

AW Hawaii Wind LLC

BOEM company number 15043

501 Ave. D

Bovina, TX 79009



Public Version

January 2015

Hawaii Offshore Wind Energy
Lease Application
Oahu South



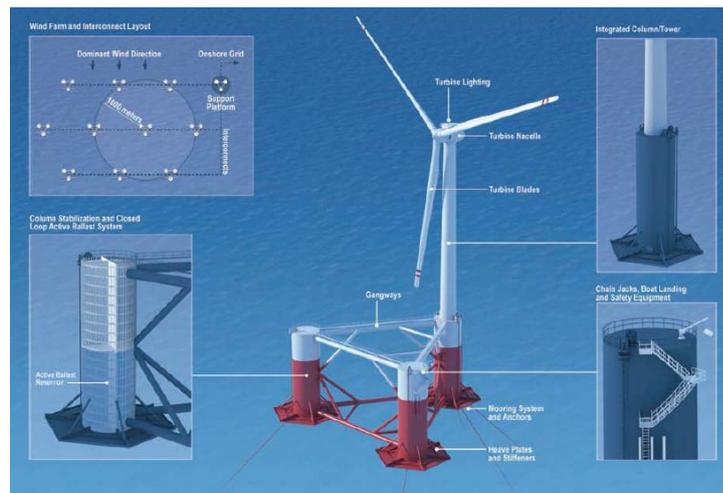
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1. Introduction

1.1. Overview, Objective

1.1.1. AW Hawaii Wind LLC (AWH), a member of the Alpha Wind Energy (AWE) group of companies has an ambition to and an interest in developing a 400 MW full scale offshore Wind Energy Project (the “Project”) sited in close proximity to the Hawaiian Islands with the option to expand further. The Project would comprise large-scale offshore wind turbines on WindFloat foundations.



1.1.2. The electricity would be transmitted to the Island of Oahu via undersea cables. The Project should be installed in an area in the vicinity of Oahu where the wind resource is optimum and the distance to the existing infrastructure is the shortest, however, at the same time outside protected nature areas and military restricted areas and far enough away from the coast not to have a significant negative visual impact.



1.1.3. A majority of the main components for the installation will be produced or assembled on Hawaii creating up to 100 permanent jobs (10 years). Assembly will be in dry-docks. After assembly the fully commissioned turbines will be towed and connected to its preinstalled anchors and electrical cables offshore.



1.1.4. For full animation please see:
<https://www.youtube.com/watch?v=IO7GXLR4YUo>

1.1.5. Most major components will have a design life of 50 years. If and when major repair is required, the turbines can be towed back to the harbor avoiding the requirement for and necessity of major offshore vessels and cranes.

1.2. Hawaii Clean Energy Initiative

1.2.1. The Hawaii Clean Energy Initiative calls for 70% renewable energy by 2030, where 40% of the electricity production should come from renewable energy. The current fuel mix for electricity production on Oahu is according to HECO as follows:

Fuel Mix in HECO Service Area - 2013 Calendar Year*

Fuel Sources	Hawaiian Electric Company (Island of Oahu)
Oil	73.40%
Coal	18.92%
Biofuel	0.40%
Biomass	0
Geothermal	0
Hydro	0
Solar	0.38%
Solid Waste	5.21%
Wind	1.69%
TOTAL:	100%
Total from Renewable Resources	7.68%

* Based on the amount of electricity generated by HECO and purchased from independent power producers in 2013

1.2.2. The Project would be designed to serve primarily the Hawaiian island of Oahu. With a population of just under 1 Million, or approx. 70% of the population of the

State, Oahu is by far the most populated Hawaiian Island and consequently has the highest electricity load. Oahu has a system load typically ranging from a peak of 1,200MW to a minimum of 600MW, and an annual net generation of roughly 8,000,000 MWh (2012, US EIA). The significance of the size of the Oahu market, at first analysis, is, that it is large enough to handle a large-scale intermittent resource. For example, a 700MW offshore windfarm with a conservative 35-40% capacity factor would account for approximately 25-30 of the existing net generation, which is generally considered acceptable for intermittent resource penetration. Furthermore, increased use of prediction and control methods used in Europe, electric cars, further smart grid development and implementation and possible energy storage facilities will only increase the possibility for additional wind penetration for the island.

- 1.2.3. Due to the scarce onshore renewable energy options and difficulty in bringing capacity from other islands in the state of Hawaii, the Project is the most likely solution to meet and exceed the goals of the Hawaiian Clean Energy Initiative at a justifiable price.

1.3. Qualifications

- 1.3.1. The partners behind AW Hawaii Wind LLC have been involved in the Wind Energy Industry for more than 25 years worldwide.
- 1.3.2. Alpha Wind Energy (AWE)
The AWE partners have been involved with wind energy project development in many countries like: Denmark, Ireland, Scotland, Norway, Sweden, Poland, Romania, Germany, Spain, Egypt, Tunisia, Saudi Arabia, India, Taiwan, South Korea and USA. The AWE partners have gained experience from both onshore and offshore developments as well as turbine manufacturing and wind and solar project development, installation and operation. The AWE core competence is green field project development using innovative development techniques and local participation. More information on the AWE group can be found www.alphawind.dk.
- 1.3.3. Silva Matos (ASM)
ASM has been involved in wind and solar project development, installation, financing and operation for more than 10 years in Europe. ASM has constructed the existing WindFloat, which has been in operation in Portugal for over 2 years. ASM holds the first production rights to the WindFloat. More information on ASM can be found on www.asilvamatos.pt.
- 1.3.4. Energy and Environmental Data (EMD)
Is a world's leading wind energy consultant. EMD has been involved in wind energy calculation and modeling activities for more than 25 years. EMD develops one of the world's leading wind energy planning software; WindPro. EMD is a leading expert in predicting average production on wind projects worldwide. More information on EMD can be found on www.emd.dk.

1.3.5. NEAS

NEAS is a leading European short term energy predicting, remote power plant controlling and energy trading company. NEAS is an expert in short term prediction of the production from wind projects in Europe and uses this ability to control and schedule more than 3,000 MW of wind energy and 200 Combined Heat and Power stations in Northern Europe. NEAS has extensive experience in optimizing a high level of renewable energy penetration including the power pricing. More information on NEAS can be found www.neas.dk.

1.4. Outreach

1.4.1. AWE has been involved with and monitored the wind energy development in Hawaii since 2005. Initially the interest was concentrated around developments on Molokai. Through careful studies of Hawaiian history and numerous consultations with the local Native Hawaiians, it became obvious that substantial industrial or tourist development on or close to the islands of Molokai and Lanai is not in the Native Hawaiians interest. Although the Ocean is also of significant cultural importance, the impact of an offshore installation is felt to be more acceptable than major developments on Molokai and Lanai. AWE has been waiting for the floating offshore wind energy technology to mature before we could move ahead on Hawaii.

1.4.2. AWH has a bottom up approach to development. AWH wishes to continue making strong outreach and possibly partnerships with the Native Hawaiian Population.

1.4.3. AWH has amongst others made outreach to the Department of Transportation, Harbor Division, the Humpback Whale Sanctuary, NOAA Fisheries, US Navy, Life of the Land, BOEM and Hawaii State Energy Office, Department of Business, Economic Development and Tourism, Chief of staff of Governor Neil Abercrombie, Department of Land and Natural Resources, Department of Planning and Permitting, City and County of Honolulu, Federal Aviation Authorities, the Department of Defense and Office of Native Hawaiian Relations. In addition AWH has had several positive and constructive meetings with local groups and individuals on Lanai and Molokai who have reservations against Wind Energy in general and Big Wind Energy development on Molokai and Lanai specifically. AWH considers this work to be of specific importance and will continue this effort. AWH will continue its outreach effort in the near future.

1.5. Site attributes

1.5.1. The selected area indicated in section 2.1 below has some of the highest predicted wind energy levels in close vicinity to Oahu. The depth of the ocean is realistic for mooring of foundations. The area is relatively close to the existing important infrastructure especially harbor and grid. The area is outside any designated environmentally protected areas. The area is not impacted by unclassified and known significant undersea cables. Merchant ship and fishing activities are limited. DOD activities and visibility from Waikiki beach are the only potential significant known issues.

2. Area requested for lease

2.1. Requested Area

2.1.1. The requested area is located south of Oahu 17 miles and further away from the coast (Diamond Head) on an approx. 5-700 meter deep plateau. If some of or part of some of these blocks are not available the area can be modified to fit the available area.

2.1.2. Block numbers

Area: nf04_09

Ref: BLOCKS_CL1 number,

Block Numbers: 7056, I, J, K, L, M; 7057, I, M; 7106, A, E, I, M; 7107, A, E, I, M.

