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TO: Honorable Alice Lee,
 Council Chair
 Maui County Council
 County of Maui
 200 South High Street
 Wailuku, Hawai'i 96793

DATE: January 3, 2020
SUBJECT: Annual Compliance Report
 (Change in Zoning Conditions
 for Makena Resort Area)

Enclosed is/are:

Copies	Date	Description
1 (HC) + 1 (CD)	January 3, 2020	Annual Compliance Report

X	For your information For necessary action For your review For your files	For your use As requested For your signature Returning
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REMARKS: On behalf of Makena Golf & Beach Club Owners we are submitting the enclosed Annual Compliance Report for your review in accordance with Condition No. 22 of Ordinance 3613 (Change in Zoning for Makena Resort Area). Condition No. 22 states that:

"The developer shall provide timely annual compliance reports to the Planning Director and the Council. The compliance reports shall include: (a) the status of the developer's compliance with each of these conditions; and (b) a reasonable estimate of the time needed for full compliance."

Should you have any questions or require additional information, please feel free to call me at 244-2015.

Signed: 
 Erin Mukai
 Manager

EM:yp
 Copy to: Kaimi Judd, Discovery Land Company (w/enclosure)
 Josh Circle Woodburn, Discovery Land Company (w/enclosure)
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Annual Compliance Report

CHANGE IN ZONING CONDITIONS FOR MAKENA RESORT AREA

Prepared by
AREG AC Makena Propco LLC (doing business as Makena Golf & Beach Club Owners)
January 3, 2020

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Exhibit A	Transmittal and Water Quality Sampling Report Dated March 2019
Exhibit B	Transmittal and Water Quality Sampling Report Dated May 2019

I. OVERVIEW

On August 27, 2010, ATC Makena N Golf LLC, ATC Makena S Golf LLC, ATC Makena Land SF1 LLC, ATC Makena Land MF1 LLC, ATC Makena Land MF2 LLC, ATC Makena Land MF3 LLC, ATC Makena Land C1 LLC, ATC Makena Land U1 LLC, ATC Makena Land B1 LLC, ATC Makena Land MF4 LLC, ATC Makena Land SF2 LLC, and ATC Makena Land AH1 LLC (collectively "ATC Makena Entities"), acquired through foreclosure most, but not all, of the lands that are covered by Ordinance No. 3613.

Lands so acquired by ATC Makena Entities and that are covered by this Ordinance are identified by the following TMKs: 2-1-5: por 108, por 120, por 124, 2-1-6: 036, por 56, por 57, por 59, 2-1-7:004 por 068, 93, por 94, 2-1-8 por 078, por 79, por 81, por 90 (collectively the "Zoned Parcels"). Earlier this year there was a change in ownership configuration whereby AREG AC Makena Propco LLC (doing business as Makena Golf & Beach Club Owners) ("Makena Golf & Beach Club Owners") acquired 100% of the membership interest of the entities that own the Zoned Parcels and this Annual Compliance Report is being submitted by Makena Golf & Beach Club Owners.

It is noted that Makena Golf & Beach Club Owners is currently in the process of planning the development of a resort residential project, the Makena Resort Land Plan, involving lands subject to above-noted Ordinance. The proposed development will be subject to environmental review under Chapter 343, Hawaii Revised Statutes (HRS), and that process is expected to be initiated in early 2020.

Ordinance No. 3613, entitled "A BILL FOR AN ORDINANCE TO AMEND PORTIONS OF LAND ZONING MAP NOS. 5 AND 514 TO ESTABLISH A-2 APARTMENT DISTRICT, B-2 COMMUNITY BUSINESS DISTRICT, B-R RESORT COMMERCIAL DISTRICT, H-M HOTEL DISTRICT, PK-1 NEIGHBORHOOD PARK DISTRICT, PK-4 GOLF COURSE PARK DISTRICT, R-1 AND R-3 RESIDENTIAL DISTRICT ZONING (CONDITIONAL ZONING) FOR LANDS SITUATED AT MAKENA, MAUI, HAWAII", which authorized a change in County zoning districts, requires compliance with 44 conditions of zoning. Approximately 603.303 acres of land located in Makena, Maui, Hawaii, were subject to the Change in Zoning action.

The intent of this document is to provide an Annual Compliance Report as required by Condition No. 22 for the Zoned Parcels.

The developer shall provide timely annual compliance reports to the Planning Director and the Council. The compliance reports shall include: (a) the status of the developer's compliance with each of these conditions; and (b) a reasonable estimate of the time needed for full compliance.

II. STATUS OF COMPLIANCE WITH CONDITIONS

The following is a report on the current status of compliance with the 44 conditions of the Change in Zoning action for the Zoned Parcels (Ordinance No. 3613).

1. *In the R-1, R-2, and R-3 Residential District zoned areas, the density shall not exceed 2.5 single-family dwelling units per acre.*

Status: Makena Golf & Beach Club Owners will comply with the provisions of said condition.

Estimate of Time for Compliance: This condition will continue during the life of the project.

2. *In the A-2 Apartment District zoned areas, the density shall not exceed eight units per acre, and the building height shall not exceed 45 feet. Height shall be measured from the natural or finish grade, whichever is lower.*

Status: Makena Golf & Beach Club Owners will comply with the provisions of said condition.

Estimate of Time for Compliance: This condition will continue during the life of the project.

3. *In the B-2 Community Business District zoned areas, the gross floor area of each building shall not exceed 60 percent of the total lot area.*

Status: Makena Golf & Beach Club Owners will comply with the provisions of said condition.

Estimate of Time for Compliance: This condition will continue during the life of the project.

4. *On Lot 19 (H-M Hotel District), the building height shall not exceed 45 feet and shall be consistent with the Urban Design Standards for Building Form in the Kihei-Makena Community Plan; no more than 89 units shall be developed; and no lockout units shall be allowed. Height shall be measured from the natural or finish grade, whichever is lower.*

Status: It is noted that Makena Golf & Beach Club Owners does not own Lot 19. H2R, LLC is the owner of Lot 19. H2R, LLC is responsible for compliance with the provisions of said condition.

5. *The developer shall preserve Makena's significant views of the Pacific Ocean and the broad vista to the Central Maui and Upcountry regions. The use of walls higher than four feet in front yard setbacks shall be prohibited.*

Status: Makena Golf & Beach Club Owners will comply with the provisions of said condition.

Estimate of Time for Compliance: This condition will continue during the life of the project.

6. *In the B-2 Community Business District zoned areas, the following permitted uses shall incorporate acoustical measures into the facility to mitigate potential noise impacts: amusement enterprises, including billiard and pool halls; auditoriums and theaters; baseball and football stadiums and other sport activities and amusements; bowling alleys; dancing and hula studios; gymnasiums; miniature golf courses; music conservatories and music studios; physical-culture studios; and printing, lithography, and publishing shops.*

Status: Makena Golf & Beach Club Owners will comply with the provisions of said condition.

Estimate of Time for Compliance: This condition will continue during the life of the project.

7. *All exterior lighting shall be shielded from adjacent residential properties and nearshore waters, and shall be fully shielded to prevent uplift. Lighting requirements in force at the time of building permit application shall be applied.*

Status: Makena Golf & Beach Club Owners will comply with the provisions of said condition.

Estimate of Time for Compliance: This condition will continue during the life of the project.

8. *In the B-2 Community Business District zoned areas, merchandise, equipment, and supplies shall be stored within enclosed buildings or enclosed areas that are appropriately*

screened with fencing and landscape planting for the following permitted uses: equipment rental and sales yards; hardware and garden supply stores; parcel delivery stations; and printing, lithography, and publishing shops.

Status: Makena Golf & Beach Club Owners will comply with the provisions of said condition.

Estimate of Time for Compliance: This condition will continue during the life of the project.

9. *The developer, its successors and permitted assigns shall pay the Department of Education, \$3,000 per dwelling unit upon issuance of each building permit to be used, to the extent possible, for schools serving the Kihei-Makena Community Plan area; provided that, should the State pass legislation imposing school impact fees that apply to the Makena Resort Area, the developer, its successors and permitted assigns, shall from that point forward comply with the State requirements, or contribute \$3,000 per dwelling unit, whichever is greater. Should a previous agreement exist between the Department of Education and the landowner, this condition shall prevail.*

Status: Makena Golf & Beach Club Owners will comply with the provisions of said condition.

Estimate of Time for Compliance: Upon issuance of each building permit for a new dwelling unit during the life of the project.

10. *The developer shall provide pedestrian and bicycle access ways within the roadways throughout and fronting the Makena Resort Area. A schematic plan for pedestrian and bicycle access ways throughout and fronting the Makena Resort Area shall be submitted to the Department of Planning for consideration by the Maui Planning Commission in conjunction with SMA permit applications.*

Status: The schematic plan for pedestrian, bicycle, and cart access ways throughout Makena Resort area prepared by Miyabara & Associates was transmitted with the 2010 Annual Report.

Estimate of Time for Compliance: A schematic plan was submitted with the 2010 Annual Report. Refinements of the plan, if necessary, will be submitted as the

Makena Resort Land Plan further develops and application(s) for SMA Use Permits are submitted.

