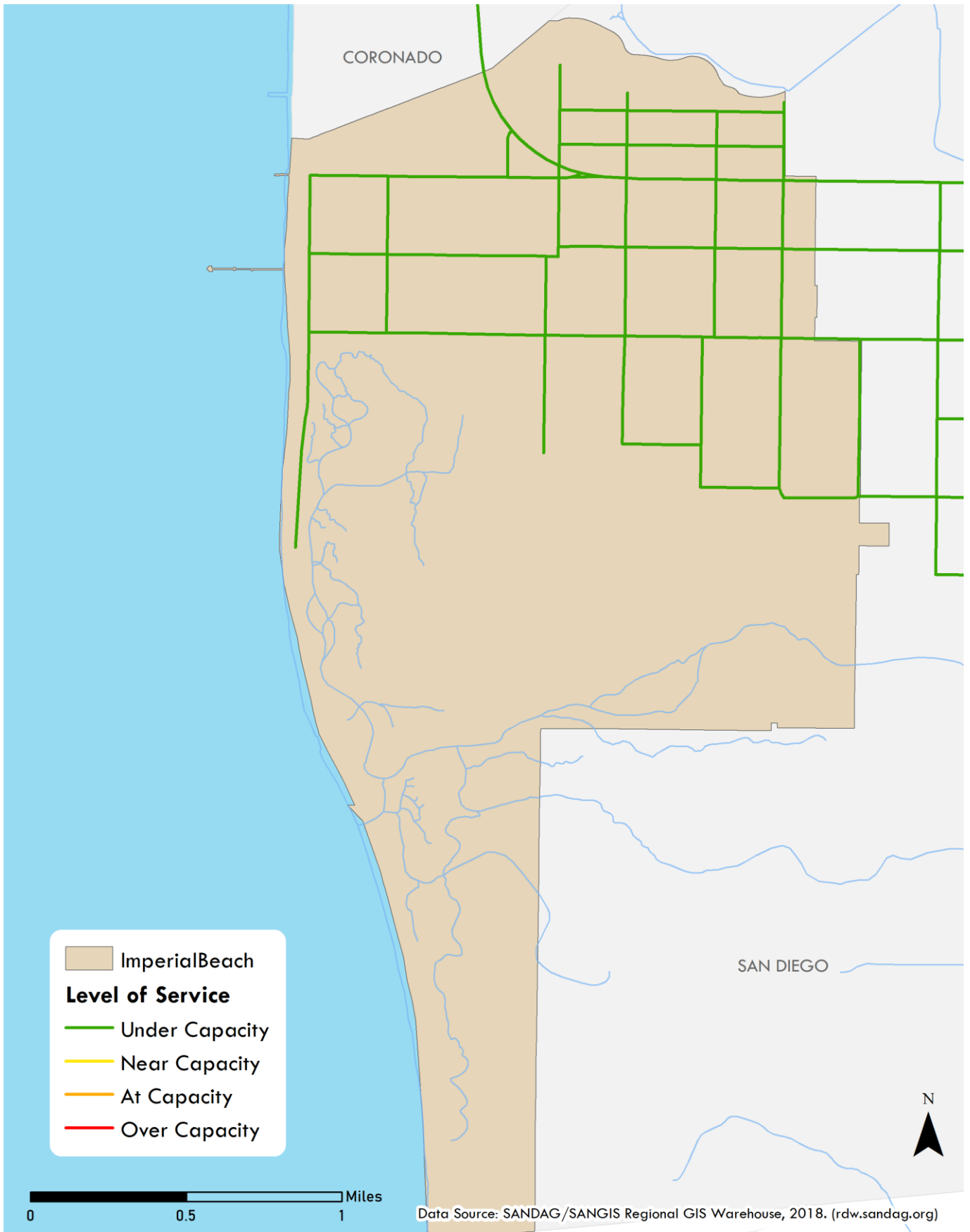
Map: Ricky Cervantes

6.2 Community Plan Critique

Current General Plan/Local Coastal Plan

Imperial Beach's current General Plan and Local Coastal Plan was adopted in 1994 and updated in 2015. Given its original adoption date, the document contains outdated information, such as mentions of MTDB and non-existent bus routes. In addition, due to the amendments not being clearly defined, the plan feels disjointed at times and many of the policy proposals are inconsistent.

The Circulation Element, however, contains several promising features. Its goals encourage "safety, environmental sensitivity and energy efficiency in all transportation designs and improvements" and propose that "pedestrian walkways, bicycle paths, and public transit… receive the same attention as facilities designed for the automobile" (C-13). Policy C-19, in particular, puts a strong emphasis on improving bicycle facilities and encouraging bicycle use. It suggests making bicycle storage facilities a required condition on new development. In addition, since the plan was adopted, some policies have been implemented and had a positive impact on the community. Policy C-21, for example, promoted the implementation of traffic calming measures on Palm Avenue between 9th Street and Seacoast Drive to enhance the pedestrian experience. Those changes have since been realized and the corridor has improved considerably.

