and along Pi'ilani Highway will also act as fire breaks, as will the golf course. Other fire mitigation measures include the use of lava rock and other non-flammable materials in building and landscaping, and creating a trail system, which will act as a fire break.

Impacts from natural hazards can be further mitigated by adherence to appropriate civil defense evacuation procedures. Honua'ula will coordinate with the State of Hawai'i Department of Defense, Office of Civil Defense and the County of Maui Civil Defense Agency regarding civil defense measures, such as sirens, necessary to serve Honua'ula.

3.5 GROUNDWATER RESOURCES AND WATER QUALITY

3.5.1 Groundwater

Tom Nance Water Resource Engineering (TNWRE) conducted an assessment of the potential impact on groundwater resources from the creation of Honua'ula. Information and conclusions from the assessment are summarized below. The complete assessment report is included in Appendix B.

The Property and the wells that will supply the Property are located in the Kama'ole Aquifer System. The system comprises a triangular-shaped area of approximately 89 square miles, with its apex at the top of Haleakala and its base along the 11-mile length of shoreline from Waiakoa Gulch on the north to Cape Kīna'u on the south. The Waiakoa Gulch boundary of the aquifer is coincident with the Wailuku-Makawao district boundary, but is otherwise of no known hydrologic significance. The southern boundary of the aquifer is the southwest rift zone of Haleakala, which is likely to be a barrier to groundwater flow. Groundwater in the Kama'ole Aquifer exists as a basal lens from the shoreline as far inland as the 1,700-foot contour.

The Property, located toward the western and southern end of the Kama'ole Aquifer, is generally semi-arid, with rainfall averaging about 18 inches per year. Because of the relatively dry conditions on and above the Property, there are no perennial streams on the Property or in the vicinity. Runoff occurs in the mauka-to-makai gulches which cross the Property only during, and for a short time following, intense rainfall events.

In 1990, the CWRM set the sustainable yield of the Kama'ole Aquifer at 11 million gallons per day (MGD). This was based on a computed groundwater recharge of 25 MGD and the assumption that 44 percent of the recharge could be withdrawn by wells without adversely impacting the integrity of aquifer. However, several far more detailed and sophisticated studies on the aquifer's recharge have been completed since then (USGS 1999; Waimea Water Services Inc. 2004; USGS 2007). These studies indicate that the recharge amount on which the CWRM's sustainable yield is based is substantially underestimated; the actual sustainable yield of the aquifer may be as much as 50 percent greater than the 1990 CWRM estimate. The most recent of these studies—which is considered to be the most reliable—estimates the groundwater flowrate to be 3.4 MGD per mile, which is the rate used by TNWRE in analyzing impacts to groundwater (TNWRE

2010). Current actual aquifer pumpage is estimated to be approximately 4.0 MGD (TNWRE 2010).

The Underground Injection Control Line[2], as established by the State DOH, is located approximately along the 600-foot elevation contour, above the majority of the Property.

Currently, Honua'ula has four brackish wells. Two of these are on the Property (Wailea 670 1 and 2). The other two are off-site (Kama'ole 1 and 2) in an area north of Maui Meadows and on land owned by Haleakalā Ranch. The total safe yield of the four wells, with one as standby, is 1.3 MGD (TNWRE 2010). All of the wells are within the Kama'ole Aquifer System and are fully permitted by CWRM.

POTENTIAL IMPACTS AND MITIGATION MEASURES

Water Resources

Four aspects of Honua'ula have the potential to impact water resources: 1) use of groundwater for potable consumption and landscape irrigation; 2) generation, treatment, and reuse of domestic wastewater; 3) increase in surface water runoff; and 4) percolation of excess landscape irrigation to groundwater. Potential impacts to groundwater may occur in two geographically distinct areas: 1) beneath and downgradient of the Property itself; and 2) downgradient of Honua'ula's off-site wells.

Use of Groundwater – Honua'ula's potable and irrigation water supply will be provided by brackish wells. As noted above, four of these wells have already been developed: two are on the Property (Wailea 670 Wells 1 and 2); and the other two are off-site (Kama'ole Wells 1 and 2) in an area north of Maui Meadows. All of the wells are fully permitted by CWRM. Honua'ula's total average groundwater use at full build-out is projected to be approximately 1.7 MGD. To provide for summertime maximum use periods and to have standby capacity, two more wells will be needed. Depending on actual water use rates that materialize, a third new well may or may not be needed as Honua'ula approaches build-out. For more information on Honua'ula's water system, see Section 4.8.1 (Water System).

Honua'ula spans a 1.9-mile length of coastline mauka of the shoreline. Assuming a lateral dispersion on the order of 10 degrees, Honua'ula's potential impacts on groundwater may occur across a 2.3-mile section of the shoreline. The existing groundwater flowrate discharging into the marine environment in this area is estimated to be on the order of 7.8 MGD.

[2] Underground Injection Control Line (UIC) means the line on the DOH Underground Injection Control maps which separates exempted aquifers and underground sources of drinking water (Section 11-23-03, HAR).

Five of Wailea Resort's nine golf course irrigation wells are within this downgradient and lateral zone. According to CWRM records, the draft of these wells is approximately 1.4 MGD as a year-round average. However, because Wailea Resort's Well 2 (No. 4126-02) is nearly directly downgradient from Honuaʻula's on-site wells, it is the only well in which there may be a potential increase in salinity due to the potential decrease of groundwater flow being taken up by the Honuaʻula wells. Decreased pumping of Honuaʻula's on-site wells would alleviate this potential impact.

Honuaʻula's well system, with on-site and off-site wells, was specifically engineered to minimize impacts to Wailea Resort's golf course irrigation wells. Honuaʻula's two on-site wells are fully permitted by CWRM and have been in place for nearly 20 years; however they cannot supply all water needed for Honuaʻula. Rather than drill additional wells on-site, which could lead to potentially adverse impacts to Wailea Resort's downgradient wells, Honuaʻula's off-site wells will draw from groundwater flows removed from Wailea Resort's wells, in an area north of Maui Meadows that has far less downgradient water withdrawals. The use of this off-site water within Honuaʻula lessens the need for groundwater withdrawals from on-site Honuaʻula wells, thus preserving more groundwater flow to the downgradient Wailea Resort wells.

Honuaʻula's off-site wells, located north of Maui Meadows, and potential new wells in the same area, span an 0.8-mile long length at about the 580-foot elevation and have the potential to impact groundwater flow along an approximate 1.4-mile long shoreline segment. The existing groundwater flow rate discharging into the marine environment in this area is estimated to be on the order of 4.8 MGD. Use of Honuaʻula's off-site wells is calculated to reduce this flow rate by approximately 27 percent.