11. *The developer shall make a contribution to the County for traffic improvements in an amount equal to \$5,000 per unit. The contribution shall be paid to the County prior to issuance of the initial building permit. Upon adoption of a traffic impact fee ordinance, the developer shall comply with the ordinance in lieu of this voluntary contribution. Should a traffic impact fee ordinance be adopted prior to the collection of this contribution, the applicable amount shall be the greater of the two. Such contributions or fees shall not be counted towards Condition No. 12 below.*

Status: Makena Golf & Beach Club Owners will comply with the provisions of said condition.

Estimate of Time for Compliance: Prior to issuance of the initial building permit and continuing with the issuance of additional building permits as the project is developed.

12. *Upon commencement of the first phase of construction, the developer shall pay its pro-rata share to upgrade Pi'ilani Highway from Kilohana Drive to Wailea Ike Drive to four lanes of traffic, and shall cooperate with the State Department of Transportation and other area developers to implement such improvements concurrent with development.*

Status: Makena Golf & Beach Club Owners will comply with the provisions of said condition.

Makena Golf & Beach Club Owners is pursuing an agreement with the State DOT that will address Makena Golf & Beach Club Owners' fair share/pro-rata share contribution and means of implementing traffic improvements related to the development of the Zoned Parcels.

Estimate of Time for Compliance: It is anticipated that Makena Golf & Beach Club Owners will have an agreement with DOT in place prior to the start of its first phase of construction on the Zoned Parcels.

13. *The developer shall provide construction access roads from Pi'ilani Highway to the construction sites. Construction traffic shall be prohibited on Kilohana Drive, Wailea Ike Drive, Wailea Alanui Drive, and Makena Alanui Drive to the extent practicable.*

Status: Makena Golf & Beach Club Owners does not own the rights-of-way for a construction access road, but has initiated discussions with adjacent landowners to identify a possible location of a construction access road route for future construction within the Zoned Parcels should construction access be warranted and practicable. These discussions are ongoing.

Further, it is noted that the Construction Transportation Management Plan, as required by Condition No. 14, includes measures that are intended to reduce construction traffic. For further information see Condition No. 14.

Estimate of Time for Compliance: At the time of construction on the Zoned Parcels if warranted and available.

14. *The developer shall develop and submit a Transportation Management Plan ("TMP"), to be reviewed and approved by the State Department of Transportation, the County Department of Public Works, and the County Department of Transportation. The purpose of the TMP shall be to reduce traffic generated by construction activity related to the Makena Resort Area. The TMP shall provide for programs such as park and ride, shuttles, and/or restrictions on worker access to ongoing construction activity during peak hour traffic. Upon approval, project contractors shall implement the TMP during construction activities. The developer shall submit an annual report to the State Department of Transportation, the County Department of Public Works, the County Department of Transportation, and the Maui County Council to document the success of the TMP in meeting its benchmarks of reducing traffic during project construction.*

The TMP shall be reviewed and approved by the State Department of Transportation, the County Department of Public Works, and the County Department of Transportation prior to issuance of each SMA permit within the Makena Resort Area.

Status: A Construction Transportation Management Plan (CTMP) for the Makena Resort area was submitted to the State Department of Transportation (SDOT), the County Department of Public Works (DPW), and the County Department of Transportation (CDOT) on July 13, 2009, and included in the 2010 Annual Report. Makena Golf & Beach Club Owners will work with applicable reviewing agencies to obtain approval of the CTMP. As

appropriate, an updated CTMP will be prepared for the Zoned Parcels in connection with the development of the Makena Resort Land Plan.

Makena Golf & Beach Club Owners will comply with the provisions of said condition.

Estimate of Time for Compliance:

An approved CTMP will be in place prior to issuance of the first SMA Use Permit for development within the Zoned Parcels.

15. *As part of the first SMA application, the developer shall submit a TMP to reduce the dependency on individual vehicular transportation modes. The TMP shall be reviewed and approved by the State Department of Transportation, the County Department of Public Works, and the County Department of Transportation to address post-construction traffic issues.*

Status:

A TMP for post-construction operations for the Makena Resort area was submitted to the State Department of Transportation (SDOT), Department of Public Works (DPW), and the County Department of Transportation (CDOT) on July 13, 2009, and included in the 2010 Annual Report. By letter dated, August 19, 2009, the SDOT approved the TMP for post-construction operations. As noted above, as appropriate, an updated TMP will be prepared for the Zoned Parcels in connection with the development of the Makena Resort Land Plan.

Estimate of Time for Compliance:

An approved TMP for post-construction operations will be included in the first SMA Use Permit application for development within the Zoned Lands.

16. *The developer shall participate in the pro rata funding and construction of adequate civil defense measures as determined by the State and County civil defense agencies.*

Status:

Satisfied. As previously reported, the ATC Makena Entities agreed to two (2) locations for emergency sirens - one at the Makena Resort Wastewater Treatment Plant (WWTP), and one near Makena State Park (as reported in the 2010 Annual Report). Final Right-Of-Entry and Non-Exclusive License Agreements dated May 25, 2012 with the State of Hawaii, Department of Defense (DOD) were submitted with the 2012 Annual Report. However, in

December 2016, DOD informed the ATC Makena Entities that it intended for one of the two sirens to instead be located at Makena State Park and for the second siren to be located on Makena Golf & Beach Club Owners' WWTP property. The siren at Makena Golf & Beach Club Owners' WWTP property was completed in 2017.

Estimate of Time for Compliance:

Makena Golf & Beach Club Owners has complied with the provisions of this condition. DOD installed the siren at Makena Golf & Beach Club Owners' WWTP property in 2017.

17. *Should any human burials or any historic sites such as artifacts, charcoal deposits, stone platforms, pavings, or walls be found, the developer shall stop construction work in the immediate vicinity and notify the State Historic Preservation Division (SHPD), the Maui/Lanai Island Burial Council (MLIBC), and the Maui County Cultural Resources Commission (CRC).*

Status:

Makena Golf & Beach Club Owners will comply with the provisions of said condition.

Estimate of Time for Compliance:

This condition will continue during the life of the project.

18. *The developer, its successors and permitted assigns, shall provide a comprehensive preservation/mitigation plan pursuant to Chapter 6E, Hawaii Revised Statutes, that has been approved by the State Historic Preservation Division, Department of Land and Natural Resources, and the Office of Hawaiian Affairs prior to any grading within the project area.*

Status:

Preservation plans and related plans will be prepared in compliance with the requirements Chapter 6E, HRS, and consistent with the findings of the Department of Land and Natural Resources, State Historic Preservation Division (SHPD)-approved archaeological studies. All such plans will be presented to SHPD and, as appropriate, the Office of Hawaiian Affairs, for approval.

Estimate of Time for Compliance:

Makena Golf & Beach Club Owners will comply with Chapter 6E, Hawaii Revised

Statutes (HRS), prior to any grading within the Zoned Parcels. In accordance with Chapter 6E, HRS, Makena Golf & Beach Club Owners will prepare preservation/mitigation plans for each Zoned Parcel in compliance with SHPD requirements, and subject to the review and approval of SHPD and the Office of Hawaiian Affairs as appropriate. Makena Golf & Beach Club Owners has engaged the archaeological firm, Aina Archaeology in this regard.

19. *Marine monitoring programs shall be conducted which include monitoring and assessment of coastal water resources (groundwater and surface water) that receive surface water or groundwater discharges from the hydrologic unit where the project is located. Monitoring programs shall include both water quality and ecological monitoring.*

Water Quality Monitoring shall provide water quality data adequate to assess compliance with applicable State water quality standards at Hawaii Administrative Rules Chapter 11-54. Assessment procedures shall be in accordance with the current Hawaii Department of Health ("HIDOH") methodology for Clean Water Act Section 305(b) water quality assessment, including use of approved analytical methods and quality control/quality assurance measures. The water quality data shall be submitted biannually, or every six months, to HIDOH for use in the State's Integrated Report of Assessed Waters prepared under Clean Water Act Sections 303(d) and 305(b). If this report lists the receiving waters as impaired and requiring a Total Maximum Daily Load ("TMDL") study, then the monitoring program shall be amended to evaluate land-based pollutants, including: (1) monitoring of surface water and groundwater quality for the pollutants identified as the source of the 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 estimate shall be submitted to the HIDOH Environmental Planning Office, TMDL Program.

The ecological monitoring shall include ecological assessment in accordance with the Coral Reef Assessment and Monitoring Program protocols used by the Department of Land and Natural Resources. The initial assessment shall use the full protocol. Subsequent

biannual assessments can use the Rapid Assessment Techniques. Results shall be reported biannually to the Aquatic Resources Division, Department of Land and Natural Resources.

The monitoring and assessments shall be conducted by degreed scientists experienced with Clean Water Act programs, water quality monitoring, water quality assessment, water quality-based permitting, water quality modeling, watershed planning, and TMDL. Study design should be made available for both public review and peer review by the State Department of Health, Department of Aquatic Resources, and the University of Hawaii researchers. Results of monitoring shall be published and publicly available online.

