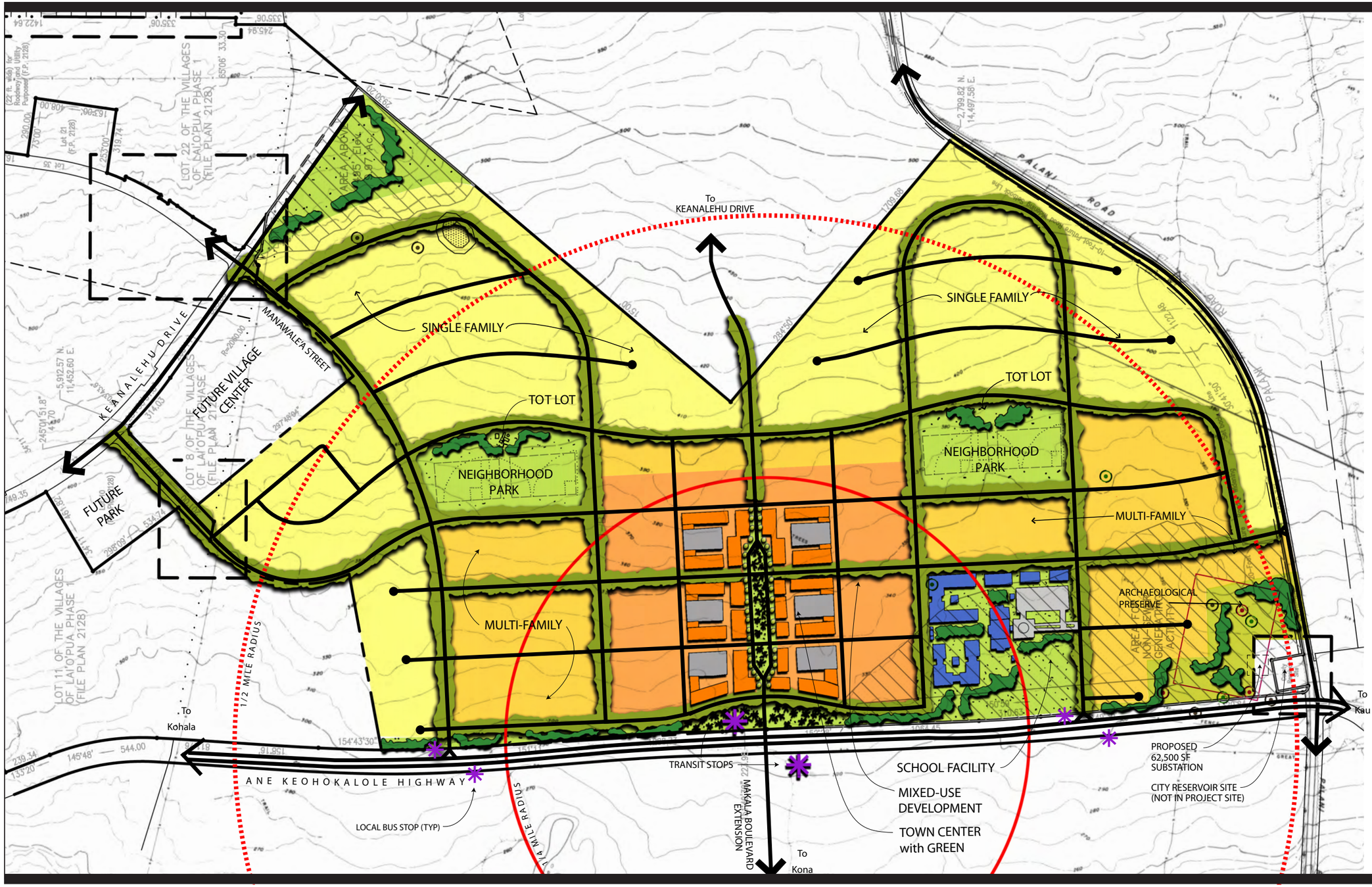

NOT TO SCALE

NORTH

KEY MAP

LAND USE LEGEND

	HHFDC Program Land Use	Ac.	Quantity
	Single Family-Low Density	100.88	400 du
	Multi-Family Medium Density	27.83	220 du
	Multi-Family High Density	33.66*	400 du
	Commercial		197,000 sf
	School Facility	11.82	
	Archaeologial Preserve	7.23	
	Open Space	25.18	
	Roads	65.40	
	Subtotal	272.00	1,020 du 197,000 sf

* The Multi-Family High Density land use area contains the Commercial land use area.

BeltCollins

NORTH

0 100 200 300 400 500
SCALE IN FEET

1 Acre

Figure 2-11
CONCEPT PLAN A

HHFDC Keahuolu Affordable Housing Project
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and high-density configurations. Single-family homes, at a density of 4 dwelling units per acre, would be built in the mauka and northernmost areas of the project site. Multi-family homes, at a density of 8 dwelling units per acre, would surround the community center. The central mixed-use and high-density residential areas would be located closest to the bus transit stops. The highest density multi-family housing would be 12 dwelling units per acre and would be located in and around the community's center.