Based on CWRM records, there are 20 wells in this downgradient and lateral zone. Most of these wells are more than 50 years old and are no longer in use. However, at least six are relatively recent (installed since the 1990s) and were developed to provide brackish landscape irrigation water for condominium parcels. The total draft of these wells is likely to be in the range of 0.12 to 0.30 MGD as a year round average. With the use of Honuaʻula's off-site wells, the active downgradient irrigation wells may be impacted by a potential increase in salinity due to reduced flowrate, which current calculations indicate may be on the order or five percent. If the actual impact materially impairs the utility of the downgradient landscape irrigation wells, additional wells (pumping the same combined amount of water) in the area north of Maui Meadows to distribute the draft over a greater area would alleviate the impact so that the utility of downgradient wells is not materially impaired.

Wastewater Generation, Treatment, and Reuse – Two alternatives are being considered for treatment of Honuaʻula's wastewater: 1) develop, maintain, and operate a private on-site WWRF; or 2) transport wastewater to the Mākena WWRF for treatment and return the treated effluent to Honuaʻula for irrigation use. With either alternative, wastewater will be treated to R-1 quality and used for golf course irrigation. Potential impacts related to use of R-1 water for irrigation are discussed in the discussions below regarding percolation to

groundwater and summary of impacts. For more information on Honua'ula's wastewater system see Section 4.8.2 (Wastewater System).

Collection and Detention of Rainfall Runoff – Honua'ula will use detention basins so that there will be no increase in the peak rate of storm water runoff leaving the Property compared to existing conditions. Of the 18 inches of average annual rainfall received on the Property, it is assumed that one-third of the rainfall percolates to groundwater and the remaining two-thirds evaporates to the atmosphere or becomes runoff.

Runoff will be stored in 26 detention basins located on the Property in low lying areas, within the golf course, or along the makai Property boundary. Each of the detention basins will have a drainage outlet consisting, in part, of a vertical perforated pipe within a gravel mound which will act as a filter. In addition to reducing the peak runoff rate by detention storage, this configuration will also capture floatables and suspended solids in the basin, thus reducing sediments in the water released from the detention basins. With the use of detention basins, the peak rate of runoff leaving the Property will not increase over current conditions and seepage of water into the ground from the detention basins will actually increase the amount of percolation to groundwater. Potential impacts regarding percolation to groundwater are discussed below. For more information on Honua'ula's drainage system see Section 4.8.3 (Drainage System).

Percolation to Groundwater – Irrigation water used within Honua'ula will be a combination of: 1) brackish water from wells; 2) R-1 quality recycled water from the either the on-site WWRF or the Mākena WWRF; and 3) concentrate from reverse osmosis (RO) treatment of the potable supply.[3]

To calculate potential changes to groundwater, the groundwater assessment study made the following assumptions:

- The salinity of water from the brackish well water will be 0.95 parts per thousand (ppt);
- The R-1 water from the on-site WWRF or the Mākena WWRF will have 775 µM (micromoles)(10.85 milligrams per liter (mg/l) nitrogen and 165 µM (2.00 mg/l) phosphorus;
- Essentially all of the nitrogen and phosphorus in the brackish well water that is run through the RO treatment process will be contained in the concentrate that is used for irrigation;
- Rainwater percolating to groundwater will have an increase in nitrogen of 20 µM and an increase in phosphorus of 2.0 µM over existing conditions;

[3] Brackish well water will be treated by RO to produce potable water for Honua'ula. The RO process generates brine concentrate in the course of producing potable water. However, by diluting the brine water with other non-potable water (brackish and R-1), the salt content will be reduced to a degree that it can be used for irrigation, thus avoiding the use of injection wells to dispose of the brine. See Section 4.8.1 (Water System) for more details.

- Fertilizer applications in landscaped areas will be at three pounds per 1,000 square feet per year for nitrogen and at 0.5 pounds per 1,000 square feet per year for phosphorus; of these applications 10 percent of the applied nitrogen and two percent of the applied phosphorus will be carried in the percolate below the root zone.
- Percolation of excess applied irrigation water will occur from irrigating: 1) the golf course and driving range; 2) landscaping along roadways and in buffer areas; 3) parks and other landscaped public areas; and 4) residential parcels. It is assumed that 10 percent of the applied irrigation water on the golf course percolates to groundwater and 15 percent of applied irrigation water on other irrigated landscaped areas percolates to groundwater. At build-out, the total percolation to groundwater of excess applied irrigation is estimated to be 0.206 MGD.
- For all the irrigation water, it is assumed that the portion percolating through the root zone will have a salinity increase of 10 percent and a 50 percent reduction of nitrogen and phosphorus concentrations as a result of plant uptake and processes in the soil; and
- In the hundreds of feet of travel by the percolate through the vadose zone (the unsaturated lavas between the ground surface and groundwater) and the thousands of feet of travel for groundwater to discharge at the shoreline, natural processes will remove 80 percent of dissolved nitrogen and 95 percent of dissolved phosphorus.

The net potential change is calculated to be: a 2.9 percent reduction in flowrate; a 0.6 percent increase in salinity; a reduction in nitrogen loading of 4.3 percent; and a reduction in phosphorus of 4.8 percent.

The net decrease in nitrogen and phosphorus is due to several compounding reasons; 1) existing groundwater is already high in nitrogen and phosphorus due to naturally occurring processes upgradient of the Honua'ula wells; 2) pumping of the two on-site Honua'ula wells will thus decrease nitrogen and phosphorus in groundwater flowing to the ocean because of the reduced groundwater flow; 3) the total amount of groundwater withdrawn from the Honua'ula wells will not all percolate to groundwater, as some will be absorbed by plants, evaporate, or be captured as runoff in the detention basins; 4) for the water that does percolate to groundwater or flow from detention basins, natural processes will remove 80 percent of dissolved nitrogen and 95 percent of dissolved phosphorus in the hundreds of feet of travel by the percolate through the vadose zone (the unsaturated lavas between the ground surface and groundwater) and the thousands of feet of travel for groundwater to discharge at the shoreline.

Summary of Potential Impacts – Table 1 below presents a compilation of potential changes to groundwater in the area downgradient of Honua'ula after full build-out incorporating the assumptions noted in the previous discussions.