Status: Makena Golf & Beach Club Owners retained the services of AECOS, Inc. for assistance with compliance with this condition. Included with this Annual Report are the last two quarterly monitoring reports dated March 2019 (See **Exhibit A**) and May 2019 (See **Exhibit B**). These reports have been transmitted to the State DOH.

Estimate of Time for Compliance: Water quality monitoring and assessment will continue to be conducted in compliance with the provisions of said condition.

20. *The developer shall implement efficient soil-erosion and dust-control measures during and after development to the satisfaction of DOH and the County.*

Status: Makena Golf & Beach Club Owners will comply with the provisions of said condition.

Estimate of Time for Compliance: This condition will continue during the life of the project.

21. *The developer shall give notice to the Department of Planning and the Council of any intent to sell, lease, assign, place in trust, or otherwise voluntarily alter the ownership interests in the Makena Resort Area, prior to any development.*

Status: As documented in this Annual Report, Makena Golf & Beach Club Owners acquired 100% of the membership interest of the entities that own the Zoned Parcels subject to Ordinance 3613. However, title to the real estate holdings has not changed since the Zoned Parcels were acquired by the ATC Makena Entities in August 27, 2010. Makena Golf & Beach Club Owners will continue to comply with the provisions of said condition.

Estimate of Time for Compliance:

This condition will continue during the life of the project.

22. *The developer shall provide timely annual compliance reports to the Planning Director and the Council. The compliance reports shall include: (a) the status of the developer's compliance with each of these conditions; and (b) a reasonable estimate of the time needed for full compliance.*

Status:

This Annual Compliance Report is being submitted in compliance with said condition.

Estimate of Time for Compliance:

This condition will continue annually in January through to the build out of the project.

23. *Failure to fulfill any condition may result in a reversion to former or more appropriate zoning or community plan designations or other remedies.*

Status:

Makena Golf & Beach Club Owners acknowledges the provisions of said condition.

Estimate of Time for Compliance:

This condition will continue during the life of the project.

24. *If any of the property subject to this Change in Zoning is consolidated with other property for purposes of an SMA permit application, these conditions shall apply to the entirety of the consolidated property.*

Status:

Makena Golf & Beach Club Owners acknowledges the provisions of said condition.

Estimate of Time for Compliance:

This condition will continue during the life of the project.

25. *The developer shall comply with the County's Residential Workforce Housing Policy as provided in Chapter 2.96, Maui County Code.*

Status: Makena Golf & Beach Club Owners will comply with the provisions of said condition.

Estimate of Time for Compliance: This condition will continue during the life of the project.

26. *The developer shall comply with all applicable County water ordinances. The water rates for the residential workforce housing units shall be no higher than the general water consumer rates set by the County in its annual budget, for as long as the units are subject to Chapter 2.96, Maui County Code.*

Status: Makena Golf & Beach Club Owners will comply with the provisions of said condition.

Estimate of Time for Compliance: This condition will continue during the life of the project.

27. *The developer shall provide a water conservation plan for the Makena Resort Area, approved by the Department of Water Supply, prior to the issuance of any SMA permits. For each project, the developer shall construct a dual waterline system to accommodate the use of non-potable water for landscaping and irrigation purposes prior to the issuance of any building permits.*

Status: A Water Conservation Plan (WCP) for the Makena Resort area was approved by the County Department of Water Supply (DWS) on July 27, 2009 and submitted with the 2010 Annual Report.

Estimate of Time for Compliance: Makena Golf & Beach Club Owners has complied with the requirement to provide a WCP. Makena Golf & Beach Club Owners will comply with water conservation requirements prior to the issuance of any building permits for any development within the Zoned Parcels requiring a SMA Use Permit.

28. *All energy systems for all residential, commercial, and hotel units shall be designed and constructed to meet all applicable Energy Star® requirements established by the Climate Protection Division of the United States Environmental Protection Agency in effect at the*

time of construction. For purposes of this condition, energy systems shall include all hot-water systems, roof and attic areas, outside walls, windows, air-cooling systems, and heating systems.

Status: Makena Golf & Beach Club Owners will comply with the provisions of said condition.

Estimate of Time for Compliance: This condition will continue during the life of the project.

29. *All residential, commercial, and hotel units shall comply with Chapter 16.16, Maui County Code.*

Status: Makena Golf & Beach Club Owners will comply with the provisions of said condition.

Estimate of Time for Compliance: This condition will continue during the life of the project.

30. *All air-cooling systems and all heating systems for laundry facilities, swimming pools, and spa areas shall make maximum use of energy-efficient construction and technology.*

Status: Makena Golf & Beach Club Owners will comply with the provisions of said condition.

Estimate of Time for Compliance: This condition will continue during the life of the project.

31. *The developer shall construct a minimum of 60 new parking stalls at Maluaka Beach, including at least 10 at the north end, within one year of the issuance to the developer of any SMA permit by the Maui Planning Commission relating to a parcel or a portion thereof that is a subject of this Change in Zoning. Unless necessary to protect public safety or to comply with State or Federal law, the required parking stalls need not be asphalt surfaced. Development costs and land shall not satisfy park dedication requirements.*

Status: Makena Golf & Beach Club Owners will comply with the provisions of said condition. It should be noted that H2R, LLC owns Lot 19 where the southern Maluaka beach parking is planned to be located.

Estimate of Time for Compliance:

Within one year of issuance of any SMA permit relating to a Zoned Parcel. If H2R, LLC proceeds with development first, Makena Golf & Beach Club Owners will cooperate towards satisfying this requirement.

32. *The developer shall develop an expansion of the beach park at the south end of Maluaka Beach, such that the beach park shall comprise at least 1.5 acres of land area for public use and beach access. The developer shall submit the necessary applications required for the expansion within six months of the approval of this Change in Zoning. The land area of the expansion of the existing park shall be applied as credit toward satisfying a portion of any applicable park dedication requirements.*

Status:

Satisfied. As previously reported, the ATC Makena Entities, in coordination with Discovery Land Company, the Makena Cultural Focus Group, the Makena Community Advisory Group, and the Department of Parks and Recreation implemented an expansion location acceptable to all parties to the south end of the existing Maluaka Beach Park. The expansion area is approximately 0.66 acres in size bringing the combined existing and proposed park up to 1.5 acres. This expansion was formalized and documented in compliance with all County, State and Federal rules and regulations through the recordation of a Declaration of Restrictive Covenants for Park Purposes with the Bureau of Conveyances. A copy of the declaration and agreement was submitted as part of the 2018 Annual Report.

Estimate of Time for Compliance:

Makena Golf & Beach Club Owners has complied with the provisions of this condition.

33. *To the extent practicable, the developer shall provide, in perpetuity, traversable lateral shoreline access in the area between the shoreward boundary and the mauka boundary of the Makena Resort Area. Costs associated with this condition shall not satisfy park dedication requirements.*

Status:

Miyabara & Associates prepared a schematic plan for pedestrian and bicycle access ways throughout the Makena Resort area. A copy of this schematic plan was submitted as part of the 2010 Annual Report. In November 2015, the ATC Makena Entities restored approximately 1,600

lineal feet of the Maluaka Shoreline trail between the Maluaka Beach Park and the Southern boundary of their oceanfront parcel near the 15th Green of the South Golf Course. The trail will be maintained in perpetuity.

Estimate of Time for Compliance:

Lateral shoreline access has been available and will continue through the life of the project.

34. *Within one year of the approval of this Change in Zoning, the developer shall initiate and fund a plan for the development of the State Park at Makena for the State Department of Land and Natural Resources and the Department of Parks and Recreation, soliciting and taking into consideration the comments of various user groups, including Surfrider Foundation, Savemakena.org, Maui Tomorrow, the Kihei Community Association, and the Makena Homeowner's Association. The plan shall incorporate recreational, landscaping, parking, and facility concepts as a guide for future development of the park. Costs associated with this condition shall not satisfy park dedication requirements.*

Status:

Satisfied. The final Makena State Park Plan dated February 2013 was submitted to the State Department of Land and Natural Resources, the County Department of Parks and Recreation and the Oneloa Coalition in March 2013. The final plan document and associated transmittals were submitted to the County of Maui Planning Department in March, 2013 in compliance with this condition. The County Department of Planning issued a letter of condition fulfillment dated June 3, 2013. These documents were provided with the 2014 Annual Report.

Estimate of Time for Compliance:

Makena Golf & Beach Club Owners has complied with the provisions of this condition.

35. *The developer shall renovate and beautify Makena Landing (TMK: 2-1-007:094), see attached map, in coordination with the Department of Parks and Recreation and the State Department of Land and Natural Resources. Costs associated with this condition shall not satisfy park dedication requirements.*

Status:

Makena Golf & Beach Club Owners will comply with the provisions of said condition. Following submittal and processing of the necessary applications, a Shoreline Setback Determination (SSD) for the Makena Landing beach park property was issued by the Department of Planning on

May 20, 2013 (see 2014 Annual Report). A Special Management Area Minor Permit and Shoreline Setback Approval (SSA) for the proposed renovation and beautification work at the park were issued by the Department of Planning on October 1, 2013. Copies of these approvals were provided with the 2014 Annual Report.

Various adjustments to the 2013 site plan to reflect input received from the Makena Community Advisory Group and the Makena Cultural Focus Group were made consistent with this input and authorized by the Department of Planning.

