ACKNOWLEDGEMENTS

We would like to acknowledge our instructors, Walker Wells and Ted Bardacke, for their guidance throughout the design process and encouragement to be experimental in our proposal. They shared their expertise and helped us build upon our vision and ideas. Special thanks to Ted Bardacke for all his support during the final stages.
This report presents a redevelopment proposal for a 56-acre parcel of land that currently makes up part of the Santa Monica Airport in Santa Monica, California. Six UCLA graduate students from the Department of Urban and Regional Planning and one from the Department of Mechanical Engineering created the proposal for a course entitled “Green Urban Studio: Designing Living Neighborhoods.” Global Green’s Senior Associate of the Green Urbanism Program, Ted Bardacke, and Green Urbanism Program Director, Walker Wells jointly taught the course.

The students used the International Living Future Institute’s Living Building Challenge as a design framework for developing a new neighborhood in the southeast corner of Santa Monica. This proposal evolved in three phases: 1) Site and Program Analysis, 2) Proposal Development and Refinement, and 3) Development of Final Proposal. In the first phase, students were each tasked with researching one the LBC’s “Petals,” or focus areas, to comprehensively understand the requirements and the opportunities that the design framework presents for the site’s development. After becoming “experts” on the Water, Energy, Site, Equity, Health and Beauty Petals, the students presented their findings to the rest of the class and the instructors for critique.

In the second phase, the students formed two groups composed of “experts” on each of the LBC Petals and created an initial proposal for the site. Each group presented its proposal to the instructors for feedback as well as to Francie Stefan of the City of Santa Monica Planning Department and Valerie Watson of the Los Angeles Department of Transportation Pedestrian Program.

In the last phase of the process, the two groups merged into one and worked to develop a final vision for the site that incorporated the strengths of each of the initial proposals as well as improvements based on the feedback received. This document presents that vision.
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Why Manzanita Landing?

The City of Santa Monica has set a goal of reducing its greenhouse gas emissions by 80 percent by 2050. Achieving this ambitious goal will require a dramatic shift in the city’s approach to planning and development that focuses on transforming the fundamental relationship between people and planet. While Santa Monica is already recognized as one of the greenest and most progressive cities in the world, it will need to take even bolder steps to achieve true sustainability.

Manzanita Landing is our vision for a sustainable, healthy, and equitable community in Santa Monica. The unique characteristics of the airport development site and the aspirational goals and parameters set by the LBC pushed us to think outside the box and contemplate the potential for creating a community unlike anything else that currently exists in Santa Monica.

The result is a community designed to create a strong sense of place, an atmosphere of cooperation, and an appreciation for nature through integrated land-uses, a non-traditional transportation hierarchy, and an emphasis on the role of natural systems.
The Living Building Challenge

The International Living Future Institute’s (ILFI) Living Building Challenge (LBC) presents an opportunity to “raise the bar” in sustainable design of the built environment. The U.S. Green Building Council’s Leadership in Energy and Environmental Design (LEED) certification system, one of the most well-known international green building certification programs in the world, has established projects promoting environmental design in over 135 countries. While LEED has undeniably fostered global participation in environmental building and neighborhood design, the LBC promotes regenerative development.

The LBC is divided into “Petals” representing the priorities of a sustainable development project. The Petals are Site, Water, Energy, Health, Materials, Equity, and Beauty. Within each Petal, the LBC specifies “Imperatives,” or standards. Unlike LEED certification, which has a tiered rating system, the LBC requires complete adherence to all Imperatives. For example, the Water Petal has an Imperative entitled “Ecological Water Flow,” which states that “One hundred percent of stormwater and used, project water discharge must be managed on site to feed the project’s internal water demands or released onto adjacent sites for management through acceptable natural time-scale surface flow, groundwater recharge, agricultural use or adjacent property needs.” Like the Water Petal, the other Petals provide imperatives followed by further detail in footnotes. The ILFI updates and edits the LBC manual regularly and, for this proposal, we used the most recent version of the LBC, Version 2.1.

For this proposal, we explored the current opportunities at the site and gave directions for achieving the LBC Petal Imperatives. To
do this, four teams were constructed that focused on certain Petals from the LBC. The Water group honed in on achieving net zero water and promoting ecological water flow. The Energy team laid the framework for a site with net zero energy. The Site expert discussed limits to growth, the urban agriculture requirement, a habitat exchange, and the promotion of “car-free living.” Finally, the Equity/Health/Beauty group explored human scale and humane places, democracy and social justice, rights to nature, and biophilia. Since our proposal primarily focuses on the planning aspects of creating a sustainable community, as opposed to the specific architectural aspects, we did not consider the Imperatives contained in the Materials Petal or some Imperatives from the “Health,” “Equity,” and “Beauty” Petals.

Site Introduction

The chosen site for our LBC neighborhood is the City Owned Parcel, one of three parcels that comprises the current site of the The Santa Monica Municipal Airport. The Federal Aviation Administration’s (FAA) lease with the City of Santa Monica on this particular parcel expires in 2015, opening up possibilities for redeveloping it for alternate, non-aviation uses. It is our hope that this proposal can contribute to that conversation and inspire the Santa Monica community to think about the possibilities for the site in a new way.

Inspiration and Concept

The LBC’s “Biophilia” Imperative communicates the importance of infusing development projects with design elements that incorporate environmental features, natural systems, and nature-inspired shapes and patterns. Studies have shown that buildings and spaces that incorporate these biophilic design elements have a positive impact on physical and mental health, productivity, and learning. They can also contribute to creating environments that are more attractive, inspiring and welcoming.
Taking inspiration from the Biophilia Imperative as well as the LBC’s emphasis on resource self-sufficiency and regenerative, holistic systems, our initial design concept centered around the shape and ecological functions of a leaf (Fig. 6). This leaf shape, modeled after California’s native Big Berry Manzanita tree, provided a structure for organizing the street grid and pathways. We also planned to use photovoltaic (PV) panels on the buildings and water catchment and treatment systems throughout the site to mimic a leaf’s ability to convert sunlight into energy through photosynthesis, and absorb, distribute, and filter rainwater. The leaf also served as the inspiration for the project’s name, Manzanita Landing, which we chose not only for its association with the native plant but also for its subtle allusion to the airport location.

While the leaf provided the initial frame for organizing the layout of the development, we felt that we needed a concept that would provide a clearer vision for the actual character and functions of our community. The Manzanita leaf remains a central feature of our final project, but the concept of “shared places” has evolved to become the true organizing theme of our community.

**Shared Spaces**

The Living Building Challenge is rooted in the understanding that humans must find innovative, equitable ways to share resources amongst themselves and with the other species on Earth. By mandating water and energy independence and prioritizing urban agriculture, the LBC sends a clear message that we must strive to live within our means by maximizing and replenishing local resources. The era of endless growth and limitless consumption must come to an end if we are to establish a society that can exist and flourish on this finite planet.

To do this, we must explore new approaches to and environments for living, working, and socializing that facilitate stronger connections between nature, neighbors, and the wider community, thereby encouraging a more harmonious society and an appreciation for natural resources. It is with these ideas in mind that we chose to focus on developing innovative, efficient, and cooperative spaces that have the potential to promote the sharing of resources, amenities, skills, ideas, and experiences. We designed Manzanita Landing to include a variety of shared spaces such as cohousing complexes, shared work spaces, mixed use buildings, and a community center. We also chose to limit the access and parking accommodations for cars on the site. The result is a street network that is geared towards people and cyclists first and cars second. With these elements, we hope to create a strong sense of place and a feeling among residents and visitors that their safety and enjoyment are the priority and their contributions are vital to the success of the community.

**Petal: Health**

**Imperative 10: Biophilia**

The project must be designed to include elements that nurture the innate human attraction to natural systems and processes. The following Biophilic Design Elements must be represented: Environmental features; natural shapes and forms; natural patterns and processes; light and space; place-based relationships; and evolved human-nature relationships.
Site Context & Parcel Overview

Our site is the 56-acre City Owned Parcel (Fig 7.) within the current boundaries of the 277-acre Santa Monica Municipal Airport property. It is located two miles from the Pacific Ocean and 15 miles from Downtown Los Angeles. The site is situated along a bluff on the western border, overlooking 23rd Street. In addition to the rest of the airport, our site is primarily surrounded by single-family homes. Community assets near the site include the Santa Monica College Bundy Campus and the Santa Monica Airport Park situated on the Non-Aviation Parcel, commercial activity along Ocean Park Boulevard including an office park to the northeast, Clover Park to the north, Penmar Golf Course and Recreation Center to the southwest, and Walgrove and Grant Elementary Schools.

The airport currently hosts multiple flight schools, personal aircraft storage, and a small number of commercial carriers. Flight schools are responsible for the majority of the air traffic at the airport and have been the primary focus of complaints from residents in the surrounding neighborhoods who are concerned about air quality, noise pollution, and safety issues. Many Santa Monica residents are eager to see the airport converted to other uses. Conversion of the City Owned Parcel will result in a 2,000 foot reduction to the existing runway, restricting aviation use to the General Aviation Parcel with a runway length of 3,000 feet. This reduction will in effect limit or otherwise restrict the use of some of the larger jets that currently use the airport.
Site History

The Santa Monica Airport site has a rich history and has played a significant role in the fabric of the city’s development. The Airport was constructed in 1919 and prior to official construction, World War I jets used it as a landing strip. From the 1920s through the 1940s, the site was transformed into one of Douglas Aircraft Company’s sites for film flying and aviation sport activities (Figure 7 and 8).\textsuperscript{11}

In 1948, the FAA and the City of Santa Monica came to a set of legal agreements that divided the airport’s 277-acre site into three parcels.\textsuperscript{12} Under these agreements, two of the three parcels were designated for airport use until specified dates while the third, the 131-acre parcel known as the General Aviation Parcel, would continue to be designated for aviation purposes in perpetuity. Throughout the mid-1950s and the 1960s the site grew and Douglas Aircraft Company expanded some of its manufacturing operations to the Long Beach Airport. At that time the Santa Monica Airport employed nearly 44,000 workers.\textsuperscript{13} The City of Santa Monica even restructured the zoning at the perimeter of the airport site to provide space for more residences because of the increase in workers.\textsuperscript{14}
In the 1970s the Douglas Aircraft Company relocated the rest of its operations to the Long Beach Airport and converted the Santa Monica Airport to a general aviation airport. In 1983 the City of Santa Monica’s Airport Master Plan contained a request for a reduction of the airport’s size due to neighboring communities filing a series of lawsuits over noise pollution from aircrafts. In 1984 the Non-Aviation Parcel was released from aviation purposes and subsequently redeveloped. The FAA’s lease on the City Owned Parcel will expire on July 1, 2015. At this critical juncture in history, Santa Monica residents, policymakers, and other stakeholders have the unique opportunity to explore various opportunities and reimagine this site to better fit the needs of the community as a whole.