Table 1. Compilation of Potential Changes to Groundwater in the Area Downgradient of Honua'ula After Full Build-Out

Component Flow	Flowrate (MGD)	Salinity (PPT)	Nitrogen (lbs/day)	Phosphorus (lbs/day)
Pre-Development Groundwater	7.8	1.00	228.3	5.217
Withdrawal by On-site Wells (No. 4125-01 and -02)	0.43	0.95	12.59	0.288
Percolation From the Project Site to Groundwater				
• Percolating Rainfall	No Change	No Change	0.14	0.0077
• Percolation From the Golf Course				
• RO Concentrate	0.0203	2.651	0.170	0.0010
• WWRF Effluent	0.0274	0.440	0.248	0.0114
• Brackish Water	0.0240	1.045	0.070	0.0004
• Applied Fertilizer Dissolved in Percolate	--	--	0.788	0.0066
• Percolation From Other Landscaped Areas				
• Brackish Water	0.1336	1.045	0.391	0.0022
• Applied Fertilizer Dissolved in Percolate	--	--	0.981	0.0082
Post-Development Groundwater				
• Amounts	7.5753	1.0062	218.498	4.9665
• Change Compared to Pre-Development Flowrate	-2.9%	+0.62%	-4.3%	-4.8%

As shown on Table 1 the computed changes to groundwater in the area downgradient of Honua'ula are: 1) a relatively small 2.9 percent reduction in flow rate discharging into the marine environment; 2) a relatively insignificant 0.6 percent increase in salinity; 3) a reduction in nitrogen loading of 4.3 percent (a positive impact regarding ocean water quality); and 4) a reduction in phosphorus of 4.8 percent (a positive impact regarding ocean water quality). The largest factor contributing to these results is that most of the groundwater supply (about 75 percent) will come from the off-site Kama'ole wells; the use of this off-site water will: 1) lessen the need for groundwater withdrawals from on-site Honua'ula wells, thus preserving more groundwater flow to downgradient wells; and 2) contribute to groundwater recharge flowing toward the downgradient wells.

Based on these results, the hydrologic assessment concludes that the creation of Honua'ula will not impair Wailea Resort's golf course irrigation wells, with the possible exception of a salinity increase in Wailea Resort's Well 2 (No. 4126-02), which is directly downgradient of Honua'ula's two on-site wells. Decreased pumping of Honua'ula's on-site wells would alleviate this potential impact.

An estimated six active downgradient wells may be impacted by a potential increase in salinity due to reduced flowrate resulting from Honua'ula's off-site wells, which current calculations indicate may be on the order or five percent. These downgradient brackish wells were developed to provide landscape irrigation for individual condominium parcels, and the combined draft of all of these wells is relatively small (in the range of 0.12 to 0.30 MGD as a year round average). It is not known if the increase in salinity would materially

impair the utility of the wells; however if the utility of the wells is materially impaired, additional wells (pumping the same combined amount of water) in the area north of Maui Meadows would distribute the draft over a greater area and would alleviate the impact downgradient.

All existing on- and off-site wells are fully permitted by CWRM. All new wells will be developed in compliance with all requirements of Chapter 174C, HRS (State Water Code) and HAR, Chapters 13-167 to 13-171, as applicable, pertaining to CWRM and administration of the State Water Code. The CWRM application process for water use permits entails: 1) the preparation of an extensive application that includes analysis of: a) the public interest; b) the rights of the Department of Hawaiian Home Lands; c) any interference with any existing legal uses; and d) alternatives; 2) a thorough public and agency review process; 3) public hearing(s); and 4) a formal decision from CWRM. Well construction/pump installation permits also have an extensive application process that includes thorough review. Therefore, there will be extensive analysis, review, and evaluation of potential impacts of any new wells.

Golf Course

To ensure that Honua'ula's golf course is developed and operated in an environmentally responsible manner and potential impacts to water resources are mitigated, Environmental & Turf Services, Inc., prepared a comprehensive Best Management Practices (BMPs) document adhering to the DOH's "Golf Course Best Management Practices" guidelines (DOH 2005). The BMPs also satisfy all previous DOH recommendations regarding golf courses, including, "Guidelines Applicable to Golf Courses in Hawaii" (Version 6, DOH 2002) and "Twelve Conditions Applicable to all New Golf Course Development" ("12 conditions;" Version 4, DOH 1992). The BMPs further satisfy specific conditions of County of Maui Ordinance No. 3554 that require compliance with several of the DOH's "12 Conditions." Sections of the BMP document relative to groundwater protection are summarized below. Appendix C contains the complete BMP document.

The overall goal of the Honua'ula BMPs is to reduce the turf chemical and water inputs required to manage the 18-hole golf course and to minimize waste generation. The most important BMP is the use of Seashore paspalum grass throughout the golf course. Traditionally, Hawaii golf courses have used bermudagrass, which presents an excellent playing surface under typical Hawaii conditions. However, the new varieties of Seashore paspalum rival bermudagrass in turf quality and have many additional environmental attributes, including tolerance of alternative water sources and high sodium and salt levels, the potential to substantially reduce fertilizer requirements (including a two-thirds reduction in nitrogen requirements) and minimal need for herbicides and fungicides.

Groundwater Monitoring – Two monitoring wells are tentatively proposed for installation on-site. An existing irrigation well will also be sampled. Baseline sampling and semi-annual operational phase sampling will be done. Analytes will include pesticides and relevant key metabolites, standard field parameters (such as pH and temperature), nitrate,

phosphorus, and inorganic substances relevant to the ongoing nearshore monitoring program (see Section 3.5.2 (Nearshore Marine Environment)). A contingency plan is proposed that would trigger pesticide use restrictions or bans if pesticides are detected at predetermined concentrations. The groundwater monitoring program and protocol will be prepared in accordance with the DOH's Golf Course BMPs (DOH 2005) and will continue until DOH certifies that no further monitoring is required based on review of the data.

In providing and executing the groundwater monitoring program, Honua'ula Partners, LLC will also be in compliance with County of Maui Ordinance No. 3554:

- Condition 18a, which requires compliance with Condition 1 of DOH's "12 Conditions," which relates to establishing baseline groundwater/vadose zone and nearshore water quality (see Section 3.5.2 (Nearshore Marine Environment)) data and reporting findings to DOH; and
- Condition 18b, which requires compliance with Condition 2 and 3 of DOH's "12 Conditions;" specifically:
    - Condition 2 of DOH's "12 Conditions" relates to establishing a groundwater monitoring program; and
    - Condition 3 of DOH's "12 Conditions" requires immediate action if data from the monitoring system indicates increased levels of a contaminate that poses, or may pose, a threat to public health and the environment.

