

## **CHAPTER 2: PROJECT NEED AND OBJECTIVES**



### **2.1 PROJECT NEED AND OBJECTIVES**

HMP serves as the final resting place for over 41,000 persons, and accommodates an average of between 700 to 800 interments<sup>1</sup> a year from families throughout Hawai‘i. HMP accommodates about 25% of all burials occurring in the state. Over the decades, as the need for additional burial space has increased, HMP has met the demand by increasing the land area available for burials within its owned property. Since 1958, as sections of the cemetery have filled, HMP has grown from six acres to their present size of about 80 acres. The most recent expansion occurred in 1999 on a 7.9-acre site within the larger Parcel 1, and is identified as the Ocean View Garden site.

However, HMP only has a limited number of burial sites remaining (3,600 plots), and there is a significant need for additional cemetery space to accommodate the State’s aging population. Even with other cemeteries on O‘ahu being available, projections indicate a shortage of 39,525 to 60,295 burial plots can be expected. Without proper planning for the future, Hawai‘i residents are expected to face a shortage of cemetery space. The 30,000 additional burial plots proposed in HMP’s project are needed to address the anticipated burial space shortage. HMP would thus have a total of 33,600 burial plots (existing plus additional expansion). Therefore, an objective of this project is to provide additional cemetery space to accommodate Hawai‘i’s residents for several decades, and provide options on disposition and memorialization for families in the future.

#### **Market Study Summary**

A market study was conducted by CBRE, Inc. (“CBRE”) (CBRE, 2018) to evaluate the need and demand for future cemetery space (see Appendix B). The project was analyzed from a real estate market perspective, and identified and quantified the probable market considering competitive, regional, prevailing and forecast trends. This study evaluated: 1) whether there would be sufficient demand in the O‘ahu burial/interment “market” to successfully absorb the additional cemetery space in a timely manner; and 2) whether the project would be an appropriate use of the site relative to market needs, desirability, land planning objectives, and the general area environment.

In summary, the CBRE market study determined that there is demand for an additional 145,025 to 165,795 burial spaces (or referred to as burial plots) needed on O‘ahu through 2040. This is due to O‘ahu’s growing resident population, an aging population with about 18% now being over age 65, and an increasing mortality rate given the increasing and aging population.

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<sup>1</sup> This includes traditional burials and disposition of cremated remains.

Other than HMP, there are only currently six major cemeteries on O‘ahu offering burial spaces to the general public, and some have none to only limited numbers of burial plots available. Cumulatively, these facilities only have about 16,500 burial spaces remaining in inventory (plots, niches and crypts) in existing phases. Future expansion or potentially new cemeteries would add a maximum of 89,000 burial spaces by 2040, resulting in about 105,000 spaces potentially being available. Therefore, additional spaces are needed, and the expansion of HMP could be completely absorbed before 2040.

CBRE estimated that HMP’s expansion could readily capture a market share of 30% to 33% of the total burials space demand. This is due to HMP’s absorption history, the desirability of potential plots created with expansion in this project area, and the characteristics of the competitive supply. HMP’s expansion area is an appropriate location for cemetery use being part of a long-successful facility established 60-years ago providing needed burial opportunities for families. The expansion area also offers exceptional panoramic views, an open space and rain forest buffer, excellent exposure and direct access, favorable climate supporting the lush landscape, and good proximity to urban Honolulu and other areas of the island via several accessible highways.

### **Support Cultural Practices and Long-Term Stewardship of Property**

Another objective of this project is to support native Hawaiian cultural practices and to ensure effective stewardship of the Petitioner’s property for the future. The Petition Area and larger property (Parcel 1) includes important historic sites, such as Kawa‘ewa‘e Heiau, and is used for cultural practices, such as collecting hula related plants. These sites need appropriate restoration and maintenance. The establishment of a Cultural Preserve that includes a preservation plan for the area would support these objectives.

Ensuring that future urban development of the larger property does not occur is also an important objective for the Petitioner. Proper stewardship of the larger property would be supported by the Petitioner’s partnership with the Hawaiian Islands Land Trust with the creation of a conservation easement for 156.5 acres of the 164.4 acre parcel.

## **2.1.1 Assessment of Future Demand for Burial Space**

There is a growing demand for more burial spaces on O‘ahu through the year 2040 due to the island’s growing population, an increasing aging population, and subsequent increasing mortality rate that are discussed in greater detail.

### **2.1.1.1 Growing Resident Population**

The resident population of O‘ahu (City and County of Honolulu) has grown a total of about 90% over the past five decades from 500,409 persons in 1960 to 955,775 persons in 2010. This reflected a compounded annual growth rate varying between 1.0% to 2.4% (DBEDT, 2017). The estimated number of persons in 2017 is 995,583 (CBRE, 2018). In the future, O‘ahu’s population is projected to continue increasing annually between 0.3% to 0.5% to about 1,086,700 persons by the year 2040 (DBEDT, 2017). CBRE forecasts a minimum and maximum range in the year 2040 of 1,086,700 persons and 1,142,430 persons, respectively. Table 2.1 summarizes the historic and future projected populations for O‘ahu and the State of Hawai‘i.

<b>Table 2.1. Historic and Future Population of O‘ahu and State</b>			
<b>Year</b>	<b>Population State of Hawai‘i</b>	<b>Population City &amp; County of Honolulu</b>	<b>City Annual Growth Rate</b>
1990	1,108,220	836,231	-
2000	1,212,670	876,156	-
2010	1,363,620	955,775	-
2020*	1,481,240	1,003,710	0.5%
2030*	1,602,340	1,052,130	0.5%
2040*	1,708,920	1,086,710	0.3%
CBRE Forecast Range		<b>1,086,710</b> <b>1,142,430</b>	
* Projected Source: 2016 State of Hawai‘i Data Book, Table 1.26			

### **2.1.1.2 Aging Resident Population**

Hawai‘i’s resident population reflects an aging demographic characteristic with increasing numbers of persons over the age of 55. This is a trend which reflects the baby boomer generation moving into and through their 50s and 60s.

As seen in Table 2.2, the total of Hawai‘i residents that are 55+ years of age is projected to increase from 19.8% of the population in 1990 to 33.8% by the year 2040. The numbers for population cohorts ages 70+ are even more dramatic. As a percentage of the overall population, the age 70+ cohort group will grow from 7.2% of the population in 1990 to a projected 18.9% by 2040. This translates to a significant increase in terms of overall numbers, from 79,421 persons in 1990 to a projected 323,560 persons by 2040.

Table 2.2. Projected Aging Resident Population (Statewide)					
Year	Total Population State of Hawai'i	Age 55+ (Statewide)	Percentage Age 55+	Age 70+ (Statewide)	Percentage Age 70+
1990	1,108,220	219,108	19.8%	79,421	7.2%
2000	1,212,670	266,943	22.0%	117,467	9.7%
2010	1,363,620	374,860	27.5%	138,420	10.2%
2020*	1,481,240	476,420	32.2%	198,576	13.4%
2030*	1,602,340	537,650	33.6%	278,990	17.4%
2040*	1,708,920	576,940	33.8%	323,560	18.9%
* Projected					
Source: 2016 State of Hawai'i Data Book, Table 1.27					

### 2.1.1.3 Increasing Death Rate

National death statistics show that the overall death rate has steadily, albeit marginally, declined over the past two decades in the United States (U.S.). However, the total nationwide population has increased at a much faster rate, resulting in an increasing death count each year. The number of deaths nationally has risen at a compounded annual growth rate of 0.9% since 1997.

