

EXECUTIVE SUMMARY

Brief Description of the Proposed Action

The Proposed Action constitutes the issuance of one long-term (30-year) Water Lease from the Board of Land and Natural Resources (BLNR) that authorizes the lessee the "right, privilege, and authority to enter and go upon" the License Area for the "purpose of developing, diverting, transporting, and using government owned waters" through the existing East Maui Irrigation (EMI) Aqueduct System which supplies water to domestic and agricultural water users. The Water Lease, which will be awarded by public auction, will enable the lessee to enter upon lands owned by the State of Hawai'i in order to maintain and repair existing access roads and trails used as part of the EMI Aqueduct System, and will allow for the continued operation of the EMI Aqueduct System to deliver water to the County of Maui Department of Water Supply (MDWS) for domestic and agricultural water needs in Upcountry Maui, including the agricultural users at the Kula Agricultural Park (KAP) and the planned 262-acre KAP expansion, as well as for the Nāhiku community, which, through the MDWS, draws between 20,000 to 45,000 gallons per day (gpd), depending on weather, directly from the EMI Aqueduct System. It will also allow the continued provision of water to approximately 30,000 acres of agricultural lands (formerly in sugarcane) in Central Maui where it will be used to support diversified agriculture.

No construction activity will be required to implement the Proposed Action in East Maui or to the MDWS systems delivering water from the EMI Aqueduct System. In the agricultural fields of Central Maui, Mahi Pono will prepare fields and conduct farming operations for diversified agricultural crops. Current plans include new accessory structures to support agricultural operations such as washing and packing areas, storage, etc. However, Mahi Pono's farm plan as described in this Draft Environmental Impact Statement (DEIS) is, like any responsible farming plan, a fluid and responsive plan that responds to the ever-changing agricultural market demands and the type of agricultural activity to be pursued (i.e. orchard crops, tropical fruits, row and annual crops, energy crops, pasturage etc.), as well as responding to other variables such as the availability and cost of water for crop irrigation, and the need to be sensitive to the existing local farming community. Mahi Pono's goals for its diversified farm plan in Central Maui will be guided by its core principles of using reasonable and environmentally responsible "best management practices" (BMP), planting non-GMO crops, and growing food for local consumption. For the purpose of this DEIS, Mahi Pono's Farm Plan projects use of the total amount of water available after compliance with the IIFS requirements of the CWRM D&O, although it is understood that the Department of Hawaiian Home Lands (DHHL) will eventually convert its water reservation to active use.

Independent of the Proposed Action, on June 20, 2018, the Commission on Water Resources Management (CWRM) issued a decision on Petitions that had been filed in 2001 to establish Interim Instream Flow Standards (IIFS). The CWRM Findings of Fact, Conclusion of Law, and Decision and Order (CWRM D&O) in Docket No. CCH MA 13-01 established IIFS for numerous streams and tributaries of streams in the License Area, which includes water originating and flowing from both State and privately owned lands within East Maui.¹ The CWRM D&O

¹ CWRM found that there are 24, not 27, streams that were subject to the IIFS contested case because: (1) Waikani is not a stream but a waterfall of Wailuānui Stream; (2) Alo is a tributary of Waikamoi Stream; and (3) Pua'aka'a is a tributary of Kopili'ula Stream.

establishes a quantity of water that must remain in each stream at specified locations. The CWRM D&O ordered full stream restoration for 10 streams and partial flow restoration on 12 additional streams (Please refer to Section 1.3.4). The maximum amount of water that can be awarded through the Water Lease is what is available for diversion after implementation of the CWRM D&O.

The amount of water awarded by the Water Lease is also subject to all applicable requirements under Hawai'i Revised Statutes (HRS) § 171-58, which articulates terms for the disposition of a water lease. HRS § 171-58(e) requires that any new lease of water rights "shall contain a covenant that requires the lessee and the department of land and natural resources to jointly develop and implement a watershed management plan. The board shall not approve any new lease of water rights without the foregoing covenant or a watershed management plan." The content and parameters of a watershed management plan related to the proposed Water Lease are unresolved at this time, but will be resolved before BLNR can issue the Water Lease.

The Water Lease is also subject to the rights of the DHHL to reserve water sufficient to support current and future homestead needs as provided by Section 221 of the Hawaiian Homes Commission Act. Until that reservation is physically claimed, however, the water will remain available for use by the lessee under the Water Lease.

Alternatives Considered

Various alternatives that could potentially achieve the objectives of the Proposed Action were evaluated, regardless of their cost and with particular attention to those that could enhance the environment or minimize adverse environmental effects. Some of these alternatives were considered but dismissed as they were not feasible or would intensify adverse environmental effects. Those alternatives that were considered feasible were comparably evaluated with the Proposed Action.

Alternatives considered but dismissed included certain water source alternatives, including use of groundwater and use of reclaimed water, as well as additional water storage. A change of ownership of the EMI Aqueduct System was similarly considered but dismissed from further study. The reasonable alternatives that were comparatively analyzed with the Proposed Action were the: (1) Reduced Water Volume Alternative, where the Water Lease would be issued allowing the lessee to use less water than is permitted under the CWRM D&O; (2), Water Lease with Different Terms, which consists of two scenarios, (a) an Alternative Lease Duration scenario, where the Water Lease would be issued for a term of years other than the 30 years contemplated under the Proposed Action; and (b) the Modified Lease Area scenario, where the Water Lease would allow the use of the same amount of water as under the Proposed Action, but the geographic boundaries of the Lease Area would be reduced in size sufficient only to maintain the public safety and integrity of the EMI Aqueduct System. The No Action aka No Water Lease alternative, where the EMI Aqueduct System would only divert approximately 30% of the water available from the Collection Area², plus the water presently diverted from streams on private lands beyond the License Area, was also analyzed.

² The Collection Area refers to the approximately 50,000 acres of land from which the surface water is collected. Of those 50,000 acres, approximately 33,000 acres are owned by the State of Hawai'i, and the remaining approximately 17,000 acres are privately owned.

Significant Beneficial and Adverse Impacts (Including Cumulative and Secondary Impacts)

The Water Lease would allow the use of government-owned waters from the License Area through the EMI Aqueduct System. Use of that surface water would allow the continued provision of water to enable approximately 30,000 acres of farmland in Central Maui to remain in agriculture. The Water Lease would also allow the continuation of a supply of water to the MDWS, which in turn provides water for domestic and agricultural water needs in Upcountry Maui, including agricultural users at KAP and the planned 262-acre KAP expansion, as well as for the Nāhiku community, which draws 20,000 to 45,000 gallons per day, depending on weather, directly from the EMI Aqueduct System.

The MDWS's Upcountry Maui Water System is the second largest in the County. It services the communities of Kula, Pukalani, Makawao Ha'ikū, Hali'imaile, Waiakoa, Kēōkea, Waiohuli, 'Ulupalakua, Kanaio, Olinda, 'Ōma'opio, Kula Kai, and Pūlehu. The Upcountry Maui Water System is estimated to serve over 35,000 people, and the service area includes several businesses, churches, Kamehameha Schools, Hawaiian Homelands and government facilities. The County anticipates that the population served by the Upcountry Maui Water system will grow to approximately 43,675 by 2030. Continued water service to the MDWS through the EMI Aqueduct System as anticipated under the Proposed Action provides a significant cost avoidance benefit to the County of Maui because the costs of developing new wells is significant. There are also beneficial agricultural and fiscal impacts related to the continued water service to the Upcountry Maui Water System. It is estimated that under the Proposed Action approximately 1,510 acres of land in Upcountry Maui would be farmed by 2030, generating crops sales and new jobs.

Moreover, the proposed Water Lease will ensure that the EMI Aqueduct System, which enabled the cultivation of naturally non-arable lands in Central Maui, will be maintained to continue to serve the community, continue Maui's rich agricultural heritage, and to enhance the sustainability and diversity of Maui's economy. Mahi Pono's objective is to transition as much of the former sugarcane land as possible to diversified agriculture. Under the Proposed Action, the utilization of waters delivered from the EMI Aqueduct System will be an essential element to the success of any such diversified agricultural pursuits. Several benefits arise from proposed diversified agriculture in Central Maui. At full implementation and operation, the Mahi Pono farm plan is projected to generate more than 338 pounds per year of crops, generating \$155.9 million per year in annual food sales and \$329.5 million per year in combined direct and indirect sales. Pastures will support some 7,300 cow-and-calf animal units, producing over 4,300 calves per year and together with crop sales will result in total farm sales of about \$160.7 million per year. The Mahi Pono farm plan is also anticipated to create some 790 jobs on-site and another 350 indirect jobs for a total payroll of \$45.3 million per year. This is projected to support 2,550 Maui residents and generate \$4.5 million per year in State revenues through taxes. Diversified agriculture will increase the amount of local food production and enhance Hawai'i's food security. The Mahi Pono farm plan also includes a utility scale renewable energy component that will further Hawai'i's goals of having 100% renewable energy by 2045. Diversified agriculture in the 30,000 acres in Central Maui will also keep the fields open and green, which is something many view as beneficial, and is consistent with State and County planning and zoning.

The amount of water available through the Water Lease will be limited by the IIFS established under the CWRM D&O. Therefore, the cumulative effect of the Water Lease includes the implemented CWRM D&O.

- The CWRM ordered that all diversions on the following streams cease to primarily allow for all water to flow to the taro growing areas or for community and non-municipal domestic uses: Honopou, Huelo (Puolua), Hanehoi, Pi'ina'au, Palauhulu, Waiokamilo, Wailuānui, Waiohue, West Wailuāiki,³ and Makapipi. (CWRM D&O, at 268-269). All diversions for these streams are required to be modified so that no out of watershed transfers will occur from these streams, which will have uninterrupted free flowing water to the communities that depend upon them. It was not the CWRM's intent to regulate where and how much water will be used for traditional kalo agriculture or how the water will be apportioned amongst the kalo lo'i. The CWRM's approach does not automatically set precedents for other areas, but provides a model of water use that integrates traditional culture with modern natural resource management (CWRM D&O, Conclusions of Law (COL) 138-145).
- The CWRM ordered full and partial restoration of streams it concluded to have the potential to benefit greatly from the restoration of flow to 64% of the median base flow (BFQ₅₀), which generally represents the flow necessary to restore 90% of the habitat in a stream (H₉₀), based on the biological diversity and habitat that already exists. Restoration of these streams (Pi'ina'au, Wailuānui, Honomanū, Waikamoi, Nua'ailua, East Wailuāiki, Kopiliula, and Waiohue) was ordered to allow the stream species to flourish and reproduce, benefitting not only the natural environment but also allowing for better opportunity for the exercise of traditional and Hawaiian right (CWRM D&O, COL 131). -
- The CWRM concluded that West Wailuāiki (that was ordered for full restoration) presents a unique research opportunity to collect valuable information regarding the impact of full restoration of a stream versus habitat restoration (H₉₀). East Wailuāiki (that was ordered for H₉₀ restoration) and West Wailuāiki lie in close proximity to each other and have similar biological values and similar habitat biota. Therefore, the CWRM intends for these two streams to be studied in the future in combination with one another to see the impact, if any, of full restoration versus habitat restoration (CWRM D&O, COL 135).
- Honomanū Stream, which was ordered for H₉₀ restoration above Hana Highway, is a gaining stream from above the Lower Kula Ditch to Spreckles Ditch. Below the Spreckles Ditch it becomes a losing stream most likely as a result of the diversion. Honomanū Stream, despite having several diversions on it, has a high biological rating with a potential for high natural habitat gains with the restoration of flow to the dry reaches. Thus, the CWRM concluded that Honomanū Stream should have full streamflow restoration below

³ West Wailuāiki was ordered to be fully restored because it presented a unique research opportunity to collect information on full restoration vs partial (H₉₀) restoration of nearby East Wailuāiki Stream which has similar biological values and similar habitat and biota.

the Lower Kula Ditch diversion, which provides water for the MDWS system that is used for domestic and agricultural uses. (CWRM D&O, COL 136).

- Various streams within the License Area have low biological ratings and or do not have the potential to improve drastically with increased flows. These streams were set at connectivity flow which is twenty percent (20%) of the instream flow (CWRM D&O, COL 30). Streams that are set at connectivity flow are: Kapā'ula, Pa'akea, Pua'aka'a, Puohokamoa, Ha'ipua'ena, Nua'ailua, and Hanawī. (CWRM D&O at 268-269). None of these streams have registered diversions for taro cultivation nor is there taro cultivation known to occur on these streams (CWRM D&O, COL 147).
- The CWRM acknowledged that in the context of a proceeding to set IIFS, it does not have the authority to determine how much water may be used for noninstream use for municipal and agricultural uses. That authority lies with the BLNR in issuing a water lease pursuant to HRS § 171-58, subject to the IIFS set by the CWRM. (CWRM D&O, COL 148). Recognizing that the noninstream uses, especially municipal use, are valued uses, the CWRM set the IIFS to allow the MDWS to continue to divert water through its Upper and Lower Kula Pipelines. (CWRM D&O, COL 149). In not requiring full restoration of all streams, the CWRM has allowed some streams to continue to be diverted so that the BLNR may continue to license the diversion of water not needed to meet the IIFS from those streams for noninstream use. The available water would also include freshets and stormwater which are not included in the calculation of the IIFS. (CWRM D&O, COL 150).
- The CWRM recognized that the EMI Aqueduct System remains a valuable asset that delivers noninstream public trust benefits, such as drinking water, as well as other reasonable and beneficial uses. The reduction in diversions does not, by itself, compromise the structural integrity of the EMI Aqueduct System so long as it continues to be maintained as a single coordinated system. The CWRM considered factors that contribute to the operational capacity of the existing EMI Aqueduct System by allowing some water diversions from streams in the higher elevation eastern portion of the watershed. (CWRM D&O, COL 151).

The diversion of surface waters from the License Area in East Maui to the agricultural fields in Central Maui under the Proposed Action, as well as delivery water to the MDWS to service Upcountry Maui and Nāhiku, would not involve the construction of any new facilities, hence, it is not anticipated that there would be any unavoidable impacts or probable adverse effects. Past access into the License Area to construct the EMI Aqueduct System may have resulted in the inadvertent introduction of invasive species. In the future, with continued access for maintenance of the EMI Aqueduct System, the possibility of inadvertently introducing additional invasive species remains.

In the Proposed Action, the amount of water that can be conveyed by the EMI Aqueduct System will be limited to the amount available after compliance with the CWRM D&O. The CWRM D&O limits the amount of water that can be diverted, particularly when streams in the License Area are

naturally running low during seasonally dry weather conditions. Hence, the amount of water that can be diverted during dry weather conditions would be substantially less than when sugar was being cultivated. As a result, dependence on groundwater resources during such conditions may increase and/or water conservation measures may be required. Future climate change could also exacerbate the frequency and length of periods of low rainfall.

The Water Lease will authorize the use of diverted surface water, resulting in certain streams having less flow than under natural conditions. However, the Water Lease will also be subject to the CWRM D&O, which identified the streams most important for biological habitat purposes and mandated certain minimum flows to support those streams. As such, the biological impacts of the Water Lease are far less than the impacts that were in place at least since the time of the completion of the EMI Aqueduct System (in 1923), if not even earlier, e.g. the completion of the first portion of the EMI Aqueduct System in 1878.

Additionally, Mahi Pono's proposed agricultural operations include a high-efficiency irrigation system to reduce water usage. Therefore it is anticipated to use less water than what was previously used during sugarcane operations, thereby leaving more water in the streams. However, by using less surface water to irrigate the Central Maui agricultural fields, it is expected that there will be a lower level of groundwater recharge to the region's groundwater aquifers as discussed in Section 4.2.2. Consequently, the lower level of groundwater recharge in combination with periods of lower rainfall, could result in lower levels of groundwater supply in the Central Maui aquifers. Beneficial impacts to the soils in Central Maui are expected as they are improved through the removal of volunteer (i.e., rogue) sugarcane and weeds, and related soil preparations for diversified agriculture. These preparations include the application of effective micronutrients, plastic removal, pH adjustments, and the application of organic matter as discussed in Section 4.1.2.

Mitigation Measures

With regard to the maintenance of the EMI Aqueduct System, when maintenance activities are undertaken within the License Area in pristine areas, such as on cliffsides, near waterfalls, or in other native species dominated areas, the following avoidance and minimization measures will be employed:

- A qualified biological monitor should be on site to ensure that no listed or candidate species are impacted.
- The monitor should have familiarity with the plants of the area, including special-status species, familiarity with natural communities of the area, including special-status natural communities, experience conducting floristic field surveys, and experience with analyzing impacts of development on native plant species and natural communities
- To avoid the introduction or transport of new invasive plant species into more pristine portions of the License Area during EMI Aqueduct System maintenance activities, all equipment and vehicles arriving from outside the License Area should be washed and inspected prior to any maintenance activities on cliff sides, near waterfalls, and in other native species-dominated areas in the License Area. Such washing and inspecting should be done at a designated location.
- Construction materials arriving from outside Maui should also be washed and/or visually inspected (as appropriate) for excessive debris, plant materials, and invasive or harmful non-native species (plants, amphibians, reptiles, and insects). When possible, any raw

materials used in maintenance activities should be purchased from a local supplier on Maui to avoid introducing non-native species not present on the island. Inspection and cleaning activities should be conducted at a designated location. The inspector must be a qualified botanist/entomologist able to identify invasive species that are of concern relevant to the point of origin of the equipment, vehicle, or material.

Mahi Pono will clear the former sugarcane fields in Central Maui to transition to a diversified farm operation. Applicable BMP and erosion control measures will be implemented to ensure no adverse impact to the existing geology and topography. Once diversified farming commences, appropriate BMP will be used to comply with applicable State Water Quality Standards as specified in Hawai'i Administrative Rules (HAR) , Chapter 11-54 and HAR, Chapter 11-55 Water Pollution Control, Department of Health. The proposed structures to support Mahi Pono's agricultural operations will obtain all applicable permits and approvals for site preparation and building construction, including the National Pollutant Discharge Elimination System permit for the management of storm water during construction.

When water service is provided to the planned 262-acre expansion of the KAP, grading and grubbing work prior to cultivation will disturb soils but with intent of facilitating cultivation and to conserve soil and water. The County will be responsible for complying with all applicable permit requirements.

The Cultural Impact Assessment (CIA), prepared by Cultural Surveys Hawai'i, Inc., suggests that cultural informants may have an unclear understanding of how the CWRM D&O and the awarding of the Water Lease may affect cultural resources and practices. However, it should be acknowledged that due to the reluctance of many to participate in the CIA consultation, much of the information relied upon in the CIA is documentation that was provided to the CWRM during the IIFS proceedings, and therefore is information that was given some years before the issuance of the CWRM D&O. Nevertheless, the CIA provides recommendations, some of which are addressed through the preparation of this DEIS

- A qualified professional should address questions or clarification on stream flow, water diversion, and climate statistics.
 - To the extent of analyzing the Proposed Action, the DEIS addresses these concerns in Chapters 2 (Section 2.1.2) and Chapter 4 (Section 4.3.1).
- A biologist or similar qualified professional should provide an assessment of the impacts of water diversion to indigenous freshwater species (*ōpae*, *o'opu*, and *hīhīwai*) within the License Area.
 - The implementation of the IIFS under the CWRM D&O has the potential to reduce or eliminate this cultural impact. Furthermore, Trutta Environmental Solutions, LLC and SWCA Environmental Consultants, Inc. prepared reports assessing the impacts of the Proposed Action, particularly impacts on indigenous freshwater species, and terrestrial flora and fauna. The impacts of the Proposed Action to freshwater species are discussed in Section 4.2.1 and the impacts to terrestrial flora and fauna are discussed in Sections 4.4.1 and 4.4.2. Moreover, the two reports are appended to the DEIS (See Appendix A and Appendix C).
- A botanist, ethnobotanist, or similar qualified professional should provide an assessment of the ideal conditions of water flow and water temperature needed for kalo growth in comparison to the current water flow and water temperature of impacted areas in order to understand and address the stated impact.

- The implementation of the IIFS under the CWRM D&O has the potential to reduce or eliminate this cultural impact
- Any personnel involved in access, maintenance, or any other related activities within the License Area should be informed of the possibility of inadvertent cultural finds, including human remains. In the event that any potential historic properties are inadvertently discovered within the License Area, these discoveries should be reported immediately to State Historic Preservation Division (SHPD). In the event that *iwi kūpuna* and/or cultural finds are encountered, consultation with lineal and cultural descendants of the area is also recommended.

The Social Impact Assessment (SIA), prepared by Earthplan, recommends measures intended to establish an ongoing working relationship between the community, Mahi Pono and EMI, and related public agencies, as well as work towards resolution with East Maui communities.

The SIA recommends that clearly defined interest groups, or stakeholder groups are established that include geographic communities, environmental, agriculture and business interests, and public agencies. Each group would be encouraged to reach consensus on their own needs, concerns, opportunities and possible solutions.

These groups should then be equitably represented in a “Core Working Group” that would serve as a forum for exchanging ideas and collaborative efforts, as well as to provide feedback and suggestions to Mahi Pono. Each member of the Core Working Group would be expected to reach out to their own networks to extend the discussion beyond the Core Working Group. While there would likely be strong differences in perspectives and opinions, the Core Working Group would need to find ways to establish core principles, common ground and manageable solutions.

The fundamental value that will help bring people to the same table is trust. Use of the water through the EMI Aqueduct System for sugarcane cultivation has elicited skepticism and distrust over many decades. Developing trust among the various groups is expected to be challenging, but being open about intent, plans, and activities can begin to establish credibility and open the door to dialogue.

Additionally, for the Ke'anae – Wailuānui community to move past historical impacts, there needs to be established a point of departure. Mitigation needs to go beyond the physical restoration of streams and needs to address the social context and include apology and reconciliation. This needs to be done within a cultural foundation that binds the community together, and key players, including Mahi Pono, public agencies and elected officials. The manner and forum for this process should be defined by the cultural leaders integral with the process.

Compatibility with Land Use Plans and Policies

The relationship of the Proposed Action to potentially applicable land use plans and policies was evaluated. It was determined that the Proposed Action is supportive or consistent with numerous applicable plans and policies. The following plans were evaluated:

- The Hawai'i State Plan, Chapter 226, HRS
- State Functional Plans
 - Agricultural State Functional Plan
 - Conservation State Functional Plan
 - Education State Functional Plan
 - Employment State Functional Plan
 - Energy State Functional Plan

- Health State Functional Plan
- Higher Education Functional Plan
- Historic Preservation State Functional Plan
- Housing State Functional Plan
- Human Services State Functional Plan
- Recreation State Functional Plan
- Tourism State Functional Plan
- Transportation State Functional Plan
- The State Land Use Law, Chapter 205, HRS (including the provisions regarding Important Agricultural Lands)
- Forest Reserves, Chapter 183, HRS and related administrative rules
- Natural Area Reserves, Chapter 195, HRS and related administrative rules
- The Hawai‘i Coastal Zone Management Program, Chapter 205A, HRS
- Governor Ige’s Sustainability Initiative
- The Hawai‘i Environmental Policy Act, Chapter 344, HRS
- The State Water Plan
 - Draft Maui Island Water Use and Development Plan (March 2019)
- The Maui Countywide Policy Plan
- The Maui Island Plan
- Maui County Zoning
- Maui Island Community Plans
 - Hāna Community Plan
 - Pā‘ia-Ha‘ikū Community Plan
 - Makawao-Pukalani-Kula Community Plan
 - Wailuku-Kahului Community Plan

Listing of Permits and Approvals

The Proposed Action constitutes the issuance of a Water Lease after public auction by the DLNR/BLNR. Thus, the BLNR approval is necessary to implement the Proposed Action. While it is anticipated that the terms of the Water Lease would govern any modifications to the existing EMI Aqueduct System, there are no immediate plans for the construction of any additional facilities that would expand the EMI Aqueduct System within the License Area. Any work on the EMI Aqueduct System would be limited to repair and maintenance activities. Consequently, no additional permits and approvals are anticipated to be required to implement the Proposed Action.

Should the Water Lease be issued according to the Proposed Action, surface water will become available for the various domestic and agricultural uses. This would, in turn, will lead to construction activities such as for expanding the KAP and building facilities in support of diversified agriculture in Central Maui. Such construction would be subject to various permits and approvals, depending on its location, proposed use and type of construction activity involved.

Irretrievable and Irreversible Commitments of Resources

The issuance of the Water Lease will not result in the irreversible use of the water resource because the Water Lease will be for a term, and not perpetual. Additionally, the Water Lease will be subject to the IIFS and the reservation in favor of the DHHL, meaning that the water resource will not be exclusively and permanently committed to the Water Lease. For the term of the Water Lease the water resource will be available to the identified uses, such as providing water to the agricultural fields in Central Maui and continuing to provide water to the MDWS for Upcountry Maui and Nāhiku. To the extent such uses are not made, the water will not be diverted and will remain in the streams.

The impacts of use of the surface water resources associated with the Proposed Action will be offset by the considerable economic, social, and environmental benefits to the residents of the region, the County of Maui and the State of Hawai'i that would be supported by the issuance of the subject Water Lease, as discussed in Section 4.7.

The Water Lease does not involve new construction within the License Area. The operation of the EMI Aqueduct System does not require the use of nonrenewable resources because the transmission of water through the EMI Aqueduct System is conducted through gravity rather than through water pumping stations that require the use of nonrenewable energy sources for operations. The diversified agricultural operations planned for the Central Maui agricultural fields will involve the commitment of some resources for the modifications of the fields' irrigation system and the construction of fencing, agricultural operating facilities and potentially renewable energy facilities. Building materials (concrete, wood, metal, etc.) will be used along with energy resources related to the construction of those items. The use of such fuels and resources is not expected to be significant and the use of the Central Maui agricultural fields for diversified agriculture is considered to be beneficial because there would be considerably more green open space in Central Maui in the form of farms and irrigated pasture, a reduction in wildfires, and approximately three times as much food production, including greater food self-sufficiency and more exports, should the Water Lease be issued.

The implementation of the Proposed Action is consistent with existing and adjacent land uses, and would not prevent or curtail any uses allowable under applicable land use policies or controls. The amount of water allowed to be diverted by the Water Lease will be significantly less than the amount diverted for sugar cultivation. Mahi Pono's farm plan is based on the amount of water that will be available through the Water Lease. However, if more water were available, more crop options would also be available. The issuance of the Water Lease should not curtail the use and access to adjacent lands (e.g., for recreation, environmental research, etc.) as the EMI Aqueduct System has been in place for over 100 years.

The implementation of the Proposed Action is not associated with activities that could directly trigger potential environmental accidents, nor pose a significant risk for potentially triggering environmental accidents. Moreover, it is not anticipated that there would be any unavoidable impacts or probable adverse effects. The EMI Aqueduct System has been operating for over 100 years, and issuance of the Water Lease should ensure contained operations and maintenance of the EMI Aqueduct System.

Relationship Between Local Short-term Uses of Humanity's Environment and the Maintenance and Enhancement of Long-Term Productivity

The Proposed Action is the issuance of a Water Lease for a 30-year commitment of government-owned water collected by the EMI Aqueduct System from the License Area for various uses, including domestic and agricultural uses served by the MDWS in Upcountry Maui, the KAP and the Nāhiku community in East Maui; diversified agricultural operations on approximately 30,000 acres in Central Maui; and, preservation of the EMI Aqueduct System. While the Water Lease would be a new commitment of government-owned water diverted through the EMI Aqueduct System, the Water Lease essentially continues an activity that has been in place for over a century. In this new commitment, however, the amount of government-owned water that may be diverted out of the License Area has been limited by the CWRM D&O.

Considering the Water Lease as a short-term use of humanity's environment, the beneficial gains over the term of the Water Lease include the benefits accrued to the various recipients of the water for domestic, commercial and agricultural uses. The Water Lease will maintain the lifestyle and livelihood of those who receive their water through the MDWS in Upcountry Maui and Nāhiku. In Central Maui the Water Lease will provide irrigation water for Mahi Pono to develop diversified agriculture on former sugar land, with associated economic gains from the sale of crops, job creation and increased local food sustainability.