Water Conservation – Water conservation is central to the functioning of the golf course. While non-potable water will be used for all golf course irrigation, the golf course will also include a modern irrigation system designed to use non-potable water efficiently. The key component of the irrigation system will be a central computer to store information for every sprinkler, including the type of sprinkler, nozzle sizes, location, soil type, slope, infiltration, exposure, etc., so that the exact amount of water needed is applied (i.e., not just turning on sprinklers for a set duration). Cycle/soak features will prevent runoff when heavy irrigation is needed. Flow management features will ensure optimum pressure and amount to every sprinkler.

Records of irrigation procedures will be maintained for each management zone. Each management zone will be treated independently; the highest priority zones (greens, tees, fairways) will receive the highest amounts of water, while lower priority zones (secondary roughs, natural areas) will receive less water. These priority designations will help to efficiently manage overall water use on the golf course, providing the highest level of playability and aesthetics while incorporating water conservation and environmentally sustainable management practices.

In designing and implementing a detailed and efficient irrigation system, Honua'ula Partners, LLC will also be in compliance with County of Maui Ordinance No. 3554 Condition 18d, which requires compliance with Condition 5 of DOH's "12 Conditions,"

which relates to use of treated wastewater for golf course irrigation (see section 4.8.2 (Wastewater System) and the need for an irrigation plan.

Golf Course Maintenance Center – The golf course maintenance center is expected to be located near the Kaukahi Street entrance. It will be a modern, carefully designed, fenced and secured, state-of-the-art complex containing offices, a maintenance shop, and equipment and material storage. It will be designed to achieve these objectives: operational efficiency; worker health and safety; environmental protection (i.e., containment and management of chemicals and fuels so that the surrounding environment will not be impacted); and compliance with all Federal, State, and County regulations. The golf maintenance center is located in an area sufficiently distanced from residential uses and will be designed to further lessen noise to surrounding uses.

The maintenance center site will be graded, and curbs will be erected, so that parking lot drainage cannot flow directly into drainage features. Catch basins will capture contaminated stormwater runoff and any spills and will be tied to a drainage system that terminates in a treatment system to remove sediments, floating debris, and petroleum contaminants. The system will be designed with consideration that runoff from the maintenance facility complex may include soil, sand, grass clippings, petroleum products (small amounts of oil and gasoline), fertilizers, and other typical hard surface runoff substances. There should be minimal to no presence of pesticides in runoff water due to the use of closed-loop recirculating systems and special containment pads.

The maintenance center will include a recycling wash water system for turfgrass equipment. The system will be capable of capturing grass clippings, oil and grease, and trace organics and will include a closed-loop wash/recycle wash-down water system independent of the storm water drainage system.

Fuel storage will be within a split, above-ground fuel tank. One tank will be used for gasoline, and one for diesel. Both tanks will have double walls with vehicle barriers for accident prevention. The tanks will conform to the Uniform Fire Code and National Fire Protection Association regulations for above-ground tanks and will be designed to meet above-ground regulatory storage requirements in the State of Hawaii.

Pesticide/biocide storage will be in a pre-fabricated building specifically designed for pesticide storage to be ventilated, fire resistant, vapor explosion resistant, vandalism protected, spill self-contained, and climate controlled. The building will be designated and posted as a pesticide storage area (as required by law) with a list of all chemicals contained in storage on file in the superintendent's office. Fertilizer and other dry bulk material typically contained in bag form will be stored in a separate building with masonry walls to prevent corrosion caused by fertilizer salts.

A self-contained concrete mixing/loading pad, enclosed on three sides, will be designed to safely contain any spill, or emergency release of materials and prevent release of any chemicals or spray mix other than proper application to the turf.

Golf course maintenance equipment and vehicles used on-site will be stored in a paved area of the maintenance center. The floor of the equipment storage area will be hard surfaced, allowing easy clean-up of oil leaks, spills, or other fluids that might come from the equipment. Proper absorbent materials throughout the storage area will allow for quick clean up of spills. No fluids will be allowed to escape this area. Floor drains will not be allowed.

In providing a state-of-the-art golf course maintenance center, Honua'ula Partners, LLC will also be in compliance with County of Maui Ordinance No. 3554:

- Condition 18e, which requires compliance with Condition 6 of DOH's "12 Conditions," which relates to storage of petroleum products for fueling golf carts, maintenance vehicles, and emergency power generators that pose potential risk to groundwater;
- Condition 18f, which requires compliance with Conditions 7, 8, and 11 of DOH's "12 Conditions;" specifically:
    - Condition 7 of DOH's "12 Conditions" relates to buildings designed to house fertilizers and biocides;
    - Condition 8 of the DOH's "12 Conditions" relates to a golf course maintenance plan and program and is discussed below;
    - Condition 11 of the DOH's "12 Conditions" relates to: 1) fugitive dust during construction, which is addressed in Section 4.6 (Air Quality) and 2) application of pesticides and chemicals, which is discussed below; and
- Condition 18g, which requires compliance with Condition 9 of DOH's "12 Conditions," which relates to minimizing noise from golf course maintenance activities.

Integrated Pest Management – Integrated Pest Management (IPM) is an interdisciplinary program that manages pest control tactics in a single system to prevent unacceptable levels of pest damage. IPM uses the least toxic control approach to address pest problems, using chemical controls only when other strategies are not effective. Appropriate control methods are generally not designed to eradicate pest populations but to manage turf grass in the most economical way with the least effect possible on people, property, and the environment.

The use of IPM avoids the conventional spray approach to pest management and is likely to reduce pesticide use by 30 percent or more. This approach ultimately develops hardier turf grass and increases the population of beneficial organisms and natural enemies to pests. Control tactics are implemented based on pest populations and not by spray intervals and calendar dates.

There is no single pest control method that provides complete control of turf grass pathogens (pathogens cause disease), but the multifaceted IPM approach provides the best and most economical control of pests. Golf courses, like other agricultural commodities,

are susceptible to occasional attacks from a rather complex list of pests. These pests and causal agents may be observed during various climatic conditions and life cycles. They may be controlled by a variety of methods. With the IPM approach, pest populations are monitored such that an appropriate treatment is implemented when pest pressure exceeds the action tolerance level of damage to turf. A threshold is a level of damage or potential damage such as the number of insects or weeds per square foot of turf. The treatment may be one of a variety of pest control measures (e.g., mechanical removal, biorational products, chemical treatments, etc.). The IPM approach will work on every defined management area but must be tailored for each tee, green, fairway, and rough.