The current plan, however, also has its flaws. It contains policies that are either inadequate or regressive. For example, although Policy C-11 advocates for the improvement of bus stops and the exploration of a future transit station, it only mentions adding amenities at transit stops near the intersection of 9th Street and Palm Avenue. Improving transit facilities is an important strategy in promoting transit ridership and reducing air pollution but the focus on a single intersection is insufficient. Additionally, policy C-3 is both regressive and inconsistent with the stated goals. It promotes the establishment of new right-of-way between Ream Field and State Route 905 by extending Tocayo Avenue and reclassifying it as a prime arterial. The policy reflects the City's frustration with the traffic and congestion the naval base generates but fails to account for the negative impact on the residents near Tocayo Avenue, the loss of agricultural land to development, and the potential induced demand. Furthermore, the policy recommendations are inconsistent with Land Use Policy L-5 which promotes the closure of the base. Traffic concerns related to Ream Field also seem to have informed the proposed change outlined in Policy C-5 that would expand Fifteenth Street from two lanes to four lanes between Iris Avenue and Imperial Beach Boulevard. The expansion would establish a 4 Lane Collector through a neighborhood and negatively impact the safety and public health of its residents.
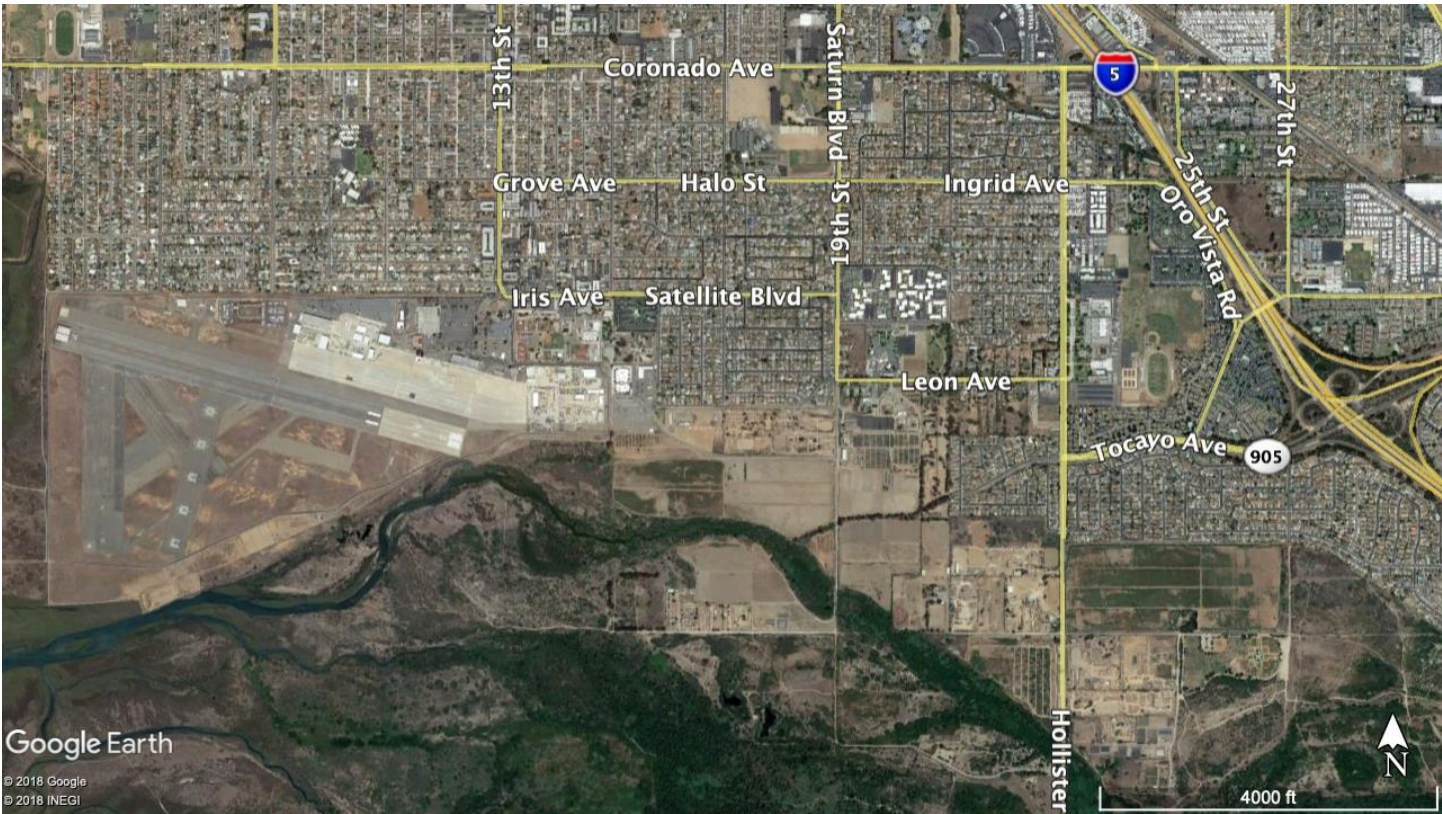
Policy C-3 would extend Tocayo Avenue to Ream Field and reclassify it as a prime arterial (top) while Policy C-5 would increase the number of travel lanes on 15h Street to four.