Estimate of Time for Compliance:

Some of the renovation and beautification work has begun, such as landscape improvements, shower improvements, new trash receptacles ordered and ongoing tree maintenance. Makena Golf & Beach Club Owners has engaged with an ADA consultant for recommendations on accessibility and also engaged with a mural painter for near term beautification of the bathroom facility. The work plan for additional measures is in the process of being clarified with the County Department of Parks and Recreation.

36. *The developer shall maintain Makena Landing (TMK: 2-1-007:094), North Maluaka (TMK: 2-1-007:068), and South Maluaka (TMK: 2-1-005:124), see attached map, and all future parklands within the Makena Resort Area.*

Status:

A Unilateral Agreement was submitted to County of Maui, Department of Parks and Recreation for their approval on June 26, 2009. After working with the Department of Parks and Recreation to revise the agreement and update the obligations for maintenance to reflect the expansion to Maluaka Beach Park, discussed above in Condition No. 32, the Unilateral Maintenance Agreement was finalized and recorded with the Bureau of Conveyances. A copy of the agreement was submitted as part of the 2018 Annual Report.

Makena Golf & Beach Club Owners will continue to maintain Makena Landing, North Maluaka, and South Maluaka in compliance with said condition and Unilateral Maintenance Agreement.

Estimate of Time for Compliance:

As noted above, the formal agreement relating to maintenance was finalized and recorded with the Bureau of Conveyances in conjunction with work related to compliance with Condition 32; however, maintenance has been and will continue to be undertaken for the life of the project.

37. *To exhibit respect for the Hawaiian culture and a Hawaiian sense of place, structures within the Makena Resort Area shall be based on or inspired by principles of Hawaiian island architecture in design and construction.*

Status: Makena Golf & Beach Club Owners will comply with the provisions of said condition.

Estimate of Time for Compliance:

This condition will continue during the life of the project.

38. *The developer shall provide a baseline study survey of flora and fauna as part of each SMA permit application within the Makena Resort Area; the study shall be conducted by recognized independent experts on Hawaiian flora and fauna and list all endemic, indigenous, and endangered species, their distribution in the Makena Resort Area and adjacent shorelines. This study shall also include a preservation/mitigation plan and comments from the State Department of Land and Natural Resources, the U.S. Fish and Wildlife Service, and the U.S. Corps of Engineers, and the Maui representative of the Hawaii Wildlife Fund and The Nature Conservancy.*

Status: Robert Hobdy prepared a baseline coastal flora and fauna study of Makena's coastal lands. The study was circulated to the State Department of Land and Natural Resources, the U.S. Fish and Wildlife Service, U.S. Corps of Engineers, the Maui representative of the Hawaii Wildlife Fund and The Nature Conservancy for review and comment. A copy of the flora and fauna study was submitted as part of the 2010 Annual Report. Robert

Hobby has been retained as part of the Makena Resort Land Plan project, which will require application(s) for SMA Use Permit(s).

Estimate of Time for Compliance: Makena Golf & Beach Club Owners will continue to comply with this condition.

39. *No transient vacation rentals or time shares shall be allowed within this Makena Resort rezoning application area; and further, no special use permit or conditional permit for such accommodations shall be accepted by the Department of Planning.*

Status: Makena Golf & Beach Club Owners acknowledges the provisions of said condition.

Estimate of Time for Compliance: This condition will continue during the life of the project.

40. *A second hotel shall not be constructed within the Makena Resort Area.*

Status: Makena Golf & Beach Club Owners acknowledges the provisions of said condition as it applies to hotel zoned lands subject to Ord. 3613, which is limited to Parcel 19 that is owned by H2R, LLC.

41. *All buildings constructed within the Makena Resort Area shall be LEED (Leadership in Energy and Environmental Design) certified if they are 500 square feet or larger.*

Status: Makena Golf & Beach Club Owners will comply with the provisions of said condition.

Estimate of Time for Compliance: This condition will continue during the life of the project.

42. *New dwelling units shall not exceed 800, excluding residential workforce housing.*

Status: Makena Golf & Beach Club Owners acknowledges the provisions of said condition. New dwelling units within the Zoned Parcels shall not exceed 800, excluding residential workforce housing.

Estimate of Time for Compliance: This condition will continue during the life of the project.

43. *The developer, its successors and permitted assigns, shall contribute \$1,000 per market-priced unit, collected at issuance of building permit, to the County, for the development and maintenance of a police station in South Maui.*

Status: Makena Golf & Beach Club Owners will comply with the provisions of said condition.

Estimate of Time for Compliance: Upon issuance of each initial building permit for market-priced units within the Zoned Parcels.

44. *The developer shall provide Driveway "D" from Makena Alanui Road to Makena Resort Sewage Treatment Plant and beyond as an emergency evacuation route for the area.*

Status: Makena Golf & Beach Club Owners will comply with the provisions of said condition.

Estimate of Time for Compliance: This condition will continue during the life of the project.

EXHIBIT A.

ATC Makena Hotel, LLC
c/o Makena Golf & Beach Club

July 29, 2019

Mr. Myron Honda
State of Hawaii, Department of Health
Clean Water Branch
2827 Waimano Home Road #225
Pearl City, HI 96782

RE: State Land Use District Boundary Amendment Docket A9-721 Condition No. 9,
County of Maui Zoning Ordinance No. 3613 Condition No. 19, Marine Water Quality
Monitoring.

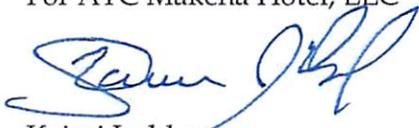
Dear Mr. Honda,

ATC Makena Holdings, LLC, in compliance with the above referenced conditions, respectfully submits the enclosed Marine Water Quality Quarterly Monitoring Report prepared by AECOS Inc. dated June 18, 2019 for the quarterly tests performed in March of 2019.

Should you have any questions, require a hardcopy, or require additional information, please do not hesitate to contact me at (808) 640-6023, or by email at kjudd@makenagbc.com.

Sincerely,

Makena Golf & Beach Club,
For ATC Makena Hotel, LLC



Kaimi Judd
Vice President of Development

Enclosures (1):

- a. PDF Copy of the March 2019 Quarterly Water Quality Sampling Report

Cc:

Mark Roy, Munekiyo Hiraga

ENCLOSURES

a.

March 2019 Quarterly Water Quality Sampling
Report

Mākena Golf & Beach Club

Quarterly water quality sampling event

March 2019

June 18, 2019

Final Report

AECOS No. 1535D

Allen Cattell, Ph.D.
AECOS, Inc.
45-939 Kamehameha Highway, Suite 104
Kāneʻohe, Hawaiʻi 96744
Phone: (808) 234-7770 Email: Cattell@aecos.com

Introduction

This report is the quarterly report for the March 7, 2019 water quality sampling event for Mākena Golf & Beach Club (MG&BC); a program stipulated in Condition No. 10, Declaration of Conditions pertaining to the Amendment of the District Boundary dated April 17, 1998, as required by the State Land Use Commission. County of Maui, Zoning Ordinance 3613, Condition 19 includes a similar requirement. The primary goals of the monitoring program are: (1) assess degree that fertilizers, as well as other nutrient sources, used on land to enhance golf course turf growth and resort landscaping leach to groundwater and subsequently discharge into nearshore waters; (2) establish delivery of these nutrients into the nearshore zone; and (3) determine if subsequent water quality has any measurable impacts on biological community structure in the nearshore marine environment. Sampling locations are shown in Figure 1.

This quarterly report is mostly an informal presentation of sampling event results with comparison to our data from three quarterly sampling events between June and December 2018, emphasizing information that may be of particular interest to MG&BC personnel.