Monitoring control systems will provide the basis for developing thresholds and determining any actions necessary for control. The system should be simple, accurate, and part of the daily regimen for turfgrass management. Pests may be defined as bacteria, plant pathogenic fungi, insects, nematodes, rodents, viruses, weeds, etc. The information obtained through monitoring will provide site specific educational knowledge and limit the levels of predictable loss to turf grass. Pest occupancy is very weather-dependent; therefore it is necessary to observe pest populations for several years to have a good idea about the range of pest problems.

A fertilizer/nutrient management plan will provide site-specific guidelines and plant requirements to maintain healthy turf grass, avoiding the over-application of nutrients resulting in transportation of dissolved nutrients off-site. Approximately half of the nitrogen fertilizer applied to turf grass is incorporated into the plant; the other half can be found stored in the soil and lost to the atmosphere. Thus there is limited fertilizer nitrogen remaining that can leach into ground water or be transported as runoff into surface water (Petrovic 1990; Cohen 1999). Golf courses can be managed so nitrogen from fertilizers does not contaminate ground water supplies (Petrovic 1990; Cohen 1999).

Biorational/organic products (fungi, bacteria, viruses, nematodes, and non-target insects) will be used whenever it is feasible, and there is a scientific basis to support their use. Biorational products can provide an effective and efficient method of eradicating disease and other pest pressures. Additional methods, such as applying composts containing microorganisms as top dressing and the use of compost teas may also suppress diseases before they harm turfed areas. EKO Compost, located in Pu'unēnē, manufactures and sells compost and compost-based mixtures. When applied as top dressing, EKO compost has been shown to improve yellowing areas on tees and fairways (Burgett 2006; EKO 2006).
Chemical treatments will only be used when a pest is present at significant levels to cause damage and should only be applied when the pest is most vulnerable to the pesticide (i.e., in juvenile stages of development) and when the environment is best suited to manage the application (e.g., not when soil is saturated, or during windy or rainy weather to prevent the amount of potential drift and surface water runoff). If the pest infestation is limited in scope, spot treatments may be possible. When applying chemical controls it is important that equipment is properly calibrated and adequately maintained. Pesticide will be rotated (alternative chemicals, or alternative pest control methods and cultivation controls) to

reduce the possibility of pests becoming resistant to the applied chemicals, and also to reduce the frequency of chemical applications.

In implementing an Integrated Pest Management program, Honua'ula Partners, LLC will also be in compliance with County of Maui Ordinance No. 3554 Condition 18f, which requires compliance with Conditions 7, 8, and 11 of DOH's "12 Conditions;" specifically:

- Condition 7 of DOH's "12 Conditions" relates to buildings designed to house fertilizers and biocides and was discussed above;
- Condition 8 of DOH's "12 Conditions" relates to a golf course maintenance plan and program in regard to: 1) use of fertilizers and biocides which is discussed above; and 2) irrigation, which was discussed above;
- Condition 11 of DOH's "12 Conditions" relates, to 1) fugitive dust during construction which is addressed in Section 4.6 (Air Quality) and 2) application of pesticides and chemicals, which is discussed above.

3.5.2 Nearshore Marine Environment

Marine Water Quality

Although Honua'ula is not located along the shoreline, Marine Research Consultants, Inc., (MRC) conducted nearshore water quality monitoring studies in 2005, 2006, 2008, and 2009 specifically regarding Honua'ula to obtain pre-construction baseline data. The most recent study was conducted in September 2009. The subsequent nearshore water quality assessment report (MRC 2010a) includes data from the previous Honua'ula studies, with particular emphasis on the most recent data. Information and conclusions from the most recent assessment (MRC 2010a), as well as other relevant information, are summarized below. Appendix D contains the complete assessment report.

The nearshore waters downstream of the Property, as are nearly all the waters along the west-facing shoreline of Maui, are classified as "A" by the State DOH. According to DOH water quality standards, "It is the objective of Class A waters that their use for recreational purposes and aesthetic enjoyment be protected." (HAR §11-54-03(c)(2)).

The *2006 State of Hawaii Water Quality Monitoring and Assessment Report*[4] ("Integrated Report") (DOH 2008) lists two areas of nearshore receiving waters downstream from Honua'ula as "impaired," meaning State ocean water quality standards for specific criteria were not attained; specifically, state ocean water quality standards for open coastal waters were not attained at: 1) Ulua Beach Park for turbidity and chlorophyll a (Chl *a*); and 2) Wailea Beach Park for turbidity. Because these State ocean water quality standards were

[4] The complete title is: *2006 State of Hawaii Water Quality Monitoring and Assessment Report: Integrated Report to the U.S. Environmental Protection Agency and the U.S. Congress Pursuant to Sections §303(D) and §305(B), Clean Water Act (P.L. 97-117)*. The report was prepared by the Hawaii State Department of Health and is dated January 11, 2008.

not attained, the Clean Water Act requires that Total Maximum Daily Loads (TMDLs)[5] be established for the specific critera that do not meet the standards. DOH is the State agency responsible for developing TMDLs; however DOH has not developed any TMDL criteria for any marine areas off the coast of Maui (DOH 2010). In addition, the Integrated Report states that at Ulua Beach Park and Wailea Beach Park there is a "low prority for initiating TMDL development with the current monitoring and assessment cycle (through April 15, 2008), based on the prioritization data established in the Integrated Report and on current and projected resource availability for completing the TMDL development process."

Data for the 2006 Integrated Report was collected in 2006 and before. The current Honuaʻula nearshore water quality monitoring study (MRC 2010a) included water quality sampling from the same locations downstream from Honuaʻula as the 2006 Integrated Report (see below regarding sampling locations). In contrast to the 2006 Integrated Report results, the results of the current nearshore water quality monitoring study do not show turbidity levels that exceed DOH standards at either Ulua Beach Park or Wailea Beach Park (MRC 2010a). Current measured levels of chlorophyll a (Chl *a*) at these locations do exceed DOH standards; however it should be noted that measures of chlorophyll a (Chl *a*) exceeded DOH standards at all sampling sites, including the control site off the ʻĀhihi-Kīnaʻu Natural Area Reserve, indicating that the exceedance of chlorophyll a (Chl *a*) is not the result of input from land. DOH anticipates publishing an update of the 2006 Integrated Report in 2010.