Area: nf04_12

Ref: BLOCKS_CL1 number,

Block Numbers: 6006, A; 6007, A, E, I, M; 6057, A, E, I, M; 6107, A, F, K, P; 6158, A, B, C, D; and 6159, A, B.

2.1.3. Map of area



Area of interest is indicated in green

2.2. Site Selection Process

2.2.1. AWE has been involved with and monitored the wind energy development in Hawaii since 2005. Initially the interest was concentrated around developments on Molokai. Through careful studies of Hawaiian history, numerous consultations with the local Native Hawaiians, internet searches and monitoring the media it became obvious that substantial industrial or tourist development of the islands of Molokai and Lanai is not in the Native Hawaiians interest. Although the Ocean is also of significant cultural importance, the impact of an offshore installation is felt to be more acceptable than major developments on Molokai and Lanai.

2.2.2. AWE has been waiting for the floating offshore wind energy technology to mature before we could move ahead on Hawaii. When this became viable through the successful development and installation of the WindFloat in Portugal, AWH initiated a screening for suitable offshore areas in the vicinity of Oahu. The following selection criteria was determined:

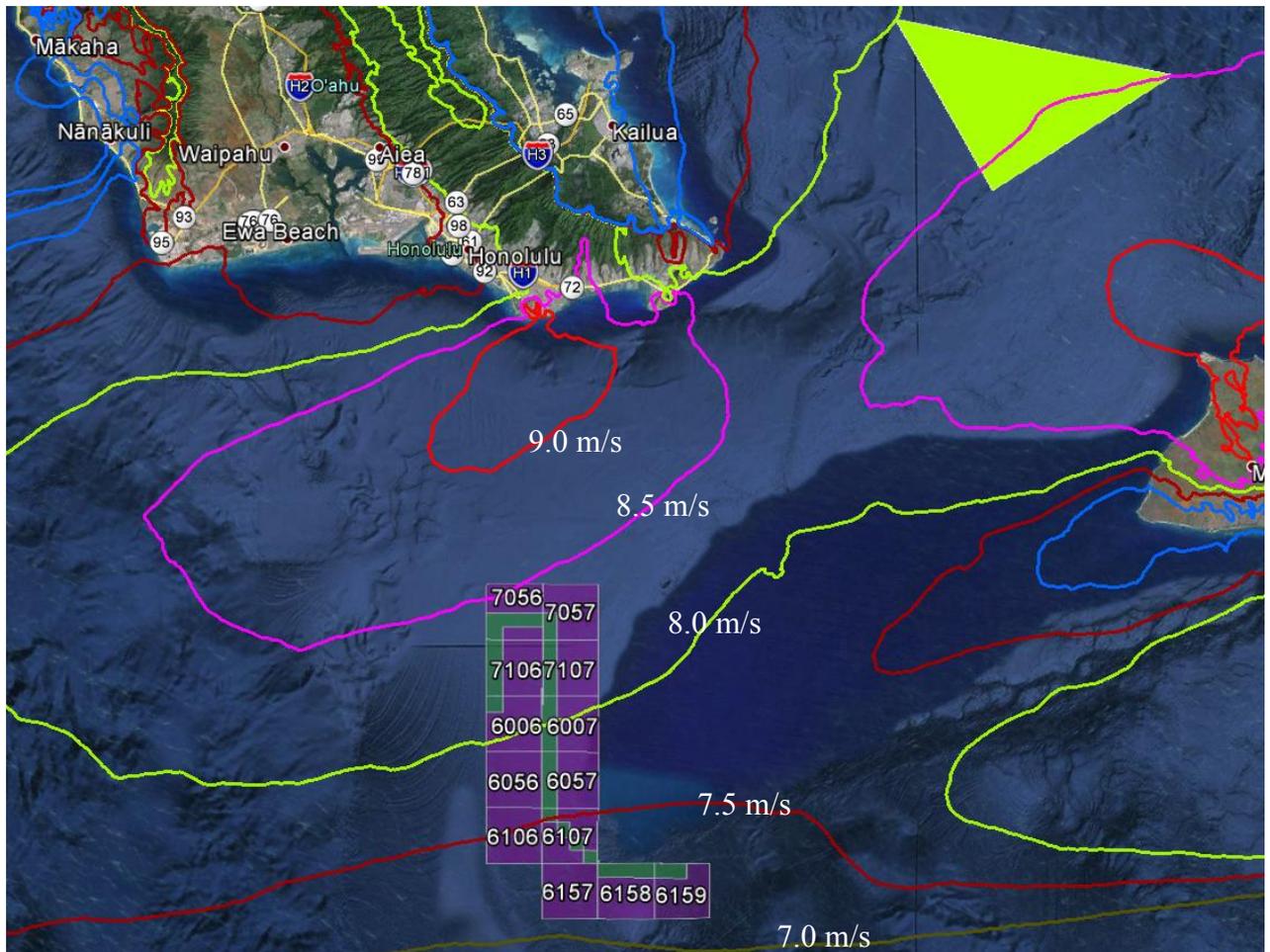
- Outside known restricted or protected areas
- Minimum 12 miles from the coast
- Best possible wind speeds

- Lowest possible sea depth
- As close to the Oahu Grid infrastructure as possible
- As close to an Oahu harbor, where suitable dry-dock manufacturing facilities could be established
- Likely commercial and recreational activities
- Substantial development potential upwards of 100 turbines

2.2.3. The initial screening process revealed 3 potential areas that would reasonably satisfy the first 3 criteria, however, the northern and eastern areas are in relatively deeper waters and the southern area has a better wind regime.

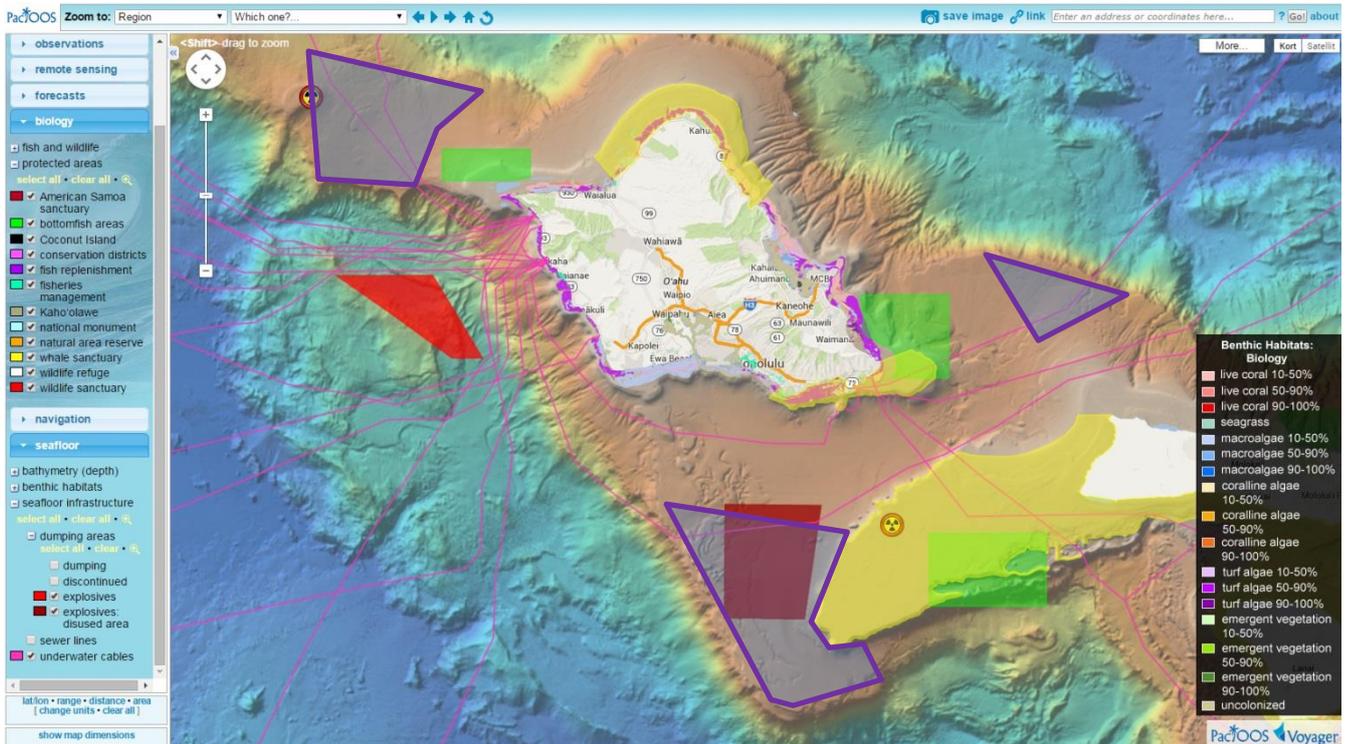


2.2.4. AWH has performed several wind studies of the site including online NREL and GeoComms maps in order to determine where the best wind resource is. This includes a wind study performed by Energy and Environmental Data (EMD) using wind data from Oahu and Molokai.