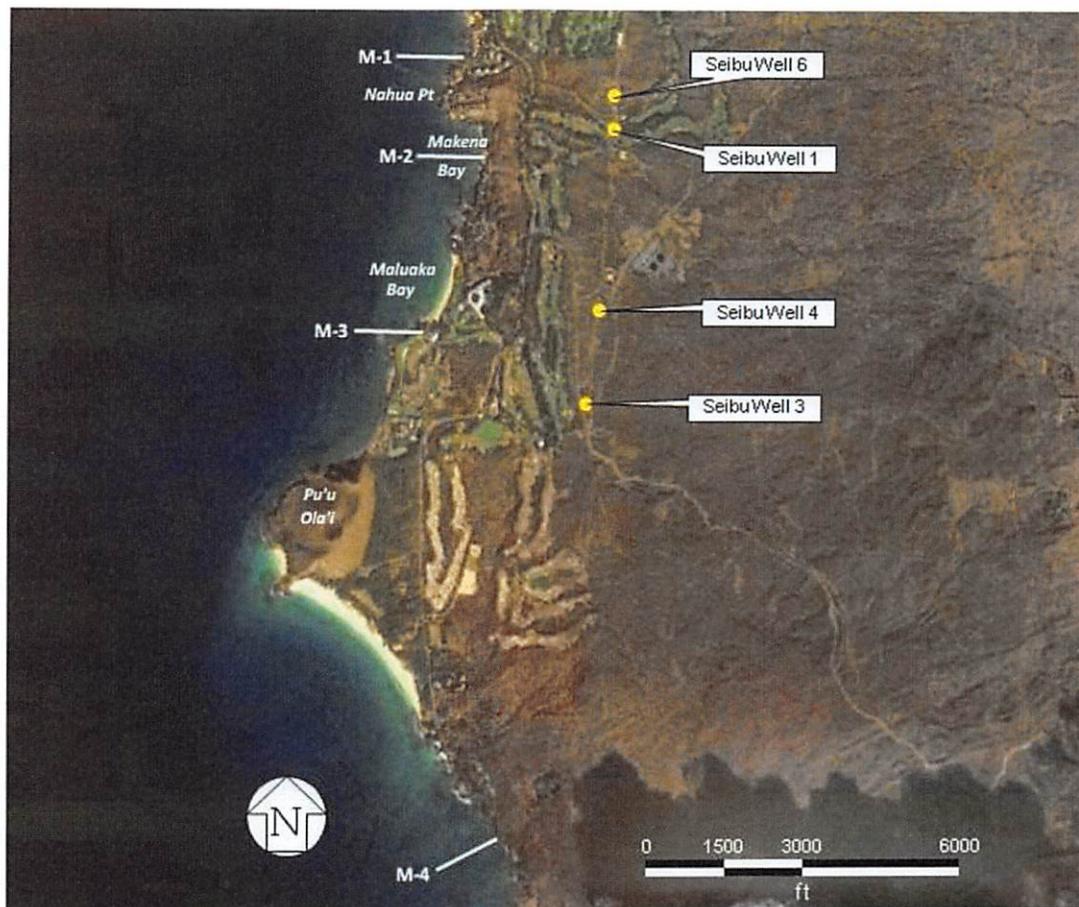


Figure 1. Location of quarterly water quality transects (M-1 through M-4) and irrigation wells.

Results

This quarterly report sampling event was conducted on March 7, 2019. Weather in the morning (0900 hours) was partly sunny, becoming mostly cloudy (~95% cloud cover) by 1300 hours. Light winds (0-5 mph) were from the NNW. Surf was 0-1 ft at all transects, except Transect 4. Surf was 2-4 ft at Transect 4 with 8 wave sets breaking just inside of Station T4-50m; whitewater persisting through to shore. Tide was falling during most of the marine waters sampling (0900-1145 hours) from a high of +1.7 ft at 0443 hours to a low of +0.12ft at 1036 hours (Mākena Station; NOAA, 2019).

Water quality data for three previous quarterly surveys made between June and December 2018 are summarized in Tables 1 and 2, and compared with results

of our March 7, 2019 sampling event. Water samples collected in March 2019 were characterized by higher than average nutrient, turbidity and chlorophyll α levels. Salinities, on the other hand, were somewhat lower than previous levels. The lower salinity levels indicate measureable intrusion of groundwater with higher nutrient levels (except ammonium) into nearshore

Table 1. Comparison of 2018 water quality means ($n = 3$) and results of March 7, 2019 monitoring event for nutrient levels

Transect	DFS [†] (m)	PO ₄ ($\mu\text{gP/L}$)		NO ₃ +NO ₂ ($\mu\text{gN/L}$)		NH ₄ ($\mu\text{gN/L}$)		TP ($\mu\text{gP/L}$)		TN ($\mu\text{gN/L}$)	
		2018	Mar-19	2018	Mar-19	2018	Mar-19	2018	Mar-19	2018	Mar-19
M-1	2	1.4	8.0	27	185	10	25.0	11	8	157	302
	10	1.4	3.0	18	152	10	49	4	6	114	280
	50	1.4	7.0	18	157	10	35	6	20	126	309
	100	1.3	2.0	10	103	16	53	7	5	121	189
M-2	2	3.3	8.0	20	133	8	19	22	186	106	274
	10	3.5	7.0	24	107	9	18	8	11	131	253
	50	2.6	6.0	23	55	7	14	7	10	98	199
	100	1.7	7.0	26	44	12	14	7	14	113	36
M-3	2	3.7	10.0	39	145	13	11	5	15	173	218
	10	3.9	4.0	24	60	17	3	4	7	126	226
	50	2.2	6.0	20	57	15	22	13	7	117	130
	100	2.2	3.0	8	21	14	25	7	3	106	143
M-4	2	2.6	8.0	12	42	11	18	13	10	102	170
	10	4.5	8.0	12	30	17	23	7	11	117	104
	50	1.7	7.0	9	36	9	22	13	8	90	147
	100	1.8	4.0	8	21	9	34	4	7	87	161
Dry Criteria		ns		$\geq 3.5 \mu\text{gN/L}$		$\geq 2 \mu\text{gN/L}$		$\geq 16 \mu\text{gP/L}$		$\geq 110 \mu\text{gN/L}$	
[†] distance from shore		[‡] geometric mean		exceeds standard		ns - no standard					

waters. This intrusion, coupled with a falling tide during most of the sampling event, indicate nearshore waters were moving offshore, causing higher nutrient levels along all four transects. The higher than average turbidity and chlorophyll α levels were not associated with groundwater inputs, but more likely to disturbance of shallow bottom waters.

Table 2. Physical parameters and chlorophyll α : comparison of 2018 water quality means ($n = 3$) and results of March 7, 2019 monitoring event.

Transect	DFS [†] (m)	Salinity (ppt)		Temperature (° C)		pH		DO (% Sat.)		Turbidity (NTU)		Chl. α ($\mu\text{g/L}$)	
		2018	Mar-19	2018	Mar-19	2018	Mar-19	2018	Mar-19	2018	Mar-19	2018	Mar-19
M-1	2	34.59	32.81	27.4	23.8	8.12	8.18	105	108	2.02	1.19	0.56	1.61
	10	34.86	34.02	27.0	23.9	8.19	8.20	111	108	0.82	0.52	0.44	0.76
	50	34.82	34.01	27.0	23.8	8.16	8.17	107	101	1.15	0.43	0.34	0.58
	100	34.92	34.33	27.0	23.8	8.14	8.18	104	96	0.59	0.45	0.26	0.52
M-2	2	34.35	33.06	26.8	23.6	8.10	8.08	104	104	1.30	6.32	0.55	2.51
	10	34.42	33.31	26.7	23.9	8.17	8.18	104	98	1.14	2.71	0.28	1.80
	50	34.67	34.28	26.6	23.8	8.14	8.18	109	98	0.91	2.48	0.31	1.14
	100	35.01	34.41	26.6	23.9	8.13	8.17	103	97	0.82	1.45	0.24	0.45
M-3	2	34.55	34.62	26.6	24.2	8.09	8.17	112	110	0.83	1.01	0.42	1.74
	10	34.82	34.57	26.6	24.2	8.13	8.16	107	107	0.83	0.77	0.46	0.58
	50	35.02	34.72	26.6	24.1	8.14	8.14	103	106	0.62	0.56	0.24	0.47
	100	35.04	35.01	26.6	24.2	8.13	8.15	98	105	0.40	0.41	0.20	0.30
M-4	2	34.51	33.83	26.5	24.4	8.07	8.23	105	108	1.44	3.41	0.68	2.06
	10	34.52	34.05	26.6	24.5	8.16	8.20	106	106	1.11	2.85	0.38	1.40
	50	34.94	34.29	26.5	24.4	8.14	8.21	110	110	0.89	2.36	0.34	0.67
	100	34.86	34.39	26.6	24.3	8.12	8.21	104	107	0.78	0.94	0.31	0.37
Hawai'i Dry Criteria		+/- 10%		+/- 1C°		7.6-8.6		≥75%		≤0.20 NTU		≤0.15 $\mu\text{g/L}$	
† distance from shore		‡ geometric mean		exceeds standard									

Water Supply Wells - Analysis of nitrate+nitrite and ortho-phosphate dilutions between average well concentrations and stations along all four transects during the March 2019 sampling event are shown Figure 2. About 73 percent of changes in ortho-phosphate levels in nearshore waters can be attributed to changes in salinity during this sampling event ($R^2 = 73.12\%$), while nearly all of the changes in nitrate+nitrite levels are attributable to changes in salinity ($R^2 = 98.04\%$.)