With the average age of Americans nearing stabilization at over 37 years, and the average life expectancy at over 78 years, there is a greater proportion of Americans reaching into the upper-age demographic (above 65 years). As a result, the number of future deaths nationally and subsequent demand for industry services will continue to grow into the foreseeable future (CBRE, 2018).

### **O'ahu and Statewide Historic Deaths**

The historic number of deaths occurring on O'ahu has been steadily increasing over the years corresponding to the growing population and increasing demographic aging of residents. Table 2.3 displays the historic number of deaths for the O'ahu resident population from 1997 through 2017, with annual data and changes provided over the past 10 years (2007 to 2017).

During the 20-year period from 1997 to 2017, the resident population has increased at a growth rate of 0.6% annually, reaching 995,583 persons in 2017. The number of resident deaths has grown at an annual rate of 2.3% per year to reach an annual total approaching 8,000 persons in 2017. The number of deaths as a percentage of the resident population has also steadily increased from 0.69% in 2007 to 0.80% in 2017 as shown on Table 2.3. Therefore, the island's death rate as a percentage of the growing population is steadily increasing along with the annual number of deaths.

Table 2.3. Historic and Future Population of O‘ahu and Statewide				
Year	Population: City & County of Honolulu	Resident Deaths: City & County of Honolulu	Deaths as Percent of Population	Percentage Annual Change in Deaths
1997	886,711	5,467	0.62%	-
2002	890,473	6,081	0.68%	-
2007	925,335	6,421	0.69%	-
2008	933,680	6,474	0.69%	0.8%
2009	973,177	6,742	0.69%	4.1%
2010	953,207	6,978	0.73%	3.5%
2011	965,629	7,125	0.74%	2.1%
2012	974,990	7,426	0.76%	4.2%
2013	984,730	7,542	0.77%	1.6%
2014	988,586	7,754	0.78%	2.8%
2015	993,166	7,878	0.79%	1.6%
2016	992,605	7,806	0.79%	-0.9%
2017	995,583	7,960	0.80%	0.3%
Source: CBRE, Inc., 2018				

### **Future Projected Deaths**

CBRE used historic rates to forecast future population, death rates and total deaths on O‘ahu through 2040 under two scenarios. Scenario One is a minimum forecast and assumes the State’s 2040 population forecast and death rates are consistent with those of the past 20 years. Scenario Two is a maximum forecast reflecting population growth trends since 1997, and a modestly higher death rate in-line with anticipated demographic changes due to the increasing proportionate of aging Hawai‘i residents.

The Scenario One model forecasts there would be a cumulative total of about 225,710 deaths among O‘ahu residents from 2018 and 2040. The Scenario Two model quantifies the projected deaths at about 245,130 persons during this same period, and reflects an 8.6% increase over Scenario One. Table 2.4 shows a summary of projected deaths given demographic trends from the year 2000 to 2040. More analytical details are provided in CBRE’s report in Appendix B. As shown on this table, there is projected to be between about 11,700 and 12,860 annual deaths on O‘ahu by 2040. This would be over twice as many deaths that occurred in the year 2000, and over 46% greater than that occurring in 2017.

Table 2.4. Summary of Future Projected Deaths (O'ahu)			
Description	Year 2000	Year 2017 (Current)	Year 2040 (Projected)
<b>Resident Population</b>	878,908	992,605	
Minimum Forecast			1,086,710
Maximum Forecast			1,142,434
<b>Mortality Rate</b>	0.65%	0.80%	
Minimum Forecast			1.08%
Maximum Forecast			1.19%
<b>Percent of Population Over Age 65</b>	14.00%	18.00%	
Minimum Forecast			24.00%
Maximum Forecast			26.00%
<b>Annual Resident Deaths</b>	5,721	7,960	
Minimum Forecast			11,694
Maximum Forecast			12,864
Source: CBRE, Inc., 2018			

#### 2.1.1.4 Projected Disposition of Deaths

This section discusses the historic and projected methods of disposition for deaths on O'ahu. There are five standard statistical classifications of "methods of disposition" for a body following death:

1. Burial – The action or practice of interring a body in a grave.
2. Cremation – The disposal of a body by burning it to ashes (cremains). Cremains can be placed in a burial plot.
3. Removal – Indicates that the body was shipped out of the State of Hawai'i.
4. Medical Science – The body is donated for medical research purposes.
5. All Others – Includes entombment and alternative disposition methods.

Burial requires a casket, as typically does an entombment, while cremation remains are stored in urns. Interment is the act of memorializing a person following death, and placing their remains in a permanent "resting place." Interment can be via:

- Burial Plots. This can contain one or more caskets and/or several urns.
- Niches. These are above-ground spaces for urns within a "columbarium" or other specially-built structure.
- Crypts. These are specially-built structures that are generally above ground in Hawai'i with spaces for bodies/caskets.

The total number of potential individuals that can be interred in a cemetery or memorial park can vary in accordance with the wishes of the family, and the size, scope and rules of the facility. The number of caskets and/or urns permitted in a plot differs between cemeteries, as does the number and size of columbarium or niche structures. Generally, most cemeteries on O'ahu, including the existing HMP, create about 1,000 to 1,100 burial spaces per developed acre.

### **Historic Method for Burial Disposition**

Nationally, there is an evolving trend in the primary method of burial disposition from in-ground burials to cremations. The cost of traditional in-ground burials are increasing, and the proportion of the population that are Catholic or fundamental Protestant is decreasing causing a trend away from in-ground burials. The percentage of persons of Asian-ancestry or of Buddhist/Shinto/Hinduism is increasing cause a rise in the number of cremations in the U.S., particularly within the past decade. Nationally, burials have decreased from 53.3% in 2010 to 45.2% in 2015, and cremation has increased from 40.4% to 47.9%, respectively. This trend is expected to continue over the coming decade (CBRE, 2018).

The State of Hawai‘i has a higher rate of cremation due to large numbers of Asian-descendant population and the scarcity/price of land. The preferences for post-death care for Hawai‘i residents has similarly seen changes over the last 35 years as shown on Table 2.5. While the percentage of burials used to be almost equal to cremation as a choice of disposition in 1980, cremation has since risen to the preferred choice at about 72% in 2015. In 1980, 45% of those interred in Hawai‘i were buried; whereas in 2015 that percentage has decreased to about 22%. Therefore, burials and cremation presently account for about 94% of all methods of disposition. Even with a decreasing percentage of burials, the overall number of burials has been stable due to the increase in overall number of deaths.

<b>Table 2.5. Method of Disposition of Deaths (Statewide)</b>						
<b>Method of Disposition</b>	<b>1980</b>	<b>1990</b>	<b>2000</b>	<b>2010</b>	<b>2014</b>	<b>2015</b>
<b>All Methods</b>	<b>5,204</b>	<b>7,055</b>	<b>8,511</b>	<b>9,654</b>	<b>10,885</b>	<b>11,215</b>
Cremation	2,241 43%	3,564 51%	5,092 60%	6,661 69%	7,907 73%	8,097 72%
Burial	2,343 45%	2,798 40%	2,767 33%	2,322 24%	2,306 21%	2,399 22%
Removal/Other	620 12%	693 10%	652 8%	671 7%	672 6%	719 6%
Source: 2016 State of Hawai‘i Data Book, Table 2.20						

#### **2.1.1.5 Projected Demand for Interments**

Using the projected number of deaths to occur from present to the year 2040, the estimate of those being interred either by cremation or burial was determined. However, other factors have been accounted for in these projections that include: 1) veterans being buried within veteran cemeteries; 2) existing burial plots already pre-purchased; 3) O‘ahu residents being buried on the neighbor islands; and 4) non-O‘ahu residents being buried on O‘ahu. These factors are summarized below, and the resulting net projected interment demand is calculated.