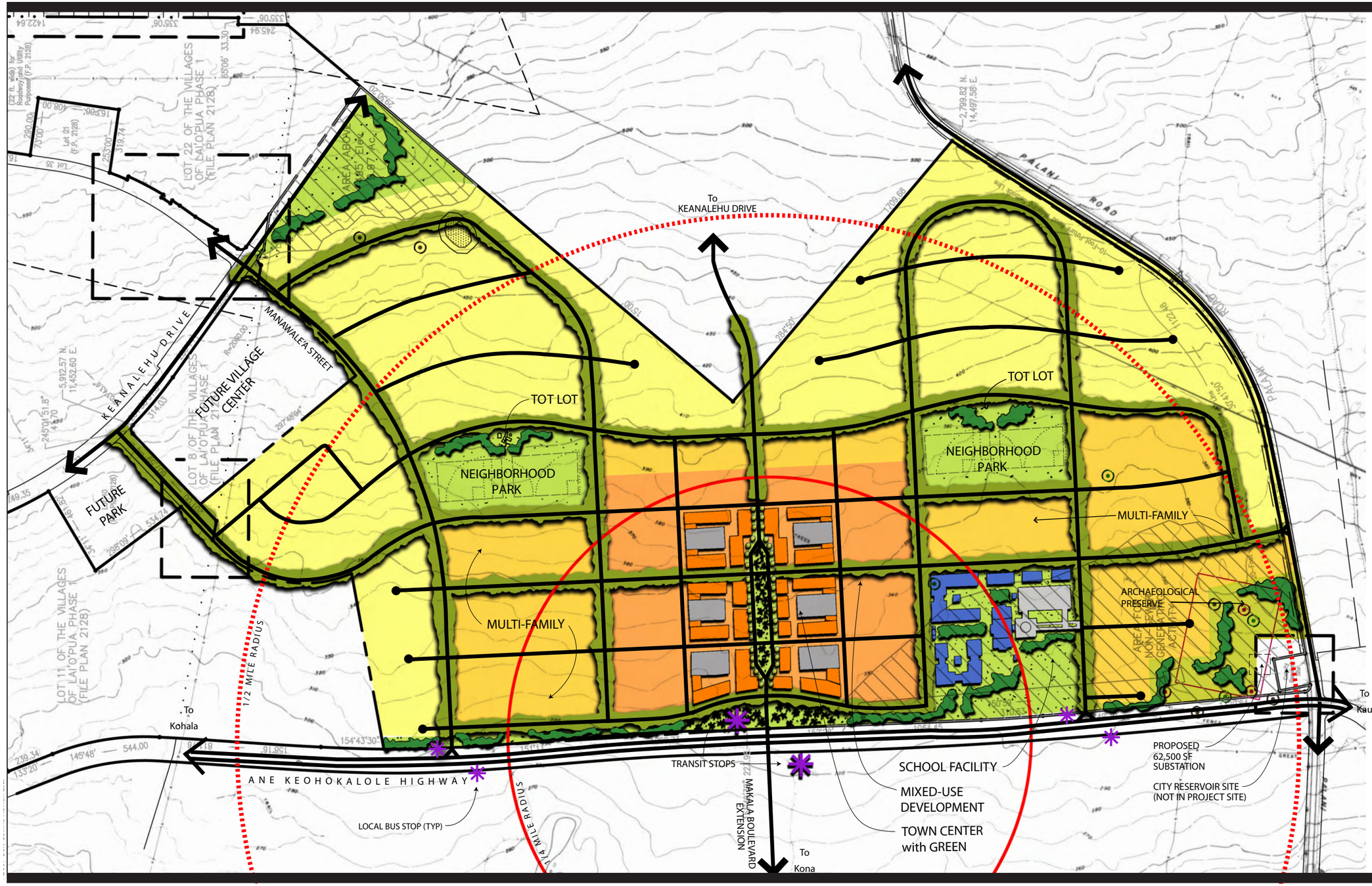
As noted previously, all three concept plans have 197,000 square feet of centrally located commercial floor area, neighborhood parks, an archaeological preserve near Palani Road, and an approximately 12-acre area reserved for a future school facility.

2.4.2 Concept Plan B – 1,840 Dwelling Units

Concept Plan B has a total of 1,840 dwelling units (Figure 2-12). All of the land use components are in the same general location as Concept Plan A. Concept Plan B has more dwelling units in all categories of housing types: more low-density single-family housing, more medium-density multi-family housing, and more high-density multi-family housing. Concept Plan B also has higher densities in all categories of housing types. Highest densities are found in the central mixed-use area with 24 dwelling units per acre, while surrounding multi-family housing would be 16 dwelling units per acre, and the perimeter single-family housing would be 6 dwelling units per acre. The remaining land use components are the same as Concept Plan A.

2.4.3 Concept Plan C – 2,330 Dwelling Units

Concept Plan C has a total of 2,330 dwelling units (Figure 2-13). All of the land use components are in the same general location as Concept Plans A and B. The significant difference is that Concept Plan C has only multi-family dwelling units and no single-family housing units. The central mixed-use community center has the highest density of all three concept plans with 24 dwelling units per acre, while surrounding multi-family housing would be 12 dwelling units per acre. The remaining land use components are the same as Concept Plans A and B.



NOT TO SCALE

NORTH

KEY MAP

LAND USE LEGEND

	HHFDC Program Land Use	Ac.	Quantity
	Single Family-Low Density	100.88	600 du
	Multi-Family Medium Density	27.83	440 du
	Multi-Family High Density	33.66*	800 du
	Commercial		197,000 sf
	School Facility	11.82	
	Archaeologial Preserve	7.23	
	Open Space	25.18	
	Roads	65.40	
	Subtotal	272.00	1,840 du 197,000 sf

* The Multi-Family High Density land use area contains the Commercial land use area.