Comparison of data from the 2006 Integrated Report and the current Honuaʻula nearshore water quality monitoring study (MRC 2010a) shows that water quality results can vary over time. It is important to note that Honuaʻula is not yet built, so any current exceedances of State water quality standards are not the result of Honuaʻula. The purpose of the Honuaʻula nearshore water quality monitoring studies is to establish baseline water quality data regarding existing conditions without Honuaʻula. Honuaʻula water quality monitoring studies will continue during construction and after Honuaʻula is built, so that any changes can be compared to the the baseline data to determine if Honuaʻula has an impact on water quality. If there is an impact from Honuaʻula, corrective actions will be taken.

For each of the Honuaʻula nearshore water quality monitoring studies, sixty ocean water samples were collected in accordance with DOH water quality standards on four transects spaced along the length of coastline makai of and downstream from Honuaʻula and one transect located outside of the downstream area as a control, as follows:

- Site 1 – Off the southern boundary of Wailea Resort Gold Golf Course;
- Site 2 – Off the southern end of Palauea Beach downstream from the southern Property boundary;

[5] A Total Maximum Daily Load, or TMDL, is a calculation of the maximum amount of a pollutant that a waterbody can receive and still safely meet water quality standards (http://www.epa.gov/OWOW/tmdl/).

- Site 3 – Off the southern end of Wailea Beach downstream from the center of the Property;
- Site 4 – Off the northern end of Ulua Beach downstream from the northern Property boundary; and
- Site 5 (control) – Off the 'Āhihi-Kīna'u Natural Area Reserve approximately two miles south of the Property.

For all transects, ocean water samples were collected at five locations along each transect extending from the highest wash of the waves to approximately 150 meters offshore. This sampling scheme spans the greatest range of salinity with respect to groundwater/surface water flowing out from the shoreline. Sampling was more concentrated in the nearshore zone because this area is most likely to show the effects of shoreline modification. With the exception of the two locations closest to the shoreline, which are in shallow waters, samples were collected at two depths; a surface sample within approximately 10 centimeters of the ocean surface, and a bottom sample collected within one meter of the ocean floor.

In addition to ocean water samples, water samples were collected from seven irrigation wells and a golf course reservoir in the Wailea area upslope of the ocean water sampling area to provide data on composition of groundwater flowing under the Property. This data has been incorporated into the findings of the study of assessment of the potential impact on groundwater resources (TNWRE 2010) discussed in Section 3.5.1 (Groundwater).

Ocean water samples were analyzed for water quality criteria specified by DOH water quality standards for Class A open coastal waters (Section 11-54-06, HAR), as well as several additional criteria. These criteria include: total nitrogen (TN), which is defined as inorganic nitrogen plus dissolved organic nitrogen; nitrate + nitrite nitrogen (NO_3^-); ammonium (NH_4^+); total phosphorus (TN), which is defined as inorganic phosphorus plus dissolved organic phosphorus; chlorophyll a (Chl *a*), turbidity, temperature, pH, and salinity. In addition, orthophosphate phosphorus (PO_4^{-3}) (an indicator of biological activity) and silica (Si) (an indicator of the degree of groundwater mixing) were reported.

The results of the assessment of marine water chemistry are summarized below.

- Water chemistry constituents that occur in high concentration in groundwater (silica (Si), nitrate + nitrate nitrogen (NO_3^-), and total nitrogen (TN)) typically displayed steeply sloping horizontal gradients with highest concentrations nearest to shore and decreasing concentrations moving seaward; meaning the highest concentrations of these constituents occur near the shore and decrease with distance from the shoreline. Salinity showed the opposite trend, with lowest values closest to shore, and increasing values with distance seaward; meaning salinity increases with distance from the shore. Gradients were steepest within 10 meters of the shoreline, but often continued across the entire length of all transects. The steep nearshore gradients had the greatest magnitude of constituents (i.e., highest

concentrations at the shoreline) at Sites 1 and 2. The steep horizontal gradients signify mixing of low salinity/high nutrient groundwater that discharges to the ocean at the shoreline and high salinity/low nutrient ocean water further from shore.

- Vertical stratification (layering) of the water column was clearly evident at all sites for the chemical constituents that occur in high concentrations in groundwater relative to ocean water. Vertical stratification indicates that physical mixing processes generated by wind, waves, and currents were often not sufficient to completely break down the density differences between the buoyant low salinity surface layer and denser underlying water.
- Most water chemistry constituents that do not occur in high concentrations in groundwater (ammonium (NH_4^+), dissolved organic phosphorus (TOP), dissolved organic nitrogen (TON), chlorophyll a (Chl *a*), turbidity) did not display distinct horizontal or vertical trends.
- Scaling nutrient concentrations to salinity indicates that during the September 2009 survey there was no apparent subsidy of nitrate + nitrate nitrogen (NO_3^{-}) to the nearshore ocean at any of the sites. During previous surveys, substantial subsidies of nitrate + nitrate nitrogen (NO_3^-) at some locations had been evident. The likely cause of the subsidies of nitrate + nitrate nitrogen (NO_3^-) in past surveys was either leaching of golf course or landscaping fertilizers to groundwater that flows under the Wailea golf courses, or possibly leakage from old septic systems or cesspools that served residences in the vicinity of Site 1.
- Comparing water chemistry parameters to DOH standards revealed numerous measurements of nitrate + nitrate nitrogen (NO_3^-) that exceeded the DOH "not to exceed more than 10 percent of the time" criteria for open coastal waters. Numerous values of nitrate + nitrate nitrogen (NO_3^-), ammonium (NH_4^+), total nitrogen (TN), chlorophyll a (Chl *a*), and to a lesser extent total phosphorus (TP), and turbidity, exceeded specified limits for geometric means. Such exceedances occurred at all survey sites, including the control site (Site 5) which is not influenced by the golf courses or other large-scale land uses. These results indicate that the exceedances of the geometric mean water quality standards are not solely associated with golf course operation or other anthropogenic land uses. Rather, natural groundwater discharge (which contains elevated nutrient concentrations relative to open coastal water) can cause water chemistry characteristics to exceed DOH standards, which do not include consideration of such natural factors.
- Comparison of survey results from the nearshore water quality monitoring assessments from 2005, 2006, 2008, and 2009 reveals that there are no statistically significant increases or decreases in the concentrations of nutrients at any of the survey sites. This indicates that there has been no consistent change in nutrient input from land to groundwater that enters the ocean from 2005 to 2009.

Marine Environment

Although Honua'ula is not located along the shoreline, MRC conducted a preliminary assessment of the marine community structure of the nearshore waters downstream from the Property (MRC 2010b). The assessment describes the results of a baseline survey of the nearshore marine communities to provide a basis for estimating alteration of community structure as a result of modifying land uses mauka of the shoreline. Information and conclusions from the marine community structure assessment report are summarized below. Appendix D contains the complete report.