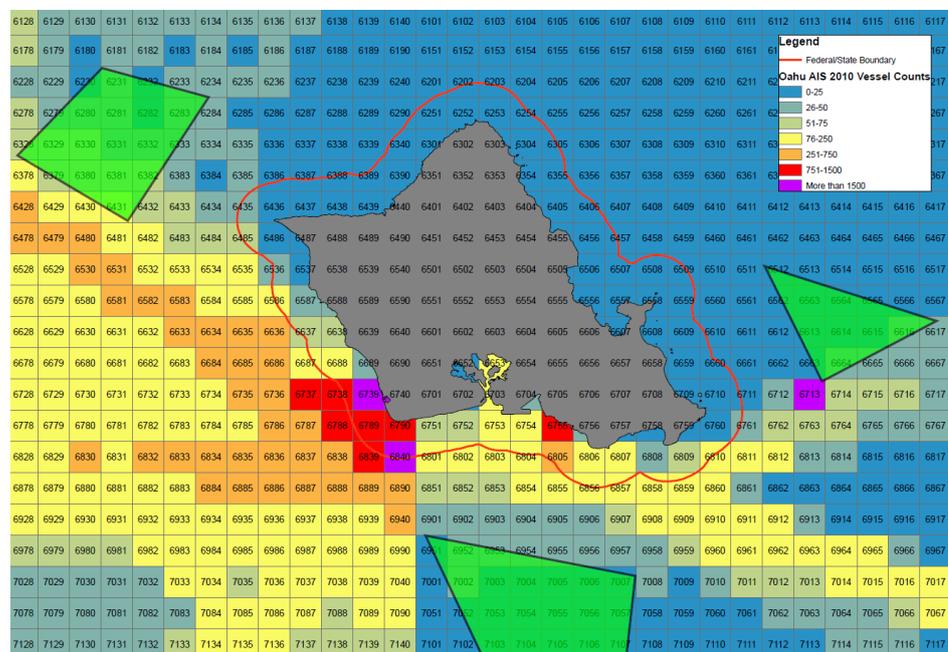


Expected Wind speeds in Meter per Second

2.2.5. Using the PaciOOS Voyager mapping tool on <http://oos.soest.hawaii.edu/pacioos/voyager/index.html> AWH has searched for limitation and restrictions around Oahu. The below map indicated that there are limited restrictions in the Southern area. An undersea cable is running through the area and there is a disused explosive dumping area on the northern side of the Project area. There is no track record of significant presence of protected or endangered species in the area.



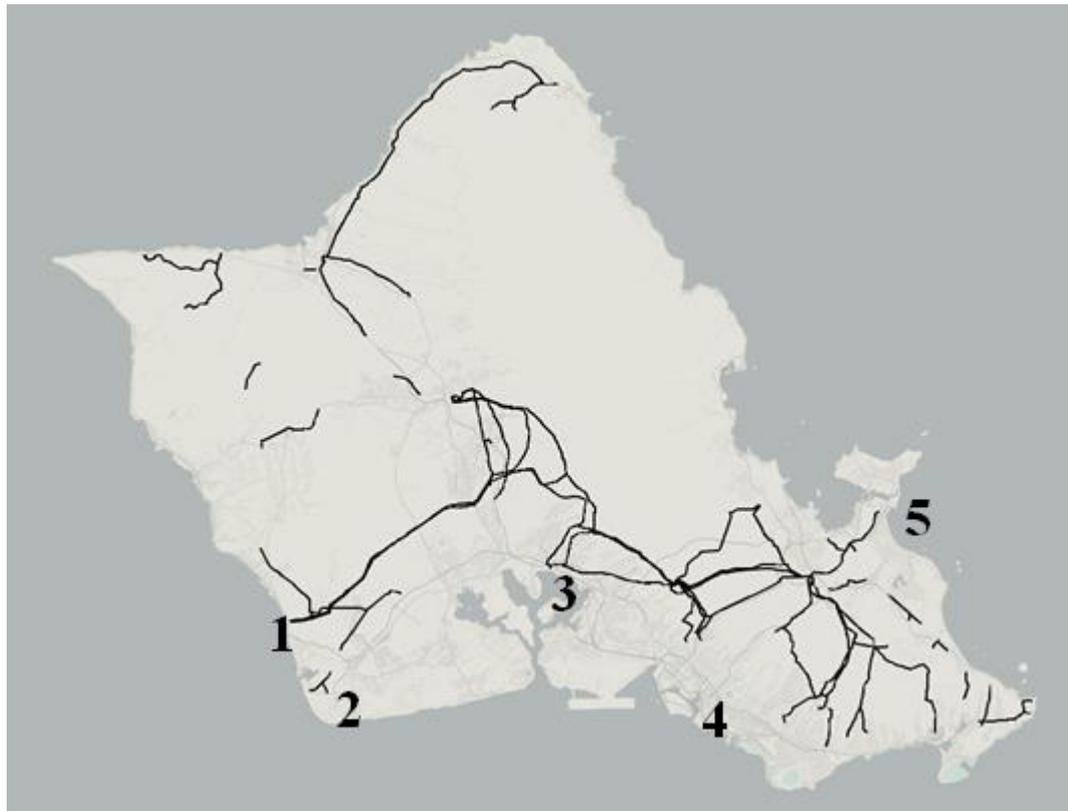
2.2.6. AIS ship count data collected by U.S. Coast Guard indicates that there is very little ship traffic in the Southern and eastern area.



2012 AIS Ship Count Data, US Coast Guard

2.2.7. Consultation with Hawaii Harbor Division quickly determined, that harbor facilities are available in the state of Hawaii for accommodating suitable dry-dock manufacturing facilities.

- 2.2.8. Screening of the Oahu grid (map below) and generating infrastructure indicates the following potential connection points:
- Kahe Power Plant
 - Barbers Point industrial area (several options)
 - Waiiau Power Plant (questionable due to possible military restrictions)
 - Honolulu Power Plant
 - Kailua area
- 2.2.9. Kahe power plant is the most obvious connection point due to the generating capacity available here, the strong grid infrastructure and the relative ease of access.
- 2.2.10. Barbers Point Industrial area is another likely option due to the relatively easy access and potential load as well as generating capacity. In this area it will also be possible to construct an additional substation and auxiliary facilities such as energy storage if and when needed.
- 2.2.11. Waiiau Power Station is also an attractive connection point due to the generating capacity here and the strong grid infrastructure, however, it is questionable if it will be possible to pull cables through Pearl Harbor.
- 2.2.12. Honolulu is a good connection point but the grid infrastructure here is unknown to AWH and it will be very difficult to upgrade it through Honolulu if required.
- 2.2.13. The Kailua area should be an attractive area for connection; however it is unlikely that the grid has sufficient and redundant capacity to accommodate a major offshore wind project.



1. Kahe Power Plant, 2. Barbers Point industrial area (several options), 3. Waiiau Power Plant (questionable due to possible military restrictions), 4. Honolulu Power Plant, 5. Kailua area

- 2.2.14. The area south of Oahu is closest to both harbor and grid connection options. Especially if a loop connection is to be installed as the wind Project grows larger and becomes a more important and critical generating facility. The Eastern area could facilitate a connection via the wind Project to Molokai, Maui and Lanai.
- 2.2.15. The northern area is the most remote site with the least visual impact and furthest away from recreational activities, however placing a windfarm here would impact a relatively unspoiled area. The Southern area will be visible from Waikiki beach. This can be regarded as both positive and negative. Negative if tourists are visiting Hawaii to enjoy an unrestricted view of the ocean (doubtful since the ocean only covers 120 degrees of the horizon at Waikiki, the sun sets over Barbers Point industrial park, the sky is filled with airplanes and the view is filled with ships, tourists, industrial areas, hotels and resorts). Positive if the Project is regarded as a landmark and visual proof that Oahu is Green and Clean (simple marketing). The eastern area is equally visible from the southeastern part of Oahu and will be part of the sunrise.
- 2.2.16. It is very likely that the Project will become a tourist attraction where tour boats will take tourists past the Project to show the size and awe of the Project. In addition it is very likely that there will be a significant increased population of fish around the foundations which will make it very attractive fishing grounds.
- 2.2.17. The southern area is by far the largest and holds the largest total potential.

2.2.18. The majority of factors points toward the southern area as the most favorable area. This is the reason for selecting the southern area as the preferred option.

2.2.19. All military restrictions are still unknown to AWH and does therefore not make the evaluation conclusive. Military restrictions could significantly alter the selection. Communication with experienced professional deep sea divers with substantial diving experience in the southern area indicates that there are very few weapons and explosives dumped in the indicated disused explosive dumping area, especially in the southern part of the area. Most of the dumped ordinances are located further north.