Creating a more resource efficient and environmentally sustainable transportation system demands multiple approaches and strategies. In addition to land use and urban design policies that promote access by proximity and support alternative modes of transportation, the City of Imperial Beach should pursue policies that facilitate walking, bicycling, and public transit use and that discourage driving. The City is currently in the process of updating its General Plan and Local Coastal Plan and, while the 2019 draft stresses the needs of pedestrians and cyclists and declares the prioritization of vulnerable users and the most resource efficient modes of travel, its parking requirements and roadway expansion policies are inconsistent with its stated goals and contrary to efforts to reduce automobile. The policies below build upon the City's positive strategies and amend detrimental policies:

- Work with the Ream Field base commander and other naval officials to implement transportation demand management strategies and negate the need for a costly and disruptive roadway expansion project
- Eliminate parking requirements along current and future transit and mixed-use corridors, including along Palm Avenue and Seacoast Drive.
- Expand traffic calming measures and enhanced pedestrian crossings to all arterial and collector streets, including bulb outs at intersections, chokers in middle of long blocks, and pavement treatments at major intersections to indicate pedestrian zones.
- Incorporate Level of Traffic Stress principles into all phases of bicycle infrastructure development to ensure the safety and comfort of all users, regardless of age and ability.
- Prioritize protected and/or raised bicycle lanes and reconfigure existing bike lanes so that they are between the sidewalk and parked cars.
- Where feasible, create curb cuts for taxis and transportation network companies, such as Lyft and Uber, on Seacoast Drive.
- Continue reclassifications of streets that reduce lanes and allow for buffered bike lanes.
- Create mobility hubs at major intersections along current and future mixed-use corridors. Include elements such as marked scooter corrals and bicycle parking facilities.
- Partner with MTS or private industry to implement a high-frequency shuttle service from the Palm Avenue Trolley Station.
  - Explore an NEV option like FRED in Downtown San Diego
  - Partner with MTS to create a new route like bus route 904 in Coronado

Existing Conditions

The Palm Ave/State Route-75 corridor is one of Imperial Beach's major commercial districts. The roughly mile-long corridor connects the community with the Otay Mesa-Nestor community and Interstate 5 in the east and Coronado to the north. Near the intersection with Delaware, the street has a Y-junction where Palm Avenue continues west as a three-lane then two-lane collector and SR-75 continues north through Silver Strand. As discussed in the ecocity zoning section, the mile-long segment of was once referred to as the Miracle Mile District. The state recently relinquished control of the Imperial Beach section of State Route 75 to the city and paid the city $5 million. The process, however, is currently ongoing as coordination between public works, fire, and utility companies continues.

The corridor represents both a challenge and an opportunity for Imperial Beach. The area was rezoned as a General Commercial and Mixed-Use Area (C/MU-1) and the City is actively encouraging pedestrian-oriented mixed-use development within the area. In addition, all the bus routes that operate within the city run, at least in part, along Palm Avenue. Efforts to create a dense, walkable center along Palm Avenue, however, are hindered by existing conditions along the corridor. Between 9th Street and 13th Street, for example, Palm Avenue is six-lane prime arterial with traffic speeds commonly in excess of 40 mph. The auto-centric nature of the area extends to the existing land uses and commercial typologies. As stated in earlier sections, the corridor is dominated by strip mall development and the resulting number of ingress and egress access points creates

dangerous conditions for pedestrians. At intersection, continental crosswalks have been installed but street width and vehicular speeds still make crossing dangerous. Furthermore, residents often must walk up to four blocks to reach crosswalks which are still limited to the signalized intersections at Rainbow Drive, 7th Street, 9th Street, Florida Street, and 13th Street. As a result, Palm Avenue acts as a physical barrier between the bayfront areas on the north end and the rest of the community to the south. Lastly, bicycle infrastructure along Palm Avenue is similarly deficient. Existing bikeways are limited to short segments of non-buffered bike lanes east of 13th Street that connect the Otay Mesa-Nestor community with the Bayshore Bikeway at the northern edge of the 13th Street.