Marine community structure can be defined as the abundance, diversity, and distribution of stony and soft corals, motile benthos such as echinoderms, and pelagic species such as reef fish. It is important to note that while no work has been initiated for Honua'ula, the Property is separated from the ocean by the Wailea Resort, which has been in existence for several decades. Hence, marine communities downslope from Honua'ula have been influenced by land uses of the Wailea Resort, and do not represent "pristine" conditions.

For the assessment, the biotic structure of benthic (bottom-dwelling) communities inhabiting the reef environment was evaluated by establishing a descriptive and quantitative baseline between the shoreline and the 20 meter (~60 foot) depth contour. First, qualitative reconnaissance surveys were conducted that covered the area off Wailea from the shoreline out to the limits of coral reef formation. Then, two quantitative transect sites were selected offshore of Wailea: Survey Site 1 was located downstream from the northern Honua'ula boundary between Polo and Palauea Beaches; Survey Site 2 was located between Ulua and Wailea Beaches. At each site, transect surveys were conducted, one in each of the dominant reef zones. Quantitative benthic surveys were then conducted by evaluating reef community composition in accordance with the Coral Reef Assessment and Monitoring Program protocols used by the Department of Land and Natural Resources (DLNR).

The main structural feature of the shoreline and nearshore areas downstream from Honua'ula are a series of crescent shaped white sand beaches separated by basaltic rocky headlands that extend up to several hundred meters offshore. Sand plains extend from the beach shorelines continuously to a depth of approximately 60 feet. The rocky headlands generally consist of extended fingers of exposed rock with sharply angled edges that form the shorelines of these features. Because of the vertical faces, there are essentially no well-defined intertidal platforms or extensive tide pools along the shoreline.

The seaward extensions of the rocky headlands that separate the beaches provide the major habitats for marine biota. The intertidal ranges of the submerged headlands are colonized by bands of the seaweeds *Anhfeltia concinna* and *Ulva fasciata*. Submerged portions of the rock surfaces are lined with various forms of encrusting red algae, and contain numerous urchins of the species *Echinometra matheai, Echinostrephus aciculatus*, and *Colobocentrotus atratus*, as well as numerous juvenile reef fish. As the headlands extend seaward, the top surfaces flatten out into dome-shaped fingers. At the seaward

termini, the headlands grade into the sandy bottom, often with a distinct boundary between the rock-rubble platform and the sand bottom, generally at a depth of approximately 25-30 feet.

The coral reef communities that occur on the hard-bottom areas off the Wailea area consist of abundant and diverse assemblages of common Hawaiian marine life. The predominant taxon of macrobenthos (bottom-dwellers) throughout the reef zones are Scleractinian (reef-building) corals. Corals, primarily of the species *Pocillopora meandrina* and *Porites lobata* were by far the two most abundant forms. Other common corals observed were *Montipora capitata, M. flabellata*, and *M. patula, Porites compressa* and *Pavona varians.* Of note is that the richest communities in terms of both species number and bottom cover occur on the rocky outcrops that are elevated above the sand bottom. This is likely in response to lessened stress from abrasion from sand scour during periods when wave action is sufficient to re-suspend sand off the bottom.

At Site 1, the basaltic extension the rock headland was relatively narrow and steep-sided. Coral cover was greatest on the sloping sides of the rock finger, with total coral cover in the range of 50-75 percent of bottom cover. In addition to substantial coral cover, the top of the finger was also occupied by abundant slate-pencil sea urchins (*Heterocentrotus mammilatus*). Of particular note is that throughout the rocky finger reefs, there were no observations of any species of frondose macro-algae. This observation is of interest as extensive growth of several species of macro-algae in several shoreline areas of Maui have been the subject of considerable concern, particularly with respect to interactions between algal abundance and human activities.

At the seaward end of the rock-outcrop finger, coral abundance is reduced considerably, with the reef consisting primarily of a rock-rubble surface that ends at the juncture of the sand flats. While no macro-algae were observed in this zone, most of the rock/rubble bottom was covered with a thin veneer of micro-algal turf. Numerous boulders at the base of the finger outcrop were colonized by numerous small colonies of *Pocillopora meandrina*. This coral has been recognized as a "pioneering" species, in that it is often the first to colonize newly cleared substrata. In addition, it also has "determinate" growth, in that colonies grow to a certain size, or age, and then die. As a result, colonies of this species never reach a size larger than approximately one foot in diameter. Such a growth form does not occur for the other major genera found on Hawaiian reefs (Porites), which has an "indeterminate" growth form where colony life span is not limited by either size or age. The significance of the abundant small colonies of *Pocillopora meandrina* at the deeper regions of Site 1 may be that it is an indication that a new year class is taking hold, or that re-colonization is beginning in an area where corals were removed by some factor. In either case, the occurrence of abundant recruiting colonies indicates that the present conditions are suitable for coral growth.

The physical structure of the reef at Site 2 is slightly different than at Site 1 in that the top of the outcrop is flatter and wider. Coral cover, consisting of the same common species as Site 1 (*Pocillopora meandrina* and *Porites lobata*), was somewhat greater on the flat reef of

Site 2, with nearly complete coverage of the rocky substratum. As at Site 1, there were no observations of frondose macro-algae. The deeper seaward extension of the rocky headland at Site 2 was also different than at Site 1: while a relatively barren rock/rubble shelf occurred at the terminus of the reef at Site 1, corals, particularly mats of the branching finger coral *Porites compressa* extended to the sand floor at Site 2. Numerous large coral-covered boulders also extended onto the sand flats at the seaward end of the reef at Site 2.

Other than corals, the dominant group of macroinvertebrates inhabiting the reef surface off the survey sites are sea urchins. The most common urchins are the small species that bore into the rock surface (*Echinometra matheai*, *Echinostrephus aciculatus*) which occurred in all reef zones. The larger species, including the collector urchin *Tripneustes gratilla* and *Heterocentrotus mammillatus* were also abundant on the tops and sides of the rocky finger reefs. Sea cucumbers (Holothurians) or starfish (Asteroidea) were not commonly observed during the survey. No crown-of-thorns starfish (*Acanthaster planci*) were observed feeding on coral colonies, nor were there observations of recently bleached coral skeletons as a result of Acanthaster predation. The green conical-shaped sponge *Iotrocha protea* was observed on the sandy flats at the seaward ends of the reefs. The only commonly occurring mollusk was the oyster *Pinctata* spp.