As previously stated, the Water Lease will be limited by the requirements under the CWRM D&O. Through the CWRM D&O, CWRM ordered full restoration of ten streams for primarily taro growing areas for irrigation and for community and non-municipal domestic uses. Five "habitat streams" were ordered to have 64% of their BFQ₅₀ restored, which generally represents the H₉₀, based on the biological diversity and habitat that already exists. Seven were ordered to have 20% of their BFQ₅₀ restored to provide connectivity for migrating stream fauna. While the Water Lease would have a term of 30 years, the IIFS requirements under the CWRM D&O and the associated benefits to the kalo growing areas, communities and environment, would not be affected by the Water Lease term and if not otherwise revised by the CWRM, the IIFS requirements will continue indefinitely.

Without the Water Lease, even if EMI could find it economically feasible to continue maintaining the EMI Aqueduct System to divert non-governmental water for diversified agriculture in Central Maui, there may not be enough water to allocate much or any to the MDWS. This lack of water would exacerbate the effects of drought when other surface water sources are unreliable for the KAP and the Nāhiku, this could eliminate their primary source of water. Insufficient water delivered to the County through the EMI Aqueduct System could have significant effects on health and safety of those who currently rely on that water delivery.

Without active, irrigated agriculture in the Central Maui fields, natural arid conditions would return, making the Central Maui fields susceptible to wind erosion and airborne dust, which could create a nuisance or potential health hazard under windy conditions. Dry windy conditions would also increase the potential for wildfires.

Unresolved Issues

Unresolved issues for the Proposed Action have to do with the steps that must be completed before the BLNR can issue the Water Lease.

The Water Lease must accommodate a reservation in favor of the DHHL, but that amount has not yet been determined and approved by the CWRM, and the DHHL's timing for calling upon its reservation is not known. Similarly, the content and parameters of a watershed management plan are not known at this time. However, both the DHHL reservation and the watershed management plan will be addressed before the BLNR can issue the Water Lease.

Other unresolved issues include the requirement for the BLNR to set the upset rental through appraisal of fair market value, and the requirement for the Water Lease disposition to be by public auction. As such, at this point the amount of rental payment that will be required under the Water Lease, the identity of the awarded lessee, and the specific terms of the Water Lease are unknown, but these issues should be resolved prior to the issuance of the Water Lease.

Consultation

Various agencies, organizations, and individuals were consulted in scoping the DEIS, including scoping that took place prior to the preparation of the EISPN, and during the 30 day public comment period on the EISPN in the form of formal written consultation pursuant to HRS Chapter 343 and HAR Title 11, Chapter 200. Consultation also included meetings with elected officials, agencies, and stakeholders including two public scoping meetings held on Maui during the 30 day EISPN public comment period. A list of those who participated in the consultation process is provided in Chapter 9 and the comments, including the transcripts of the public meetings, and responses are reproduced in Appendix J. Moreover, those who submitted public comments on the published EISPN, and the corresponding responses are reproduced in Appendix M.

Chapter 1:

Purpose and Need of the Proposed Action

1. STATEMENT OF PURPOSE AND NEED OF THE PROPOSED ACTION

1.1 Purpose of the Proposed Action

The purpose of the Proposed Action (the Water Lease) is to enable the Board of Land and Natural Resources (BLNR)-awarded lessee the right, privilege and authority to enter and go upon State-owned lands for the purposes of developing, diverting, transporting and using government-owned waters. The requested Water Lease would allow the use of government-owned waters from the License Area (approximately 33,000 acres which includes lands within Nāhiku, Ke‘anae, Honomanū, and Huelo) through the East Maui Irrigation Company, LLC (EMI) Aqueduct System. Use of that surface water would allow the continued provision of water to enable approximately 30,000 acres of farmland in Central Maui to remain in agriculture. The Water Lease would also allow the continuation of a supply of water to the County of Maui Department of Water Supply (MDWS), which in turn provides water for domestic and agricultural water needs in Upcountry Maui, including agricultural users at Kula Agriculture Park (KAP), and the planned 262-acre KAP expansion, as well as for the Nāhiku community, which draws up 20,000 to 45,000 gallons per day, dependent on weather, directly from the EMI Aqueduct System.

The MDWS’s Upcountry Maui Water System is the second largest in the County. It services the communities of Kula, Pukalani, Makawao Ha‘ikū, Hali‘imaile, Waiakoa, Kēōkea, Waiohuli, ‘Ulupalakua, Kanaio, Olinda, ‘Ōma‘opio, Kula Kai, and Pūlehu. The Upcountry Maui Water System is estimated to serve over 35,000 people, and the service area includes several businesses, churches, Kamehameha Schools, Hawaiian Homelands and government facilities. The County anticipates that the population served by the Upcountry Maui Water System will grow to approximately 43,675 by 2030.

The primary purpose of the Water Lease is to continue to provide water to service agricultural and domestic purposes. A need for the Water Lease is the lack of practicable alternative sources of water and the lack of alternative infrastructure to meet these demands (Draft Maui Island Water Use and Development Plan, March 2019).

Moreover, the proposed Water Lease will ensure that the EMI Aqueduct System, which enabled the cultivation of naturally non-arable lands in Central Maui, will be maintained to continue to serve the community, continue Maui’s rich agricultural heritage, and to enhance the sustainability and diversity of Maui’s economy. In December of 2018 Alexander & Baldwin (collectively EMI and Alexander and Baldwin will be referred to as “A&B”) sold the majority of its former sugarcane lands in Central Maui to Mahi Pono.¹ Mahi Pono’s objective is to transition as much of the former sugarcane land as possible to diversified agriculture. Under the Proposed Action, the utilization of waters delivered from the EMI Aqueduct System will be an essential element to the success of any such diversified agricultural pursuits in Central Maui.

1.2 Objectives of the Proposed Action

In general, the objectives of the issuance of the Proposed Action (Water Lease) are:

- Preserve and maintain the EMI Aqueduct System, including its access roads
- Continue to meet domestic and agricultural water demands in Upcountry Maui

¹ MP Central A, LLC, MP Central B, LLC, MP CPR, LLC, MP East A, LLC, MP East B, LLC, MP West, LLC and MP EMI LLC and acquired former sugar cane and watershed lands, including the Central Maui agricultural fields, from A&B in December 2018. Agricultural operations are centralized under Mahi Pono, LLC. All such entities are hereinafter referred to, whether individually or collectively, as “Mahi Pono”.

- Continue to provide water for agricultural purposes in Central Maui (specifically, to transition fields previously used for sugar cane cultivation into new, diversified agricultural uses)
- Continue to serve community water demands in Nāhiku

1.3 Background - Historical Perspective

1.3.1 The EMI Aqueduct System

For more than a century, the East Maui watershed forests have provided water for off-stream uses through a surface-water diversion system, known as the EMI Aqueduct System. The system has been used to collect and transport water to meet consumptive needs and enable economic opportunities. The EMI Aqueduct System is owned and operated by the EMI. EMI was previously a wholly owned subsidiary of A&B. In February, 2019, MP EMI, LLC, became a co-owner of EMI. In addition to becoming the co-owner of the EMI Aqueduct System, as noted above, Mahi Pono acquired former sugarcane and watershed lands, including the Central Maui agricultural fields, from A&B in December 2018. Agricultural operations are centralized under Mahi Pono, LLC.

The EMI Aqueduct System was constructed in phases, beginning in the 1870s and extending to its completion, as it currently stands, in 1923. It consists of approximately 388 separate intakes, 24 miles of ditches, and 50 miles of tunnels, as well as numerous small dams, intakes, pipes, 13 inverted siphons and flumes. The EMI Aqueduct System collects surface stream water from approximately 50,000 acres of land (Collection Area), of which approximately 33,000 acres are owned by the State of Hawai'i (which includes lands within Nāhiku, Ke'anae, Honomanū, and Huelo) (License Area), and the remaining approximately 17,000 acres which are privately owned (See Figure 1-1).

Figure 1-1 illustrates the EMI Aqueduct System overlaid on the Department of Land and Natural Resources (DLNR) Division of Aquatic Resources (DAR) geographic information system (GIS) data obtained from the State Office of Planning's GIS download portal. An electronic drawing of the EMI Aqueduct System was georeferenced by Akinaka & Associates, Ltd. (Akinaka) to depict major diversions on East Maui streams shown on a United States Geological Survey (USGS) base layer map obtained from ESRI.² Due to the complexity of the EMI Aqueduct System and the level of detail shown on the map, not all of the minor diversions could be associated with a stream or tributary. The stream names shown are from the DAR GIS database but a few of those stream names may differ from how some East Maui residents may refer to them. Moreover, certain streams that were identified during certain proceedings before the Commission on Water Resources Management (CWRM)³ do not have associated GIS data and therefore could not be precisely located on the map.

² ESRI is an international supplier of geographic information system software, web GIS and geodatabase management application.

³ Petitions to Amend Interim Instream Flow Standards (IIFS) for numerous East Maui streams were filed with CWRM in 2001, and concluded with CWRM's issuance of its Findings of Fact, Conclusions of Law and Decision and Order in CCH-MA 13-01, on June 20, 2018 (CWRM D&O), which established the Interim Instream Flow Standards for numerous streams.

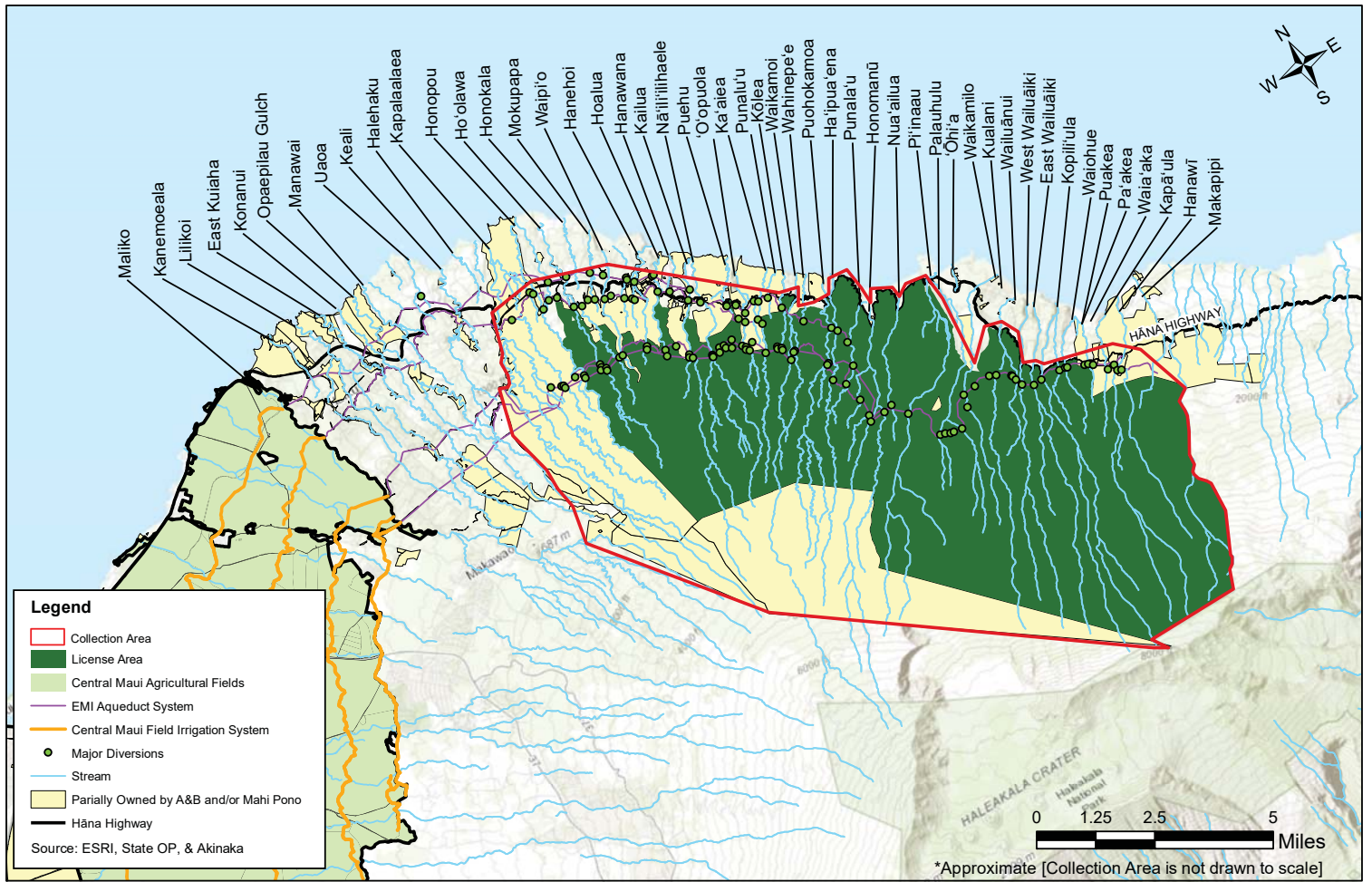


FIGURE 1-1

EMI AQUEDUCT SYSTEM COLLECTION AREA

PROPOSED LEASE (WATER LEASE) FOR THE NĀHIKU, KE'ANAE, HONOMANŪ, AND HUELO LICENSE AREAS



Kualani (aka Hāmau) and Waia'aka streams do not have associated GIS data, but were identified in the CWRM proceedings. Puakea stream, which was recognized in the Instream Flow Standard Assessment Report for Hydrologic Unit 6061, Pa'akea, December 2009, is within the License Area but was not identified in the CWRM Decision and Order (D&O) also does not have GIS data. Therefore, the approximate location of Kualani, Waia'aka, and Puakea streams, based on the geographically sequential listing of stream names by CWRM, is shown in Figure 1-1.⁴ The depiction of the EMI Aqueduct System shows the general alignment of the various ditches comprising the EMI Aqueduct System and their major diversions, which were georeferenced by Akinaka to coincide with the streams shown on the USGS base layer map, where possible. In some cases, the diversions may be on smaller tributaries that do not appear in the DAR GIS data.

1.3.2 History of Stream Diversion in East Maui

Built at a time when Hawai'i was still an independent kingdom, the EMI Aqueduct System was the first of its kind, both in the Pacific and on the West Coast of the United States. The initial construction of the first section of the EMI Aqueduct System by Samuel T. Alexander and Henry P. Baldwin under the name of the Hamakua Ditch Company began the 1870s, was named the Hamakua Ditch (considered Old Hamakua Ditch now). This began the engineering trend of catchment ditches that would later fuel the sugar industry on Kaua'i, O'ahu, Hawai'i, and Maui, making sugar the major economic sector of Hawai'i for over a century. Over the course of the ensuing decade, A&B's plantation was incorporated as the Pā'ia Plantation and included Hāli'imaile Plantation (also known as Grove Ranch), East Maui Plantation, and Seaside Farm. The first license granted by the Kingdom of Hawai'i to A&B and their partners in the Hamakua Ditch Company to divert water from East Maui lasted until September 30, 1898 – approximately 20 years following the completion date of the first ditch (Hamakua Ditch).

In 1876, Claus Spreckels, a sugar magnate and industrialist, closely followed the efforts of Samuel T. Alexander and Henry P. Baldwin. It was at this time that Spreckels conceived of an irrigation project inspired by Alexander and Baldwin's work on the Hamakua Ditch, one that would serve to irrigate and transform the dry and arid Central Maui Plains into thousands of acres of rich sugarcane. The second addition to the EMI Aqueduct System was the Spreckels Ditch, also known as the Haiku Ditch, constructed between 1879 and 1880. The lease granted to Spreckels by the Kingdom of Hawai'i gave him rights to all water not already in use by September 30, 1878, the same date as the deadline for the completion of the Hamakua Ditch. Taking advantage of his unrestricted access to all streams not currently under collection, the Haiku Ditch was twice as long, three times as large, carried 50 percent more water than the Hamakua Ditch, and stretched from Honomanū Stream to the Kīhei boundary (Wilcox 1996). The ditch was 30 miles long and could deliver up to 60 million gallons per day (mgd), costing nearly half a million dollars by the time it was completed (American Society of Civil Engineers (ASCE), 2001). The breadth and scale of this endeavor would redefine standards of water collection for the sugar industry in Hawai'i. The massive Haiku Ditch was the first developed by a foreign engineer named Herman Schussler, a trend that would continue for all future additions to the EMI Aqueduct System (Wilcox 1996). Schussler began construction on Center Ditch in 1898, Manuel Luis Ditch in 1900, and the Lowrie Ditch in 1899-1901 (ASCE 2001).

In 1898, Spreckels lost controlling interest of Hawaiian Commercial and Sugar Company (HC&S), to A&B. With the acquisition of HC&S, the two corporate partners gained control of the vast majority of the sugar lands on the island of Maui as well as the numerous irrigation systems

⁴ It should be noted that Hanawana is referred to as Hanahana in the CWRM D&O.

that enabled their cultivation. Immediately upon acquiring HC&S, their partners started construction on the Lowrie Ditch, which started in the rainforests of Kailua in the Makawao District of Maui. The Lowrie Ditch had two sources, the first was a reservoir at Pāpa'a'ea that was fed by two five- to six-mile ditches, and the second was Kailua Stream where a diversion intercepted the source of the older Haiku Ditch and ran parallel to that ditch. The Lowrie Ditch was named after William J. Lowrie, manager of HC&S's plantation and mills at Spreckelsville. Work on the ditch system was primarily accomplished by a team of Japanese laborers, with contracting beginning in 1899 and construction concluding in late 1900. Upon completion, the Lowrie Ditch accounted for a 22-mile system, three quarters of which was open ditch, and had a total capacity of 60 mgd, and was capable of irrigating up to 6,000 acres. The Lowrie Ditch, by means of inverted siphons, ended at the 475-foot elevation, 257 feet above the Haiku Ditch.

The next undertaking for the Hamakua Ditch Company was the construction of the Koolau Ditch, which was built over a two year period from 1904-1905 by M. M. O'Shaughnessy. The Koolau Ditch extended the water collection system another 10 miles toward Hāna, around the Ko'olau Range to Makapipi. The Koolau Ditch accounted for 7.5 miles of tunnel and 2.5 miles of open ditch and flume. The thirty-eight tunnels that are part of the Koolau Ditch system were all dug out of solid rock by laborers employing hand-drills and were 8 feet wide and 7 feet high. In length, the tunnels averaged 1,000 feet; the shortest of which was 300 feet and the longest was 2,710 feet. A total of 4.5 miles of 6-inch-thick concrete lining was used in the tunnel. The Koolau Ditch was later turned over to EMI, a new business entity that succeeded the Hamakua Ditch Company. While the Koolau Ditch originally fed into the New Hamakua Ditch at Alo, it was connected to the Wailoa Ditch upon its completion in 1923. By the time the Wailoa Ditch was completed in 1923 it was the highest capacity channel in the entire network of the EMI Aqueduct System. The Koolau Ditch was connected to the new Wailoa section, being diverted away from the New Hamakua Ditch, and connected to a series of hydro-electric power plants on the north shore of Maui. The Wailoa Ditch ran parallel to, and above, the earlier New Hamakua and Kauhikoa Ditches (Wilcox 1996).

In 1938, the Territory of Hawai'i and A&B entered into an agreement intended to set the stage for competitive bidding when the existing water licenses expired. The 1938 agreement provides for the joint use of the EMI Aqueduct System, whereby both parties granted easements to each other for portions of the EMI Aqueduct System facilities that crossed their respective lands.

Another aspect of the agreement set forth the manner in which the Territory was to charge for water collected. The amount charged was to be in inverse relation to the distance between the source and the delivery point. In other words, the further the distance, the less the amount paid. The reasoning behind this approach was that the value of the water to the lessee declined as the cost of conveying the water rose. Thus, the government received less for Nāhiku water, which had to travel the greatest distance to Central Maui agricultural fields, than it did for water taken from the Huelo portion of the License Area, which was closer to the Central Maui agricultural fields.

The revolutionary changes that occurred in the second half of the 19th century – in East Maui as well as elsewhere in the Hawaiian islands – served as the backdrop for the rise in the commercial cultivation of sugar cane, and encapsulates the essence of the plantation-era culture of old Hawai'i which laid the foundation for the diverse socio-cultural environment that exists in the islands today.

The signing of the Reciprocity Treaty with the United States in 1875, which allowed Hawai'i to sell sugar to the United States on an unrestricted basis spurred Hawai'i based sugar planters to

increase production. This was accomplished by extending their plantings to lands far removed from natural water courses, and the import of migrant workers by the tens of thousands – workers who, at the end of their contracts, stayed on in the islands to grow rice, open shops, and fill other economic niches. Moreover, the challenge of moving water from the wet-side of an island to its dry-side became one of the dominant preoccupations of sugar industrialists of the Plantation Era, and was an effort unto itself that demanded the collaborative efforts of an increasingly diverse workforce. The industrialization of agriculture served as a catalyst for radical social, cultural, and economic change that the islands experienced over the course of the latter half of the 19th century, and much of the 20th century.

Over the course of the past several decades, the users of the EMI Aqueduct System have grown to include non-potable water service for agricultural uses at the KAP as well as potable water service through the MDWS to domestic and agricultural users in Upcountry Maui, as well to a portion of the Nāhiku community below Hāna Highway in East Maui.

1.3.3 Chronology of Water Lease and the Interim Instream Flow Standards

Since 1876, A&B, or its predecessors and affiliates, have been issued from the Kingdom, the Territory and then the State of Hawai‘i, various leases, agreements, licenses, and permits that authorized the development, diversion, transportation and use of government-owned water from streams in East Maui. The water leases were for the 33,000 acres owned by the Territory/State (License Area).

The original lease traces back to a September 13, 1876 license from the Kingdom of Hawai‘i. Subsequent leases have been governed by an agreement dated March 18, 1938 between the Territory of Hawai‘i and A&B. Over the course of the 20th Century, A&B retained the rights to the use of water from the License Area by being the successful bidder for water leases. The last long-term licenses were issued in the 1950s and 1960s, ultimately expiring in 1986. Since 1986, however, the BLNR has authorized holdover and/or annual revocable permits for the use of water, with the latest being approved on November 9, 2018.

On May 14, 2001, A&B requested that the State, pursuant to Hawai‘i Revised Statutes (HRS) Section 171-58, offer a long-term (30 year) lease at public auction for the right, privilege and authority to enter and go upon State-owned lands at Ko‘olau Forest Reserve and Hanawī Natural Area Reserve, Hāna and Makawao, Maui, for the purposes of developing, diverting, transporting and using government-owned waters. The requested lease would allow the use of government-owned waters from the License Area. The location of the approximately 33,000-acre License Area is on State-owned land identified by Tax Map Key (TMK) numbers in Table 1-1 and are illustrated in Figure 1-2.

Shortly after the request was made, the Coalition to Protect East Maui Water, Maui Tomorrow Foundation, and Nā Moku Aupuni O Ko‘olau Hui (Nā Moku) requested a contested case hearing on the lease matter, thereby delaying BLNR action. In recognition of the request for a contested case hearing, the BLNR deferred action on issuing a lease at public auction, and, in the interim, the BLNR approved a month-to-month holdover of the existing revocable permits.

Table 1-1: License Area TMKs		
Portion of	Tax Map Key	Area

License Area		(Approximate Acreage)
Nāhiku	(2) 1-2-004:005,007 (por.)	7,832
Ke‘anae	(2)1-1-002:002	13,007
Honomanū	(2)1-1-001:044	3,381
Huelo	(2)1-1-001:050, (2)2-9-014:001, 005, 011, 012, 017	8,753

Separate and apart from the Water Lease process, the Native Hawaiian Legal Corporation (NHLC) on behalf of Nā Moku, Beatrice Kepani Kekahuna, Marjorie Wallet, and Elizabeth Lehua Lapenia⁵ (hereafter collectively referred to as “Nā Moku”) filed with CWRM 27 Petitions to Amend IIFS for various East Maui streams located within the License Area.

The State Water Code (Code), Chapter 174C, HRS, provides that the CWRM may adopt IIFS on a stream-by-stream basis or a general Instream Flow Standard (IFS) applicable to all streams within a specified area to protect the public interest in the waters of the State. The CWRM initially set IIFS for all streams in Hawai‘i at their status quo condition as of June 15, 1988. In *In re Water Use Permit Applications*, 94 Hawai‘i 97, 148, 9 P.3d 409, 460 (2000), the Hawai‘i Supreme Court characterized that under the Code, “instream flow standards serve as the primary mechanism by which CWRM is to discharge its duty to protect and promote the entire range of public trust purposes dependent upon instream flows.” The Water Code defines an IFS as a “quantity or flow of water or depth of water which is required to be present at a specific location in a stream system at certain specified times of the year to protect fishery, wildlife, recreational, aesthetic, scenic, and other beneficial instream uses.” (HRS § 171C-3).

At the time that NHLC filed the 27 Petitions, the IIFS for East Maui streams was as follows:

The Interim Instream Flow Standard for all streams on East Maui, as adopted by the commission on water resource management on June 15, 1988 shall be that amount of water flowing in each stream on the effective date of this standard, and as that flow may naturally vary throughout the year and from year to year without further amounts of water being diverted offstream through new or expanded diversions, and under the stream conditions existing on the effective date of the standard[.]

Hawai‘i Administrative Rule (HAR) § 13-169-44. This IIFS is often referred to as a “status quo IIFS.”

In considering a petition to amend an interim instream flow standard, the Code directs CWRM to “weigh the importance of the present or potential instream values with the importance of the present or potential uses of water for noninstream purposes, including the economic impact of restricting such uses.” HRS Section 171C-71(2)(D). The Code (HRS § 171C-3) defines “instream use” as:

⁵ NHLC no longer represented Ms. Lapenia as of May 10, 2007

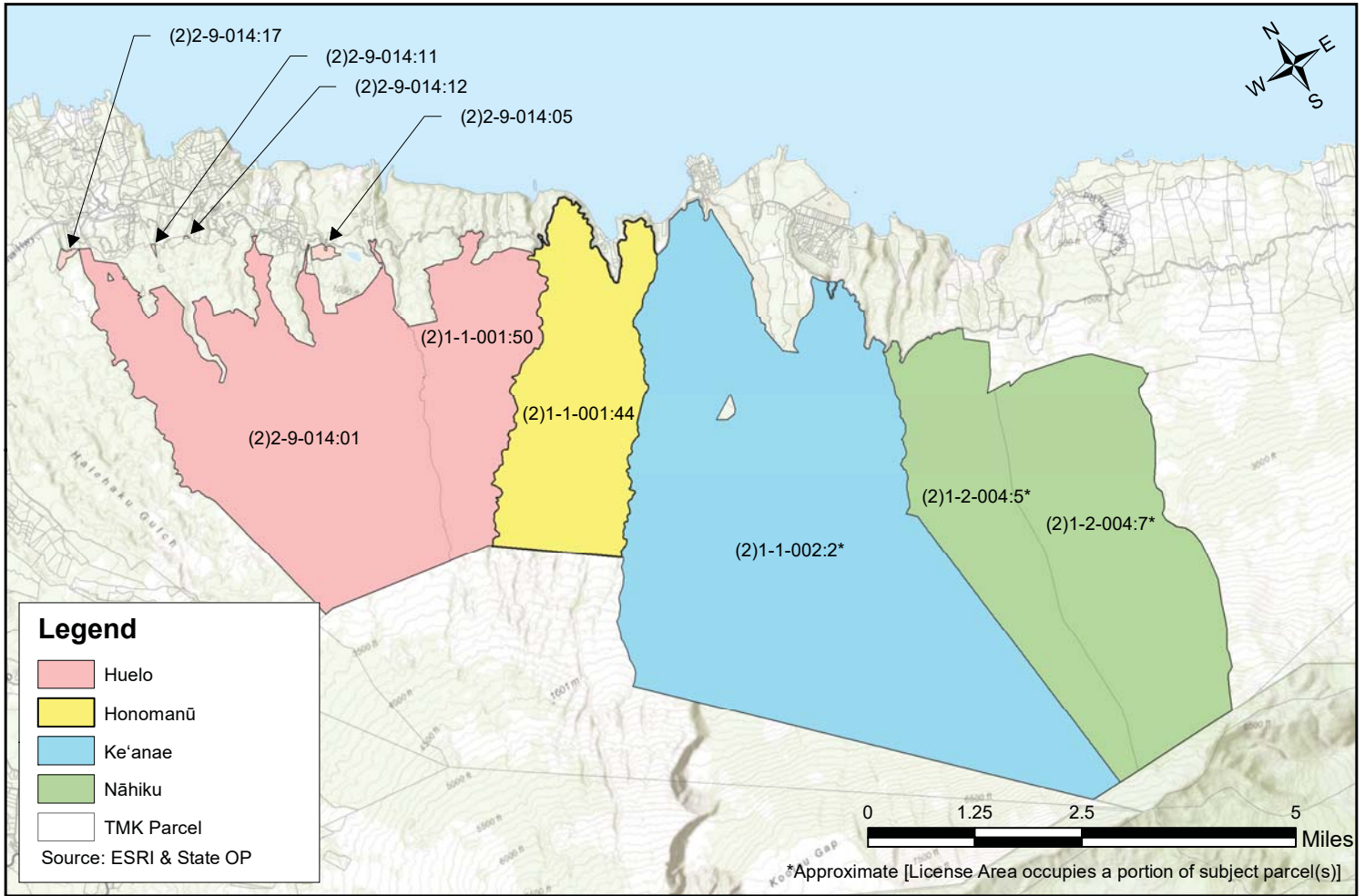


FIGURE 1-2

TAX MAP KEYS OF LICENSE AREA

PROPOSED LEASE (WATER LEASE) FOR THE NĀHIKU, KE'ANAE, HONOMANŪ, AND HUELO LICENSE AREAS



beneficial uses of stream water for significant purposes which are located in the stream and which are achieved by leaving the water in the stream. Instream uses include, but are not limited to:

- 1) Maintenance of fish and wildlife habitats;
- 2) Outdoor recreational activities;
- 3) Maintenance of ecosystems such as estuaries, wetlands, and stream vegetation;
- 4) Aesthetic values such as waterfalls and scenic waterways;
- 5) Navigation;
- 6) Instream hydropower generation;
- 7) Maintenance of water quality;
- 8) The conveyance of irrigation and domestic water supplies to downstream points of diversion; and,
- 9) The protection of traditional and customary Hawaiian rights.

