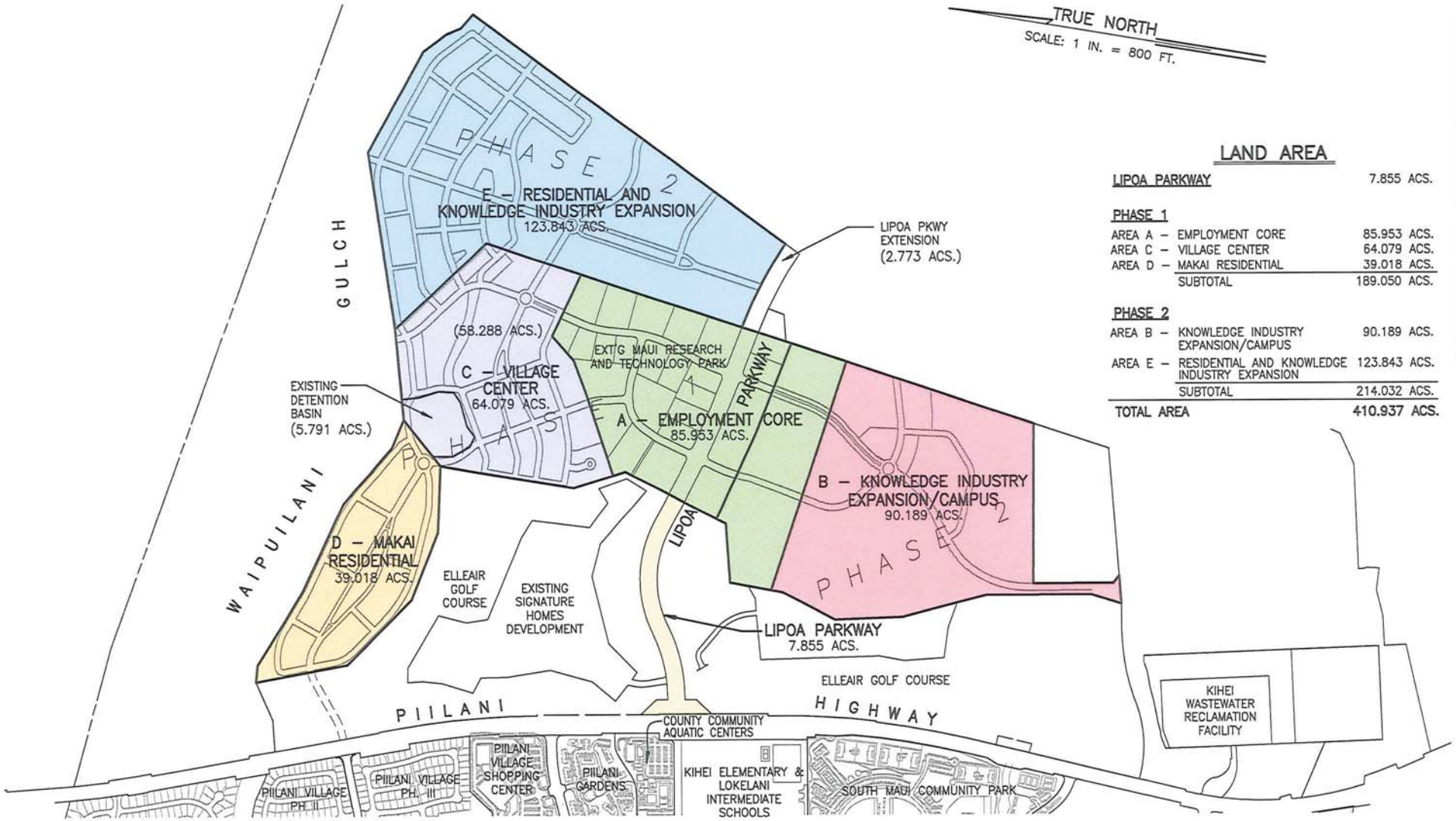
APPENDIX M
Historical DBA Incremental Maps



LAND AREA

LIPOA PARKWAY		7.855 ACS.
PHASE 1		
AREA A –	EMPLOYMENT CORE	85.953 ACS.
AREA C –	VILLAGE CENTER	64.079 ACS.
AREA D –	MAKAI RESIDENTIAL	39.018 ACS.
	SUBTOTAL	189.050 ACS.
PHASE 2		
AREA B –	KNOWLEDGE INDUSTRY EXPANSION/CAMPUS	90.189 ACS.
AREA E –	RESIDENTIAL AND KNOWLEDGE INDUSTRY EXPANSION	123.843 ACS.
	SUBTOTAL	214.032 ACS.
TOTAL AREA		410.937 ACS.

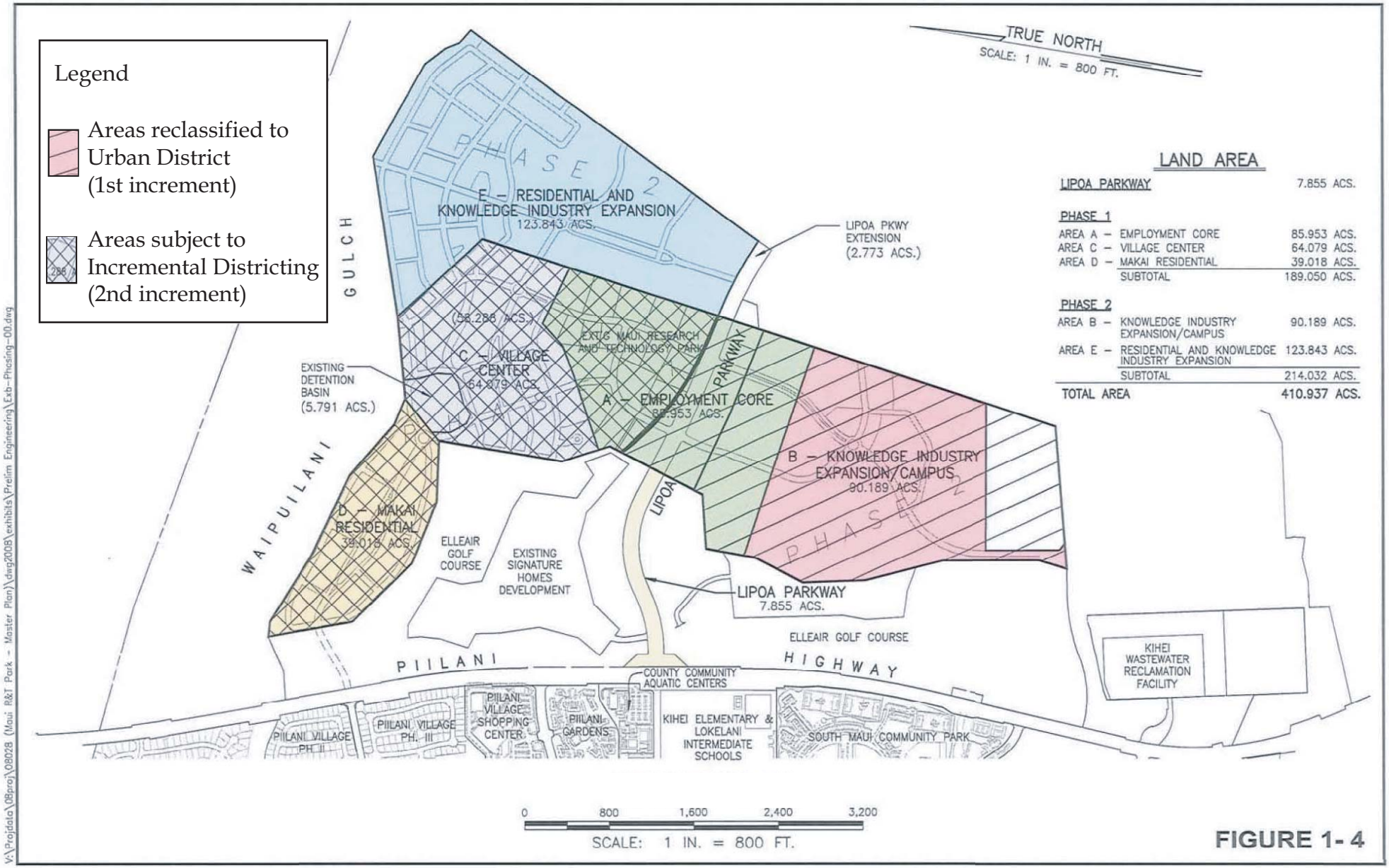
PHASING PLAN

0 800 1,600 2,400 3,200

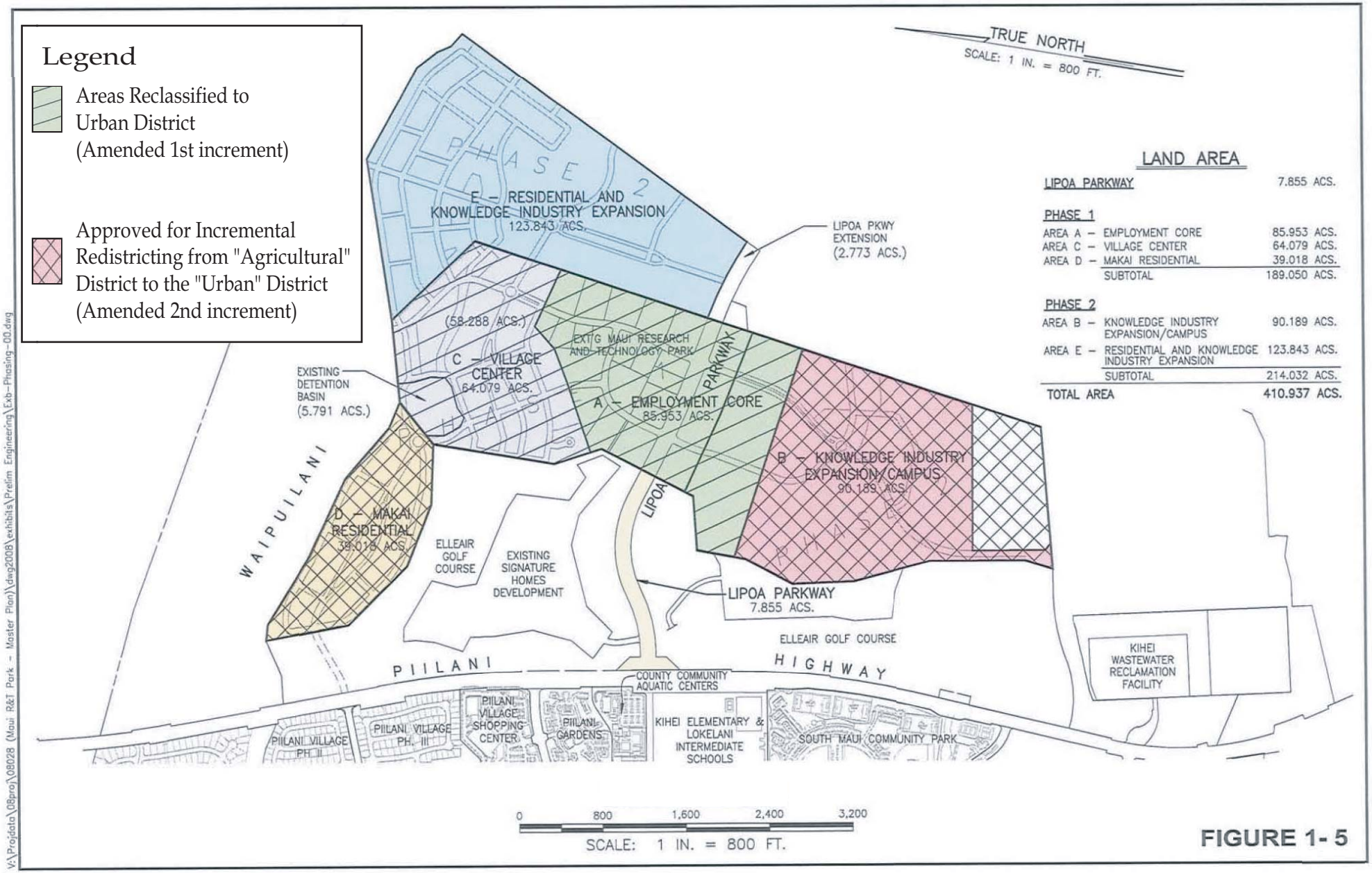
SCALE: 1 IN. = 800 FT.

FIGURE 1- 3

V:\Projdata\08proj\08028 (Maui R&T Park - Master Plan)\dwg2008\exhibits\Prelim Engineering\Exb-Phasing-00.dwg



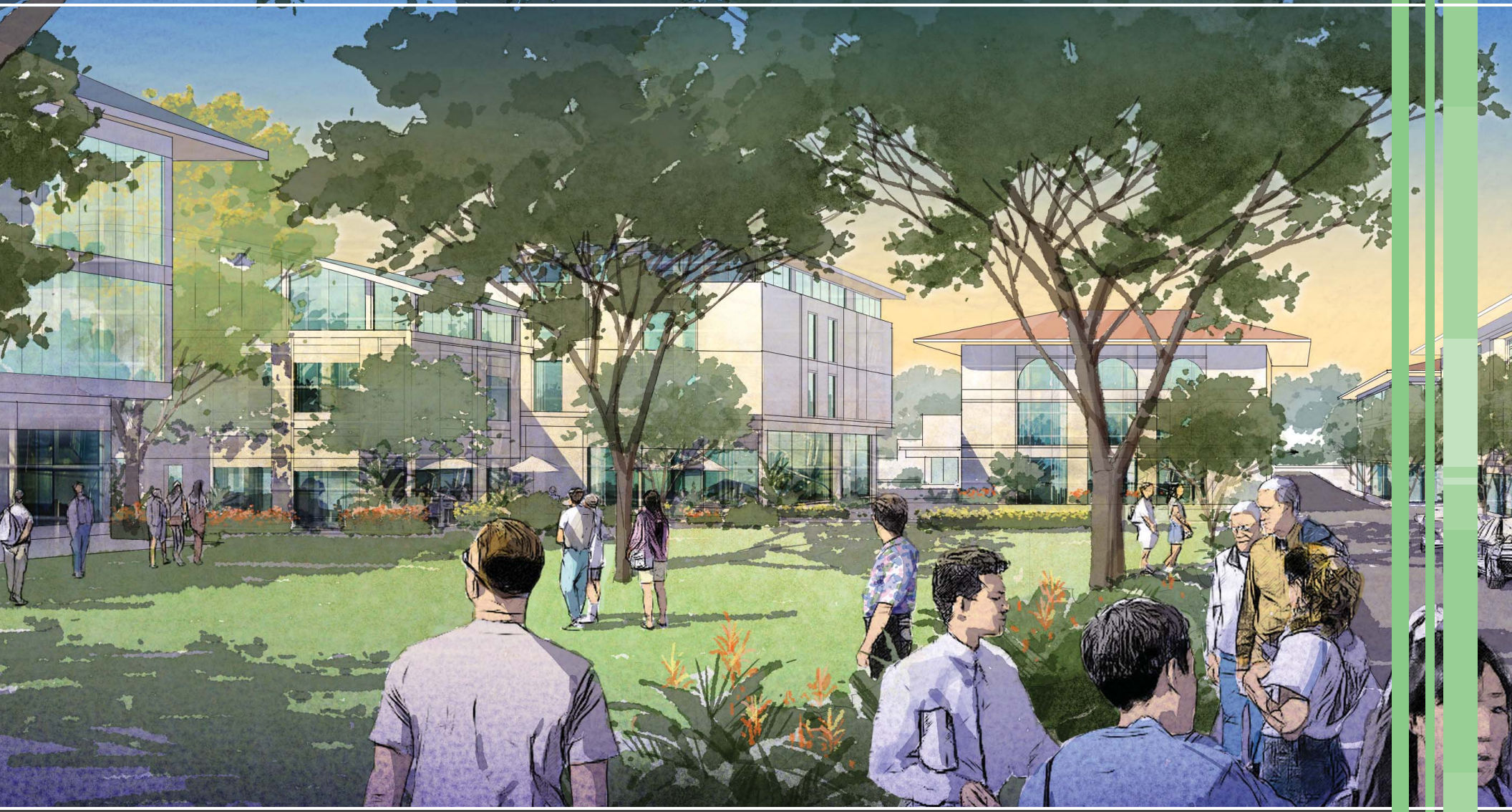
1985 State Land Use Decision and Order Designation Area



Areas Affected by State Land Use Commission 1986 Decision and Order

APPENDIX N
Sustainability Study

MAUI RESEARCH AND TECHNOLOGY PARK



SUSTAINABILITY PLAN

November 3, 2012

Maui R&T Partners, LLC

Kihei, Maui, Hawaii

www.mauitechpark.com

Calthorpe Associates

Berkeley, California

www.calthorpe.com

Chris Hart & Partners, Inc.

Wailuku, Maui, Hawaii

www.chpmaui.com

SUSTAINABILITY PLAN

First, urbanism – compact and walkable development – will arise naturally if the built-in bias of our current infrastructure investments, financial structures, zoning norms, and public policies is reformed. Second, such urbanism, when mixed with simple conservation technologies, can have a major impact in reducing carbon emissions and energy demand. Third, urbanism is the most cost-effective solution to climate change, more so than most renewable technologies. And finally, urbanism's many collateral benefits – economic, social, and environmental – enhance its desirability and economics. In short, urbanism is the foundation for a low-carbon future and is our least-cost option.

Peter Calthorpe

The Maui Research & Technology Park is an employment park on the island of Maui. The Park has achieved some of its civic goal of diversifying the economy. However, in order to carry forward this vision, given the current needs of technology businesses, as well as to respond to current environmental and social needs, the Park plans to diversify its land uses, update its infrastructure, and enhance its attractiveness to businesses.

Plans for the Park take a broad view of sustainability, incorporating social, economic and environmental factors. This sense of balance is in fact a fundamental element in long-term sustainability and making Maui even better place than it is now. This Sustainability Plan explains the Park's aspirations. The development of the Park will happen over many years. This plan is intended to guide the development of the Park by showing the reasoning behind the updated Park plan, establishing a base of understanding of sustainability as it relates to the Park, and by discussing a range of options which can be incorporated into future development in the Park.

The Way to Sustainability

The founding mission of the Maui Research and Technology Park was to help diversify the economy of Maui County. This is an important goal, one which remains as valid now as it was in the earliest years of the Park. The long-term health of Maui's economy will play a vital role in the quality of life here. At the same time, we live in an age where the limits of the environment's ability to absorb the affects of human development are becoming ever more clear. Pursuit of economic development without consideration of our actions' affects on the environment would be unacceptable to the current and future residents of Maui County and the State of Hawai'i. Too many times, environmental principles, and even long-term fiscal health, have been sacrificed in the pursuit of short-term economic gain.

Fortunately, we also live in a time in which companies and the people who run them are concerned with more than the simple equations of profit. More and more companies, and their employees and customers, want to do well and do right at the same time. It is with the goals of sustainability coupled with economic prosperity that the plan for the Technology Park has been created. These goals are not in opposition.

The plan seeks to enable a sustainable future for the Park in large part through the creation of a functional and attractive urban environment. The value of urbanism to the environment can hardly be overstated. Poorly created places, places which make it difficult to travel without an automobile, places which segregate land uses and people, places which spread development out across land without concern for what gets paved over, are the very antithesis of sustainability. The Park, through the current planning process, aims to be a good steward of the environment by creating an efficient place for people to live, work and play.

Especially in the sector of companies which the Park seeks to attract and nurture, high quality urbanism has come to be valued highly. The skilled workers in the technology sector have choices about where to live and start businesses. Maui itself is an attractive place, but technology clusters thrive on the mix of uses and people which an urban environment provides. Such an environment does not guarantee success, but has increasingly become a prerequisite for it. Thus, we aim to create a good urban place in the Park. Its attraction for companies will be matched by its environmental sustainability.

To achieve the highest level of sustainability, it is important to think at the correct scale for every action. The Park's high quality urbanism should be combined with sustainable development practices at the level of building and landscape. The large number of building sites will provide many opportunities to use sustainable practices and the science and understanding of these practices is becoming ever greater.

Hawai'i Context

Hawai'i is, to state the obvious, a unique and beautiful place. It is this beauty, along with its relative isolation and therefore need for self-sufficiency, which have helped to foster a high level of environmental concern. This concern has motivated the people of the state to put principles of sustainability into the law itself. Hawaii Act 181 defines the Principles of Sustainability:

1. Encouraging balanced economic, social, community, and environmental priorities;
2. Encouraging planning that respects and promotes living within the natural resources and limits of the State;
3. Promoting a diversified and dynamic economy;
4. Encouraging respect for the host culture;
5. Promoting decisions based on meeting the needs of the present without compromising the needs of future generations;
6. Considering the principles of the ahupuaa system; and
7. Emphasizing that everyone, including individuals, families, communities, businesses, and government, has the responsibility for achieving a sustainable Hawaii.

Sustainability is achieving:

1. Respect of the culture, character, beauty, and history of the State's island communities;
2. Striking a balance between economic, social, community, and environmental priorities; and
3. Meeting the needs of the present without compromising the ability of future generations to meet their own needs.

The plan for the Maui Research & Technology Park aspires to move Hawai'i forward toward achieving these principles. The Park will have a more balanced social, economic, and environmental system as a mixed-use community. This balance itself will be a fundamental way to work toward the Principles.