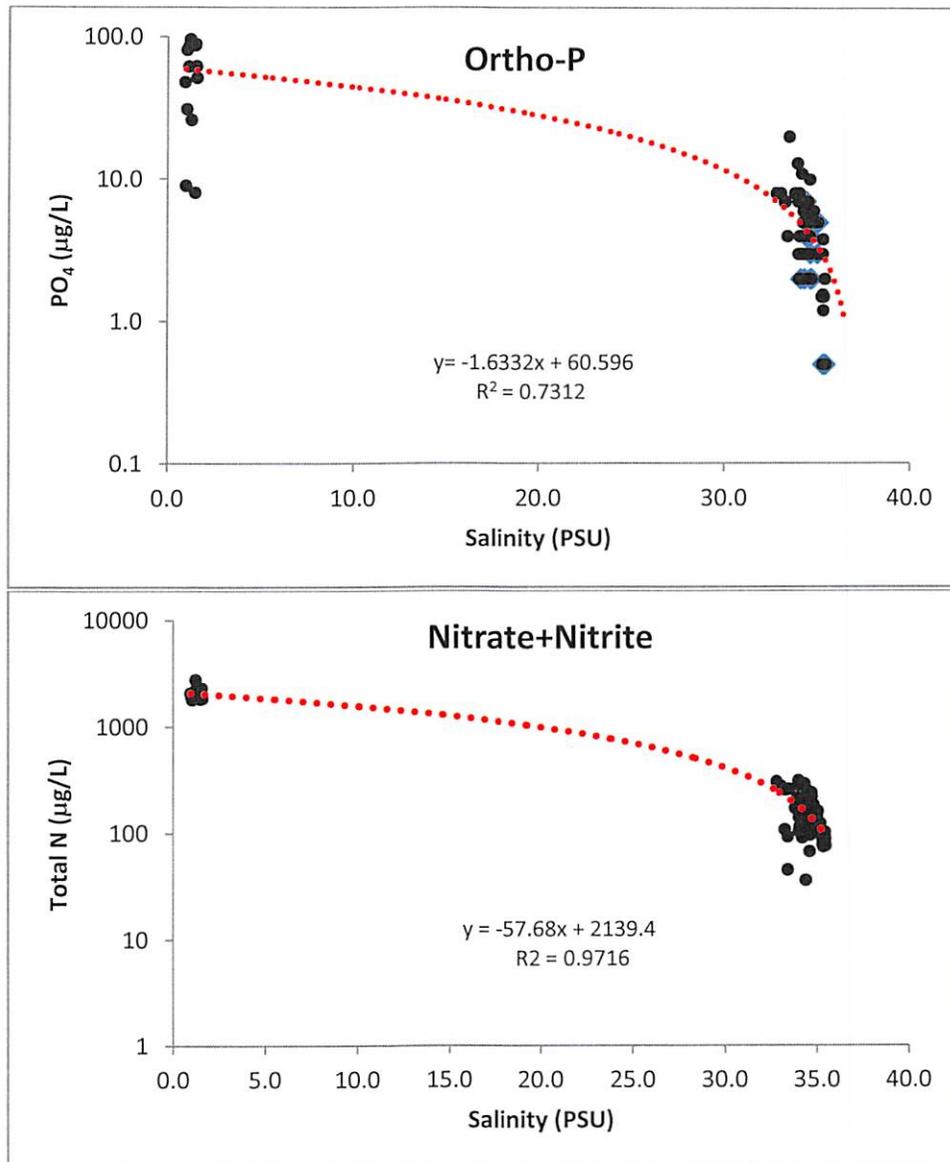


Figure 4. Relation between salinity and ortho-phosphate and nitrate+nitrite (R^2) for all AECOS sampling events between June 2018 and March 2019.

Potential groundwater subsidies (Table 3) for nitrate+nitrite were noted at all shore stations during the March 2019 sampling event, except at Station M4. Note: negative values indicate no subsidy. These results are expected considering that low seawater salinities, due to a falling tide and groundwater intrusion, were present at these stations on this sampling date.

Potential groundwater subsidies for ortho-phosphate (Table 4) were negative. These results are expected since fertilizers used for resort irrigation do not contain any phosphorus compounds.

Table 3. Estimated nitrate+nitrite subsidy at nearshore station (2 m) for March 2019 sampling event.

Well Transect	Mar-19 Measured	Mar-19	Mar-19	Subsidy NO ₃ +NO ₂
	NO ₃ +NO ₂	Salinity	NO ₃ +NO ₂	
	(µgN/L)	(PSU)	(µgN/L)	(µgN/L)
Seibu Wells	1598	1.27	---	---
M-1	185	32.81	41	144
M-2	133	33.06	40	93
M-3	145	34.62	38	107
M-4	42	33.83	39	-3

Table 3. Estimated ortho-phosphate subsidy at nearshore station (2 m) for March 2019 sampling event.

Well Transect	Mar-19 Measured	Mar-19	Mar-19	Surplus PO ₄
	PO ₄	Salinity	PO ₄	
	(µgP/L)	(PSU)	(µgP/L)	(µgP/L)
Seibu Wells	70	1.27	---	---
M-1	8.0	32.81	54	-46
M-2	8.0	33.06	53	-45
M-3	10.0	34.62	51	-41
M-4	8.0	33.83	52	46

We are also tracking monthly turf fertilization and irrigation rates (data provided by Jonathan Galicinao, MG&BC) together with nutrient concentrations in the irrigation supply wells (Table 5) to explore long-term trends of potential groundwater effects on Mākena nearshore waters. Estimated subsidies for all AECOS sampling events are shown in Table 5.

Table 5. Average irrigation per day with mean nutrient content for Seibu wells and fertilizer additions for March through August, 2018.

Month	Irrigation	Fertilizer	Calculated NO ₃ +NO ₂ Subsidy			
			Year	NO3+NO2	M-1	M-2
	Liters/day	(µgN/L)	(µgN/L)			
Mar-18	1,825,199	19,021	---	---	---	---
Apr-18	2,056,822	9,540	---	---	---	---
May-18	1,340,195	11,263	---	---	---	---
Jun-18	1,626,646	18,559	0	0	102	0
Jul-18	1,601,099	9,428	---	---	---	---
Aug-18	2,248,571	5,370	---	---	---	---
Sep-18	2,108,810	12,168	0	0	0	0
Oct-18	1,461,007	8,265	---	---	---	---
Nov-18	2,001,382	9,805	---	---	---	---
Dec-18	1,336,355	15,814	108	29	73	0
Jan-19	2,694,082	7,844	---	---	---	---
Feb-19	2,768,296	15,268	---	---	---	---
Mar-19	3,334,056	5,433	144	93	180	0

To date, sufficient data are not available to make any statistical inferences regarding potential effects of fertilizer nutrient loading on nearshore waters. Nevertheless, waters at Transect M-3 are quite near a former leg of the golf course (now maintained as a green area) which is a possible source for nitrate+nitrite subsidy in the nearshore waters at Transect 3. Transect M-1, on the other hand, is located somewhat north of the Makena golf course and may be influenced by nearby residential septic system seepage and/or other groundwater inputs.

References

National Oceanic and Atmospheric Administration (NOAA). 2018. Tide Predictions for gauge 1615202, Makena, HI. Available at URL: <https://tidesandcurrents.noaa.com>.

EXHIBIT B

ATC Makena Hotel, LLC
c/o Makena Golf & Beach Club

September 4, 2019

Mr. Myron Honda
State of Hawaii, Department of Health
Clean Water Branch
2827 Waimano Home Road #225
Pearl City, HI 96782

RE: State Land Use District Boundary Amendment Docket A9-721 Condition No. 9,
County of Maui Zoning Ordinance No. 3613 Condition No. 19, Marine Water Quality
Monitoring.

Dear Mr. Honda,

ATC Makena Holdings, LLC, in compliance with the above referenced conditions, respectfully submits the enclosed Marine Water Quality Quarterly Monitoring Report prepared by AECOS Inc. dated August 12, 2019 for the quarterly tests performed in May of 2019.

Should you have any questions, require a hardcopy, or require additional information, please do not hesitate to contact me at (808) 640-6023, or by email at kjudd@makenagbc.com.

Sincerely,

Makena Golf & Beach Club,
For ATC Makena Hotel, LLC



Kaimi Judd
Vice President of Development

Enclosures (1):

- a. PDF Copy of the May 2019 Quarterly Water Quality Sampling Report

Cc:

Mark Roy, Munekiyo Hiraga

ENCLOSURES

a.

May 2019 Quarterly Water Quality Sampling Report

Mākena Golf & Beach Club

Quarterly water quality sampling event

May 2019

August 12, 2019

Final Report

AECOS No. 1535E

Allen Cattell, Ph.D.
AECOS, Inc.
45-939 Kamehameha Highway, Suite 104
Kāneʻohe, Hawaiʻi 96744
Phone: (808) 234-7770 Email: Cattell@aecos.com

Introduction

This document is a quarterly report covering the May 2019 water quality sampling event for Mākena Golf & Beach Club (MG&BC) under a program stipulated in Condition No. 10, Declaration of Conditions pertaining to the Amendment of the District Boundary dated April 17, 1998, as required by the State Land Use Commission. County of Maui, Zoning Ordinance 3613, Condition 19 includes a similar requirement. The primary goals of the monitoring program are: (1) assess degree to which fertilizers, as well as other nutrient sources, used on land to enhance golf course turf growth and resort landscaping leach to groundwater and subsequently reach nearshore waters; (2) establish delivery of these nutrients into the nearshore zone; and (3) determine if consequent marine water quality has measurable impacts on biological community structure in the nearshore environment.

A quarterly report under the program presents results of a sampling event and makes comparison to previous data summarized from prior quarterly sampling events (four, between June 2018 and March 2019), as well as presenting longer-term supply well nutrient analyses of interest to MG&BC personnel.