If the IIFS for the 27 Petitioned streams were amended, the maximum amount of water that could potentially be diverted from these streams by the EMI Aqueduct System would change. On July 23, 2001, the CWRM agreed to focus its proceedings first on eight "Priority Streams" identified by NHLC, which were Honopou, Hanehoi, Waiokamilo, Kualani, Pi'ina'au, Palauhulu, and Wailuānui (consolidated with Waikani Waterfall, East and West Wailuānui Stream), and Puolua (Huelo) Stream, the tributary of Hanehoi Stream (Priority Streams) (CWRM D&O, Findings Of Fact (FOF) 2-3).

In cooperation with the CWRM, the USGS conducted a study (Gingerich, 2005) to assist in determining reasonable and beneficial noninstream and instream uses of surface water in Northeast Maui. These assessments were documented in various Instream Flow Standard Assessment Reports (IFSAR), which are compilations of the hydrology, instream uses, and noninstream uses related to a specific stream and its respective surface water hydrologic unit. The purpose of the IFSAR is to present the best available information for a given hydrologic unit. The IFSAR is also intended to act as a living document that should be updated and revised as necessary.

In 2007, A&B ceased diversions on Waiokamilo Stream, fully restoring flows to the stream, in response to an interim order by the BLNR. In September 2008, the CWRM acted to amend the IIFS for the eight Priority Streams recognized by NHLC in 2001 (the Priority Streams D&O).

On May 25, 2010, the CWRM acted to address the remaining 19 streams, amending the IIFS for 6 of those streams, through a seasonal approach to address habitat availability for native stream animals, with winter total restorative amounts of 9.45 mgd, and summer restoration reduced to 1.11 mgd.⁶ At the end of this meeting, the petitioners requested a contested case.

On June 3, 2010, Nā Moku filed a Petition for a Contested Case with the CWRM for "Petitioners' right to sufficient stream flow to support the exercise of their traditional and customary Native Hawaiian rights to growing kalo and gathering in, among, and around East Maui streams and estuaries, and the exercise of other rights for religious, cultural, and subsistence purposes.

⁶ The six streams that were amended during this stage were Hanawī, Makapipi, Waikamoi, West Wailuāiki, East Wailuāiki, and Waiohue.

Specifically, the rights of members to engage in such practices in, on, and near Waikamoi, Puohokamoa, Ha'ipua'ena, Punalau/Kōlea, Honomanū, West Wailuāiki, East Wailuāiki, Kopili'ula, and Pua'aka'a, Waiohue, Pa'akea, Kapā'ula, Hanawī streams from HRS § 1-1 and HRS § 7-1 and protected under HRS § 174-101." (CWRM D&O, FOF 13). The petitioners' request for a contested case identified 5 of the 6 streams that had their IIFS amended, and 8 of the 13 streams that had been left at status quo IIFS under the CWRM May 25, 2010 decision. The May 25, 2010 decision did not revisit the CWRM Priority Streams D&O.

Also on June 3, 2010, the MDWS filed a contested case petition to be a party in a contested case hearing before the CWRM citing the reasons that: 1) any decision will directly affect their ability to provide water for domestic and agricultural purposes; and 2) being the public water supplier for the County of Maui, they are in the best position to represent the public's interest in continued use of these resources for the Upcountry Maui public water supply. On October 18, 2010, the CWRM voted to deny the petitions filed by Nā Moku and MDWS.

On November 17, 2010, Nā Moku filed a notice of appeal, contending that the CWRM erred in: 1) concluding that Nā Moku had no right to a contested case hearing; and 2) reaching its underlying decision regarding IIFS amendment for the 19 streams at issue. The Intermediate Court of Appeals ordered the CWRM to proceed with a contested case hearing by decision issued November 30, 2012. (*In re Interim Instream Flow Standards for Waikamoi*, 128 Hawai'i 497, 291 P.3d 395 (Ct. App. 2012)).

On January 29, 2014, the CWRM appointed Dr. Lawrence Miike as Hearings Officer. He proposed that the contested case address all 27 streams in an integrative approach and not just the 13 streams named in the request for the contested case by the NHLC in 2010. On August 20, 2014, the CWRM voted to "*authorize, order, delegate, and direct*" the Hearings Officer to conduct a contested case hearing on the Petitions to Amend the IIFS for all 27 streams filed by the NHLC in 2001.

Between March 2, 2015 and April 2, 2015, 15 days of hearings were held, during which 36 witnesses testified and an additional 16 witness statements and approximately 550 exhibits were introduced into evidence from various parties, including the Hearings Officer. (CWRM D&O, FOF 27). On October 2, 2015, Nā Moku and Maui Tomorrow Foundation jointly, HC&S, and MDWS submitted their proposed Findings of Fact, Conclusions of Law, and Decision & Order to the Hearings Officer.

On January 6, 2016, A&B announced that HC&S was ceasing sugarcane cultivation in Central Maui and was transitioning to a diversified agriculture farming model. (CWRM D&O, FOF 29).

On January 15, 2016, the Hearings Officer submitted his Proposed D&O to the CWRM and the parties. Dr. Miike's proposed IIFS would have increased flows in 12 of the 22 streams diverted by the EMI Aqueduct System that were subject to the contested case, restoring approximately 18 mgd to the streams (CWRM D&O, FOF 46-47). Six of the 12 streams would have had their flows returned to their undiverted, natural flows.

On March 10, 2016, the CWRM directed the Hearings Officer to "reopen the hearing to address A&B's decision of January 6, 2016 to change HC&S's business operations from farming sugar to a diversified agricultural model." (CWRM D&O, FOF 31). This is due to the fact that

A&B's decision to change farming practices would have a different impact on surface waters and management strategies compared to the former sugar operations.

Shortly after the hearing reopened, on April 20, 2016, A&B announced it would voluntarily fully restore flow to the eight Priority Streams identified by the NHLC in its 2001 Petitions. These streams were Honopou, Hanehoi (including Puolua), Waiokamilo, Kualani, Pi'ina'au, Palauhulu, and East and West Wailuānui (CWRM D&O, FOF 33).

On July 28, 2017, the Hearings Officer submitted his Proposed D&O to the CWRM and the parties, and on August 2, 2017, he submitted his Amended D&O to the CWRM and the parties.

On June 20th, 2018, the CWRM issued its D&O for the 27 East Maui streams that had been subject to IIFS Petitions that evolved through several CWRM proceedings since May 2001. The 2018 CWRM D&O is described in more detail in Section 1.1.4.⁷

1.3.4 Interim Instream Flow Standard Decision and Order

The June 20, 2018 CWRM D&O establishes a quantity of water that must remain in each stream at specified locations subject to the IIFS Petitions. The CWRM D&O does not specifically authorize or allocate amounts of water for offstream uses. The CWRM evaluated each of the streams under the IIFS Petitions individually, analyzing their flow characteristics, instream uses, offstream uses, habitat restoration potential for fish and other stream animals, recreational opportunities, and scenic values. Then the streams were looked at in an integrative approach with consideration for the overall ecological ramifications of the decision. The CWRM also considered the economic ramifications of its decision on offstream uses, with a specific focus on supporting public uses such as drinking water, as well as diversified agriculture.

Theoretical models of un-diverted total and base flows were used in the majority of the streams to set the IIFS. The IIFS is a numeric flow rate, measured in cubic feet per second (cfs) that must remain in the stream at a certain location. The CWRM used a median base flow (BFQ₅₀) to make their decision, which is an amount of stream flow that can be expected to be found in the stream at least 50% of the time. Base flow is a smaller component of the stream's total flow. Total flow includes water input from normal rainfall and storm events. Depending on the location, the base flow standard can vary, therefore it is typically measured at a lower elevation downstream that is more accessible.

To set the IIFS, the CWRM grouped the streams into four broad categories with different objectives and management strategies: (i) conveyance of water to kalo growing areas for community use; (ii) water for streams with high biological value, (iii) water for streams that have barriers to biological or ecological improvements, and (iv) noninstream use of water for municipal and agricultural uses. (See Figure 1-3). The CWRM D&O significantly reduces the amount of water that can be diverted for offstream uses relative to the capacity and use of the EMI Aqueduct System when sugar was being cultivated. Ten streams were ordered to have no diversions at all (one of which, Waiokamilo, had stream flow fully restored in 2007) (referred to as "Fully Restored Streams" in Figure 1-3), 5 were required to return 64% of BFQ₅₀ in the

⁷ The CWRM found that there were 24, not 27, streams that were the subject of the contested case. The difference being that (i) Waikani is not a stream but a waterfall of Wailuānui Stream; (ii) Alo is a tributary of Waikamoi Stream; (iii) Pua'aka'a is a tributary of Kopili'ula Stream; and (iv) Pi'ina'au and Palauhulu are separate streams that join together before reaching the ocean (CWRM D&O, FOF 56).

stream at all times (referred to as “Habitat Streams” in Figure 1-3), and 7 were required to have 20% of BFQ⁵⁰ in the stream at all times (referred to as “Connectivity Streams” in Figure 1-3).

Conveyance of Water to Kalo Growing Areas for Community Use

The CWRM ordered that all diversions on the following streams cease to allow for all water to flow to the taro growing areas or for community and non-municipal domestic uses: Honopou, Huelo/Puolua, Hanehoi, Pi’ina’au, Palauhulu, Waiokamilo, Wailuānui, ‘Ōhi’a/Waianu, Kualani/Hāmau,⁸ and Makapipi. (CWRM D&O, Conclusions of Law (COL) 138). All diversions for these streams are required to be modified so that no out-of-watershed transfers will occur from these streams, which will have uninterrupted free flowing water to the communities that depend upon them. It was not the CWRM’s intent to regulate where and how much water will be used for traditional kalo agriculture or how the water will be apportioned amongst the kalo lo’i. The CWRM’s approach does not automatically set precedents for other areas, but provides a model of water use that integrates traditional culture with modern natural resource management (CWRM D&O, COL 138-145).

Water for Streams With High Biological Value

Some of the petitioned streams have the potential to benefit greatly from the restoration of flow to 64% of the median base flow (BFQ₅₀), which generally represents the flow necessary to restore 90% of the habitat in a stream (H₉₀), based on the biological diversity and habitat that already exists. These streams were ordered to be restored to allow the stream species to flourish and reproduce, benefitting not only the natural environment but also allowing for better opportunity for the exercise of traditional and Hawaiian right (CWRM D&O, COL 131). These streams are: Pi’ina’au, Wailuānui, Honomanū, Waikamoi, Nua’ailua, East Wailuāiki, Kopili’ula, and Waiohue.

Moreover, the CWRM determined that West Wailuāiki present a unique research opportunity to collect valuable information regarding the impact of full restoration of a stream versus habitat restoration (H₉₀). East and West Wailuāiki lie in close proximity to each other with similar biological values and similar habitat biota. The CWRM intends for these two streams to be studied in the future in combination with one another to see the impact, if any, of full restoration versus habitat restoration (CWRM D&O, COL 135).

Honomanū Stream is a gaining stream from above the Lower Kula Ditch to Spreckles Ditch. Below the Spreckles Ditch it becomes a losing stream most likely as a result of the diversion. Honomanū Stream, despite having several diversions on it, has a high biological rating with a potential for high natural habitat gains with the restoration of flow to the dry reaches. Thus, the CWRM ordered that Honomanū Stream should have full streamflow restoration below the Lower Kula Ditch diversion, which provides water for the MDWS system that is used for domestic and agricultural uses. (CWRM D&O, COL 136).

Water for Streams That Have Barriers to Biological or Ecological Improvements

Various streams within the License Area have low biological ratings and or do not have the potential to improve drastically with increased flows. These streams were set at connectivity flow which is twenty percent (20%) of the instream flow (CWRM D&O, COL 30). Streams that are set at connectivity flow are: Kapā’ula, Pa’akea, Pua’aka’a, Puohakamoa, Ha’ipua’ena, Nua’ailua, Waia’aka, and Hanawī. (CWRM D&O, COL 146). None of these streams have

⁸ Although this stream continues to be referred to as “Kualani”, it is in fact the easternmost tributary of Waiokamilo Stream and now known as “East Waiokamilo Stream.” Kualani Stream is below the EMI Aqueduct System and has never been diverted (CWRM D&O, FOF 62,184,186).

registered diversions for taro cultivation nor is there taro cultivation known to occur on these streams (CWRM D&O, COL 147).

Noninstream Use of Water for Municipal and Agricultural Uses

The CWRM acknowledged that in the context of a proceeding to set the IIFS, it does not have the authority to determine how much water may be used for noninstream use for municipal and agricultural uses. That authority lies with the BLNR in issuing a water lease pursuant to HRS § 171-58, which the lease would be subject to the IIFS set by the CWRM. (CWRM D&O, COL 148). Recognizing that the noninstream uses, especially municipal use, are valued uses, the CWRM set the IIFS to allow the MDWS to continue to divert water through its Upper and Lower Kula pipelines. (CWRM D&O, COL 149). In not requiring full restoration of all streams, the CWRM has allowed some streams to continue to be diverted so that the BLNR may continue to license the diversion of water not needed to meet the IIFS from those streams for noninstream uses. The available water would also include freshets and stormwater which are not included in the calculation of the IIFS. (CWRM D&O, COL 150).

The CWRM recognized that the EMI Aqueduct System remains a valuable asset that delivers noninstream public trust benefits, such as drinking water, as well as other reasonable and beneficial uses. The reduction in diversions does not, by itself, compromise the structural integrity of the EMI Aqueduct System so long as it continues to be maintained as a single coordinated system. CWRM considered factors that contribute to the operational capacity of the existing EMI Aqueduct System by allowing some water diversions from streams in the higher elevation eastern portion of the watershed. (CWRM D&O, COL 151).

The CWRM recognized that the stream water that may be leased/licensed by the BLNR from the petitioned East Maui streams may not be sufficient to satisfy the full implementation of a diversified agricultural plan for Central Maui. However, the CWRM expected that a sufficient amount of noninstream water would be available to provide the initial phase of allowing lands already designated as Important Agricultural Lands (IAL) under HRS Chapter 205 in Central Maui to be developed for diversified agriculture. (CWRM D&O, COL 152).

The CWRM D&O does not require the removal or modification of every diversion. The CWRM's intent is that diversion structures only need to be modified to the degree necessary to accomplish the IIFS, and not for the complete removal of diversions, unless necessary to achieve the IIFS. The CWRM's intent is to allow for the continued use and viability of the EMI Aqueduct System (CWRM D&O at p. 269).

Tables 1-2 and 1-3 below, show the streams that are within the License Area as presented in the Environmental Impact Statement Preparation Notice (EISPN) and the CWRM D&O and a discussion reconciling the difference between Tables 1-2 and 1-3. Table 1-3 includes the CWRM D&O regarding the 24 streams subject to the IIFS Petitions. Streams are listed from East to West, starting with those in the Nāhiku portion of the License Area.

1.3.4.1 CWRM IIFS D&O Stream Identification

Due to discrepancies in names used in reference to various streams, tributaries and a waterfall in the License Area, for this Draft Environmental Impact Statement (DEIS), the stream names used in the CWRM D&O are used in the text, tables, maps and the various appended studies, to the extent possible. The discrepancies in stream names between what was used in the CWRM D&O and what was contained in the EISPN, are reconciled in Table 1-2 below, which lists in the

left column the streams considered to be within the License Area as presented in Table 1-2 of the EISPN. Table 1-2 lists a total of 40 items, 39 of which are considered streams and one of which (Waikani) is a waterfall. In contrast, the CWRM D&O specified 36 streams in the License Area.⁹

In this DEIS, the CWRM D&O listing of streams and nomenclature will be used; however, diacritical markings, which are inconsistently used in the CWRM D&O, have been retained or added, as appropriate. The items highlighted are those that differ in some way from the CWRM D&O. The highlighted items are explained in the Notes column.

Table 1-2: License Area Streams as presented in Table 1-2 in the EISPN (February, 2017) Reconciled with Stream Names Used in the CWRM D&O (June 20, 2018)				
License Area	No.	Stream Name	Notes: Reconciliation with CWRM D&O	Revised Count
Nāhiku	1	Makapipi		1
Nāhiku	2	Hanawī		2
Nāhiku	3	Kapā'ula		3
Ke'anae	4	Wai'aka	Referenced "Waia'aka" per CWRM D&O	4
Ke'anae	5	Pa'akea		5
Ke'anae	6	Puakea	Not identified in the License Area under CWRM D&O	6
Ke'anae	7	Waiohue		7
Ke'anae	8	Puaka'a	Referenced as "Kopili'ula (Pua'aka'a tributary with a separate restoration status)" per CWRM D&O	N/A
Ke'anae	9	Kopili'ula		8
Ke'anae	10	East Wailuā-iki		9
Ke'anae	11	West Wailuā-iki		10
Ke'anae	12	East and West Wailuānui	Referenced "Wailuānui" per CWRM D&O	11
Ke'anae	13	Waikani	Due to Waikani being a waterfall it was combined with Wailuānui above	N/A
Ke'anae	14	Kualani	Referenced as "Kualani (or Hāmau)" per CWRM D&O	12

⁹ This DEIS identifies 37 streams within the License Area. Puakea Stream was not identified by in the CWRM D&O as a stream within the License Area that is diverted by the EMI Aqueduct System.

Table 1-2: License Area Streams as presented in Table 1-2 in the EISPN (February, 2017) Reconciled with Stream Names Used in the CWRM D&O (June 20, 2018)				
Ke'anae	15	Waiokamilo		13
Ke'anae	16	Palauhulu	Transposed sequence with 'Ōhi'a (or Wainu) below	15
Ke'anae	17	Waianu/'Ōhi'a	Referenced as "'Ōhi'a (or Waianu)" per CWRM D&O and, transposed sequence with Palauhulu above	14
Honomanū	18	Pi'ina'au	EISPN noted Pi'ina'au in the Honomanu License Area; CWRM D&O has it in Ke'anae License Area	16
Honomanū	19	Nua'ailua		17
Honomanū	20	Honomanū		18
Honomanū	21	Kōlea/Punala'u		19
Honomanū	22	Ha'ipua'ena		20
Huelo	23	Puohokamoa		21
Huelo	24	Wahinepe'e		22
Huelo	25	Alo	Combined with Waikamoi below as a tributary	
Huelo	26	Waikamoi	Referenced as "Waikamoi (Alo tributary)" per CWRM D&O	23
Huelo	27	Kōlea		24
Huelo	28	Punalu'u		25
Huelo	29	Ka'aiea		26
Huelo	30	'O'opuola	Referenced as "'O'opuola (Makanali tributary)" per CWRM D&O	27
Huelo	31	Puehu		28
Huelo	32	Nailiilihaele	Nā'ili'ilihaele (diacritical markings added)	29
Huelo	33	Kailua/Ohanui		30
Huelo	34	Hanauana	Referenced as "Hanahana (Ohanui tributary)" per CWRM D&O	31
Huelo	35	Hoalua		32

Table 1-2: License Area Streams as presented in Table 1-2 in the EISPN (February, 2017) Reconciled with Stream Names Used in the CWRM D&O (June 20, 2018)						
Huelo	36	Pualoa/Hanehoi		Referenced as "Hanehoi (Huelo (also known as Puolua) with a separate restoration status) tributary" per CWRM D&O		33
Huelo	37	Waipi'o				34
Huelo	38	Mokupapa				35
Huelo	39	Ho'olawa-Li'ili/Ho'olawa-Nui		Referenced as "Ho'olawa (Ho'olawa 'ili and Ho'olawa nui tributaries)" per CWRM D&O		36
Huelo	40	Honopou		Referenced as "Honopou (Puniawa tributary)" per CWRM D&O		37

1.3.4.2 IIFS D&O Table

Table 1-2 in the EISPN also indicated which of the listed streams were subject to the Petitions for IIFS. Table 1-3 below indicates which of the 37 streams are subject to the CWRM D&O and also shows what the required restoration status and location of the IIFS under the CWRM D&O. (See generally CWRM D&O, FOF 59, and CWRM D&O, Order at page 268-269).

Table 1-3 Streams In The License Area as Presented in CWRM D&O						
Area	#	Stream Name	Subject to IIFS	Restoration Status	Median Base Flow at IIFS (cfs)	IIFS Location
Nāhiku	1	Makapipi	Yes	Full	1.3	Above Hāna Highway
	2	Hanawī	Yes	Connectivity	4.6	Below Hāna Highway
	3	Kapā'ula	Yes	Connectivity	2.8	On Diversion at Koolau Ditch
Ke'anae	4	Waia'aka	Yes	None	0.77	Above Hāna Highway
	5	Pa'akea	Yes	Connectivity	0.9	At Hāna Highway

Table 1-3 Streams In The License Area as Presented in CWRM D&O

Area	#	Stream Name	Subject to IIFS	Restoration Status	Median Base Flow at IIFS (cfs)	IIFS Location
	6	Puakea	No	N/A	N/A	N/A
	7	Waiohue	Yes	Full	5	At Hāna Highway
	8	Kopili'ula	Yes	Limited	H90 (64% of the Median Base Flow)(F or Habitat Restoration)	Below Hāna Highway
	8A	Pua'aka'a Tributary	Yes	Connectivity	1.1	Above Hāna Highway
	9	East Wailuāiki	Yes	Limited	H90 (64% of the Median Base Flow)(F or Habitat Restoration)	At Hāna Highway
	10	West Wailuāiki	Yes	Full	6	Above Hāna Highway
	11	Wailuānui (Waikani Waterfall)	Yes	Full	6.1	At Hāna Highway
	12	Kualani (or Hāmau) (Below Ditch System)	Yes	None (Never Diverted)	N/A	N/A
	13	Waiokamilo	Yes	Full	3.9	Below Diversion at Koolau Ditch
	14	'Ōhi'a (or Waianu) (Below Ditch System)	Yes	None (Never Diverted)	4.7	N/A
	15	Palauhulu (Hau'oli Wahine and Kano Tributaries)	Yes	Full	11	Above Hāna Highway
	16	Pi'ina'au	Yes	Full	14	Above Hāna

Table 1-3 Streams In The License Area as Presented in CWRM D&O

Area	#	Stream Name	Subject to IIFS	Restoration Status	Median Base Flow at IIFS (cfs)	IIFS Location
						Highway
Honom-anū	17	Nua'ailua	Yes	Connectivity	0.28	TBD
	18	Honomanū	Yes	Limited	H90 (64% of the Median Base Flow)(F or Habitat Restoration)	Above Hāna Highway
	19	Punala'u (Kōlea and Ulunui Tributaries)	Yes	Limited	H90 (64% of the Median Base Flow)(F or Habitat Restoration)	Above Hāna Highway
	20	Ha'ipua'ena	Yes	Connectivity	4.9	Below Hāna Highway
Huelo	21	Puohokamoa	Yes	Connectivity	8.4	Below Hāna Highway
	22	Wahinepe'e	Yes	None	0.9	Above Hāna Highway
	23	Waikamoi (Alo Tributary)	Yes	Limited	H90 (64% of the Median Base Flow)(F or Habitat Restoration)	Above Hāna Highway
	24	Kōlea	No	None	N/A	N/A
	25	Punalu'u	No	None	N/A	N/A

Table 1-3 Streams In The License Area as Presented in CWRM D&O						
Area	#	Stream Name	Subject to IIFS	Restoration Status	Median Base Flow at IIFS (cfs)	IIFS Location
	26	Ka'aiea	No	None	N/A	N/A
	27	'O'opuola (Makanali Tributary)	No	None	N/A	N/A
	28	Puehu	No	None	N/A	N/A
	29	Nā'ili'ilihaele	No	None	N/A	N/A
	30	Kailua	No	None	N/A	N/A
	31	Hanahana (Ohanui Tributary – also known as Hanawana and Hanauna)	No	None	N/A	N/A
	32	Hoalua	No	None	N/A	N/A
	33	Hanehoi	Yes	Full	2.54	Upstream of Lowrie Ditch
	33 A	Huelo (also known as Puolua) Tributary	Yes	Full	1.47 at Huelo	Downstream of Haiku Ditch at Huelo
	34	Waipi'o	No	None	N/A	N/A
	35	Mokupapa	No	None	N/A	N/A
	36	Ho'olawa (Ho'olawa ili and Ho'olawa nui Tributaries)	No	None	N/A	N/A
	37	Honopou (Puniawa Tributary)	Yes	Full	6.5	Below Hāna Highway

*Some of these streams may be identified by other names. The listed names are based on the June 20, 2018 CWRM D&O identified by the CWRM and the State Office of Planning's GIS data.

*H₉₀ is 64% of the median base flow at that stream. These streams are for habitat restoration

*cfs – Cubic Feet per Second, the IIFS numeric flow rate at the IIFS location.

*Huelo is considered to be a tributary to Hanehoi Stream but is identified for "Full" restoration.

Figure 1-3 corresponds with the Table 1-3 above and depicts the CWRM D&O status of each stream as to whether streamflow has been or will be fully restored, partially restored for habitat restoration, and those that may be diverted for offstream uses ("Noninstream Use of Water for Municipal and Agricultural Uses"). As previously discussed, some of these streams may be identified by a different name. The names used in Figure 1-3, are those used in the CWRM D&O matched against the names used in the State Office of Planning's GIS data layer for streams. However, two streams identified in the CWRM D&O, Kualani and Waia'aka, do not

have associated GIS data and, therefore, could not be precisely located on the map. Puakea Stream, a stream within the License Area that was not identified in the CWRM D&O, does not have associated GIS data. For these streams, their approximate locations are shown, based on the geographically sequential listing of stream names in the CWRM D&O.