Ahupua'a

The ahupua'a system provides an example and analogy to guide the actions of the Plan. Each ahupua'a, including a section of land from the mountain to the shore, is in essence a system to itself. Natural processes like the circulation of water extend throughout the ahupua'a, with each part of the system related to the next. The human interaction with this natural system is founded on respect, cooperation, and stewardship, with an understanding of natural limits. Within the system, human activities have appropriate levels and are suitable for certain locations. All activities and processes within the ahupua'a are nested within the overall system, which is itself nested within the island's larger natural and cul-

tural system.

The plan's strength comes from considering these ideas from the start and embedding them into the structure of the community. The plan abandons outdated notions of human communities founded not on natural principles but on machine principles. These ideas held functions like living and working as separate and unrelated, not part of an interrelated system with the possibility of positive feedback between them. Thus, for example, the Park's housing is intended to be affordable to Park workers, strengthening the ability of businesses within the Park to attract talented workers and making the Park more attractive to those businesses. The resulting short commutes can be more frequently made by bicycle and walking, making the Park more sustainable as well. The presence of both homes and employment will make neighborhood-serving retail more viable, again making the Park more attractive to other employers. Without using these ideas of the needs and feedbacks within the system, we could be led to separate employment, retail and residential areas as has been done in most places built in the last fifty years. This separation removes the possibility of these positive feedbacks and makes it necessary to travel everywhere by automobile. This has led to congestion, pollution, lack of physical activity, and higher levels of obesity. None of these promote sustainability over the long term or human quality of life.

Economic Context

The Maui Research & Technology Park is being developed by a master developer, Maui R&T Partners, LLC. The developer will be in charge of creating a sustainable plan for the Park as well as coordinating infrastructure. Individual parcels may be developed by the developer, or may be developed by others, such as employers seeking a place to start or expand their business.

In both cases, whether development is created by the master developer or by others, the aspiration is that the Park will be a model of sustainability and stewardship. Much of what will make the park sustainable is already contained within the plan, as will be discussed later in this document.

The purpose of the Park, however, is not solely about the environmental aspects of sustainability. As noted in Act 181, it is important to maintain a balance between economic, social, community and environmental priorities. Since the reason for creation of the Park was to enhance the economy of Maui, it will not always be possible to pay for the highest levels of sustainable practices in infrastructure and construction. It is the ambition of the park to keep the Park's level of sustainability very high. But if the Park is not viable financially or cannot attract new business because the standards make it unaffordable for growing businesses, then the goal of economic development will not be achieved.

In addition, because other people and businesses will also develop land within the Park, the master developer will not have full control over all future development activity in the Park. It is hoped that by setting a high example, by educating potential building developers in the Park, and by creating documents such as this which show the ambitions of the Park for sustainability, that the level of sustainability of all aspects of the Park can be kept at a high level.

Site Description

Island of Maui

The Maui Research & Technology Park is located in the South Maui town of Kihei, mauka (east) of the intersection of Pi'ilani Highway and Lipoa Parkway (called Lipoa Street makai of Pi'ilani Highway). Kihei is one of many small towns on Maui, and is developed in a linear form along South Kihei Road, which runs north and south parallel to the ocean shore. The newer Pi'ilani Highway lies mauka of most of the town's development, and is a high speed facility with a limited number of intersections. The island's primary airport is in Kahului, about 30 minutes away by car.

Kihei has a variety of development, including many mid-range hotels and condominium developments, single family homes and some low density multifamily. Much of Kihei's retail is small in scale and lies along South Kihei Road, but several large shopping centers exist as

MRTP lies mauka of Kihei, beyond Pi'ilani Highway

Azeka Shopping Center in Kihei

Maui coastline

well, including Azeka Shopping Center near the intersection of South Kihei Road and Lipoa Street. Pi'ilani Shopping Center is one block north of Lipoa Street and just makai of Pi'ilani Highway, very near the Technology Park, and includes a large Safeway grocery store. A large new shopping center called Downtown Kihei is planned near Pi'ilani Shopping Center, and a large outlet mall and shopping center is planned for an area north of the Park, also mauka of Pi'ilani Highway.

Divided from the rest of Kihei by the high speed four-lane Pi'ilani Highway, the Technology Park is physically and visually isolated. A golf course lies between the Park and the highway, leaving the park with no highway frontage. The one road access, Lipoa Parkway, is currently two lanes with a very wide right of way which will easily accommodate four lanes. There are no through roads in the park, leaving the Park's overall road network to function as a cul de sac. The Park is surrounded by undeveloped land on the north, east and south sides.

A Park tenant

Local Context

The Park has open setbacks and lush landscaping

Park Plaza building

Existing development in the park is on five parcels. Buildings are one and two stories, and all development (as required by existing design guidelines) sits behind deep setbacks, usually filled with one or more rows of parked cars. Roads and intersections are large, with large turn radii. Most roads have sidewalks, and much of the landscaping is lush and beautiful.

Some Park buildings have little local architectural influence

Hedges screen unattractive parking lots from the street

Parking lots line most streets

MRTP Context Map

SUSTAINABLE DESIGN PRINCIPLES

The following chapter covers the principles which have been followed in this design. As planned, the Maui Research & Technology Park to a great degree has its sustainability "baked in." This is to say, the design of the Park itself has been done in a way intended to create long-term sustainability. The patterns of transportation and land use commonly known as sprawl have devastated the environment with congestion, needless consumption of farmland and natural areas, obesity, inefficiency, and gas consumption, to name a few things.

The understanding of the importance of Urban Design and Planning has changed greatly in the last twenty years. Far from being concerned simply with aesthetic issues, well-designed places function far more efficiently than poorly-designed ones do. They have positive effects on the environment, on individual health and well-being, and on long-term economic viability and adaptability. Well-designed places are also better and more enjoyable places for people to live and work, which has made good design an important element in efforts to create economic development.

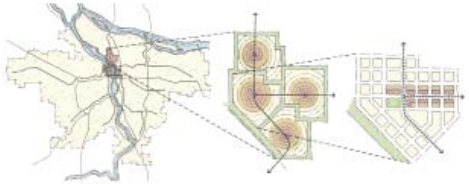
The motivation for the founding of the Maui Research and Technology Park remains as important as ever. Continuing job creation and economic development are essential for the well-being of Maui. This has become even more apparent with the recent economic downturn and the continuing decline of agriculture on the island.

Fortunately, the latest understanding of urban design for quality economic development, especially in fields of high technology, is also urban design which achieves environmental and other goals. Places which attract and create new high technology businesses are those which facilitate the exchange of ideas and make it easier for people to become entrepreneurs, and are able to deliver a high quality of life. By providing a variety of public and private spaces and a quality public environment, these places give people and businesses the flexibility and freedom to experiment, to take chances, and to make connections. These types of places are fertile ground for growth and entrepreneurship.

Conservation and Restoration

Human and Pedestrian Scale

Diversity and Balance



Connections and Interdependence

For these reasons, it is essential to use new models of development for the Park. New development must address many concerns simultaneously, incorporating the latest understanding of multiple issues. While good design involves an infinite number of elements, we have grouped the major concerns of urban design into four categories for purposes of discussion: conservation & restoration of the environment, economic and social diversity & balance, human & pedestrian scale in the public and private realms, and connections & interdependence between the neighborhood, town and region.

Because it is also important that the plan fit the needs and desires of Kihei residents, the details of these principles also incorporate elements of other local guidelines, such as the Kihei Community Association General Open Space and Design Guidelines. The KCA Guidelines are concerned with community quality and livability, with major areas of concern being:

- Open space drainage ways and flood control
- Wetlands and low lying drainage areas
- Neighborhood connectivity and pocket parks
- Shoreline property
- Beach access/impact
- Pedestrian and community safety and de-emphasis of the automobile
- Roundabouts and street design guidelines
- Affordable housing
- Schools, parks and roads
- Commercial and high density developments
- Green Building Guidelines

The design principles and plan which follow address nearly all of these concerns and are in near-total agreement with the KCA Guidelines.

Waipuilani Gulch

Park Plaza Building in MRTP

Conservation & Restoration

Before After

Conservation and restoration of the environment does not imply that no land will be developed. On the contrary, this principle recognizes the importance and appropriateness of human activity in the landscape and attempts to do it well and compactly while preserving essential elements and systems in the environment. Cities represent a fragile balance between our human needs and the capacity of our ecosystems. As we continue to gain deeper understanding of the repercussions of our human activity on the world's environment, the city is increasingly understood as an important place to adopt a more sustainable lifestyle.

The design of the Maui Research & Technology Park will have an effect on the environment both locally and globally. Design which respects existing topography and other natural features not only is less damaging to construct, but preserves natural systems and the area's cultural and geographic memory.

On the other hand, design which minimizes unnecessary automobile travel has effects on the environment world-wide. The world is facing an environmental crisis of profound economic and social dimensions. Brought about largely by carbon emissions into the atmosphere, climate change is already affecting the human and natural environment and promises to create immense problems in the coming years and decades. Such problems may be particularly pronounced in island communities like Hawaii.

As is now understood, one of the major causes for carbon emissions over the last fifty years has been the way we build our cities. A purposeful emphasis on the creation of cities for automobiles at the expense of pedestrians, bicycles, and transit has increased automobile usage and the associated carbon emissions. At the same time, this style of development has increased land consumption, thereby reducing forest cover and increasing problems with stormwater runoff and pesticide use wherever it has been implemented.

Choices made now will have immense effects on the future of carbon emissions. Creating the Park in an efficient, livable, and environmentally-friendly way will ensure reduced emissions. Using an outmoded, auto-centric development model will do the opposite, and the effects will be solidified in the built environment for years to come.

The Maui Research & Technology Park should add to the sustainability of Maui. It will be environmentally responsible by reducing resource waste, demanding less of the environment, and accommodating growth to support the island economy. It will address an ongoing challenge of economic development by attracting new growth in proximity to housing and regional transit.

By incorporating strategies on the neighborhood and building level, the design of the Maui Research & Technology Park can affect not only its site and surroundings, but the health of the planet as a whole.

Diversity & Balance

Mixed Use and Clustering

Mixing of uses and clustering of destinations is a way to reduce distances and make walking and bicycling more convenient. Maui already has development of middle density, but it often lacks clustering with other uses which leaves it seeming unfocused. Bringing the densest development together, ideally around a transit node, shortens trips and makes them more convenient. Having more residents or workers within 1/4 mile of a transit node makes it more likely that those persons will chose to use transit when they go elsewhere in the island, also.

Mixed Use

Mixed use is the mixing of various activities and land uses within a small area. Vertical mixed use means that a single building has several uses within. Horizontal mixed use means that multiple uses and activities are clustered near each other. Both of these types achieve the goal of making trips shorter and more convenient and raising the possibility that people will choose to use walking, bicycling or transit for their trips.

Mixing of uses at the neighborhood scale, within the 1/4 mile walking radius, allows people to reach daily destinations easily by foot. Large areas with single uses such as housing or employment force everyone to travel long distances to get around. Having retail and civic uses within areas of residential and employment uses makes it easy for people to do quick errands during their daily activities. Having recreational spaces nearby allows people to reach them more easily, creating situations where people can incorporate healthful activity into their daily lives. Having appropriate uses and activities near homes allows children as well as older people who can no longer drive a car to have increased independence.

Diversity of Housing

There will never be a single perfect housing type. Housing types must be as diverse as the needs of the people who inhabit them and accommodate changing demographic and consumer preferences. Even a single individual's housing needs change over his or her lifetime. A young person living in a small apartment may want a house after marrying, then a larger house after having children. Once these children grow up and leave home, the empty-nester couple may again choose a smaller home or apartment. Neighborhoods with a diversity of housing can accommodate these changes without forcing someone to move a long way or even to another community. A collection of townhomes, single family dwellings, and low apartment buildings can achieve a diversity appropriate for a growing and changing population.

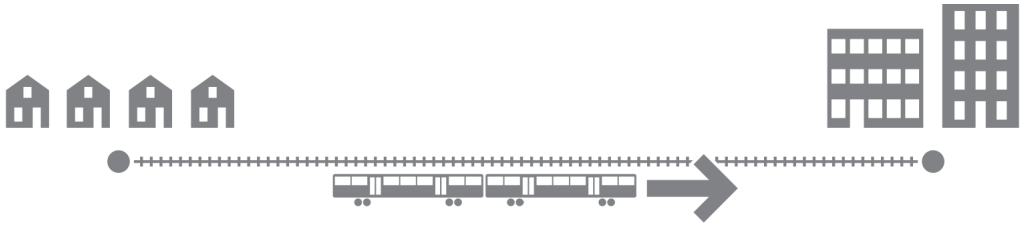
Jobs Housing Balance

Another important reason for a mix of uses on the district scale is to create jobs housing balance. This means that an area would have a similar amount of jobs within it as it has workers living in it. This not only shortens many commute trips and therefore makes it more likely that people can travel to their jobs by walking or bicycling, but it also makes transit and automobile travel more efficient. By using transportation lines (roads or

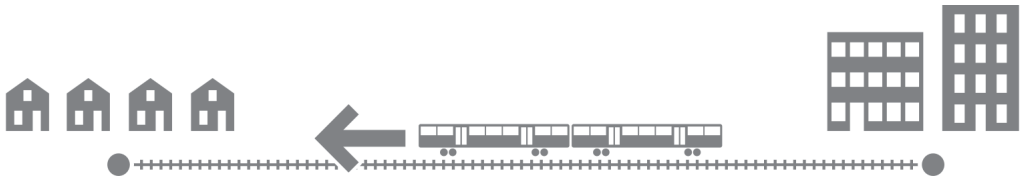
bus lines) in both directions in a similar amount, peaking is reduced and a line of the same size can accommodate more travelers. (see diagrams)

Balanced Flows

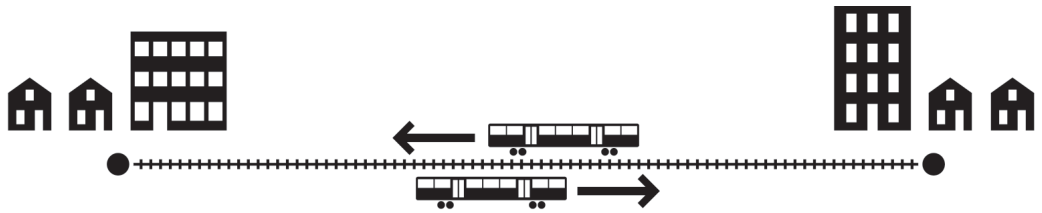
As a jobs center, it is unlikely that the Park would achieve a complete jobs housing balance. However, adding at least some housing will improve the situation, improving transportation efficiency as well as adding 24-hour activity to the Park. Having people in an area during more hours of the day makes an area safer and helps local serving businesses like restaurants survive, since they have customers in both the daytime hours and the evening hours. This will make the Park a more livable and economically viable area.



Unbalanced Morning Commute - going to work

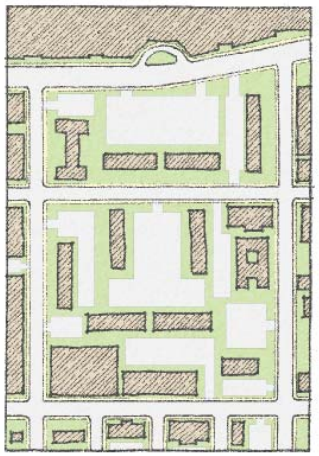


Unbalanced Evening Commute - returning home



Balanced Commute - moderate flows in both directions

Human & Pedestrian Scale



Auto - Scale

Pedestrian - Scale

Places with human scale are in stark contrast to the auto-centric development which has been common over many years and continues all over the world. Human and pedestrian scale recognizes the needs of people for safety, convenience and pleasure in the public realm. By creating places designed for humans, we give people the flexibility to order their lives in ways other than around the automobile.

Mixed Use and Proximity

Human and pedestrian scale includes many aspects of a place. Among the most important factors is a diversity of land use, as discussed in the preceding pages. A mix of uses in close proximity allows people to satisfy needs within an area which can be easily traveled by walking or bicycling. To achieve this result, the development must also be of sufficient density to contain these uses in a small area. Of course, each person differs in the distance which they are willing or able to walk, and factors such as the current weather affect this as well. However, a good rule of thumb is that destinations should be with about five minutes' walk, which is a distance of about 1/4 mile.

Walkable Streets

Another critical factor in human and pedestrian scale is walkable streets. An environment that encourages walking is imperative to the creation of a vibrant community. By walking for transportation we receive a variety of benefits – we reduce the need for the automobile, we provide foot traffic to local businesses, we interact with our neighbors, and we improve our physical health. In fact, a Washington State study found that residents of a pedestrian friendly neighborhood weigh, on average, seven pounds less than residents of a sprawling suburb[1]. In addition, walkable neighborhoods need less infrastructure for cars, thus sparing land for more enjoyable spaces such as parks and promenades.

To be walkable, streets must be well designed. Sidewalks are a must, but the design of the road network and of the streets themselves are key.

Street Networks

Auto-oriented street networks are designed in a very similar way all over the world. Beginning on local streets (often cul de sacs), every journey moves then to collector roads, then arterials, and often then onto a highway. Because of the fear of through traffic and a disregard for pedestrians, road networks are typically designed to force this pattern for every trip, lengthening each trip and congesting all of the arterials. This congestion then creates calls for road widening and the resulting huge roads make walking or bicycling even more difficult and dangerous.

Connector Roads

Rather than this typical street hierarchy of cul-de-sacs, locals, collectors and arterials, the Plan builds a network of interconnected local streets and connector roads. By ensuring multiple connections and routes, connector roads avoid the difficult problem of unlivable, high traffic collectors which are too busy and too noisy to accommodate residential development. Connector roads

[1] *Smart Growth America, http://blog.smartgrowthamerica.org*

typically occur every quarter mile and serve to disperse traffic widely.

Local Roads

Local roads are intended primarily for local access, but are also a vital part of the road network. They only rarely end in cul-de-sacs in the plan. Speed and through traffic are controlled by narrow road widths and curved alignments, while connections on both ends preserve emergency access and add route choice for daily users. Parking is provided along the road, further slowing traffic and providing for more activity on the street as people access their cars.

Street Design

The Evolution of Street Design

The weight of years of experience and research is chipping away at the entrenched practice of creating wide, auto-centric roads in disconnected, discontinuous networks. Promoted for years as the safest and most efficient way to build road systems, it has now been proven that this type of system is just the opposite. Wide roads, contrary to providing an added cushion for error by drivers, instead provoke drivers to speeding and carelessness. The result is more crashes and more severe crashes. Pedestrian and bicycle injuries and deaths are multiplied by large, fast, busy roads, and because few people who have other options choose to walk or bicycle, even more traffic is created.

In contrast, the streets in this Plan are designed with a pedestrian-friendly environment as the first priority. Comfortable, walkable and bikeable streets knit neighborhoods and districts together, adding to a sense of community and facilitating transit use. Each sidewalk needs the shelter of trees, the presence of building entries and porches rather than parking lots, and a buffer of parking to protect the pedestrian corridor from moving traffic.

In all cases streets must be designed to slow traffic, as high speeds are entirely unnecessary within the site. High speed traffic creates a much higher level of noise, disturbing workers and residents. Preserving livability on the area's road network will require reasonable speeds to be maintained. More importantly, high automobile speeds create much greater danger for pedestrians as well as automobiles, making accidents more likely and multiplying the force of a crash many times. A pedestrian struck by a car at 20 miles per hour has a less than 10 percent chance of death. At 30 miles per hour, this chance rises to almost 50 percent. And at 40 miles per hour, fatalities are nearly 90 percent [2]. Speed on all roads in the Park should be limited to 25 miles per hour or less. At these speeds, a driver can still easily reach any Park location in minutes or less.

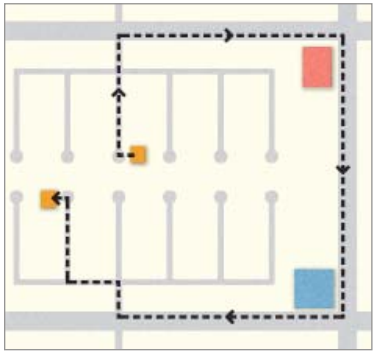
Traffic Calming

Traffic calming is the practice of bringing vehicular speeds and behavior into conformity with the needs of non-drivers. The streets in the Park have been designed to be calmed through their basic design to be more human in scale and character. By sizing the streets correctly and highlighting character elements that emphasize the streets' quality as much as their quantity, the Park's neighborhoods will be naturally safer for all users, including employees, residents, and their children.

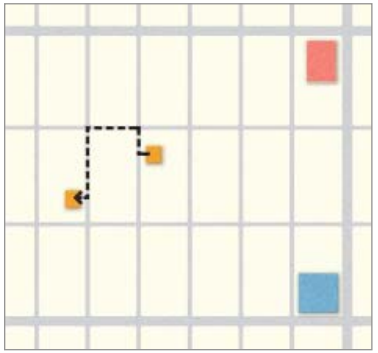
However, where extra care is needed or desired, additional calming methods can be used to ensure a safe and efficient street. Although they vary in application, the basic theory behind these techniques is to present a driver with physical and psychological cues which prompt more careful driving behaviors or choice of travel route. By using signage in concert with uncommon movements, a street's design can encourage safer speeds, reduce volume, or invite more careful navigation. Many times, one or a combination of measures can accomplish all of these goals simultaneously.