BeltCollins

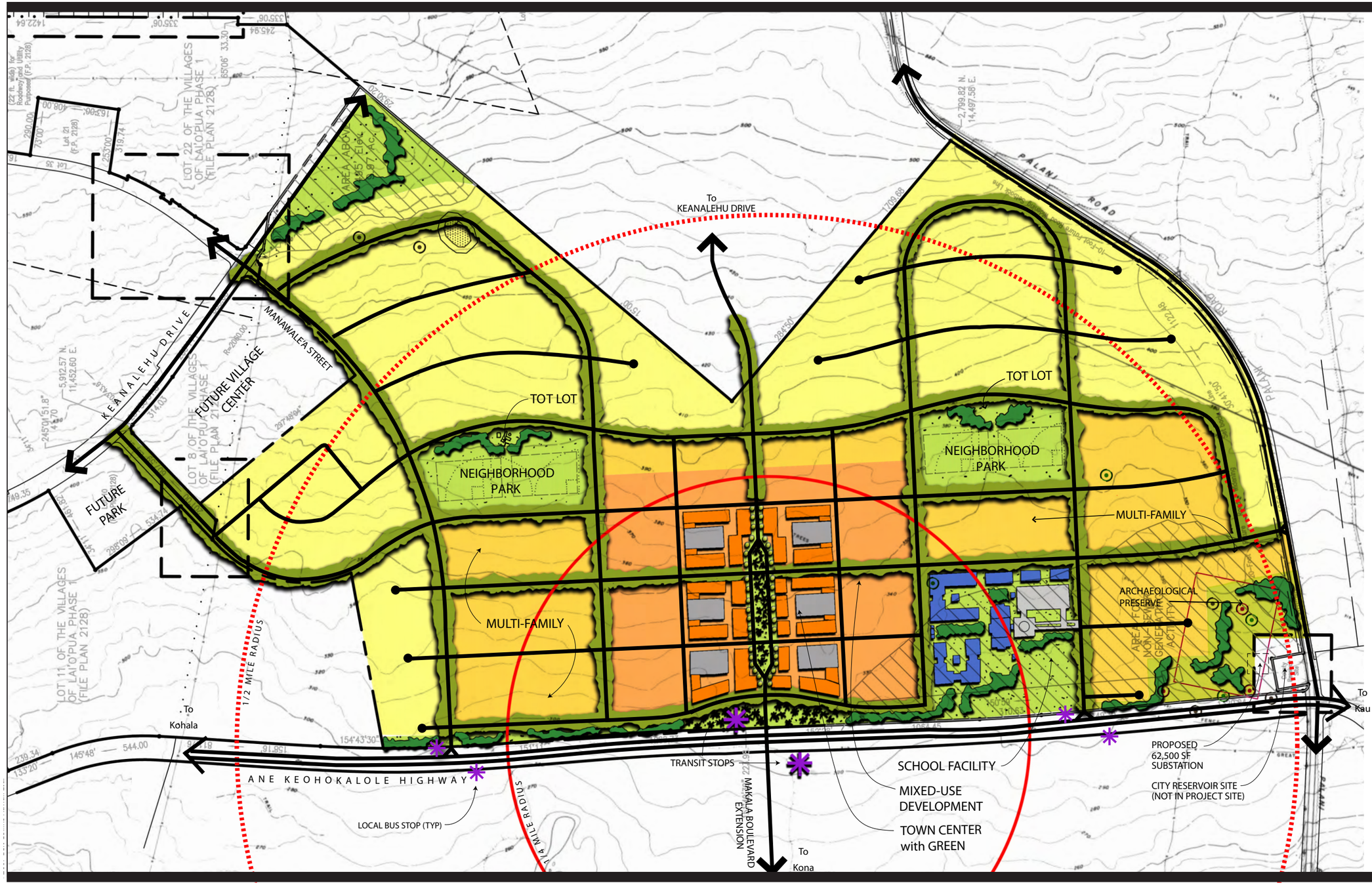
NORTH

0 100 200 300 400 500
SCALE IN FEET

1 Acre

Figure 2-12
CONCEPT PLAN B

HHFDC Keahuolu Affordable Housing Project
Environmental Impact Statement
September 2008



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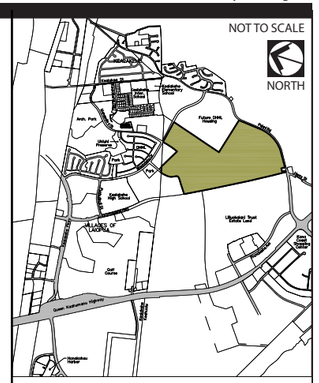

KEY MAP

LAND USE LEGEND

	HHFDC Program Land Use	Ac.	Quantity
	Single Family-Low Density	–	–
	Multi-Family Medium Density	128.71	1,530 du
	Multi-Family High Density	33.66*	800 du
	Commercial		197,000 sf
	School Facility	11.82	
	Archaeologial Preserve	7.23	
	Open Space	25.18	
	Roads	65.40	
	Subtotal	272.00	2,330 du 197,000 sf

* The Multi-Family High Density land use area contains the Commercial land use area.