Conditions on Palm Avenue. Photos: Ricky Cervantes.

Case Study: Octavia Boulevard (San Francisco, CA)

The development of Octavia Boulevard in San Francisco can inform efforts to improve the Palm Avenue/SR-75 Corridor. After the 1989 Loma Prieta earthquake damaged the Hayes Valley section of Central Freeway, the temporary closure proved that the highway segment was not as vital for regional connectivity as it had previously been considered by traffic engineers. With mayoral support, the two-level, elevated section cutting through the central neighborhood was removed and replaced by a multi-way boulevard in 1992. With four travel lanes in the center and a frontage street on each side, the roadway reconfiguration separated through traffic from local access lanes and allowed for development along the corridor.

The multiway boulevard has been a huge success for the Hayes Valley neighborhood. The changes have maintained roadway capacity while spurring development along Octavia Boulevard and increasing housing production, job growth, transit ridership, and surrounding property values. Neighborhood streets or streets with low-traffic volume now open onto frontage streets reducing pedestrian interaction with fast moving traffic. The frontage streets also function as slower-traffic travel lanes that cyclists can safely use. Lastly, medians between the sections create pedestrian safety islands making it safer for pedestrians crossing the street.
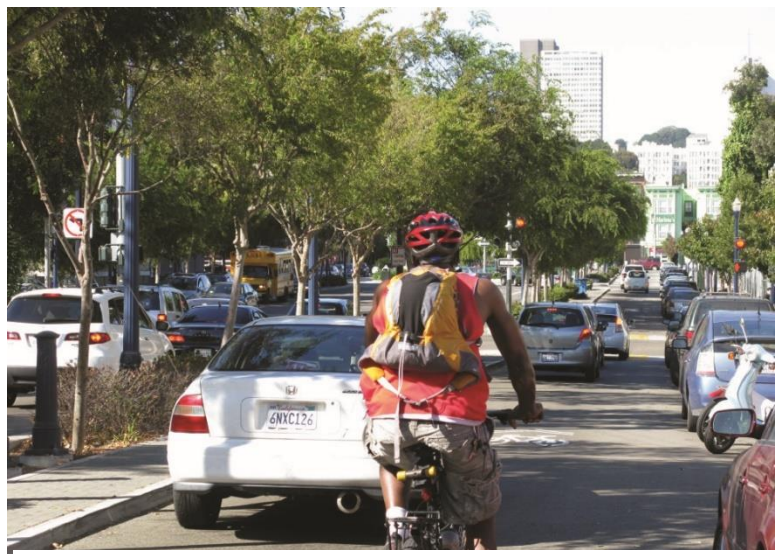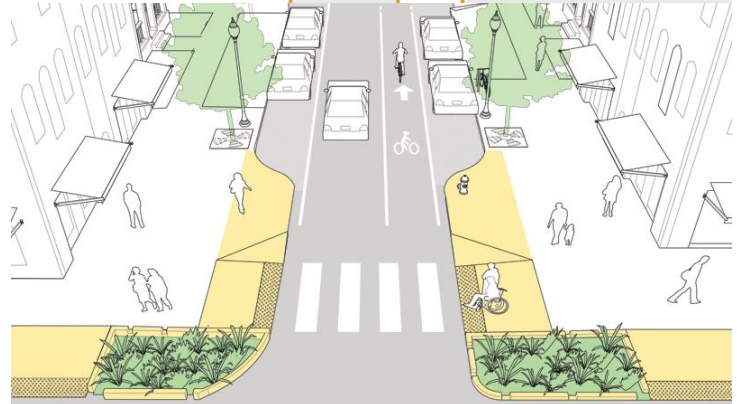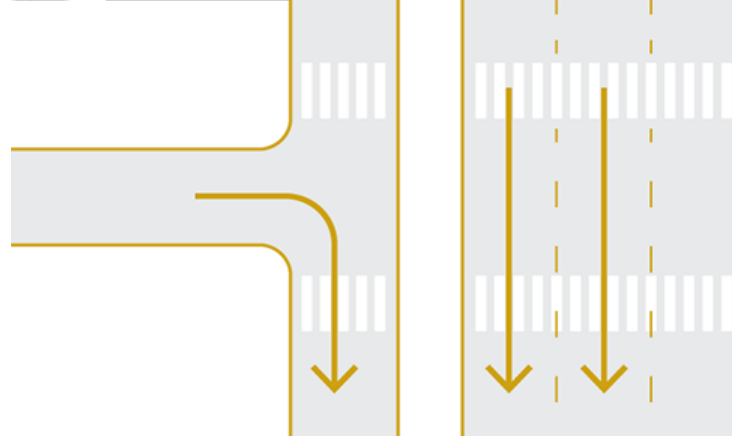