There are three major categories whereby a street's design can affect driving behavior, as described below: signage and graphics, deflection (vertical and horizontal), and narrowing.

[2] *http://www.walkinginfo.org/pedsafe/crashstats.cfm*



Hierarchical road networks require long trips on large roads.



Connected road networks allow direct routing and small-scale roadways.

Vertical and horizontal deflections slow traffic

Simple markings can make streets and pathways safer for all users

For further information on traffic calming methods, see "U.S. Traffic Calming Manual", published by APA Planners Press and the American Society of Civil Engineers in 2009, written by Reid Ewing and Steven Brown.

Signage and Graphics

Signage and graphics are the most common traffic calming measures. Not only are they the least costly and usually the least disruptive to implement, they also benefit from a history of use and are therefore familiar to the public and to regulating municipalities. Common types of signage/graphics include:

- Striping
- Bicycle Lanes
- Crosswalks
- Stop Signs
- Child-Related Signage
- Speed Reduction
- Signal Progression
- Pedestrian and Bicycle Signals

Deflection (vertical and horizontal)

Deflections in the travel path require the driver to slow in order to maintain control or to avoid unpleasant forces on themselves or their automobile. Deflections come in vertical and horizontal varieties, and can be gently, or harshly persuasive in form. Common types of a deflection are:

- Speed Humps/Speed Bumps
- Pedestrian Tables/Speed Tables
- Raised Crosswalks
- Raised Intersections
- Chicanes/Slaloms
- Forced Turns
- Street Closures (full or half)
- Median Islands
- Full Roundabouts (full or mini)
- Traffic Circles

Narrowing

When physical elements of the streetscape are drawn in toward the travel lane, the driver feels that the travel lane narrows as well. This perception, real or imaginary, prompts lower speed and more careful observation of the road ahead. Common types of narrowing include:

- Bumpouts/Curb Extensions
- Bus Bulbs
- Pinch Points/Chokers
- Neckdowns
- Narrow Streets
- Narrow Planting
- Streetside Parking

Narrow Streets

One of the primary methods of traffic calming, the use of narrow streets has many advantages, not all of which are immediately obvious. As mentioned above, wide roads are not safer roads. Studies have indicated that for local roads, crash frequency and injury rise with street width. The safest local roads are the narrowest. In addition to safety, narrow roads consume less land, produce less stormwater runoff, and are less expensive to construct and maintain.

Fire Response

One major hurdle to implementation of narrow streets is fire access. The International Fire Code sets a standard of 20 feet clear driving space for fire access. This allows two fire trucks to pass each other while getting to a fire, and allows plenty of space for firefighters to set up their equipment at a fire. This 20 foot standard would forbid roads with narrow lanes such as local roads with

12 or 14 feet of driving area (queueing streets) and two-lane roads with medians and less than 20 feet between parked cars and the median. For these narrow roads, approval of fire authorities is necessary.

Fire access is a critical life-safety issue. However, automobile and pedestrian safety is also a life-safety issue, and an increasing number of fire officials are recognizing this in their approval of alternative road configurations. Alternative street sections have already been proposed on Maui Island, including those in the Pulelehua project such as the “Street” and “Avenue” sections.

On roads with less than 20 feet of clear driving space, fire access can be maintained and even improved compared to a standard road network with a number of strategies:

- Alley access – Alleys provide a critical second means of access for fighting fires and are alternate routes for fire trucks.
- Network connectivity – Having room for fire trucks to pass each other becomes less important with good road connectivity. A connected network of streets allows fire trucks to access a fire from multiple directions.
- Center block staging area – Limiting parking in short sections mid-block, within hose distance of buildings in the middle of the block, can create a valuable staging area for fire fighting equipment.
- Entry neck downs – Neck downs limit parking near intersections. In situations where two narrow roads meet, parking too near the corner can reduce turn radii so much that fire trucks cannot enter the street. Neck downs preserve fire access.
- Mountable curbs at corners and roundabouts – Mountable curbs serve to retain access for larger vehicles like fire trucks and freight trucks, while keeping corners tight and thereby limiting vehicular speeds.
- Limited block lengths – Blocks of limited lengths (less

Store fronts benefit from street parking as it activates the sidewalks

Effective streets prioritize spaces for pedestrian

Narrow streets slow down traffic enough to create safe environments for pedestrian circulation

than 300 feet), such as the short ends of typical city blocks, allow fires to be fought from the adjacent intersections even if the street itself is blocked.

- Sprinklers in buildings – Requiring sprinklers in all buildings can reduce fire risk and increase acceptable response time such that a reduction in fire truck speed may be allowed. This strategy was used in Baldwin Park in Orlando, Florida, to achieve local street widths as small as 21 feet across, with street parking.

These strategies, alone and in combination, can keep people and property safe from fires while improving road safety and livability.

Street parking creates a buffer between moving traffic and sidewalk

Parallel parking supplies functional parking for all uses

Street Parking

On-street parking acts as a traffic calming device and protects pedestrians from moving vehicles. While this buffer is not typically needed for physical protection, it serves as a valuable psychological division between the automobile realm and the pedestrian realm. In addition to this function, street parking helps to activate the street with people coming and going, and makes street-facing store and business entries work. Parallel parking is preferred to diagonal parking, as it keeps street widths to a minimum and because, diagonal parking can cause serious conflicts with bicycles since it impedes drivers' ability to see bicyclists while backing.

Intersection Design

Another critical factor for walkable streets is the design of intersections. Intersection design affects the safe and comfortable flow of travel for all modes, including walking and bicycling. Intersections are particularly important to the overall safety of a road network since a high proportion of accidents occur there. A variety of strategies can be used to make intersections safer and more functional for all users while maintaining critical functionality.

Actual Curb Radius and Effective Turning Radius

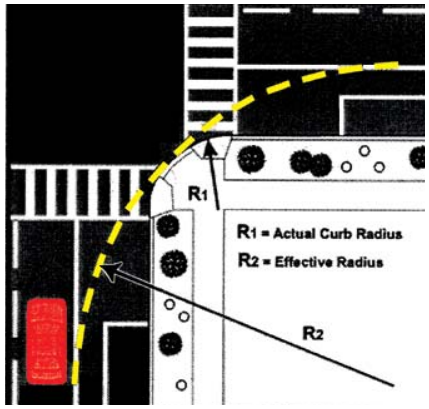
An important factor for intersection safety is the speed of turning vehicles. Smaller curb radii and the associated tighter turns by vehicles at corners can allow normal use by automobiles, while at the same time slowing turning movements and thereby increasing safety.

The effective turning radius (ETR) of a corner refers to the path of travel of the inside wheel of a turning vehicle (see figure at left). This is usually unmarked on the street and is not visible as part of the street assembly. The ETR of an intersection should not be confused with the actual curb radius which is likely to be significantly smaller.

Recognizing the difference between ETR and the actual curb radii is important because overlarge actual curb radii serve to make intersection crossing distances longer without enhancing the intersection's performance for automobiles. In fact, large curb radii can actually encourage drivers to take turns at unsafe speeds, endangering themselves, other drivers, and any pedestrians or bicyclists also using the intersection.

Curb extensions

Narrow widths make intersections safer for pedestrians by limiting crossing distances. Intentionally narrowing roads at intersections with curb extensions achieves shorter distances and helps to slow automobile traffic.



AASHTO Comparison of Actual Curb Radius (R1) to Effective Turning Radius (R2)

Curb extensions are allowed and encouraged at all intersections. It is also appropriate to consider curb extension areas as opportunities to achieve other goals of the plan.

In denser and more urban areas, curb extensions are well-suited for bus stops and other pedestrian seating areas. Special care should be taken to understand traffic flow and its implications on safety and signalization when bus stops are located near intersections and within the moving lane.

Curb extensions can also be paired with bicycle storage facilities which provide a safe and visible area for bicycles to be stored on the more active streets. Placing bike facilities in the curb extensions also means that pedestrian walkways and sidewalks in the immediate area are not partially blocked by parked bicycles. Placing bicycles in this prominent area also has the potential to add to the creation of a cycle-minded community where bicycles are not only a priority, but are also aesthetically part of the streetscape.

In lower intensity areas, curb extensions may be well-used as stormwater detention and filtration areas. "Flush" volumes of rainfall can carry unhealthy amounts of surface pollutants when the water runs over the street surface and along the street-side gutter. These pollutants are often carried along hard infrastructure for long distances, and potentially into sensitive water bodies such as streams and ponds, and eventually the ocean. By catching surface contaminants in street-side swales and retention areas, contaminants can be filtered naturally by plants while the clean water is left to infiltrate into the ground. Using curb extensions to build these retention areas means that contaminants are less detrimental to downstream environments, and stormwater infrastructure has less of a chance of being overwhelmed by large volumes of stormwater runoff when large rain events occur.

Bicycle and Pedestrian Facilities

Walking and bicycling are important transportation modes. They promote health, reduce traffic congestion, reduce the need for large parking lots, and are often enjoyable recreational activities which will serve as amenities for employees, residents, and visitors to the Park.

Pedestrian Network

The need for pedestrian facilities (sidewalks, safe crossings) is a given. Regardless of whether sidewalks are provided, people will at times walk along roadways, and forcing people to walk in traffic is dangerous and unnecessary. The Plan instead encourages people to walk by providing safe, pleasant sidewalks and pedestrian paths connecting all locations.

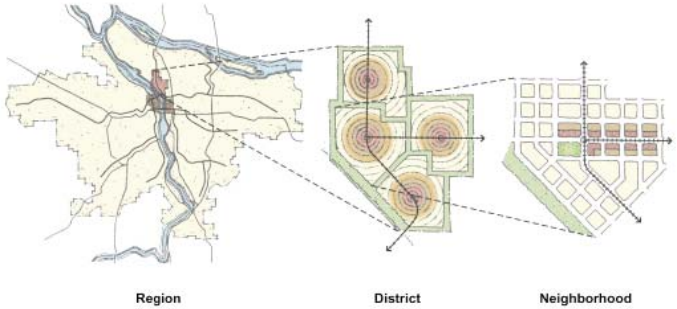
Traffic circles slow traffic without causing delays and can beautify the streetscape

Bicycle System

As for bicycles, they need to travel wherever automobiles travel. Bicycles have many of the health and environmental advantages of walking, and their higher speed allows longer travel distances. This will be especially important in the Park due to its current location outside the main area of development in Kihei.

In contrast to the typical 1/4 mile travel distance limit for pedestrians, their higher speed allows bicyclists to commonly travel much further, between one and 2.5 miles.

Connections & Interdependence



Thinking of individual elements of the urban environment as distinct and unrelated has been a hallmark of Modernist thought and has led to regions which are socially, economically and environmentally disconnected. Contemporary thought searches for a deeper understanding of the relationships between all elements of the built environment. Elements such as the environmental and economic connections and interrelationship of the park to the rest of the county are important considerations, as discussed above. A more direct and very important connection to consider here is transportation.

Intermodalism

Much transportation planning as it is currently practiced is in fact only automobile transportation planning. Given the increasingly-apparent health and environmental benefits of non-automotive modes like walking, bicycling and transit, this emphasis on the automobile is unfortunate. A robust, equitable, environmentally sound transportation system accommodates multiple transportation modes. A variety of strategies can be used to achieve this, from provision of adequate pedestrian and bicycling facilities to implementation of transportation demand management strategies such as parking cash-out, where those who do not use “free” parking receive a cash payment instead.

Connectivity

Connectivity is closely related to intermodalism and is an important tool. Well-connected street networks better accommodate multiple modes. Direct routes are especially important for pedestrians, since the rate of trips made by walking is highly sensitive to distance. Connected streets also affects trip lengths for automobiles, reducing vehicle miles traveled while providing alternate routes in case of road blockages or repairs. And consideration of connectivity between modes, such as good sidewalk connections to transit stations, improves the efficiency and effectiveness of the entire system.

The Fallacy of Free Parking

The issue of parking is one of the most contentious in planning and urban design. For many years, government authorities have required with minimum parking standards that plentiful parking be made available for every type of land use. The reasoning behind this was that if a business or residence did not provide sufficient parking, people would be forced to park their cars on the street, inconveniencing their neighbors. While generally not requiring that parking be free, regulations have required that parking be provided at such high levels that there

Multi-Modal street, Ottawa

has been typically no point in charging for it, and people have become used to the idea of plentiful, free parking wherever they go.

However, free parking is not really free. There are many costs to providing parking, from land costs to construction costs to ongoing maintenance and security. With the current system, however, the costs of parking are bundled into the cost of everything else, and so parking seems free to drivers.

Free, plentiful parking leads to increased driving. When a normal good is underpriced, it will be over consumed. This applies to parking – because a portion of the journey is subsidized, people's decisions are influenced toward driving and away from other modes or carpooling. In addition, the requirement for large amounts of parking means that destinations are spread further apart by large parking lots. Since parking often takes up more than half of a developed parcel, the amount of destinations within reach in the critical pedestrian quarter mile is often cut by more than half. And few people enjoy walking to destinations through the seas of parking in which buildings often float.

Changing Parking Minimums

For these reasons, this plan proposes reduction of mandated parking provision in the Park. With reduced parking requirements and creative options for meeting those requirements, the Plan will provide one more element of flexibility to businesses seeking to locate in the Park. A business which desires to promote walking, bicycling or transit use, or even to run a commute shuttle service for its employees, may choose to provide less parking.

If street parking becomes scarce, which is to say, if drivers are forced to circle looking for spaces, then metering can be introduced and the price raised to a level where supply equals demand. The resulting income could be devoted to improvements within the park such as sidewalk and street maintenance and improvements, open space maintenance, or transportation demand management measures such as transit passes. Moving automobile parking toward a market-based system will help to incorporate market efficiencies and reduce the overconsumption motivated by underpricing.

Shared Parking

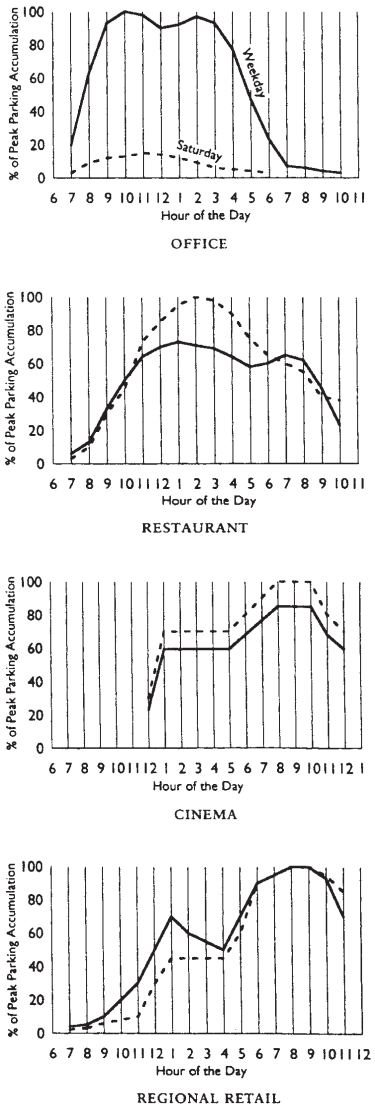
While parking lots are necessary parts of the transportation system, they are expensive to build and maintain and they spread development out, making places less walkable. There are many benefits to only building the amount of parking that is needed. While each parking space has a financial and environmental cost, additional usage of that space has little additional cost. Thus, for a given amount of parking needed, it is much better to utilize one space for longer periods than have two spaces each occupied for only a portion of the day.

By recognizing that peak demand occurs at different times for different land uses, shared parking facilities help minimize the need for parking lots and garages. For example, office parking lots are typically full during the day Monday to Friday, but nearly empty at other times. Retail parking has a different pattern, reaching

Multiple parking facilities can share one parking surface

See "The High Cost of Free Parking" by Donald Shoup for an in-depth discussion of the costs and complications of abundant and underpriced parking.

For more information about shared parking, see Shared Parking (Urban Land Institute, 2005) and Shared Parking Planning Guidelines (Institute of Transportation Engineers, 1995).



Parking Demand Diagrams

maximum usage on the weekend. Mixed use, retail, office, civic buildings, and multi-family developments may share off-street parking spaces. This approach works well anywhere, as long as walking distances to the parking area are reasonable.

Commercial users in the Park are encouraged to use shared parking. The Urban Land Institute's (ULI's) Shared Parking Standards, or an equivalent, are good ways to calculate the total number of shared parking spaces. To determine parking demand if spaces are shared, parking demands for the two or more uses are added for each hour of the day - for weekdays, Saturdays and any other days with significant variation in parking patterns - to see which hour produces the highest parking demand.

The following steps can be used to determine the minimum number of spaces needed for mixed-use areas:

1. Start with the maximum parking needed for each user which will be using the shared parking arrangement.
2. Determine the parking demand for each user for key times. The ULI uses weekdays and Saturdays at 10 AM, 1 PM, 5 PM, 8 PM and 10 PM.
3. Determine the total parking demand for these key times by summing the demand of the various land uses for each key time.
4. Determine the minimum shared parking space requirement by noting the largest of the aggregate parking demand figures.

Example Shared Parking Calculation

The following example illustrates how to determine the parking demand from joint use shared parking for a mixed-use area containing a 10,000 square foot restaurant and 200,000 square feet of office space:

Assume that the restaurant user estimates a maximum need for 10 spaces per 1,000 square feet of restaurant space and the office user estimates a maximum need for 3 spaces per 1,000 square feet of office space. A 10,000 square foot restaurant and a 200,000 square foot office building thus require 100 and 600 spaces, respectively, or 700 total.

Land Use	Single Use Peak Hour Demand (spaces)	Percentage of Demand for Key Times*									
		Weekdays					Saturdays				
		10 AM	1 PM	5 PM	8 PM	10 PM	10 AM	1 PM	5 PM	8 PM	10 PM
Retail	3/1,000 sf	50	75	75	65	25	50	100	90	65	35
Office	3/1,000 sf	100	90	50	5	5	15	15	5	0	0
Restaurant	10/1,000 sf	20	70	70	100	95	5	45	60	100	95
Cinema	1/3 seats	0	60	60	85	85	0	70	70	100	100
Hotel	1/room	45	30	60	90	100	40	30	60	90	100
Health Club	5/1,000 sf	10	80	100	30	10	60	80	60	30	10
Residential	1.3 - 2/unit (see req's)	85	80	85	95	100	70	65	75	95	100

** From the Urban Land Institute's* Shared Parking Standards, *1983.*

An example of a shared parking demand spreadsheet

Assume that the restaurant user estimates a maximum need for 10 spaces per 1,000 square feet of restaurant space and the office user estimates a maximum need for 3 spaces per 1,000 square feet of office space. A 10,000 square foot restaurant and a 200,000 square foot office building thus require 100 and 600 spaces, respectively, or 700 total.

To determine parking demand if spaces are shared, parking demands for the two uses are added for peak times on weekdays and Saturdays, to see which hour produces the highest parking demand. In this case, the highest total demand is at 10 am on a weekday, when the office parking usage is estimated to be 100%, but the restaurant will be using only 20% of peak usage. The total is parking needed is thus 620 spaces, 80 fewer spaces than would be needed with separate parking lots. Even larger reductions in demand are possible with uses that have greater differences in their demand curves, such as office and cinema.

The Need for Sustainability

Development-as-usual has proven detrimental to our environment and our health. Maui needs development that is efficient, harmonious with the natural environment, and capable of meeting human needs.

Changing the current standard practice of development will take many years and the efforts of many people. The built environment changes slowly, so for a long time areas with better development patterns will be small pockets in large areas with less to offer. But for places scaled to people, small areas are enough - the walk to the grocery, to work, or to the park will happen at short distances, so even small pockets of quality can function better than they would have as autocentric sprawl.

And it is important to begin now. The Maui Research & Technology Park has the opportunity to showcase an array of cutting edge sustainable design strategies. Workers and residents will enjoy a diversity of housing, transit connectivity, and quality economic development from this community for years to come.

Wide traveling lanes promote higher vehicular speeds

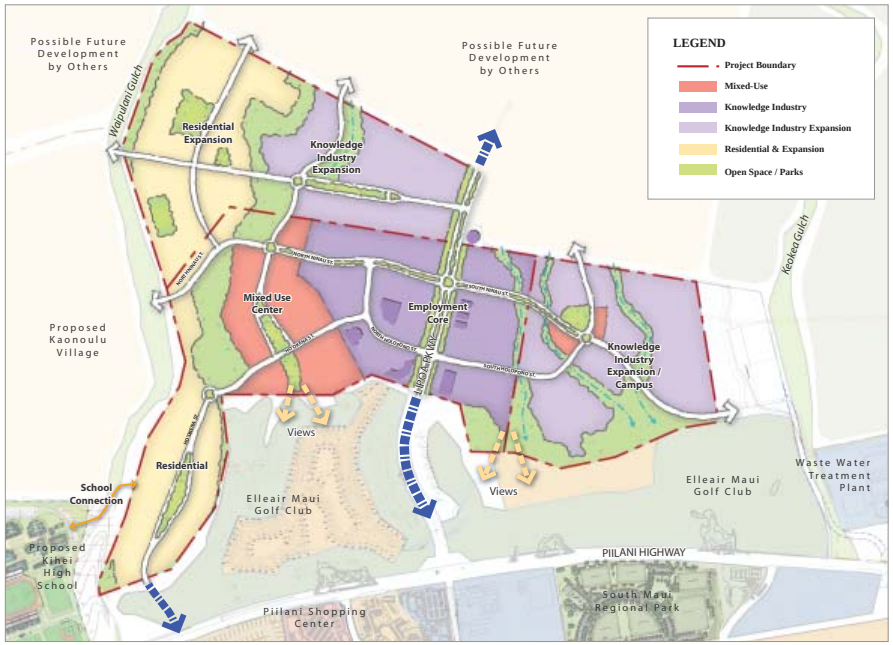
Car-Centered intersections like this one at Lipoa Parkway and Pi'ilani Highway discourage pedestrian activity, leaving the park somewhat cut off from the rest of Kihei.