BeltCollins

NORTH

0 100 200 300 400 500

SCALE IN FEET

1 Acre

Figure 2-13
CONCEPT PLAN C

HHFDC Keahuolu Affordable Housing Project
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2.4.4 Preliminary Development Schedule

Development of the master-planned community is anticipated to begin as soon as all of the entitlement and permitting approvals have been received. Site preparation may begin as early as 2008/2009 with full build-out projected to be within 10 years or by year 2020.

The timing and phasing of the actual construction of the project's improvements depend on factors beyond this environmental review document. The HHFDC's RFP process and its selection of the ultimate developer and development scheme will determine the actual development schedule for the Keahuolu Affordable Housing Pproject.

Table 2-4 illustrates a conceptual development schedule provided by the HHFDC for planning purposes. This conceptual development schedule has been used for planning purposes in this environmental review document.

Table 2-4: Conceptual Development Schedule
Housing Units and Commercial Floor Area

Year	Alternative Concept Plans			Commercial (SF)
	A	B	C	
2010	300	300	300	
2011	300	300	300	
2012	300	300	300	
2013	120	300	300	
2014		300	300	
2015		300	300	
2016		40	300	
2017			230	
2018				100,000
2019				
2020				97,000
Total	**1,020** dwelling units	**1,840** dwelling units	**2,330** dwelling units	**197,000 SF**

Source: Hawaii Housing Finance and Development Corporation

The conceptual development schedule estimates that approximately 300 housing units would be built per year. Based on that, the development schedule varies between the concept plans due to the total number of housing units provided. Concept Plan A would have the shortest duration

with completion in 2013. Concept Plan B would be completed in 2016. Concept Plan C would be completed in 2017.

The commercial floor area conceptual development schedule is the same for all three concept plans. By 2018, 100,000 square feet of commercial floor area would be completed. The remaining 97,000 square feet would be completed by 2020.

2.5 LAND USE COMPONENTS OF THE CONCEPT PLANS

The following is a description of the various land use components of the three concept plans. The HHFDC RFP documents provide guidance and parameters to potential developers about the ultimate development scheme. An overview of the parameters of the land use components is provided below with information and details taken from the RFP.

2.5.1 Housing Units

According to HHFDC's RFP, the development of the project may be in fee or leasehold. Transfer of the project site in fee will be by quitclaim deed. HHFDC acknowledges that the selected developer may develop the project site as "for-sale market and/or affordable single-family or condominium projects and that the residential units being offered for sale may need to be in fee simple." Transfer of the fee or leasehold title from HHFDC to the developer will be subject to the following:

1. Subdivision of the applicable phase of the site to be conveyed is to be completed.

2. HHFDC reserves the right to convey title in phases and to withhold conveyance of title until after the approval of the last discretionary approval for the project, e.g., zoning exemptions and/or ~~Land Use Commission~~LUC approval.

3. Rental, commercial, and commercial mixed-use projects are to be developed on a separately subdivided parcel, such as the community center concept shown in the plans, and are to be developed under a ground lease with a ~~65~~ 65-year lease of $1.00/year lease rent fixed for 65 years.

4. The duration of affordability for any residential rental project is to be the duration of the ground lease.

5. The developer is to be responsible for preparation of the legal descriptions of the parcel(s) to be conveyed to the developer.

For-Sale or Rental Projects. Development may include residential for-sale or rental projects. The developer's entire sales and rental programs may be monitored by HHFDC to ensure compliance with HHFDC's requirements. At a minimum, the developer's for-sale program will be subject to the following:

1. For-Sale Market Units. A preference shall be given to qualified residents pursuant to ~~Hawaii Revised Statutes (~~HRS~~)~~, Sections 201H-47(g) and 201H-32.

2. For-Sale Affordable Units. Each unit shall be subject to a buy-back restriction and HHFDC's Shared Appreciation Equity Program in favor of HHFDC, pursuant to HRS Sections 201H-47, and Hawaii Administrative Rules (HAR), Sections 15-174-121 to -130.

   For-~~S~~sale affordable units shall be offered to households with a range of incomes. The proposed affordable sales prices under this RFP shall be based on the area median income as established by the ~~U.S. Department of Housing and Urban Development (~~HUD~~)~~ as adjusted for family size.

   For purposes of determining maximum affordable sales prices under this RFP, the following shall be assumed: 33 percent of the HUD median income adjusted for family size according to the affordable unit types shown below, a down payment of 5 percent of the sales price, and a monthly payment based upon the prevailing interest rate for a 30-year fixed-rate loan and an appropriate customer trust fund which shall include real property tax, condominium association maintenance fees, mortgage insurance, homeowner's insurance, and any average monthly Community Facilities District payments:

Unit Type	Household Size
Studio	1 person
1-bedroom	2 persons
2-bedroom	3 persons
3-bedroom	4 persons
4-bedrooms	5 persons

3. For-Sale Single-Family Projects. Proposals with single-family dwelling units of 50 units or more shall first offer a minimum of 10 percent of the total number of single-family units to owner-builders or to non-profit organizations assisting owner-builders in accordance with HRS Section 201H-40.