Photos: NACTO

Recommendations

Octavia Boulevard's historical and spatial context differs from that of the Palm Avenue/CA-75 Corridor, but the problems are comparable and the lessons relevant. As the case study demonstrated, the reconfiguration of the Miracle Mile to a multiway boulevard would improve pedestrian safety and encourage mixed-use development along the corridor by creating frontage streets that slow traffic near businesses and pedestrians. To revitalize the area, reduce vehicular traffic, and create a vibrant walkable center, the City of Imperial Beach should incorporate the recommendations outlined below into a future redesign of the corridor.

As shown in Figure 6-5, the multiway boulevard would stretch from the 13th Street intersection to the Rainbow Drive intersection. The reconfiguration would improve safety at the existing signalized intersections by creating medians that act as pedestrian safety islands and create a multi-stage crossing process. The medians would be protected by bollards to prevent auto-pedestrian collisions. Additional, traffic-calming and pedestrian safety strategies should be implemented to complement the new layout, including speed humps at intersections with frontage streets (see top image) and lead pedestrian interval (LPI). LPI gives pedestrians a head start when crossing the street. Given the width of the corridor, it is critical to pedestrian safety and comfort. Lastly, midblock crosswalks should be installed between distant signalized intersections, such as between 9th and Florida and between Florida and 13th. In terms of bicycle infrastructure, Imperial Beach should install dedicated raised cycle tracks along the corridor to improve promote cycling and increase cyclist safety. To reduce LTS, the cycle tracks should be placed between the sidewalks and the parking on the frontage streets.


(from top) Corridor enhancements include: multiway boulevards, t-intersections at frontage streets, gateway curb extensions at those intersections, and separated cycle tracks (Photos: NACTO).

The multiway boulevard's interaction with adjacent neighborhood streets is an important feature of the design. Minor intersections with residential streets with low traffic volumes should only open to the frontage streets. The resulting T-intersections should be raised and include "gateway" curb extensions to improve the pedestrian experience and signal to motorists that they are entering a residential street (see second image from bottom). To address the unique circumstances at the Y-junction with the Palm Avenue collector, the signalized intersection would remain but the slip lane at Delaware Street would be removed and be replaced by a T-intersection with the northern frontage street. Motorists needing to turn north on Delaware would need to enter the frontage street at the intersection with 9th Street.

As mentioned in both the current General Plan and reiterated in the 2019 draft, efforts should be made to create a multi-modal transit center on Palm Avenue. Three suitable sites for a potential transit center are shown in Figure 6-5, including the gas station on the southeast corner of Palm and 9th, a used car dealership on the northwest corner of Palm and Delaware, and the gas station at 7th Street between Palm and CA-75. The location at Palm Avenue and 9th Street fits with the 2019 LCP/GP Final Draft's site recommendations and would benefit from the existing four-way intersection. Another candidate site is the used car dealership on the northeast corner of the intersection with Delaware Street. The parcel is large and, unlike the other two candidate sites, it would not require soil remediation. However, the location would require reconfiguring the signalized intersection. Lastly, the city could procure the existing gas station, Beach Side Station, as a future location for an Imperial Beach Transit Center. It would place the intermodal station closer to the beach and could be improved upon by instituting land reductions or bus lanes on the segment of 7th Street between Palm Avenue and CA-75. Regardless of which site the City selects, it should prioritize transit service enhancements and improvements to pedestrian and cyclist facilities to facilitate sustainable first-last mile connections and reduce the need for park-and-ride facilities.
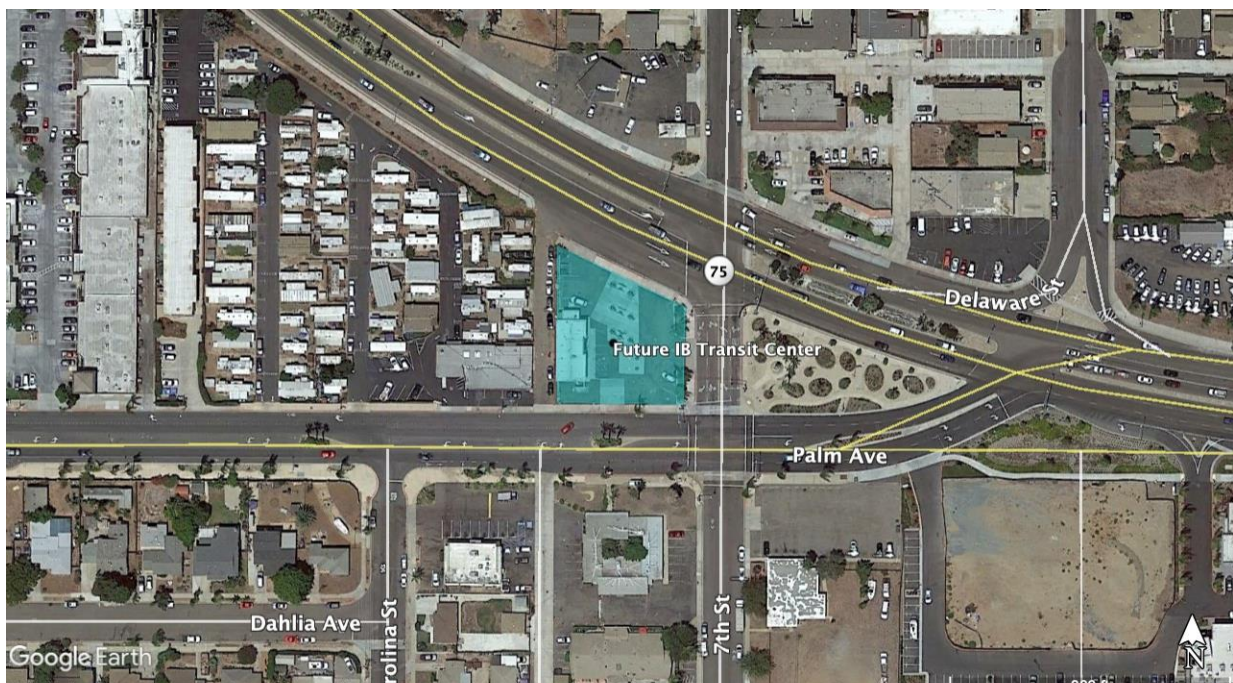
Beach Side Station site (Map: Google Earth).