Results

This quarterly report sampling event was conducted on May 23, 2019. Sampling locations are shown in Figure 1. Weather in the morning (0900

hours) was mostly sunny; ~5% cloud cover became about 60% by 1300 hours. Winds were variable throughout the day: 0–5 mph with occasional 10 mph gusts. NOAA forecast 3–4 ft waves for May 23, 2019. Surf was 1–3 ft along Transect M-1 breaking at about 160 ft from shore. Surf 1–3 ft along Transect M-2 breaking nearshore and creating a turbidity plume. Surf was 1–2 ft along Transect M-3 with a floating algal mass, possibly *Cladophora serica*, occurring from shore to about 160 ft offshore. This algal mass likely drifted south from north Kihei waters where it is known to occur as a problem species. Surf at Transect M-4 was about 2–5 ft breaking near 300 ft from shore. The tide was falling during part of the sampling event (0900–1055 hours) from a predicted high of +0.77 ft at 0443 hours to a low of +0.12ft at 1055 hours (Mākena Station; NOAA, 2019).

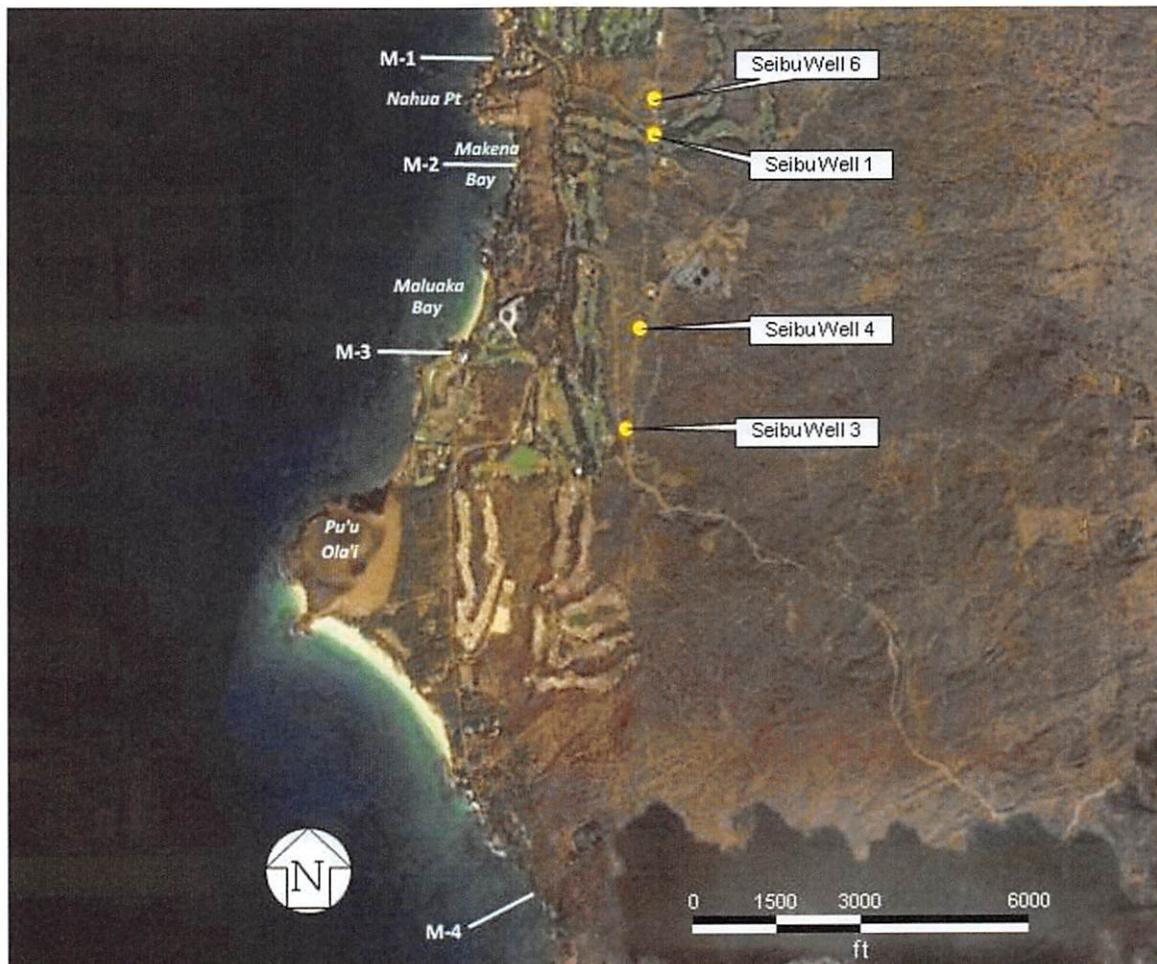


Figure 1. Location of quarterly water quality transects (M-1 through M-4) and irrigation supply wells at MG&BC.

Water quality data from four previous quarterly surveys made between June 2018 and March 2019 are summarized in Tables 1 and 2, and compared with results of our most recent sampling event. Water samples collected on May 23, 2019 were characterized by generally higher than average nutrient levels and temperatures. Salinities, on the other hand, were somewhat lower than the averages to date, indicating intrusion by groundwater. This intrusion,

Table 1. Comparison of previous water quality means ($n = 4$) and results of May 23, 2019 monitoring event for nutrient concentrations

Transect	DFS [†] (m)	PO ₄ (µgP/L)		NO ₃ +NO ₂ (µgN/L)		NH ₄ (µgN/L)		TP (µgP/L)		TN (µgN/L)	
		Means	May-19	Means	May-19	Means	May-19	Means	May-19	Means	May-19
M-1	2	2.9	8.0	47	63	15	29	10	9	191	219
	10	2.2	6.0	35	58	15	15	6	27	145	155
	50	2.7	7.0	36	68	16	30	8	9	166	202
	100	2.3	1.0	24	71	23	30	7	8	139	158
M-2	2	5.1	11.0	37	61	13	40	52	186	139	156
	10	4.7	8.0	38	48	14	40	10	19	155	160
	50	4.0	10.0	32	50	11	30	8	10	124	155
	100	3.1	8.0	32	43	15	35	10	8	127	112
M-3	2	5.0	6.0	61	104	16	41	7	9	206	259
	10	4.7	10.0	38	91	14	46	5	11	153	187
	50	3.1	4.0	33	85	18	32	9	11	127	160
	100	2.6	4.0	15	67	17	22	6	7	132	232
M-4	2	3.3	3.0	17	23	14	27	11	7	112	99
	10	5.2	5.0	17	24	23	57	8	7	107	84
	50	2.5	3.0	14	16	16	66	12	12	109	141
	100	2.4	3.0	12	23	15	27	5	7	101	99
Dry Criteria		ns		≥3.5 µgN/L		≥2µgN/L		≥16µgP/L		≥110 µgN/L	
† distance from shore		‡ geometric mean		exceeds standard				ns - no standard			

coupled with a falling tide during most of the sampling event, indicates nearshore waters were moving offshore, producing slightly elevated nutrient levels along Transects M-1 through M-3.

Table 2. Physical parameters and chlorophyll α: comparison of previous quarterly water quality means (n = 4) and results of May 23, 2019 monitoring event.

Transect	DFS [†] (m)	Salinity (ppt)		Temperature (° C)		pH		DO (% Sat.)		Turbidity (NTU)		Chl. α (µg/L)	
		Means	May-19	Means	May-19	Means	May-19	Means	May-19	‡	‡	‡	‡
M-1	2	33.94	33.14	26.7	27.4	8.19	8.18	103	94	1.40	0.80	0.72	0.70
	10	34.24	33.59	26.4	27.0	8.21	8.20	109	104	0.79	1.15	0.51	0.74
	50	34.35	33.28	26.4	27.4	8.17	8.17	106	109	0.78	0.86	0.40	0.53
	100	34.52	33.51	26.4	27.5	8.15	8.18	103	106	0.57	0.72	0.33	0.36
M-2	2	34.07	33.21	26.5	27.2	8.15	8.08	99	98	2.53	3.40	0.63	0.48
	10	34.12	33.40	26.6	27.5	8.15	8.18	99	100	1.82	2.31	0.42	0.42
	50	34.29	33.16	26.5	27.5	8.18	8.18	99	102	1.26	2.14	0.34	0.30
	100	34.49	33.53	26.5	27.7	8.17	8.17	99	107	0.93	1.62	0.24	0.24
M-3	2	34.26	33.01	26.4	27.8	8.24	8.17	113	120	0.89	0.99	0.57	0.48
	10	34.46	33.24	26.3	27.7	8.22	8.16	110	121	0.86	1.08	0.54	0.79
	50	34.64	33.42	26.3	27.6	8.18	8.14	105	111	0.64	0.79	0.29	0.31
	100	34.80	33.85	26.4	27.7	8.18	8.15	101	107	0.49	1.10	0.23	0.27
M-4	2	34.19	33.55	26.1	26.6	8.12	8.23	103	91	1.72	1.47	0.79	0.47
	10	34.24	33.57	26.2	26.6	8.13	8.20	105	99	1.41	1.41	0.47	0.30
	50	34.63	34.00	26.2	26.9	8.13	8.21	108	99	1.02	0.66	0.37	0.29
	100	34.53	33.69	26.2	27.0	8.12	8.21	104	101	0.83	0.89	0.29	0.27
Hawai'i Dry Criteria		+/- 10%		+/- 1C°		7.6-8.6		≥75%		≤0.20 NTU		≤0.15 µg/L	
† distance from shore		‡ geometric mean		exceeds standard									

Assessment

Potential groundwater subsidies calculated for nitrate+nitrite at the “2 m” stations on transects M1 through M3 are provided in Table 3. These results are expected considering that below average seawater salinities were present at these stations for the May 2019 sampling event. Potential groundwater subsidies for ortho-phosphate were negative (essentially none; Table 4), also expected since fertilizers used for resort landscaping do not contain inorganic phosphorus compounds.