4. A Community Land Trust Model. In concept, the ground lease of the land for this model of an affordable for-sale project is conveyed to a community land trust, which then sells leasehold ownership in the affordable units to homebuyers. Upon resale, the homeowner is required to resell the unit back to the community land trust at a maximum cap of the consumer price index (CPI) over the homeowner's initial sale price (less depreciation of the improvements). The land trust then resells the leasehold unit to another affordable buyer. If a community land trust model is proposed by a prospective developer, title to the land shall be conveyed to the land trust by ground lease for a ~~65~~ 65-year lease at $1.00/year lease rent fixed for 65 years.

Other Considerations. The developer shall, on its own behalf or in conjunction with a non-profit or other entity acceptable to HHFDC, own, operate, and manage any rental units. The developer shall be responsible for the operation and maintenance of all common areas not dedicated to the County or applicable condominium associations. The HHFDC Keahuolu Master Plan is included as a part of the RFP as a reference and is not a requirement.

2.5.2 Commercial Space

All three concept plans of the Keahuolu Master Plan contain 197,000 square feet of commercial space located in the community's center. The commercial space is intended to primarily serve the local residential market of the Keahuolu Affordable Housing P~~p~~roject. At the time of this writing, the tenants/tenant types of the commercial space are not known.

2.5.3 School Facility Site

An approximately 12-acre school site is designated along Ane Keohokalole Highway. There is a deed reservation for a school facility site to be conveyed in fee for set-aside to the Department of Education (DOE).~~The HHFDC RFP states that a variety of options could be explored for fulfilling the on-site school facility land use component. Currently, there is a deed reservation for a school facility site to be conveyed in fee for set-aside to the Department of Education (DOE). However, passed by Act 245, the 2007 Legislature allows various approaches to fulfilling educational facility requirements. Therefore the RFP states that both traditional and nontraditional facilities (e.g., charter school, day care center, early learning center, etc.) should be explored by the developer. Any educational facility should preferably be sensitive to minimizing vehicular traffic hazards to pedestrian student traffic.~~

2.5.4 Archaeological Preserve

An approximately 7-acre archeological preserve is designated in the lower southwest corner of the project site near the intersection of Palani Road with Henry Street. As described in the QLT EIS and the HHFDC Keahuolu Master Plan, significant archaeological sites have been identified in this area of the project property. The HHFDC RFP states that the developer is to be responsible for identifying and completing the historic preservation requirements for the project area.

Mitigation work must be implemented. This involves further archaeological data recovery work (detailed recording and possible excavations) at identified sites within the project area and within Block E, a 400-square-foot sample block in the southern portion of the project area, near Palani Road. The Block E data recovery work will entail vegetation clearing within the block, detailed recording of the archaeological features within the block, and preparing a report on the overall data recovery work. Burial testing must be conducted at possible burial sites in the project area. If any burials are identified, a burial treatment plan must be prepared, approved by the Burial Council, and implemented. Finally, a site preservation plan needs to be prepared to current regulatory standards and the plan must be approved by the State Historic Preservation Division (SHPD) and implemented.

The RFP stipulates that in the event that any sites or remains such as shell, bone or charcoal deposits, human burials, rock or coral alignments, pavings or walls are encountered during construction, the developer and its contractors shall stop work and contact SHPD and comply with its requirements.

2.5.5 Parks and Open Space

The HHFDC RFP states that the developer will be responsible for providing parks in accordance with requirements of the County of Hawai‘i Department of Parks and Recreation (P&R).

1. Park lands shall be planned at a rate of 5 acres of net usable area for active recreation and its supporting infrastructure and amenities per 1,000 persons projected for the development (person count to be rounded up to the next highest full thousand). Net usable area does not include hillsides, ravines, archaeological sites, restrictive easements, and other similar land features that would be of no recreational value to the

community or an undue burden on the County. Minimal landscape buffers can be considered appurtenant to the active recreation sites; stand alone landscape buffers and those not physically a part of an active recreation site will not be considered. Also, P&R prefers to not assume responsibility for detention basins and similar flood control features. The factors used for determining the development's person count is based on dwelling type using a predetermined ratio. These ratios are 3.5 persons per single-family or duplex dwelling unit and 2.1 persons per multi-family dwelling unit.

P&R would prefer multiple Neighborhood Parks to be developed in this type of large-scale residential development, adequately dispersed throughout the development. Neighborhood Parks consist of sites that are 5 acres of net usable area minimum, are fully grassed and landscaped, and have perimeter fencing, on-site parking, a comfort station with pavilion, a combination of sports fields (baseball/softball field, soccer field, outdoor tennis/basketball courts), and children's playground equipment and similar amenities. Neighborhood Parks also may contain some passive uses such as picnicking and landscaped areas, but those would be subservient to the active recreational needs.

2. P&R would be willing to accept dedication of appropriately sized, designed, and constructed Neighborhood Parks and similar park sites with active recreation as their main purpose.

3. Archaeological sites are not related to active recreation and therefore shall not be included in park lands for dedication to the County.

4. Linear parks may be acceptable for dedication to the County but are dependent upon the uses they encompass. If strictly a greenway or pedestrian/bicycle trail (i.e., alternate transportation corridor), such a park may not be acceptable to the P&R; however, the developer may approach the County Department of Public Works (DPW) if they would be agreeable to accept such areas. If used to link active recreation venues or incorporate active recreation fields and such into it, or as its periphery/buffer, then it is probably acceptable to P&R. Greenways are not active recreation parks and should be left to the community association to care for. Alternative transportation corridors are more likely to be under ~~Department of Public Work~~DPWs' jurisdiction, and they should be approached on acceptance of these types of lands/improvements.