**Site Analysis**

Before beginning the site planning process, we conducted research to ensure that the LBC guidelines would allow for development on the City Owned Parcel. The LBC specifies that development can only occur on a site that has been previously developed, or is designated as a greyfield and/or brownfield. Additionally, development cannot occur on a site that is classified as a sensitive ecological habitat, prime farmland, or within the 100-year floodplain.

These “Limits to Growth” are intended to not only protect endangered ecological resources and agricultural land, but also to constrain human development to land that has already been used and in effect reverse the advancement of sprawl. The proposed site of Manzanita Landing has a geological classification of Ramona Placentia soil, indicating the original

---

**Petal: Site**

**Imperative 1: Limits to Growth**

The project may only be constructed on previously developed sites, greyfields and/or brownfields that are not within the 100-year flood plain or classified as prime farmland or sensitive ecological areas (wetlands, primary dunes, old-growth forest, or native prairie).16

**Imperative 4: Car Free Living**

The project should contribute towards the creation of walkable, pedestrian-oriented communities. Pedestrian-oriented communities are optimized when there is a good mix of land uses including Residential, Commercial, Assembly, Educational, Institutional and Light Industrial. For a LBC neighborhood project, the proposed development may not lower the density of the existing site or the catchment area.17

**Imperative 3: Habitat Exchange**

For each hectare of development, an equal amount of land away from the project site must be set aside in perpetuity as part of a habitat exchange. The permanent easement or transfer of ownership must be to an official Land Trust organization to ensure proper safeguarding and long-term care.18
conditions was as alluvial fans. The site has been previously developed and does not qualify as a sensitive ecological area, fulfilling the requirements of this imperative and allowing us to move forward in the design and development of the site.

In order to meet the LBC’s “Car Free Living” Imperative, the proposed development must complement the density of its catchment area (one kilometer radius around the proposed site). Our analysis shows that within the catchment area the land-use mix ratio is 68 percent residential to 32 percent commercial, with a Floor Area Ratio (FAR, a measure of density) of .91. Following the LBC’s FAR guidelines, we had to match or increase the density of the catchment area and had the option of either matching the area’s existing land use mix or adjusting it to create a more equal mix of land uses. Because of the abundance of residential development already present in the catchment area we chose the latter option, with a land-use mix of 57 percent residential and 43 percent commercial within the site. Our proposal maintains a .91 FAR on the site.

**Land Swap**

To increase integration of the site into the surrounding community and its assets, we are proposing a land swap between the City...
Owned Parcel and the Generation Aviation Parcel (Fig. 10 and 11). Currently, an 8,400 square foot portion of the General Aviation Parcel lies between the boundary of the City Owned Parcel and Clover Park to the north. We propose that this portion of the General Aviation Parcel be traded for 8,400 square feet on the eastern edge of the City Owned Parcel because it would allow Clover Park to be adjacent to a more complementary land use, rather than an aviation storage or operation facility. Additionally, the land offered in trade will slightly extend the airport’s runway, making the exchange beneficial to all parties.

**Habitat Exchange**

In order to ensure that we are mindful of the need to share land and resources with other creatures on Earth, the LBC’s “Habitat Exchange” Imperative requires that for each developed hectare on the site, an equal amount of undeveloped land must be set aside in perpetuity. To meet this Imperative, we have will allocate 22.7 hectares (the area to be developed at Manzanita Landing in hectares) should be set aside under the protection of the Ballona Wetlands Land Trust, the closest protected natural habitat to the site.

**Challenges**

There are two main challenges that restrict the integration of the site into the surrounding community. One of the main challenges of the site is its lack of connection to the surrounding areas. The site is surrounded by the Santa Monica Airport, a bluff, and single-family neighborhoods (Fig. 12). Understandably, the homes are oriented with their backs to the airport. The disconnect and lack of interaction creates an intrinsic sense of isolation from the community for our development site. This is partially overcome through the activity configuration within our site, but
ultimately it was also embraced to facilitate a stronger sense of community within the site. Another challenge of developing on the City Owned Parcel is that it neighbors an active airport. Though the Santa Monica Airport is not a bustling commercial airport like LAX, flight schools and private pilots heavily use it. With the release of the City Owned Parcel, the airport’s shortened runway will limit the types of planes that are able to utilize the airport. This will reduce public health impacts and noise pollution, but not eliminate them.

Opportunities

Community assets around the site include Santa Monica College’s Bundy Campus and several local parks. Manzanita Landing will leverage the proximity of these spaces through complementary land uses, such as the elementary school and Community and Senior Centers. The details of how the Bundy Campus and Clover Park are integrated into the site plan will be discussed further in the next chapter. Other parks within the catchment area are the Penmar Recreation Center, Santa Monica Airport Park, and the Venice Reservoir Site. These three, combined with the neighboring Clover Park, provide Manzanita Landing’s residents and workforce opportunities to play soccer, basketball, baseball, golf, and tennis nearby. These parks also offer picnic areas and children’s play areas.

The abundance of nearby park space relieves Manzanita Landing of the pressure to fill a need for parks, and instead provides us, as site planners, an opportunity to use the land for different, more creative uses that offer a new dimension to the City of Santa Monica.
Manzanita Landing Community Overview

Manzanita Landing is organized around the central idea of cooperative, collaborative spaces and shared resources. The community includes several cohousing complexes: shared working spaces, a co-located elementary school, senior center, and community center, and several shared outdoor spaces such as community gardens and a central plaza. The community will also host an urban farm, a water systems educational center, and will retain the fire station that currently exists on the parcel. When it came to the sharing of roadways, we decided that within the boundaries of Manzanita Landing the needs of pedestrians and bicyclists would be given priority over those of cars. Instead of a thoroughfare for cars, the community’s central bisecting path (Stem Road) is intended primarily for pedestrians and cyclists. This main street leads to the community’s central plaza and is lined with the majority of the community’s commercial and mixed use buildings.

Due to its higher elevation and historical use as an airport runway, the project site is naturally somewhat isolated from the surrounding neighborhood and street grid. Instead of going to great lengths to remedy this isolation, we decided to embrace it, taking the opportunity to carefully control and curate the access and utility that cars would have within the community. Although we recognize that it is necessary to make some concessions to allow for a certain limited motor vehicle access (e.g. for people with limited mobility, fire trucks, garbage trucks, and delivery trucks), the street design, circulation routes, and land uses aimed to prioritize the safety and enjoyment of pedestrians and cyclists above all. These elements will be discussed further in the Circulation section.

Figure 13. Pacifica Cohousing in Carrboro, North Carolina
## Overview of Land Use

<table>
<thead>
<tr>
<th>Land Use</th>
<th>Square Feet</th>
<th>Percentage of Site</th>
<th>Percentage of Built Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>1,267,136</td>
<td>24%</td>
<td>57%</td>
</tr>
<tr>
<td>Commercial</td>
<td>962,749</td>
<td>20%</td>
<td>43%</td>
</tr>
<tr>
<td>Farm</td>
<td>488,809</td>
<td>20%</td>
<td>--</td>
</tr>
<tr>
<td>Streets, Paths &amp; Bioswales</td>
<td>625,110</td>
<td>26%</td>
<td>--</td>
</tr>
<tr>
<td>Water Treatment</td>
<td>252,492</td>
<td>10%</td>
<td>--</td>
</tr>
</tbody>
</table>

**Figure 14.** Land use map and land allocation for Manzanita Landing
Places for Living

Just under fifty-seven percent of the buildings in the community will be designated for residential use (Fig. 14) and four different types of residences will be available at Manzanita Landing: units within standard apartment buildings, units within cohousing complexes, upper floor units above commercial properties (mixed use), and shophouse residences. These residences will have the capacity to house approximately 4,000 people across the site. Sizes of residences will vary, but the average size of all units will be 900 square feet. We decided not to include single family homes within the development due to the fact that they are typically more resource intensive and do not contribute to creating the level of density we aim to achieve within the community. Also, the surrounding neighborhood already consists of a disproportionate number of single family homes and our goal was to contribute something new to this area of Santa Monica.

Among other requirements, the LBC’s “Democracy and Social Justice” Imperative mandates that a minimum of 15 percent of the residential units within the community must be designated as affordable housing. The City of Santa Monica’s Affordable Housing Production Program also sets requirements for affordable housing provision in multi-family housing projects and specifies the units’ level of affordability, unlike LBC. Table 1 shows how the U.S. Department of Housing and Urban Development (HUD) defines the different levels of affordability.

To meet and exceed the requirements set by both parties we are taking a more inclusive approach to our affordable housing mix. Of the 550 planned ownership units (cohousing and shophouses) 138 units will be affordable. More specifically, 10 percent of the units for ownership will be priced for low-income households and 15 percent for moderate-income households. The multi-family rental units will include 5 percent of the total units for extremely low-income households, 10

Table 1: Household Income Level Classification

<table>
<thead>
<tr>
<th>Household Classification</th>
<th>Percentage of Area Median Income (AMI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moderate-Income</td>
<td>80-120%</td>
</tr>
<tr>
<td>Low-Income</td>
<td>50-80%</td>
</tr>
<tr>
<td>Very Low-Income</td>
<td>50-30%</td>
</tr>
<tr>
<td>Extremely Low-Income</td>
<td>Below 30%</td>
</tr>
</tbody>
</table>
Land Use

Petal: Equity
Imperative 17: Democracy and Social Justice

All primary transportation, roads and non-building infrastructure that is considered externally focused must be equally accessible to all members of the public regardless of background, age and socioeconomic class—including the homeless—with reasonable steps taken to ensure that all people can benefit from the project’s creation. A minimum of fifteen percent of housing units must meet an affordable housing standard and provisions must be in place for these units to remain affordable through time.23

percent for low-income, and 10 percent for moderate-income. Of the 796 rental apartments, 199 will be affordable. In total, one-fourth of Manzanita Landing’s housing will be affordable housing that is accessible to a full range of household income levels.

Affordable housing within Santa Monica is relatively scarce, further supporting our decisions to increase the affordable housing allocation. Additionally, it is important that such revolutionary developments like Manzanita Landing be accessible for all income levels to live, learn, and grow within.