### **Other Factors Considered**

Veterans Buried Within Veteran Cemeteries. Military veterans represent just over 8% of O‘ahu’s population. This amount has been decreasing at 0.05% compounded annually over the past two decades. These individuals have alternative cemetery spaces available to them in federal and/or state memorial parks, such as the Hawai‘i State Veterans Cemetery adjacent to HMP. A 2001 national survey of veterans concluded that approximately 18% of veterans desiring interment would be buried in military/veteran facilities (CBRE, 2018).

Using projected population figures for O‘ahu, the number of annual veterans deaths were determined. This is projected to be about 690 veteran deaths annually in 2018 that increases to about 935 persons annually by 2040. The 18% national factor for veterans desiring to be burial in military/veteran facilities was then applied. This results in about 126 (year 2018) increasing to 170 (year 2040) veterans annually, a cumulative total of about 3,380 veterans between 2018 and 2040, being interred within veteran cemeteries on O‘ahu.

Pre-Purchased Burial Spaces. Every major cemetery on O‘ahu has sold plots, niches, and crypt spaces to families or individuals who are still living, and won’t be “absorbed” until the owner is interred. CBRE’s survey of the major cemeteries on O‘ahu indicates there are about 50,000 burial spaces in this “on-hold” category, and about 25,000 of these spaces are within the existing HMP cemetery. It was conservatively forecast that all these burial plots would be used during the year 2018 to 2040 projection time-frame at the rate of 2,200 persons per year through 2035, and 2,080 annually over the last five-year period (2036 to 2040).

O‘ahu Residents Buried on the Neighbor Islands. An increasing number of O‘ahu families are electing to bury their relatives in Neighbor Island cemeteries due the higher average costs on O‘ahu. Based on CBRE’s discussions with funeral and cemetery directors in Hilo and on Maui, and review of available media publications, it was estimated that about 250 persons per year from 2018 through 2025 would take this alternative. This is projected to increase to 400 persons per year through the year 2035, and up to 500 persons per year through 2040.

Non-O‘ahu Persons Buried on O‘ahu. Acknowledged to be a generally rare occurrence, an allocation of 15 burials of this type per year would contribute to O‘ahu’s net demand.

### **Projected Number of Disposition by Cremation**

Using the projected number of deaths to occur from present to the year 2040, the estimate of those being interred by cremation was determined. Not all cremations result in interment creating demand for additional burial spaces. On a national level, according to the Cremation Association, about 35% of persons considering cremation have their ashes scattered. About 8% have their urn kept in a family home.



Hawai'i residents have a longer and more extensive experience with cremation, and are more respectful of interment than the national population due to this state's large and strong Asian-based heritage. Discussion with O'ahu mortuaries indicates that at most 25% of cremated decedents have their ashes scattered (some opined as few as 15% to 20%), and well less than 10% have their urns kept within family homes. The majority of cremations are thus interred in burial plots, niches, or crypts.

CBRE developed minimum (Scenario One) and maximum (Scenario Two) burial space demand scenarios projecting cremation on O'ahu given Hawai'i's large Asian population and cultural components, and input from existing mortuaries. In Scenario One, only 18% of O'ahu cremations are estimated to result in a scattering of ashes and about 4.6% are disposed otherwise. Scenario Two assumes only 12% of O'ahu cremations results in the ashes being scattered and 3% being disposed otherwise.

Under Scenario One, it was estimated that a cumulative total of 139,276 persons would need to be interred (burial plot) by cremations on O'ahu between 2018 and 2040. Under Scenario Two, the cumulative total number of interred cremations during this same time period is forecast to be 158,409 persons. Annual interred cremations would increase from between 4,450 to 4,990 in 2018 to about 7,940 to 9,200 by 2040.

### **Projected Number of Disposition by Burial**

The number of in-ground (casket) burials projected from 2018 through 2040 is a residual estimate calculated by deducting the number of cremations projected in each scenario from the respective total burial estimates. Under Scenario One, the ratio of deaths that are interred increases at a rate of 0.01% compounded annually, resulting in a cumulative total of 75,402 burials on O'ahu between 2018 and 2040. In Scenario Two, the ratio of deaths that are interred increases at a rate of 0.015% compounded annually, resulting in a total of 76,924 burials during this same period. Annual burials would increase from between 2,670 to 3,150 persons in 2018 up to about 3,300 to 4,100 persons by 2040.

### **Projected Net Demand for Interment**

A model forecasting the net demand for additional burial spaces on O'ahu from the year 2018 through 2040 was developed using the variables and assumptions previously discussed. A summary of the net demand is shown in Table 2.6 by five interval periods for both the minimum and maximum demand scenarios. The first interval is 3 years (2018-2020), and the remaining intervals are divided into 5 years each (2021-2025, 2026-2030, 2031-2035 and 2036-2040).

<b>Table 2.6. Projected Net Demand for Burial Spaces (2018 to 2040)</b>						
<b>Description</b>	<b>2018 to 2020</b>	<b>2021 to 2025</b>	<b>2026 to 2030</b>	<b>2031 to 2035</b>	<b>2036 to 2040</b>	<b>Totals</b>
<b>Scenario One - Minimum Demand</b>						
Projected Interred Cremations	13,694	25,434	29,110	33,260	37,778	139,276
Projected Burials	9,490	16,160	16,500	16,675	16,578	75,402
<b>Total Interments</b>	<b>23,184</b>	<b>41,594</b>	<b>45,609</b>	<b>49,935</b>	<b>54,355</b>	<b>214,678</b>
Purchased Burial Spaces (Unused)	6,600	11,000	11,000	11,000	10,400	50,000
Veterans at Veteran Cemeteries	382	673	723	775	829	3,383
Residents Interred on Other Islands	1,500	2,500	3,750	3,750	5,000	16,500
Non-O'ahu Residents Buried on O'ahu	30	50	50	50	50	230
<b>Total Net Demand for Burial Spaces</b>	<b>14,732</b>	<b>27,471</b>	<b>30,186</b>	<b>34,460</b>	<b>38,176</b>	<b>145,025</b>
<b>Scenario Two - Maximum Demand</b>						
Projected Interred Cremations	15,385	28,674	32,954	37,872	43,524	158,409
Projected Burials	8,180	14,762	16,286	17,946	19,751	76,924
<b>Total Interments</b>	<b>23,564</b>	<b>43,436</b>	<b>49,239</b>	<b>55,818</b>	<b>63,275</b>	<b>235,332</b>
Purchased Burial Spaces (Unused)	6,600	11,000	11,000	11,000	10,400	50,000
Veterans at Veteran Cemeteries	382	673	723	775	829	3,383
Residents Interred on Other Islands	1,500	2,500	3,750	3,750	5,000	16,500
Non-O'ahu Residents Buried on O'ahu	30	75	75	75	75	345
<b>Total Net Demand for Burial Spaces</b>	<b>15,128</b>	<b>29,338</b>	<b>33,841</b>	<b>40,367</b>	<b>47,120</b>	<b>165,795</b>
<b>Mid-Point Total Periodic Interments</b>	<b>14,930</b>	<b>28,404</b>	<b>32,014</b>	<b>37,414</b>	<b>42,648</b>	<b>155,410</b>
Source: CBRE, Inc., 2018						

Totals for projected interred cremations and burials by intervals are estimated. This total is then deducted (shown in Red) for unused burial spaces already purchased, veterans interred in veteran cemeteries, and for residents interred on other islands. Finally, an allowance is added for non-O'ahu persons wanting to be interred on O'ahu. The resulting "net" demand for burial spaces is then shown for interval periods.