5. P&R may be willing to entertain the development of a larger community park to serve the development and its surrounding neighborhoods. However, that does not negate the need for other future developments on neighboring lands to provide their share of parks based on the same criteria noted in paragraph 1 (above).

   If the concept of a community park is pursued, it would need to be more centrally located in the community it is serving than a Neighborhood Park. It would have the same amenities as the Neighborhood Park but would include a multi-purpose community recreation center and possibly a gymnasium. It could also have some passive uses/amenities.

6. The concept of smaller "pocket" parks should be encouraged to benefit the residents and facilitate a social fabric in that neighborhood. They could include smaller and more passive amenities such as gazebos, picnic tables, benches, and playgrounds. P&R supports the development of such sites; however, P&R feels that those sites should be managed and cared for by the community associations representing surrounding residents (as opposed to the County). The overall park land requirement should not be significantly impacted (reduced) by the lands assigned to create these "pocket" parks.

Over 25 acres of open space areas will be provided in the form of public neighborhood parks, a central green public space in the middle of the community's center, and a space along the Keanalehu Drive extension, which is not recommended for development due to site constraints, such as a steep slope. Green spaces, such as walkways with street trees, are also illustrated in the concept plans along all of the interior roadway corridors and along the project's frontage with Ane Keohokalole Highway.

2.5.6 Internal Roads, Pedestrian Walkways, and External Roads

The HHFDC RFP states that the developer is to be responsible for development of the roads within the project site. The developer is to provide connection points between the internal collector roads and Ane Keohokalole Highway for eventual connection through QLT property to Makala Boulevard and Manawale'a Street and Keanalehu Drive, as shown in the HHFDC Keahuolu Master Plan's conceptual plans. Unless otherwise approved by HHFDC, these roads are to be constructed to County standards and dedicated to the County.

The developer is to accommodate the 80-foot ~~right-of-way~~ROW of the Keanalehu Drive extension along the northern boundary of and within the project site and is to dedicate the roads to the County upon completion.

The RFP states that the developer is advised that due to maintenance, sight distance, and Americans with Disabilities Act (ADA) compliance concerns, the County will not accept any street trees within roadways which will be dedicated to the County unless the developer executes a maintenance agreement to maintain the street trees.

The HHFDC Keahuolu concept plans also indicate a proposed connection to Palani Road, which would be limited to a right-turn-in and right-turn-out only.

The County plans to use Ane Keohokalole Highway as the main transit route for this area, which will eventually serve as a primary arterial road that will connect at Henry Street and extend north to the Keahole Airport area. The current preliminary engineering studies and environmental assessment for Ane Keohokalole Highway are being prepared for the section between Henry Street and Hina Lani Street.

The County plans to finance construction of Ane Keohokalole Highway using Community Facilities District financing. The HHFDC RFP states that the developer of Keahuolu is to be responsible for any allocable share of the cost of Ane Keohokalole Highway that is attributable to the Keahuolu Affordable Housing Pproject. The HHFDC RFP advises the developer that the 50 percent allocable share used in the HHFDC Keahuolu Master Plan is an arbitrary assumption for planning purposes.

The Keahuolu Affordable Housing Pproject's concept plans provide a regional bus transit stop at the future intersection of Ane Keohokalole Highway and Makala Boulevard, and bus stops are provided along Ane Keohokalole Highway for local circulator buses that will serve the Keahuolu project's neighborhoods.

2.5.7 Other Project Considerations Contained in the HHFDC RFP

The following information was provided in the HHFDC RFP to prospective developers of Keahuolu regarding energy and design considerations and infrastructure service for the project.

2.5.7.1 Energy and Design Considerations

According to HHFDC's July 23, 2007 RFP, to the extent possible, the project shall comply with HRS Section 196-9 and the Governor's Administrative Directive No. 06-01, dated January 20, 2006, as follows:

1. Design and construct buildings to meet and receive certification for U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) standards. As appropriate for the type of construction, the buildings should meet LEED Silver certification for new commercial construction and major renovation, LEED for existing building operations, and LEED for commercial interiors.

2. Incorporate energy efficiency measures to prevent heat gain in residential facilities of one to three stories by providing R-19 or equivalent insulation on roofs, R-11 or equivalent in walls, and high-performance windows to minimize heat gain and, if air conditioned, to minimize cool air loss. Where possible, orient buildings to maximize natural ventilation and day lighting without heat gain, and optimize building roof exposure for solar water heating.

3. Incorporate design features to conserve energy and water usage pursuant to Chapter 344, HRS (State Environmental Policy) and Section 226-18, HRS, of the Hawaii State Plan. If the project does not incorporate solar water heating into its design, the developer shall submit to HHFDC, either a written approval of a cost-benefit comparative analysis by the Energy Branch of the Department of Business, Economic Development and Tourism (DBEDT), or a cost-benefit comparative analysis bearing the stamp and signature of a licensed mechanical engineer, concluding that the use of the proposed conventional water heating system for the project is more cost effective than a solar water heating system. The analysis shall be based on the projected life-cycle costs to purchase and operate the water heating systems. If the life-cycle analysis is positive, the facility shall incorporate solar water heating. If water heating entirely by solar is not cost-effective, the analysis shall also evaluate the life-cycle, cost-benefit of solar water heating for preheating water.