2.3. Geological and Biological Evaluation

2.3.1. Our selection criteria has been to find areas outside environmentally sensitive and/or protected areas, preferably more than 12 miles from the coast, lowest possible depth of water, closest distance to the existing infrastructure and best possible wind speed. Other than the acceptable depth of approx. 600 meters, only limited information about the sites' geology has been known in the selection process. However communication with experienced professional deep sea divers with substantial diving experience in the southern area indicates that the sea bed in the Southern area primarily consists of a mud bed that should be suitable for drag in anchors. Further studies will be required, however AWH is expecting that the issues found can be overcome technically and economically.

2.4. Consultation with Stakeholders

2.4.1. AWH has a bottom up approach to development. AWE has been in the wind energy development business for more than 25 years and most of the projects AWE has seen fail have been because of lack of local support. Hawaii is especially sensitive to this due to its history. AWE has worked for more than 10 years in Ireland, where similar issues like on Hawaii exist, and obtained 90% success in developing 22 wind energy sites. The lost sites were due to insufficient wind and unsuitable infrastructure and not due to local objections. AWE has been interested in the Hawaiian renewable energy market for more than 9 years. AWE has carefully monitored the culture, the discussions, the media and the trends of the developments and the balance with the Native Hawaiians. We know that many proposed projects on Hawaii have failed due to resistance from local people. AWE has therefore carefully studied Hawaiian history and consulted with Native Hawaiian leaders to understand what could potentially be acceptable to them and particularly, what is not acceptable to them.

2.4.2. AWE initially had an interest in developing a wind energy project on Molokai, but quickly became aware, that a large scale development on Molokai was not in the interest of the Native Hawaiians. AWE has therefore abandoned this idea.

2.4.3. AWE has been waiting for the Floating offshore technology to mature to a stage, where it would make sense to employ this technology on Hawaii. AWH has checked this idea with Native Hawaiian people, and although the ocean is an important part of the Native Hawaiians spiritual culture, it appears to be a more acceptable alternative than major onshore development.

- 2.4.4. AWH will continue to expand the relationship with the Native Hawaiian population at all levels.
- 2.4.5. AWH has consulted the Humpback Whale Sanctuary on protecting the whales in the Hawaiian waters. In our selected areas this should not cause any significant problems. However more consultation and studies will be needed. Possible modifications to the technical installations need to be considered to mitigate risks.
- 2.4.6. AWH has consulted NOAA Fisheries in order to further understand the marine wild life issues. Very few concrete issues were discovered, but much more consulting is needed in order to make a final decision.
- 2.4.7. AWH has consulted the Oahu Harbor Authorities, the Harbor Division, in order to find the best location for our production facilities. The Harbor Division has indicated that harbors and space are available suitable for Dry-dock facilities. Further consulting with the Harbor Division is required.
- 2.4.8. AWH has consulted FAA on the issue of using local Harbors and assemble 200 meter high turbines in these area. FAA has concerns about this, but cannot make any final determination until a formal application is filed. In addition FAA identified a potential issue with radar that needs to be addressed. The radar issue is a well know concern that has been properly and sufficiently addressed in Europe, and AWH is convinced that the FAA concerns can be satisfactorily addressed.
- 2.4.9. AWH has consulted with the US Navy. The results of the consultation is not yet fully conclusive. Further consultation with the DOD to determine what areas can be made available for offshore wind energy development is required.
- 2.4.10. AWH has consulted with the Life of the Land organization and has had sound and constructive dialogs with the organization. No substantiated conclusions were made, but AWH has found the consultations inspiring and AWH wishes to continue the dialog.
- 2.4.11. AWH has, since 2005, monitored the local discussions mostly against large scale wind energy on Molokai and Lanai. AWH has had several positive and constructive meetings with local groups and individuals on Lanai and Molokai, who have reservations against Wind Energy in general and Big Wind Energy development on Molokai and Lanai specifically. AWH considers this work to be of specific importance and will continue this effort. AWH will intensify this area of work and reach out to local and native groups on the island of Oahu specifically. Without significant local support the Project will have a very limited chance of success.
- 2.4.12. AWH has met with the staff of the Office of Native Hawaiian Relations. The Project impact on and to the Native Hawaiians were discussed. Several options of interaction and communication were discussed and a mutual interest in continuing a positive constructive relationship was agreed.

2.5. Stakeholder’s Impact

2.5.1. The stakeholder’s impact on AWH project development decisions has been significant. It has meant that AWH has shifted focus from onshore to offshore development. It has meant that AWH has delayed its development efforts by 9 years. It has meant that we have been able to more precisely locate the best area for the development. Lately many of our thoughts and plans have been confirmed and supported. Some new ideas have been created and a few ideas have been added. Further consulting with many more stakeholders are required in the future, and AWH is looking forward to these consultations.

3. General description of development objectives and proposed facilities

3.1. Objectives

3.1.1. Major Objectives

AW Hawaii Wind LLC (AWH), a member of the Alpha Wind Energy (AWE) group of companies has an ambition to and an interest in developing a 400 MW full scale offshore Wind Energy Project (the “Project”) sited in close proximity to the Hawaiian Islands with the option to expand further. The Project would comprise large-scale offshore wind turbines on WindFloat foundations.



3.1.2. The electricity would be transmitted to the Island of Oahu via undersea cables. The Project should be installed in an area South of Oahu where the wind resource is optimum and the distance to the existing infrastructure is the shortest, however, at the same time outside protected nature areas and military restricted areas and far enough away from the coast to not having a significant negative visual impact.



- 3.1.3. A majority of the main components for the installation will be produced or assembled on Hawaii creating up to 100 permanent jobs (+10 years). Assembly will be in dry-docks. After assembly the fully commissioned turbines will be towed and connected to its preinstalled anchors and electrical cables offshore.



- 3.1.4. For full animation please see:
<https://www.youtube.com/watch?v=IO7GXLR4YUo>
- 3.1.5. Most major components will have a design life of 50 years. If and when major repair is required the turbines can be towed back to the harbor avoiding the requirement for and necessity of major offshore vessels and cranes.
- 3.1.6. HECO RFP for renewable energy
AWH will, if at all possible, participate in any future HECO RFP for renewable energy generated power for Oahu. AWH will carefully evaluate any RFP in order to best adapt this Project to the requirements of the RFP. AWH do believe that, at the end of the day, this Project will be the most competitive project which will meet the needs for renewable energy on Oahu both in the short, medium and long term. AWH will be happy to participate in multilateral talks, brainstorming and

negotiations in order to optimize the pricing structure for the consumers on Oahu.

3.1.7. Grid Connection Plan

As soon as AWH has secured an Ocean Energy Lease right AWH will initiate talks with HECO regarding the grid connection. Since the development process of the Project, before major construction starts, is expected to take 3 years, there should be sufficient time to fully study and negotiate grid connection and integration issues for the Project. AWH does consider the interconnection and integration of the Project into HECO grid to be specifically complex and cannot emphasize enough the importance of close, in-depth and positive cooperation between the Project and HECO in order to optimize the benefits of the Project.

3.2. Offshore Production Facilities and Substations

3.2.1. Offshore Facilities

AWH is planning to use the WindFloat floating offshore technology with 6-8MW turbines from world leading turbine manufacturers with a long standing track record in the wind turbine manufacturing and offshore industry.



3.2.2. The concept is best illustrated in the following animation:

<https://www.youtube.com/watch?v=IO7GXLR4YUo>

3.2.3. Installation Vessels

AWH expects that one permanent major anchor handling and tug supply vessel (AHTSV) and several smaller support and supply vessels should be sufficient to perform most of the required installations on the Project.



Anchor handling and tug supply vessel (AHTSV)

3.2.4. However for special tasks such as cable laying, it could be necessary to bring in special vessels for shorter periods of time. The extent of this will be determined as the Project is further developed and the technology to be used has been further defined.