Cohousing Communities

One of the inspirations behind Manzanita Landing’s “shared spaces” theme is the cohousing model. The Cohousing Association of the United States defines cohousing in the following way: “Cohousing communities are old-fashioned neighborhoods created with a little ingenuity. They bring together the value of private homes with the benefits of more sustainable living. That means common facilities and good connections with neighbors. All in all, they stand as innovative answers to today’s environmental and social problems.”24

Cohousing gives people the option of downsizing their homes and the associated costs and upkeep that goes with them, while still having access to the amenities that they need and enjoy. Residents of cohousing communities typically own their own private homes—whether they are free standing homes, townhouses, or units within a larger apartment-style complex—but have access to shared common spaces such as kitchens and dining rooms, workshops, meeting and work spaces, laundry facilities, guest rooms, gardens, and playgrounds. Cohousing residences usually line pedestrian streets and cluster around a central open space or garden. Cars are typically restricted to the periphery, ensuring a safe and friendly environment for pedestrians and cyclists, especially children. Residents of cohousing communities enjoy

Figure 16. Eastern Village Cohousing in Silver Spring, Maryland
many practical and social benefits that come from increased interactions and cooperation with their neighbors. These might include sharing the labor of maintaining a vegetable garden or helping to manage a parent-run childcare co-op. One of the most commonly cited reasons that people with kids choose cohousing is the desire to live in a safer, more close-knit community where the saying “it takes a village to raise a child” is put into practice.

There are also economic and environmental benefits that come with cohousing. For example, in a typical neighborhood filled with single family homes, every family on the block might have its own lawn mower, power drill and collection of DVDs, even though each of these items may only be used occasionally. In a cohousing community, these kinds of items can be shared, resulting in less money spent by each family, less resources consumed in creating redundant items, and less space required within each family’s home to store them.

Enough area has been designated to accommodate twelve cohousing communities at Manzanita Landing. The number of individual residences within each of these communities will vary, ranging between 28 and 59 units. Some of the cohousing communities would resemble a collection of small townhouses, while the majority would look more like apartment buildings organized around a central courtyard and “common house.” Some of the cohousing communities will be clustered on the western side of the site close to the Terrace Community Garden and bordered by the Green Leaf Path, while the others will be located on the eastern side and bordered by the North East Community Garden and Urban Farm.

One of the defining characteristics of cohousing is that the future residents of the community must be involved in the planning and design of the community from the very beginning. This is to ensure that the resulting development will meet their needs and vision for the kind of shared, cooperative community they want to live in. With Manzanita Landing’s anticipated 527 cohousing units, it is entirely possible that finding enough people who are willing to help design and purchase residences in these cohousing communities would prove extremely difficult. However, our goal here is to propose something entirely new for Santa Monica that exemplifies the spirit of the Living Building Challenge and we feel that cohousing communities would be an innovative way to meet this goal.

Figure 17. Apartment-style cohousing at Quayside Village in British Columbia

Figure 18. Townhouse-style cohousing at Pacifica Cohousing in Carrboro, North Carolina
A Day in the Life: Manzanita Landing Cohousing Resident

Sally is a web designer who lives in one of Manzanita Landing’s cohousing complexes with her two young children. On weekday mornings she has breakfast with her kids in their apartment and then drops off her 3 year old daughter, Amelia, at the parent-run childcare cooperative downstairs. Then she and her 7 year old son, Aidan, walk the path that runs through the Urban Farm to Manzanita Elementary where she drops him off. She then hurries back home to get a few hours of work done before her mother and father arrive from out of town for a week-long visit. She grabs her laptop and heads to the Common House, which has a great community workspace with wifi, printers, a scanner and various other office equipment. It also has a conference room that is perfect for when she needs to meet with clients.

When her parents arrive she welcomes them and shows them to one of the guest rooms in the complex that cohousing residents can use when they have the occasional out of town visitor. The three of them pick up Amelia and then walk together to the school to surprise Aidan. That night, Sally enjoys dinner with her family in the community dining room along with many of the other cohousing community residents. She is relieved that it is not her night this month to volunteer for cooking and clean-up duties. After dinner, Sally and her parents sit outside on a bench in the courtyard and chat while the children run around the garden with their friends until bedtime.

Apartment Buildings

Manzanita Landing will also offer rental units in traditional apartment buildings. These buildings will be distributed throughout the site, interspersed among commercial and mixed use buildings and cohousing complexes. The total number of units in these buildings will be approximately 465, and they will range in size from student friendly “micro-units” to family friendly three bedroom units.

Mixed Use Buildings & Shophouses

In addition to standalone apartment buildings, apartments will also be located on the upper floors of some of the buildings that host commercial, retail, and office spaces on their ground floor. These mixed use buildings will accommodate about 350 residential units and, like the apartments, will vary in size. Placing the mixed use buildings throughout the site and adjacent to the commercial center, apartment buildings, and cohousing communities ensures that every resident at Manzanita Landing is only a few steps away from a range of goods and services provided on the ground floor of these buildings.

The second type of mixed use residential property available at Manzanita Landing will be shophouses. Like the mixed use buildings
described previously, shophouses are combined commercial and residential properties. The difference is that shophouses are typically owned and not rented and the person operating the business on the ground floor usually lives above it. Slightly more than 20 shophouse residence/office units will be located in areas of the site designated as mixed use.

**Places for Working**

Manzanita Landing’s commercial, retail, and office spaces will also embrace the theme of shared spaces. In addition to traditional models, the community will foster spaces geared towards providing collaborative spaces for working and innovating. The two main types of commercial spaces available on our site are traditional office, retail spaces, and more flexible shared office spaces.

**Traditional Retail & Office**

Commercial activity will be most dense along Stem Road. At the core of the site is Plaza del Sol, a meeting place surrounded by shops and outdoor seating for restaurants and cafes along the edges. Plaza del Sol will draw users from around the site. The small triangle-shaped block will specifically be designed as a café with ample outdoor seating space to further generate the neighborhood’s street life. The inspiration for the plaza is Piazza del Campo in Siena, Italy, a public space filled with social life and excitement.

The street level of the commercial corridor will consist of storefronts that house retail establishments, restaurants, art galleries, and specialty stores. On the second floor of the commercial buildings we envision a mix of professional services. Some of the second floor commercial spaces will also be designed to accommodate fitness centers and studios for group exercise classes. The remaining space of the upper levels will be available for
organizations of various sizes.

The mixed use buildings demonstrate that a single building can be shared for both living and working. The residents of mixed use buildings can enjoy the convenience of nearby retail, restaurants, and services, while business owners will benefit from having a client base as close as upstairs.

Community Workspace

An emerging form of commercial space is the community workspace, which is essentially a large office that offers entrepreneurs and freelance professionals a shared, more flexible workspace. Such offices are considered improved alternatives to coffee shops and home offices because they not only provide a professional setting, but also a platform to share infrastructure, conference rooms, equipment, furniture, and ideas. Four key spaces will be specifically designed for these collaborative environments with the possibility of more conversions if the market calls for it. Three of the four will be within cohousing complexes. The fourth will be located along Manzanita Landing’s commercial corridor. This site will offer the greater Santa Monica community this innovative option for sharing workspace. We envision that start-up companies using the workplaces will have the opportunity to blossom into larger organizations that will relocate into one of Manzanita Landing’s private office spaces.

Lending Libraries

To further encourage positive behavior change and underline our goals to create a more sustainable and transformative lifestyle, we would like to dedicate some of our commercial space to various lending libraries. Possibilities could include a tool lending library, a seed library, a toy library and a place to borrow formal or special occasion clothing. One of the first tool lending libraries was in Berkeley, CA. Like Berkeley, our model can link with the existing local library system so that members can check out items using their library card. The objective of these spaces is to promote a culture of sharing that eliminates the need for private consumption of underutilized items. Other benefits include financial savings and reduced storage needs.

Places for Connecting

Plaza del Sol

At the heart of Manzanita Landing will be Plaza del Sol, an open space that connects people with each other and to nature. Surrounded by various commercial and residential spaces at the center of our site, Plaza del Sol provides a comfortable place to relax and enjoy the outdoors. The pedestrian and bicycle-oriented streetscape will increase accessibility to the plaza, and we envision this will lead to a space that is lively and well utilized.

Public spaces facilitate social connection and create a strong social fabric. Plaza del Sol will bring people together from the surrounding buildings to engage and connect whether it be over lunch or coffee, through an outdoor meeting, or even for families to take a break while shopping. As an open-minded space, the possibilities are endless, and all users will be welcomed. Plaza features and amenities include shaded benches, open lawn space, and a gazebo. A key inspiration for this plaza was The Uptown Circle, a successful roundabout plaza in Normal, Illinois.
Community & Senior Center

Manzanita Landing’s Community and Senior Center is envisioned as a forum for facilitating the sharing of experiences, skills, and ideas. Located to the south of Clover Park and the elementary school, the Center will serve as a place for community members both inside and outside of Manzanita Landing to meet, learn, recreate, and connect with one another. The Center will contain a variety of different spaces able to accommodate things such as art shows and performances, workshops and lectures, artists’ studios, and group exercise classes, just to name a few. In addition to classes and workshops on cooking, gardening, art, and music, the Center could host Green Living Workshops to educate residents about important environmental issues and the choices they can make on a daily basis to conserve resources and improve their health. These workshops would reinforce the water and energy conserving behaviors necessary to allow Manzanita Landing to function successfully while giving residents a contextualized appreciation for the features of their unique community.

Within the Community Center will also be space dedicated for use by the area’s senior citizens. There, seniors will be invited to meet and mingle, participate in activities and games, and enjoy a variety of special events. In addition to providing a safe and welcoming space for older residents to connect, we have chosen to locate the Senior Center next to the elementary school in order to create opportunities for intergenerational learning and relationship building.

Studies have shown that intergenerational relationships have many health, social, and learning benefits for children and seniors alike.26 For seniors, the experience can be invigorating and energizing, providing a sense of purpose and preventing the likelihood of depression and a sense of isolation. For children, these relationships can broaden their understanding of the world and instill an early sense of respect and appreciation for older members of society. Both groups can learn from one another and build connections that reinforce their sense of community and history. Seniors could be invited by teachers and school administrators to volunteer at the school as storytellers, mentors, playground supervisors, or classroom “grandparents.”

In order to facilitate successful and beneficial partnerships between the Senior Center and the elementary school, classes could be offered at the Community Center to teach
seniors skills for relating to and engaging with 21st century children in positive and culturally, socially, and generationally sensitive ways.

**Places for Learning & Growing**

One of the pillars of the Manzanita Landing community is its emphasis on learning from others and learning from nature in shared spaces. Nowhere does this theme become more apparent than in the Manzanita Landing Elementary School, the Urban Farm and Community Gardens, and the Water Systems Educational Center.