Figure 6-5: Corridor Improvements

Map: Ricky Cervantes

-     Jose R. Cervantes

7 Conclusion

Transforming Imperial Beach into an ecocity requires a paradigm shift. As the report outlined, changes to its urban form, its transportation system, and its relationship with water are required. Future development in Imperial Beach must be pedestrian-friendly, compact, and affordable. Seacoast Village attracts people from throughout the region who enjoy the relaxed atmosphere and ocean views, and it is already becoming denser. A similar mixture of housing, retail, and public space can transform the Miracle District and Aviation Center into vibrant community centers; the City should adopt Specific Area Plans to guide infill development there. History reveals that people have always been attracted to Imperial Beach because of its location and low cost of living. The City should preserve its existing affordable housing, including mobile homes, and adopt inclusionary zoning to create additional low-income units.

Efforts to craft the compact and pedestrian-friendly land use and neighborhood design policies outlined in the report should be complemented by a more resource efficient and environmentally sustainable network. To improve mobility and accessibility, Imperial Beach must emphasize active transportation for travel within the city and public transit use for regional travel. A reconfiguration of Palm Avenue/SR-75 corridor into a multi-way boulevard must be pursued to enhance pedestrian and cyclist safety and create a vibrant commercial center. In addition, the City needs to build upon its relatively high transit ridership by working with MTS to improve service and enhance facilities, including the future creation of a transit center.

To support the urban form and its circulation network, Imperial Beach has set achievable goals for conserving and growing its natural green infrastructure, which are stated in their Local Coastal Plan and Climate Action Plan. These documents will ensure there is support for the creation of new parks, open space, and tree canopy for several years to come. The latter, growing a tree canopy, will bring a breadth of remarkable benefits to both the city and its residents. By prioritizing the planting of new trees each year, Imperial Beach will better the condition of its storm water runoff, improve air quality, sequester carbon, improve property values, and help with energy conservation of buildings just to name a few. In addition to a green infrastructure plan and guidelines that protect and maintain trees, Imperial Beach has also highlighted major concern areas for restoring and enhancing water quality and the infrastructure that it supports. Adopting site-specific policies and programs in areas of concern shall strengthen the community's resilience to flooding, sea level rise, and polluted water. By adopting green infrastructure within a vibrant urban form, a sustainable network will develop that connects people to their natural environment in a meaningful way.

- Brittany Cabeje & Jose R. Cervantes

8   Appendix A

Appendix A - Methodology for Current Inventory

West Coast Arborists, Inc. inventoried a total of 4,748 street trees, stumps, and vacant sites located in street rights-of-way, medians, and facilities in the CITY OF IMPERIAL BEACH. The information collected for each tree is listed below, followed by an explanation of each of the following data fields:

- Tree Site Location
- Tree Identification
- Diameter Range
- Height Range
- Condition
- Utility Presence
- Recommended Maintenance
- Removal Priority

<u>Tree Site Location</u>   District: geographical areas such as maintenance zones or assessment areas.