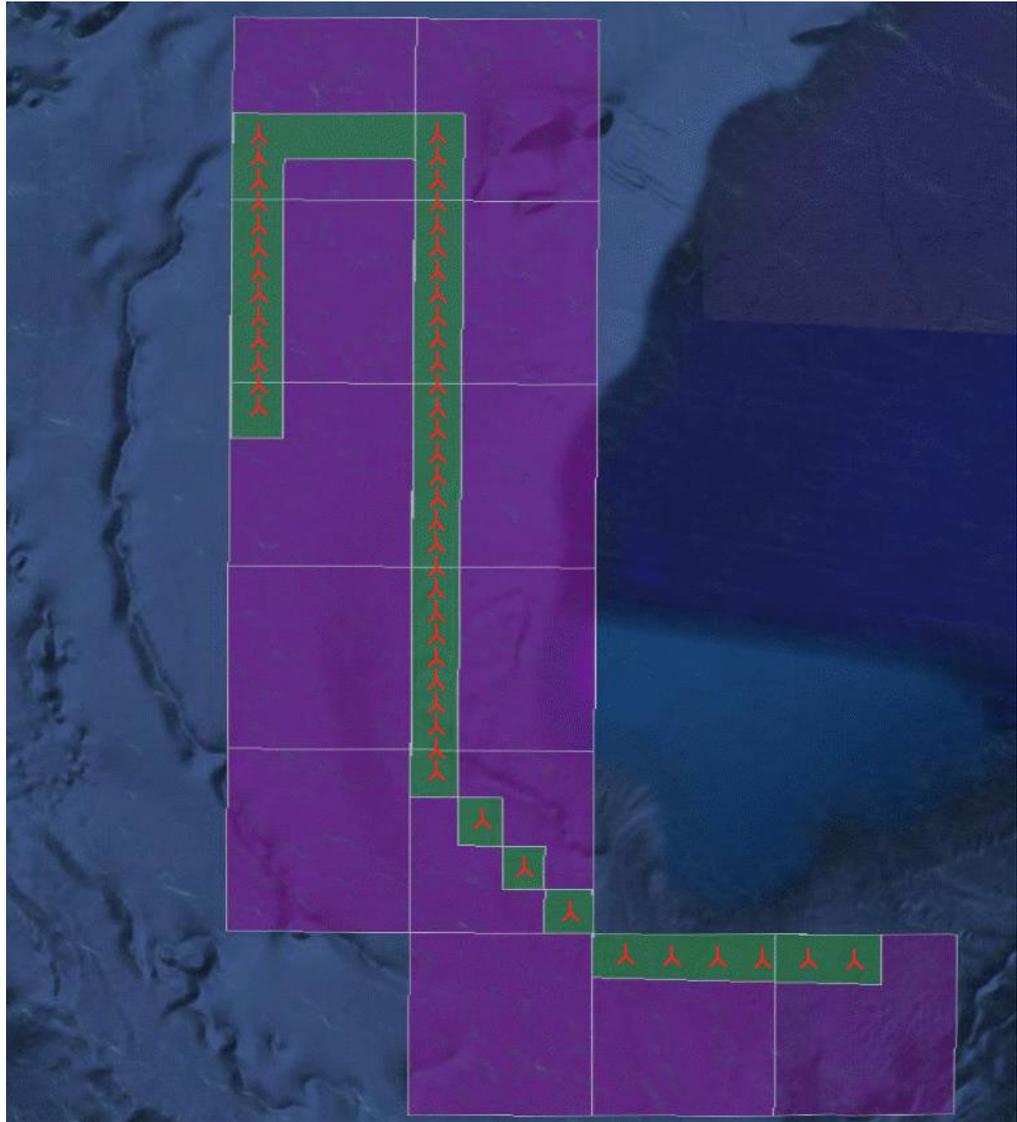


Cable laying vessel

3.2.5. Site Layout

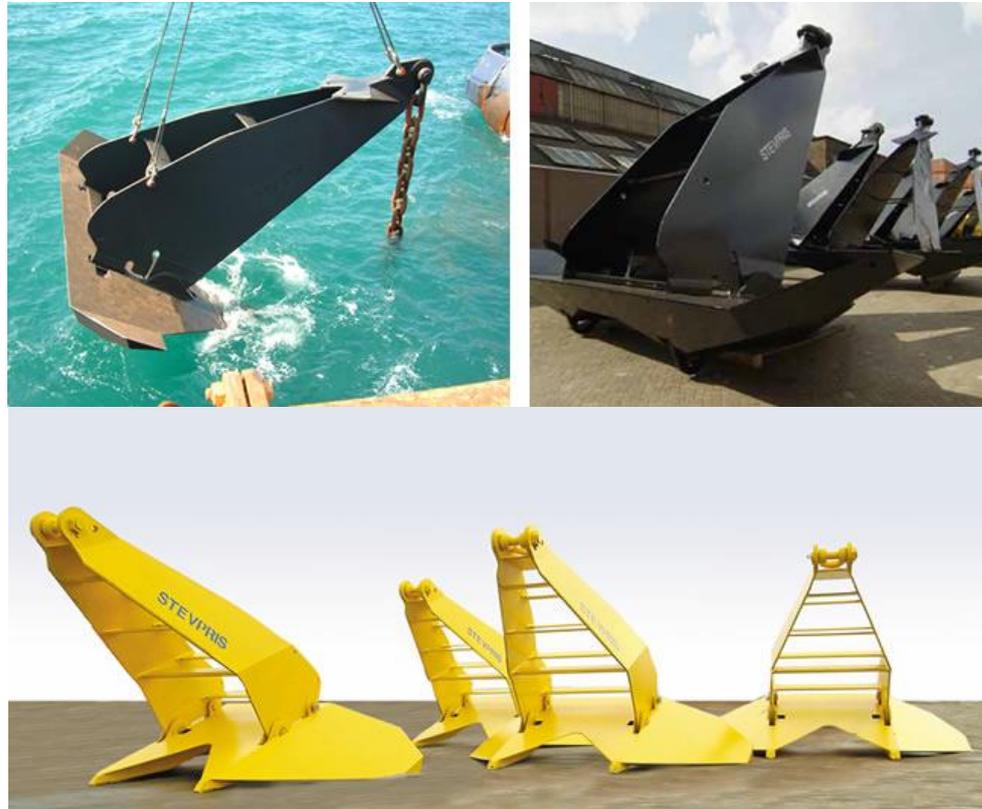
Several factors play into the design of the optimum site layout. The wind resource, as wind speed and primary direction, park efficiency, mooring lines, undersea cables, ocean floor conditions, environmental and wildlife considerations, visual impact, aviation and military activities and other use of and interest in the area, all play in the decisions on how to layout the site. At the

present the most likely layout will be in rows with 3-5 rotor diameters between the turbines and 5-20 rotor diameters between the rows. Due to the floating and thereby moving nature of the foundation, it is an option that the turbines will not be installed in a straight line but more likely in a slight bow, since this is a graceful and aesthetical positive visual impact and does mask the slight misalignment of the turbines due to their movements. Further studies are required before the final layout can be determined.



3.2.6. Mooring System

The mooring system will most likely consist of drag-in anchors.



Examples of drag in anchors

3.2.7. The length of the mooring lines will depend on the type and weight of anchors. With the right design of anchors it is expected that the anchors will be able to be placed within the proposed area. In a lease block of 1200 x 1200 meters where mooring lines are placed diagonally in the block this will allow anchors to be placed app. 850 meters from the center. Even at app 1000 meter sea depth this provides sufficient stability of the system. However it does depend on the ocean floor conditions which are not yet confirmed. Further investigations are required.

3.2.8. Cable Suspension

Offshore electrical cables are well known from many places around the world. This includes high voltage electrical cables for ocean depths of 6-800 meters as will be the case for this Project. However, due to the massive focus on offshore wind energy and the relative short distance between turbines in wind energy Projects, the development of new and innovative cable and suspension systems and technologies are moving rapidly forward. This includes the option for buried cables, flexible cables, umbilical cables and even floating cables as well as AC and DC cables. Due to the rapid development of the offshore cable technologies it is difficult to determine at this time, what will be the best and most economical solution. AWH will be aiming towards a long term and robust solution that will have long term viability with low maintenance and low environmental impact.

3.2.9. Emergency Precautions

The WindFloat system is not critically sensitive to a Tsunami at the site or earthquakes in the vicinity. The highest risk to the site is collision with large ships and impact of hurricanes. AWH has launched two studies into the risk of hurricanes. The studies show, that the risk of tropical storms and hurricanes in the vicinity of the site is low but not impossible.

3.2.10. The WindFloat and turbines will be properly marked for sea navigation according to federal and international regulations and procedures as well as being marked on navigational maps.

3.2.11. The impact of a direct hit of a major hurricane is difficult to predict. It is not expected that the waves will be the most critical issue. The most critical issue will most likely be the high winds. The turbines will be designed to stop and pitch the blades and yaw the nacelle into the best position for survival. It is likely that some blades will break off but it is unlikely that the tower and nacelle will suffer significant damage. The mooring system will also be designed to withstand hurricane force winds. Further studies, design improvements and tests are required prior to manufacturing and installation.

3.2.12. Offshore Substations

The initial studies performed by AWH indicate that the most likely configuration of the electrical grid on the site is collecting power at 33-69kV level and either transmit power from the offshore collector station to onshore at 69kV or transform power up to 138kV at the offshore collector station and transmit power from the offshore collector station to onshore at 138kV. Initially only one collector station is planned with one cable to onshore. However as the Project grows in size, it is important to build redundancy into the system. 2 or more collector and transformer offshore stations will be required. Redundancy will be built into the system in order to perform service and maintenance as well as bypass faults on the grid systems without interrupting the power flow from the entire Project. The offshore collector and substations will most likely be on dedicated floating foundations to avoid conflicting issues with turbine repair that has to take place in the harbor.