Based upon the forecast, the projected range for additional burial space on O'ahu by 2040 would total between 145,030 and 165,800 spaces. The mid-point demand for burial spaces would be about 155,400 spaces by 2040. The demand for burial spaces would increase by about 14% to 17% during each 5-year incremental period from 2020. Using the mid-point estimate, this would increase from about 28,400 burial spaces during the 2020 timeframe increment up to 42,650 burial spaces during the 2035 timeframe. This shows that there will be a significant demand for burial space on O'ahu over the next 20+ years to accommodate the increasing and aging resident population.

## **2.1.2 Evaluation of Existing and Future Inventory**

This section discusses the existing and future inventory of burial spaces available on O‘ahu to accommodate to projected demand to the year 2040. A discussion of HMP’s remaining inventory of available spaces is provided along with consideration of spaces available at other O‘ahu cemeteries (non-veteran cemeteries).

### **Background on Cemetery Industry**

The cemetery industry provides products and services to bereaved family members of the deceased, which includes:

- Sales of burial spaces, such as in-ground plots, niches in columbariums and memorials, and crypts in mausoleums.
- Sales of funerary-related merchandise such as coffins, urns, grave markers, and ornamental goods.
- Provision of mortuary services such as embalming, cremation, body preparation and transportation, and memorial/funeral services.

#### **2.1.2.1 Inventory of HMP Available Plots Being Exhausted**

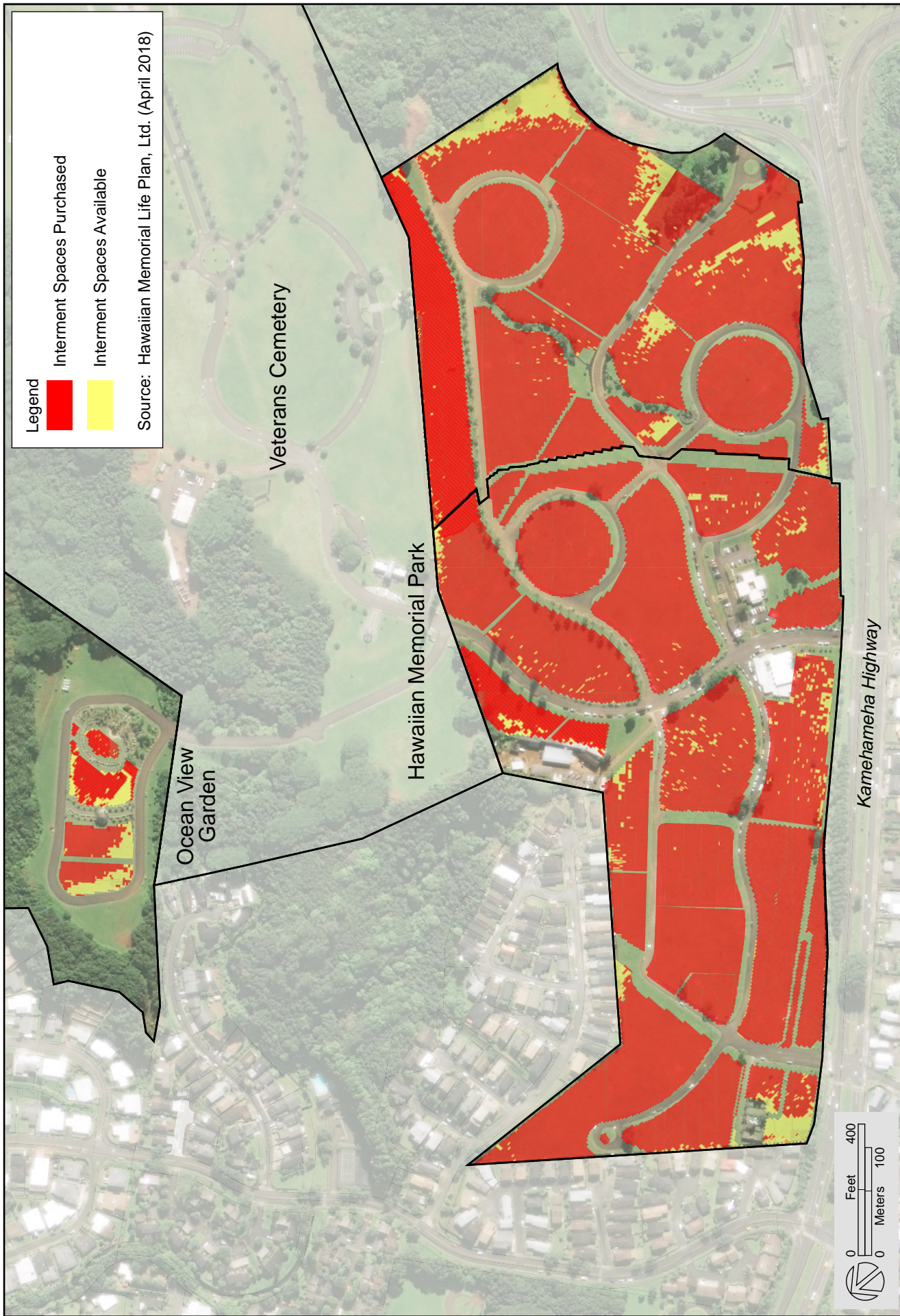
As of April 2018, HMP has sold over 94% percent of available burial plots, and anticipates it will exhaust its available supply of burial plots in the near-term. As shown on Figure 2.1, of the approximately 79,000 individual plots within HMP, less than about 6% (about 4,500 plots) remain available for the public. HMP has been selling about 700 burial plots a year. Consequently, HMP’s inventory of plots is significantly constrained and could be exhausted in about 5 years, if not sooner.

#### **2.1.2.2 Inventory of Other Cemeteries Available**

There are six other major cemeteries on O‘ahu that are still offering burial plots. Appendix B has more information on these cemeteries. Most of these cemeteries provide burial plots, and mausoleum and columbarium for families wanting above ground places, along with cemetery and mortuary services for families. A summary of these cemeteries is provided below.

1. Diamond Head Memorial Park. Established in 1936, this cemetery is located on 25 acres in the Diamond Head community at 529 18<sup>th</sup> Avenue. This cemetery is estimated to have a total of about 30,500 existing burials (including niches and crypts). It is estimated that this cemetery has about 300 burial plots and 1,000 niches of inventory available.