APPLYING THE PRINCIPLES

The plan for the Maui Research & Technology Park has been prepared using the principles of sustainability which were discussed in the previous chapter. These principles form a holistic system for creating sustainability. When applying the principles to an existing development such as this, some major elements of sustainability are outside the control of the plan. For instance, the Park's location across Pi'ilani Highway from the residential and retail areas of Kihei makes non-motorized transportation to the Park difficult. However, through attention to these principles existing conditions such as this can be mitigated. In this example, adding housing and retail activities to the park serves to add the appropriate mix of activities which will create a more complete community and allow people to meet all of their needs in the area.

The Concept Diagram at right shows the overall vision for the future of the Maui Research and Technology Park. The Park's existing buildings are within the Employment Core area. This area will remain exclusively in employment uses, though incidental supportive retail uses will be allowed. Major new employment zones south of Lipoa Parkway (the Knowledge Industry Expansion/ Campus area) and mauka the employment core (the Knowledge Industry Expansion area) provide large new areas for employment expansion and diversification. The new Mixed Use Center is a flexible area to contain space for incubating new businesses as well as supportive retail, civic uses, open space, and residential uses. New residential zones mauka and makai of the Center provide additional housing in a variety of formats which will appeal to park business owners and employees.

The Park has been envisioned with pedestrian connectivity as a first priority. A green corridor, running north to south along Ninau Street, links the center of the site. This corridor links the Park's two mixed use areas. Ideally, transit stops in these locations will also connect park workers and residents to the larger region. With a majority of businesses and homes within a 5-minute walk of the centers, many daily needs will be within a short and comfortable walk.



Concept Diagram

Conservation & Restoration

Conservation and restoration of the environment is at the heart of the Park's sustainable urban design. Open space, as demonstrated in the Open Space Plan at right, is essential to a healthy community and transcends the aesthetic role of an attractive landscape to accommodate ecological factors, infrastructure systems and social needs. Ecological factors to be addressed include wildlife movement, habitat enhancement, water conservation, storm water capture and treatment, microclimate control to minimize heat island effects, and stream corridor protection. Open space serves as both landscape and infrastructure through the use of constructed facilities to capture, control and clean storm water and the provision of transportation corridors for trails and pathways. Open space also provides for the social needs of the community by providing spaces for recreation, relaxation and social interaction. In the end, multi-layered landscapes become expressions of cultural values and gather meaning and value to the entire community over time and through shared experience.

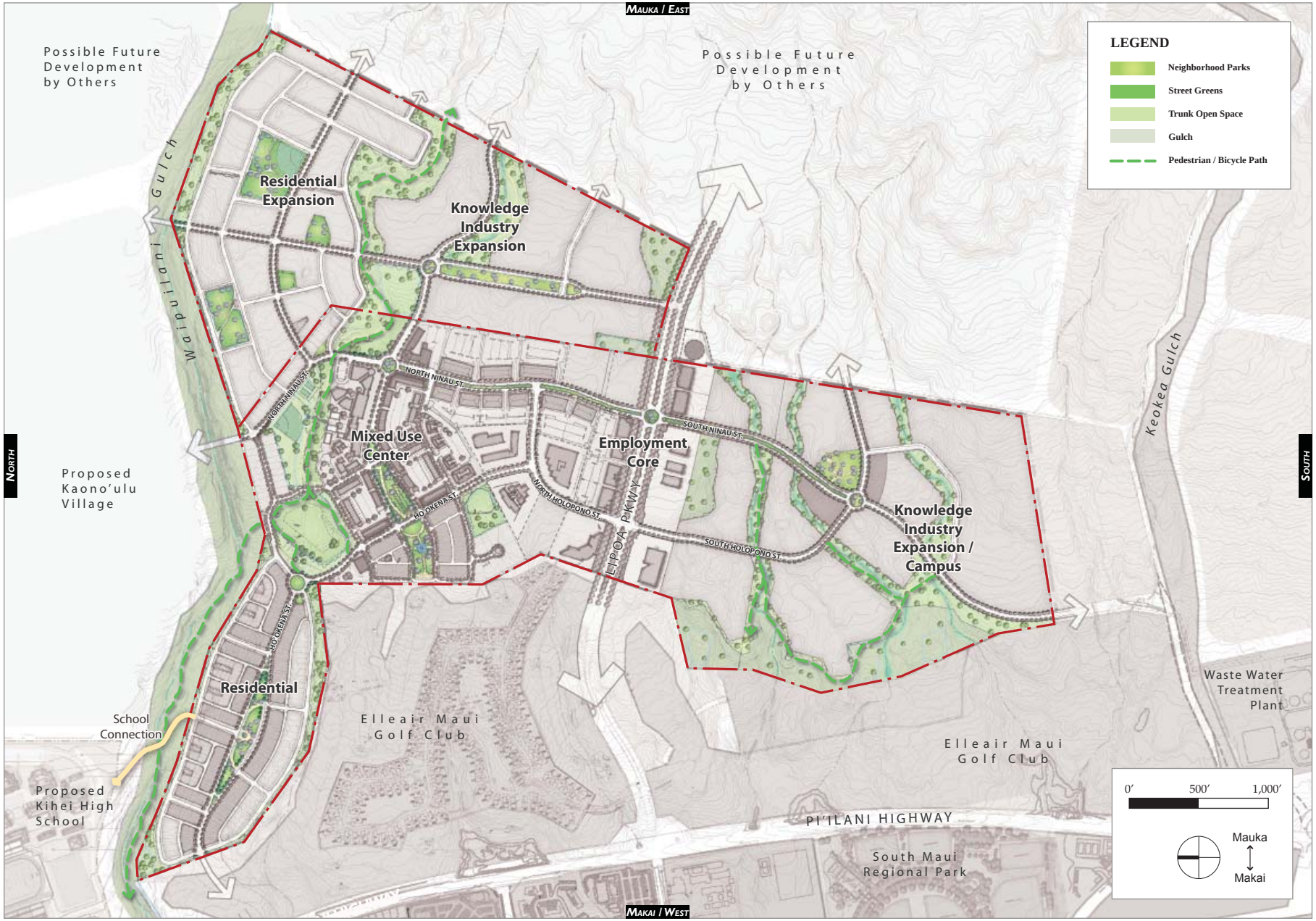
The plan connects to existing gulches (outside the Park boundary) which provide valuable connections mauka/makai and could form the trunk routes of a trail network connecting to the rest of Kihei. Neighborhood parks serve as community focal points and places for exercise, sports, relaxation, activities like community gardening, and celebration. Trunk open spaces contain some of the site's more dramatic terrain, allowing the plan to respect the existing topography while creating another set of linkages throughout the site. The north-south connector greenway (North and South Ninau Street) connects the site laterally, linking the mixed-use center with the employment area center while linking together other open spaces as well. This connection along with the fine grained street system, will serve bicyclists and pedestrians, giving full access to this compact and comprehensive community and reducing automobile use.

The Park will use recycled water from the county wastewater treatment plant everywhere except at single family homes. The master developer will encourage the use of recycled water for fire control, in toilets at commercial facilities, and anywhere else allowed by law. Based on the landscape architect's calculations, this should prevent approximately 170 million gallons of water per year from being sent into injection wells, potentially mitigating damage to ocean reefs and marine life. Water conserving irrigation practices will be implemented and required by design guidelines. As feasible, the park will implement or encourage drainage best practices such as bioswales and pervious surfaces.

Approximately 300 kilowatts of photovoltaic power is currently in use at the park, with another 200+ kilowatts planned. When that power is in place, 4 of the Park's 5 buildings will be offsetting a portion of their electrical use through solar power. The master developer of the park will encourage further use of as much renewable energy and distributed generation as the utility will allow. Design guidelines will encourage renewable energy projects, and energy conservation design features, such as low E glass (while still allowing people outside to see in), and shading of windows through architectural design. Solar hot water systems are required for residential projects in Hawaii.

Landscape CC&R's will allow sub associations to decide to use common areas for community gardens, and "edible landscaping." The use of native, drought tolerant plants will be encouraged. The Park plans to allow for the common areas to be used for a farmer's market.

When parcels are bought from the master developer, buyers will be encouraged to evaluate LEED certification for all commercial buildings. The plan itself has being analyzed for LEED-ND (Neighborhood Development) compatibility. However, certification is not assured as this process takes many years and eligibility is also keyed upon factors outside the control of the current planning process, such as the location of the Park away from other development, which was chosen many years ago by the Park's founders.



Open Space Plan

Diversity & Balance

The plan at right shows an illustrative vision of how the Park might develop, based on the Concept Diagram at the beginning of this chapter. The plan provides a diversity of uses within the Park, far different than typical single-use development.

The housing, employment, retail, educational facilities and recreation areas within the relatively small area of the Park will create a situation with shorter distances for people to travel between their various activities. Many people will be able to forgo the use of a car for many of their trips, reducing pollution and congestion.

There is diversity even within the sub-areas and land use categories in the Park. The Mixed-Use Center contains a diversity of uses and building types, providing the densest housing nearest to the highest concentrations of jobs and retail. In the southern employment area, a small center provides a focus for employment expansion, giving access to retail services to that portion of the Park without having to travel even the short distance to the Mixed-Use Center. These locations, the densest and most varied in land use, will be the most appropriate for service by transit.

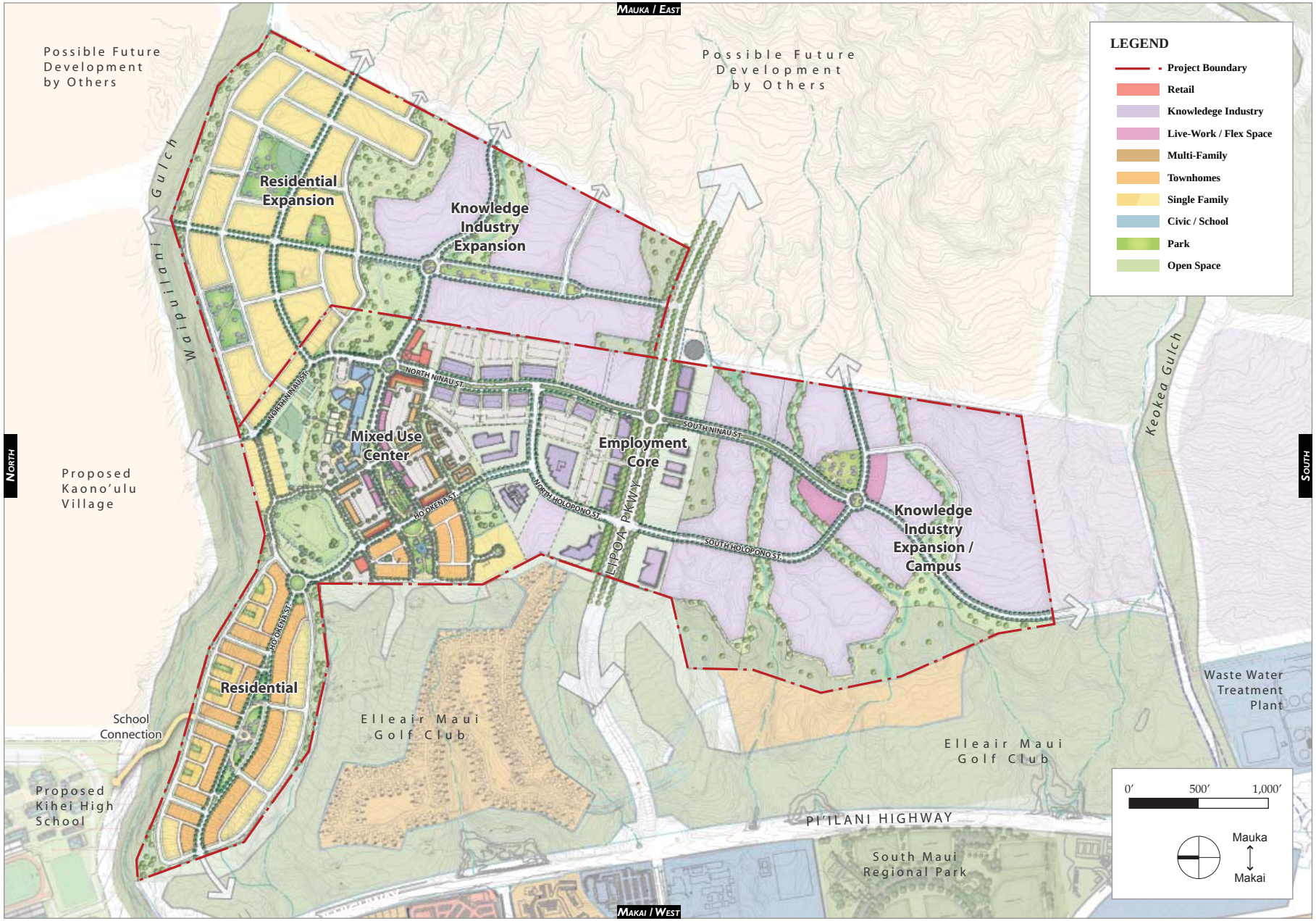
The plan assigns overall densities to the various residential areas in the Park. Within those areas, it is expected that there will be a wide variety of housing types. Housing variety not only allows development to respond to the changing conditions of the market, it will also make the Park a more vibrant area by supplying housing to a wide variety of people. A diverse housing offering will also make the Park more economically vibrant by appealing to a broader portion of the housing market.

Overall densities can be derived with a variety of unit mixes. In the Makai Residential area, for example, an overall density of 14 units per acre for developable land (not including parks, roads, utilities and other non-developable land) could be reached with all fee-simple housing. Most of the homes in this case would be townhomes and small lot detached houses. This mix would serve more young families and first-time home buyers. Other options include both a higher percentage of land with compact development, in multifamily and 3 & 4-plex buildings, and more low density units of various types. This type of mix would create a market for singles and couples to get into the neighborhood, and at the same time provide move-up housing for more established families.

In the same way, the plans for the Park have attempted to create a diversity of opportunity for employers. Current park regulations are highly restrictive, obligating the creation of larger buildings on larger parcels. But businesses go through life cycles just as people do, and one building size would not fit all businesses' needs. Newer businesses need small, inexpensive space. As businesses grow, they need larger spaces and can afford more amenities. Eventually if they continue to grow they will need very large spaces, but as employees move on and start their own businesses, the cycle begins again. Technology business thrives on this kind of change and growth, and the Park should be able to serve many stages of the life of a business. This is part of the economic side of the Park's sustainability mission.

The addition of civic uses and open spaces will create a complete community in the Park. Sprinkling smaller open spaces throughout the residential and business areas provides the opportunity for leisure and for exercise, as well as safe and pleasant routes to get around by foot and bicycle.

The Park's increased balance of employment and residential will help to alleviate problems of commuting. Having employment located nearer to residents shortens trips as well as promotes multi-directional commuting. This helps to avoid the situation where one side of the road is congested and the other is empty.

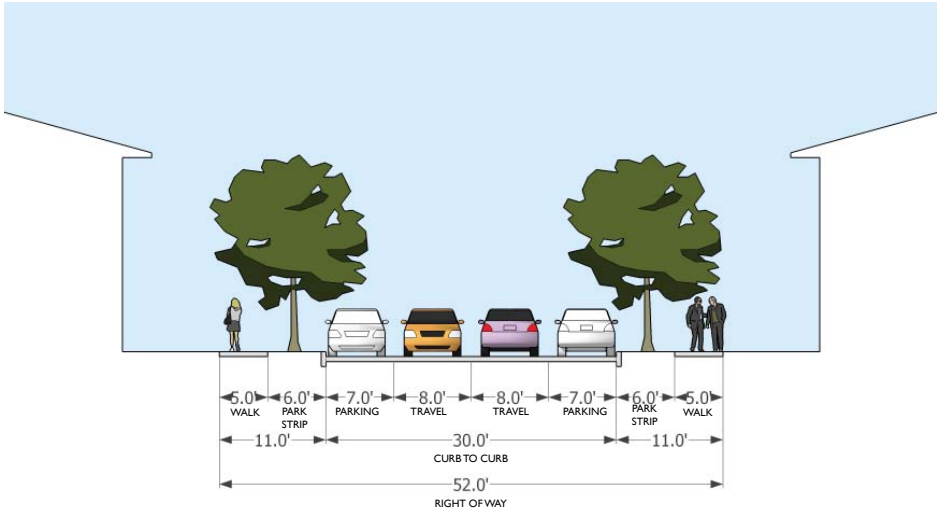


Illustrative Plan

Human & Pedestrian Scale

In large part, the human and pedestrian scale of the Park's design comes from the fine grain of mixed use. Having a variety of activities and land uses available within a reasonable walking and bicycling distance creates an area scaled to people, not automobiles.

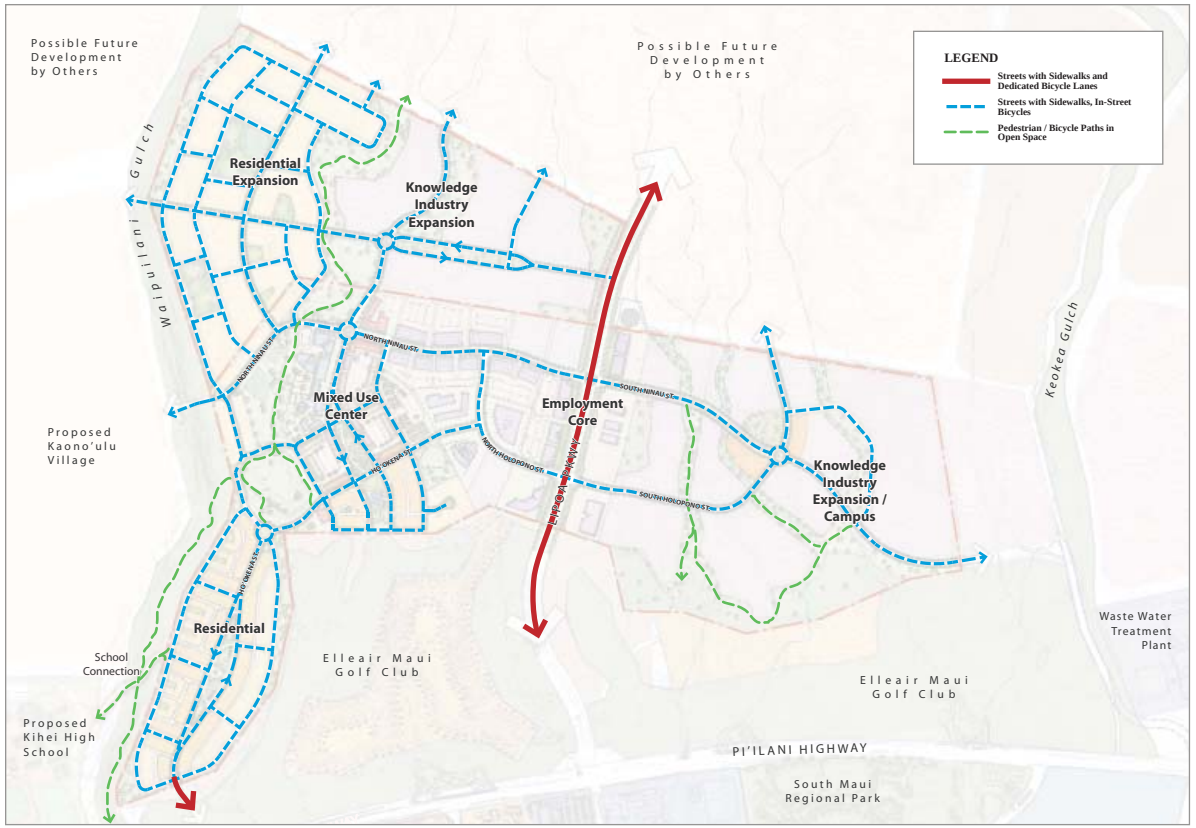
How those various land uses and buildings relate to the streets is also important. One critical but common mistake in urban design is the idea that green space cures every ill. Too much green space, however, particularly in the form of deep, formless setbacks and buffers, saps the vitality from the street, isolates buildings from the public realm, and makes every journey by foot or bicycle significantly longer. In the plan, new employment buildings line the streets and parking is placed at the rear. The scale of development is broken down in many areas to provide a greater variety of buildings and parcels, adding to pedestrian interest and utility. As shown in the proposed street section below, the plan proposes narrow streets for slow automobile traffic and nearby buildings, creating a kind of outdoor room which will be comfortable, safe and inviting for pedestrians.