3.2.13. Future Site Assessment

Once an Ocean Energy Lease right has been secured, a substantial number of further studies as mentioned above will be initiated. A significant number of additional not yet identified studies will also be required and diligently performed.

3.3. **Power Transmission and Grid Interconnection**

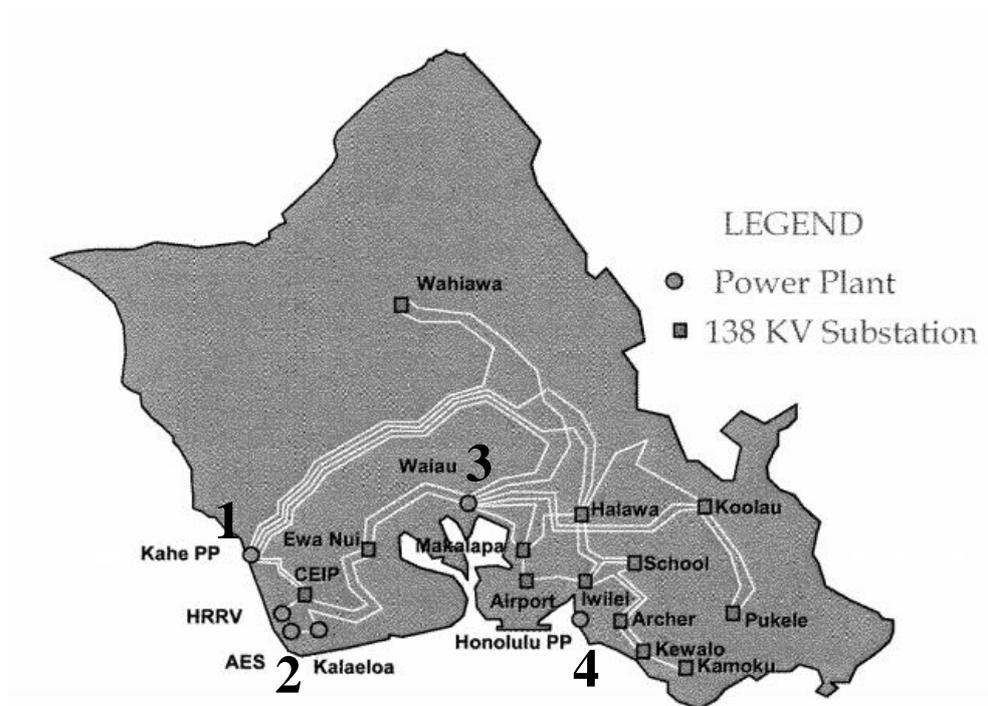
3.3.1. Power Cable Routing

Screening of the Oahu grid (map below) and generating infrastructure indicate the following potential connection points for a Project south of Oahu:

- Kahe Power Plant
- Barbers Point industrial area (several options)
- Waiiau Power Plant (questionable due to possible military restrictions)
- Honolulu Power Plant

3.3.2. Kahe Power plant is the most obvious connection point due to the generating capacity available here, the strong grid infrastructure and the relative ease of access.

3.3.3. Barbers Point Industrial area is another likely option due to the relatively easy access and potential load as well as generating capacity. In this area it will also be possible to construct additional substation, auxiliary facilities and storage if and when needed.



Oahu 138kV transmission system

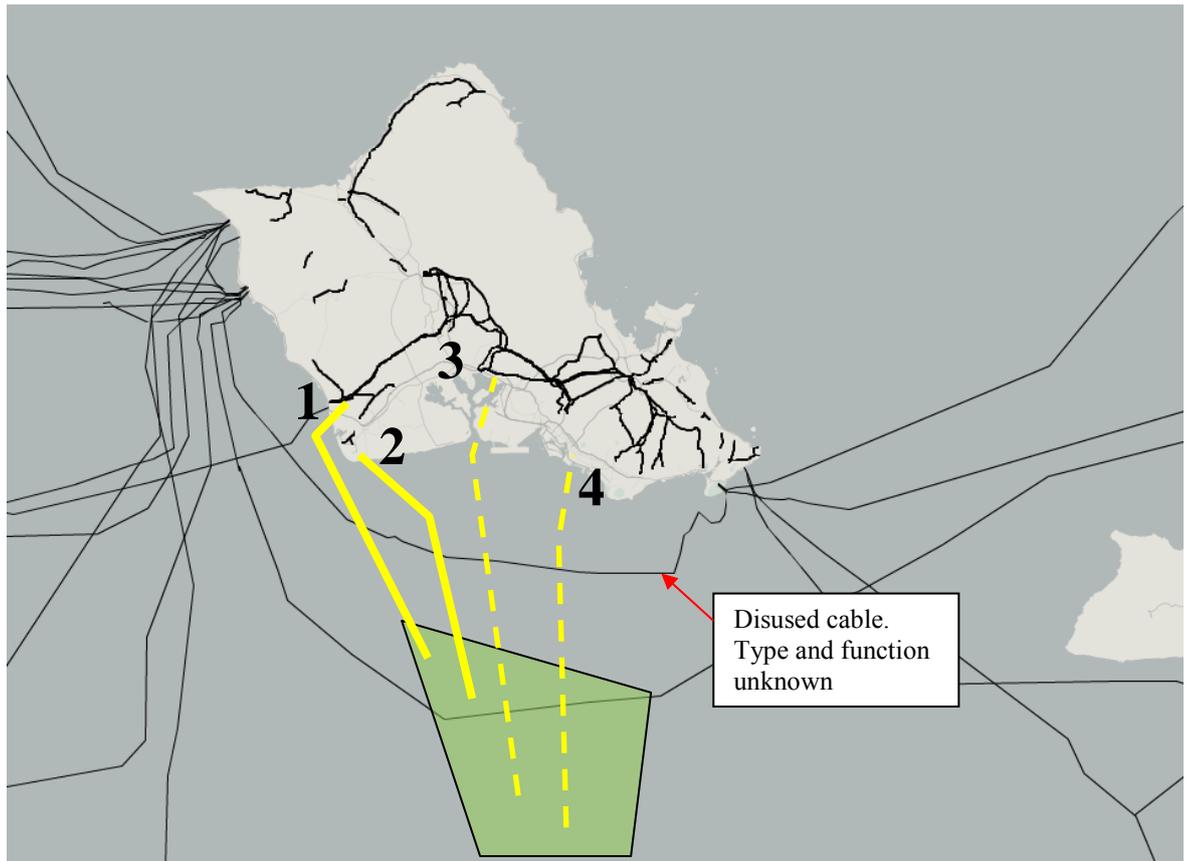
3.3.4. Waiiau Power Station is also an attractive connection point due to the generating capacity here and the strong grid infrastructure, however it is questionable if it will be possible to lay cables through Pearl Harbor.

3.3.5. Honolulu Power Plant is a good connection point but the grid infrastructure here is unknown to AWH and it will be very difficult to upgrade it through Honolulu if required.

3.3.6. As the Project grows in size it will be important to be able to loop the Project into the Oahu grid infrastructure in order to provide redundancy.

3.3.7. Past and Future Route Surveys

AWH has not yet performed any detailed offshore cable route surveys. However map studies indicate only minor issues with other known cables. Full offshore cable route studies will be performed after an Ocean Lease Right has been secured. Only minor and short onshore cable routing will be necessary and most likely in industrial areas. If any major issues are encountered AWH is prepared to consider underground cables.



Grid connection options: 1. Kahe Power Plant, 2. Barbers Point industrial area (several options), 3. Wai'anae Power Plant (questionable due to possible military restrictions), 4. Honolulu Power Plant,

3.3.8. Cable Specifications

Offshore electrical cables are well known from many places around the world. This includes high voltage electrical cables for ocean depths of 6-800 meters as will be the case for this Project. However, due to the massive focus on offshore wind energy and the relative short distance between turbines in wind energy Projects, the development of new and innovative cable and suspension systems and technologies are moving rapidly forward. This includes the option for buried cables, flexible cables, umbilical cables and even floating cables as well as AC and DC cables. Due to the rapid development of the offshore cable technologies it is difficult to determine at this time, what will be the best and most economical solution. AWH will be aiming towards a long term and robust solution that will have long term viability with low maintenance and low environmental impact.

3.3.9. Cable Installation Plans

AWH will work with all relevant authorities in order to obtain the appropriate and necessary permissions, authorizations and certifications required to install the cables to and from the Project as well as internally in the Project. AWH will use the best available technologies to install the cables in order to minimize the environmental impacts. This will include horizontal drilling if and where necessary.

3.3.10. Cable Installation Vessels

AWH expects that the permanently available Anchor Handling and Tug Supply Vessel (AHTSV) should be sufficient to perform most of the required inter-turbine cable installation tasks on the Project.