**Manzanita Landing Elementary School**

Given that our site will be home to just over 4,000 people, we estimate that there will be between 500 and 800 children, up to 300 of which will be children of elementary school age. Since the schools in the surrounding neighborhoods are already at capacity, we have chosen to include a 300 seat school on the site to accommodate the students who will live there. Having a school conveniently located on site near residences will also promote the ideal of “car free living.”

Thematically, this elementary school will be a cornerstone of the Manzanita Landing community as it represents the sharing of knowledge and experiences. One goal of the elementary school is to reinforce the community value of collective education. The school will also be closely linked to other community ideals such as environmental education through its proximity to the Urban Farm and Water Systems Educational Center.

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**Petal: Beauty Imperative 20: Inspiration and Education**

Educational materials about the operation and performance of the project must be provided to the public to share successful solutions and to motivate others to make change. Non-sensitive areas of the project must be open to the public at least one day per year to facilitate direct contact with the Living Building Challenge.²⁷

**Figure 23. Places for Learning and Growing at Manzanita Landing**
It is our hope that the school can be a place for all residents to learn and teach others. Specific events that might occur at the school include child-senior “read-ins,” child-friendly gardening events, and an annual Earth Day Festival. While it is technically an elementary school, it is also a meeting space for community members of all ages who are engaged in the process of learning.

**Urban Farm & Community Gardens**

To meet the LBC’s “Urban Agriculture” Imperative we plan to host an Urban Farm and several Community Gardens at Manzanita Landing. Per the LBC’s guidelines, the amount of land that must be dedicated to support urban agriculture is determined by the site plan’s FAR, which is an indicator for density. Manzanita Landing is designed to have an FAR of .91, requiring the plan to dedicate 20 percent of the site, or 11.2 acres, to urban agriculture. This area will be divided up into four main areas. The Urban Farm will be the largest area at just over seven acres and will be located on the northeastern portion of the site. There will also be a small school garden (just over half an acre) located at Manzanita Elementary, as well two community gardens. The smaller of the two,
the North East Community Garden, will be just over an acre and will lie adjacent to the Urban Farm and between the Community Center and the cohousing complexes. The remaining community garden, known as the Terrace Community Garden, will be approximately 2.4 acres and will be built into the hill that bounds the site to the southwest.

Each of these urban agriculture locations will serve several functions. First, they will provide community members with easy access to organic, locally-grown, nutritious food. According to the LA Food Policy Task Force, one acre of land can produce enough fruits and vegetables for 144 people. Therefore, Manzanita Landing’s combined 11.2 acres could potentially meet the produce needs of about 1615 people, or around 40% of the community’s residents. Growing food locally not only has important health benefits, it also translates into fewer resources consumed in the production and transportation of produce, which in turn means lower greenhouse gas emissions and improved air quality.

Second, the Urban Farm and community gardens will act as places for the community to gather, share, and learn about the art and science of agriculture and edible gardening. This will be a primary focus of the school garden which will be utilized for class lessons and other educational purposes. Finally, these areas will provide spaces for people to connect with nature as they witness the evolution of seeds to sprouts to fruiting plants, and ultimately, back to soil. These spaces and the experiences they provide will honor the LBC’s “Biophilia” Imperative by satisfying the innate attraction to natural systems and processes that is common to all people.

Our vision for the Urban Farm is a cooperatively (or privately) owned and operated commercial enterprise which, in addition to

A Day in the Life: Manzanita Elementary School Student

Alex and his parents live in one of the shophouses on Stem Road above his Mom’s bakery. Alex’s rides his bike to school, since very few cars ever drive down his street and he particularly enjoys riding over the 25th street Bike Bridge. Once he gets to school, Alex is excited to learn that he and his classmates will be walking over to the Water Education Center for their science lesson. The children learn how the water they use at home is captured and treated. They leave feeling determined not to waste a drop!

After school, Alex walks to the Community Center for his weekly Boy Scouts meeting. Next he stops by the Senior Center to visit his friend, Mr. Rodriquez, who used to be a sailor back in the day. Alex knows Mr. Rodriquez will be able to help him with his earn his knot-tying badge. Then Alex hops on his bike and rides home in time for dinner. After dinner, Alex and his parents walk to Plaza del Sol and sit on the grass to listen to the jazz band that is giving an open air concert tonight. Since tomorrow is Saturday, Alex’s parents are letting him stay out a little bit later than usual, but he is tired from his long, full day so he rests his head on his mother’s lap and nods off as the music washes over him.
providing the community with a convenient source of local produce, will also employ residents of Manzanita Landing as farm managers, farm workers, and produce distributors. The farm will dedicate one area for seasonal fruit and vegetable crops and another for an orchard of fruit trees. The food produced on the farm could be sold at a permanent farm stand, a weekly farmer’s market on the site, or distributed to the homes of Manzanita Landing residents who are members of a Community Supported Agriculture (CSA) program.

The North East and Terrace Community Gardens have been purposefully located near the cohousing complexes on either side of the site. The majority of the plots in these gardens will be designated for the exclusive use of cohousing residents, with a smaller portion set aside for use by the wider community. In keeping with the cohousing model, cohousing residents will all share in the responsibilities of maintaining the garden plots assigned to their particular community. Together, cohousing residents will decide which crops are planted in the community gardens, how much of the produce to keep for the community and how much, if any, to sell in order to raise money for garden maintenance. The cohousing communities will also be encouraged to invite residents from the larger Santa Monica and Los Angeles areas to the site for gardening work days, community education events, and demonstrations.

As mentioned, Manzanita Landing Elementary School’s garden will primarily serve as a teaching garden for young children. In line with the LBC’s “Democracy and Social Justice” Imperative, this garden will be ADA (Americans with Disabilities Act) accessible with special raised beds and paths designed to accommodate all mobility levels, including wheelchairs.

**Water Systems Educational Center**

Next to the Community Center and school is a Water Systems Educational Center. This education center will serve to teach residents, as well as the public, about the novel sustainable water system present on the site. The education center will contain examples of all of the water system apparatuses such as recirculating biofilters, living machines, cisterns, and a small demonstration constructed wetland. The education center will be open to residents and the general public for tours. It will be staffed by members of the cohousing communities occupying the Manzanita Landing site.

**Educational Opportunities**

As the first neighborhood scale Living Building Challenge project in the world, Manzanita Landing will be a living laboratory and should be leveraged as the unique teaching tool that it is. Opportunities will be numerous to educate residents and visitors about the ideas, technologies, design features, methodologies, and systems that allow the community to achieve net zero water and energy while still supporting the electricity and water needs of homes, businesses, institutions, an urban farm, and a community garden. The rationale for creating a street grid that limits access to cars should be shared with residents and visitors and they should be informed about the benefits of walking and biking. The community will also provide opportunities to educate people about cohousing, sustain-

![Figure 26. Visitors at the Omega Center for Sustainable Living in Rhinebeck, New York](image-url)
able agriculture, intergenerational learning environments, cooperatives, and the health benefits of biophilic design elements.

In order to facilitate a fuller implementation of the community as a teaching tool we propose that educational signage be posted at key locations to draw people’s attention to the sustainable and regenerative features and activities of the community and encourage them to learn more. The Community Center will be in charge of a website and print materials to introduce the Living Building Challenge and highlight how each of the imperatives have been met. Finally, tours and open-houses will be offered throughout the year for visitors to experience the Water System Educational Center, the Urban Farm and Community Gardens, cohousing common facilities, and the various cooperative working spaces and community assets that exemplify the community’s shared vision.

### SUMMARY OF LAND USE

#### Table 2: Site Area

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<thead>
<tr>
<th></th>
<th>Square Feet</th>
<th>Acres</th>
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<tr>
<td>Total Site Land Area</td>
<td>2,439,416</td>
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<tr>
<td>Total Site Built Area</td>
<td>2,229,885</td>
<td>51.19</td>
</tr>
<tr>
<td>Total Site Footprint Area</td>
<td>1,007,452</td>
<td>23.13</td>
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</table>

#### Table 3: Residential & Commercial Land Use

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<th>Land Use</th>
<th>Land Area- Square Feet</th>
<th>Built Area- Square Feet</th>
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<tr>
<td><strong>Total Residential</strong></td>
<td>559,390</td>
<td>1,267,136</td>
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<td>Cohousing</td>
<td>238,847</td>
<td>530,471</td>
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<tr>
<td>Apartments</td>
<td>135,072</td>
<td>417,969</td>
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<tr>
<td>Mixed Use Apartments</td>
<td>185,471</td>
<td>318,695</td>
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<td><strong>Total Commercial</strong></td>
<td>397,024</td>
<td>962,749</td>
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<td>Fire Station</td>
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<td>Senior &amp; Community Center</td>
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<td>Other Commercial</td>
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<td>Mixed Use Commercial</td>
<td>185,471</td>
<td>139,103</td>
</tr>
</tbody>
</table>
A Car Free Community

We interpreted LBC’s “Car Free Living” Imperative in two ways. We aspired to create an environment that would not require a car to move through it and we also strove for an environment that did not emphasize or give preference to automobiles. We achieved these goals by creating a street network that prioritizes human-powered transit over vehicles.

Street Network

At Manzanita Landing, the traditional automobile-centric transportation hierarchy is reversed. Our site’s street network promotes mobility via active modes of transportation—walking and biking. To facilitate car-free living, human-powered transit is prioritized with a healthy network of dedicated streets, alleys, and paths that connect the various places and activities the site offers. The majority of the site’s circulation routes are modeled after woonerfs, which are streets designed with a single grade that allows equal access for pedestrians, bicycles, and vehicles. At Manzanita Landing, however, the woonerf-style streets will only allow select vehicles for people with limited mobility, goods delivery, garbage collection, and emergency services, thus creating an extensive (almost) car-free zone across most of the site.

To encourage walking and pedestrian activity, paths need to be “useful, safe, comfortable, and interesting.”30 The woonerfs, other pedestrian paths, and sidewalks along the complete streets will provide all four of these elements through careful design of the built environment. Both cyclists and pedestrians will find the amenities they need and enjoy along these routes, such as sidewalk furniture, bike racks and corrals, transparent and inviting storefronts, nature-inspired public art, and street trees. Colored pavers will be used to incorporate biophilic designs into the woonerfs. These features will also encourage social interaction and develop community amongst cyclists and pedestrians.