For the overall street network, the plan creates a unified bicycle and pedestrian system within the Park and connections to its existing and future surroundings. The Park's street design includes narrow streets, as previously mentioned, as well as the possibility of other traffic calming measures where needed. Remarkably, in many new developments and road projects one of the most basic elements of pedestrian comfort and safety is missing - sidewalks. The Park's streets will have sidewalks throughout, creating a fine grained network of access as well as the subtle message that walking is respected and valued. The presence of street parking on nearly every street will help to protect pedestrians literally and psychologically from automobile traffic. Intersections are meant to have small corner turn radii, causing cars to slow to reasonable speeds and making crossing distances for pedestrians shorter.

Trails create major connections through many of the greenways within and near the Park, as shown in the Pedestrian and Bicycle Connections Plan at right. Because of the Park's relatively long walking distance from Kihei makai of Pi'ilani Highway, walking will be important inside the park but bicycling will assume additional importance for accessing the Park. The roads into the Park from Pi'ilani Highway will have bicycle paths, making the journey uphill as safe and easy as possible. Connectivity in the Park is mostly provided without separate bicycle lanes; streets within the Park are intended to be small in scale and low in speed, which will make it safe to use bicycles in traffic.

An additional opportunity for access is presented by the Pi'ilani Highway overpass over the Waipuilani Gulch. This wide connection, while also an important stormwater drainageway, could make an excellent connection for pedestrians and bicyclists from the rest of Kihei to the Park and the new high school planned nearby.



Pedestrian and Bicycle Connections Plan

This roadway in Kahului near a major shopping destination has a small sidewalk on one side and only this dangerous shoulder for walking on the other.

Pedestrian routes are often unconsidered, discontinuous, and unsafe, like this one at the intersection of Lipoa Parkway and Piʻilani Highway.

Connections & Interdependence

Regardless of the higher level of self-sufficiency created by the mix of uses, the Maui Research & Technology Park will be a part of Maui's economic, social, and environmental landscape. This connection to and interdependence with the island and county as a whole have been considered throughout the plan.

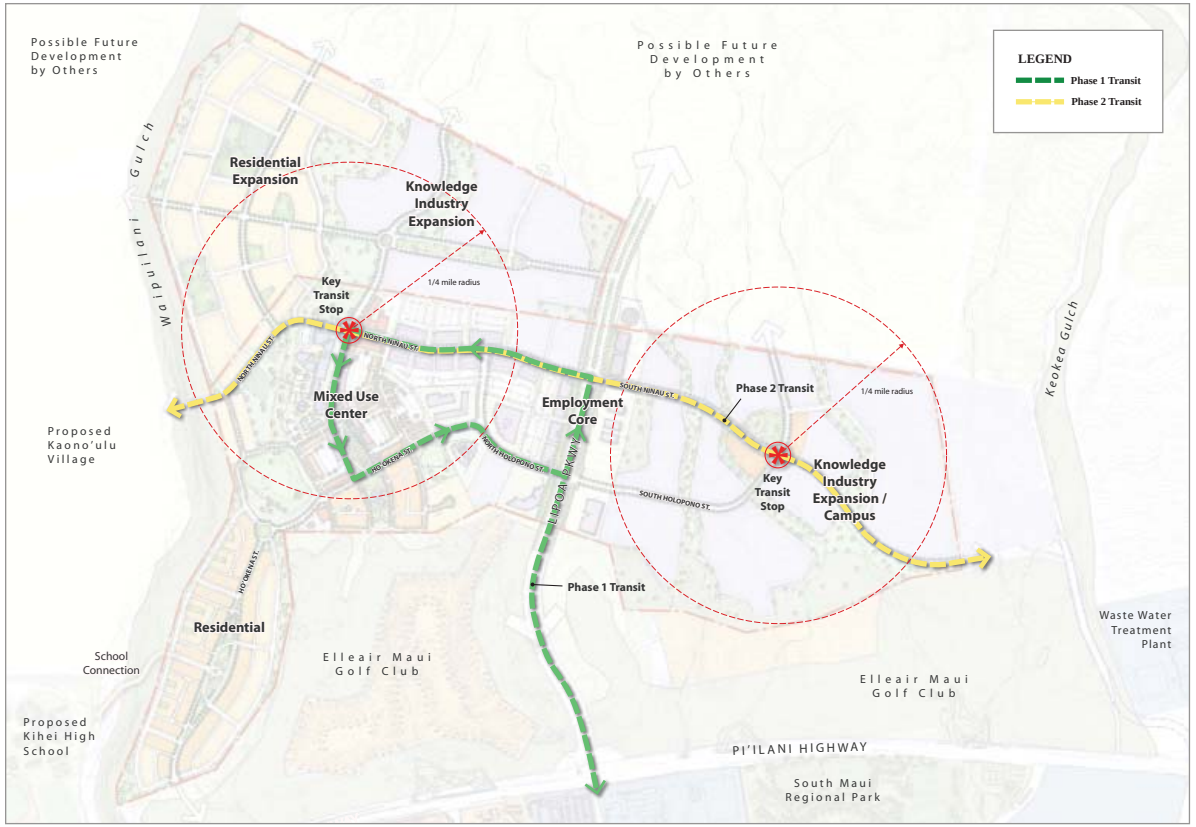
Given the low existing general density of the site and the site's position at the edge of the developed area, high quality transit will be difficult to achieve. However, over time at least a basic level of service should be provided to serve transit dependent persons and those who chose not to drive. As the site gains employment and population, transit service will become more viable as well as more essential. The site has been planned with this in mind, as is shown in the Public Transit Phasing Diagram at right. While many factors are and will remain outside the Park's control, such as the implementation of adjacent development and the level of funding of transit on Maui, it is essential that the plan consider how transit can work in the site.

The Park in its current context

Phase one transit service could run either as an extension of existing transit service from the Pi'ilani Shopping Center area or as a dedicated jitney serving the park. Making a loop within the first phase development area, this line would link central Kihei to the development, providing easy access up the hill across Pi'ilani Highway. Contingent on the form of surrounding development and future road network changes, phase two transit service could run north and south along Ninau Street, connecting the site to nearby development and the island as a whole.

The Park's frequent street connections with proposed nearby development will provide flexibility for future transit routing. These connections will also serve to disperse and calm traffic, making all roads livable instead of creating a few large through roads which then become smothered in traffic. This connectivity will also increase the viability of pedestrian and bicycle access, which thrive in more direct routes and lower levels of traffic.

Many people will of course arrive in the Park by automobile, which will undoubtedly be the primary mode of transportation on Maui for the foreseeable future. However, current parking regulations tend to force businesses and residents to subsidize automobile use via the provision of free and plentiful parking. While parking is necessary, providing too much wastes money and land and causes people to drive more than they would if they had to pay for their own parking. While it does not seem feasible to eliminate parking minimums, the plan proposes reducing minimums, leaving the decision of parking provision more in the hands of the businesses and residents of the Park. The plan also promotes the use of shared parking, so that land uses which need parking spaces at different times can use the same parking lots. These steps will make the park more sustainable not by limiting driving but by causing drivers to pay more of the cost of their driving.



Public Transit Phasing Diagram

Natural connections are also maintained in the Park's design. Instead of piping water through the site, the plan preserves many of these natural corridors (see the Open Space Plan shown previously) to provide drainage in a more natural way. This also provides corridors for wildlife, and for recreation and travel through the site by residents and employees.

Transit networks can be a supportive part of a diverse, multi-modal transportation system on Maui.

Phase one jitney services can operate from relatively small and fuel-efficient vehicles, which can be privately owned and easily maintained.

Conclusion

Sustainability in new development is not an add-on which can be considered after the structure of the development is conceived. Rather, sustainability relies on the basic structures and relationships of a development as discussed in this plan. Sustainability must be considered from the first stages of planning and design. This is how the design for the Maui Research & Technology Park was created. It is through these principles of Conservation & Restoration, Diversity & Balance, Human & Pedestrian Scale, and Connections & Interdependence that long-lasting, human-centered, and economically successful sustainability will be achieved.

As a further effort to enhance as well as confirm its sustainability, the Park has analyzed the possibility of gaining LEED-ND status. LEED-ND, or LEED-Neighborhood Development, is intended to gauge the overall sustainability of a neighborhood plan. The analysis is contained in this report as an appendix, and concludes that as an existing development, begun over twenty years ago, the Park has certain pre-existing characteristics such as its location which may make it impossible to attain LEED-ND. However, as the analysis also shows, the current plan takes major steps toward sustainability, regardless of whether the project is able to be officially declared LEED-ND.

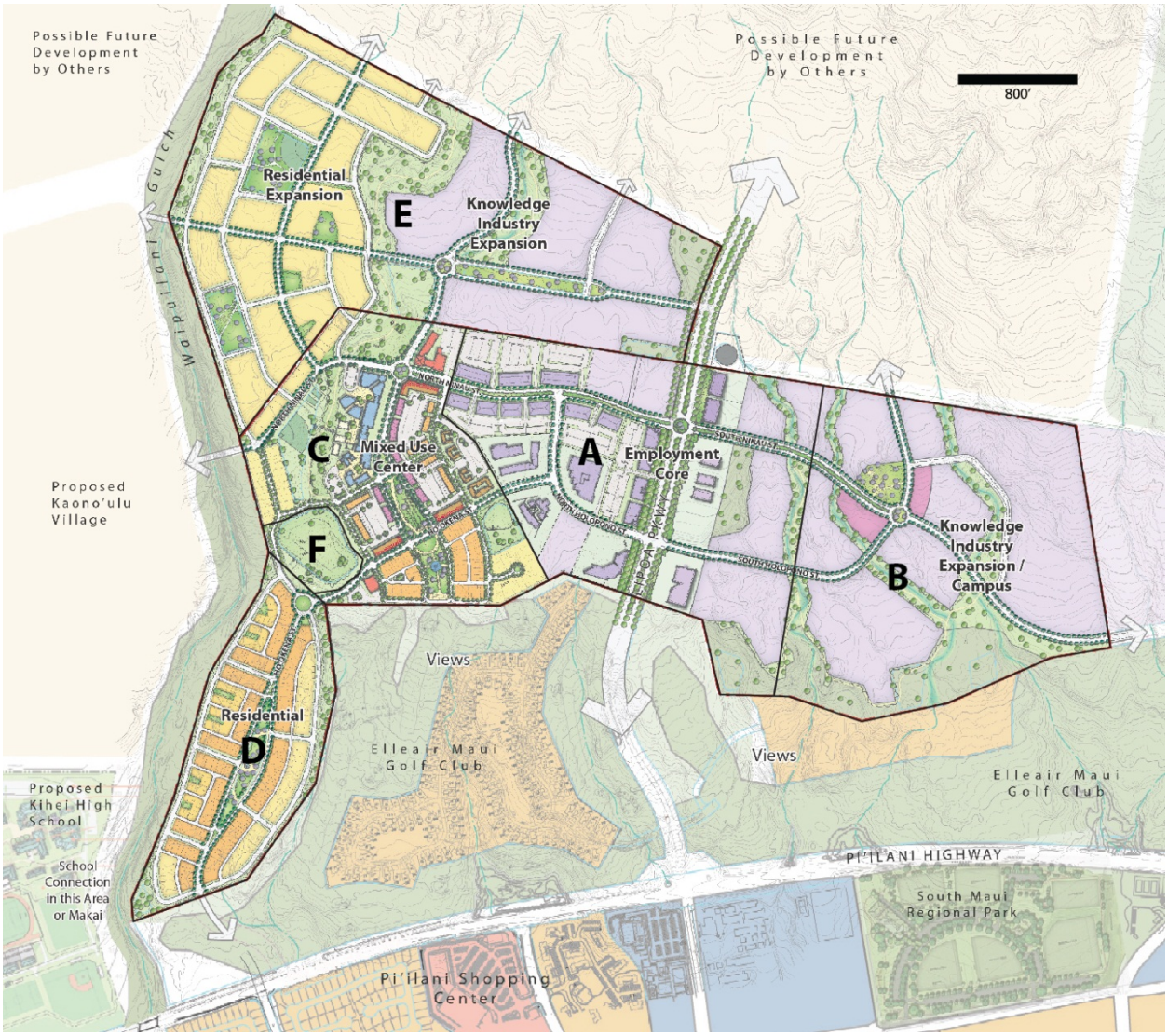
In the end, there is no single action or project that can solve the issues posed by the need for sustainability. Every action is a choice, and some of our choices as a society will require difficult decisions about priorities such as economic development, the environment, costs, and benefits. By incorporating sustainable principles as discussed above into the very structure of the plan for the Maui Research & Technology Park, we hope that the Park can play its part in the long term sustainable future of the island, the State of Hawaii, and the world as a whole.

LEED for Neighborhood Development
PRELIMINARY EVALUATION

December 13, 2012

The Purpose of This Report

The goal of this analysis is to demonstrate the commitment of the Maui Research & Technology Park to smart growth and sustainable development standards and the aim to make this project a walkable and healthy community. The certification process is an involved one, and this analysis will also inform the Park management as to whether they should invest the time and resources into trying to make the Park a LEED-ND project. It is possible for a project to be sustainable and of high quality without certification. Many worthy projects do not qualify for one reason or another, or choose not to try for certification for other reasons. But certification provides a verifiable, publicly-acknowledged guarantee of the project's quality and sustainability, and can help a project gain community and government support and acceptance.



Illustrative plan of the Maui Research & Technology Park with the six major divisions.

This analysis is based on the current version of the LEED-ND system, LEED 2009 for Neighborhood Development, updated October 2012. All of the analysis in this report is based on an understanding of the LEED rating system. However, actual determinations of prerequisite fulfillment and awards of points are determined during the certification process by the USGBC; thus, it is possible that any prerequisite analysis in this report could need alteration and that the point total shown below could change in either direction. This report does not confer any LEED status, but only discusses what that status might be should the Park management decide to proceed. LEED status can only be conferred by going through the certification process.

The LEED-ND System

The Leadership in Environmental and Energy Design for Neighborhood Development (LEED-ND) system is intended to rate the planning and development of new neighborhoods, whether infill sites or greenfield developments. It certifies exemplary development projects that perform well in terms of smart growth, urbanism, and green building. The program was designed by the US Green Building Council (USGBC), the same organization which created the LEED system for buildings.

LEED-ND certification is based on a set of prerequisites, which the project must meet, and a series of points, awarded based on whether a project meets a list of criteria. Depending on the number of points, the project can attain different levels of certification, as below:

40-49 Points	CERTIFIED
50-59 Points	SILVER
60-79 Points	GOLD
80+ Points	PLATINUM

Points fall into four general categories. Smart Location and Linkage considers the project's location, context, and links to the surroundings. Neighborhood Pattern & Design considers the design of the project. Green Infrastructure & Buildings considers environmental treatments more specific to individual buildings or to the project's infrastructure. And Innovation considers special factors.

Prerequisites and points are based on both elements of the plan itself and characteristics of the project's existing context. The system considers the context in order to encourage projects to be undertaken in locations which are well suited to development. Because the location of the Maui Research & Technology Park was chosen years ago when the Park was created, the element of context is beyond the control of the current planning and design process. It is the elements based on context and existing conditions which may keep the Maui Research & Technology Park from receiving LEED-ND certification.

The LEED Process

Because of the length of time involved in many development projects, projects may apply in one of three stages of development. At certain times during the development cycle, a project may fall into none of these categories. In such case, the project would need to wait until it moved into the next stage of development before applying for LEED certification.

Stage 1. Conditional Approval of LEED-ND Plan – This is for a project where less than 50% of the project's anticipated building area has land use entitlements ("the existing or granted right to use property for specific types and quantities of residential and nonresidential land uses", i.e. zoning).

Conditional Approval is for a project in the design phase before it has completed entitlements, and provides the Green Building Council's conditional approval of a LEED-ND Plan. The reason to attempt Stage 1 certification would be to help the project get support from the local government and from the community while pursuing entitlements. The Park will surpass this stage immediately when entitlements are approved, as the entire site will be zoned at one time.

Stage 2. Pre-Certified LEED-ND Plan – a project with 100% of the project's building area fully entitled. This is for projects which are fully entitled (zoning, with all land use approvals granted by the locality) or for projects under construction up to completion of 75% of the total building area. Pre-Certification may help a project secure financing, expedited permitting for buildings, or attract tenants.

Stage 3. LEED-ND Certified Neighborhood Development – a project fully built. Because the project is complete, all credits may be verified as achieved. This is the final seal of approval, where a project becomes officially LEED-ND.

The LEED certification process has a variety of steps, as shown below. Note that the process is administered by a third party organization, the non-profit Green Building Certification Institute (GBCI).

1. PROJECT REGISTRATION

Registering a project declares the intent to certify a neighborhood development under the LEED Green Building Rating Systems. Registration (for LEED-ND projects) with a fee provides tools and resources necessary to apply for LEED certification and the project is listed on the online LEED project database.

Introductory Call. This call is an opportunity to receive general guidance about the program and review the certification process.

2. PREPARE APPLICATION

The project team is assembled to collect the necessary documentation, uploads the materials to LEED online, and starts the application review process.

3. SUBMIT APPLICATION

Project teams submit completed documentation requirements for all prerequisites and at least the minimum number of credits required to achieve certification, as well as completed general project information forms.

Application for Smart Location and Linkage (SLL) Prerequisite Review. The SLL Prerequisite Review, for a fee, enables project teams to assess the likelihood of achievement of the SLL prerequisites. The GBCI reviews a project's compliance with the SLL prerequisites and informs the team whether the location qualifies, giving a project team the opportunity to pull out before additional expense is incurred.

Application for Initial Review (All Stages).

Application for Subsequent Review (Stages 2 and 3).

4. APPLICATION REVIEW

All documentation is reviewed with the LEED-ND rating system and each reviewed prerequisite and credit is designated as 'anticipated', 'pending', or 'denied'.

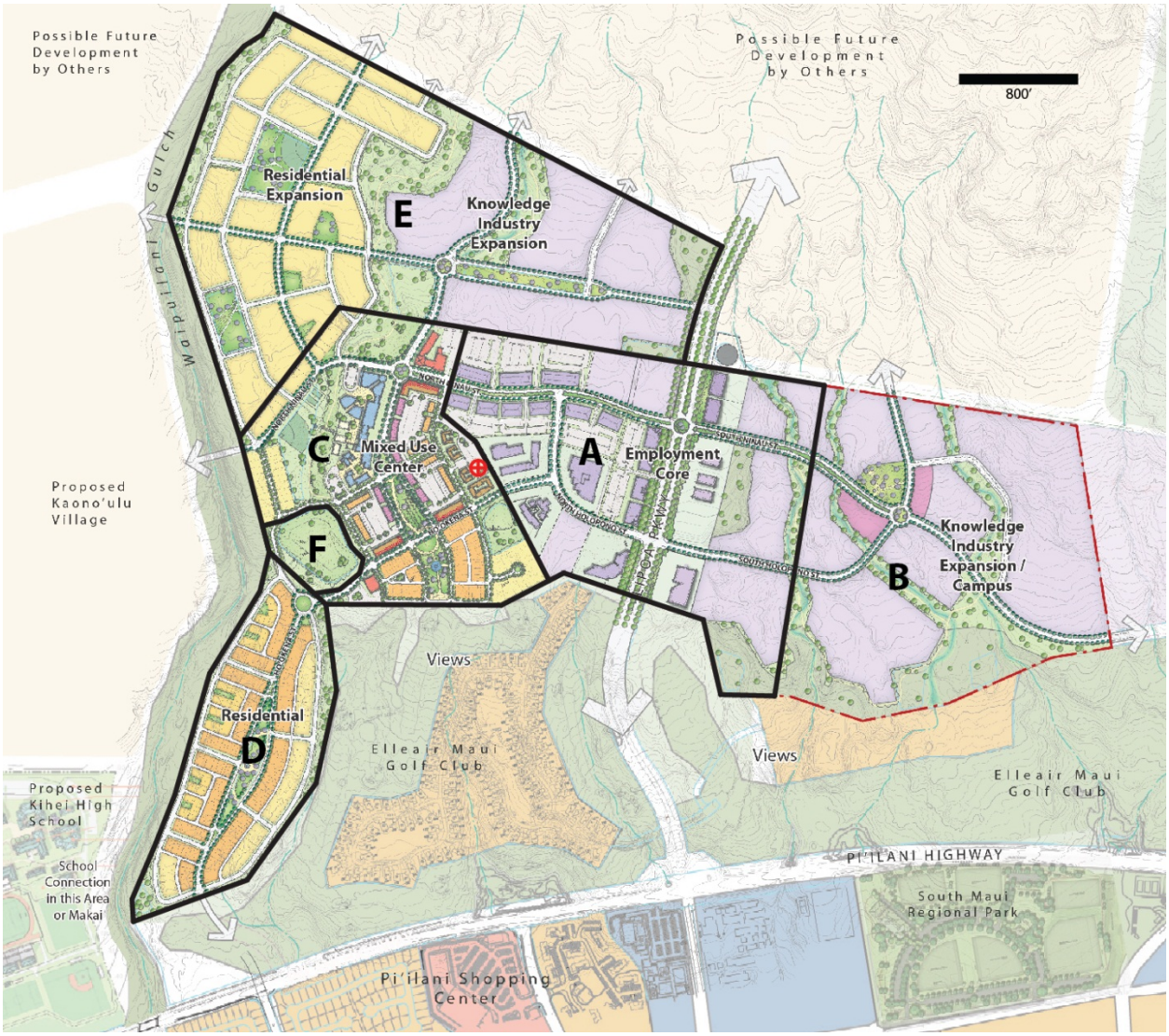
5. CERTIFICATION

LEED ND projects are considered certified upon the successful completion of a Stage 3 application. Upon successful completion of any application stage, a LEED-ND project will receive formal recognition and may be included (at the owner's discretion) in online LEED Project Directory of registered and certified projects.