Table 3. Estimated nitrate+nitrite subsidy at nearshore station (2 m) for May 2019 sampling event.

Well Transect	Measured NO ₃ +NO ₂ (µgN/L)	Salinity (PSU)	Estimated NO ₃ +NO ₂ (µgN/L)	Subsidy NO ₃ +NO ₂ (µgN/L)
Seibu Wells	1490	1.37	---	---
M-1	63	33.14	38	25
M-2	61	33.21	38	23
M-3	104	33.01	39	65
M-4	23	33.55	38	0

Table 4. Estimated ortho-phosphate subsidy at nearshore station (2 m) for May 2019 sampling event.

Well Transect	Measured PO ₄ (µgP/L)	Salinity (PSU)	Calculated PO ₄ (µgP/L)	Surplus PO ₄ (µgP/L)
Seibu Wells	70	1.37	---	---
M-1	8.0	33.14	54	0
M-2	8.0	33.21	53	0
M-3	10.0	33.01	51	0
M-4	8.0	33.55	52	0

We are also tracking monthly turf fertilization and irrigation rates (data provided by Jonathan Galicinao, MG&BC) together with nutrient concentrations in the irrigation supply wells to better understand long-term groundwater impacts on Mākena nearshore waters. Estimated subsidies for nitrate-nitrite in recent sampling events are shown in Table 5.

Table 5. Average irrigation per day with mean nutrient content for Seibu wells and fertilizer subsidies for March 2018 through May 2019.

Month		Fertilizer	Calculated NO ₃ +NO ₂ Subsidy			
Year	Irrigation	NO3+NO2	M-1	M-2	M-3	M-4
	Liters/day	(µgN/L)	(µgN/L)			
2018						
Mar-18	1,825,199	19,021	---	---	---	---
Apr-18	2,056,822	9,540	---	---	---	---
May-18	1,340,195	11,263	---	---	---	---
Jun-18	1,626,646	18,559	0	0	102	0
Jul-18	1,601,099	9,428	---	---	---	---
Aug-18	2,248,571	5,370	---	---	---	---
Sep-18	2,108,810	12,168	0	0	0	0
Oct-18	1,461,007	8,265	---	---	---	---
Nov-18	2,001,382	9,805	---	---	---	---
Dec-18	1,336,355	15,814	108	29	73	0
2019						
Jan-19	2,694,082	7,844	---	---	---	---
Feb-19	2,768,296	15,268	---	---	---	---
Mar-19	3,334,056	5,433	144	93	180	0
Apr-19	2,528,584	5,373	---	---	---	---
May-19	2,614,132	5,197	25	23	65	0

--- no nearshore samples collected.

To date, insufficient data are available to make statistical inferences regarding potential effects of fertilizer nutrient loading on nearshore waters. Nevertheless, waters at Transect M-3 are quite near a former leg of the golf course (now maintained as a green area) which is a possible source for nitrate+nitrite subsidy in the nearshore waters there. Transect M-1, on the other hand, is located somewhat north of the Mākena Golf Course and may be influenced by area residential septic system seepage and/or other groundwater inputs.

Results of regression and Student's t-test analyses of long-term nitrate+nitrite concentrations in MG&BC irrigation wells are shown graphically in Figure 2. No significant change has occurred over this 20-year period at Well 1 or Well 4 as indicated by the more-or-less flat best-fit lines and no significant differences at the 0.05 probability (P) level of the two sets of data points. On the other hand, the best-fit lines for Well 6 and Well 3 slope downwards over this same time period and the difference between the older and newer data sets is significant ($P = 0.01$).

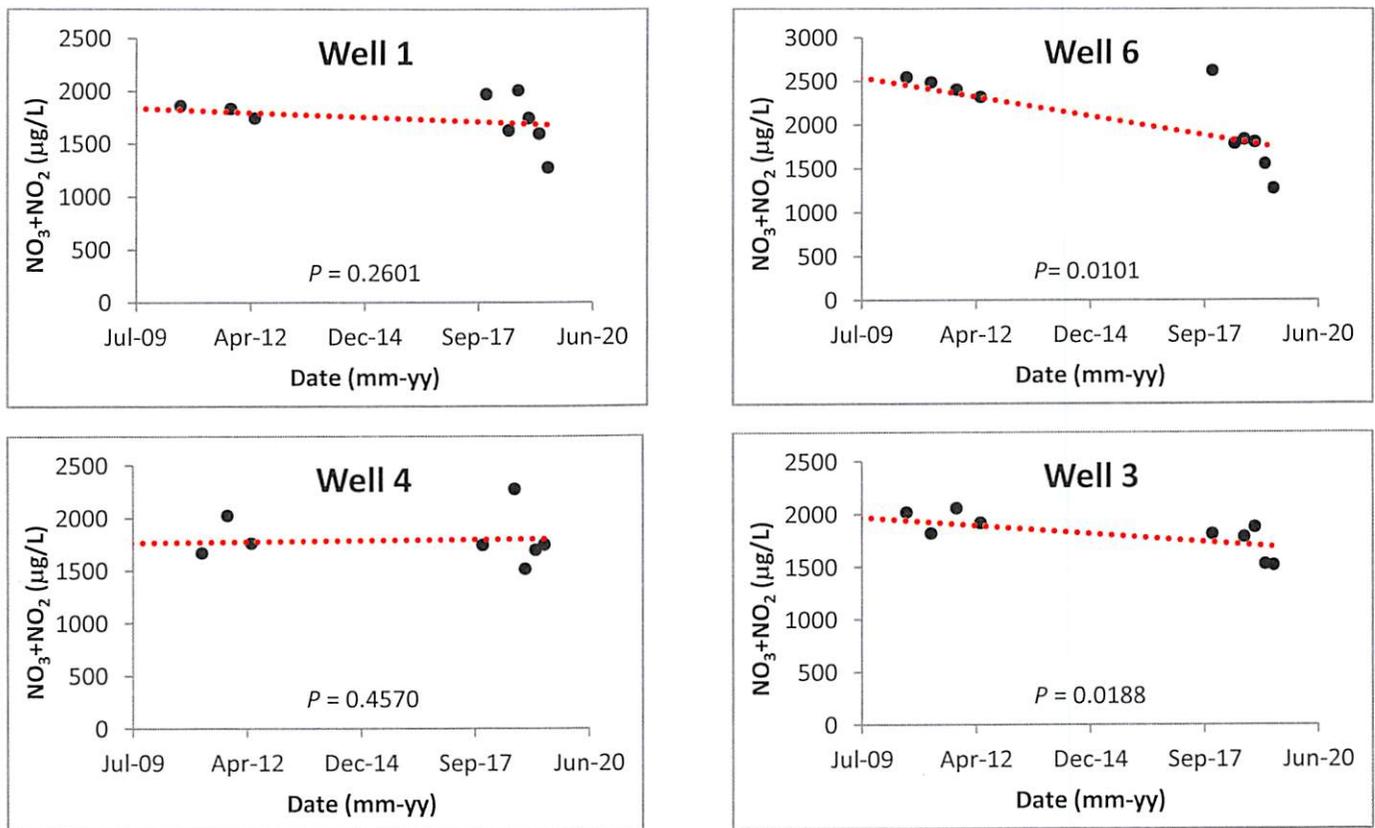


Figure 2. Nitrate+nitrite concentration in four irrigation wells measured between 2009 and 2019 (after MRCI, 2017; AECOS, 2019)

Conclusions

The essential plant nutrients (nitrogen and phosphorus) that we monitor each quarter determine to a large extent not only water quality in these coastal waters, but the nature of the benthic and pelagic biologic communities as well.

These nutrients are primarily supplied to Mākena coastal waters from two sources: (1) dissolved in groundwater seeping out near the shore; and (2) long-shore transport from other nearby coastal waters. Surface water runoff is a third potential source, but occurs only rarely along this coast. Excess nutrients and turbidity in the coastal waters of northern Kīhei and Ma‘alaea Bay generally have resulted in degradation of coral reef communities and increases in episodic invasive algae.

For this quarterly report, we have reviewed the historic groundwater data available for changes in the most important nutrient for these coastal waters—nitrate+nitrite—as measured in four MG&BC irrigation wells between 2009 and 2019 (Fig. 6). This information may provide a useful baseline for comparison with nearshore nitrate+nitrite concentrations to evaluate any effects due to land management activities. It is important to note that groundwater in these wells represent conditions upslope of the golf course and other landscaping areas (see Fig. 1) and therefore, are not influenced by irrigation practices on resort property. Any residual irrigation water moving to groundwater and eventually entering the nearshore environment will be *makai* (downslope) of these supply wells and reflect groundwater nutrient concentrations enhanced or not by fertilizers.

References

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