The LBC’s Imperative on circulation emphasizes the importance of building at a “human scale” and establishes a strict standard for frequency of circulation routes and maximum street block size. Based on its density, the site must have circulation routes no more than 45 meters (148 feet) from the next, and they are to be at least three meters (10 feet) wide. This requirement led us to design a grid with small blocks and alternating 40 foot wide woonerf “streets” and 20 foot wide woonerf “alleys.” Any blocks larger

Petal: Equity

Imperative 16: Human Scale and Humane Places

The project must be designed to create human-scaled rather than automobile-scaled places, so that the experience brings out the best in humanity and promotes culture and interaction. The Living Building Challenge defines specific maximum and minimum requirements for paved areas, street and block design, building scale and signage that contribute to livable places.31
Figure 28. Manzanita Landing circulation routes
than 45 meters are bisected by simple foot-paths through alleys and courtyards which create permeability for users trying to move through the site and satisfy the LBC Imperative. Other important aspects of the Imperative which strive to improve the pedestrian experience include street width maximums and sidewalk minimums.

In the spirit of creating safe, human-oriented spaces throughout Manzanita Landing, only a select few roads accommodate regular automobile use. We designated the eastern edge-of-the-leaf route to be a continuation of 25th Street to allow for car travel through the site. Chaparral Road improves also access to Airport Avenue. Providing surface street lanes for cars has two benefits. First, it makes the site more accessible for auto-users and allows for connections to the existing 25th Street and Airport and Walgrove Avenues. Second, this permeability provides exposure to the new LBC community and hopefully will spark curiosity and interest to either stop and look around the neighborhood, or pass through with the intention of returning.

A small road leads into the urban farm with the purpose of allowing access for farming equipment and produce distribution. Extend-
ing from the farm area turnabout shown in the diagram will be informal, dirt farm paths that will be more dynamic. The crop configuration changes through the seasons, so the paths routing through the farm may also need to change.

**Green Leaf Path**

Another unique open space and connectivity feature of the community is the Green Leaf Path, a dedicated pedestrian and bike path and greenway that cuts through the site’s western neighborhoods. Forming one side of the central leaf shape, the Green Leaf Path will effectively extend Clover Park via the 25th Street bike bridge and run the width of Manzanita Landing all the way to the southeast corner of the Terrace Community Garden next to Airport Avenue. The Path will provide a park-like atmosphere for residents and visitors to take a stroll, a leisurely bike ride, or just sit and relax on a park bench. It will be lined with shade trees, other California native vegetation, and sculptures. An above-ground water channel will also be incorporated along the Path to help people become cognizant of the movement of greywater from the community’s buildings to the water treatment facilities throughout the community. The Path itself will be paved with attractive, permeable materials to enhance stormwater maintenance and groundwater recharge. The buildings along the path will feature “living walls” as well as murals meant to celebrate Santa Monica’s social, cultural, and environmental history. The space will be infused with biophilic design elements such as natural shapes, forms, patterns, and processes which will enhance users’ connection to the environment and community.

**Figure 31. Pedestrian and bicycle roads in Manzanita Landing**

**Figure 32. Inspiration for the Green Leaf Path at the Singapore Botanical Gardens**
**Bike Bridges**

Bike bridges will connect pedestrians and cyclists safely and conveniently into and out of the site’s main network of paths, lanes, and streets. The 25th Street Bike Bridge is located on the northern edge of the site, connecting Clover Park to the Green Leaf Path. The second, Airport Bike Bridge, is on the southern edge of the site, safely connecting the Green Leaf Path to Walgrove Avenue over Airport Avenue.

**Stairways**

The southwestern edge of the community is the location of Terrace Community Garden, which is built into the slope that separates 23rd Street and Airport Avenue from the higher elevation of Manzanita Landing. To improve connectivity between Manzanita Landing and the surrounding neighborhoods we will install a pair of stairways that will wind their way up the side of the slope, through the garden plots and into the com-

![Figure 33. Inspiration for "living walls" on the Green Leaf Path—trellises at Eastern Village Cohousing in Silver Spring, Maryland](image1)

![Figure 34. Bike bridge](image2)

![Figure 35. Garden stairway](image3)
munity, just a few short blocks from the Green Leaf Path. In addition to serving the utilitarian purpose of facilitating access into and out of the development, these stairways will also act as a pleasant and enjoyable route for experiencing a different kind of green space as they transition into this unique, pedestrian-friendly community. Outdoor exercise enthusiasts may even adopt these stairways as an alternate to the famous “Santa Monica Stairs.”

**Public Transportation**

Santa Monica’s Big Blue Bus can play a key role in supporting a car-free lifestyle for Manzanita Landing’s residents. Currently, “Sunset Ride” and “Route 6” provide direct service to the eastern portion of the Santa Monica Airport site.32 When the Expo Line extends to Santa Monica, the Route 6 will have a stop one block away from the Bundy Station and the Sunset Ride will stop one block from the Bergamot Station. In order to improve public transit access to Manzanita Landing, we recommend that the City reroute both lines. We propose the Route 6 begin its loop on Airport Avenue and then continue north on 23rd Street. The Sunset Ride, which currently circles around the Santa Monica College Bundy Campus, can also expand its loop by traveling west along Airport Avenue, cutting up through the site on Chaparral Road, and connecting to 25th Street. These recommendations would tremendously improve connectivity and access for the site’s residents and users and further encourage alternative modes of transportation. Additionally, the local bus system will likely benefit from increased ridership.
A Day in the Life:
Manzanita Landing Visitor

Ginger lives in Venice and works in an office complex on Ocean Park Blvd. Today, like most weekdays, Ginger bikes to work, riding up Venice Boulevard to Walgrove Avenue, down Manzanita Landing’s Green Leaf Path, and over the 25th Street Bike Bridge to Clover Park, which is adjacent to her office. She is happy to have such a pleasant and scenic route to take to work each day and remembers when she used to have to ride up busy 23rd Street and cut across on Ashland Ave to get to her office. Because there is no dedicated bike lane, the morning car traffic speeding up and down the 23rd Street hill always put her on edge and she is grateful to have a much more relaxing way to start her day.

On her lunch break, Ginger jumps on her bike and heads back over the bridge to meet her boyfriend, Antonio, for lunch at the Plaza Cafe. Antonio works at a graphic design firm across the street from Plaza del Sol, where they try to meet a few times a week for lunch. After a quick bite, they stroll a few blocks to the Urban Farm to see how the trees in the orchard are filling out with fruit. On the walk back to her bike they run into Heather, a cyclist friend of theirs who volunteers at the Bike Co-Op on Stem Road. She tells them about the bike safety workshop she will be leading next week at the Community Center and asks them to help spread the word. Realizing her lunch hour is almost over, Ginger pedals quickly back to the office, but not before making plans to meet Antonio after work for happy hour at the Green Thumb Pub.

Underground Tunnels and Parking Infrastructure

On-site parking will be limited in order to sustain a “car-free” living environment, as well as to promote alternative forms of transportation. Underground parking is included on our site in order to ensure that residents and visitors can access the site while making cars less visible. Access to the surface level of Manzanita Landing from the underground parking lots will be through stairway openings scattered throughout. The spiralling access stairwells will provide natural lighting and ventilation and create opportunities for public art.

There will be four entrances/exits to the garages. The first entrance is off of 25th Street at the north edge of the site across from the school and the southern corner of Clover Park. Two entrances come into the site from 23rd Street on the southwest edge of the site. The fourth entrance to the garage is located off Airport Drive on the southeast corner of the site. These entrances lead to separate sections of the underground parking. Spreading the parking around the site both provides better site accessibility for all people—especially those with limited mobility—and avoids creating a single enormous sea of parking. Our parking garages will be compliant with the Americans with Dis-
abilities Act so that people of all physical ability levels can easily use the site. Taking inspiration from the underground car tunnels of Guanajuato, a city in Oaxaca, Mexico, a network of tunnels will connect the different sections of the parking structure.

Overall, it is not our intention to provide underground parking in order to encourage or even make it convenient for people to drive in and out of the site. In fact, the structure is designed for 50 percent less parking than typical developments of this land use mix. To further encourage car-free living, some spaces will be dedicated to car-share vehicles along 25th Street, to gain visibility, and within the parking garages, to offer residents more convenience. Our objective in including limited parking on site is to ensure that the site is accessible without promoting the automobile as a primary mode of transportation and connectivity.
Water Independence

Water is a precious and limited resource that is essential for the survival for all life on Earth. Despite this undeniable fact, water is too often taken for granted, wasted, and polluted. A tremendous amount of energy is required to transport water to us over great distances and more energy is needed to treat it after it discharges down our drains. The LBC pushes us to take responsibility for the way we use water by mandating that all water used by LBC projects be captured, treated, and discharged onsite. This closed-loop model discourages wasteful practices, mimics natural systems, and encourages an appropriate level of respect for this life-giving resource.

LBC Imperatives: Net Zero Water and Ecological Water Flow

There are two Imperatives that make up the LBC Water Petal: Net Zero Water and Ecological Water Flow. In practical terms, the Net Zero Water Imperative means that Manzananita Landing must only use water that comes into the site through natural precipitation. For this Petal, it is also acceptable to use water flowing onto the site from a river, lake, or stream, however, our site is constrained by the fact that there is no such source from which we can draw water.

In response to the lack of water bodies on our site, we researched the idea of drilling a well and drawing water from the aquifer below our site. After consulting with experts who work with the City of Santa Monica, we learned that a study might have been conducted in preparation for drilling a well at Clover Park adjacent to our site, but that the well was never actually drilled (personal communication, April 24, 2013). Additionally, the groundwater in the area is most likely contaminated and Boeing is currently conducting soil remediation at the site due to fuel release into the ground (personal communication, April 30, 2013). Finally, it is unclear whether or not there would be salt water intrusion into the process (personal communication, April 30, 2013). For all of the uncertainties listed above, we decided not to rely on including a well on our site as a source of water.

Achieving the Ecological Water Flow Imperative means that the natural processes used to treat rainwater, greywater, and blackwater are of paramount importance. It is also

Imperative 5: Net Zero Water

One hundred percent of the project’s water needs must be supplied by captured precipitation or other natural closed loop water systems that account for downstream ecosystem impacts, or by recycling used project water. Water must be appropriately purified without the use of chemicals.\textsuperscript{34}

Imperative 6: Ecological Water Flow

One hundred percent of storm water and used, project water discharge must be managed onsite to feed the project’s internal water demands or released onto adjacent sites for management through acceptable natural time-scale surface flow, groundwater recharge, or agricultural or adjacent property needs.\textsuperscript{35}
essential that all water is treated and managed on site and that the site integrates water management into the community in a visible and informative way. While traditional water treatment occurs at a centralized plant and is pumped back to the community, water treatment on our site will be decentralized in order to follow a more natural and less-energy intensive route. Water treatment covers 10% of our total site and water treatment stations are dispersed throughout the site so that water can be treated in each district. By locating water treatment stations in four corners of the site, we made sure to minimize the travel distance for water treatment and for returning water back to the community. Our water treatment stations do not require energy to move the water from one location to another, relying on gravity instead.