Address: the numeric address of the property.

Fictitious: an 'X' follows the address if no address is visible, indicating the approximate address on the block.

Street: the full name of the street.

Side: indicates where the tree is physically located: Front, Side, Median, Sub Street, Lot, Park, and Rear.

Tree: tree sites are numbered consecutively in the direction of increasing address on the street.

Tree sites are inventoried in the direction of increasing address on each street. The house address number, street name, side and tree number are included. In addition to the house address, the name of the "on" street is collected for side or corner trees.
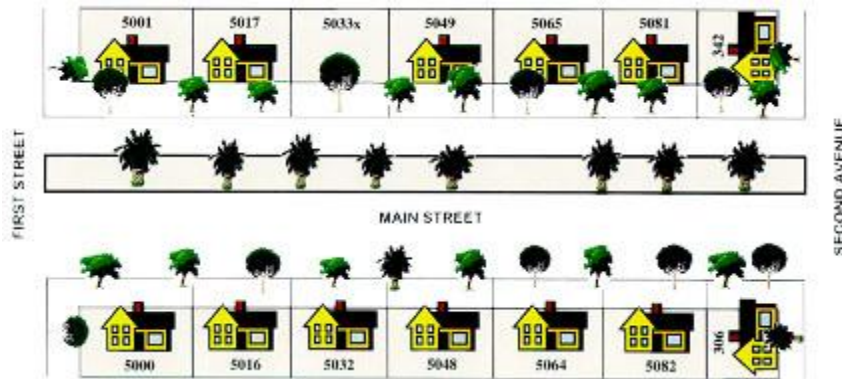
Tree Identification   All trees are identified by their botanical and common names. Stumps and vacant planting sites are also designated here.

Diameter Range   Tree diameters were inventoried in the following ranges: 0-6 inches, 7-12 inches, 13-18 inches, 19-24 inches, 24-30 inches and >30 inches.

Height Range   Height is estimated from the ground to the top of the crown, or from the ground to the frond base in the case of palms. The height ranges are 1-15 feet, 16-30 feet, 31-45 feet, 46-60 feet and >60 feet.

Condition   During data collection the condition of the trees was recorded. *Conditions are based on findings on the date of inventory and are susceptible to change at any time.*

Good: The tree appears to be healthy and has been pruned relatively well in the past. There are signs of new flushes of growth.

Fair: The tree is healthy in most respects, but may appear stunted in comparison to other trees in that stand. Past maintenance, such as topping, may have caused a weakened structure. Leaves may be offcolor, suggesting a lack of nutrients or the presence of pest infestations.

Poor: The tree may have large decay pockets, severe insect or disease problems, twig and branch, poor vigor, and/or serious structural defects.

Dead: The tree should be removed as soon as possible.

Not Applicable (N/A): stumps and vacant planting sites.

<u>Utility Presence</u>	The presence of overhead utility lines is indicated by Yes/No. Overhead lines cause problems for urban trees because the trees must be pruned to minimum clearance from the lines to avoid interference. Most trees do not respond well to the severe heading back commonly used on trees situated beneath utilities. The healthiest trees will result from a selection of species having a mature height less than that of the primary overhead utility lines. Heavy pruning is not required for secondary and other utilities because these lines are rarely a limiting factor on crown development.

Recommended Maintenance

As part of the inventory data collection process, the urban forest maintenance requirements were also identified so that maintenance needs and costs can be projected for upcoming years. The purpose is to maintain urban forest health, a vigorous tree population, and an effective and efficient maintenance cycle. The assessment includes routine maintenance trimming, removals of hazardous, dying, or dead trees, removals of stumps, and tree planting in vacant locations within the easement.

Grid/Routine Trim

Regardless of the amount of a community's tree management budget, systematic tree maintenance reduces costs in the long term. Systematic tree maintenance programs reduce the need for "emergency" maintenance, help prevent liability problems (such as dead or weak branches), reduce tree mortality and improve the urban forest health and real value over the long-term.