4. Implement water and energy efficiency practices in operations to reduce waste and increase conservation.

5. Incorporate principles of waste minimization and pollution prevention: reduce, reuse, and recycle as a standard operating practice, including programs for construction and demolition waste management and office paper and packaging recycling programs.

6. Use life cycle cost-benefit analysis to purchase energy efficient equipment such as Energy Star products and use utility rebates, where available, to reduce the purchase and installation costs. Energy Star products meet strict efficiency guidelines set by the U.S. Environmental Protection Agency and the U.S. Department of Energy.

7. Procure environmentally preferable products, including but not limited to recycled and recycled-content, bio-based, and other resource-efficient products and materials.

2.5.7.2 Infrastructure, Maintenance and Coordination Considerations

According to HHFDC's July 23, 2007 RFP for Keahuolu, the developer will be required to provide and/or develop adequate infrastructure to service the project.

~~Potable~~ Drinking Water. The developer shall be responsible for obtaining ~~potable~~ drinking water for the project, including a ~~potable~~ drinking water allocation from the DLNR and payment of any Department of Water Supply~~'s~~ (DWS) water facilities charges.

Wastewater. The developer shall be responsible for securing adequate sewage treatment capacity at the Kealakehe ~~Wastewater Treatment Plant~~WWTP and connection approvals from the County and the payment of any facilities charges for such connections or capacities required for the project. HHFDC agrees to quitclaim to the project any rights HHFDC may have to sewage treatment capacity from the Kealakehe ~~Wastewater Treatment Plant~~WWTP under HHFDC's agreement with the County, dated March 19,1992, for development of the project, up to a maximum of an average of 431,360 gallons per day. As indicated in the HHFDC Keahuolu Master Plan, sewage from this project may be conveyed to the Kealakehe ~~Wastewater Treatment Plant~~WWTP~~:~~ (1) by an alignment through the DHHL's Village of La'i 'Opua project in the northerly direction, (2) by an alignment through QLT property to the west, or (3) by a combination of alignments through La'i 'Opua and QLT properties.

The developer shall satisfy the respective requirements of DHHL and QLT for alignments through the applicable projects.

The developer shall also be responsible for accommodating offsite County sewage from the Queen Lili'uokalani Village project from Palani Road, either within the ~~right-of-way~~ROW of the Keanalehu Drive extension, or from Palani Road to the most convenient connection to the onsite project sewer system.

Maintenance of the Project Site. The developer shall be responsible for any maintenance of the project site, as well as the area from the project boundary to the adjacent street curb, commencing six months from the date of HHFDC Board of Directors' approval of the project.

Coordination of Construction. The developer shall coordinate construction of the project with other activities taking place in the area. The developer shall be responsible for repairing or paying for the costs of repairing any damage that its activities may cause to any improvements, including Palani Road or the adjacent Villages of La‘i ‘Opua project.

Accessibility. The project shall be accessible to and usable by persons with disabilities in compliance with HRS Section 103-50, and the developer shall submit written evidence to HHFDC that the project plans have been approved by the Disability and Communication Access Board, prior to start of construction. This requirement is in addition to any other applicable requirement for accessibility such as the Fair Housing Amendments Act of 1988 (Pub. L. 100-430, approved September 13, 1988) and the Fair Housing Accessibility Guidelines (24 Code of Federal Regulations [CFR] Chapter 1).

2.6 PRELIMINARY PROJECT COSTS

Preliminary project costs are not available at the time of this writing because the developer and the final project development scheme have not been determined. Preliminary off-site infrastructure costs are discussed in Chapter 4 in Section 4.8.

2.7 PERMITS AND APPROVALS

The HHFDC RFP states that the project shall comply with the rules, regulations, ordinances, codes, and standards of the County of Hawai‘i and any federal and state requirements. If there is a conflict between requirements, the more restrictive requirement shall control.

3CHAPTER THREE: DESCRIPTION OF THE AFFECTED NATURAL ENVIRONMENT, POTENTIAL IMPACTS, AND MITIGATION MEASURES

3.1 CLIMATE

3.1.1 Existing Conditions

Regional temperatures range from the mid-60s in the winter to the mid-80s in the summer. The annual rainfall in the region averages 20 to 40 inches per year. Unlike most areas in Hawai‘i, rainfall in Kona is heavier in the summer than in winter. Trade winds in Hawai‘i typically blow from the northeast direction. The local Hualalai and Mauna Loa volcanoes influence the wind pattern on the Kona side of the island of Hawai‘i. The prevailing winds blow toward the ocean in the early morning and from the ocean toward the island in the afternoon (Juvik, 1998).

3.1.2 Potential Impacts and Mitigation Measures

The proposed Keahuolu Affordable Housing Pproject is not expected to have any impacts on climate. No mitigation measures are warranted.

The Impacts of the Alternatives on Climate

ALTERNATIVES	NO IMPACTS	POTENTIAL IMPACTS	ADVERSE IMPACTS	COMMENTS/MITIGATION MEASURES
1. No Action	✓			No impacts on climatic conditions are expected under the No Action Alternative.
2. Alternative A	✓			No impacts on climatic conditions are expected under Alternative A.
3. Alternative B	✓			No impacts on climatic conditions are expected under Alternative B.
4. Alternative C	✓			No impacts on climatic conditions are expected under Alternative C.