Too often, people turn on their tap and watch water flow into the drain without thinking about where it comes from and where it is going to be treated. Our primary goals for carrying out these Imperatives were to conserve water resources and to educate the community about their habits with regard to water use. Through careful design and analysis, we successfully achieved our goals and met the standards outlined in both Imperatives.

Infrastructure & Technology

While rainwater provides our site with a significant amount of water, it does not fulfill all of the site’s water demands. In order to make up the deficit, water will need to be used more than once for different purposes. Therefore, we will use several methods for treating water at each stage of the cycling process through our closed loop system.

Water Catchment and Cisterns

Southern California has a semi-arid climate with an average annual rainfall of only about
There are four types of water as defined by “Achieving Water Independence in Buildings: Navigating the Challenges of Water Reuse in Oregon.”

Rainwater – “The product of condensation of atmospheric water vapor that is returned to the Earth’s surface through precipitation. Rainwater is the primary source of fresh water for most areas of the world.”

Potable Water – “Often referred to as ‘fresh,’ ‘tap,’ or ‘drinking’ water; typically comes from a municipal source or well and is widely thought to be the only source available to a household. It is generally used for everything—drinking, bathing, toilet flushing and irrigation.”

Greywater – “Wastewater generated from domestic processes such as hand washing, clothes washing and bathing. Greywater gets its name from its cloudy appearance and from its status as being neither fresh (as in potable water) nor heavily contaminated (as in blackwater).”

Blackwater – “Also known as sewage. Refers to water contaminated by human body waste, food residue, chemicals (including those found in many household cleansers) and solvents (often found in paints). Blackwater originates from toilets, urinals, kitchen and janitorial sinks. In some jurisdictions, kitchen wastewater is classified as blackwater.”

Additionally, rainfall in Santa Monica occurs unevenly on an annual basis, falling mostly within a five-month time period. Consequently, in terms of capturing and using water, the primary question for our site is: How do we capture as much water as we can during the rainy months and store water for the months when we do not receive as much rain?

In order to capture as much of the rainwater as possible and store it for use during the dry months we will use large cisterns, while keeping in mind that we will constantly be taking water out of the cisterns for use. When rainwater falls onto rooftops, it will be collected in cisterns at the block level. Here it will be stored until it is needed, at which point it will be treated using ultraviolet (UV) light. Some transportation of rainwater around the site will be needed since residential buildings use more water than commercial buildings. After use, greywater and blackwater will be collected on a larger district scale and funneled to the water treatment location nearest that district.

In total, the required capacity of the cisterns will be 3.02 million cubic feet. This will be divided between smaller cisterns for rainwater storage at the block level and larger cisterns for recycled water at the treatment facilities. Cisterns will vary in size based on...
the water needs of the building users and capacity of each treatment site. Because the cisterns will take up a substantial amount of space, we will place them underground and integrate them with the parking infrastructure.

**Water Treatment**

In order to treat rainwater, greywater, and blackwater, we will use water treatment processes that require limited energy inputs and are designed to minimize the distance that the water would have to travel in order to be treated and then returned to users. Most importantly, all treatment processes are chemical-free and most mimic natural treatment processes.

**Ultraviolet (UV) Light**

UV light will be used to treat rainwater to potable standards. UV light disinfects water by killing potentially harmful microorganisms. One advantage to using this treatment mechanism is that it requires very little maintenance and is fast-acting. UV light will purify rainwater when it comes out of each cistern to be used by residents (not before it enters the cistern) in order to ensure the cleanest water.39

**Recirculating Biofilters**

To treat greywater so that it can be used as potable water, we plan to use recirculating biofilters. Similar to wetlands, recirculating biofilters treat water by allowing it to flow through a system of vegetation, soil, and microbes. This natural filtration process removes harmful components.40
**Reverse Osmosis**

In order to treat blackwater to a potable level, we will use the process of reverse osmosis. Reverse osmosis is a process of purifying water that uses an ultra-fine, semi-permeable membrane which allows only water molecules to pass through, filtering out excess products. We will use reverse osmosis to treat some blackwater to a potable level and the remainder to greywater standards.41

**Constructed Wetlands and Bioswales**

Constructed wetlands will be used to treat blackwater before it is discharged back into the ground. Bioswales will be located in some street medians and between the school and Community Center and will treat stormwater runoff from paved areas of the site. Both systems work similarly to recirculating biofilters by removing sediments, pollutants, and heavy metals with vegetation, soil, and microbes.42

While constructed wetlands and bioswales take up much more space per gallon treated than the other water treatment options, it is essential that we have them on site because they are a highly visible form of water treatment and connect human needs to natural processes in a direct way. Constructed wetlands will be present at the Water Systems Educational Center so that residents and visitors alike can see how a natural water treatment process works.

**Solid Waste to Soil Amendment**

In addition to treating rainwater, greywater, and blackwater, we will also have to manage the solid waste (sewage) that is produced on our site on a daily basis. Because we are working towards achieving ecological water flow on the site, pumping solid waste to a municipal waste treatment facility off-site is not an option. Instead, we plan to compost solid waste and use it to fertilize the urban farm and community gardens.

**Treatment Throughout the Year**

It is important to note that, during the rainy months, we will have more rainwater available for use (about 800,000 gallons per month). Also, we will have the option to treat less water during that time period. More specifically, while we will always have to treat blackwater to be greywater regardless of available rainwater (reverse osmosis machines will always to be working at some capacity), some of the recirculating biofilters...
Figure 47. Diagram of water sources, treatments, and uses with projected quantities
may take a “break” during the rainy months from November through March.

Overall, the most important aspect of our water system, from catchment to treatment, is that it is a closed loop system with water constantly cycling back through it.

**Biophilic Design Elements**

Providing opportunities to experience natural processes such as the flow of water is an important element of biophilic design. Because much of the water catchment, storage, and treatment at Manzanita Landing will happen out of sight, we plan to include a small but prominent above-ground water channel that will run along the Green Leaf Path to make water more visible and facilitate people’s connection to the natural circulation and closed loop management of the site’s water. There will also be a bioswale running between the school and Community Center to a small constructed wetland at the Water Systems Educational Center. These features will allow people to see how water can be purified through natural processes, leading them to a better understanding of the community’s unique water systems as a whole.

**Water Use**

To satisfy residential and commercial water demand on our site, we will need just under 1.82 million gallons of water each month, but average rainfall will be able to provide only about 470,000 gallons. Therefore, about 1.35 million gallons of water will be required to meet the remaining demand. To meet this need, we will treat approximately 1.33 million gallons of greywater, which is the remaining greywater after we meet the site’s irrigation needs. To make the greywater potable, we will use recirculating biofilters. To treat the necessary amount of blackwater to potable standards (almost 17,000 gallons), we will use new, energy-efficient reverse osmosis technology.

There will be about 14,700 gallons of blackwater remaining that will be treated to be greywater levels through a less rigorous reverse osmosis process, and we will discharge this greywater in a constructed wetland.

In general, residential buildings use more water than the commercial buildings. This is because residential buildings contain more water-intensive appliances such as clothes washers and showers. The other water-using fixtures and appliances in residential buildings include toilets, lavatories, kitchen sinks, and dishwashers. The total residential demand on our site will be about 1.63 million gallons of potable water and with the use low-flow toilets, only about 960 gallons of greywater will be used per month for flushing toilets. To ensure that available water will be sufficient to meet demand, residents will be encouraged to conserve water.

Commercial buildings primarily use three types of fixtures: toilets, lavatories, and kitchen sinks. Very few businesses need water-intensive appliances like washing machines and dishwashers. Commercial demand is approximately 184,000 gallons per month of potable water and approximately 530 gallons per month of greywater for flushing toilets.

In addition to residential and commercial water demand, water will also be needed to irrigate the urban farm and community gardens. The water demands for these areas will
be just under 456,000 gallons per month and will be met using greywater that does not require extra treatment. Current greywater legislation allows greywater for irrigation purposes if it is applied only at the ground or root level through drip irrigation. All landscaping on the site including street trees and vegetation along the Green Leaf Path will be native to California and will be chosen for its drought tolerance and ability to thrive with available rainwater.

**Conservation Strategies**

In order to reach the LBC water imperatives, it is essential that all buildings at Manzanita Landing utilize the most efficient, water-saving technologies and appliances. These will include low-flow toilets and shower heads, waterless urinals, faucet aerators, and high efficiency washing machines and dishwashers. Where necessary, agriculture will be maintained using drip irrigation and mulch to ensure that not a drop is wasted. We will also promote water conservation as a matter of community culture by providing educational opportunities for residents and visitors at the Water Systems Educational Center and Green Living Workshops. Residents and visitors will also be encouraged to visit the City of Santa Monica’s Airport Demonstration Garden located on the neighboring Non-Aviation Parcel.

**A Day in the Life:**

**Manzanita Landing Senior Resident**

Ed is a retiree who moved to Manzanita Landing with his wife, Sophia, to enjoy their golden years. In the morning after breakfast, they like to take their dog, Scruffy, for a walk through the neighborhood. Today, Sophia has asked Ed to check off a few items on his “Honey-Do” list including hanging a shelf in their living room. So on their morning walk, they stop by the Tool Lending Library to borrow the tools he’ll need for the job. Then, they decide to pop over to the Senior Center to say hello to their pinochle partners, Betty and Jim, and catch up on some local gossip. They head back home for lunch and to install the shelf. Afterwards, Ed decides to ride his bike over to the Terrace Community Garden to check on his plot. He waters his veggie patch, pulls a few weeds, then heads back home for his afternoon nap.

That evening, Ed remembers that it’s his turn do the laundry. He remembers that before moving to Manzanita Landing, he never thought twice about throwing a few items into his old, inefficient washing machine even if he didn’t have a full load. But after he and Sophia took a Green Living Workshop at the Community Center he realizes how important it is to only wash full loads in cold water (to save energy) and use non-toxic detergent. He feels good knowing that he is now using a highly energy and water efficient machine and that after the water is used in his washer it will be used again for other purposes, like irrigating his veggie patch!
ENERGY
Chapter Six
Energy Independence

The Living Building Challenge calls for energy independence with the use of renewable energy. To achieve the Net Zero Energy Imperative we must reduce the site’s energy demand through aggressive conservation strategies while generating enough energy on-site to meet Manzanita Landing’s energy demands. Through our approach to demand reduction paired with the utilization of highly efficient solar technology, we expect Manzanita Landing to achieve its net-zero energy goal.