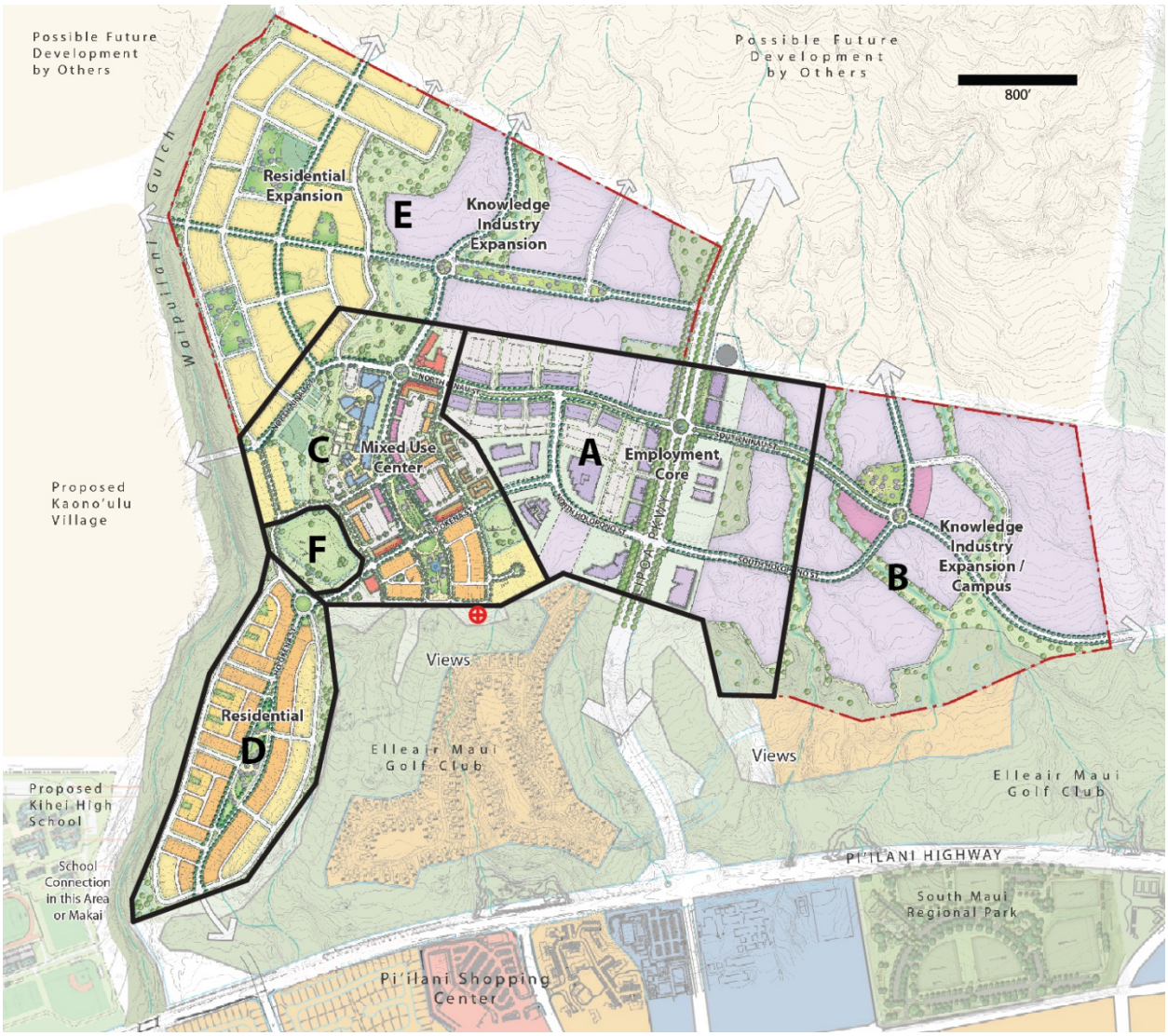
Site Selection

Site selection is an important first step in the LEED-ND program. The location, characteristics, existing uses, adjacencies, and size inform and determine which requirements in the SLL Prerequisites the "project" will pass or fall short of. The maximum size recommended by the USGBC for LEED-ND projects is 320 acres. Beyond that size, a project may run into difficulties meeting certain distance-related requirements such as walking distances to various amenities. The typical project sizes discussed are between 40 and 160 acres, though a project may be as small as two habitable buildings.

It seems likely if the Park was to apply for LEED-ND that it would either need to be split into several "projects," to be dealt with separately, or the Park would only apply for certification for a portion of the total site. The graphics below show several options for projects that encompass various sections of the site. There is no requirement that the project boundary be set based on these large areas, however. On close analysis, it may be found advantageous to divide the site more finely by individual parcels. This report assumes that any meaningful pursuit of LEED-ND certification would include at least the mixed use center and the employment core. Ideally the project area would also include the makai residential area and land in the expansion areas mauka of the mixed use center and employment core.



A possible LEED-ND "project" area, including Park areas ACDEF. The red circle represent the center of the assembled parcels.



A possible LEED-ND "project" area, including Park areas ACDF. The red circle represent the center of the assembled parcels.

Analysis One: PREREQUISITES

The prerequisites determine whether a site may even be considered for LEED-ND status. These prerequisites fall into three of the same four categories that points do, as below.

Smart Location and Linkage

- Smart Location
- Imperiled Species and Ecological Communities
- Wetland and Water Body Conservation
- Agricultural Land Conservation
- Floodplain Avoidance

Neighborhood Pattern & Design

- Walkable Streets
- Compact Development
- Connected and Open Community

Green Infrastructure & Buildings

- Certified Green Building
- Minimum Building Energy Efficiency
- Minimum Building Water Efficiency
- Construction Activity Pollution Prevention

This section will consider each of the prerequisites. Where a prerequisite could be achieved by a future action of the Park, even where steps have not yet been taken to achieve that prerequisite, this report assumes that the Park would do so in the case that Park management decided to pursue LEED-ND certification.

Smart Location and Linkage

SLLP1 SMART LOCATION

Smart Location is a key element of the LEED-ND program. It focuses on selecting sites that minimize adverse environmental effects of new development and avoiding sprawl; reducing vehicle miles traveled and household transportation costs; and improving the health and livability of a community by offering walkable mixed-use environments. Smart Location is an important first step and for that reason a major hurdle in the LEED-ND program that determines whether a project should register and continue with the certification process.

In some ways, Smart Location is the "gateway" requirement. Projects can change their other characteristics by changing their design and their construction practices, but once the site itself is selected there's no simple way to qualify for Smart Location if the project is not in the right spot. Since the Maui Research & Technology Park's site was selected many years ago by the originators of the Park, there is nothing that can currently be done about it.

Within the prerequisite there are two requirements, both of which must be satisfied. One is related to water and one to adjacencies. The Park qualifies for the water requirement because it is served by existing water and wastewater infrastructure.

The adjacencies requirement has four options:

a. an infill site
b. a site adjacent to previously developed land and with a high level of connectivity
c. a site on a transit corridor with a high level of service
d. a site with nearby neighborhood assets

Infill Site (option a)

To be an infill site, a project must have one of these characteristics.

a. 75% of the project boundary borders parcels that are previously developed
b. Using selected bordering parcels in addition to the site, 75% of the total boundary borders parcels that are previously developed
c. at least 75% of the land within ½ mile of the project boundary is previously developed
d. land within ½ mile of the project boundary has at least 140 road intersections per square mile

The Park, or any project site within it of reasonable size, does not satisfy any of these requirements and so is not an infill site.

Adjacent Site (option b)

To be an adjacent site with connectivity, the project must have at least 25% of the border connected to previously developed land. Per contact with the USGBC, the golf course qualifies as previously developed land. Within the area within ½ mile of the boundary with the golf course, however, there must be at least 90 road intersections per square mile, and the project must be connected to the adjacent land with a roadway at least every 800 feet.

The Park and adjacent site do not meet the required number of existing intersections per square mile, nor does the Park have the required connections to the previously developed land, so it does not qualify as an adjacent site.

Transit Corridor (option c)

To qualify as a site on a transit corridor, at least 50% of a project's residences and non-residential development must lie within ¼ mile walking distance of transit stops served by existing or planned transit service with at least 60 weekday trips and 40 weekend trips. To qualify as planned, transit service must have funding agreements or plans in place.

As shown on the plans below, the closest bus stops to the Park for the two nearby routes are in the Pi'ilani Shopping Center, across Pi'ilani Highway from the Park. This is beyond the maximum ¼ mile walking distance requirement. In addition, transit service at the shopping center does not meet the minimum trip requirements in any case. See the Maui Bus website (*http://www.co.maui.hi.us/index.aspx?NID=609*) for detailed schedule information.

Excerpt of the map for the Kihei Islander, Route 10 (left) and Kihei Villager, Route 15 (right)

To our knowledge, there is also no planned and funded transit service which would meet the requirement. Therefore, the Park does not have existing or planned transit service at the required level and so does not qualify as a site on a transit corridor.

Neighborhood Assets (option d)

To qualify for Smart Location based on neighborhood assets, a site must do both of the following:

a. Have at least 30% of its total building square footage as residential. Depending on the defined project boundary, the Park should easily qualify for this.

b. Locate near existing "diverse uses," so that either:

    a. The project boundary is within ¼ mile walk of at least five diverse uses, or
    b. The project's geographic center is within ½ mile walk of at least seven diverse uses.

    The list of diverse uses is as follows:

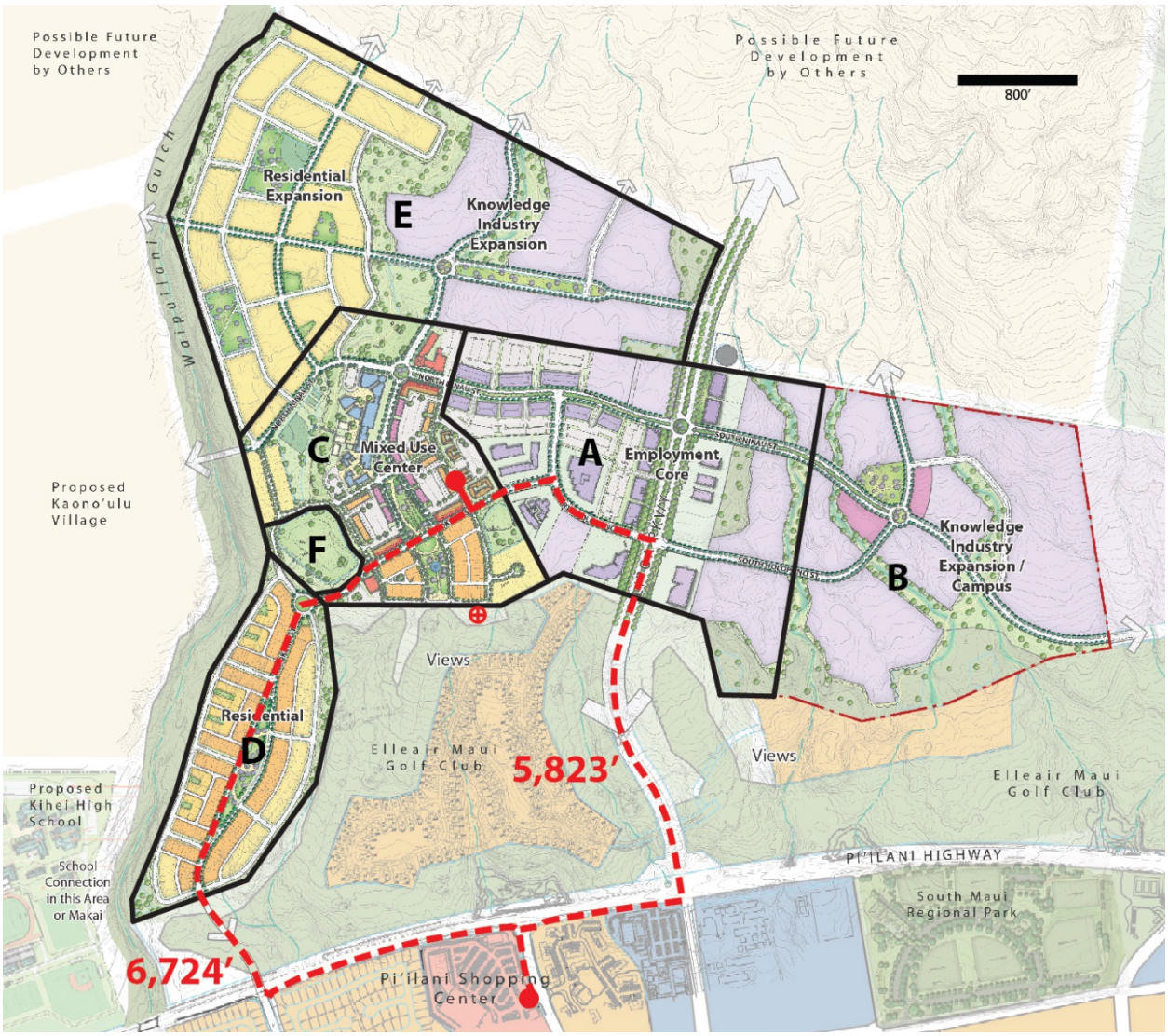
    Food retail
    Supermarket
    Other food store with produce

    Community-Serving retail
    Clothing store or department store selling clothes
    Convenience store
    Farmer's market
    Hardware store
    Pharmacy
    Other retail

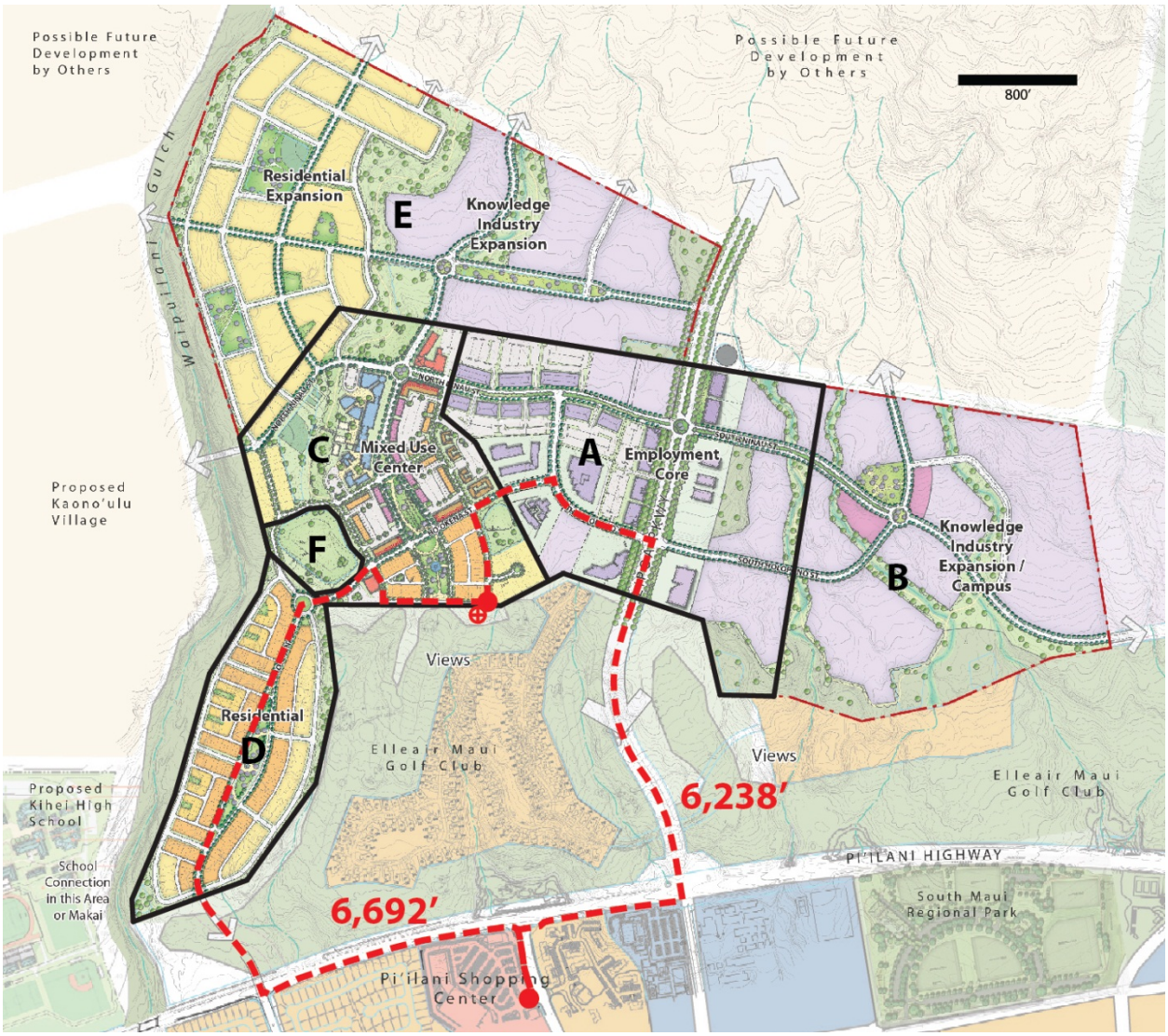
    Services
    Bank
    Gym, health club, exercise studio
    Hair care
    Laundry, dry cleaner
    Restaurant, café, diner (excluding establishments with only drive-throughs)

    Civic and Community Facilities
    Adult or senior care (licensed)
    Child care (licensed)
    Community or recreation center
    Cultural arts facility (museum, performing arts)
    Educational facility (including K–12 school, university, adult education center, vocational school, community college)
    Family entertainment venue (theater, sports)
    Government office that serves public on-site
    Place of worship
    Medical clinic or office that treats patients
    Police or fire station
    Post office
    Public library
    Public park
    Social services center

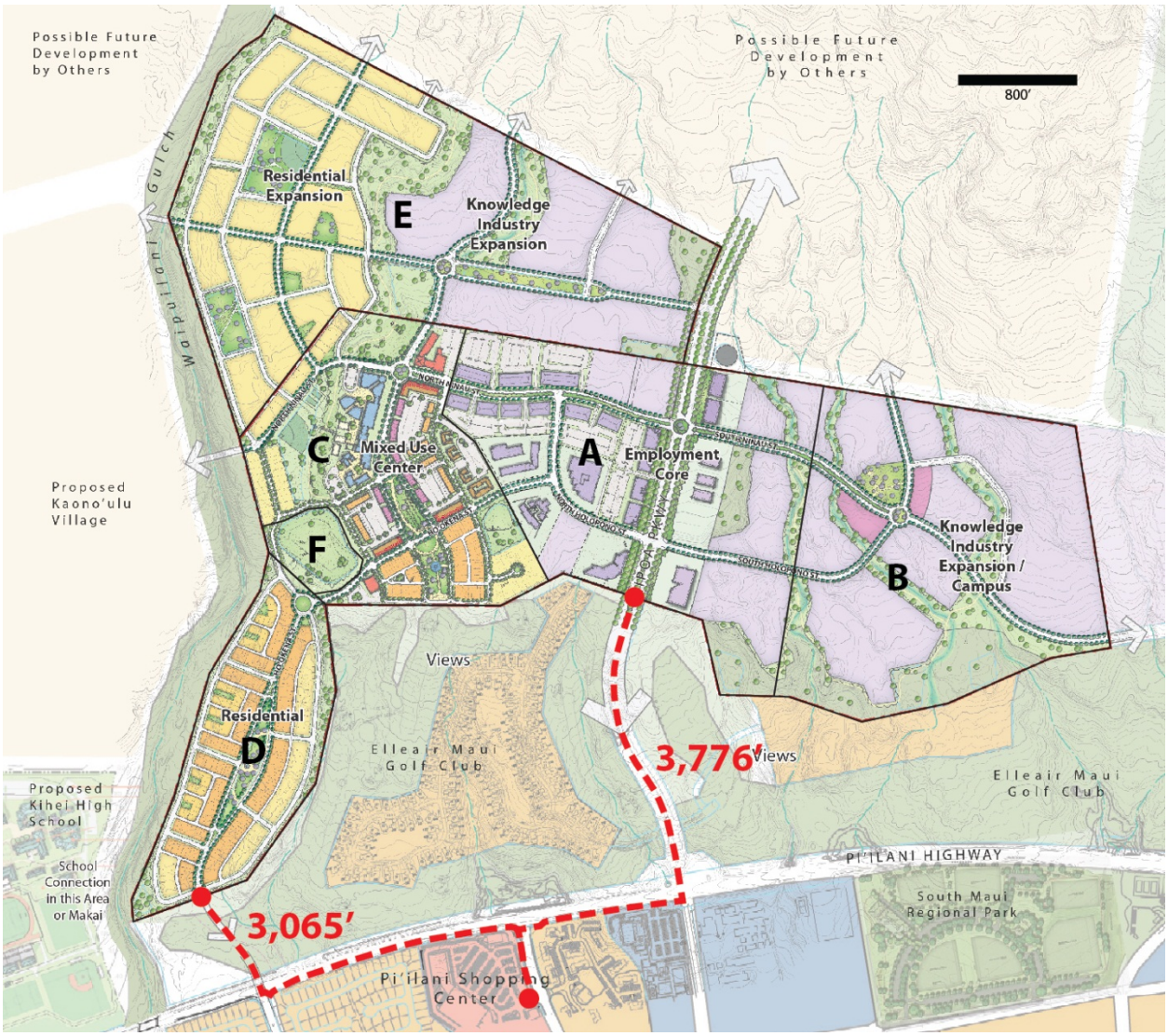
    The nearest location which includes these diverse uses possibly in enough quantity to qualify is the Pi'ilani Shopping Center, across Pi'ilani Highway from the Park. The maps which follow investigate two options for reaching this shopping center by foot using two hypothetical project areas. The walking distances are measured using both methods, from the geographic center of the hypothetical project area (one map for each option), and from the project boundary (one map, the same for both).