**Hawaiian Memorial Park Remaining Interment Plots** **Figure 2.1**

Hawaiian Memorial Park Cemetery Expansion Project Draft Environmental Impact Statement  
 Kāne'ohe, O'ahu, Hawai'i

2. Nu‘uanu Memorial Park. Incorporated in 1949, but with a longer history tied to the Royal Mausoleum, this cemetery is located on 3.5 acres in the Nu‘uanu community at 223 Nu‘uanu Avenue. This cemetery is estimated to have a total of about 7,800 existing burials. It is also estimated this cemetery has no burial plots available, but does have 200 crypts and 500 niches of inventory available. Thus, Nu‘uanu Memorial Park is effectively “sold out” with only a limited number of crypts and niches remaining.
3. O‘ahu Cemetery. Founded in 1844, O‘ahu Cemetery is Hawai‘i’s oldest public cemetery. This cemetery is located on 15.5 acres in the Nu‘uanu community at 2162 Nu‘uanu Avenue. It is estimated to have a total of about 25,000 existing burials. It is also estimated that this cemetery has 100 burial plots, and 600 niches of inventory available. O‘ahu Cemetery is also effectively “sold out” with only a limited number of burial plots and niches remaining in inventory.
4. Valley of the Temples Memorial Park. Founded in 1963, this cemetery is the largest on O‘ahu within 244 acres of property located in the Temple Valley community at 47-200 Kahekili Highway. This memorial park also attracts thousands of visitors a year with its Zen garden, wild peacocks, meditation pavilion, Byodo-In Temple, and Shinji-iki reflection pond. This cemetery is estimated to have a total of about 88,000 existing burials, making it comparable to HMP. It is estimated to have about 7,500 burial plots and 2,200 niches of inventory available.
5. Mililani Memorial Park. Opened in 1965, Mililani Memorial Park is located on 143 acres in the Waipio community at 94-560 Kamehameha Highway. This memorial park acquired the Mililani Downtown Chapel in 1976 and expanded their facilities in 1995 to now provide two additional chapels (Mauka and Makai Chapels) at the Waipio site. This cemetery is estimated to have a total of about 70,000 existing burials, and about 3,800 burial plots available.
6. Lā‘ie Cemeteries. Established in 1922, this cemetery predominantly serves the Lā‘ie community and is located on 5 acres at 55-710 Wahinepee Street. The site predominantly consists of burial sites, and without facilities supporting cemetery and mortuary services. This cemetery is estimated to have a total of about 4,200 existing burials, and has about 300 burial plots available.

Based upon CBRE’s interviews with cemetery personnel and research of available records, it is estimated there are currently about a total of 16,500 burial plots remaining from the six major O‘ahu cemeteries previously described. This total does not include the estimated 3,600 burial plots remaining within HMP’s inventory. Collectively all of these cemeteries have a total remaining inventory of 20,100 burial plots.

### **New Cemeteries Planned**

Future expansions of existing cemeteries or new cemeteries was researched by CRBE to evaluate future projected burial space. Overall, there is a significant barrier to entry in the O‘ahu cemetery sector due to the scarcity of available sites, high land costs, infrastructure expenses, and

community issues. There hasn't been a new public cemetery opened on the island in over 50 years, despite evident rising demand and dwindling supply.

Plans for a new cemetery on a 69-acre parcel in Kamilo Nui Valley in Hawai'i Kai were approved by the City Council in 2001. However, development of this site was never initiated, and ownership of the property has changed hands on multiple occasions (in 2003 and 2006). Plans for the new cemetery proposed a total of approximately 45,000 to 60,000 plots, and a first phase was proposed to contain 12,000 burial plots.

In 2010, present ownership entities involved with this development entered bankruptcy. Later that year, the project was restructured and was periodically announced to begin moving forward; though no additional details or project schedules have proven realistic. In May 2015, it was reported that the present landowner is Hawai'i Kai Memorial Park LLC, and they were trying to obtain a cemetery license from the State (Fujimori, 2015). The property also has site issues because the ground is a layer of rock with little topsoil, therefore, an estimated 50,000 cubic yards of material needs to be imported to develop a landscaped cemetery (Gomes, 2012). Currently, this cemetery project is still believed to be hindered by bankruptcy issues, no State cemetery license has been issued, and the site is instead being used for stockpiling materials that has generated opposition from the surrounding community.

### **Additional Inventory Projected**

CBRE estimated the total number of remaining existing and additional proposed burial space that may be available for O'ahu by the year 2040. A few existing cemeteries have plans to add more burial spaces based upon research. An allocation was also added for the new Hawai'i Kai Memorial Park LLC, (Hawai'i Kai Cemetery) even though existing issues make its feasibility questionable. Table 2.7 shows the estimated burial spaces that could be added to the inventory by 2040, not including the proposed HMP expansion.

Overall, about 105,500 new burial space could be provided within the 2040 study timeframe (without existing HMP space). Including remaining available burial spaces at HMP adds about another 3,600 burial spaces to the existing inventory resulting in a current island total of about 20,100 spaces. In 2040, this would total 109,100 burial spaces, including existing HMP.

No new expansions are planned by Diamond Head Memorial Park, Lā'ie Cemetery, Nu'uanu Memorial Park, and O'ahu Cemetery, and these sites do not have additional property to develop. Therefore, only Valley of the Temples Memorial Park and Mililani Memorial Park are proposing development to provide additional burial space to accommodate future needs. Without the Hawai'i Kai Cemetery, the future total of available plots would decrease to 85,100 plots by 2040. With a future projected demand of between 145,030 and 165,800 burial spaces needed, the likely inventory of between 85,100 to 109,100 spaces would be significantly short of adequately meeting this demand.



<b>Table 2.7. Maximum Estimate of Existing Remaining and Proposed New Burial Space</b>			
<b>Cemetery Description</b>	<b>Combined Burial Plots, Crypts and Niche Spaces</b>		
	<b>Existing Available</b>	<b>Currently Proposed</b>	<b>Total Available and Proposed</b>
Diamond Head Memorial Park	1,300	0	1,300
Nu'uuanu Memorial Park	700	0	700
O'ahu Cemetery	700	0	700
Valley of the Temples Memorial Park	9,700	46,000	55,700
Mililani Memorial Park	3,800	19,000	22,800
Lā'ie Cemetery	300	0	300
(1) Hawai'i Kai Cemetery (Proposed)	0	24,000	24,000
<b>Totals</b>	<b>16,500</b>	<b>89,000</b>	<b>105,500</b>
Hawaiian Memorial Park (2)	3,600	0	3,600
<b>Totals</b>	<b>20,100</b>	<b>89,000</b>	<b>109,100</b>
Note (1): Two phases of 12,000 burials spaces each have been included, to provide a more conservatively high number of future burial space that could be available. Note (2): Future proposed by HMP subject to completion of entitlement process Source: CBRE, Inc., 2018			

### 2.1.3 Appropriateness of Petition Area and Absorption Estimates

The previous section quantified that there is significant future market demand for more burial space based upon demographics and evaluation of existing and proposed inventory. This section discusses the appropriateness of the proposed HMP expansion area from a market perspective to meet this future projected demand. CRBE's evaluation of this aspect documents the HMP expansion project's competitiveness and resulting probable market shares.