We embraced both mitigation and adaptation in our energy strategy. One way to reduce energy demand is through building design and operation. The second is through user behavior modification. During our planning process, we emphasized the mitigation aspect of our energy strategy because energy savings brought about by good building design are more reliable than savings that are dependent on human behavior. However, that is not to say mitigation is enough. The adaptation of human behavior around energy usage is critical to the success of our site and the LBC model for neighborhood planning.

Energy Demand

Our site’s mix of residential and non-residential buildings will have unique energy consumption profiles that allow for energy demand peaks to spread out across the day. Residential demand is highest early in the morning and later in the evenings. Offices, retail, and schools have high-energy needs during normal business hours. These alternating peaks are key to maintaining a well-functioning energy generation system, since the grid is less likely to be overburdened at any given point.

Both offices and homes have in common a heavy dependence on heating, ventilation, and air conditioning (HVAC) systems, which accounts for the largest part of both groups’ energy bills. Typical reliance on HVAC systems makes up 48 percent of commercial and 46 percent of home energy use. In commercial spaces, the next greatest use of energy is lighting, typically accounting for 35 percent of total demand. This is followed by the use of energy intensive equipment including computer workstations, on-site servers, and large copy machines, which make up just under 10 percent of commercial energy usage. In homes, lighting and appliances use almost equal amounts of energy, at 12 percent and 13 percent, respectively, of total demand.

44 Nuclear energy is not allowed under the LBC, nor is any type of combustion (except in certain very limited circumstances).

45 Typical reliance on HVAC systems makes up 48 percent of commercial and 46 percent of home energy use.
Residential energy use also includes heating water and powering various consumer electronics. On average, hot water represents 14 percent of energy need and electronics require about 8.5 percent of a home’s energy usage.\(^4\)

Since the energy generation possibilities are constrained by the site’s size, reducing the energy demand is essential. A measurement of thousands of British thermal units per square foot per year (kBtu/sf/y) can also be referred to as the Energy Usage Intensity (EUI). Our calculations showed that under typical construction and human behavior conditions, residential spaces have an EUI of 23, while commercial spaces have an EUI of 55. (Table 4). These numbers will both be dramatically reduced at Manzanita Landing through the application of conservation strategies.

Energy efficiency and savings embedded into the building design and the site’s educational program allowed us to reach residential and commercial EUIs of 14 and 22, respectively. In total, Manzanita Landing will have an EUI just above 17.

### Table 4: Energy Intensity

<table>
<thead>
<tr>
<th></th>
<th>Typical Energy Intensity (EUI)</th>
<th>Energy Intensity with Potential Savings (EUI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial</td>
<td>54.59</td>
<td>21.84</td>
</tr>
<tr>
<td>Residential</td>
<td>22.75</td>
<td>13.65</td>
</tr>
<tr>
<td>Average</td>
<td>36.50</td>
<td>17.18</td>
</tr>
</tbody>
</table>

### Table 5. Commercial Energy Consumption Reduction Strategies

<table>
<thead>
<tr>
<th>Usage</th>
<th>Strategies Implemented</th>
<th>Potential Reduction in Particular Energy Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lighting</td>
<td>Daylighting, CFLs, Light Redirection, Censors &amp; Controls</td>
<td>50%</td>
</tr>
<tr>
<td>HVAC</td>
<td>Natural Ventilation, Efficient HVAC System, Daylighting, Light Redirection, Building Orientation, Building Envelope, Windows</td>
<td>90%</td>
</tr>
<tr>
<td>Office Equipment</td>
<td>Energy Star, Standby Modes</td>
<td>60%</td>
</tr>
</tbody>
</table>

### Table 6. Residential Energy Consumption Reduction Strategies

<table>
<thead>
<tr>
<th>Usage</th>
<th>Strategies Implemented</th>
<th>Potential Reduction in Particular Energy Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lighting</td>
<td>Daylighting, CFLs, Building Orientation</td>
<td>75%</td>
</tr>
<tr>
<td>HVAC</td>
<td>Natural Ventilation, Efficient HVAC System</td>
<td>40%</td>
</tr>
<tr>
<td>Appliances</td>
<td>Energy Star</td>
<td>40%</td>
</tr>
<tr>
<td>Electronics</td>
<td>Energy Star, Unplugging Censors</td>
<td>10%</td>
</tr>
<tr>
<td>Water Heating</td>
<td>Solar Thermal</td>
<td>65%</td>
</tr>
</tbody>
</table>
Energy Conservation

Design Strategies

The way buildings are designed has a significant impact on their energy efficiency. Building efficiency can be significantly improved by maximizing daylighting and natural ventilation; installing proper insulation; utilizing efficient HVAC systems; and paying close attention to building orientation and envelope. Figure 50 shows how much each category of energy use can be reduced through conservation strategies. To ensure that Manzanita Landing could meet its energy needs, conservative percent reductions were used for our demand projections. Additionally, schools generally have lower energy demand than commercial retail and office spaces; however, to factor in the possibilities for higher need, the site’s elementary school and Community and Senior Centers are considered non-residential, commercial spaces.

Building Orientation & Height

Manzanita Landing’s street grid is intentionally designed at angles that do not line up with the surrounding neighborhood street grid. This was done to align our buildings with the sun’s path through the sky. Orienting buildings along the east-west axis with a long side facing due south maximizes exposure to sunlight through the day, which helps to heat and light buildings. Awnings will be placed in such a way that they will block the sun during summer when it is brightest and hottest, but still allow sunlight and warmth to enter buildings during the winter when the sun is lower in the sky. Buildings can deviate from the east-west axis by up to 20 degrees with only minor efficiency loss.

At Manzanita Landing, all of the woonerf roads that make up the “veins” of the leaf motif are oriented zero, 15, or 20 degrees off of the east-west axis, allowing buildings to present one long wall to the south.

The reliance on sunlight to reduce both lighting and HVAC demand is reinforced by LBC’s equity imperative, which requires that all building users have access to sunlight. So that our buildings do not cast excessive shade on any other building, most development in Manzanita Landing is only three stories tall. The majority of the four story buildings are located immediately south of the largest east-west roads so there is sufficient distance between these buildings and their neighbors to the north. Two of the cohousing communities immediately south of the North East Community Garden are also four stories, and four other buildings are built in a stair-step fashion so that the four-story portion casts a small shadow on the roof of the attached three-story portion, but does not infringe on

Figure 49. Building orientation relative to Sun’s angle during winter and summer sun

Petal: Equity

Imperative 18: Rights to Nature

The project may not block access to, nor diminish the quality of, fresh air, sunlight and natural waterways for any member of society or adjacent developments. The project may not block sunlight to adjacent building facades and rooftops such that they are shaded above a maximum allotted height.

47 At Manzanita Landing, all of the woonerf roads that make up the “veins” of the leaf motif are oriented zero, 15, or 20 degrees off of the east-west axis, allowing buildings to present one long wall to the south.

48 The project may not block access to, nor diminish the quality of, fresh air, sunlight and natural waterways for any member of society or adjacent developments. The project may not block sunlight to adjacent building facades and rooftops such that they are shaded above a maximum allotted height.
the next building’s right to sunlight.

Daylighting
Daylighting is the use of natural light to illuminate indoor spaces. Harnessing sunlight for this purpose results in reduced demand for artificial light. Daylighting can be facilitated by light redirection. Light redirection can take the form of reflective shading fixtures on the building exterior to redirect sunlight towards the top of a room, office, or store to provide lighting. This also prevents sunlight from shining directly onto building occupants, which generally causes discomfort and results in air-conditioning use.49

Since sunlight cannot meet all the lighting needs of our buildings, the installed light fixtures will minimize energy needs through the use of compact fluorescent light bulbs (CFLs) and Light-Emitting Diodes (LEDs). Motion sensors will also be installed to ensure that unoccupied spaces are not lit unnecessarily. To increase control over lighting and allow for more flexible light usage in larger offices and rooms there will be fewer light fixtures per light switch than is typical.

HVAC & Natural Ventilation
Another critical area for energy demand reduction is HVAC. We found that through the use of natural ventilation, commercial buildings can substantially reduce their HVAC dependence. Natural ventilation uses wind, buoyancy, and pressure differences to circulate fresh air through a building. The spaces designed with the fewest interior walls and partitions will experience the most benefit from a natural ventilation system. To accommodate the narrow floor plates required by natural ventilation systems, open-air courtyards will be incorporated into the build-

ings.50 Manzanita Landing is fortunate to have Santa Monica’s temperate climate and cool breezes so the site’s demands on HVAC systems are likely to be lower than a typical American home or business. With the incorporation of natural ventilation, HVAC systems will only be relied on for a small amount of time each year.

Home Appliances & Office Equipment
Home appliances and office equipment can also easily be targeted for energy reductions. All spaces designed for living and working will be equipped with Energy Star® appliances and equipment. Sensors and easily accessible power strip switches will be installed to reduce phantom loads. Phantom load is the energy consumed by a device that is in standby mode or switched “off.”
Behavioral Strategies

The efforts to reduce energy demand from the behavior side will focus on educational programming, signage, and positive use of social pressure. Educational programming will be integrated into the elementary school curriculum and Community Center. Information about various opportunities to reduce demand will be shared with new tenants and homeowners of Manzanita Landing. Signage will also be posted in each building to serve as a gentle reminder to people to change their behavior and take a more active role in reducing energy demand.

The social pressure lever is likely to be the most effective in encouraging responsible consumption. Studies have shown that consumers change energy behavior more dramatically when they are being compared to their neighborhoods or peers. To maximize the impact of this tool, monthly energy bills will indicate how the home or business’ energy usage during the previous month compared to the energy usage of similar units or businesses within Manzanita Landing. Additionally, within each home or office, there will be an energy use orb which contains an energy use monitor. The orb will change colors to show users how their real-time energy usage compares to the previous month’s average daily usage. For example, if an office is using less energy than it did on average during the previous month, the orb will be lit green. The intensity or brightness of the color will indicate the magnitude of difference. This will result in users becoming more aware of the impact that each action has on energy demand.

Manzanita Landing’s inclusion of cohousing and shared office space will naturally lead to reduced energy need compared to traditional spaces. Office equipment will be shared by multiple businesses eliminating
the plug loads of dozens of printers, routers, and other equipment. In cohousing, one example of energy savings realizations will be the sharing of washers and dryers, which usually sit idle in homes because they are used relatively infrequently.

**Energy Generation**

Several clean energy generation options were considered for Manzanita Landing, including geothermal, wind turbines, PV, solar thermal, and tidal power. Ultimately, given our goals and the site’s location and conditions, PV and solar thermal rose to the top as the most appropriate sources of energy, with supplemental wind turbines added to diversify energy production.