While frondose benthic algae were conspicuously absent on the survey reefs, encrusting red calcareous algae (*Porolithon* spp.*, Peysonellia rubra, Hydrolithon* spp.) were abundant on rocky surfaces throughout the study area. These algae were abundant on bared limestone surfaces, and on the nonliving parts of coral colonies.

Reef fish community structure was largely determined by the topography and composition of reef structure. Fish were most abundant on the edges of the rocky outcrops and in areas of highest relief. Fish were abundant, but were small in size. Overall, fish community structure in the waters off Wailea is fairly typical of the assemblages found in undisturbed Hawaiian reef environments. The lack of abundance of food fish indicates that the area has been subjected to moderate amounts of fishing pressure.

POTENTIAL IMPACTS AND MITIGATION MEASURES

Marine Water Quality

The results of the nearshore water quality assessment (MRC 2010a) and further evaluation of the potential changes to groundwater composition (discussed in Section 3.5.1 above) indicate that there is little or no potential for alteration of the marine environment or negative impacts to marine waters due to Honua'ula. With potable water supplied by RO brackish well water and irrigation water supplied from brackish well water and R-1 recycled water, the nearshore water quality assessment concludes: "there will be no adverse affect to groundwater resources in areas in the vicinity of the project." Regarding runoff, the assessment concludes that the detention basins will: 1) ensure that the peak rate of runoff leaving the Property will not increase over current conditions; and 2) capture

floatables and suspended solids in the basins, thus reducing sediment loads discharging to the marine environment at the shoreline. Similarly, the assessment concludes that "there is little potential for any significant input of sediment to the marine environment resulting from [construction of] the proposed project" due to permit regulations and the predominant direction of wind. The assessment further concludes that: "the estimates of changes to groundwater and surface water would result in a decrease in nutrient and sediment loading to the ocean relative to the existing condition. With such a scenario, it is evident that there would be no expected impacts to the nearshore marine ecosystem owing to development of Honua'ula." The assessment states that: "All of these considerations indicate that the proposed Honua'ula project will not have any significant negative effect on water quality in the coastal ocean offshore of the property."

In compliance with County of Maui Ordinance No. 3554 Condition 20:

- The Honua'ula nearshore water quality monitoring assessments conducted in 2005, 2006, 2008, and 2009 provide pre-Honua'ula baseline data and an assessment of existing conditions of coastal water resources (groundwater and surface water) that receive surface or groundwater discharges from the hydrological unit where Honua'ula is located; Honua'ula nearshore water quality monitoring assessments will continue during construction and after Honua'ula is built;
- Current and future nearshore water quality monitoring assessments provide, and will provide, water quality data necessary to assess compliance with Section 11-54-06, HAR (Open Coastal Waters of the DOH Water Quality Standards);
- Current and future Honua'ula nearshore water quality monitoring assessments were done, and will continue to be done, in accordance with the current (and as may be amended) DOH methodology for Clean Water Act Section 305(b) water quality assessment, including the use of approved analytical methods and quality control/quality assurance measures; and
- After construction commences water quality data will be submitted annually to DOH for use in future Hawaii Water Quality Monitoring and Assessment Reports prepared under Clean Water Act Sections 303(d) and 305(b) (i.e., Integrated Reports).

In further compliance with County of Maui Ordinance No. 3554 Condition 20, it is noted that the 2006 Integrated Report (DOH 2008) lists two areas of nearshore receiving waters downstream from Honua'ula as "impaired," meaning State ocean water quality standards for specific criteria were not attained based on data collected in 2006 or before. The Clean Water Act requires that TMDLs be established for specific criteria that do not meet the standards; however, DOH, the State agency responsible for developing TMDLs, has not developed any TMDL critera for any marine areas off the coast of Maui (DOH 2010). Honua'ula is not yet built, and thus is not currently contributing to any downstream water quality impacts. Comparison of data from the 2006 Integrated Report and the current Honua'ula nearshore water quality monitoring study (MRC 2010a) shows that water quality results can vary over time. DOH anticipates publishing an update of the 2006 Integrated Report in 2010, and, in light of the recent test results from the Honua'ula study,

it is possible that the 2010 update will find a lesser degree of impairment than the 2006 Integrated Report. If the State's Integrated Report lists the receiving waters downstream from Honua'ula as "impaired" after construction of Honua'ula commences, and if by that time, DOH has developed TMDL critera for receiving waters downstream from Honua'ula, then the Honua'ula nearshore water quality monitoring program will be amended to evaluate land-based pollutants, including: 1) monitoring of surface water and groundwater quality for the pollutants indentified as the source of impairment; and 2) providing estimates of total mass discharge of those pollutants on a daily and annual basis from all sources, including infiltration, injection, and runoff. The results of the land-based pollution water quality monitoring and loading estimates will be submitted to DOH Environmental Planning Office, TMDL Program.

In preparing the nearshore water quality monitoring assessment (which provides pre-construction baseline data) Honua'ula Partners, LLC is in compliance with County of Maui Ordinance No. 3554 Condition 18a, which requires compliance with Condition 1 of DOH's "12 Conditions," relating to establishing baseline groundwater/vadose zone (see Section 3.5.1 (Groundwater)) and nearshore water quality data and reporting findings to DOH.

Marine Environment

Results of the preliminary assessment of the marine community structure of the nearshore waters downstream from Honua'ula (MRC 2010b) do not reveal any substantial effects to marine community structure from human activities along the shoreline (with the possible exception of overfishing). Aggregations of nuisance algae do not occur in the area.

The creation of Honua'ula will not involve alteration of the shoreline or offshore environments, as Honua'ula is separated from the shoreline by the existing Wailea Resort. The marine community structure assessment report (MRC 2010b) concludes:1) potential changes to water chemistry as a result of the alteration of groundwater flow and composition (see Section 3.5.1 (Groundwater)) will not change the existing character of the marine environment to an extent that will alter biotic community structure; 2) Honua'ula does not appear to present the potential for alteration of the offshore environment; and 3) none of the activities necessary for the creation of Honua'ula has the potential to induce large changes in physico-chemical properties that could affect biotic community structure.

In compliance with County of Maui Ordinance No. 3554 Condition 20:

- In addition to water quality monitoring, baseline ecological monitoring (i.e. marine community structure assessment) has been conducted in accordance with the Coral Reef Assessment and Monitoring Program protocols used by DLNR; and
- Marine community structure assessment surveys (i.e. ecological monitoring) will be done annually and the annual results will be reported to the Aquatic Resources Division, DLNR.