1.4 Chapter 343, Hawai'i Revised Statutes (Hawai'i EIS Law)

Compliance with the requirements of Chapter 343, HRS is necessary prior to the BLNR's issuance of a Water Lease. Under HRS Section 343-5(e), whenever an applicant proposes an action specified by HRS § 343-5(a) that requires approval of an agency, and that action is not declared exempt under HRS § 343-6, the applicant must engage in the environmental review process set forth under Chapter 343. Under HRS § 343-2, "approval" means a discretionary consent required from an agency prior to actual implementation of an action, and the term "discretionary consent" means a consent, sanction, or recommendation from an agency for which judgment and free will may be exercised by the issuing agency, as distinguished from a ministerial consent. The BLNR's decisions related to the requested issuance of a water lease at public auction in accordance with HRS Chapter 171, will be an exercise within the BLNR's discretion. The applicable "trigger" requiring compliance with Chapter 343, HRS, includes the proposed continuing use of State lands in the License Area, including water resources from those lands.

For the purposes of HRS Chapter 343, the applicant for the Water Lease is A&B, pursuant to orders of the BLNR in April and June of 2016, directing A&B to prepare an EIS. In accordance with HAR of the State of Hawai'i Department of Health (DOH), Section 11-200-4(b), the BLNR, as the executive board of the DLNR, is the accepting authority for the proposed EIS because the DLNR is the agency initially receiving and agreeing to process the request for the issuance of a Water Lease at public auction.

In connection with its May 2001 submittal, A&B offered to perform the environmental review required under HRS Chapter 343. However, as part of its request for a contested case hearing on the lease matter, the NHLC on behalf of Nā Moku objected to A&B undertaking the environmental review process, and asserted that the HRS Chapter 343 documents had to be prepared by the BLNR. NHLC did not withdraw its objection regarding the preparation of the HRS Chapter 343 environmental documents until oral arguments before the BLNR in May 2015, which withdrawal was then documented in the April 14, 2016 order issued by the BLNR, directing A&B to commence the environmental review process and provide a scope of work for the preparation of an environmental review document pursuant to HRS Chapter 343. The BLNR instructed that the scope of work should distinguish between those matters that could be undertaken prior to issuance of the CWRM D&O, and those matters that required the final CWRM D&O.

On June 9, 2016, A&B submitted to the BLNR a Scope of Services for Preparation of a Chapter 343, HRS Environmental Impact Statement for Proposed Lease for the Nāhiku, Ke'anae, Honomanū, and Huelo License Areas. By order dated July 8, 2016, the BLNR acknowledged that the scope of work provided the information requested and instructed that "A&B and EMI should proceed with the preparation of an environmental impact statement (EIS) in as expeditious manner as possible." The EISPN was published on February 8, 2017. Public scoping meetings were held on Maui on February 22, 2017 in Kahului, and February 23, 2017 in Ha'ikū for the DEIS (See Chapter 9 and Appendices K, L, and M). The CWRM D&O setting forth its decisions on the IIFS Petitions was issued on June 20, 2018.

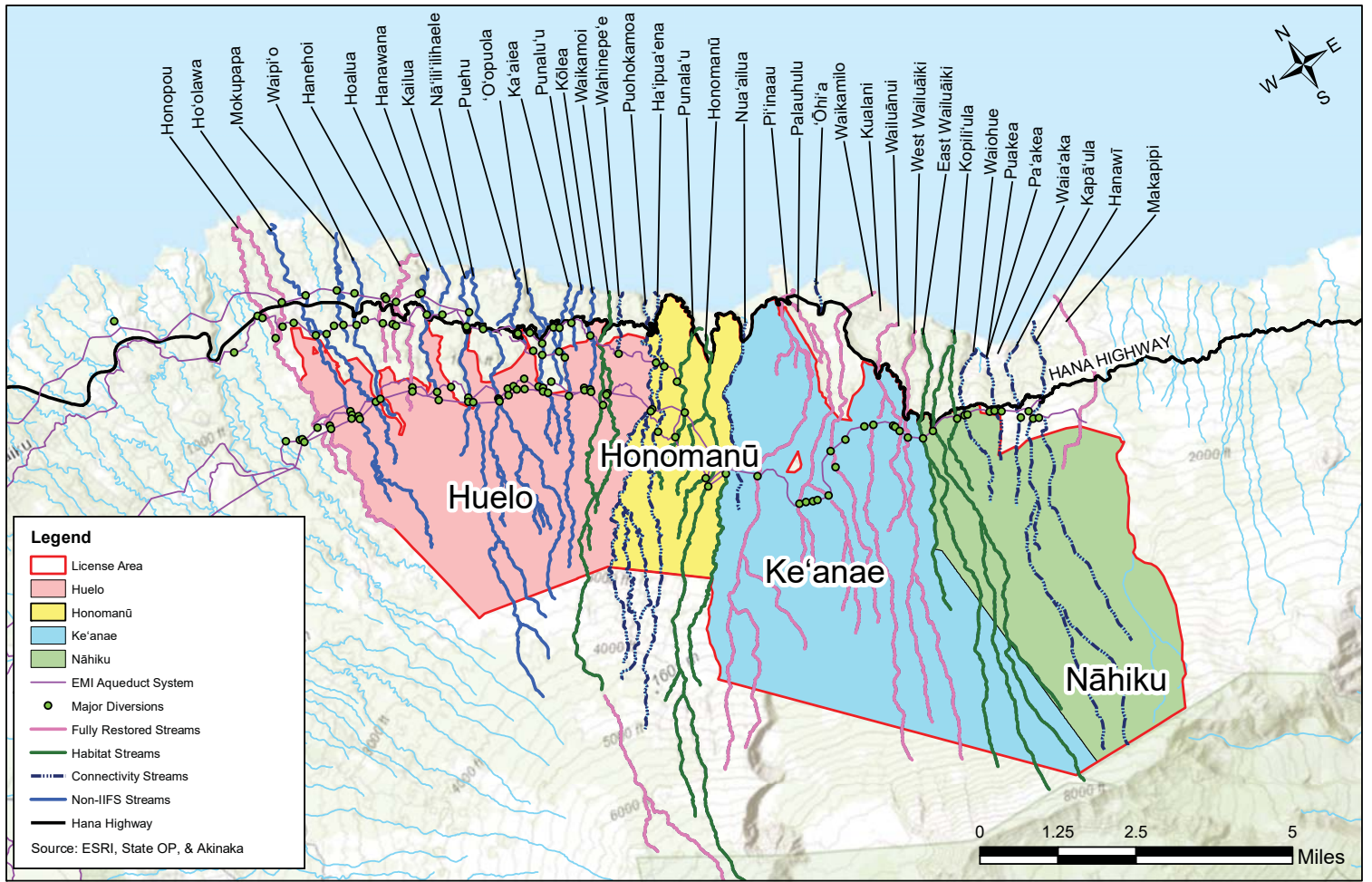


FIGURE 1-3



CWRM IIFS DECISION & ORDER MAP

PROPOSED LEASE (WATER LEASE) FOR THE NĀHIKU, KE'ANAE, HONOMANŪ, AND HUELO LICENSE AREAS

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Chapter 2:

Proposed Action

2. PROPOSED ACTION

2.1 Proposed Action

The Proposed Action constitutes the issuance of one long-term (30-year) Water Lease from the BLNR that grants the lessee the *"right, privilege, and authority to enter and go upon"* the License Area for the *"purpose of developing, diverting, transporting, and using government owned waters"* through the existing EMI Aqueduct System which supplies water to domestic and agricultural water users. The Water Lease, which will be awarded by public auction, will enable the lessee to enter upon lands owned by the State of Hawai'i in order to maintain and repair existing access roads and trails used as part of the EMI Aqueduct System, and will allow for the continued operation of the EMI Aqueduct System to deliver water to the MDWS for domestic and agricultural water needs in Upcountry Maui, including the agricultural users at the KAP and the planned 262-acre KAP expansion, as well as for the Nāhiku community, which, through the MDWS, draws up 20,000 to 45,000 gallons per day (gpd), dependent on weather, directly from the EMI Aqueduct System. It will also allow the continued provision of water to approximately 30,000 acres of agricultural lands (formerly in sugarcane) in Central Maui. The Proposed Action will not require the use of public funds. A substantial amount of private funds will be used to maintain and operate the EMI Aqueduct System. Total operational costs for labor, fringe benefits, materials, professional services, taxes, maintenance, anticipated rental payments to the State for the Water Lease, and other expenses are projected to be approximately \$2.5 million per year (Munekiyo, 2019).

Independent of the Proposed Action, on June 20, 2018, the CWRM issued its D&O setting IIFS for numerous streams and tributaries of streams in the License Area, which includes water originating and flowing from both State and privately owned lands within East Maui.¹ The CWRM D&O establishes a quantity of water that must remain in each stream at specified locations. The CWRM D&O ordered full stream restoration for 10 streams and partial flow restoration on 12 additional streams (Please refer to Section 1.3.4). Therefore, the maximum amount of water that can be awarded through the Water Lease is what is available for diversion after the CWRM D&O is implemented. This is the premise of the Proposed Action.

The amount of water awarded by the Water Lease is subject to all applicable requirements under HRS § 171-58. HRS § 171-58(c), (d), and (e) articulate terms for the disposition of the Water Lease. HRS § 171-58(e) requires that any new lease of water rights "shall contain a covenant that requires the lessee and the department of land and natural resources to jointly develop and implement a watershed management plan. The board shall not approve any new lease of water rights without the foregoing covenant or a watershed management plan."

At the March 22, 2019 meeting of the BLNR, the DLNR staff proposed a watershed management cost share formula and contribution for leases of water rights pursuant to HRS § 171-58(e). The BLNR deferred decision-making on the staff's proposal, the

¹ The CWRM found that there are 24, not 27, streams that were subject to the IIFS contested case because:

- Waikani is not a stream but a waterfall of Wailuānui Stream
- Alo is a tributary of Waikamoi Stream
- Pua'aka'a is a tributary of Kopili'ula Stream

consensus was that compliance with the watershed management provision of HRS § 171-58(e) should be determined on a case-by-case basis for each individual water lease.

A&B was a founding member of the East Maui Watershed Partnership (EMWP), which was the first watershed partnership in the State of Hawai'i and which served as a model for other watershed partnerships throughout the State. Since the founding of the EMWP in 1991, A&B, on its own and through EMI, has actively participated in watershed partnership activities through monetary contributions and in-kind services. Under the Proposed Action, it is anticipated that EMI and/or Mahi Pono will continue to pursue watershed management activities.

2.1.1 Department of Hawaiian Homelands Water Reservation

The Water Lease is also subject to the Department of Hawaiian Home Lands' (DHHL) rights to reserve water sufficient to support current and future homestead needs as provided by Section 221 of the Hawaiian Homes Commission Act. Until that reservation is physically claimed, however, it will be available for use by the lessee. For all proposed state water leases, HRS § 171-58(g) provides:

The department of land and natural resources shall notify the department of Hawaiian home lands of its intent to execute any new lease, or to renew any existing lease of water rights. After consultation with affected beneficiaries, these departments shall jointly develop a reservation of water rights sufficient to support current and future homestead needs. Any lease of water rights or renewal shall be subject to the rights of the department of Hawaiian home lands as provided by section 221 of the Hawaiian Homes Commission Act.

In order to help implement this provision, and in accordance with the DHHL policies, the DHHL held a Beneficiary Consultation on the proposed Water Lease and the DHHL's water reservation on January 14, 2019 at the Paukūkalo Community Center on Maui. Presentations were made by representatives of A&B and Mahi Pono, the DLNR's Land Division, and the DHHL staff and consultants, followed by a question and answer and discussion period. Approximately 40 individuals were in attendance, of whom 24 signed in and 11 voluntarily identified as beneficiaries.

The purpose of the Beneficiary Consultation was to: (1) share information on the request for the BLNR's issuance of a water lease; (2) explain the BLNR's water lease process; and (3) discuss the DHHL's water needs in the relevant area, including how the DHHL's water needs are identified, the identification of existing water reservations in favor of the DHHL, and other matters necessary to identifying a water reservation for purposes of the State's proposed East Maui Water Lease.

The DHHL has a two-fold interest in state water leases. First, state water leases shall contain reservations of water for the DHHL tracts of land, as described in HRS § 171-58(g) above. Second, thirty percent (30%) of the revenues derived from all water leases issued by the State are deposited into the Native Hawaiian Rehabilitation Fund pursuant to Hawai'i State Constitution Article XII, Section 1, and is used to fund programs as prioritized in the Native Hawaiian Development Program Plan adopted by the Hawaiian Homes Commission.

In regards to this Water Lease, the DHHL's lands in Ke'anae, Wailuānui, Kēōkea and Waiohuli, and Pulehunui all have, or have had, some relationship with the EMI Aqueduct System.

In identifying its water needs, the DHHL is guided by the DHHL's planning system, which is comprised of the following plans:

- DHHL General Plan
- DHHL Water Policy Plan
- DHHL Maui Island Plan
- DHHL Regional Plans
- DHHL Development Plans

Formulating a water reservation for this proposed Water Lease for purposes of HRS § 171-58(g) is also influenced by the State Water Projects Plan (SWPP) (part of the Hawai'i Water Plan approved by the CWRM), and groundwater reservations for the DHHL that have already been approved by the CWRM pursuant to the SWPP.

The DHHL's Maui Island Plan identifies land use designations for 31,000 acres on Maui and water demands for the different types of land uses (e.g., subsistence agriculture, residential). The SWPP (last adopted by CWRM in May 2017) calculates water demands based on the DHHL plans and relevant standards (e.g. Maui County Water System Standards). Both the Maui Island Plan and the State Water Projects Plan project water needs over 20-year time frames. The DHHL's water reservation, however, addresses the DHHL water needs in their entirety, beyond the 20-year time frame.

The DHHL has previously secured from the CWRM the following reservations of groundwater:

- 3,000 gpd for Ke'anae-Wailuānui
- 813,000 gpd for Kēōkea-Waiohuli
- 1,734,000 gpd for Pulehunui

Non-potable water needs for the DHHL's lands in Ke'anae-Wailuānui amount to 6,868,000 gpd. Although the DHHL holds a reservation for 3,000 gpd of potable water for this area for development over the next 20 years, another 7,000 gpd of potable water may be required for longer-term development. Thus, a potential reservation for this area amounts to 6,875,000 gpd. Ke'anae is fed by Pi'ina'au and Palauhulu Streams; Wailuānui is fed by Wailuānui and Waiokomilo Streams. These four streams are, or will soon be, fully restored. The proposed Water Lease, therefore, would not be affected by such reservations of water for the DHHL.

For its agricultural and residential lots in Kēōkea-Waiohuli, the DHHL has already secured a potable water reservation from the CWRM. Non-potable water demand amounts to 10,428,000 gpd for which a water reservation would have to be secured.

Until 2016, the DHHL's Pulehunui lands in Central Maui had been leased to HC&S, cultivated in sugar cane, and, thus served by the irrigation system situated in the Central Maui agricultural fields, which will herein be referred to as the Central Maui field irrigation system. The DHHL's current plans for these lands include agricultural, commercial, industrial and civic uses. A reservation of 1,734,000 gpd of ground water has already been

secured from the CWRM. A non-potable water demand of 1,027,510 gpd has been identified, and water delivered through the EMI Aqueduct System has been identified as a potential source of this water.

The DHHL staff has identified 11,455,510 gpd (10,428,000 gpd for Kēōkea-Waiohuli + 1,027,510 gpd for Pulehunui) of water as their recommendation for a reservation of water rights sufficient to support current and future homestead needs related to this proposed Water Lease.

The DHHL has indicated that reserved water may be available for other purposes until the DHHL has an actual need for the water. For its Kēōkea-Waiohuli and Pulehunui lands, the DHHL will be dependent on the EMI Aqueduct System collecting and transporting East Maui stream waters, in order to get waters to its lands. Until actual need materializes, the DHHL would receive payments related to lease rents paid by the lessee for those waters should EMI use a portion/all of the DHHL's Water Reservation, and the DHHL could receive other possible compensation or consideration.

Following the January 2019 Beneficiary Consultation, beneficiaries were given a month to provide additional written comments to the DHHL staff. Thereafter, the DHHL staff would formulate a recommended water reservation for approval by the Hawaiian Homes Commission before it is presented to the CWRM as a request for a water reservation for the East Maui Water Lease, pursuant to HRS § 171-58(g).

The Proposed Action also incorporates the proposed use of the water, as discussed previously, in Upcountry Maui and in Central Maui. The discussion below expands upon the Proposed Action spanning the three geographic areas of East Maui, Upcountry Maui, and Central Maui.

2.1.2 East Maui/License Area

The Proposed Action would allow the lessee the *"right, privilege, and authority to enter and go upon"* the License Area for the *"purpose of developing, diverting, transporting, and using government owned waters"* through the existing EMI Aqueduct System which supplies water to domestic and agricultural water users. The Water Lease will enable the lessee to enter upon lands owned by the State of Hawai'i in order to maintain and repair existing access roads and trails used as part of the EMI Aqueduct System, and will allow continued operation of the EMI Aqueduct System.

The EMI Aqueduct System spans the State-owned License Area which includes four areas in East Maui, known as the Nāhiku, Ke'ānae, Honomanū, and Huelo. The EMI Aqueduct System consists of approximately 388 separate intakes, 24 miles of ditches, and 50 miles of tunnels, as well as numerous small dams, intakes, pipes, 13 inverted siphons and flumes. The EMI Aqueduct System collects surface stream water from approximately 50,000 acres of land (Collection Area), of which approximately 33,000 acres are owned by the State of Hawai'i (License Area), and the remaining approximately 17,000 acres are privately owned by EMI and Mahi Pono.

The EMI Aqueduct System starts at Makapipi Stream, in the Nāhiku portion of the License Area, with the Koolau Ditch. The Koolau Ditch traverses westward across the Ke'ānae License Area and into the Honomanū License Area where it crosses paths with the Spreckles Ditch. This is where streams had multiple diversions at different levels to supply

water to the EMI Aqueduct System. Separating higher elevation ditches allows them to maintain the very slight slope necessary to convey flows by gravity over long distances to irrigate higher elevation fields. This avoids the cost of energy required to pump water up from ditches delivering water at lower elevations. As the system continues westward, the Koolau Ditch transitions at the boundary between the Honomanū and Huelo portions of the License Area to the Wailoa Ditch. Makai of the Koolau/Wailoa Ditch, are the Manuel Luis and the Center Ditch. At Waikamoi Stream, the New Hamakua Ditch begins, running parallel to the Wailoa Ditch, but at a lower elevation.

The Spreckles Ditch terminates its mauka segment at Waikamoi Stream, and begins its makai segment at Ka'aiea Stream, until it converges with the Lowrie Ditch at Nā'ili'ilihale Stream. Makai of Lowrie Ditch is the Haiku Ditch. At Honopou Stream, the water collected within the License Area by the EMI Aqueduct System exits the License Area. Crossing this western boundary of the License Area in descending elevation are the Wailoa Ditch, the New Hāmākua Ditch, the Lowrie Ditch, and the Haiku Ditch. West of Honopou Stream, the EMI Aqueduct System traverses land that was largely owned by A&B and is now largely owned by Mahi Pono. Additional flows from streams located on this land are diverted by the EMI Aqueduct System until it crosses Maliko Gulch beyond which there are no stream diversions. Crossing Maliko Gulch in descending elevation are the Wailoa Ditch, Kauhikoa Ditch, Lowrie Ditch, and the Haiku Ditch. Figure 2-1 depicts the EMI Aqueduct System in East Maui identifying the system's ditches, and major stream diversions within and outside the License Area. Figure 2-2 depicts the major ditches that transport water to the agricultural fields in Central Maui.

The EMI Aqueduct System was designed and is intended to be operated to capture and convey a major portion of the base flow from streams in the License Area to supply the former sugarcane operations in Central Maui. The EMI Aqueduct System is not designed to capture and convey short periods of high streamflow known as freshets that occur when it rains heavily in the upslope areas of the watershed. Such larger flows quickly overtop or bypass the diversions and remain in the streams. The system will only divert up to the capacity of the ditches to convey slow moving water along the very slight slopes of the ditches. Up until 1986, when the first return of water was made to the East Maui streams, the long-term average delivery by the EMI Aqueduct System was 165 mgd (CWRM D&O, FOF 519) before any use of the water by the MDWS or HC&S. In 2001, the CWRM began the process toward its D&O for several East Maui streams that further changed the amount of water available for delivery to Upcountry Maui and to the Central Maui agricultural fields. Based on these changes to the system, a more recent history of flow deliveries from the EMI Aqueduct System was computed from 1987 to 2006 (20 year time period). When analyzing the delivery data at Honopou Stream and Maliko Gulch, the median (Q50) flow at these areas for this time period was 135.58 mgd at Honopou Stream and 146.64 mgd at Maliko Gulch (Akinaka, 2019).

Compliance with the June 2018 CWRM D&O requires modifications to many of the stream diversion works that are part of the EMI Aqueduct System. Streams requiring partial restoration of flow have required adjustments to their diversions. Full stream flow

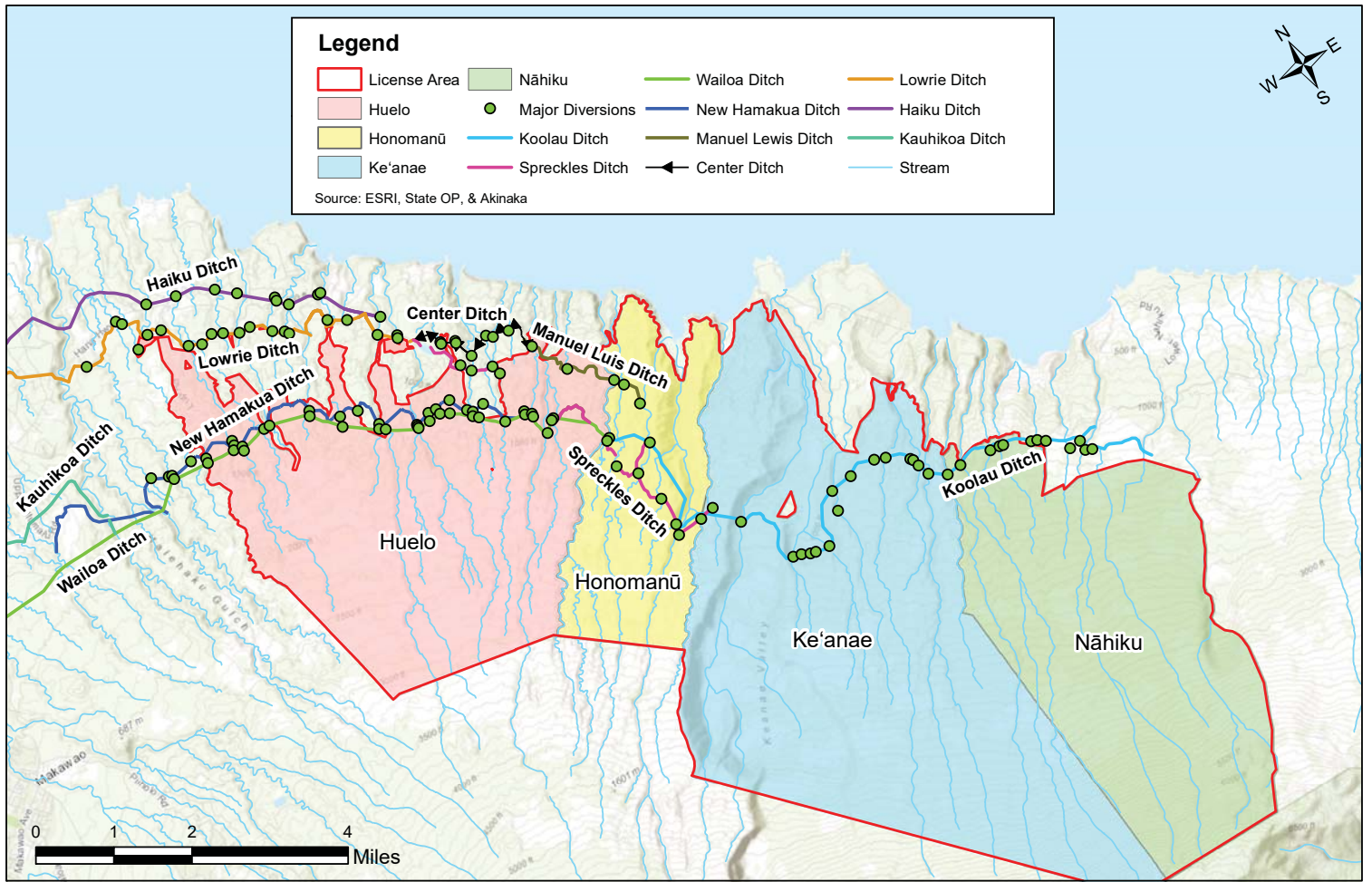


FIGURE 2-1

EMI AQUEDUCT AQUEDUCT - EAST MAUI

PROPOSED LEASE (WATER LEASE) FOR THE NĀHIKU, KE'ANAE, HONOMANŪ, AND HUELO LICENSE AREAS



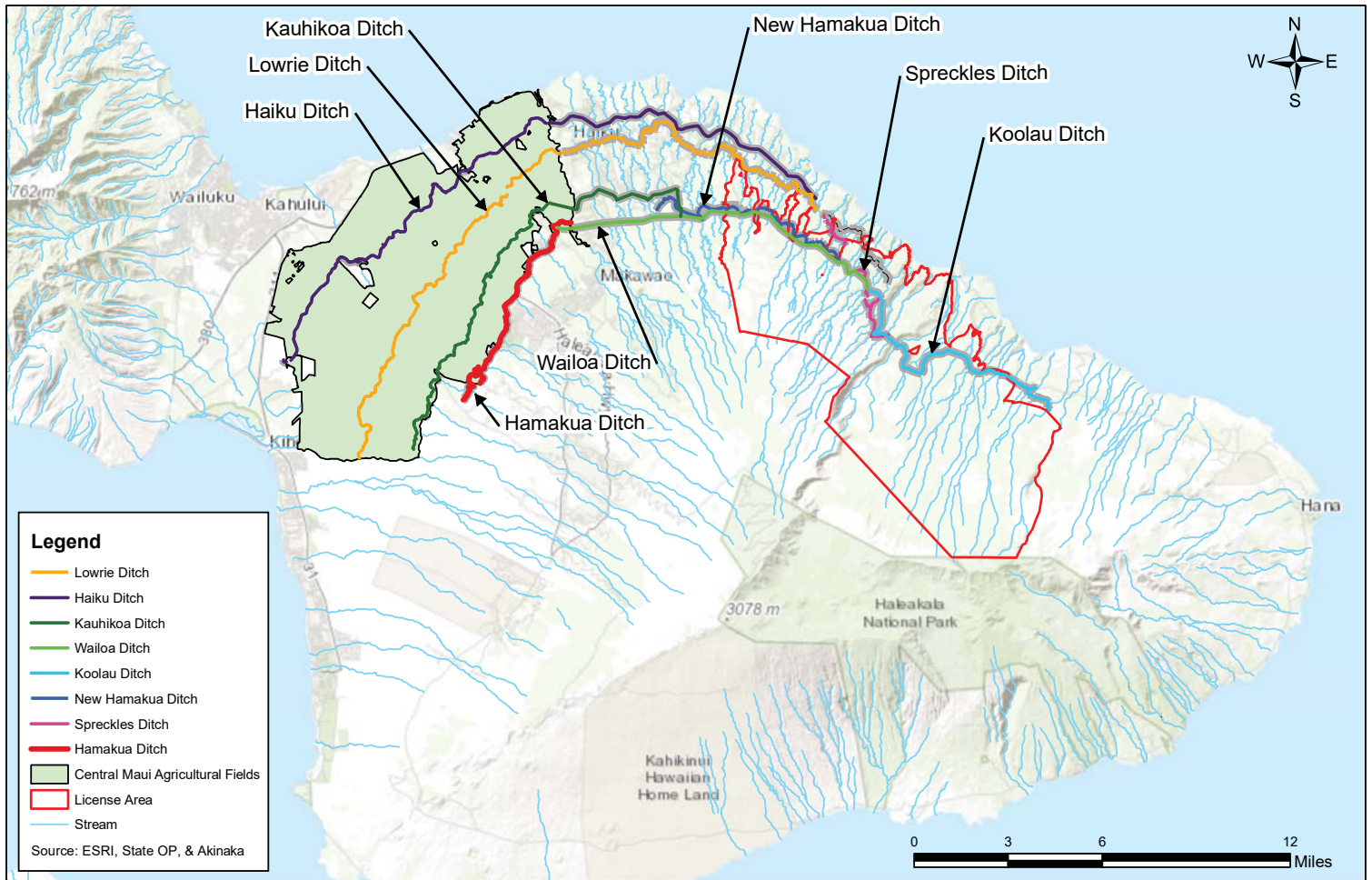


FIGURE 2-2

EMI AQUEDUCT SYSTEM

PROPOSED LEASE (WATER LEASE) FOR THE NĀHIKU, KE'ANAE, HONOMANŪ, AND HUELO LICENSE AREAS



restoration has required closure of the stream diversions. These compliance requirements must be met irrespective of whether the Water Lease is issued. East Maui, specifically the License Area, has already been affected by increased stream flows resulting from less offstream diversions due to the closure of sugar operations in December 2016. Currently, the EMI Aqueduct System is only diverting approximately 20 mgd. As a result, very little surface stream water is currently being diverted relative to what would be allowed should the Water Lease be awarded per the Proposed Action. However, the amount of water that may be diverted should the Water Lease be issued is substantially less than the amount that was diverted during normal sugar production. For example, in 2006 it is estimated that the EMI Aqueduct System delivered approximately 156.69 mgd at Maliko Gulch, whereas under the CWRM D&O, it is estimated that the delivery at Maliko Gulch will be approximately 92.32 mgd (Akinaka, 2019)).