3.2 GEOLOGY AND TOPOGRAPHY

3.2.1 Existing Conditions

The project site consists of approximately 272 acres extending northward from Palani Road. The elevation of the property ranges between 300 and 580 feet above msl. The adjacent proposed reservoir ranges in elevation from approximately 580 to 640 feet above msl. Situated on the western slope of Hualalai volcano, the subject properties are composed of prehistoric lava flows estimated to be from 3,000 to 5,000 years old.

The lower or western half of the housing site is easily developable with approximately half of the area in less than 5 percent slopes and the remainder in 5 to 15 percent slopes. Topography slopes downhill from east to west. The upper or eastern half of the site is steeper; some of the slopes are greater than 15 percent. However, the larger portion of the property has slopes less than 15 percent. This organizes the site to be used more intensively in the lower (makai) sections of the property with larger footprint uses or higher density residential uses being placed on the flatter areas. The upper (mauka) sections should be used for smaller footprint residential structures that can accommodate grade changes more easily.

3.2.2 Potential Impacts and Mitigation Measures

A grading permit must be approved from the ~~State DLNR Historic Preservation Division~~SHPD, County Planning Department and ~~Department of Public Works (~~DPW~~)~~ before construction can begin on either the housing site or the reservoir site. All grading operations will be conducted in compliance with dust and erosion control requirements of county, state, and federal regulations. During the grading permit review and approval, the grading plans for the site will be reviewed by the County DPW and SHPD.

The existing topography would be altered to the extent necessary for construction of the proposed improvements. It is anticipated that cut and fill quantities would generally balance as construction progresses. During all phases of construction, erosion control practices will comply with state, county and federal regulations. National Pollutant Discharge Elimination System (NPDES) general permit coverage authorizing discharges of storm water associated with

construction activities will be required for the project from the State DOH, Environmental Management Division, Clean Water Branch. Best management practices (BMP) to control erosion during construction will be a component of the NPDES permit.

Potential Short-Term Impacts:

During grading activities, portions of the site would be disturbed and the potential for site erosion would increase. The contractor will be required to comply with Chapter 10 – Erosion and Sedimentation Control - of the County Code, the DPW Storm Drainage Standard, and the NPDES permit requirements, including the ~~best management practices (~~BMP~~)~~ plan to contain and control site erosion and to prevent the discharge of sediment from the site. Based on the requirement for construction activities to comply with county requirements and the approved NPDES permit, the short-term environmental impacts from grading activities are anticipated to be mitigated and insignificant.

Potential Long-Term Impacts:

Long-term impacts of the project on drainage and erosion are not anticipated to be significant. The increase of impermeable surfaces resulting from site development would have the effect of increasing storm water runoff quantities on the site. To comply with the County's Storm Drainage Standard, runoff flow rates and volume from the site will not increase. The runoff will be collected and discharged to on-site seepage areas, seepage wells, and drywells for percolation into the ground. Thus, precipitation falling on the site will discharge into the ground as it does under pre-development conditions. An underground injection control (UIC) permit will be required by the State DOH to construct and operate the dry wells. It is recommended that the drainage systems also include storm drain filtration devices to mitigate potential impacts from pollutants. Filtration devices may include vegetated swales, bio-retention areas, sand or organic filtering systems, or commercially available proprietary products such as catch basin inserts and hydrodynamic devices. The method of filtration would be determined based on available technology and integrated with the system design.

The Impacts of the Alternatives on Geology and Topography

ALTERNATIVES	NO IMPACTS	POTENTIAL IMPACTS	ADVERSE IMPACTS	COMMENTS/MITIGATION MEASURES
1. No Action	✓			No impacts to geology or topography are anticipated under the No Action Alternative.
2. Alternative A		✓		A grading permit and an NPDES permit would be required prior to construction. A UIC permit would be required for any dry wells constructed. No significant long-term impacts to topography are anticipated. The contractor would be required to comply with erosion and sedimentation rules and regulations. Runoff flow rates and volume would not be increased from the site to comply with the County's Storm Drainage Standard. Precipitation falling on the site would discharge into the ground as it does under pre-development conditions. Storm drainage filtration devices are recommended to mitigate pollutants from entering the groundwater.
3. Alternative B		✓		Generally the same grading improvements would be required for Alternative B as Alternative A. A grading permit, an NPDES permit, and other necessary permits would be required prior to construction.
4. Alternative C		✓		Generally the same grading improvements would be required for Alternative C as Alternative A. A grading permit, an NPDES permit, and other necessary permits would be required prior to construction.

3.3 GROUNDWATER, HYDROLOGY, SURFACE WATER AND DRAINAGE

3.3.1 Existing Conditions

3.3.1.1 Groundwater and Hydrology

Kona's regional water resources are classified in three distinct reserve types: basal groundwater, brackish basal groundwater, and dike-impounded perched groundwater. The region's rainfall pattern is responsible for the recharge of the basal aquifer that extends from the upper slopes of Hualalai to the shoreline. Seawater intrusion at the shoreline results in the creation of brackish water. The extent of brackish water inland is highly variable within the Kona region and depends on the character of rainfall, specific terrain, and geologic formations. Dike-impounded