The conceptual plan for the proposed project is consistent with modern cemetery planning objectives. This includes considerations for views, maximizing use of easily walkable terrain, creating individual/exclusive burial areas, and addressing feng shui issues that is an important consideration in Hawai'i. Features of the Petition Area considered most relevant relative to achieving full market acceptance are identified:

1. Exceptional panoramic views stretching for miles along the Ko'olau Pali, encompassing the hills of Mōkapu Peninsula and Kaneohe Bay.
2. HMP provides feelings of serenity for family members enhanced by a surrounding buffer of dense vegetation and open spaces, and insulation from future intruding land uses. At one time, it was acclaimed as the most beautiful memorial park in the United States.
3. The site would have a gently flowing terrain creating discrete memorial gardens within the larger HMP cemetery.

4. The Petition Area, as an expansion of HMP, provides excellent exposure and direct access from Kamehameha Highway and the H-3 Freeway. In addition, the Likelike Highway and Pali Highway located about 1.5 miles to the north and south, respectively, provide convenient additional vehicle access and route options for residents.
5. HMP has good proximity to Kāneʻohe and Kailua, which are the two largest towns in the windward district, and the cemetery site is only 10 miles away from Downtown Honolulu. HMP is also the closest cemetery to urban Honolulu with significant numbers of burial spaces available.
6. The favorable windward climate with a higher island rainfall helps keep HMP cemetery lawns along with surrounding areas green and lush (CBRE, 2018).

There are other qualitative factors that contribute to the HMP's attractiveness and marketability to O'ahu families.

1. There are many family members from all parts of the island buried at HMP. Only the Valley of the Temples Memorial Park has more existing burials than HMP. Just as there is a societal tendency for families and friends to settle in the same neighborhood or community, many families desire to have burial space in the same area of the cemetery as their parents and other relatives to be close to them from a relational perspective. This is called "Heritage," and is an important part of the end of life experience and choice. This places long-term demands on memorial parks to fulfill these important desires. Space management for the cemetery requires that vacant burial plots be scattered throughout the park to allow families to locate close to other family members as a final resting place.
2. The Hawai'i State Veterans Cemetery is relatively new and located inland of HMP, and shares the same main vehicular entrance from Kamehameha Highway. As a result, existing veterans and many future veterans would eventually be buried at this cemetery. There would be a tendency for family members to want to be located at HMP to be closer to family as part of the Heritage factor.
3. There is also a practical consideration and benefit to being located close to family members, so that family and relatives can easily visit a single cemetery site to pay respects instead of having to travel to different locations (e.g. HMP to Mililani Memorial Park).
4. Another form of "Heritage" is the very important desire for religious and ethnic groups in the greater community to have special affinity gardens tailored to their customs, rituals, and symbolism. HMP plans for and accommodates such gardens and the inevitable expansion required over time to accommodate these groups and their members. HMP supports these religious and ethnic factors throughout the cemetery, which would be accommodated and complemented with the proposed expansion. HMP is non-denominational, welcoming all religions and cultures. It includes a floral urn garden with Buddhist figures, accommodates Asian shrines, etc. Other features supporting the site's desirability include a memorial of "The Fraternal Order of Eagles," a memorial for the Honolulu Police Department and Honolulu Fire



Department. HMP includes a number of iconic Hawaiian musicians, and most recently added a memorial monument dedicated to Hawai'i's Gold Star Families.

### **Projected HMP Expansion Absorption Rate**

Given the various factors contributing to HMP's attractiveness and marketability, the proposed expansion would be highly supportive of meeting the projected market demand for additional burial space over the next 20+ years, and should be successfully absorbed during the 2040 study period. The probable absorption velocity for the additional burial spaces created by the proposed HMP expansion project was estimated by CBRE using three methodologies:

1. Gross Demand/Supply Comparison. This technique assumes that if there is insufficient existing and planned supply to meet projected market gross demand levels during the projection period, there is rational support for the subject project.
2. The Residual Method. Under this method, all the competitive inventory existing and proposed for development on O'ahu during the 2018-2040 projection period is placed on a time-line depicting their combined anticipated rates of absorption or assuming a reasonable market share. To the extent this supply of burial spaces falls short of the forecast demand for space on O'ahu, an undersupply situation is present generating a "residual" demand for the inventory created by the HMP expansion. This method is considered the most conservative because it allows the maximal competitive product to achieve their full absorption potential before any residual demand flows to absorb the subject.
3. The Market Shares Method. This approach accounts for the probable competitiveness of the project's inventory regardless of the total level of product being otherwise offered on the market. It is an estimate of how much of the total forecast net demand for additional burial spaces on O'ahu the project could expect to capture on an annual basis considering its history, location, product type, probable pricing, perceived competitiveness, and other characteristics.

Gross Demand Results. On an islandwide basis, the Gross Demand method indicates there is strong support for the HMP expansion project. The net demand for non-military burial spaces on O'ahu through 2040 is forecast to be between 145,000 to 164,800 total burial plots. The remaining unsold existing and proposed inventory (not including HMP) total about 105,500 burial spaces or only 64% to 73% of the needed inventory. If the Hawai'i Kai Cemetery does not materialize given its history of issues, these percentages would decrease considerably to only 49% to 56% of projected demand being met. Therefore, this Gross Demand method shows the proposed HMP expansion project would be highly supportive of sufficient market demand existing over the next 20+ years, and new burials should be successfully absorbed during a reasonable exposure period.

Residual Demand Results. Using the Residual Demand method, there would still be a substantial unmet demand needed for burial space through 2040. If it is reasonably assumed that existing unused burial space and additional proposed burial space at existing cemeteries are developed by 2040, there would be 105,500 new spaces provided for O'ahu families. This total would be

110,000 plots if the unused burial space existing at HMP is also added. However, there will remain substantial unmet residual demand throughout the 2040 study period given the projected 145,000 to 164,800 total burial plots needed. Table 2.8 summarizes this by increment periods.

<b>Table 2.8. Projection of Potential Absorption Using Residual Method (2018 to 2040)</b>						
<b>Description</b>	<b>2018 to 2020</b>	<b>2021 to 2025</b>	<b>2026 to 2030</b>	<b>2031 to 2035</b>	<b>2036 to 2040</b>	<b>Totals</b>
<b>Scenario One - Minimum Demand</b>						
Assumed Supply of Burial Space	13,761	22,935	22,935	22,935	22,935	105,500
O'ahu Net Burial Spaces Demand	14,732	27,471	30,186	34,460	38,176	145,025
Shortage or (Excess) Supply	971	4,536	7,252	11,525	15,241	39,525
<b>Potential Residual Minimum Demand</b>						
100% Capture Rate	971	4,536	7,252	11,525	15,241	39,525
95% Capture Rate	923	4,309	6,889	10,949	14,479	37,549
<b>Scenario Two - Maximum Demand</b>						
Assumed Supply of Burial Space	13,761	22,935	22,935	22,935	22,935	105,500
O'ahu Net Burial Spaces Demand	15,128	29,338	33,841	40,367	47,120	165,795
Shortage or (Excess) Supply	1,367	6,403	10,907	17,432	24,186	60,295
<b>Potential Residual Minimum Demand</b>						
100% Capture Rate	1,367	6,403	10,907	17,432	24,186	60,295
95% Capture Rate	1,298	6,083	10,361	16,561	22,976	57,280
<b>Scenario Three - Mid-Point Demand</b>						
Assumed Supply of Burial Space	13,761	22,935	22,935	22,935	22,935	105,500
O'ahu Net Burial Spaces Demand	14,930	28,404	32,014	37,414	42,648	155,410
Shortage or (Excess) Supply	1,169	5,469	9,079	14,479	19,713	49,910
<b>Potential Residual Minimum Demand</b>						
100% Capture Rate	1,169	5,469	9,079	14,479	19,713	49,910
95% Capture Rate	1,111	5,196	8,625	13,755	18,728	47,414
Source: CBRE, Inc., 2018						

Table 2.8 shows three scenarios consisting of a minimum demand, maximum demand, and mid-point demand. Even if the assumed supply made available at other cemeteries achieves full absorption within reasonable periods, there will be excess residual demand available for the 33,600 total remaining HMP burial spaces (estimated 3,600 in existing acreage and 30,000 for expansion project). The shortage in supply increases considerably under the mid-point scenario from 1,169 in years 2018 to 2020 up to almost 20,000 burial spaces during the 2036 to 2040 period.