The median flow required by the CWRM D&O provides an estimated available median flow at Honopou Stream of 87.95 mgd, where the EMI Aqueduct System leaves the License Area. Beyond the License Area, the diverted streams only provide supplemental ditch flow when License Area diversions are low. The amount that can be added is relatively low because when rainfall is high in East Maui, the ditches are fuller and there is little needed to supplement the flow. And, when rainfall is low in East Maui, the streams west of Honopou Stream have less flow in them as they are in an area that receives less rainfall than areas further east. During drier (low flow) periods, it is estimated that 4.37 mgd is available to supplement the EMI Aqueduct System between Honopou Stream and Maliko Gulch. With this added flow, the estimated median flow available beyond Maliko Gulch for use in Upcountry Maui and the Central Maui fields is estimated to be 92.32 mgd (Akinaka, 2019).

With the issuance of the Water Lease under the Proposed Action, the EMI Aqueduct System would divert only the maximum allowable amount under the CWRM D&O from streams within the License Area, which is estimated to be approximately 87.95 mgd. The EMI Aqueduct System is estimated to divert an additional 4.37 mgd from the point that it leaves the License Area at Honopou Stream and collects water from streams on privately owned land to its last diversion at Maliko Gulch. Thus, an estimated total of approximately 92.32 mgd would be conveyed to supply the MDWS for users in Upcountry Maui, Nāhiku, and the agricultural fields in Central Maui.

2.1.3 MDWS Water Service Sourced from the EMI Aqueduct System

The MDWS is the main municipal water provider for the County of Maui. The MDWS operates and maintains five separate water systems on the island of Maui. The second largest of these systems is the “Upcountry Maui Water System” which services the communities of Kula, Pukalani, Makawao Ha’ikū, Hali’imaile, Waiakoa, Kēōkea, Waiohuli, ‘Ulupalakua, Kanaio, Olinda, ‘Ōma’opio, Kula Kai, and Pūlehu (See Figure 2-3). In Upcountry Maui, the MDWS serves customers’ water needs (homes, schools, hospitals, churches, businesses and agriculture) for both domestic (approximately 60% of use) and agricultural (approximately 40% of use) purposes, including the agricultural users at the KAP. The MDWS also serves a portion of the Nāhiku community via the Ko’olau Water System, which is not located in Upcountry Maui. For the purposes of the Proposed Action, however, this service is included because the Nāhiku service area portion of the Ko’olau Water System is sourced by the EMI Aqueduct System. With the issuance of the Water Lease in the Proposed Action, the amount of water the MDWS would receive through the

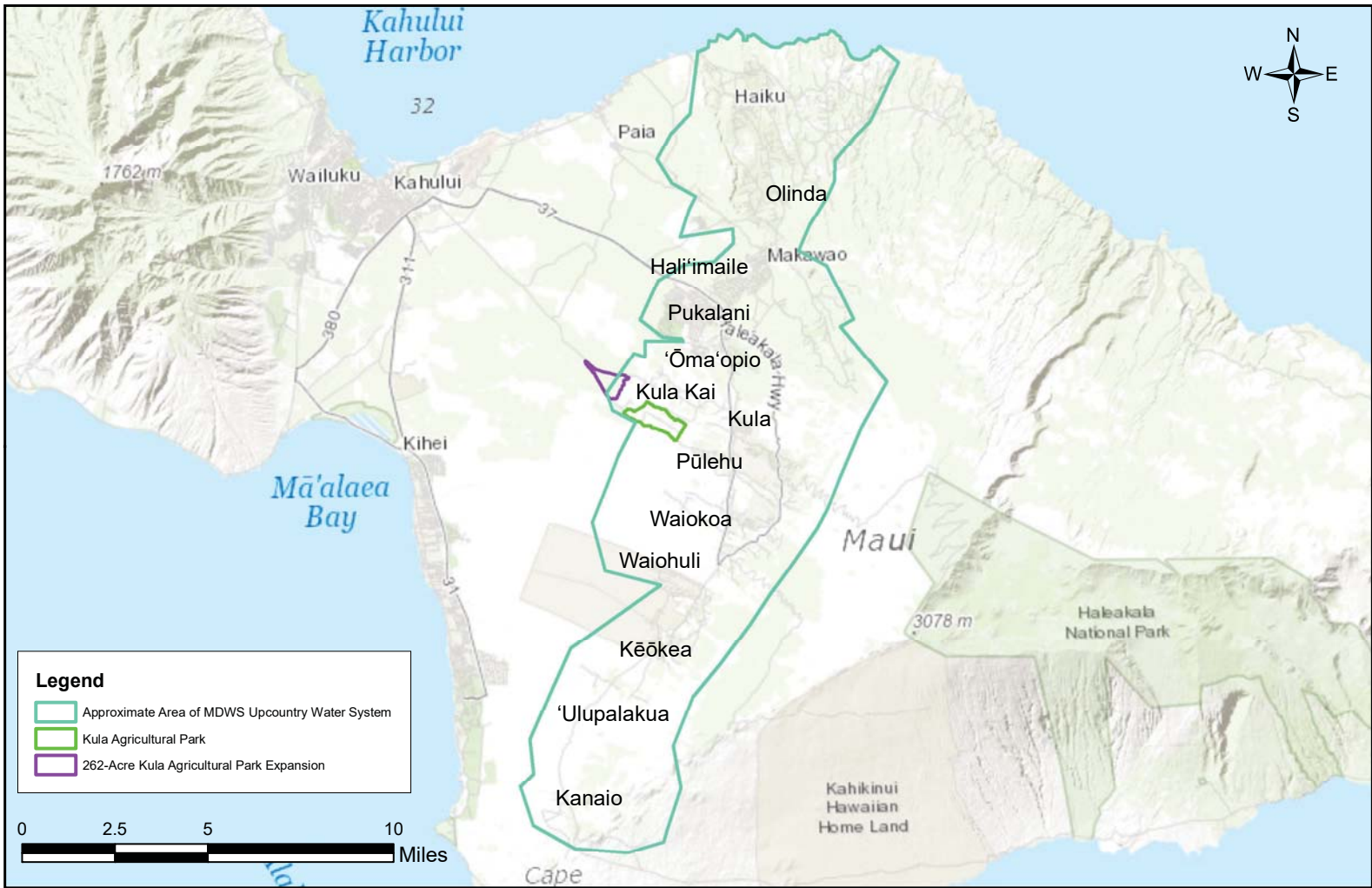


FIGURE 2-3

Upcountry Maui Water System Service Area

PROPOSED LEASE (WATER LEASE) FOR THE NĀHIKU, KE'ANAE, HONOMANŪ, AND HUELO LICENSE AREAS



EMI Aqueduct System through the Wailoa Ditch is assumed to be consistent with prior use, identified in the CWRM D&O as an average of 7.1 mgd.

2.1.3.1 Upcountry Maui Water System

The Upcountry Maui Water System relies on three surface water sources, which accounts for approximately 80-90 percent (13 mgd) of water delivered through the Upcountry Maui Water System (CWRM D&O, FOF 799). One of the three surface water sources is delivered directly by the EMI Aqueduct System, through the Wailoa Ditch. Average daily use by the MDWS from the Wailoa Ditch is about 7.1 mgd, which includes water processed by the Kamole-Weir Water Treatment Plant (WTP) (discussed in further detail below) and non-potable water for the KAP, which receives water from Reservoir 40.

The other two surface water sources are not supplied by the EMI Aqueduct System, but are fed by streams located on lands previously owned by A&B and now owned by Mahi Pono. Under a contractual agreement with EMI, these waters are diverted and transported by two MDWS high-elevation aqueducts (Upper and Lower Waikamoi Flumes) that are also situated on land that was previously owned by A&B and now owned by Mahi Pono, located above the License Area (Ha'ikū Uka Watershed). These aqueduct systems deliver water to the MDWS' Olinda and Pi'iholo Water Treatment Plants (See Figure 2-4). These two high elevation aqueducts are maintained by EMI. However, these sources are not part of the proposed Water Lease being addressed by this DEIS as they are outside the License Area. The water received at the higher elevation is preferred by the MDWS because it can be delivered to users at higher elevations without the cost of pumping from a lower elevation source like the Wailoa Ditch.

The remaining approximately 10-20 percent of water delivered through the Upcountry Maui Water System comes from a series of basal aquifer wells: the Ha'ikū Well, Po'okela Well, and the two Kaupakalua wells. These four wells account for a total of about 4.9 mgd of water delivered. In times of emergency, the Upcountry Maui Water System can draw up to 1.5 mgd from the Hāmākuapoko Wells (CWRM D&O, FOF 808). However, there is concern over this water due to the presence of pesticides from former pineapple production. The total combined production capacity of the available water sources for the Upcountry Maui Water System (surface and groundwater) is approximately 17.9 mgd but, the reliable capacity is approximately 9.1 mgd due to limitations and maintenance requirements (CWRM D&O, FOF 811). Water from wells is also more expensive as it must be pumped.

The MDWS has been able to receive its surface waters from all three Upcountry Maui water sources through a series of agreements with EMI. Because the EMI agreements with the MDWS provide that water supplied to the MDWS is contingent upon the Water Lease being issued, for purposes of this EIS, no water is presumed to be provided to the MDWS if the Water Lease is not issued. Currently the MDWS is being charged 6¢ per 1,000 gallons to receive East Maui surface water for the KAP and other Upcountry Maui farm areas.

The Upcountry Maui Water System serves a total population of approximately 35,251, and the County anticipates the population will grow to approximately 43,675 by 2030. As there is no "excess" supply of water for Upcountry Maui, the MDWS customers have been required to adhere to strict conservation measures during periods of drought (Draft Maui

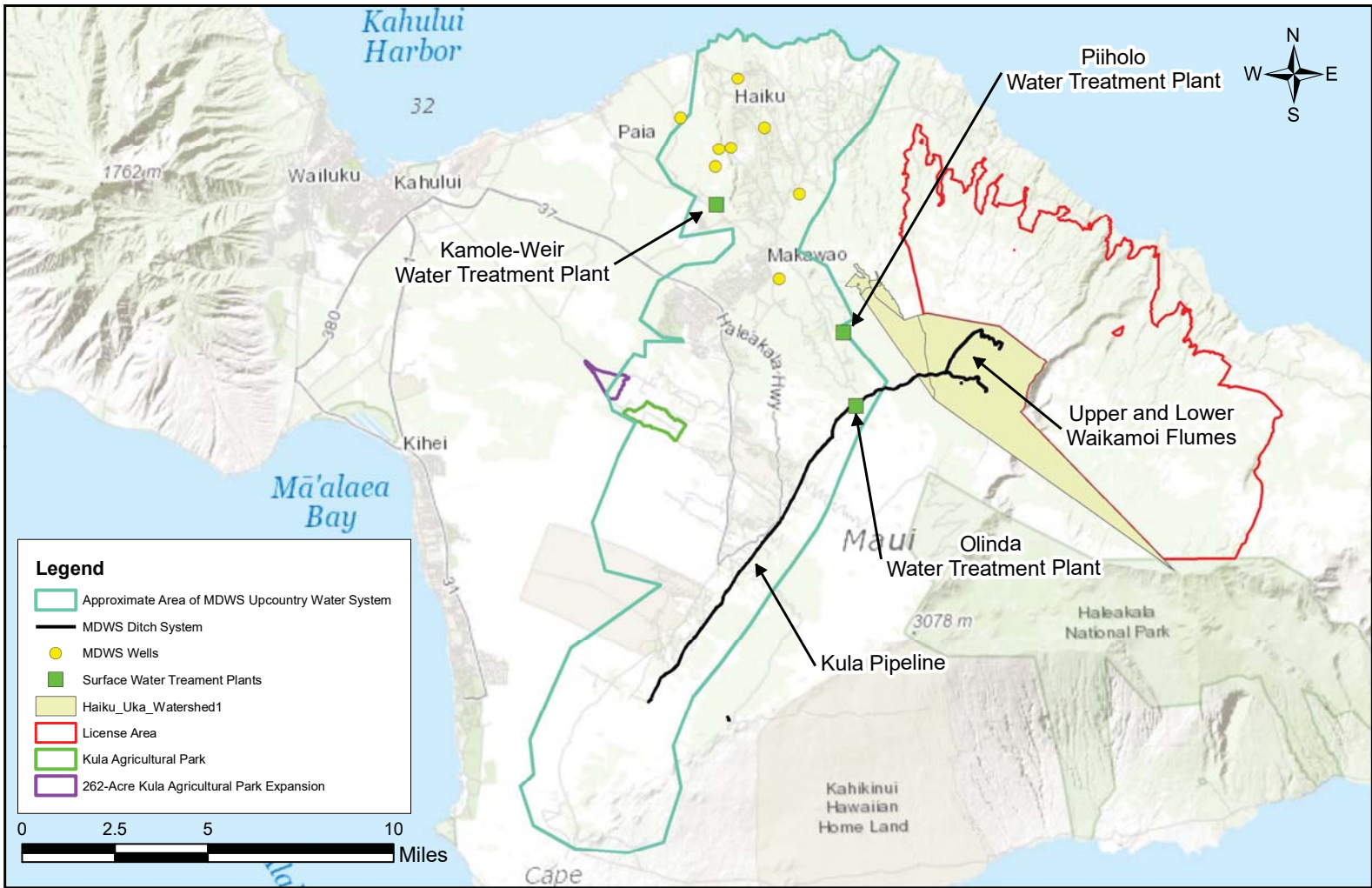


FIGURE 2-4
Upcountry Maui Water System

PROPOSED LEASE (WATER LEASE) FOR THE NĀHIKU, KE'ANAE, HONOMANŪ, AND HUELO LICENSE AREAS



Island Water Use and Development Plan, March 2019). Customer usage, based on meter readings between 2005 and 2013, averaged approximately 7.9 mgd, varying between 6 mgd and 10 mgd. The MDWS anticipates that the projected population growth would add an additional need for 1.65 mgd of water. Moreover, there is a long waiting list of Upcountry Maui residents seeking water meters, some of whom have been waiting for over a decade. Currently, there are approximately 9,865 water connections to the Upcountry Maui Water System, with approximately 1,852 applicants on the County's waiting list for new water connections (Draft Maui Island Water Use and Development Plan, March 2019).

While the MDWS has worked diligently in recent years to bring additional sources of water online for Upcountry Maui users, the County's dependence on water received through the EMI Aqueduct System cannot be overstated. The MDWS asserts that if all connections were to be made, the water demand of the Upcountry Maui Water System would increase by about 7.5 mgd, or approximately 95 percent of the current usage of 7.9 mgd because many of the 1,852 applicants are asking for multiple meters for subdivisions. Therefore, the 1,852 applicants represent many more meters. The MDWS expects it will need to develop between 4.2 mgd and 7.95 mgd by 2030 to meet demands of future population growth, new connections from the current list of water meters, as well as present uses (Draft Maui Island Water Use and Development Plan, March 2019).

Currently, the MDWS has no plans to drill new production wells to serve the Upcountry Maui communities as they are costly to develop and operationally use a large amount of energy due to the elevation that the water would need to be pumped (CWRM D&O, FOF 825). New basal well development would involve construction of new wells at the 1,300-foot elevation and/or wells at the 1,800-foot elevation, along with transmission pipelines, storage tanks, and booster pump stations. Moreover, there are legal issues that would need to be resolved before the MDWS could proceed with well development.² The EMI Aqueduct System continues to serve a critical role in providing Upcountry Maui with water, and should the delivery of water from the EMI Aqueduct System to the MDWS be curtailed, Upcountry Maui may be left without a reliable source of water.

The Upcountry Maui Water System's reliance on surface water (80-90%) makes the system extremely vulnerable to drought and presents as a challenge for the MDWS. For decades, the Upcountry Maui region has experienced voluntary and mandatory water use restrictions imposed on residential and agricultural users during droughts, primarily during the dry season, often negatively impacting the productivity of the farmers. Droughts are a natural phenomenon that have been historically experienced throughout the Hawaiian Islands, however, drought events have become more intense over the years, and are expected to intensify in the future.³

Droughts in Maui are a part of the regular climate cycle, and have been occurring on average every 3 to 4 years (Akinaka, 2019). These periods of low rainfall have even

² In 2003 the County entered into a consent decree in the matter of *The Coalition to Protect East Maui Water Resources et al. v. Board of Water Supply et al.* that requires that the MDWS conduct rigorous cost/benefit analyses of other water source options before developing groundwater in the East Maui Region. In that case, the plaintiffs demanded that before looking to East Maui as a source of groundwater, the MDWS must look first to surface water drawn from the Waikapu, 'Īao, and/or Waihe'e hydrologic units, and the MDWS must meet several other criteria before pursuing groundwater development in the East Maui area.

³ Discussed in further detail in Section 4.3.1

affected the normally lush East Maui area. Historical occurrences as noted in the recently updated Hawai'i Drought Plan (2017) have occurred many times within the past 70 years. Since 1950, droughts occurred in East Maui in 1953, 1962, 1971, 1981, 1984, 1999, 2006, and most recently a long period of 2008 to 2013. During these times, the EMI Aqueduct System has delivered less than 50,000 million gallons annually to the County of Maui. The average of the delivery over the past century has been 61,000 mg per year (Akinaka, 2019). Historically, Kamole-Weir WTP is the primary source of water for all of Upcountry Maui during times of drought. However, the facility lacks raw water storage and is restricted to how much water that the facility can treat or how much water that can be delivered through the Wailoa Ditch (Draft Maui Island Water Use and Development Plan, March 2019).

The recent CWRM D&O for East Maui streams would result in decreased base flows for Wailoa Ditch, which is the main source of water for the Kamole-Weir WTP (Draft Maui Island Water Use and Development Plan, March 2019). With the IIFS established, surface water under extended low flow/drought conditions (Q90), is not sufficient to meet the projected municipal demand of the MDWS Upcountry Maui Water System (Draft Maui Island Water Use and Development Plan, March 2019). Typically, during drought periods, the average daily demand increases per user. Even with decreased offstream use resulting from the proposed diversified agricultural use in Central Maui (which will use less water than historically used for sugar cultivation), water shortage in droughts will likely continue as long as the Upcountry Maui Water System relies on surface water as its primary source. Peak demands for Upcountry Maui's projected needs must be accounted for to ensure a reliable water supply. Should the EMI Aqueduct System be curtailed, MDWS will need to expand existing water resources and seek the development of alternative water resources.

There are three MDWS water treatment facilities that rely on water from the EMI Aqueduct System or water from the privately-owned Ha'ikū Uka Watershed that supply the Upcountry Maui Water Service Area with municipal water: the Kamole-Weir WTP (supplied by the EMI Aqueduct System; subject to the Water Lease), the Pi'iholo WTP, and the Olinda/Upper Kula WTP (supplied by Waikamoi Flumes sourced and situated in the Ha'ikū Uka Watershed; not within the License Area).

The Kamole-Weir WTP receives surface water from the Wailoa Ditch, which, in turn receives water from diversions of various streams extending as far east as Makapipi Stream at the eastern border of the License Area. The streams are Honopou, Hanehoi, Puolua, Alo, Waikamoi, Puohokamoa, Ha'ipua'ena, Kōlea, Punalau, Honomanū, Nua'ailua, Pi'ina'au, Paluhulu, East and West Wailuānui, East and West Wailuāiki, Kopili'ula, Pua'aka'a, Waiohue, Pa'akea, Waia'aka, Kapā'ula, Hanawī, and Makapipi. The Kamole-Weir WTP serves the communities of Makawao, Pukalani, Hali'imaile, and Ha'ikū. The facility uses micro-filtration technology and is the largest surface water facility on the island of Maui. The average daily production at this facility is about 3.6 mgd, but it can process up to 6 mgd at maximum capacity. However, there is no raw water storage at Kamole-Weir WTP. The MDWS is considering development of a 100- to 200 mg reservoir at the Kamole-Weir WTP, which does not currently have a reservoir. No funds have been allocated towards design or construction of the potential new reservoir at this time. As required by the CWRM D&O, the MDWS will need to update the CWRM on the status of their plans for Kamole-Weir WTP.

The Pi'iholo WTP relies on water through the Lower Waikamoi (Kula) Flume, which diverts water from various streams in the Ha'ikū Uka Watershed (Waikamoi, Puohokamoa, Ha'ipua'ena, and Honomanū), previously owned by A&B and now owned by Mahi Pono, and serves the Lower Kula community. Water for this facility is stored in a reservoir with a capacity of 50 mg. Average daily production at the Pi'iholo Water Treatment Plant is 2.5 mgd, but it can process up to 5 mgd at maximum capacity.

The Olinda/Upper Kula WTP relies on water from the Upper Waikamoi (Kula) Flume, which diverts water from various stream diversions in the Ha'ikū Uku Watershed (Waikamoi, Puohokamoa, and Ha'ipua'ena), and serves the Upper Kula, Ulupalakua, and Kanaio communities. Water for this facility is stored in the 30 mg Waikamoi Reservoir and the 100 mg Kahakapao Reservoir. The average daily production of the Olinda/Upper Kula WTP is 1.6 mgd, with a maximum capacity of 2 mgd.

With the issuance of the Water Lease in the Proposed Action, the amount of water the MDWS could receive through the EMI Aqueduct System at its Kamole-Weir WTP assumed to remain at an average of 3.6 mgd (average daily use by the MDWS from the Wailoa ditch is 7.1 mgd, which includes water for the Kamole-Weir WTP and the KAP). Therefore unless, other water sources can be developed or storage capacity increased, the potential for growth would continue to be limited and the voluntary and mandatory restrictions during droughts will continue.

2.1.3.2 The MDWS Kula Agricultural Park

The MDWS also serves KAP with non-potable water from diversions of the same streams that serve the Kamole-Weir WTP through the Wailoa Ditch. Non-potable water for the KAP is pumped from the end of the Hāmākua ditch near Reservoir 40 to the KAP. The KAP is owned by the County of Maui and is managed by the County's Office of Economic Development for the purposes of promoting the development of diversified agriculture by providing appropriately sized agricultural lots at a reasonable cost per Maui County Code (MCC) Section 22.04A.030. The KAP currently consists of 31 farm lots, ranging in size from 7 to 29 acres, for a total of approximately 445 acres, and supports 26 farmers. Each individual lot at KAP is metered and billed by the MDWS. The diverted stream water that is used to supply the KAP is stored in two reservoirs with a combined total capacity of approximately 5.4 mg.

Presently, water demands at KAP are served by the County, which, by contractual agreement, is able to draw up to 1.5 mgd from the end of the Hāmākua Ditch and to utilize a former plantation reservoir to serve KAP. As noted previously, the Hāmākua Ditch is fed directly by the EMI Aqueduct System through the Wailoa Ditch. As of late 2015, the Maui County Office of Economic Development calculated that the current use for the KAP is approximately 548,191 gpd of which 80-90 percent of delivered water is from surface water sources with the remaining portion from basal aquifer wells. Due to the current design of the County's KAP distribution system (pump system in the reservoir), 1.5 mgd must be delivered to the County in order for it to provide the needed 548,191 gpd to the KAP users.

2.1.3.3 The MDWS Nāhiku

A portion of the Nāhiku community is also served by the MDWS directly through the EMI Aqueduct System via a development tunnel in the Koolau Ditch near Makapipi Stream. The tunnel draws between 20,000 to 45,000 gpd, dependent on weather, directly from the

EMI Aqueduct System. The area is at a lower elevation where the water system has sufficient pressure for residential service. Nāhiku overlies the Ke‘anae and Kūhiwa aquifers and is an area of high rainfall, receiving 219 inches annually at Hana Highway and nearly 300 inches at higher elevations. The MDWS purchases water delivery for domestic use from EMI’s West Makapipi Tunnel 2, Well No. 4806-07, which is also known as the “Nāhiku Tunnel” (Draft Maui Island Water Use and Development Plan, March 2019). The water serves 43 water meters located along Nāhiku Road. One meter is classified as an agricultural use while all the others are classified as single-family use. Water from the tunnel is chlorinated at the Upper Nāhiku Tank before it is serviced to the users. Based on water use in the Nāhiku portion of the Ko‘olau Water System, there is sufficient source to accept new meter service applications to meet future demands. However, the cost for water service, storage, and transmission is borne by the meter applicant (Draft Maui Island Water Use and Development Plan, March 2019).

2.1.4 Central Maui Field System

A&B cultivated sugarcane on the fields of Central Maui for over a century up until the termination of operations in 2016. Approximately 30,000 acres of the agricultural fields in Central Maui are irrigated by waters diverted by the EMI Aqueduct System and delivered into the agricultural fields in Central Maui which includes a system of reservoirs and ditches originally designed to service the cultivation of sugar cane (See Figure 2-5). Recently, these agricultural fields were sold to Mahi Pono, which plans to cultivate these fields with various diversified agriculture crops. Over its history, the long-term average delivery of water by the EMI Aqueduct System has been approximately 165 mgd (prior to any use of water by the MDWS or HC&S on the agricultural fields). Since 1999, however, deliveries have declined significantly. In the ten year period from 2004 to 2013, the average delivery was 126 mgd from the EMI Aqueduct System to the Central Maui agricultural fields (CWRM D&O, FOF 519).

In addition to the surface water imported from the EMI Aqueduct System to the Central Maui field irrigation system, the irrigation infrastructure includes fifteen brackish water wells that can supplement surface water to approximately 17,200 acres of the plantation at the lower elevations (CWRM D&O, FOF 738). These brackish wells extract groundwater from the subsurface aquifers lying beneath the agricultural lands, and which are cyclically dependent on recharge derived from the irrigation of the overlying lands by water from the EMI Aqueduct System. The remaining approximately 12,800 acres cannot be serviced by pumped ground water on a consistent basis due to their higher elevation, which makes the land uneconomical to reach with pumped water. Groundwater, however, can be delivered to 7,000 acres at higher elevations via a shared pipeline that served as a penstock line for a hydroelectric unit (CWRM D&O, FOF 739). This pump station was designed and built to be an emergency water source for the high-elevation fields in the event of extreme drought. The combined pumping capacity of these fifteen brackish water wells is 228 mgd of brackish water. However, installed pumping capacity is not an indication of how much water can be reliably provided by these wells. The true instantaneous pumping capacity of the wells – the most that can be pumped over 3 to 5 days – was 115 mgd during sugar cultivation, after which sump levels start to decline.