Measurement to the entrance of Pi'ilani Shopping Center from the center of a project area including Park areas ACDEF.



Measurement to the entrance of Pi'ilani Shopping Center from the center of a project area including Park areas ACDF.



Measurement to the entrance of Pi'ilani Shopping Center from the edges of the Park.

While the Park would most likely qualify based on the percentage of residential area, it would not qualify based on the proximity to diverse uses. Thus, the Park would not qualify under the Neighborhood Assets option.

Smart Location Prerequisite Conclusion

As we have seen, the Park would not qualify based on any of the four options, a-d. Therefore, the Park would not meet the SLL prerequisite 1, Smart Location, and would not qualify for LEED-ND status. This disqualification is due to the existing location of the Park.

Based on advice from the USGBC, it might be possible to apply for LEED-ND certification for portion of the Park based on Neighborhood Assets after sufficient "diverse uses" are built within the Park itself. Following creation of those uses, other portions of the Park could count them. However, in the current situation, the Park cannot meet this prerequisite.

SLLP2 IMPERILED SPECIES AND ECOLOGICAL COMMUNITIES CONSERVATION

The project should not be built on a site with imperiled species or ecological communities. Based on extensive flora/fauna surveys conducted for the Park, there are no imperiled species or ecological communities found onsite. The Park should meet this prerequisite.

SLLP3 WETLAND AND WATER BODY CONSERVATION

The project should not include wetlands or water bodies, or be within 50 feet of wetlands or 100 feet of water bodies. While development in the gulches just north and south of the Park is regulated, there are no wetlands or water bodies in or near the site. The Park should meet this prerequisite.

SLLP4 AGRICULTURAL LAND CONSERVATION

The project should not be in a state or locally designated agricultural preservation district, and should not impact important soils. The Park is in the lowest/least valuable classification of land and soil for agriculture. We do not anticipate a problem meeting this prerequisite.

SLLP5 FLOODPLAIN AVOIDANCE

The project should be located in an area without FEMA-designated floodplains, or develop only those portions of the site which are not floodplains. The Park does not contain any floodplains in our knowledge and should meet this prerequisite.

Neighborhood Pattern & Design

NPDP1 WALKABLE STREETS

This prerequisite has four components, all of which must be met.

a. At least 90% of new building frontage must have a principle entry facing a street or public space. Based on the design guidelines, the Park should meet this requirement in most areas. The campus area in the south may create an issue, where buildings are not adjacent to the street but facing private areas and parking lots. This is one reason why the campus area should be excluded from the “project” for the purposes of LEED-ND

b. At least 15% of existing and new street frontage within the project has a building height of at least 1’ for every 3’ of space across the roadway (building façade to building façade). Given the Park’s narrow planned roadways and short allowed setbacks, the Park should be able to meet this requirement. However, final completion of the requirement would depend on the specifics of future development in the Park. Were LEED-ND to be pursued, the Park would need to develop a strategy for meeting this requirement based on the most likely areas for achievement, possibly to include requirements on individual parcels to build buildings which would help to meet this walkable streets component.

c. At least 90% of streets within the project must have sidewalks, at least 8’ wide on mixed use blocks and 4’ elsewhere. The Park should meet this requirement, given that all planned street sections have sidewalks. Proposed sidewalks all meet the 4’ minimum. Sidewalks in mixed use blocks could be built wider, including part or all of the green space shown on the section drawings, to meet the 8’ minimum.

d. No more than 20% of street frontages should be faced directly by garages and service bays. The Park’s design guidelines should allow it to meet this requirement.

It appears that all four requirements of this prerequisite can be met, though with some planning and effort.

NPDP2 COMPACT DEVELOPMENT

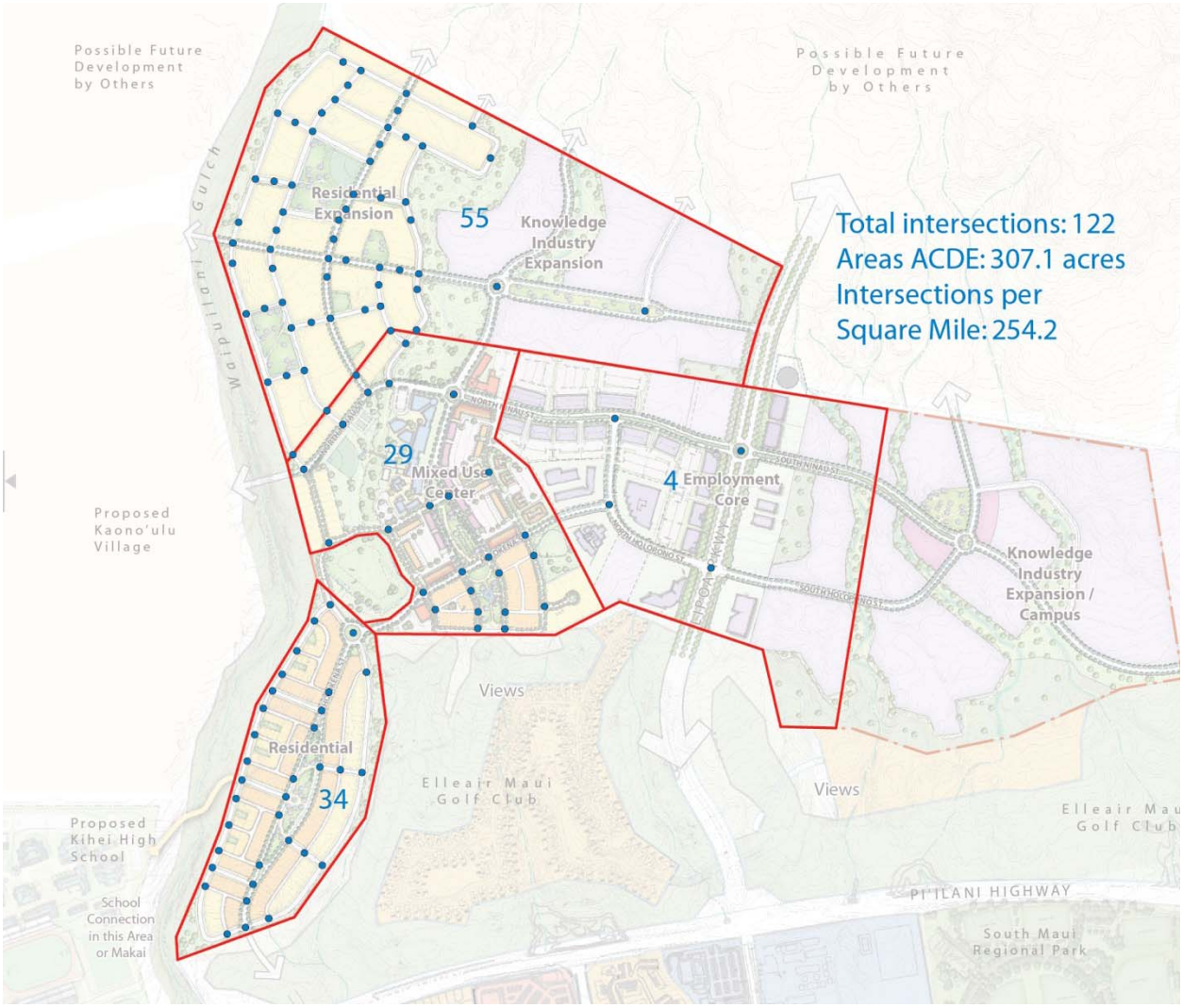
This prerequisite requires that residential components of the plan be built at the minimum average net density of 7 dwelling units per acre, and non-residential components be built at a minimum average floor area ratio (building area divided by land area, also known as FAR) of 0.5. This average FAR will be difficult to achieve, given that the overall non-residential FAR in the Park is to be around 0.3. It is possible, however, that the LEED-ND project area could be targeted for the most dense employment uses, leaving the other employment areas even less dense but the entire Park at the same average density. In any case, there is a possible other way to achieve the density requirement, as noted in the next paragraph.

The Park's planned overall housing density is approximately 15 units per acre, well over the necessary average density. In fact, the LEED-ND system makes an allowance for either residential or non-residential uses to carry the load for the density requirement. The requirement states that if either the constructed housing or non-residential built area on its own, divided by the total (combined) land area for residential and non-residential, equals a density higher than required for that element of the plan (residential or non-residential), then the entire prerequisite is met. Thus, if the housing is built and ends up at a density greater than 7 units per acre over the entire project site's developable land area, the prerequisite is met and the non-residential density is irrelevant.

One complication is that the density must be achieved within five years of the date that the first building of any type is occupied. This seems to bias the choice of project sites to smaller areas which can be built out quickly, in five years or less. Overall, it appears that this prerequisite can be met, with proper planning to achieve the minimum density of development and the right amount of time for development completion.

NPDP3 CONNECTED AND OPEN COMMUNITY

This requires that the project's internal street network have at least 140 intersections per square mile and that the network have one street connecting to the project boundary at least every 800 feet. Intersections which count for this calculation include streets, alleys and non-motorized rights of way. As shown in the graphic below, the Project, if it were to include areas A,C,D and E, has 122 planned and existing intersections in 307 acres, giving an average of 254 intersections per square mile, well over the required amount.



The intersections within the project are at 254 per square mile.

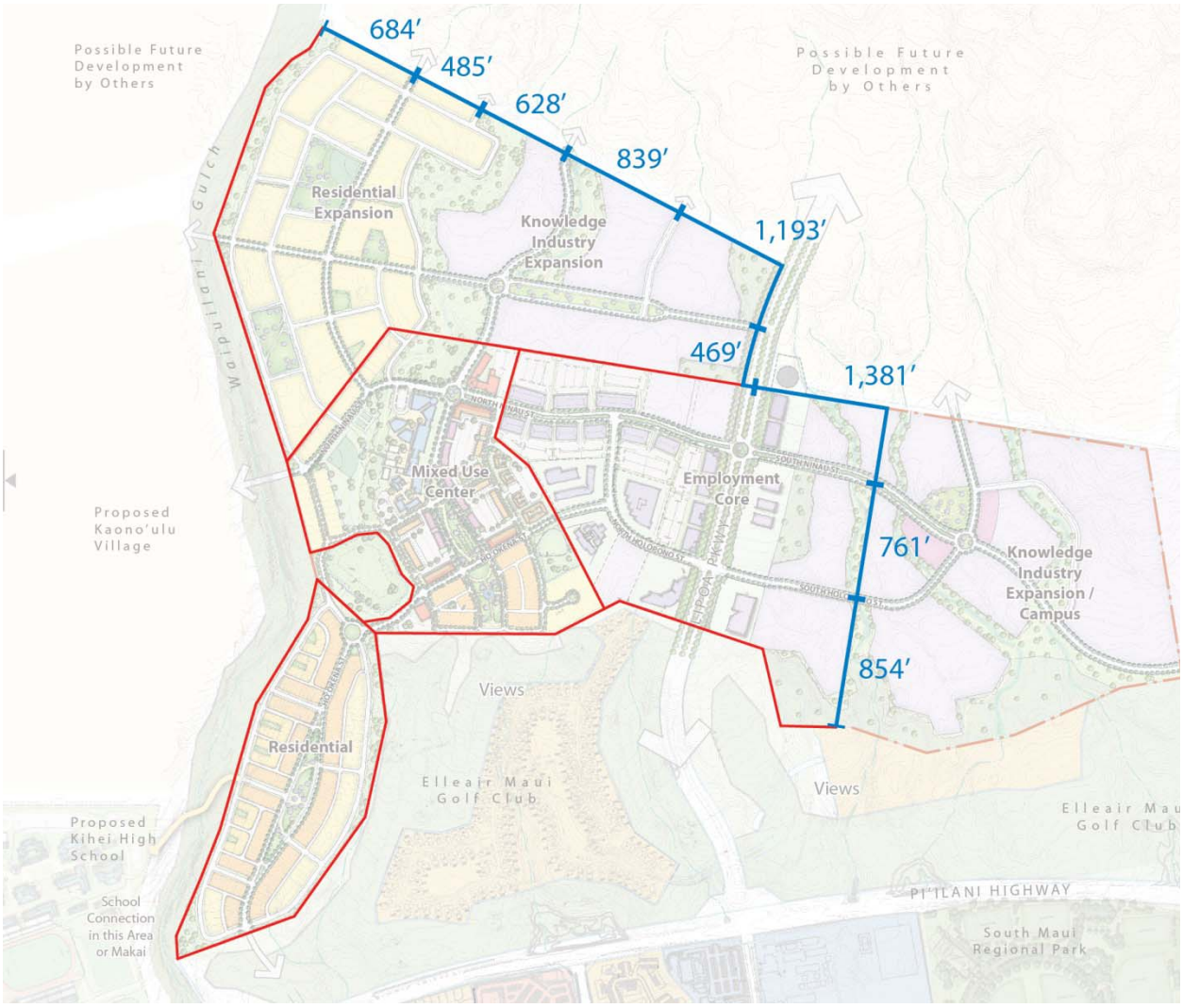
As for street connections, this requirement is a bit more problematic. Note that the connections requirement does not apply to "portions of the boundary where connections cannot be made because of physical obstacles, such as prior platting of property, construction of existing buildings or other barriers, slopes over 15%, *wetlands* and *water bodies*, railroad and utility rights-of-way, existing limited-access motor vehicle rights-of-way, and parks and dedicated open space." We take this to mean that boundaries along the golf course and along Waipuilani Gulch would not need to meet the requirement.

However, given the need for flexibility and the possibility of large employment parcels, the distances between several planned connections to other areas outside the project are over 800 feet, as shown in the graphic below. We believe that each of these could be overcome, however:

- 839' – From the north near Waipuilani Gulch, the first instance of a distance over 800 feet is the distance between the two roads going from the expansion employment land to mauka. Because the distance is not much more than the maximum and there are no existing roadways which these roads are intended to meet, the position of one or both roads could be adjusted to reduce the distance to 800 feet or less.
- 1,193' – Continuing to the south, the next distance between connections is also more than 800'. An exception is granted for areas where a connection is not possible because of slopes over 15%. This area is impacted by slopes, though the precise amount of slope, and whether it creates enough of a barrier to warrant an exception, would have to be investigated. We believe that such an exception will be granted, but a detailed investigation would be required in order to meet LEED-ND reporting

requirements. Alternatively, an alteration could be made to the road network to add another connection in this location should that be necessary, to be added when the associated adjacent property is developed.

- 1,381' – This next location of concern is south of Lipoa Parkway. In this case, there is no problematic area of slope. The reason for the large distance between connections is the desire to preserve large parcels for development. However, should the Park decide to pursue LEED-ND accreditation, an additional road could be added here to connect South Ninau Street to the area mauka of the Park. The road would only be constructed when the parcel through which it ran was developed.
- 854' – This final location of concern borders an area of very steep slope. It seems likely that the exemption for steep slope would be granted in this location.



Connections outside the project vary from 469 feet apart to 1,381 feet apart. The maximum allowed is 800 feet.

In the end, there are concerns about connections to the surrounding areas, as discussed. However, we believe that all of these could be overcome if the Park was to pursue LEED-ND.

Green Infrastructure & Buildings

These prerequisites set requirements for buildings and building activities in the project. We list the requirements here in simplified form, but we assume that all of these prerequisites could be met through agreements with and requirements on building in the Park should the Park decide to pursue LEED-ND.

GIBP1 CERTIFIED GREEN BUILDING

Requires the construction of at least one LEED-certified building within the project.

GIBP2 MINIMUM BUILDING ENERGY EFFICIENCY

Requires that at least 90% of new building area of nonresidential and mixed use buildings and of multifamily buildings over four stories show an average 10% improvement over ANSI/ASHRAE/IESNA Standard 90.1–2007, and that buildings undergoing major renovation average 5% improvement over ANSI/ASHRAE/IESNA Standard 90.1–2007. Also requires that at least 90% of new single-family residential buildings and new multiunit residential buildings of three stories or fewer meet Energy Star or equivalent.

GIBP3 MINIMUM BUILDING WATER EFFICIENCY

Requires that nonresidential buildings, mixed-use buildings, and multifamily residential buildings of four stories or more which are new or undergoing major renovations have indoor water usage an average of 20% less than in baseline buildings, based on the Energy Policy Act of 1992, subsequent rulings by the DOE, the requirements of the Energy Policy Act of 2005, and fixture performance standards in the 2006 Uniform Plumbing Code or International Plumbing Code. Also requires that at least 90% of new single-family residential buildings and new multiunit residential buildings three stories or fewer use fixtures that would earn 3 points under LEED for Homes 2008 WE Credit 3, Indoor Water Use.

GIBP4 CONSTRUCTION ACTIVITY POLLUTION PREVENTION

Requires that all new construction activites create and implement an erosion and sedimentation control plan.

Prerequisite Conclusion

While based on our analysis the Park could meet all other prerequisites, the Park's existing location and context will prevent it from currently meeting the SLLP1 Smart Location prerequisite. Therefore, in our opinion the Park is unfortunately unable to achieve LEED-ND accreditation.

Analysis Two: POSSIBLE POINTS

Regardless of the conclusion of the prerequisite analysis, in this section we will analyze of the various possible points available in the LEED-ND process. The purpose of this is to determine what level of certification the Park might achieve if it were able to apply. As noted before, this analysis is based on the authors' opinion. Actual awarding of LEED-ND points would be at the discretion of the USGBC in the course of the accreditation process.

Smart Location and Linkage

SLLC1 PREFERRED LOCATIONS – 10 POSSIBLE POINTS

This credit has a three point-generating options which may be added for a total of 10 points.

Option 1 – Location Type

This option has four location types which reward points. However, all of these types require a project to be either an infill site or a previously developed site. The Park would not qualify as either of these.

Option 2 – Connectivity

This option is based on existing road intersection density within ½ mile of the project. Because of the project's location, the local intersection density is too low to qualify for points for this option.

Option 3 – Designated High-Priority Locations

This option awards points based on whether the project is both in a designated high priority redevelopment area and has long term designated affordable units on-site. The relevant site categories are EPA National Priorities List, Federal Empowerment Zone, Federal Enterprise Community, Federal Renewal Community, Department of Justice Weed and Seed Strategy Community, Department of the Treasury Community Development Financial Institutions Fund Qualified Low-Income Community, and HUD Qualified Census Tract or Difficult Development Area. The project is not located in one of these designated areas, and so would not be eligible for points under this option.

SLLC2 BROWNFIELDS REDEVELOPMENT – 2 POSSIBLE POINTS

The project is not a designated brownfield and would not qualify for points.

SLLC3 LOCATIONS WITH REDUCED AUTOMOBILE DEPENDENCE – 7 POSSIBLE POINTS

This credit has two point-generating options.

Option 1 – Transit-Served Location

This option requires the project to be located near existing high-frequency transit service. The Park would not qualify for points for this option.

Option 2 – Metropolitan Planning Organization Location with Low VMT

This option awards points if the project is located in a traffic analysis zone where the annual non-home-based VMT per employee is 90% or less of the average for the metropolitan region. The information must be based on employee transportation surveys conducted by the metropolitan planning organization in the last ten years. The Park does not meet this requirement.

SLLC4 BICYCLE NETWORK AND STORAGE – 1 POSSIBLE POINT

To qualify for this point, a project must both lie within ¼ mile of an existing bicycle network of at least 5 miles length and provide a specified amount of bicycle storage within multiunit residential, retail, and other nonresidential buildings. The Park meets the requirement for proximity to a bicycle network due to the bicycle lanes on Pi'ilani Highway. The Park could also meet the bicycle storage requirement by causing builders to provide the bicycle storage. We believe that the Park could earn this credit.

SLLC5 HOUSING AND JOBS PROXIMITY – 3 POSSIBLE POINTS

This credit has three options – for projects with affordable residential components (3 points possible), for projects with residential components not including affordable units (2 points possible), and for infill sites (1 point possible). Of these, the Park would fall into the first category. The requirements for this option are that the project include at least 30% residential building square footage and that the geographic center be located within ½ mile walking distance of a number of existing jobs equal to or greater than the number of dwelling units in the project.