*Solar Thermal Systems*

One of the most energy intensive needs for a household is hot water. The use of traditional water heaters would overburden the site with its energy generation demands. To resolve this issue, we integrated solar thermal into our renewable energy generation portfolio and consider it a critical piece to reach our net-zero energy goals. Solar thermal panels are installed on rooftops to store water for the sun to directly heat. Solar thermal can meet approximately 70 percent of the site’s hot water needs, and the remainder will be met using traditional electric water heaters to raise water to very high temperatures and ensure hot water is available at night. Approximately .65 acres of roof space will dedicated to solar thermal. The installations will be dispersed across the site’s residential and mixed use buildings.

*Photovoltaic Systems & Technologies*

In order to meet our energy needs for the site it will be necessary to use the most productive solar panels available on the market. The HIT Power 240S boasts 19 percent efficiency,\(^\text{52}\) which is about 30 percent greater than typical PVs currently on the market and is the only solar panel commercially sold that can meet our needs. The site’s 17.2 acres of remaining available roof space will be covered by solar panels to meet the site’s energy needs. To maximize solar panel roof space, 25th Street will have solar shaded street parking and the Fire Station parking lot will be covered too. In our calculations, we account for leaving one third of roof space open for fire safety as well as a potential degradation of up to 15 percent in the minimum 20 year lifespan of the system. Each year, even after we account for these reductions, this high output system is expected to generate just above 51 kBtu/sf/yr.
Wind Turbine Systems & Technologies
Given the airport presence, land space constraints, and the urban landscape, larger wind turbines were not seriously considered. Instead, we explored rooftop wind turbines with relatively strong performance paired with low noise levels. The two models considered for Manzanita Landing were the Honeywell Rooftop Wind Turbine and the innovative Architecture Wind ™ from AeroVironment.

After careful consideration of the site’s topography and average wind speed we realized that wind-generated energy production is too uncertain as a primary source of energy for this site. As a result, we ensured that sufficient energy could be produced from PV alone. However, some Honeywell Wind turbines will be installed facing south west to diversify Manzanita Landing’s renewable energy portfolio and provide the site with a buffer of additional energy. The wind turbines will also carry symbolic and educational significance, as they will remind visitors and residents of Manzanita Landing’s energy independence and investment in renewable energy.
CONCLUSION
Chapter Seven
Manzanita Landing: Successes and Challenges

Reimagining a completely new way to develop a 56-acre site that will, at least in the near term, continue to neighbor a functioning airport, is not a simple or straightforward task. Meeting the constraints and demands of the Living Building Challenge’s rigorous imperatives also added a level of complexity that we needed to embrace in order to arrive at a feasible yet imaginative solution. Considering the challenges of designing a neighborhood capable of hosting more than 4,000 residents, a 300 seat school, a functioning commercial farm, and a range of commercial and retail functions (among other things), we are pleased that we successfully demonstrated that net zero water and energy are attainable goals. We are also satisfied that we could leverage the site’s limited connectivity to our advantage by using it to create a community that is self-contained and pedestrian and bike-oriented. However, we still wanted to create a community that is connected to the surrounding neighborhoods. We believe that we achieved this by incorporating elements designed to invite outside users into the community such as the Community and Senior Centers, Water Systems Education Center, bike bridges, garden staircases, and commercial corridor.

One of the primary challenges in this process was the scale of the project. We were essentially charged with designing a small town complete with all of the features and functions a new community would need. The large scale of our project site and the amount of development that was necessary to achieve the required density forced us to take a more macro view of the site. This in turn limited our ability to be as detailed as we would have liked about the specific design features of buildings, infrastructure, and open spaces such as those geared towards maximizing energy and water efficiency and meeting the criteria of biophilic design elements.

Another challenge the site presented was its relative isolation from the surrounding community assets and street network. Although we were determined to approach this challenge as an opportunity, we struggled to find the right balance between creating a completely self-contained, car-free community, and still making enough concessions for vehicle accessibility and parking to make the proposal plausible within the current context of Southern California’s dominant transportation mode.

Despite these challenges, we are pleased with what we have been able to accomplish in a relatively short time and hope that this

Figure 56. Concept model of Manzanita Landing, view from the southwest
Conclusion

proposal will encourage those responsible for deciding the future of the City-Owned Parcel to reach for something ambitious in the transformation of the site. In particular, we hope that any development of the site will attempt to bring something new to the Santa Monica community, whether that is a walkable village atmosphere with numerous car-free zones, alternative housing options, a community that is completely energy and water self-sufficient, or a large urban farm in the midst of the city. We also hope that this proposal will help others consider innovative ways to foster a sense of community by providing opportunities, environments, and forums that can help facilitate the sharing of resources and the free flow of knowledge and skills.

Assessment of Living Building Challenge Framework

The Living Building Challenge sets an extremely high bar that pushes those who use it as a development and design framework to think holistically about creating buildings and neighborhoods that are not only sustainable but restorative, healthy, educational, and inspiring. Through the LBC, the International Living Future Institute has effectively communicated the idea that in order to ensure a peaceful, productive, and livable planet, it is imperative that we take bold action, think beyond what might be convenient, cheap, and easy, and embrace the challenge of reshaping what our communities can be.

While we find these ideals inspiring and believe that the issues that the Living Building Challenge brings to light are essential, from a practical standpoint we have some critiques of the LBC model based on our experience with it.

One critique has to do with the level of specificity of some of the Imperatives which relate to qualitative features that are highly subjective. For example, the Biophilia Imperative mandates that each of the six types of biophilic design elements be incorporated for every 2000 meters of the project. While it is relatively easy to decipher the meanings of “natural shapes and forms,” “natural patterns and processes,” and “light,” some of the other required elements such as “space,” “place-based relationships,” and “evolved human-nature relationships” are extremely vague.

A second critique arose as we attempted to design our site to comply with the Human Scale and Humane Places Imperative, which prescribes maximum and minimum widths for streets and sidewalks, and allowable space between street trees and circulation routes. Although we believe in the spirit of this Imperative and prioritizing the needs of pedestrians and cyclists, we feel that requiring circulation routes be present every 45 meters is unnecessarily rigid. We would argue that walkable neighborhoods do not adhere to an exact set of design specifications and attempting to impose them seems overly prescriptive. While we believe that we were successful in designing a walkable, human-scale community, in the end we chose to adhere to this imperative by specifying that some buildings would need to have publicly accessible courtyards and allow people to pass through, because we felt it would be impractical at this point to design in as many pathways as LBC requires.
This brings us to a third critique, which is that the LBC framework requires 100 percent compliance with all Imperatives regardless of regional variations in climate or other existing conditions that are beyond the project developer’s control. Differences in weather, climate, annual rainfall, and access to natural water resources vary widely by region and, despite their best efforts, it may be impossible for some communities to achieve net zero water or energy goals. This seems to make the LBC framework unnecessarily narrow in its reach by limiting its relevance to only those regions with the right combination of water and renewable energy sources. While we feel that certain accommodations should be considered to include a wider range of regions, we recognize that it is entirely possible that the ILFI’s stance might be that people should just not live in regions where net zero energy and water are not possible.

Still, the total compliance mandate also seems to discourage redevelopment of existing neighborhoods and urban infill, which are types of development that we would think the LBC framework would embrace. Here again, the requirements regarding circulation paths might be difficult to comply with if a project were being developed within an integrated community setting with already defined roads and water and energy infrastructure. Even though it was not one of the imperatives we considered for our project, we noted that the Health Petal’s “Civilized Environment” Imperative, which requires that all occupiable interior spaces have a window of a certain specified size, might preclude certain renovation projects from LBC certification. In these ways, the LBC seems to encourage new construction as opposed to renovation or infill development.

Finally, we took issue with the vagueness of the Democracy and Social Justice Imperative requiring that 15 percent of the residential units in a project “must meet an affordable housing standard.” This is troublesome because it is too ambiguous about the household income levels for which this affordable housing should be accessible. To truly demonstrate equity, all income levels, including extremely low-income, should be accounted for in an LBC site’s housing stock. This ensures that the amenities and benefits of the healthy, connected, and safe environments that LBC generates are accessible to the full range of household income brackets. Without specifying the level of affordability in the Imperative, developers may choose to only include affordable housing for moderate-income households, resulting in the neglect of lower-income housing needs.

Despite these critiques, overall we feel that the Living Building Challenge provides a useful, visionary, and forward-looking framework for developing the kinds of buildings and neighborhoods we need to foster communities that will heal and sustain the planet into the future.
Endnotes

12. FAA 1948 Agreement

Figure Credits:

Figure 4 Living Building Challenge 2.1: A visionary path to a restorative future. International Living Future Institute. Seattle, WA. 2012. (Pg. 12)
Figure 5 Community sees first concrete 'visioning' plans. Community Against Santa Monica Airport Traffic. Retrieved From http://www.casmat.org/2012_04_01_archive.html.
Figure 7 Google Earth. Greater Santa Monica Airport Area. Santa Monica, CA
Figure 8 Community sees first concrete 'visioning' plans. Community Against Santa Monica Airport Traffic. Retrieved From http://www.casmat.org/2012_04_01_archive.html.
Figure 9 Google Earth, Circa 1920s, Santa Monica, CA. Santa Monica Public Library Images
Figure 12 Google Earth Street View. Santa Monica Airport. 23rd Street and Walgrove Avenue, Santa Monica, CA
Figure 13 Hunter, Timothy. Pacifica Cohousing, Carrboro, North Carolina. Retrieved from https://plus.google.com/photos/100598659326398663917/albums/553284165390163041?banner=pwa&authkey=CTJUurU_MD-dg>
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Figure 18 Hunter, Timothy. Pacifica Cohousing, Carrboro, North Carolina. Retrieved from https://plus.google.com/photos/100598659326398663917/albums/553284165390163041?banner=pwa&authkey=CTJUurU_MD-dg>
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Figure 26 Omega Center for Sustainable Living. Rhinebeck, New York. Retrieved from <http://inhabitat.com/omega-center-for-sustainable-living-gets-leed-platinum-certification/>
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Figure 33 Sable, James. Eastern Village Co-Housing in Silver Spring, Maryland. Retrieved from http://www.fendrickdesign.com/community/projects/02/04.html.
Figure 34 Loggekopp. Flickr. Retrieved from http://www.flickr.com/photos/loggekopp/6235896800/lightbox/.
Figure 40  Bikes and Baechle. Freiburg, Germany. Retrieved from <http://members.virtualtourist.com/m/f1306/f6ce/>
Figure 43  Filtration and Biofiltration. Retrieved from http://ag.arizona.edu/azaqua/extension/Classroom/Filtrationpage.htm.