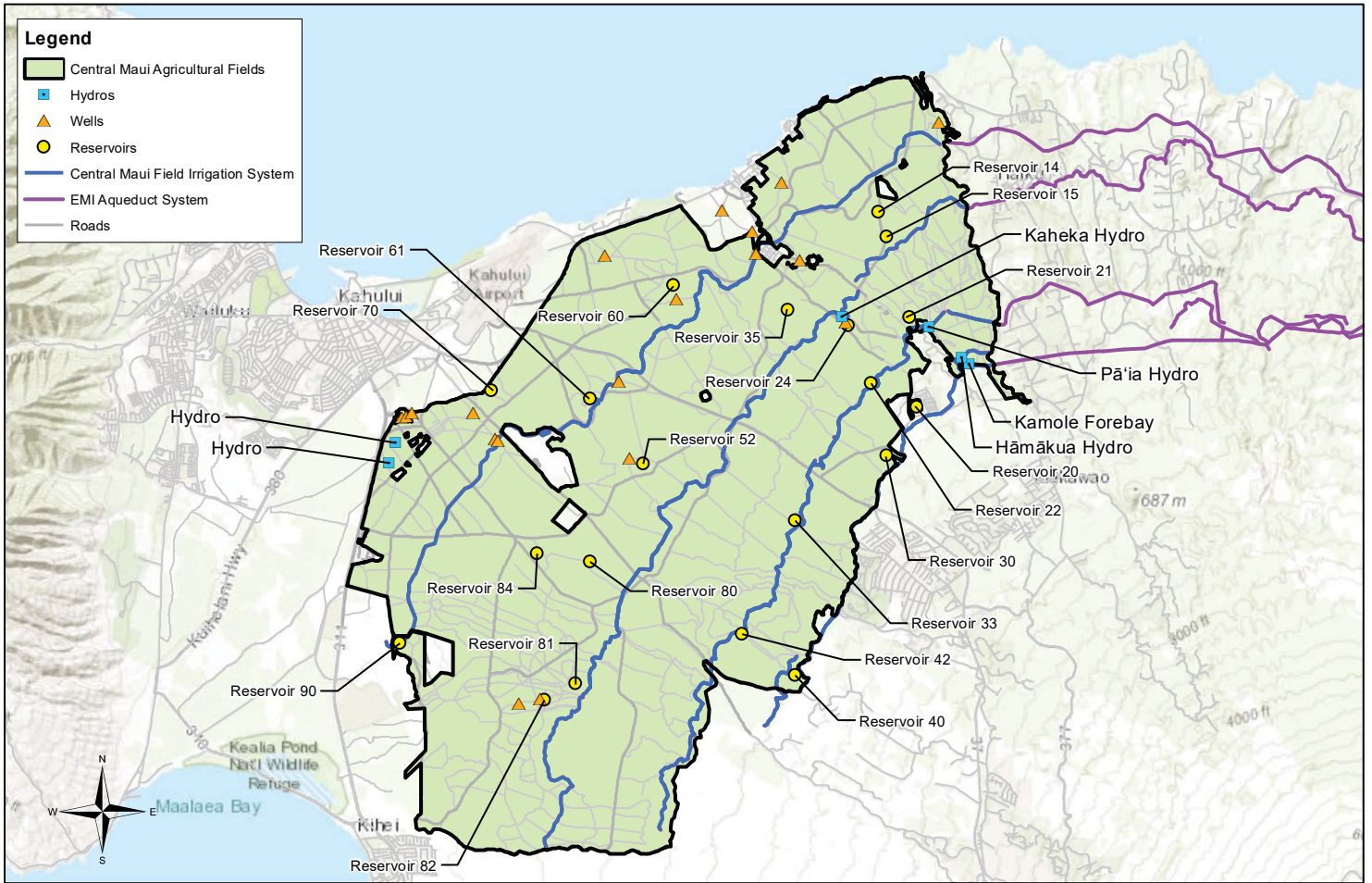


FIGURE 2-5

CENTRAL MAUI INFRASTRUCTURE MAP



0 5,500 11,000 22,000 Feet

0 0.5 1 2 3 4 Miles

1 inch = 11,000 feet

Source: ESRI, State OP, & Akinaka

Proposed Lease for Nāhiku, Ke'anae, Honomanū and Huelo License Areas

From 1986 to 2013, A&B pumped an average of 71 mgd from the brackish water wells; during the 2008-to-2013 period, these wells delivered about 70 mgd of brackish groundwater to the lower-elevation fields. This was a suitable source of water for sugarcane during droughts because sugarcane can tolerate periodic use of water with higher salinity levels.

When the sugar cane fields were in cultivation, well water was being applied typically during dry periods, when surface water was not available for sustained periods. Sugar cane was cultivated in a twenty-four month crop cycle, providing ample time for the crop to recover from a prolonged use of brackish water. The crops planned for Mahi Pono's diversified agricultural operation may have a shorter crop cycle and be much less tolerant than sugar cane of higher salinity levels. Thus, the planned crops will generally be more vulnerable to the negative impacts on crop growth associated with prolonged exposure to brackish water and lower crop yields.

The supplementation of water demands by these brackish wells presents a significant constraint to the viability of the future implementation of diversified agriculture. Under sugar cultivation, the full needs of the 30,000 acres of Central Maui fields could not be met by stream waters diverted by the EMI Aqueduct System at all times of the year. Therefore, every month HC&S would be required to utilize its brackish wells to supplement available surface water supplies to meet the demands of its sugar cultivation operations in Central Maui.

Currently, the majority of the Central Maui fields are no longer in active cultivation, and approximately 20-25 mgd of water is being diverted by the EMI Aqueduct System. Seepage loss, which is recharged back into the groundwater, takes place beyond the last stream diversion at Maliko Gulch, and accounts for approximately 22.7% of the water delivered at Maliko Gulch.

To allow for the identification and analysis of impacts, alternatives considered, proposed mitigation measures, and to discuss all reasonably foreseeable consequences of the action, this DEIS incorporates Mahi Pono's farm plan which projects its 2030 vision (See Figure 2-6). For the purpose of this DEIS, Mahi Pono's farm plan projects use of the total amount of water available after compliance with the IIFS requirements of the CWRM D&O, although it is understood that the DHHL will eventually convert its water reservation to active use. Mahi Pono's water use will be incremental as diversified agriculture is brought back to Central Maui.

Mahi Pono's farm plan is, like any responsible farming plan, a fluid and responsive plan that responds to the ever-changing agricultural market demands and the type of agricultural activity to be pursued (i.e. orchard crops, tropical fruits, row and annual crops, energy crops, pasturage etc.), as well as responding to other variables such as the availability and cost of water for crop irrigation. All of these things must be considered when developing an evolving and feasible diversified agricultural plan for Central Maui.

Another factor in developing the farm plan is to be sensitive to the existing local farming community. Mahi Pono does not want to displace local farmers by planting competing crops or artificially accelerating the ramp-up of operations, both of which could have the potential to drive local farmers out of the market. Mahi Pono's goals for its diversified farm plan will be guided by its core principles of using reasonable and environmentally

responsible “best management practices”, planting non-GMO crops, and growing food for local consumption.

Water Lease Limited to CWRM D&O Farm Plan

The Mahi Pono farm plan assumes the following:

- The total surface water available for use after system losses is estimated to be approximately 65.88 mgd.
- Surface water can be supplemented by a brackish groundwater amount equal to 20 percent of surface water. Taking into account the CWRM D&O, it is estimated that there could be up to 16.47 mgd of brackish groundwater used in the Central Maui agricultural fields. (Plasch, 2019)
- Under the CWRM D&O, the total water available for use on the Central Maui agricultural fields after system losses is approximately 82.35 mgd
- That total amount of water will be delivered to approximately 30,000 acres. Of those 30,000 acres:
 - Approximately 15,950 acres would be used for farming, including 12,850 acres for orchard crops and 3,100 acres for other crops.
 - Approximately 13,800 acres would be used for pasture, of which about 4,700 acres would be irrigated.
 - Approximately 250 acres would be used for green energy, such as a solar farm.

Because there is insufficient surface water to support the entire farm plan, brackish groundwater will also be used.

Given these figures and assumptions, a farm plan consistent with the amount of water available under the CWRM D&O is shown in the table below:

Table 2-1 Mahi Pono Farm Plan							
Proposed Use	Acres	Gallon Per Acre a Day	Surface MGD	Ground water MGD	Total MGD	Annual MGD	% of Total
Community Farm	800	3,392	1.87	0.83	2.70	987	3.28%
Orchards (citrus, mac nuts, beverage crops)	12,850	5,089	53.39	12.04	65.43	23,883	79.48 %
Tropical Fruits	600	4,999	2.07	0.87	2.94	1,073	3.57%
Row and Annual Crops	1,200	3,392	3.14	0.95	4.09	1,491	4.96%
Energy Crops	500	3,392	1.18	0.53	1.70	622	2.07%
Pasture, irrigated	4,700	1,161	4.20	1.25	5.46	1,992	6.63%
Pasture, unirrigated	9,100	0	0	0	0.00	0	0.00%
Green Energy	250	0	0	0	0.00	0	0.00%
TOTAL	30,000	2,744	65.86	16.47	82.33	30,047.77	100.00 %

This farm plan would consist of the following:

- Approximately 20,650 acres of irrigated farm land, including 12,850 of orchard crops, 600 acres of tropical fruit, 1,200 acres of row and annual crops, in addition to a community garden and limited non-GMO energy crops.

- Approximately 13,800 acres of cattle pasture, comprised of 4,700 acres of irrigated pasture, and 9,100 acres of unirrigated pasture. This should fit the proposed model of grass-finishing on irrigated pasture. The unirrigated acreage is less than 10,000 acres, which helps ensure that that the entire area devoted to unirrigated pasture will remain productive.

2.1.5 Phasing and Timing of the Proposed Action

After the Final EIS (FEIS) is published and accepted by the BLNR, the State of Hawai'i will conduct appraisals of the water from the License Area, produce lease agreements and a Watershed Management Plan (refer to Section 2.1). Once this is complete the Water Lease will be put to public auction. Once the Water Lease is issued by the BLNR, under the Proposed Action, Mahi Pono can implement its proposed farm plan.

An estimated 10 years will be required for Mahi Pono and lessees to remove volunteer sugarcane and weeds from the approximate 30,000 acres, amend soils, install field improvements, build warehouses and other structures, and plant crops. The predominant crops will be various types of orchard trees (avocado, coffee, citrus, macadamia nuts, etc.), which reflect a long-term commitment to farming. About 5 to 12 years will be required for orchard trees to reach full maturity, after which the trees will provide yields for 35 to over 100 years (Plasch, 2019).

In order for Mahi Pono and other farmers to justify the very substantial investment in a 30,000-acre farm, a long-term water lease will be required. A short-term lease would derail development of the Mahi Pono farm plan because of the risk of not being able to farm for a long enough period to recover their planned investment (Plasch, 2019).

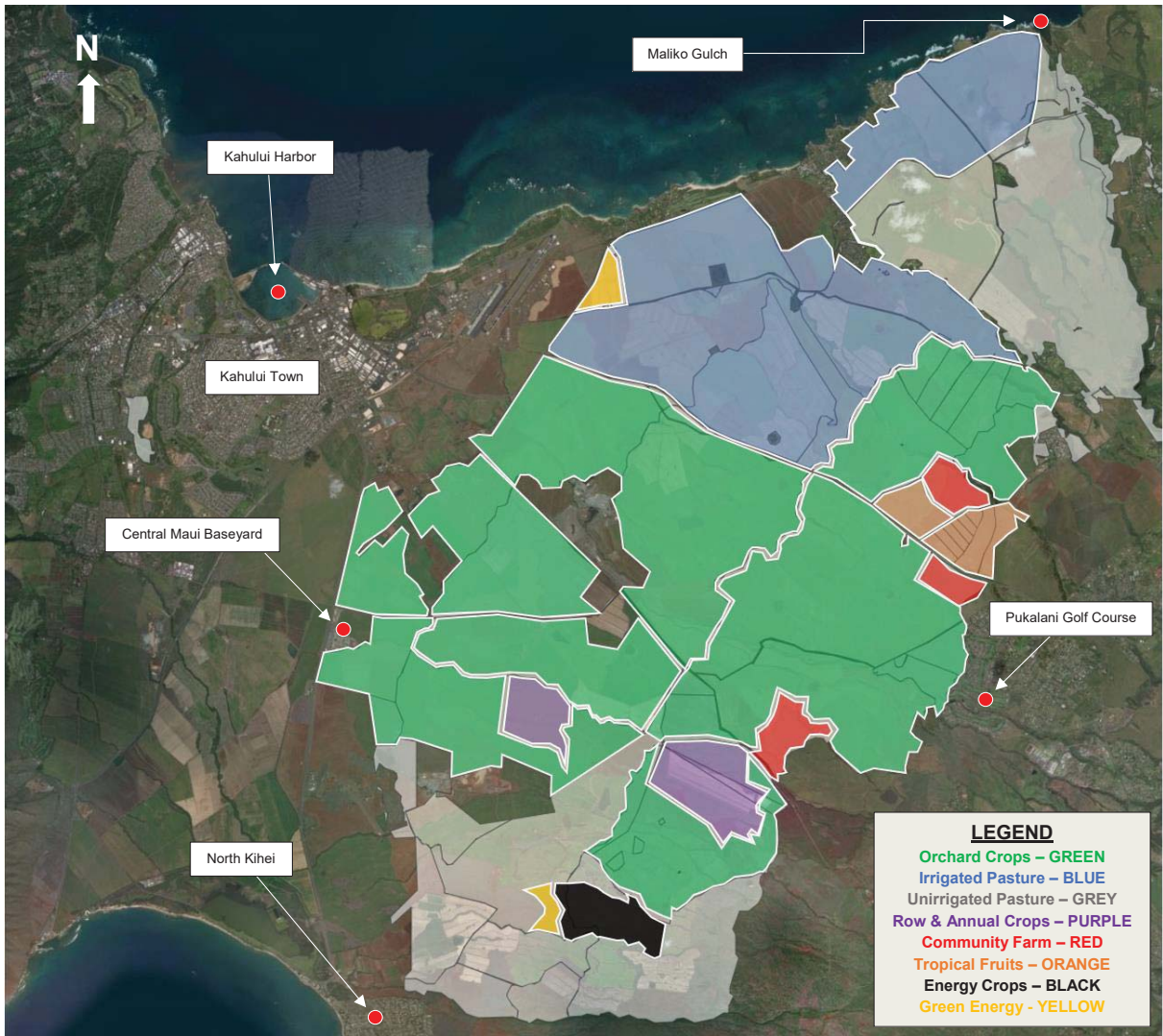


Figure 2-6 Mahi Pono Farm Plan

Chapter 3:

Alternatives

3. ALTERNATIVES

Under Section 11-200-17(f), HAR, a DEIS must include a section discussing alternatives which could attain the objectives of the action regardless of cost, in sufficient detail to explain why they were rejected. In each case, the analysis of the alternatives must be sufficiently detailed to allow the comparative evaluation of the environmental benefits, costs, and risks of the Proposed Action and each **reasonable alternative**. Particular attention should be given to alternatives that might enhance the environmental quality or avoid, reduce, or minimize some or all of the adverse environmental effects, costs, and risks. In addition, an analysis of the "no action" alternative should be included.

The objectives of the Proposed Action are:

- Preserve and maintain the EMI Aqueduct System, including its access roads
- Continue to meet domestic and agricultural water demands in Upcountry Maui
- Continue to provide water for agricultural purposes in Central Maui (specifically, to transition fields previously used for sugar cane cultivation into new, diversified agricultural uses)
- Continue to serve community water demands in Nāhiku

With these objectives in mind, the alternatives considered are: (1) the Proposed Action, meaning a Water Lease being issued permitting water diversions up to the maximum amount authorized under the CWRM D&O (an assessment of the impacts of the Proposed Action is provided in Chapter 4); (2) a Water Lease issued permitting water diversions in an amount less than what is allowed under the CWRM D&O (this is the Reduced Water Volume alternative); and (3) a Water Lease issued with different terms, i.e. the Alternative Lease Duration alternative or the Modified Lease Area alternative. The "No Action" alternative, meaning no Water Lease being issued, is also assessed, although the No Action alternative clearly does not meet the objectives listed above.

3.1 Alternatives Considered But Dismissed

This chapter also reviews alternative means of achieving some of the objectives of the Proposed Action through alternative sources of water. However, a preliminary analysis determined that these options are not considered viable for various reasons including the expected intensification of environmental effects and lack of feasibility. Therefore, these options are considered but dismissed from further study.

3.1.1 Water Sources Alternatives

New and additional water sources could be used to supplement periodic and/or long-term deficits under the No Action alternative or Water Lease Volume alternative to achieve the objectives of the Proposed Action. Any alternative requiring significant development, including facilities such as wells, pumps, distribution pipes and reservoirs, however, would incur more cost, which would increase water delivery costs and potentially discourage, or at least limit, the diversity of agriculture that could otherwise be provided. Since the quantity of groundwater in Central Maui is dependent on surface water for recharge, increased pumping from existing wells in Central Maui cannot be depended on for long term development of agriculture in Central Maui. Additionally, the salinity levels of the groundwater in Central Maui, prohibit use

of groundwater as a sole source of water for diversified agricultural development in Central Maui. Diversified agricultural crops are generally less salt-tolerant than sugar, the previous agricultural crop grown in Central Maui.

Alternative water sources also have more potential for adverse environmental impacts than the Proposed Action, which would utilize the existing EMI Aqueduct System, and utilize the existing Central Maui irrigation system that is planned for upgrades by Mahi Pono. Mahi Pono's irrigation engineering team is designing a high-efficiency irrigation system that will reduce water usage by: (1) using automatic, real-time irrigation sensors to deliver precise amounts of water efficiently; (2) recycle and re-use all water used in Mahi Pono's processing plants; and (3) integrate various live technology feeds to constantly monitor plant, soil, and tree health.

3.1.1.1 Groundwater Alternative

This alternative is intended to reduce the amount of surface water required for irrigation to support diversified agriculture in Central Maui. If sufficient groundwater sources can be developed, then the groundwater together with the amount of surface water that may be available through the No Action or Reduced Water Volume Alternative could, conceivably, meet objectives of the Proposed Action.

The Central Maui agricultural fields are within the MDWS's Central Maui Aquifer Sector which includes four aquifer systems: Pā'ia, Kahului, Kamaole, and Makawao aquifers. Currently, the Central Maui agricultural fields have 15 wells (see Figure 2-5) in the Pā'ia and Kahului aquifers. The average pumping rate from 1987 to 2006 was about 26,663 mg per year. This volume equates to a pumping average of 73 mgd. Brackish groundwater used on the Central Maui agricultural fields during that time was approximately 42.5 mgd. (Plasch, 2019). This average daily pumping rate is well above the Sustainable Yield (SY) of 8 mgd (7 mgd for the Pā'ia aquifer and 1 mgd for Kahului aquifer), as determined by the CWRM (see detailed discussion in Section 4.2.2). This high pumping rate may have been achievable in the past due to the large amount of recharge that was occurring when sugar was being cultivated and irrigated by surface water. During this same period, irrigation from surface water in Central Maui was approximately 112 mgd, and an additional approximately 44 mgd of surface water was applied to the fields through system losses (evaporation and leakage) within the Central Maui field system. The recharge from these system losses were replenishing the Kahului and Pā'ia aquifers and is likely the reason that pumping groundwater at rates greater than the SY was achievable. Under the Proposed Action, less surface water will be used for irrigation in Central Maui than was the case in the past, leading to less recharge of the underlying aquifers (92.32 mgd is the maximum amount of surface water estimated to be available). All of the existing wells are located within the Pā'ia and Kahului aquifers and, with little recharge from former sugar irrigation, maximum pumping exceeding the SY of 8 mgd would eventually increase salinity of the water drawn from the wells. At that point, pumping rates would need to be reduced to protect the aquifers. Given that there are other wells in these aquifers, the safe maximum pumping rate is probably about half, or 4 mgd (Akinaka, 2019).

To increase groundwater yields, additional wells could be drilled in other aquifers in Central and East Maui. Assuming that a single well is normally allowed to pump about 1 mgd within its area, 53 new well sites would need to be developed, each requiring site acquisition, drilling, testing and if adequate, brought into production. These wells would need to be spaced far

enough to avoid salt water intrusion into the aquifer. Each well site would have an estimated development cost of \$6 million. (Akinaka, 2019). To plan, obtain permits for, and construct 53 wells would probably be in the order of \$318 million. Added to this cost would be transmission pipes, additional pumping and related energy consumption to reach higher elevations, and reservoirs. It is anticipated to be very unlikely that 53 new wells could be constructed within the Central and East Maui areas, as the environmental impacts would be considerable and permit approvals would be prohibitive. Therefore, the groundwater alternative is viewed as an unreasonable alternative with greater risks of adverse environmental effects than the Proposed Action, and was dismissed from further review.

3.1.1.2 Reclaimed Water

The alternative of using reclaimed water from the Wailuku-Kahului Wastewater Reclamation Facility (WWRF) was considered. Kahului WWRF is surrounded by Kanahāe Beach Park to the east, the Kanahā Pond Wildlife Sanctuary is mauka, and Kahului Harbor to the west. Presently, the Kahului WWRF has capacity for 7.9 mgd. Average flow in 2012 was 3.85 mgd. Average R-2 reuse in 2012 was 0.16 mgd. R-2 is secondary treated wastewater that has been disinfected. Presently, the R-2 recycled water from the Kahului WWRF is disposed through injection wells. R-2 recycled water can be used for subsurface irrigation of crops such as fruit trees where the edible portion of crops has minimal contact with the recycled water. R-2 surface drip or subsurface drip irrigation is allowed for timber and trees not bearing food crops. R-2 recycled water can be further treated to R-1 standard by filtration, which may entail adding a chemical flocculant to cause small particles in the water to clump together so they can be filtered out in the next step. R-1 recycled water is the highest quality and can be for agricultural irrigation via spray, surface drip or subsurface drip irrigation, as well as for watering livestock, with the exception of dairy animals that produce milk for human consumption.

Costs for using recycled water include costs for upgrading the water from R-2 to R-1 standards, transmission by pump and pipelines, and reservoir(s). Kahului WWRF is at a low elevation, approximately five feet above mean sea level. The use of any reclaimed water for irrigation purposes in Central Maui would involve pumping and related energy consumption. The installation of pipelines, reservoirs, and other infrastructure to bring the reclaimed water to Central Maui would entail construction in the vicinity of the Kanahā Pond Wildlife Sanctuary, a 143 acre State of Hawai'i facility that comprises large brackish water wetland features and is home to three endangered bird species, the Hawaiian stilt, the Hawaiian duck, and the Hawaiian coot, as well as a variety of other bird wildlife, increasing the risks of detrimental environmental impacts. Considering the limited amount of reclaimed water that could be obtained due to the capacity at Kahului WWRF, infrastructure and operational costs, and the risk of environmental impacts, this alternative is viewed as an unreasonable alternative with greater risks of adverse environmental effects than the Proposed Action, and was dismissed from further review.

3.1.1.3 Added Storage Alternative

Given the variations in rainfall amounts in East Maui, if excess surface flows could be captured and stored to be used when flows through the EMI Aqueduct System are insufficient, the overall amount of diverted flow required to meet irrigation needs in Central Maui could be reduced. Currently, the EMI Aqueduct System has eight reservoirs, mostly along the lower

ditch systems, and the Central Maui field irrigation system has 48 major reservoirs¹. The combined storage capacity of these existing reservoirs is approximately 1,344 mg (Akinaka, 2019). Most of these reservoirs, however, have not been used since the closure of sugar in 2016 and others have not been used because they do not meet dam safety requirements. As a result, many will require extensive upgrades to put them back into service. These upgrades could cost between \$50 – 100 million (Akinaka, 2019). Obtaining permits to upgrade and repair these reservoirs will also be challenging due to current dam safety requirements. Assuming that the existing reservoirs can be restored to their full capacity of 1,344 mg, and the amount of flow available for irrigation under the Proposed Action is approximately 92.32 mgd, then the existing reservoirs could provide about 16 days of storage capacity.

The existing reservoirs are fed by the EMI Aqueduct System so they can be filled when the amount of water delivered exceeds the amount used. The EMI Aqueduct System, however, is not designed to capture and convey high-volume freshet flows which overwhelm and bypass the diversions. If such freshet flows (in excess of the IIFS standards under the CWRM D&O) could be captured, it could significantly increase storage capacity.

If an additional storage volume of 1,200 mg is assumed, an additional two weeks of flow could be provided at the rate of 82.36 mgd. Combined with the storage capacity of the restored and existing reservoirs, a total of about a month of storage would be available, which would provide a substantial supply to weather periods of low rainfall during the dry season. Moreover, since captured freshet flows would be used to replenish the restored and existing reservoirs between freshets, the period that stored water could be used could be extended even longer.

A single reservoir of this size (to hold 1,200 mg) could be located upstream of the Koolau Ditch within Hānawī Gulch. This area is preferable for the location of a reservoir to capture and store water because of its elevation and rainfall. The reservoir would be created by damming a ravine above the ditch so it can be fed by gravity flow and allow streamflow to continue in compliance with the CWRM D&O. Based on a rough estimate, a reservoir of this size would encompass about 30 acres with a 4,000 foot long dam structure standing approximately 150 tall at its highest point. (Akinaka, 2019). Construction of such a reservoir would be in the order of some \$300 million. (Akinaka, 2019). Dams are uniquely engineered structures that require knowledge and experience in dam safety, particularly how to safely handle water flows in and out of the structure through appurtenant features, as well as mitigating the hazards of water passing through the dam embankment itself (seepage). Dams sustain high hydrostatic water loads, which can result in failure of the embankment if they are not properly designed. (DLNR, The Hawai'i Dam and Reservoir Safety Program, FY 2017). It is very unlikely such a reservoir could be constructed as its environmental impacts would be considerable in terms of impacts to views and public safety concerns.

3.1.2 Aqueduct Ownership

During public scoping for the DEIS in 2016 and 2017, it was suggested that the EMI Aqueduct System should be brought under new ownership, without the further involvement of A&B and EMI, and potentially under public ownership. Ownership of the EMI Aqueduct System changed

¹ GIS data provided by the State Office of Planning does not include all 48 reservoirs within the Central Maui agricultural fields.

in January 2019 to include Mahi Pono, which intends to pursue diversified agriculture in Central Maui. Consideration of another change in ownership is too speculative at this point to warrant analysis. A change in the ownership of the EMI Aqueduct System will not enhance environmental quality or avoid, reduce, or minimize all or even some adverse environmental effects, costs, or risks of the Proposed Action. As discussed elsewhere in this DEIS, EMI has been operating the EMI Aqueduct System since the start of construction in the 1870s. Few have the knowledge to operate and maintain this unique and complex system, consisting of approximately 388 separate intakes, 24 miles of ditches, and 50 miles of tunnels, as well as numerous small dams, intakes, pipes, 13 inverted siphons and flumes. Furthermore, the EMI Aqueduct System is not for sale, and forced acquisition of the system is projected to be prohibitively expensive, resulting in substantial costs to the public. For these reasons, this alternative is viewed as a highly speculative and unreasonable alternative, and one that would not meet the objectives of the Proposed Action. Therefore, it was dismissed from further review.

3.2 Alternative Analysis

3.2.1 Reduced Water Volume Alternative

The BLNR cannot authorize a lease that allows the use of more water than can be diverted under the CWRM D&O. However, the BLNR could elect to issue a water lease that authorizes the use of a lesser amount of water. Projections of the amount of government water available from the License Area at Honopou stream after taking into account the CWRM D&O, is approximately 87.95 mgd. This amount would be subject to further reduction in accordance with the DHHL reservation once called upon for use by the DHHL. The CWRM estimated that the amount of water potentially available after implementation of the CWRM D&O might be enough for about 90% of the irrigation needs for the approximately 23,000 IAL lands in Central Maui (although it is not clear if the CWRM D&O took into account the future DHHL reservation). However, there are approximately 30,000 agricultural acres in Central Maui (largely, but not exclusively, IAL lands), and Mahi Pono has expressed an intention to farm as much of that land as possible.