CBRE's analysis shows HMP burial spaces would be expected to successfully capture left-over, unmet demand under both 95% and 100% capture rate projection scenarios. Using the residual analysis, the remaining and new burial space (from expansion project) inventory at HMP would be fully absorbed (sold-out to final users) within 15 to 19 years, with a mid-point of 17 years.

Given HMP's desirable location, the unique qualities of its cemetery site and support facilities, its historic market standing, and anticipated pricing envisioned for new inventory resulting from the HMP's expansion, it will achieve a solid market standing and prove competitive in the O'ahu

burial plot market. HMP would be able to garner a reasonable share of total island net demand regardless of the numbers of competing plots offered.

Market Shares Results. Using the Market Shares method, CBRE estimates that the HMP cemetery with proposed expansion could readily achieve an average “capture rate” (market shares) rate of 30% to 33% of O‘ahu’s total net burial space demand during the projection period. This capture rate was determined to be a reasonable and appropriate fraction of the total demand given HMP’s historic market penetration, and because there will only be two or three other cemeteries offering competing (though probably less desirable) burial spaces and location.

Using this method, a total absorption period for the proposed expansion burial spaces would be between 15 and 18 years (minimum and maximum demand forecast), with a mid-point at 16.8 years. This equates to an average market capture rate of 29.8% with an average annual absorption of 1,975 plots.

Conclusion. The correlation of the analysis resulting from the three absorption quantification techniques indicates that HMP’s total 33,600 burial spaces associated with 30,000 new spaces created with this expansion project, plus 3,600 existing inventory remaining, should achieve full absorption within approximately 17-years of the expansion area’s opening for sale and interment in 2021.

## **2.1.4 Need for Cultural Practices and Stewardship**

### **Need for Cultural Practices**

There is a need to support traditional native Hawaiian cultural practices within the Petition Area and larger Parcel 1 property. Kawa‘ewa‘e Heiau is a significant historic site listed in the National Register of Historic Places. Members of the Ko‘olaupoko Hawaiian Civic Club have served as caretakers of this heiau and the surrounding area to the extent possible. Kawa‘ewa‘e Heiau currently requires extensive clearing given the widespread growth of invasive flora, along with other landscape restoration and maintenance. Improving access to and within this area is needed to support these efforts, which requires clearing trees, etc. Other historic sites in the vicinity would also be included as part of cultural landscape restoration efforts.

Other cultural practices also occur in the vicinity, such as collecting plants for hula-related activities and other plants with traditional medicinal value. Cultural organizations have expressed a desire to conduct traditional native Hawaiian burials in the heiau vicinity as part of cultural practices. The adoption of the “clean burial” law by the Hawai‘i legislature in 2015 (Act 171) recognized and allows for the preparation of a deceased person for burial in a manner consistent with traditional native Hawaiian cultural customs and such burials are intended within the Cultural Preserve.

Consequently there is a need to establish a Cultural Preserve where such cultural practices and activities can occur. The Preserve would need to include a preservation plan to guide and regulate cultural activities, access, management responsibilities, and coordination responsibilities with the landowner (Petitioner). The project proposes to establish a 14.5 acre site for the Cultural Preserve.

The boundary amendment is required for the Cultural Preserve because activities that would occur in the Preserve are not allowed within the State Conservation District. HMP is unique compared to other cemeteries due to the presence of Kawa'ewa'e Heiau and the cultural significance of this site, which complements and supports the opportunity to have native Hawaiian burials following traditional practices. New burials would need to be recorded and coordinated with the Petitioner as part of applicable state burial and cemetery regulations. Establishing a Cultural Preserve would further define boundaries where activities could occur supporting management efforts. The preservation plan included as part of the Cultural Preserve would support this need and ensure the long-term restoration, maintenance, and stewardship of the area.

### **Need for Long-Term Stewardship**

There is a need to establish long-term stewardship responsibilities for the 156-acre property (does not include HMP's 7.9-acre existing Ocean View Garden site). Areas of the property outside of the Petition Area would remain undeveloped, but some management and stewardship of this area is necessary for the future. Efforts are needed to prevent unauthorized use of the remaining areas because the area could be accessed from surrounding properties.

A conservation easement is proposed for the remaining 156.5 acres of this property to address long-term management and stewardship of the area. A conservation easement is a legal agreement between a landowner and a third party that permanently limits uses of the land. The conservation easement would ensure no future urban development of the remaining 103 acres outside of the Petition Area would occur and that development of the Petition area would be limited to cemetery use and the Cultural Preserve. The conservation easement would establish a partnership between the Petitioner and the Hawaiian Islands Land Trust, and allow for that organization to oversee the long-term management of remaining undeveloped areas. This conservation easement would also oversee the Cultural Preserve and ensure the long-term stewardship of this area as well.

### **2.1.5 Project Objectives**

Without proper planning for the future, Hawai'i residents could easily face a shortage of cemetery space in the near future based upon the results of the market study. At the base of the Ko'olau Mountains, HMP provides a convenient location for Windward, Honolulu and Leeward communities for both initial interment and subsequent visitations to a burial site by family and relatives. With O'ahu's increasing and aging population and growing yearly deaths projected, there is a need for more burial space and proper planning to ensure a crisis does not occur in the future.

The long history of HMP serving families since 1958 reflects the importance and tradition of this cemetery. The "Heritage" factor associated with HMP, which is an important part of the end of life experience and family choice, also supports the importance of HMP allowing families to have burial space in the same area of the cemetery as their parents and other relatives. The adjacent Hawai'i State Veterans Cemetery would have many future veterans buried there as well, and further supports the desire for family members wanting to be located nearby at HMP as part of the Heritage factor.

Management of cemeteries requires a large number of available inventory, especially ground burial spaces, in order to adequately service the community, specifically allowing a choice for the future generations of the families that currently own and/or are interred at HMP. Since HMP must be able to satisfy all of these different demands, it is necessary to have vacant inventory available scattered throughout the cemetery, even as new inventory is developed. Consequently, future planning must occur well in advance of the depletion of existing inventory to ensure the needs of families can be met.

Therefore, an important objective of the proposed project is to increase the number of available burial plots to ensure the long-term needs of families can be adequately fulfilled and addressed given the increasing number of annual deaths and limited number of cemetery spaces islandwide. It is also important to provide additional burial space close to HMP due to the "Heritage" factor, associated with proximity to families who have burials within HMP and the nearby Hawai'i State Veterans Cemetery. The expansion of HMP would address this objective by providing additional burial plots and options on disposition and memorialization for families for the future. The cemetery expansion area is also desirable for several other reasons (e.g. climate, location, views) as previously discussed.