The number of jobs within the required distance numbers approximately 400 (existing jobs within the Park). In the case where the project for LEED-ND was to include the entire residential component of the project (1,250), this would not be a sufficient number of jobs. However, it is possible that the project boundary could be set to include a smaller area which would meet this requirement. Since the LEED-ND project boundary is undetermined at this time and could, for this or other reasons, be set to include less than the full Park area, we assume for the purposes of this report that the project could achieve these points during the LEED-ND process.

SLLC6 STEEP SLOPE PROTECTION – 1 POSSIBLE POINT

This credit requires that development within a project avoids slopes above 15%. Some development is allowed based on percentages of area developed and the amount of development on steeper versus less steep areas. A detailed analysis of slope amounts has not been completed. However, the project design has been created with extensive consideration of the avoidance of existing slopes. A LEED-ND application would require further study, but we believe that the Park would qualify for this point.

SLLC7 SITE DESIGN FOR HABITAT OR WETLAND AND WATER BODY CONSERVATION – 1 POSSIBLE POINT

This requires that the project be located on a site without significant habitat, wetlands, or water bodies, or if it is that the project take steps to protect them. The Park should receive this point.

SLLC8 RESTORATION OF HABITAT OR WETLANDS AND WATER BODIES – 1 POSSIBLE POINT

The Park does not have degraded habitat, wetlands, or water bodies and therefore could not qualify for this point.

SLLC9 LONG-TERM CONSERVATION MANAGEMENT OF HABITAT OR WETLANDS AND WATER BODIES – 1 POSSIBLE POINT

The Park does not have significant habitat, wetlands or water bodies and could not qualify for this point.

Neighborhood Pattern & Design

NPDC1 WALKABLE STREETS – 12 POSSIBLE POINTS

This credit has 12 possible points based on the achievement of up to 16 individual items, with points awarded as below.

Items Achieved	Points
2-3	1
4-5	2
6-7	3
8-9	4
10	7
11	8
12	9
13	10
14	11
15-16	12

The items are as below. Many of these items are based on the final built form of the project's buildings and streetscape elements. We have made assumptions about whether the Park would get credit based on current plans and design code elements as well as possible requirements on future building.

a. *At least 80% of the linear feet of street-facing facades are no more than 25 feet from the property line.* The Park should get this.

b. *At least 50% of the linear feet of street-facing facades are no more than 18 feet from the property line.* The Park should get this.

c. *At least 50% of the linear feet of mixed-use and nonresidential street-facing facades are within 1 foot of a sidewalk.* The Park will have many nonresidential buildings which are not retail buildings. These will have setbacks greater than 1 foot, and the Park will not meet this requirement.

d. *Functional entries occur at an average of 75 feet or less along nonresidential or mixed-use buildings or blocks.* Most of the Park's buildings will be larger in footprint for use as offices. While there will be some areas of smaller buildings for flex space and retail uses, it seems unlikely that the average throughout the project for nonresidential and mixed-use buildings will be less than 75 feet, and we do not believe the Park will meet this requirement.

e. *Functional entries occur at an average of 30 feet or less along nonresidential or mixed-use buildings or blocks.* This item is cumulative with item "d". The Park would also not meet this requirement.

f. *All ground-level retail and services that face public space have clear glass on at least 60% of their facades between 3 and 8 feet above ground level.* This requirement could be placed on development within the Park. We assume the Park can meet this requirement.

g. *Building facades along sidewalks have no more than 50 feet and no more than 40% of the facade length without windows or doors.* This requirement could be placed on development within the Park. We assume the Park can meet this requirement.

h. *Project restrictions on buildings must stipulate that ground level retail windows must remain visible (unshuttered) at night.* This requirement could be placed on development within the Park. We assume the Park can meet this requirement.

i. *On street parking are provided on a minimum of 70% of streets.* Park designs include parking along almost all street sections. The Park will meet this requirement.

j. *Continuous sidewalks line both sides of all streets. In retail or mixed-use blocks the walks must be a minimum of 10 feet wide, and 5 feet elsewhere.* The Park's streets will meet this requirement. The widths of sidewalks are not 10 feet in the street sections as shown, but it is anticipated that in retail and mixed-use blocks the sidewalk would be expanded to include the Park Strip. In all cases this would provide over 10 feet of sidewalk width.

k. *The principal floor of at least 50% of ground floor dwelling units must be at least 24 inches above the sidewalk grade.* The achievement of this requirement would depend on final building designs. We assume here that this requirement could be achieved.

l. *Among other elements, this requirement requires that at least 50% of office buildings include ground floor retail along at least 60% of the street facade.* Due to the high level of employment in the Park compared to the low amount of retail, there will not be enough retail within the Park to meet this requirement.

m. *At least 40% of all street frontage within the project has a minimum building height to street width ratio of 1:3, measured between building facades.* Due to the relatively low heights of buildings anticipated in the Park, even with the generally narrow streets we do not anticipate that the Park will meet this requirement.

n. *At least 75% of residential-only streets within the project are designed for speeds of 20 miles per hour or less.* The Park has been designed with a dense network of narrow streets, suitable for low speed travel. Should the Park pursue LEED-ND accreditation, the streets could be designed to this requirement.

o. *At least 70% of non-residential or mixed-use streets within the project are designed for speeds of 25 miles per hour or less.* The Park has been designed with a dense network of narrow streets,

suitable for low speed travel. Should the Park pursue LEED-ND accreditation, the streets could be designed to this requirement.

p. *Driveway crossings should occupy no more than 10% of the sidewalk length in the project.* Due to the use of alleys and rear-accessed parking lots, the Park should meet this requirement.

In sum, we anticipate that the Park could achieve 13 of the 16 items in this credit, giving it 10 points.

NPDC2 COMPACT DEVELOPMENT – 6 POSSIBLE POINTS

This credit encourages dense development. Points are awarded based on the level of density achieved on buildable land. Non-residential density required for points begins at 0.75 FAR. Development at this density would exceeds the Park's maximum allowable development. The residential density required is also relatively high, beginning at 10 units per acre. The Park's overall residential density on residential and mixed use buildable land is slightly lower than this. However, depending on the final LEED-ND project boundary chosen, some of the lower density residential areas may not be included. In that case, the residential density should rise above the minimum. Given this uncertainty, we estimate that the Park could achieve 1 point based on its residential density.

NPDC3 MIXED-USE NEIGHBORHOOD CENTERS – 4 POSSIBLE POINTS

This credit requires that 50% of a project's dwelling units be within a ¼ mile walking distance of a specified number of "diverse uses". Unlike the SLL prerequisite, uses may be planned and not currently existing. These must include at least one use in each of these four categories, with higher numbers of uses granting higher numbers of points – food retail, community-serving retail, services, and civic and community facilities.

Given the Park's size, not all residential development is within ¼ mile of the mixed use center. This credit like others may point to the need to use a smaller portion of the Park for the LEED-ND project area. However, the densest residential development will occur in the mixed use center, so the likelihood of being able to reach the 50% requirement is very high.

As for the diverse uses, the precise uses which locate in the Park will be determined by market forces. Space has been created in the design to accommodate these uses, however, and we assume with the success of the Park that a reasonable number will occupy the space. Points are awarded based on the numbers as shown in the table below:

Diverse Uses	Points
4-6	1
7-10	2
11-18	3
19+	4

We assume, based on the size of the mixed use center, that 7-10 qualifying uses will be there, which would give the Park 2 points.

NPDC4 MIXED-INCOME DIVERSE COMMUNITIES – 7 POSSIBLE POINTS

There are three sections of this credit – housing diversity, housing affordability, and the combination of diversity and affordability. To achieve points for housing diversity, the precise unit mix must be known. Based on that, a formula is used to derive the point total, from 1 to 3 points. Given the high level of diversity in the Park's housing, we believe that it could obtain 3 points for housing diversity. Note that this is an estimate and is not based on a calculation.

Housing affordability points are based on the percentage of designated affordable units in the project. Based on the applicable workforce housing ordinance, the Park will be required to provide at least 25% of sold or rented units to "income-qualified groups". These groups include households with from 50% to 160% of the area median income. LEED-ND points are awarded based on specified percentages of units affordable to various income groups. Points are awarded for amounts starting at 5% of affordable units in rental and for sale housing. While the precise combination of affordable units in the Park is not yet known, because of the much-higher (25%) requirement for the Park, we believe that the full 3 points would be awarded for this requirement.

The combined diversity and affordability point is awarded for projects that earn at least two points in both. Since we believe the Park will earn 3 points for both diversity and affordability, it will also receive this point.

NPDC5 REDUCED PARKING FOOTPRINT – 1 POSSIBLE POINT

This credit has four parts, all of which must be satisfied:

1. New non-residential development must either not construct new off-street parking facilities, or those facilities must be beside or behind the building, leaving the building lining the street. The Park will satisfy this requirement.

2. Off-street parking facilities must not cover more than 20% of the project's "development footprint," as defined here:

   > ***development footprint*** *- the total land area of a project site covered by buildings, streets, parking areas, and other typically impermeable surfaces constructed as part of the project.*

   Unfortunately, the Park would most likely not meet this requirement. Employment and mixed use land occupies over half the developable land, and these development types will most likely require parking lots which cover significantly over 20% of the "development footprint." Even with the lower percentage of parking facility coverage for residential land, it seems unlikely that the percentage will be below 20% overall.

3. Provide bicycle parking to specified levels for multifamily, retail, and other non-residential development. The Park could achieve this if it was to place requirements on new development.

4. Provide carpool and shared-use vehicle parking equal to 10% of the total spaces for non-residential uses. This is a high requirement, and could possibly be achieved. Given that part 2 above will not be satisfied, however, it would not make a difference for this credit.

The Park will not achieve this point.

NPDC6 STREET NETWORK – 2 POSSIBLE POINTS

This credit has two requirements, as below:

1. The project must have a street intersecting the project boundary at least every 400 feet.

2. The project must have at least 300 intersections per square mile, with the second point awarded to projects with more than 400 intersections per square mile.

These are very high levels of connectivity and not suited to the large parcels required in the Park for employment uses. Based on the calculations done for the Connected and Open Community prerequisite, the Park will satisfy neither of these requirements and will not receive points for this credit.

NPDC7 TRANSIT FACILITIES – 1 POSSIBLE POINT

This credit requires the project sponsors to work with the local transit agency to appropriately locate and fund high quality transit facilities within and bordering the site. The project would also be required to plan for informational kiosks and signage informing possible riders about transit stops and schedules. We assume that the Park would be able to achieve this point were it to pursue LEED-ND accreditation.

NPDC8 TRANSPORTATION DEMAND MANAGEMENT – 2 POSSIBLE POINTS

This credit has five options. For each two options achieved, the project would receive one point.

Option 1 – TDM Program - Create and fund a transportation demand management program that reduces vehicle use by at least 20%.

Option 2 – Transit Passes - Provide subsidized transit passes to occupants for at least three years following occupancy.

Option 3 – Developer-Sponsored Transit - Provide year-round developer sponsored transit of at least 45 trips per weekday following 20% occupancy of the site until at least 3 years following buildout.

Option 4 – Vehicle Sharing - Ensure at least 50% of residents and non-residential building entrances are within ¼ mile walking distance of a shared vehicle following 20% project occupancy. Additional shared vehicles are required depending on project density.

Option 5 – Unbundling of Parking - At least 90% of the parking spaces for multifamily and nonresidential development must be sold or rented separately from the developed space.

Given the expense and effort required for some of these options, it seems likely that the Park would choose to complete only some of them. We assume that at least two of the five would be implemented, earning one point.

NPDC9 ACCESS TO CIVIC AND PUBLIC SPACE – 1 POSSIBLE POINT

This credit has two parts, both required:

1. At least 90% of residential units and non-residential building entrances are within ¼ mile walking distance of a park, square or plaza of at least 1/6 acre.

2. Design or locate the project so that the median size of public open spaces is at least ½ acre.

The design of the Park includes a great variety of open spaces accessible to the public. The Park will achieve this point.

NPDC10 ACCESS TO RECREATION FACILITIES – 1 POSSIBLE POINT

This credit is earned if at least 90% of residential units and non-residential building entries are within ½ mile walking distance of a recreational facility of at least 1 acre, to include physical improvements such as sports fields and tot lots. As currently planned, the shared-use recreational facility in the proposed mixed-use center should satisfy this requirement, earning the project one point.

NPDC11 VISITABILITY AND UNIVERSAL DESIGN – 1 POSSIBLE POINT

This credit requires that a certain percentage of residential units in the project be built with a high level of accessibility and accessible features. This detail of design would be determined at the architectural level, but we assume that this could be achieved through agreements with residential builders.

NPDC12 COMMUNITY OUTREACH AND INVOLVEMENT – 2 POSSIBLE POINTS

This credit has three options, two of which build upon the first.

Option 1 – Community Outreach – this requires that the project sponsor conduct a series of meetings and workshops to solicit community input. This option would earn a project one point, and we believe that the Park would qualify.

Option 2 – Charrette – this option requires that a project satisfy Option 1 and also hold a public design charrette of at least two days duration. The Park would not qualify for this option.

Option 3 – Local Endorsement Pursuant to Evaluation Program – this option is achieved if the project satisfies option 1 and also earns an endorsement from a local or regional non-governmental organization which rates smart growth projects based on a point rating system. The Park would not to our knowledge qualify for this option.

NPDC13 LOCAL FOOD PRODUCTION – 1 POSSIBLE POINT

This credit requires that the project ensure in its covenants and restrictions that food production is allowed on all portions of a lot and on balconies and rooftops. In addition, the project must meet at least one of the following:

Option 1 – Neighborhood Farms and Gardens – At the Park's residential density, this would require 200 square feet per residential unit of dedicated neighborhood garden space. With 1,250 units, this would require 5.7 acres of garden space. Given the amount of space required, as well as the poor growing conditions in the Park, we do not think this is a reasonable option.

Option 2 – Community Supported Agriculture – This option would require that the Park purchase shares in a community supported agriculture program for at least 80% of the project's dwelling units, to continue for at least two years.

Option 3 – Proximity to Farmers Market – This option requires that the project's geographic center be located less than ½ mile walk from a farmers market, either existing or planned.

In pursuit of this credit, the Park could either use option 2 or, ideally, provide space for a farmers market as in option 3. We believe that the Park could reasonably achieve this point.

NPDC14 TREE-LINED AND SHADED STREETS – 2 POSSIBLE POINTS

In this credit, one point is given for planting of trees along at least 60% of streets in the project at intervals no greater than 40 feet. Another point is given for provision of shade along at least 40% of all sidewalks. We believe the project could earn these points.

NPDC15 NEIGHBORHOOD SCHOOLS – 1 POSSIBLE POINT

This credit requires that at least 50% of dwelling units be within ½ mile walking distance of an existing or planned middle or elementary school building entrance, or 1 mile walking distance of an existing or planned high school building entrance. In addition, the school size must not exceed 15 acres for a high school, 10 acres for a middle school, or 5 acres for an elementary school.

Unfortunately, the size of the planned high school as well as the probable indirectness and therefore long distance of the walking connection to the building entrance will make the high school ineligible for this credit. However, the location of the planned school in the mixed use center should fall within the distance requirement. In addition, while the site as shown may exceed the size limit (if the school is an elementary only), areas such as playfields which are under shared-use agreements with the community (which is envisioned for this school) do not count as part of the site. This should make the site area small enough to qualify, earning the Park one point.

Green Infrastructure & Buildings and Innovation Categories

Points in the final two categories (Green Infrastructure and Buildings; and Innovation) will be earned based primarily on future actions taken by the Park in the construction of specific buildings and infrastructure. Thus, it is not possible to determine at this time how many points the Park will earn. Considering the Park's high commitment to sustainability combined with the need to maintain flexibility in order to attract employers, we estimate that the Park would earn a little over half of the points. The precise total of points will depend on a variety of factors and many credits would require significant expenditure of time, effort and money. The Park would have to make many choices about what to prioritize in order to maximize earned points while staying within budget and on schedule.

The total possible points in these categories are 35. We estimate that the Park would earn 60%, or 21 points. Obviously, this is a very rough approximation.

Green Infrastructure & Buildings

GIBC1 Certified Green Buildings – 5 Possible Points
GIBC2 Building Energy Efficiency – 2 Possible Points
GIBC3 Building Water Efficiency – 1 Possible Point
GIBC4 Water Efficient Landscaping – 1 Possible Point
GIBC5 Existing Building Reuse – 1 Possible Point
GIBC6 Historic Resource Preservation and Adaptive Use – 1 Possible Point
GIBC7 Minimized Site Disturbance in Design and Construction – 1 Possible Point
GIBC8 Rainwater Management – 4 Possible Points
GIBC9 Heat Island Reduction – 1 Possible Point
GIBC10 Solar Orientation – 1 Possible Point
GIBC11 On-Site Renewable Energy Sources – 3 Possible Points
GIBC12 District Heating and Cooling – 2 Possible Points
GIBC13 Infrastructure Energy Efficiency– 1 Possible Point
GIBC14 Wastewater Management – 2 Possible Points
GIBC15 Recycled Content in Infrastructure – 1 Possible Point
GIBC16 Solid Waste Management Infrastructure – 1 Possible Point
GIBC17 Light Pollution Reduction – 1 Possible Point

Innovation

IDC1 Innovation and Exemplary Performance – 5 Possible Points
IDC2 LEED Accredited Professional – 1 Possible Point

Point Total

The following table shows all of the point estimates as detailed above. The column "Based on Existing Location" is an attempt to understand which points are denied to the Park based on its location, regardless of the current design. At bottom is the total and the expected LEED-ND rating, were the Park eligible to apply for accreditation.

	Based on Existing Location	Point Estimate
SMART LOCATION AND LINKAGE - POSSIBLE: 27		**6**
SLLc1 Preferred locations – possible 10	yes	0
SLLc2 Brownfields redevelopment – possible 2	yes	0
SLLc3 Locations with reduced automobile dependence – possible 7	yes	0
SLLc4 Bicycle network and storage – possible 1	yes	1
SLLc5 Housing and jobs proximity – possible 3	yes	3
SLLc6 Steep slope protection – possible 1	no	1

SLLc7 Site design for habitat or wetland and water body conservation – possible 1	yes	1
SLLc8 Restoration of habitat or wetlands and water bodies – possible 1	yes	0
SLLc9 Long-term conservation Management of habitat or wetlands and water bodies – possible 1	yes	0
NEIGHBORHOOD PATTERN & DESIGN - POSSIBLE: 44		**30**
NPDc1 Walkable streets – possible 12	no	10
NPDc2 Compact development – possible 6	no	1
NPDc3 Mixed-use neighborhood centers – possible 4	no	2
NPDc4 Mixed-income diverse communities – possible 7	no	7
NPDc5 Reduced parking footprint – possible 1	no	0
NPDc6 Street network – possible 2	no	0
NPDc7 Transit facilities – possible 1	no	1
NPDc8 Transportation demand Management – possible 2	no	1
NPDc9 Access to civic and public space – possible 1	no	1
NPDc10 Access to recreation facilities – possible 1	no	1
NPDc11 Visitability and universal design – possible 1	no	1
NPDc12 Community outreach and involvement – possible 2	no	1
NPDc13 Local food production – possible 1	no	1
NPDc14 Tree-lined and shaded streets – possible 2	no	2
NPDc15 Neighborhood schools – possible 1	no	1
GREEN INFRASTRUCTURE & BUILDINGS - POSSIBLE: 29		**60% est.**
GIBc1 Certified green buildings – possible 5		
GIBc2 Building energy efficiency – possible 2		
GIBc3 Building water efficiency – possible 1		
GIBc4 Water efficient landscaping – possible 1		
GIBc5 Existing building reuse – possible 1		
GIBc6 Historic resource preservation and adaptive use – possible 1		
GIBc7 Minimized site disturbance in design and construction – possible 1		
GIBc8 Rainwater Management – possible 4		
GIBc9 Heat island reduction – possible 1		
GIBc10 Solar orientation – possible 1		
GIBc11 On-site renewable energy sources – possible 3		
GIBc12 District heating and cooling – possible 2		
GIBc13 Infrastructure energy efficiency – possible 1		
GIBc14 Wastewater Management – possible 2		
GIBc15 Recycled content in infrastructure – possible 1		
GIBc16 Solid waste Management infrastructure – possible 1		
GIBc17 Light pollution reduction – possible 1		
INNOVATION - POSSIBLE: 6		**60% est.**
IDc1 Innovation and exemplary performance – possible 5		
IDc2 LEED Accredited Professional – possible 1		
TOTAL - POSSIBLE: 106		**57**
Expected Rating, had Prerequisites been met		Silver

Overall Conclusion

In the end, the Maui Research & Technology Park is not eligible to pursue LEED-ND certification. This is unfortunate, and is due to decisions made many years before the current planning process began, and many years before the current understanding of sustainability was derived. The issue is that the Park was originally located without concern for the priorities that LEED-ND is meant to address. LEED-ND tries to prevent development in locations which are far from existing development, on the edge of the community. The Park can and should be designed and built to the highest standards from this point forward. However, the Park will not attain LEED-ND status due to decisions made many years ago which cannot now be changed.