The existing water delivery agreements with the MDWS are contingent upon the Water Lease being issued, therefore if no Water Lease is issued, it is assumed that the delivery of water to the MDWS would terminate. Under the Reduced Water Volume alternative, depending on the amount of water authorized under the Water Lease, the MDWS may receive no water from the Wailoa Ditch or some amount up to 7.1 mgd. The greater the reduction in the amount authorized under the Water Lease, proportionally less water will be available to the MDWS.

3.2.2 Water Lease With Different Terms

3.2.2.1 Alternative Lease Duration

As discussed in Chapter 1, on May 14, 2001, A&B requested that the BLNR offer a long-term (30 year) lease at public auction for the right, privilege and authority to enter and go upon the State-owned License Area for the purposes of developing, diverting, transporting and using government-owned waters. However, the BLNR has the authority to offer such a lease with a term that is either shorter or longer than 30 years, provided, however, that under HRS § 171-36, the BLNR cannot authorize a lease for a term longer than sixty-five years. Some have

viewed a shorter term for the Water Lease as an opportunity to evaluate the lessee's performance during its term as a basis for further extension. In this context, a lease term shorter than 30 years could limit the ability of Mahi Pono or a lessee to obtain financing for the needed investment in establishing successful diversified agricultural operations and crops that may take years to reach economic viability. This would be inconsistent with the Proposed Action objective of developing diversified agriculture in Central Maui.

3.2.2.2 Modified Lease Area

Although A&B's May 14, 2001 submittal referred to a License Area comprised of approximately 33,012.91 acres of State-land (subject to review and confirmation by the Department of Accounting and General Services, Survey Division), the BLNR has the discretion to set the geographic parameters of the Lease Area to an area that is smaller, but still maintains the safety and integrity of the EMI Aqueduct System. Limiting the geographic extent of the Lease Area to that which is reasonably necessary to operate the EMI Aqueduct System with appropriate buffers to ensure public safety and the security of the system, could be consistent with the objectives of the Proposed Action. EMI would not manage public access into the License Area, and that obligation will fall upon a State agency. While some have advocated for greater or unfettered public access into the License Area, potentially adverse impacts of such access could include the introduction and spreading of invasive species and damage to historic resources.

3.3 No Action

Under a 1938 agreement between the Territory of Hawai'i and A&B, A&B was given a perpetual right and easement to convey water through those portions of the EMI Aqueduct System located within State lands, and to divert the water so conveyed through the EMI Aqueduct System, and A&B granted the Territory a similar perpetual right and easement. This agreement is in place irrespective of the issuance of any Water Lease. The No Action alternative would result in no Water Lease being issued from the State. However, under the 1938 agreement and a related calculation involving isohyet analysis of rainfall patterns, it is understood that approximately 30% of the water in the License Area streams is derived from the privately owned lands. Therefore, the EMI Aqueduct System could continue to divert approximately 30% of the water available from the Collection Area, plus the 4.37 mgd from that portion of the Collection Area that is derived from privately owned lands outside of the License Area between Honopou stream and Māliko Gulch. Under the No Action alternative, it is assumed that an estimated total of 26.39 mgd is available to be diverted from that portion of the Collection Area east of Honopou stream, and approximately 4.37 mgd of surface water would be available from privately owned lands (i.e. not within the License Area) between Honopou stream and Māliko Gulch. Thus, it is estimated that the maximum amount of surface water available to the EMI Aqueduct System under the No Action alternative would be approximately 30.76 mgd (Akinaka, 2019). This reduction in water would significantly limit Mahi Pono's ability to develop robust diversified agriculture in Central Maui, and would have associated detrimental impacts on food production and economic benefits that would be achieved under the Proposed Action.

The existing water delivery agreements with the MDWS are contingent upon the Water Lease being issued, therefore if no Water Lease is issued, it is assumed that the delivery of water to the MDWS would terminate. As a consequence, domestic and agricultural water needs in Upcountry Maui would need to be met by alternative water sources that would need to be

developed by the MDWS. At this point in time, it is unknown whether sufficient groundwater resources exist in Upcountry Maui to meet these water demands. It is anticipated that the development of alternative water-source infrastructure would be prohibitively expensive, and depending upon the specific sources, or combination of sources, could result in significant direct adverse impacts to the environment.

3.4 Comparative Evaluation of Reasonable Alternatives

Alternatives are to be evaluated based upon the extent to which they are able to satisfy the objectives of the Proposed Action. An EIS must include a comparative evaluation of the environmental benefits, costs, and risks of the Proposed Action and each reasonable alternative. The objectives of the action are to:

- Preserve and maintain the EMI Aqueduct System, including its access roads
- Continue to meet domestic and agricultural water demands in Upcountry Maui
- Continue to provide water for agricultural purposes in Central Maui (specifically, to transition fields previously used for sugar cane cultivation into new, diversified agricultural uses)
- Continue to serve community water demands in Nāhiku

A comparative evaluation of impacts to relevant environmental characteristics and the various alternatives is provided in the following section (the impacts analysis for the Proposed Action is provided in Chapter 4).

3.4.1 Topography

Neither the Proposed Action nor any of the alternatives are expected to have any significant effect on topography within the License Area because no topographic changes to the License Area are proposed under the Proposed Action or the alternatives. Some construction related to the preparation of the Central Maui agricultural fields for the Mahi Pono farm plan and related agricultural facilities is anticipated under the Proposed Action, and would likely take place under the Modified Lease Area alternative as well. The extent of Mahi Pono's implementation of its farm plan and related facilities under either the Reduced Water Volume alternative or the Alternative Lease Duration alternative would depend upon the degree of certainty required to warrant such investment.

3.4.2 Soils

East Maui

Neither the Proposed Action nor any of the alternatives are expected to have any significant effect on soils within East Maui because no changes are proposed under the Proposed Action or the alternatives. However, under the Modified Lease Area alternative, there may be some adverse impact to soils within the License Area through greater public access to and use of the License Area.

Upcountry Maui

Under the Proposed Action, there may be some beneficial alteration to soils in Upcountry Maui as more currently fallow former sugarcane fields will be put into productive agricultural uses at the planned 262-acre expansion to KAP, and the continued supply of irrigation water to the existing KAP would maintain status quo or potentially allow for greater improvements to the soils at KAP. Under the Reduced Water Volume alternative, the beneficial impacts to the Upcountry Maui soils may not take place, depending upon how much water from the EMI Aqueduct System is available for use in Central Maui. Under the No Action alternative, it is assumed that no water would be transported through the EMI Aqueduct System to the MDWS, therefore no beneficial impacts to Upcountry Maui soils are expected. The Alternative Lease Duration alternative would not have a direct impact on Upcountry Maui, but indirectly it is assumed that a Water Lease of a longer term will provide greater stability and predictability, thereby enhancing the changes of beneficial impacts to Upcountry Maui soils, and a shorter Water Lease term could have an opposite effect. The Modified Lease Area alternative is not expected to have any impact on Upcountry Maui.

Central Maui

Under the Proposed Action, there will be a beneficial impact on soils in Central Maui as they are improved through the removal of volunteer (i.e., rogue) sugarcane and weeds, and related soil preparations for diversified agriculture. These preparations include the application of effective micronutrients, plastic removal, pH adjustments, and the application of organic matter. Under the Reduced Water Volume alternative, the beneficial impacts to the Central Maui soils would be more limited, depending upon the amount of water actually available through the Water Lease. The No Action/No Lease alternative would require less soil preparations due to the reduction of acreage devoted to diversified agriculture. Instead of diversified agriculture, a significant amount of acreage would be allocated for use as cattle pasture. The Alternative Lease Duration alternative could have similar impacts to the No Action alternative should the Water Lease be issued for a period of time that is insufficient for Mahi Pono to make the desired improvements to the Central Maui fields as proposed under the Proposed Action. The Modified Lease Area alternative is not expected to have any impact on Central Maui.

3.4.3 Surface Water and Aquatic Environment

License Area

The HSHEP model requires specific diversion conditions at each diversion. Applying the model to the Reduced Water Volume alternative would require information regarding where stream flows are proposed to be increased over the Proposed Action and the amounts. Given such information, the HSHEP model is able to readily calculate the number of remaining Habitat Units (HU) in any given scenario. Under the No Action alternative, 30% of remaining low flow discharge is diverted at each individual diversion after complying with the CWRM D&O. Therefore, approximately 70% of the total HU would remain, or put conversely, the No Action alternative reduces HU by approximately 30% from natural flow conditions. Neither the Alternative Lease Duration alternative nor the Modified Lease Area alternative are expected to have any significant effect on surface water hydrology and aquatic environment because the stream diversions would not change under either alternative.

No effects to surface waters are expected to Upcountry Maui or Central Maui under the Proposed Action or the alternatives because no alterations to streams in those areas, to the extent any streams exist, would take place.

3.4.4 Groundwater

East Maui

Neither the Proposed Action nor any of the alternatives include activities that would draw upon groundwater in East Maui (i.e. no well development is proposed) or have the potential to cause significant adverse effects to groundwater in East Maui, because no development in East Maui is proposed under any of the alternatives. There may be a connection between decreased stream diversions and increased groundwater as would be the case under the Reduced Water Volume alternative and the No Action alternative. However, the current pumpage of wells in the four aquifers in East Maui (Ha'ikū, Honopou, Waikamoi, and Ke'anae of the Ko'olau Aquifer Sector) is well below the SY, as discussed in Section 4.2.2.

Upcountry Maui

No significant, direct impacts to groundwater resources in Upcountry Maui are expected under the Proposed Action or any of the alternatives. However, any alternative that reduces the amount of surface water delivered by the EMI Aqueduct System to the MDWS (such as the No Action alternative and potentially the Reduced Water Volume alternative) could have a secondary effect of causing the MDWS to seek replacement water through the development of wells that draw upon groundwater.

Central Maui

The Proposed Action and other alternatives have the potential to cause beneficial impacts to groundwater resources in Central Maui, with the understanding that the more surface water that is used to irrigate Central Maui, the greater the replenishment of the underlying aquifers. The irrigation recharge that has occurred over the years of sugarcane farming in Central Maui (recharge of the Kahului and Pā'ia aquifers) is believed to be the reason why wells in those aquifers have been able to pump at rates that exceed the SY (the CWRM's establishment of SY for aquifers does not take into account water transfers). Furthermore, a simulated scenario in a USGS study prepared in 2008 suggests that the complete removal of irrigation return recharge would decrease water levels and increase salinity in the Central Maui Aquifer Sector.

3.4.5 Coastal Waters

East Maui

Neither the Proposed Action or any of the alternatives include activities that would impact the coastal waters in East Maui or have the potential to cause significant adverse effects to coastal waters or the marine environment in East Maui, because the vastly larger ocean environment is not be impacted by the intensity of the flow in stream water that diverts into the ocean.

A reduction in the volume of water diverted from East Maui streams under the No Action/No Lease alternative and the Reduced Water Volume alternative may lessen the suspended-sediment concentrations in streams during large storms which discolor coastal waters during and following storms. The sediment deposited into the marine environment may also be stressful for marine life and coral reef. However, because of the continuous wave energy in shore areas in East Maui, nearshore areas in East Maui do not constitute important habitats

for coral reef communities and associated marine species (Sea Engineering, Inc (SE) & Marine Research Consultants, Inc (MRC), 2019).

Upcountry Maui

Neither the Proposed Action nor any of the alternatives include activities that would significantly impact the coastal waters or the marine environment based upon activities in Upcountry Maui because there are no coastal waters in Upcountry Maui.

Central Maui

The Proposed Action and other alternatives may have beneficial impact on coastal waters in Central Maui near to the agricultural fields (Māliko Bay, Ho'okipa Beach Park, Pā'ia Bay, and Ma'alaea Bay) because the amount of wind-blown erosion which may damage nearshore environments is minimized by cultivation of the agricultural fields. Theoretically, a reduction in the volume of water diverted from East Maui streams under the No Action/No Lease alternative and the Reduced Water Volume alternative may decrease the amount of runoff from the agricultural fields that may impact the nearby coastal waters. However, in actuality, under all alternatives, including the No Action/No Lease alternative, Mahi Pono will apply BMP that control the volume and flow rate of runoff water, keep the soil in place, and reduce soil transport.

3.4.6 Drainage

East Maui

Under the Reduced Water Volume alternative and the No Action alternative, the streams within the License Area would have an increase in stream flow. However, drainage facilities throughout the communities in East Maui, which can include, but not limited to drains, gutters, storm sewers, etc., are only impacted when storm runoff reaches extremely high levels. The Proposed Action and the other alternatives will have no discernible impacts on such storm flows and their impact on drainage facilities.

Upcountry Maui

Neither the Proposed Action nor any of the alternatives would significantly impact the drainage facilities in Upcountry Maui.

Central Maui

The Central Maui agricultural fields are designed and operated to efficiently utilize irrigation water from the EMI Aqueduct System so there is no surface runoff. Neither the Proposed Action nor any of the alternatives would significantly impact the drainage facilities in Central Maui.

3.4.7 Natural Hazards

East Maui

Climate change indicators suggest that East Maui will face increased periods of intense, episodic rainfall where several inches of rain fall in a few hours (SOEST, 2014). With several streams being within East Maui, greater, episodic rainfall could increase stream flows and possibly exceed the capacity of the EMI Aqueduct System as discussed in Section 4.3.1. The continued use and maintenance of the EMI Aqueduct under the Proposed Action and all

alternatives will not exacerbate those impacts, and may help to lessen the severity of such impacts to the extent that the system helps to manage, redirect and disburse flows. The Modified Lease Area alternative could present risks to public safety if unfettered public access within the License Area meant more people could be put at risk due to stream flooding. If the No Action alternative involved the abandonment of the EMI Aqueduct System, these risks may be greater. However, Mahi Pono has developed a preliminary farm plan to be implemented in the event the Water Lease is not issued as presented in Section 3.4.14, and that plan continues to rely on the EMI Aqueduct System. The Alternative Lease Duration alternative could conceivably encourage the abandonment of the system, but this scenario is too speculative to evaluate.

As discussed in SE & MRC report (See Appendix B), global rates of mean sea-level change (SLC) is $+3.4 \pm 0.42$ mm/yr. The sea level trend in Kahului Harbor from 1947 to 2017 is $+2.21 \pm 0.42$ mm/yr. Hawai'i has thus far experienced a rate of sea level rise that is less than the global rate, but that is expected to change over the next few decades as the impacts from melting ice originating far from Hawai'i will begin to be felt in Hawai'i. Relatedly, coastal erosion in Hawai'i is expected to increase as discussed in Section 4.3.2. Without any changes to the existing surface of land and sea floor (as is the case under the Proposed Action and all alternatives), there will be an increase of passive flooding along the shoreline in East Maui, resulting in an expected landward regression of landforms combined with an increase in elevation. Neither the Proposed Action nor the alternatives involve any construction along or near the shoreline that would be at risk from sea-level rise.

According to the FEMA Flood Insurance Rate Maps (FIRM), the License Area is predominantly designated as Zone "X", "Areas determined to be outside the 0.2% annual chance floodplain." A number of adjacent parcels along the makai edge of the License Area lie in areas designated as Zone "A", "Areas subject to inundation by the 1-percent-annual-chance flood event generally determined using approximate methodologies." (See Figure 4-28 in Section 4.3.3) However, flooding in East Maui generally caused by freshets.

According to the Tsunami Evacuation Zone maps for Maui, the entire License Area is outside of the tsunami evacuation zones. There are areas below the Ke'anae and Honomanū portions of the License Area that are within the tsunami evacuation and extreme tsunami evacuation zone (See Figure 4-29 in Section 4.3.3).

Neither the Proposed Action nor any other alternatives involve any construction or any ground disturbance that would alter the topography that may potentially impact flooding or tsunami hazards.

Upcountry Maui

Climate change may cause a decline in rainfall in Upcountry Maui. Any alternative that may result in less water being delivered through the EMI Aqueduct System to the MDWS for use in the Upcountry Maui Water System could increase periods of intense water shortages in Upcountry Maui. Regarding sea level rise, Upcountry Maui is between the 1000-4000 feet elevation. There are no coastal waters adjacent to Upcountry Maui. Neither the Proposed Action nor any of the alternatives are anticipated to cause or suffer from any impacts related to sea level rise.

According to the FEMA FIRM, Upcountry Maui is predominantly designated as Zone “X”, “Areas determined to be outside the 0.2% annual chance floodplain.” (See Figure 4-30 in Section 4.3.3) Moreover, according to the Tsunami Evacuation Zone maps for Maui, Upcountry Maui is entirely outside of the tsunami evacuation zones. A small portion of Maliko Bay within the MDWS Upcountry Maui Water System service area lies within the Tsunami Evacuation Zone (See Figure 4-31 in Section 4.3.3).

Neither the Proposed Action nor any other alternatives would impact flooding or tsunami hazards in Upcountry Maui.

Central Maui

Central Maui is already relatively dry. If climate change increases the periods of drought in Central Maui, as is predicated, continued diversified agriculture under the Proposed Action and all alternatives is vulnerable. Any alternative that may result in less water being delivered through the EMI Aqueduct System to Central Maui increases the likelihood of wildfires. To the extent that the use of renewable energy, such as Mahi Pono's proposed utility scale solar farm, offers any climate change avoidance benefits, all of the alternatives, including the Proposed Action, will provide a beneficial impact.

According to the FEMA FIRM, Central Maui is predominantly designated as Zone “X”, “Areas determined to be outside the 0.2% annual chance floodplain.” A number of adjacent parcels along the makai edge of Central Maui lie in areas designated as Zone “AE”, “Areas subject to inundation by the 1-percent-annual-chance flood event generally determined using approximate methodologies,” and Zone “VE”, “Areas subject to inundation (See Figure 4-32 in Section 4.3.3).

According to the Tsunami Evacuation Zone maps for Maui, the majority of the Central Maui agricultural fields are outside of the tsunami evacuation zone. However, there are portions of the Central Maui agricultural fields in the vicinity of Kihei, Pā'ia, and Kahului that are within the tsunami evacuation zone (See Figure 4-33 in Section 4.3.3).

Neither the Proposed Action nor any other alternatives involve any construction or any ground disturbance that would alter the topography that may potentially impact flooding or tsunami hazards.

3.4.8 Flora, Fauna, and Invertebrates

East Maui

The Modified Lease Area alternative may have a significant effect on flora, fauna, and invertebrate species in East Maui because the License Area could see an increase in public access. More hiking, hunting, gathering, and other recreational and/or cultural activities within the License Area would result in vegetation trampling, which, depending on degree of access and use of the area, may have a significant impact on existing flora. In addition, the potential for weed introduction and invasion would increase. Weeds, by definition, can outcompete most flora for space and nutrient resources. Weed invasions, if they were to occur, would decrease the quality and quantity of habitat available for native plant species, which in turn may decrease the quality of critical habitat for the Maui parrotbill and crested honeycreeper. The presence of vehicles and humans for various activities in the License

Area could disrupt the normal behavior of wildlife and temporarily displace individuals from roadside habitat. Human noise and activity would increase due to an increase in access, which would have a negative impact on wildlife. None of the other alternatives, including the Proposed Action, are expected to generate significant effect on flora, fauna, or invertebrate species (SWCA Environmental Consultants (SWCA), 2019).

Upcountry Maui

Neither the Proposed Action nor any of the alternatives are expected to have any significant impacts on flora, fauna, or invertebrate species in Upcountry Maui because no alternative directly involves the development of any new lands in Upcountry Maui.

Central Maui

Under the No Action alternative and the Reduced Water Volume alternative, if the reduction is significant, and depending upon the viability of Mahi Pono's No Action/No Lease farm plan (see Table 3-1 in subsequent Section 3.4.12), it is possible that some proportion of the Central Maui fields would be abandoned and become fallow. This could result in a pattern of succession of weedy plants, beginning with herbaceous species and grasses such as wild sugarcane (*Saccharum spontaneum*), Guinea grass, and swollen fingergrass. Tree tobacco, castor bean, and woody species such as African tulip, albizia, Java plum, and Christmas berry would ultimately follow. Few to no native species would colonize the fields in the foreseeable future. Holding ponds would dry up and fill in, which would eliminate nest and foraging habitat for endangered Hawaiian waterbirds and foraging habitat for migrant shorebirds and migrant waterfowl. If Central Maui fields were to remain fallow, over time, biodiversity could gradually rise as the establishment of woody species would increase the complexity of the habitat structure, which would provide more nesting opportunities for MBTA-listed birds such as cattle egret, northern cardinal, mourning dove, and house finch. The potential for tree tobacco to colonize abandoned fields would be beneficial for the Blackburn's sphinx moth because it would increase available breeding habitat. Impacts could be similar under the Alternative Lease Duration alternative, if the term of the Water Lease is too short to allow for the implementation of the Mahi Pono farm plan.

3.4.9 Historic Resources

East Maui

A reduction in the volume of water diverted from East Maui streams under the Reduced Water Volume alternative will not include partial or total destruction or alteration of historic properties, detrimental alteration of the surrounding environment, detrimental visual, spatial, noise or atmospheric impingement, increasing access with chance of resulting damage, nor neglect resulting in deterioration or destruction. As such, the Reduced Water Volume alternative will have no impact to archaeological historic properties. Similarly, the Alternative Lease Duration alternative will have no significant effect on historic resources because the duration of the Water Lease will not include partial or total destruction or alteration of historic properties, detrimental alteration of the surrounding environment, detrimental visual, spatial, noise or atmospheric impingement, increasing access with chance of resulting damage, nor neglect resulting in deterioration or destruction (CSH LRFI, 2019).

The Modified Lease Area alternative, if resulting in an increase in unmanaged public access to the License Area, has the potential to impact historic properties. Potential impacts from

unmanaged access could include looting and “rock-robbing” of surface and subsurface historic properties, littering, harvesting of archaeologically-associated flora such as ti (Cordyline fruticose), trampling or erosion from pedestrian/vehicular access, and unpermitted ground disturbance. Consultation with the SHPD is recommended in order to determine the appropriate historic preservation requirements if there is to be an increase in vehicular/pedestrian traffic or uncontrolled public access within the License Area.

The No Action alternative involves the continued use of the EMI Aqueduct System to supply irrigation water to Central Maui in support of Mahi Pono's No Lease/No Action farm plan and should not have a significant effect on historic properties. However, if the No Action alternative does not include continued maintenance and repair of the existing EMI Aqueduct System, then the No Action alternative has the potential to pose an impact to historic properties. Components of the aqueduct system that deteriorate and begin to fail, such as broken ditch walls or collapsed tunnels, have the potential to alter natural drainage patterns and increase erosion in downstream areas that are outside of established stream channels. These areas have the potential to contain surface and subsurface historic properties that could be affected by flooding and erosion. As an architectural resource, the EMI Aqueduct System would also be affected by “neglect resulting in deterioration or destruction” if maintenance and repair of the EMI Aqueduct System are discontinued (Mason Architects, 2019).

No impacts to historic resources in Upcountry Maui or Central Maui are anticipated under the Proposed Action or any of the alternatives.

3.4.10 Cultural Resources and Practices

East Maui

The Reduced Water Volume alternative has the potential for cultural impacts related to the diversion of water but potentially to a lesser extent than the Proposed Action. These impacts include: interest in getting clarification on stream flow, water diversion, and climate statistics; concern regarding indigenous freshwater species that may be impacted by the act of diverting water; concern of water not exiting stream beds and flowing into the ocean; and concern of the lack of water needed to maintain a healthy and productive lo'i kalo or taro patch in areas where water may continue to be diverted. Recommended mitigation for the Reduced Water Volume alternative is equal to that of the Proposed Action (see Section 4.6). The application of the IIFS under the CWRM D&O has the potential to reduce or eliminate this cultural impact as many of the streams that are currently in use by community participants where these impacts are identified have been fully restored in accordance with the CWRM D&O (CSH CIA, 2019).

The Alternative Lease Duration alternative has the potential for cultural impacts related to the diversion of water to an equal extent as the Proposed Action (see Chapter 4) and similar mitigation measures would be proposed. The IIFS requires under the CWRM D&O has the potential to reduce or eliminate this cultural impact as many of the streams that are currently in use by community participants where these impacts are identified have been fully restored in accordance with the CWRM D&O.

The Modified Lease Area alternative is assumed to increase public access to the License Area, but not to alter stream diversions. Unfettered public access could make traditional cultural

resources more available for consumptive use, but risk unsustainable overuse of those resources.

Under the No Action alternative, no Water Lease would be issued, but the EMI Aqueduct System would continue to be authorized to divert to 30 percent of the water from the larger 50,000-acre Collection Area based on previous agreements, in addition to surface water collection arising from the areas between Honopou (the western end of the License Area) and Māliko. As such, the No Action alternative may have impacts similar to the Proposed Action, but to a lesser extent due to the reduction in water volume and the locations of the diversions. Also, as with the Proposed Action, the application of the CWRM D&O has the potential to reduce or eliminate cultural impacts of the No Action alternative as many of the streams that are currently in use by community participants where impacts were identified have been fully restored in accordance with the CWRM D&O. Mitigations measures would be similar as those under the Proposed Action.

Upcountry Maui

No impacts to cultural resources are anticipated in Upcountry Maui under any of the alternatives because no new development or activities (with the exception of the planned 262-acre expansion of the KAP, which expansion is within lands that were formerly used for sugarcane production) are planned for Upcountry Maui related to the Water Lease.

Central Maui

No impacts to cultural resources in Central Maui are anticipated under any of the alternatives. The agricultural fields have been cultivated for over a century to grow sugarcane and there are no known cultural practices that occur or cultural resources within the agricultural fields in Central Maui.

3.4.11 Social Characteristics

East Maui

East Maui residents expressed concerns about the physical condition of the EMI Aqueduct System and a hope that Mahi Pono's ownership of EMI would lead to improved stewardship of the EMI Aqueduct System. In light of Mahi Pono's intention to pursue diversified agriculture under all alternatives, even the No Lease/No Action alternative, and to irrigate the Central Maui fields with diverted surface water from East Maui, ongoing maintenance and operation of the EMI Aqueduct System is expected to take place under all alternatives, to the extent operations and maintenance of the system is financially feasible. In addition, Mahi Pono is designing a high-efficiency irrigation system for use in the Central Maui fields, which is intended to reduce water usage overall and to integrate various live technology feeds to constantly monitor plant, soil, and tree health. As such, under the Proposed Action and all alternatives, beneficial impacts to the Central Maui irrigation system are anticipated. The East Maui residents' concerns about social and emotional impacts from generations of having East Maui streams diverted to Central Maui is a significant impact present under all alternatives (Earthplan, 2019).

Upcountry Maui

The effect of the Proposed Action and the alternatives on Upcountry Maui social characteristics depends on the amount of water that will be delivered by the EMI Aqueduct System for the MDWS use. The more water that is released to Upcountry Maui, the more it will benefit the

social community of the region. Upcountry Maui residents are concerned about the continuation of reliable water service, and recognize that the MDWS would be challenged to adapt should water delivery from the EMI Aqueduct System cease. They also recognize that replacing the water would require developing new source with related costs that would get passed to the MDWS customers. These concerns and potential impacts should only be present under the No Lease/No Action alternative or potentially under the Reduced Water Volume alternative. However, other impacts are less physical, such as concerns about water being a public trust. These impacts would be present under all alternatives.

Central Maui

Under the Proposed Action and all alternatives, Central Maui will be put into agricultural production, which is seen as a beneficial impact to the Central Maui community that values agriculture as a major land use in Central Maui and values green fields in Central Maui and seeks to avoid urban development in this area.