Anchor handling and tug supply vessel (AHTSV)

3.3.11. However, for major cable laying tasks to and from the shore it could be necessary to bring in special vessels for shorter periods of time. The detailed use of vessels will be determined with due respect to US laws as the Project is further developed and the technology to be used has been further defined.



Cable laying vessel

3.3.12. Cable crossings

AWH will use the best available technologies for any cable crossings. Since the number, type, size, condition and position of cables to be crossed is yet unknown, it is not possible to make detailed descriptions of the cable crossing technology

and technique at this time.

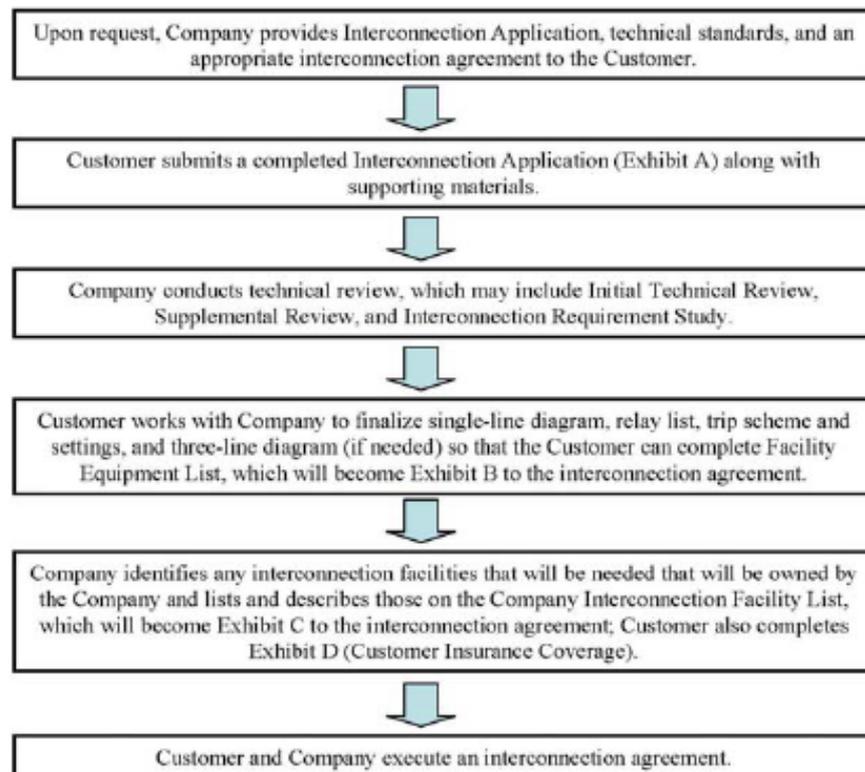
3.3.13. Coral Reefs

AWH will, if at all possible, attempt to avoid crossing any coral reefs with any cables. If it is not possible to avoid coral reefs, AWH will use best available technologies and techniques to pass the coral reefs with the absolute minimal impact to the coral reefs. This includes using horizontal drilling to pass underneath the coral reefs. AWH will consult with all relevant authorities in order to find the optimum solution and obtain all the relevant permissions.

3.3.14. Grid Integration Plans

AWE has applied for interconnection in many countries including the continental US. AWH has reviewed the HECO process as defined by HECO Rule 14, Appendix III and found it to be similar to the process AWE has experienced in the continental US.

3.3.15. The HECO interconnection process is defined by the chart below. The process allows for “Simplified Interconnection projects” to go through the steps of the process without having to undergo all elements of the process



HECO Interconnection process
(Source HECO Rule 14 sheet 34D-2 December 3, 2011)

3.3.16. AWH, however, expect the size and location of this project will require the full process to be applied. The major activity in the process will be the Interconnection Requirement Study (IRS) which can take up to 150 calendars days. AWH

estimates the full process will take one to one and half year to accomplish. In the process AWH shall provide detailed technical information on the planned interconnection and pay the cost of the IRS. During the process AWH expects to work closely and in great detail with HECO to define the best possible solution.

3.3.17. AWH will hire a US based consultant company, preferably with expertise on the HECO transmission system, to provide the technical information required during the process.

3.3.18. Anticipated schedule:

- Preliminary work,
 - a) Informal consultations, 3 months and AWH generates first set of technical data for application
 - b) AWH, formal application, 1 week
- HECO step 1,
 - a) HECO provides interconnection process information, 5 business days (HECO rule)
 - b) AWH provides technical information, 1 day (drafted earlier)
- HECO step 2,
 - a) HECO confirms technical information is complete, 15 business days or as agreed with HECO (HECO rule)
- HECO step 3
 - a) HECO Initial Technical Review and HECO notifies that a Supplemental Review is required, 15 business days (HECO rule)
 - b) AWH agrees to the Supplemental Review, 1 business day
 - c) HECO performs the Supplemental Review and determines whether an Interconnection Requirements Study (IRS) is required, 20 business days (HECO rule)
 - d) Scope and cost of IRS is agreed, 40 business days (this time limit is not set by HECO)
 - e) AWH provides payment for IRS, 1 business day (this time limit is not set by HECO)
 - f) IRS is performed, 150 business days or as agreed (HECO rule)

- HECO step 4,
 - a) Interconnection facilities are defined and agreed, 30 business days (no time limit set by HECO rule)

- HECO step 5,
 - a) HECO completes a listing of the interconnection facilities, 15 business days or as agreed (HECO rule)
 - b) HECO and AWH agree on schedule for the interconnection facilities construction and time of interconnect (30 business days, time limit not set by HECO)

- HECO step 6,
 - a) HECO provides an executable interconnection agreement, 5 business days (HECO rule)
 - b) HECO provides fully executed interconnection agreement, 15 business days after all permits for generating facility has been granted (HECO rule)

3.3.19. Control and prediction

In order to facilitate the significant penetration of renewable energy from the Project and other sources on Oahu, it will be important to implement a control and prediction system that can accurately predict the production of power from the various resources both in the short term (minutes to one hour), medium term (1-36 hours) and longer term (36 hours – 5 days) ahead. In addition it will be important to be able to centrally control the output of the Project as well as other controllable power sources.

3.3.20. With the latest technology developed in Europe it is possible to very accurately predict the production of wind and solar projects in the short, medium and longer term. The medium term is typically within 1-2% accuracy. In addition it is possible to remotely control and curtail the wind projects to shape the power precisely to the power required at any time or to the power committed to the system (within the limits of the available wind resource). Finally, it is possible to remotely control the firm power stations to deliver the balance of power needed at any time.

3.3.21. These systems and many other systems and techniques such as smart use of electricity, energy storage, electrical vehicles etc. are important technologies that need to be developed and implemented alongside the Project in order to maximize the benefit of the Project.

3.3.22. AWH is happy to bring all of its in house and network/partner know-how and ideas to the Hawaiian market in order to optimize the penetration of renewable

energy

3.4. Onshore Support Facilities and Staging Areas (Ports)

3.4.1. Ports

Consulting with the Harbor Division Authority confirms that suitable harbors are available for manufacturing, servicing and maintenance of the Project. An area of app. 100,000 m² is required. Other ports will play supporting roles for shipping in parts and for supporting service functions.

3.4.2. Required Vessels

The use of vessels are described in section 3.2.33, 3.3.10

3.4.3. Local Supply Chain and Infrastructure

Most main components will be produced elsewhere and shipped to Hawaii for assembly. However, some smaller components and several support services can be provided by local industries. AWH will seek to support the local industries and services companies as best it can.

3.4.4. Offshore O&M

Offshore O&M is a major part of keeping the Project operating and performing optimum. Each turbine will require 2-4 scheduled service and maintenance visits per year. The visits will last from 1 to 4 days. Overnight stays at the turbines might be an option. Additional unscheduled service and maintenance visits are likely, but should be minimized. Most access will be by boat but some helicopter support should be expected from time to time. If major overhaul or repairs are required, it is expected that the turbine will be disconnected and hauled into the harbor for ease of work and use of major cranes.

3.4.5. Employment Impacts

AWH expects employment for app. 40 people directly in manufacturing. AWH expects an additional work force growing with the size of the Project to approx. 60 people for a 400 MW project in functions such as Management, Operations, Administration, Service, Maintenance, Vessel Operations and support functions. AWH expects an additional 1-200 local jobs in indirect jobs supporting the manufacturing, installation and operation of the Project. In addition to this AWH expects, that the Project will stimulate teaching, training, study and research interest and opportunities at university level as well as substantial international interest in coming to Hawaii to see and learn how integration and operation of large scale renewable energy into a limited stand-alone grid is done. As the penetration of renewable energy increases, this will stimulate the interest in increasing the use of electricity in other fossil fuel dependent sectors like the transport sector. This will further increase the know-how, education, production, retail sale, installation, operation, service, maintenance and export which results in many more new jobs. It is a self-driven win-win scenario.