A systematic tree maintenance program is composed of pre-designed trimming grids which are trimmed in their entirety on a set schedule. By trimming every tree on the street regardless of size, every resident in that community feels that they have received a service for their tax dollars. At the same time, the safety and welfare of the community will be enhanced. The following are a few of the benefits of a grid trimming system:

<u>Scheduling:</u>	A long-term grid schedule is set at the beginning of the project enabling more efficient use of personnel and resources.
<u>Improved Public Relations:</u>	Citizens can be informed in advance when their trees are scheduled for service. This is a pro-active approach to manage the community's urban forest.
<u>Equitable Service:</u>	Every citizen receives service whether requested or not. Maintenance is not dependent on a formal request or individual.
<u>Preventive Maintenance:</u>	Street trees receive routine maintenance and inspections during the grid trimming cycle and problems are corrected before they reach crisis level.
<u>Improve Health:</u>	Grid pruning improves the health of the tree population through routine pruning which removes deadwood, corrects structure and enhances appearance.
<u>Maintain a Capital Asset:</u>	By investing in the systematic maintenance concept, the City is maintaining its overall financial value to the community and one of the most valuable and overlooked assets.
<u>Reduced Liability:</u>	Due to the efficiency of grid trimming, all trees are serviced in a timely manner, reducing liability exposure.
<u>Efficient Record Keeping:</u>	WCA is able to update tree characteristic information on every tree in the City during the trim cycle period. Maintenance records are maintained by WCA and given to the City.

Trim-Poorly Structured

Trees that have been identified having structural defects that can be improved through structural pruning. These can include codominant stem trees requiring reduction cuts to reduce competition. This can also include end weight reduction cuts to improve structure.

Young Tree Maintenance

Newly planted trees that have not been established or had stakes removed yet. These trees need monitoring, watering, re-staking, fertilizing and structural pruning. This typically ends when the stakes are no longer needed and the work type should be transitioned to a routine / grid trim.

Monitor for Disease or Decline

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These trees are in decline due to, environmental, pest or disease problems, or due to normal senescence. The trees have not, at the time of the inventory, reached the point where removal is necessary. In some cases, the condition of these trees may be improved by trimming, watering or improved by application of plant health care practices. It is recommended that these trees go through a process of disease identification and treatment prescription and be monitored to determine the timing of treatment and application or when removal is warranted.

Inspect - Recommended Removal

These are trees identified by any field staff with conditions listed in the recommended removals categories that warrant further inspection and possible removal. The agency or contract arborist should evaluate for final recommendation.

Recommended Removals

The trees identified by a certified arborist, city arborist or their designated person using the following criteria to validate the potential removal recommendation and assign a priority to the most hazardous trees. The cost to remove these trees can easily be determined with the inventory information. These trees are grouped into categories meeting the following criteria:

Overhead Spacing

Dead

Diseased or Declining

Poorly Structured

Seedling or Volunteer

Tree Spacing

Overhead Spacing

These trees pose overhead spacing hazards which will, in the near future, cause conflicts with overhead utility lines, buildings or aerial signage. In many cases the conflict could be alleviated by excessive pruning. The photo shown at right is an example of trees that would be recommended for removal evaluation because they meet the overhead spacing criteria. The trimming technique utilized in the past on these trees (topping) compromises the trees natural form, causes weak limb attachments, allows for insect infestation and initiates rapid new growth which will require a more frequent trim cycle. The most cost effective solution in this case is to remove the trees and replant with species whose natural growth pattern will not allow them to create a future conflict.

Dead

Dead trees are identified by their species names where the species can be determined. If they are not identifiable they are called "Dead Tree." All dead trees should be scheduled for immediate removal. These can also be considered for preservation to create suitable wildlife habitat where conditions for public safety are not a concern.

Diseased or Declining

Trees that are diseased or declining to a point beyond any management strategy to recover them. It is recommended that these be removed to reduce the potential spread of problems and also for public safety concerns where targets are in proximity. These can also be considered for preservation to create suitable wildlife habitat where conditions for public safety are not a concern.

Poorly Structured

These are trees that have hazardous cracks or structural problems that present above normal safety concerns, and the potential for tree failure cannot be mitigated through pruning. Other examples of poorly structured trees have actively separating included bark located in a primary branch attachment which greatly increases the potential for limb failure in the future.

Seedling or Volunteer

Trees meeting these criteria were not intentionally planted by the City and are inappropriate for the current site conditions. These may be trees planted by homeowners, grown from seeds or surrounding trees or from bird droppings.

Tree Spacing

These trees do not have enough growing space in the City right-of-way. Crowding or inappropriate locations often result in displaced hardscape which may present a serious trip and fall hazard for the public. Trees may be planted too close to one another or to objects such as hydrants, poles, or meters, or be influenced by overhanging private trees.

Removal Priority

Trees that are recommended for removal are prioritized based on an assessment of their risk at the time of inventory.

Immediate - these trees appear to be hazardous and should be evaluated for immediate removal.

Routine - these are declining trees that do not appear to pose an immediate hazard. They should be evaluated for removal during the next maintenance cycle.

Tree Planting

Based on the criteria provided by the City, West Coast Arborists identified vacant sites that are suitable for planting. Identification of vacant sites during the inventory collection allows the City to expand the urban forest and may assist in obtaining additional grant funding. Vacant site listings from the inventory can be generated to create work lists and utilized for budget projections.

9 Resources

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