Under all alternatives, crops will be grown, but the extent to which the crops will supply local vendors and restaurants, as desired by Central Maui residents, and increase food self-sufficiency will depend upon the amount of water that can be diverted from the License Area. Similarly, the extent to which the Mahi Pono farm plan will encourage the younger generations to consider farming as a way of life, may depend upon the extent of the farm plan. Under the Proposed Action, Central Maui will ultimately produce some 338 million pounds of crops per year, including 8 million pounds from the community farms that Mahi Pono will incorporate into Central Maui (Plasch, 2019). Productive community farms may contribute to making farming attractive to future generations. In contrast, under the No Lease/No Action farm plan, Central Maui would produce about 110.5 million pounds per year in crops, which is only about a third of the production under the Proposed Action, with only around 3 million pounds per year from community farms. Central Maui residents also care about Mahi Pono's commitment to planting non-GMO crops, which commitment is present under all alternatives.

3.4.12 Economic and Fiscal Resources

East Maui

No significant differences to the economic and fiscal impacts are expected within East Maui under any of the alternatives. Due to the heavy rainfall on the windward slopes of Haleakalā and the many streams in the area, many of the makai communities in East Maui are well suited for growing taro and truck crops. (Munekiyo, 2019). Also, a number of farmers in East Maui have appurtenant and riparian rights to use water from these streams. Collectively, there are about 45 acres in East Maui that are suitable for growing taro, and about 35 acres for truck crops (Plasch, 2019). As such, the factor that had the most influence in potentially altering the economic and fiscal impacts in East Maui was the issuance of the CWRM D&O that established IIFS and required full restoration of stream flows of all taro streams in East Maui. Neither the Water Lease (under any alternative) nor the No Action/No Lease alternative has the potential to change that.

The impacts of East Maui farming activity would be the same for the Proposed Action, Reduced Water Volume alternative, Alternative Lease Duration alternative, Modified Lease Area alternative, and the No Action alternative. At full development, East Maui farms would produce about 1.0 million pounds per year of taro and about 400,000 pounds per year of other crops,

resulting in \$2.9 million in direct and indirect sales per year. Farms would support a total of 21 direct and indirect jobs. However, State revenues, Maui County property taxes, and City and County of Honolulu excise tax surcharge revenues associated with East Maui farming activities would be nominal. (Munekiyo, 2019).

There is a potential for impacts to the Nāhiku Community, located in East Maui. The Nāhiku Community receives domestic water service from the MDWS which is directly sourced from the EMI Aqueduct System, and the MDWS services approximately 43 water meters, located along Nāhiku Road. The Proposed Action would allow for the continued water service for the approximately 43 water meters in the Nāhiku community. Under the No Action/No Lease alternative, water service to Nāhiku community is assumed to terminate. Water delivery amounts under the Reduced Water Volume alternative depend upon the amount of permitted diversions (Munekiyo, 2019).

Upcountry Maui

There are potentially significant economic and fiscal impacts related to Upcountry Maui under the various alternatives. Under the Proposed Action, it is anticipated that the rate the MDWS pays for water delivery through the EMI Aqueduct System will increase from the current \$0.06 per kgal because EMI's per unit operating cost will increase as a result of fixed costs being spread out over a lower volume of water diverted and possible higher payments to the State for Water Lease rent as compared to historic payments. (Munekiyo, 2019).

Furthermore, even under the Proposed Action, which contemplates continued delivery of water to the MDWS, the County is nevertheless expected to need an additional 7.95 mgd to meet future demands arising from growth. The life-cycle unit cost of developing and operating incremental basal wells is projected to be \$34 per thousand gallons (kgal), which far exceeds the current average water service rate of \$4 per kgal. The total life-cycle cost for 7.95 mgd of new wells is \$1.2 billion. It is assumed that the MDWS would seek a variety of funding sources to cover the cost to develop the new wells, but due to the significant cost of new water source development, it would also be reasonable to expect that the water service rate charged by the MDWS would increase. The Reduced Water Volume alternative would have impacts ranging between those under the Proposed Action and those under the No Action/No Lease alternative, depending upon how much new water sources the MDWS would have to develop to make up for the shortfall. If the MDWS has to replace the 7.1 mgd supplied by the EMI Aqueduct System, and in addition develop to the 7.95 mgd projected to be needed to meet future water demands, the MDWS would need to develop 15.05 mgd of new water source. It is estimated that the life-cycle unit cost to develop those necessary wells and reservoirs for Upcountry Maui is \$38 per kgal. This would translate to \$2.6 billion, compared to \$1.2 billion under the Proposed Action. The significantly higher costs associated with the No Action alternative would impact the County's Water Supply Fund and would be expected to have a corresponding impact to the MDWS finances and on the ratepayers Countywide. (Munekiyo, 2019).

Furthermore, the approximately 37,100 residents and 14,200 households within the Upcountry Maui service area in 2017 had a collective income of \$1.1 billion and residential property values within the Upcountry Maui service area was about \$2.3 billion, and the approximately 880 businesses in Upcountry Maui in 2017, employed 5,400 individuals with a payroll estimated at \$245.7 million. The lack of reliable and sufficient water has the potential to constrain the otherwise anticipated growth in population, business, and jobs (Munekiyo, 2019).

Water availability under the various alternatives may have economic and fiscal impacts related to Upcountry Maui agriculture. Under the Proposed Action, with continued and expanded farming, it is projected that about 1,510 acres would be farmed in 2030, and this farming would generate about \$31.8 million per year in direct and indirect sales, about 150 direct and indirect jobs, and about \$5.8 million in payroll for these jobs. Under the No Action/No Lease alternative, this farming is anticipated to terminate (Munekiyo, 2019).

Central Maui

There are potentially significant economic and fiscal impacts related to Central Maui under the various alternatives. Impacts are assessed in two phases, a development period, where the Central Maui fields get prepared and used for diversified agriculture, and that period is followed by the full operations period, when the fields are in full operation under the Mahi Pono farm plan. Under the Proposed Action, there is an estimated 10-year development period to establish the Mahi Pono farm plan. Under the No Action alternative, preparation of the Central Maui fields for the No Lease farm plan will be less and is estimated to take 6 years.

Full development of the Mahi Pono farm plan under the Proposed Action would result in substantial beneficial impacts. Direct crop sales are projected at \$155.9 million per year, and total combined farm sales, including crops, cattle, and energy revenues, would reach \$168.9 million per year in direct sales (far exceeding the \$101 million of revenue in 2006 derived from sugar production). Farm employment is expected to reach 790 direct jobs. Diversified agricultural operations would generate an estimated \$4.5 million in State tax revenues by 2030. Property taxes paid to the County of Maui would be about \$800,000 per year. The City and County of Honolulu would derive about \$140,000 per year from the excise tax surcharge (Munekiyo, 2019).

In contrast, under the No Action/No Lease alternative, at full operations, the scaled-down Farm Plan would result in a significant reduction in acreage dedicated to crop cultivation and an increase in unirrigated pasture, and related reduction in sales, employment, and State and County tax revenues. Annual sales are expected to reach \$51.3 million based upon about only a third as much crop production as under the Proposed Action. The pastures would support a cattle herd of about 9,700 cow-and-calf animal units, produce nearly 9,700 calves per year, and generate revenues of about \$6.3 million per year. The solar farm would generate about 82,125 mW of electricity per year, with revenues of about \$8.2 million per year. Combined farm and energy revenues would reach about \$65.9 million per year in direct sales and \$57.7 million per year in indirect sales for a total of \$123.5 million per year, of which about \$103.4 million would be on Maui and \$20.2 million on Oahu. Profits from farm operations, energy operations, and indirect sales would be about \$12.4 million.

At full operations, there would be one-third as much employment as the Proposed Action: about 270 direct jobs, 120 indirect jobs, and 390 total jobs. Payroll for direct and indirect jobs is estimated at \$15.6 million. The direct and indirect jobs would support an estimated 880 residents. State tax revenues would be less than half that of the Proposed Action: about \$1.7 million per year. Property taxes paid by to the County of Maui would be about \$650,000 per year (Munekiyo, 2019).

During the farm development period, State taxes to be generated from the No Lease/No Action farm plan arising from the conversion of Central Maui farmlands from sugar cane to diversified agriculture and green energy would generate an average of about \$1.9 million per year in State taxes, for a 6-year cumulative total of about \$11.4 million. The planned solar farm with the State subsidy would average about \$3.1 million per year, for a 6-year cumulative total of about \$18.8 million. Thus, State tax revenues minus the energy subsidy would average a negative \$1.2 million per year, for a 6-year cumulative total of a negative \$7.3 million. The County would derive negligible tax revenues from the anticipated development activity and the City and County of Honolulu would derive cumulative excise tax surcharges of about \$60,000 (Munekiyo, 2019).

The Reduced Water Volume alternative would have proportionally lesser beneficial economic and fiscal impacts than the Proposed Action. The Alternative Lease Duration alternative could have significantly less beneficial impacts than the Proposed Action depending upon whether the Water Lease term reasonably allowed for development of the Mahi Pono farm plan. It is not anticipated that the Modified Lease Area alternative would have any significant fiscal or economic effects.

3.4.13 Agricultural and Related Economic Resources

East Maui

No significant differences to the agricultural activities and related economic benefits are expected within East Maui under any of the alternatives. Collectively, there are about 45 acres in East Maui that are suitable for growing taro and 35 acres suitable for truck crops and those estimates would not change under any of the alternatives. Related gross and net water requirements would be approximately 6.28 mgd and 1.52 mgd respectively (the high gross water requirement is due to the fact that nearly 80% of the water used for growing taro is diverted from streams, passed through lo'i, and is then returned to the streams). At full production, farmers in East Maui who rely depend on stream flows are estimated to be able to produce some 1 million pounds/year of taro and about 400,000 pounds/year of other crops at full development. Under all alternatives, East Maui farms are expected to generate about \$67,000 per year in State taxes and about \$100 per year in County property taxes. (Plasch, 2019). The farms that depend on stream water generate approximately \$1.4 million/year in direct sales and about \$2.9 million/year in direct and indirect sales.

Upcountry Maui

At full operations of the farm plan, under the Reduced Water Volume alternative, significant but smaller changes would occur for Upcountry Maui as are anticipated for Central Maui, e.g. for each 1 mgd less of surface water there would be a related reduction of 24.51 acres of lands in crops, a reduction in direct sales on Maui of about \$245,000 per year, a reduction in direct sales on Maui of about \$245,000 per year, about 2.4 fewer direct and indirect jobs, and a reduction in State tax revenues of about \$9,000. (Plasch, 2019).

Under the No Action alternative, farming activity in Upcountry Maui is expected to be near zero (reduced from approximately 1,520 acres and about 15.1 million pounds of crops per year under the Proposed Action). Without water through the EMI Aqueduct System, the County would have to develop new water sources, which is expected to take several years. In the interim, it is expected that farming in Upcountry would end, and even once new water sources

are developed to supply Upcountry Maui, it is not expected that significant farming would return to the area because better farming conditions exist in Central Maui. A significant drop in sales is estimated, from \$31.8 million/year direct and indirect sales under the Proposed Action to about zero under the No Action alternative.

The farms that depend on water from the EMI Aqueduct System would generate annual State taxes of about \$54,000 and County revenues of \$85,000 under the Proposed Action. The County revenues include both property taxes and rents from the KAP. The taxes generated from Upcountry Maui under the Proposed Action would drop to zero, or close thereto, under the No Action alternative because the County would no longer receive rents for lots at the KAP, and property tax rates are assumed to drop because the agricultural land would be assessed as pasture values. (Plasch, 2019).

Under the Proposed Action, development activity related to the conversion of the fallow sugarcane land at the expected KAP expansion is estimated to cost about \$1.3 million (about \$260,000/year assuming a 5 year development period). This would not take place under the No Action alternative. The 7.5 direct and indirect jobs associated with the KAP expansion during the development period, and the 150 direct and indirect jobs associated with the KAP expansion and other Upcountry Maui water users by 2030 would not materialize under the No Action alternative.

No additional State and County tax revenues generated from Upcountry Maui are anticipated under the No Action alternative, in contrast to the \$200,000 State tax revenues related to the expansion of the KAP under the Proposed Action during the development period, and the additional \$54,000/year in State taxes anticipated from the KAP expansion and other farmers in Upcountry Maui by 2030.

Central Maui

There are potentially significant impacts to agriculture in Central Maui under the various alternatives. Impacts are assessed in two phases, a development period, where the Central Maui fields get prepared and used for diversified agriculture, and that period is followed by the full operations period, when the fields are in full operation under the Mahi Pono farm plan. Under the Proposed Action, there is an estimated 10-year development period to establish the Mahi Pono farm plan. Under the No Action alternative, preparation of the Central Maui fields for the No Lease farm plan will be less and is estimated to take 6 years.

The Reduced Water Volume alternative has the potential for a significantly adverse effect on agriculture production in Central Maui and the related economic impacts. For each 1 mgd less of surface water made available to the Central Maui fields, there is a related reduction by about 173 acres of land in crops, a reduction by about 15 acres of land in irrigated pasture, an increase of about 188 acres of land in unirrigated pasture, a reduction in direct sales on Maui of about \$1.7 million per year, a reduction in direct-and indirect sales on Maui and O'ahu of about \$3.3 million per year, about 8.5 fewer direct jobs on Maui and about 12 fewer direct-and-indirect jobs on Maui and O'ahu, and a reduction in State revenues of about \$50,000 per year.

For illustration, if the Water Lease permitted diversions in the amount of 70 mgd (an estimated 22.32 mgd reduction from the Proposed Action), there would be 189 fewer jobs than expected under the Proposed Action (604 jobs under the Reduced Water Volume if diversions of 70 mgd

were permitted v. 793 jobs under the Proposed Action). The detrimental effects of the Reduced Water Volume continue the greater the reduction in permitted diversions.

Under the No Action alternative there would be an estimated drop in water supply from 82.34 mgd under the Proposed Action to 29.72 mgd. Mahi Pono prepared a conceptual No Action, i.e. no Water Lease farm plan. This scaled-down farm plan would provide significantly less irrigated farm land, and therefore significantly fewer crops. At full operations, the No Action alternative farm plan includes:

- 9,080 acres of irrigated farm land, including 200 acres of tropical fruit, 4,180 of orchard, 400 acres of row and annual crops, in addition to 300 acres for a community farms and space for limited non-GMO energy crops. In contrast, under the Proposed Action there is expected to be 20,650 acres of irrigated farm land, including 12,850 of orchard crops, 600 acres of tropical fruit, 1,200 acres of row and annual crops, in addition to 800 acres for community farm, and space for limited non-GMO energy crops.
- 24,470 acres of cattle pasture, comprised of 3,800 acres of irrigated pasture, and 20,670 acres of unirrigated pasture (in contrast to approximately 13,800 acres of cattle pasture, comprised of 4,700 acres of irrigated pasture, and 9,100 acres of unirrigated pasture under the Proposed Action).
- 11,570 unirrigated acres will have limited agricultural utility. Mahi Pono will likely have to find alternative uses for this property, including utilizing the property for unirrigated pasture.

The Mahi Pono farm plan envisioned under the No Action alternative Proposed Action would consist of the following:

Proposed Use	Acres	GPAD	Surface MGD	Groundwater MGD	Total MGD	Annual MGD	% of Total
Community Farm	300	3,392	0.70	0.26	0.97	353	3.25%
Orchards (citrus, mac nuts, beverage crops)	4,180	5,089	17.36	3.39	20.75	7,574	69.77%
Tropical Fruits	200	4,999	0.69	0.26	0.95	349	3.21%
Row and Annual Crops	400	3,392	1.15	0.82	1.98	722	6.65%
Energy Crops	200	3,392	0.47	0.20	0.68	248	2.28%
Pasture, irrigated	3,800	1,161	3.40	1.01	4.41	1,610	14.83%
Pasture, unirrigated	20,670	0	0	0	0.00	0	0.00%
Green Energy	250	0	0	0	0.00	0	0.00%

TOTAL	30,000	991	23.79	5.95	29.74	10,855.16	100.00%
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At full operations, once the No Action/No Lease farm plan was fully implemented, Central Maui would produce about 110.5 million pounds per year in crops, which is only about a third of the production under the Proposed Action, which is estimated to produce \$338 million pounds per year in crops (Plasch, 2019).

Under the No Action/No Lease alternative, annual crop sales would reach about \$51.3 million (compared to \$155.9 million under the Proposed Action). Cattle pasturage would increase from 7,300 cow-and-calf units generating \$4.8 million/year under the Proposed Action to 9,700 cow-and-calf units and revenues of \$6.3 million/year under the No Action alternative.

Total farm sales under the No Action/No Lease alternative could reach \$57.7 million/year, with \$46.1 million being Hawai'i sales and \$11.5 million being export sales. This is a sharp reduction from the \$160.7 million/year under the Proposed Action (with \$104.4 million of that being Hawai'i sales and \$56.2 million being export sales). To help put these numbers in context, under the Proposed Action, combined farm and energy revenues would reach \$168.9 million/year in direct sales, which far exceeds the \$116 million average revenues from sugar production between 2008 to 2013 and the \$101 million in revenues during the 2006 sugar period. Under the No Action alternative, combined farm and energy revenues would reach only \$65.9 million/year.

At full operations, the Mahi Pono No Action/No Lease farm plan would generate about one-third as many jobs (390 direct and indirect jobs with a payroll of \$15.6 million) as under the Proposed Action, which is anticipated to support some 1,140 jobs, with a payroll of \$45.3 million, and with about 1,000 of those jobs being on Maui. (Plasch, 2019).

State and County tax revenues would be about half as much under the No Action alternative as under the Proposed Action. At full operations anticipated in 2030, the Proposed Action farm plan would generate some \$7.5 million in State tax revenues, \$800,000 in County property taxes, and about \$140,000 to the City and County of Honolulu from the excise-tax surcharge. The No Action farm plan is estimated to generate about \$3.8 million per year, \$650,000 in County property taxes, and about \$50,000/year to the City and County of Honolulu for the excise-tax surcharge.

The No Action alternative would also result in far less in capital investments and less revenue to the State during the 6-year development period. Under the No Action/No Lease farm plan, capital investment for land preparation and related agricultural improvements would drop to \$144.8 million invested over about 6 years, with expenditures and indirect sales averaging approximately \$42.9 million per year (in contrast to the \$214.7 million capital investment under the Proposed Action, and \$39.9 million/year for 10 years in expenditures and indirect sales under the Proposed Action). During the farm development period, costs for converting the fallow sugarcane fields to support the No Lease farm plan are estimated at \$40.5 million (compared to \$89 million under the Proposed Action). Jobs during the relatively shorter development period (6 years compared to 10 years under the Proposed Action) are estimated at 290 direct and indirect jobs (compared to 330 direct and indirect jobs for the 10 year development period under the Proposed Action). Taxes paid to the State during the 6 year

development period are estimated at \$11.4 million over the 6-year development period, but with the State solar subsidy the State tax revenues would be negative \$7.3 million for the 6 year cumulative total. In contrast, State tax revenues the 10 year cumulative total under the Proposed Action is \$18.6 million under the Proposed Action, minus the State solar subsidy, resulting in a cumulative loss of State tax revenues of about \$100,000.

Development costs for the solar farm (\$93.8 million) are expected to be the same across all alternatives. Similarly, energy sales from the solar farm are expected to be the same under all alternatives; approximately \$8.2 million/year.

3.4.14 Recreational Resources

East Maui

The Modified Lease Area alternative would have different impacts on recreational resources in the License Area from the other alternatives, including the Proposed Action. Hunting and hiking are permitted in the License Area now and that is expected to be the case under all alternatives. However, the access is limited and regulated. If the License Area were reduced to make more of the State land open to the public that could potentially have a beneficial impact on the availability of recreational resources in East Maui.

Upcountry Maui

All of the alternatives that allow for water to continue to be supplied to the MDWS from the EMI Aqueduct System have the potential to have some beneficial impact on the Upcountry Maui recreational resources because many of the recreational facilities in Upcountry Maui have irrigated landscaping restrooms, showers, water fountains, and pools that are supplied with water delivered through the EMI Aqueduct System.

Central Maui

Neither the Proposed Action nor any of the alternatives are expected to have significant impact on the recreational resources in Central Maui because water derived from the EMI Aqueduct System is not used for any recreational facilities in Central Maui.

3.4.15 Visual Resources

East Maui

Neither the Proposed Action nor any of the alternatives are expected to have significant impact on the visual resources in the License Area because no new construction or land alteration is planned for the License Area. However, in the short-term, where diversions are lower due to the minimal amount of agricultural activity currently taking place in Central Maui, and once Mahi Pono's farm plan is significantly developed, there may be a decrease in stream flows and waterfalls that can be viewed along Hāna Highway. However, views from Hāna Highway were formally recognized a significant as early as the year 2000 (when President Clinton designated the Hāna Millennium Legacy Trail), when stream diversions were significantly greater than will be the case under the Proposed Action.

Upcountry Maui

Neither the Proposed Action nor any of the alternatives are expected to have significant impact on the visual resources in Upcountry Maui because no new construction or land alteration is planned for Upcountry Maui.

Central Maui

Under the No Action alternative, the Mahi Pono farm plan would include some 9,080 acres in green open space in the form of farms and irrigated pasture, which is a significant reduction from the 20,650 green open space acres under the Proposed Action. Therefore, the No Action alternative and potentially the Reduced Water Volume alternative have the potential to decrease the amount of green open space planned under the Proposed Action because the water availability is directly connected to the acreage of land used for crops. The Alternative Lease Duration alternative may also negatively impact the visual resources should the Water Lease be issued for a period of time that is insufficient for Mahi Pono to fully implement its farm plan and make its desired improvements to the Central Maui agricultural fields.

3.4.16 Air Quality

East Maui / Upcountry Maui

Neither the Proposed Action nor any of the alternatives are expected to have significant impact on the air quality in the License Area or Upcountry Maui because no new construction, water service facilities, or land alteration is planned for these regions. Thus, there would be no associated dust generation or emissions from construction-related vehicles or stationary equipment.

Central Maui

Under the Proposed Action and all the alternatives, there will be beneficial impacts on regional air quality because of the termination of sugarcane burning practices. Nevertheless, the transition to diversified agriculture may adversely affect air quality because of an increase in equipment emissions and dust from uncultivated land. Mitigation measures are described in Chapter 4.

3.4.17 Noise

East Maui

Neither the Proposed Action nor any of the alternatives are expected to have significant impact on the noise levels in the License Area or East Maui overall because no significant noise generating activities are proposed. It is possible that under the Modified Lease Area alternative that with increased public access there would be some increase in noise levels, but not to any degrees that could be considered significant.

Upcountry Maui

Neither the Proposed Action nor any of the alternatives are expected to have significant impact on the noise levels in Upcountry Maui. Under the No Action alternative and potentially under the Reduced Water Volume alternative, water deliveries to the Upcountry Maui water system will be terminated or reduced, which could discourage new activities that might otherwise have a slight and short-term increase in noise, such as the KAP expansion. However, no significant noise related impacts are anticipated in Upcountry Maui under any of the alternatives or under the Proposed Action.

Central Maui

Under the Proposed Action and the alternatives, there may be impacts on noise in Central Maui because of the transportation vehicles and equipment used for the diversified agriculture.

However, due to the expansive agricultural fields and the internal cane haul roads in Central Maui, the noise levels will not affect public areas. None of the other alternatives will have a significant impact on noise quality in Central Maui.

3.4.18 Hazardous Materials

East Maui

Under the Proposed Action and alternatives, no significant impacts are anticipated as EMI personnel will likely continue to use federally regulated herbicides to maintain the trails and access roads used to maintain the EMI Aqueduct System. The amount of water diverted will have little bearing on these maintenance requirements.

Upcountry Maui

Under the Proposed Action, and potentially all other alternatives except for the No Action alternative, expansion of the KAP may include a corresponding increase in the use of herbicides and pesticides for crop maintenance. Such use would be subject to federal regulations so no significant environmental impacts are anticipated. In the Reduced Water Volume and No Action alternatives agricultural use and the associated use of herbicides and pesticides may decline or end due to the potential contraction or elimination of the KAP.

Central Maui

Any use of agricultural chemicals for diversified agriculture in the Central Maui fields would be in strict compliance with federal regulations and Mahi Pono will exercise due care to prevent the release of fuels, lubricants and other hazardous materials. Hence, no significant impacts are anticipated. The Reduced Water Volume and No Action alternatives will result in fewer crops and a corresponding decrease in the use of agricultural chemicals.

3.4.19 Traffic

East Maui

No significant impacts to traffic in East Maui are expected under any of alternatives, including the Proposed Action. Under the Modified Lease Area alternative with increased public access to the License Area, there may be a moderate increase in traffic as compared to the other alternatives.

Upcountry Maui

No significant impacts to traffic in Upcountry Maui are expected under any of alternatives, including the Proposed Action. Long term, should Upcountry Maui experience a lack of growth or even a loss of population or other activities, as anticipated under the No Action alternative, Upcountry Maui may have less traffic in the future or as compared to the other alternatives.

Central Maui

Even under the Proposed Action with the full implementation of the Mahi Pono farm plan, no significant impacts to Central Maui traffic are anticipated. The other alternatives would have even lesser impacts due to fewer Mahi Pono farm employees (estimated 790 employees at full operations under the Proposed Action compared to an estimated 270 jobs under the No Action alternative).

3.4.20 Public Water Systems

East Maui

A portion of the Nāhiku community is served by the MDWS directly through the EMI Aqueduct System via a development tunnel in the Koolau Ditch near Makapipi Stream. The tunnel draws up 20,000 to 45,000 gdp, dependent on weather, directly from the EMI Aqueduct System. The area is at a lower elevation where the water system has sufficient pressure for residential service. Potential impacts to the Nāhiku community will depend upon the amount of water allowed to be diverted under the Water Lease. Under the Proposed Action, water delivery to the Nāhiku community is expected to continue to be provided. With increasingly deeper reductions in the amount of water available through the Water Lease, however, the reliability of water supplied to the Nāhiku community would become increasingly tenuous. Water delivery amounts under the Reduced Water Volume alternative depend upon the amount of permitted diversions. The alternative of a Water Lease with a shorter lease term would reduce the time horizon for certainty that water would be available to the Nāhiku community. Therefore, for the Nāhiku community, this would reduce the time to pursue alternative sources of water, which are limited. Under the No Action alternative, where no Water Lease is awarded and the only available water would be derived from privately owned land, water service to Nāhiku community is assumed to terminate.

Upcountry Maui

Potential impacts to the Upcountry Maui Water System will depend upon the amount of water allowed to be diverted under the Water Lease. Under the Proposed Action water delivery to Upcountry Maui is expected to continue as usual. Under the No Action/No Lease alternative, water service to Upcountry Maui is assumed to terminate. Water delivery amounts under the Reduced Water Volume alternative depend upon the amount of permitted diversions.

Central Maui

Neither the Proposed Action nor the alternatives are expected to have a significant adverse effect on public water systems because water service to Central Maui is through the privately owned EMI Aqueduct System. Regarding impacts to the private Central Maui irrigation system, Mahi Pono's irrigation engineering team is also designing a high-efficiency irrigation system. The new irrigation system will reduce water usage by: (1) using automatic, real-time irrigation sensors to deliver precise amounts of water efficiently; (2) recycle and re-use all water used in Mahi Pono's processing plants; and (3) integrate various live technology feeds to constantly monitor plant, soil, and tree health. As such, under the Proposed Action and all alternatives, beneficial impacts to the Central Maui irrigation system are anticipated.

3.4.21. Public Services and Facilities

East Maui

No significant impacts are anticipated on public services and facilities as a result of the Proposed Action, Reduced Water Volume and No Action alternatives. Increased public access in the Modified Lease Area alternative could require greater involvement by the DLNR personnel and possibly by County police.

Upcountry Maui

No significant impacts are anticipated.

Central Maui

Under the Proposed Action, upon restoration of the Central Maui field irrigation system reservoirs, it is anticipated that the previous relationship with the Maui County Fire Department would resume whereby firefighters would use water from the reservoirs to fight fires. In the Reduced Water Volume and No Action alternatives, the amount of water in reservoirs, particularly during drier weather conditions, would likely be less or unavailable, reducing their usefulness in fighting fires. Wildfires in fallow fields in Central Maui would be of greatest concern, particularly during drier weather conditions.