The second important objective of this project is to support native Hawaiian cultural practices and the desire for native Hawaiian burials following traditional practices and protocols now permitted under a 2015 change in state law (clean burial). Kawa'ewa'e Heiau is a significant historic site that requires restoration, improved access, and maintenance to support cultural practices and activities.

Establishment of the Cultural Preserve supports these objectives. A preservation plan for the Cultural Preserve will provide guidance regarding cultural activities, access, management responsibilities, and coordination with the landowner (Petitioner) will further support these objectives and allow for proper stewardship of the area. Including the Cultural Preserve as part of the Petition Area allows for burials following traditional native Hawaiian cultural customs and practices.

The third project objective is to establish long-term stewardship responsibilities for the 164.4-acre property, less HMP's 7.9-acre existing Ocean View Garden cemetery site. As previously discussed, areas outside of the Petition Area would remain undeveloped, but would require management and stewardship oversight, guarantees of no additional development, and prevention of unauthorized or unpermitted activities. Establishing the conservation easement would create a partnership between the Petitioner and the Hawaiian Islands Land Trust, and allow the organization to support the long-term management of remaining undeveloped areas.

## **2.2 PROPOSED ACTION**

Proposed improvements (Proposed Action) within the approximately 53.45-acre Petition Area would consist of two main components: 1) expansion of the HMP cemetery; and 2) creation of a 14.5-acre Cultural Preserve immediately to the northeast of the cemetery expansion area. Other project components include internal roadways and open space. Remaining undeveloped areas of HMP's property (Parcel 1) outside of the Petition Area would continue to remain undeveloped. The 156.5 acres of the 164.4 acre parcel (less 7.9-acre Ocean View Garden) would also be placed in a conservation easement with the Hawaiian Islands Land Trust to protect it from future development of undeveloped areas. Figure 2.2 includes a Conceptual Site Plan for this project, and a summary of the proposed land use is provided.

### **Summary of Proposed Land Use**

1.	Cemetery Expansion Area	28.20	acres
2.	Internal Roadways (Approximate)	3.00	acres
3.	Cultural Preserve	14.50	acres
4.	Other Open Space Area	7.75	acres
<b>Total</b>		<b>53.45</b>	<b>acres</b>





**Figure 2.2**

## Proposed Concept Plan

Hawaiian Memorial Park Cemetery Expansion Project Draft Environmental Impact Statement  
Kāne'ohe, O'ahu, Hawai'i



## **2.2.1 Overview of Cemetery Expansion**

The majority of the approximately 53.45-acre Petition Area would be used for expansion of the cemetery by 28.2 acres (53% of total Petition Area). The cemetery expansion would involve the construction of landscaped areas for burial space. Small private structures could also be placed throughout the cemetery grounds with special features, garden walls, walkways, and monuments similar to that present within other areas of HMP<sup>2</sup>. After grading to establish appropriate slopes, the majority of the land would be landscaped with turf and would match the appearance of the existing cemetery. An internal roadway system encompassing about 3 acres would be constructed to provide access to various areas as shown in Figure 2.2.

An irrigation system would be provided to irrigate the landscape elements of the cemetery when necessary. The irrigation system for the existing HMP is served by the City's potable water system. A connection point is located at the entrance to HMP in the vicinity of Mahinui Road and Kamehameha Highway. A waterline under Kumakua Place irrigates the existing Ocean View Garden site. The feasibility of incorporating a non-potable water source for the cemetery expansion area would be evaluated during the project's design phase based upon the City Board of Water Supply's (BWS) comments. However, initial evaluation of this indicates such a non-potable water source would not be feasible or practicable. If a non-potable water source cannot be obtained, the cemetery would be allowed to hook up to the domestic water supply as the BWS has indicated there is sufficient capacity to accommodate this project.

Storm water runoff would be managed in accordance with applicable City regulations and drainage standards. The primary method planned to manage the cemetery's stormwater would be a system of detention basins designed to meet City's Drainage Standards for the 100-year, 1-hour storm event. More detailed information associated with grading and drainage improvements are discussed later.

## **2.2.2 Preliminary Grading Plans**

The proposed cemetery expansion area is generally contained within a broad drainage basin bounded by the Oneawa hill's slopes and summit ridgeline that consist of undeveloped and forested land along the lower elevation slopes. The terrain along the lower flank slopes of the Oneawa hills generally rise and steepen toward the east and south (mauka) within the cemetery expansion site, and generally decrease toward the north and west within the site.

Proposed gravesites along roadways would be designed to have slopes no greater than 20% to allow for pedestrian access. Along the fringes of the cemetery expansion site, retaining walls and cut/fill slopes would be used to tie into existing grades. The geotechnical engineer recommends both the cut and fill slopes not exceed two horizontal to one vertical slope ratio. Fill slopes would have benches at a maximum of 30 feet height intervals, and would be "keyed" in design to provide

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<sup>2</sup> There are no mausoleum buildings proposed for the project.



additional stability. Subdrains would be installed at the base of fill slopes to assure seepage water does not accumulate at the toe of the slope, which may cause instability.

In order to achieve the desired finish grades, the lower flank slopes of the Oneawa hillside on the western end of the site would need to be cut. Figure 2.3 includes a preliminary grading plan showing general areas of proposed cut and fill activities that have been developed using topographic contour data generated by the U.S. Geological Survey. Refinements to this grading plan would be determined during the project's design phase when data from a detailed topographic survey is obtained.

The majority of the hillside on the western end of the expansion site would be excavated reducing it up to 40 feet in height; however, the areas near the top of the hillside would reduce it up to 100 feet in height. A smaller ridge line below this hillside in the area generally between Lipalu Street and Ohaha Place would also be excavated. Excavations would extend up to 60 feet for this smaller ridge.

The excess soil from excavation activities would be used to fill the lower portions of the basin areas within the cemetery expansion site. As shown in Figure 2.3., these areas proposed for fill generally include areas below the current hillside, and the majority of the eastern half of the cemetery expansion site. The majority of fill activities would increase the existing height of the basin less than 20 feet; however, a section would fill up to 40 feet in height. A site section portraying the large cut section within the hillside and the lower fill areas are shown in Figure 2.4.

The estimated area of disturbance for earth moving activities is about 33.6 acres. The estimated quantities of excavation and embankment are shown below. It is anticipated the quantities will be revised as more accurate topographic survey data is available.

Estimated Excavation	470,960	cubic yards
Estimated Embankment	413,673	cubic yards
Net Change	[57,287]	cubic yards (cut)

### **Retaining Walls**

The roadways alignment and earthwork balance requirements under the preliminary grading plan necessitate the need for constructed retaining walls at various locations within the cemetery site. A total of seven retaining walls (labelled Walls A to G) are planned and were previously shown on Figure 2.3 of keystone design. These retaining walls would be utilized within the central and western areas of the Petition Area, and most are associated with the excavation of the hillside.

The keystone designed retaining walls would average about 10 feet in height, with some sections having a maximum height of 25 feet due to terrain. The use of walls taller than 10 feet tall is planned to be kept to a minimum. However, where taller wall sections are required, the keystone would be terraced to provide for a more aesthetic view complete with landscaping.

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