3.4.6. Community Benefits

In addition to the permanent jobs created on Oahu and supporting the reduction of dependency on oil, AWH will work with a significant community benefit plan,

which will benefit the local community and population in general in the short, medium and long term. The plan can include sponsorships, training, education, support and participation as the situation dictates and as there is local interest.

4. General Schedule of Activities

4.1. The general schedules are based on best estimates with the knowledge AWH has at this time. A multitude of factors play into the schedule and any change on any of the critical path items will impact the schedule. However, at this time it is estimated that Construction of infrastructure can start by mid-2018, construction of turbines can start mid-2019 and the first turbine could be commissioned delivering power to the Oahu grid by early 2020. This is a very aggressive but realistic schedule. It will, however, take every effort at all levels to meet this schedule.

4.2. OCS Leasing Process

4.2.1. The OCS leasing process is described in 30 CFR 585.230 and 30 CFR 585.210 and is divided into a noncompetitive process and a competitive process. After a qualified application BOEM determines if there is a competitive interest for the same area. If there is, then the competitive process is followed. If there is no competitive interest, then the noncompetitive process is followed.

4.3. Project Schedule

Detailed project schedules has been developed in the Gantt diagrams and are included in the confidential part of the application. In general the project can be divided into the following phases:

Phase	Description	Timeframe
1	Feasibility technology, market development and preparation	2005-2014
2	BOEM Ocean Energy Lease Acquisition	2015-2016
3	Project Development	2016-2018
4	Construction of manufacturing facilities and infrastructure	2018-2020
5	Construction of windfarm	2019-2027
6	Operation	2020-2070
7	Decommissioning or repowering	2070?

4.4. Scope of Work + SAP & COP

4.4.1. Detailed Scope of Work will have to be developed for each phase of the project. Several external consultants will be involved in developing the Scope of Work for the phases they are experts in and are involved with. Detailed Scope of Work will be developed once the contents of the different phases are better defined and agreed with all the relevant stakeholders.

4.4.2. Similar processes will be followed for development of Site Assessment Plans (SAP) and Construction and Operation Plans (COP). SAP and COP will be delivered in a timely manner for BOEM approval.

5. GANTT Chart Information

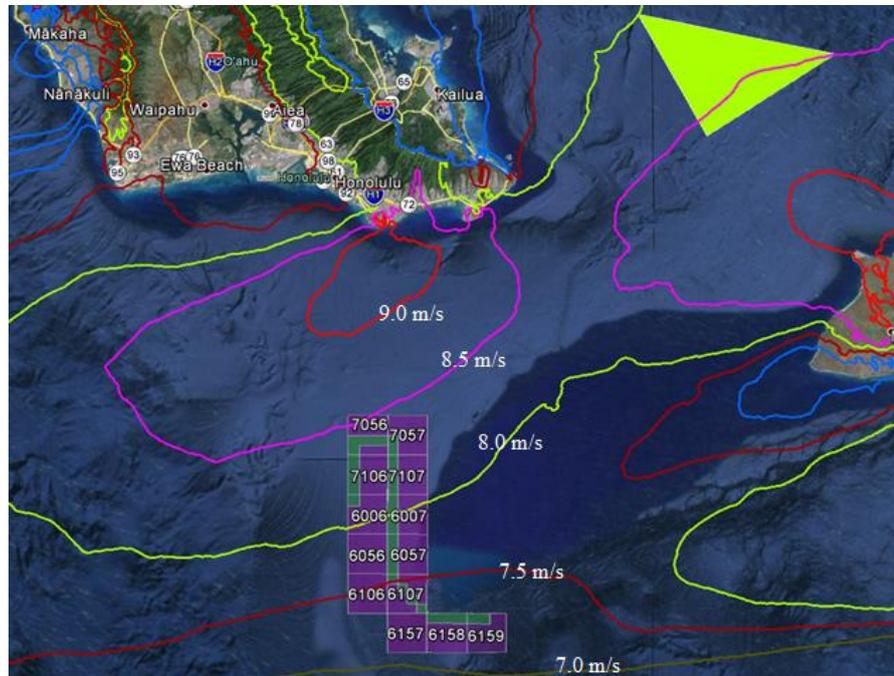
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6. Energy and Environmental Resource Data

6.1. Energy Resource

6.1.1. Since the wind resource is the fuel for the projects wind turbines and since the energy produced is proportional to the wind speed cubed, AWH has spent significant time on determining where the best wind resource is and what it is. AWH has searched all available open source in addition to using a few private sources and commissioned Energy and Environmental Data (EMD International) to perform a study to verify the open sources.

6.1.2. Wind Energy Resource Map



Expected Wind speeds in Meter per Second

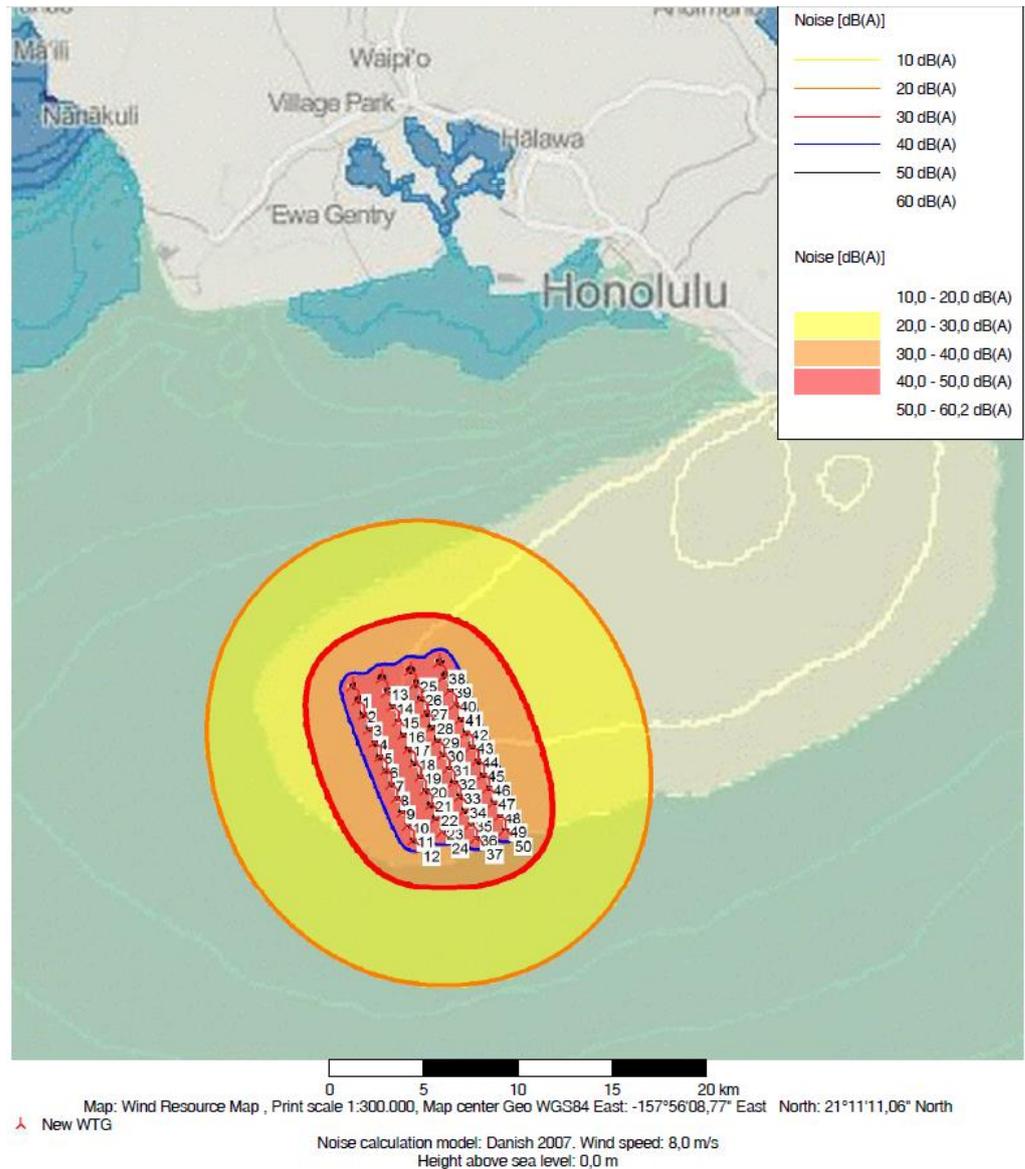
6.2. Environmental Resources

6.2.1. AWH has commissioned Planning Solutions Inc. (PSI) to conduct a Critical Issues Analysis (CIA) to address the environmental aspects of the Project.

6.2.2. Photomontages, animations and 3D models will be created as the project is further developed.

6.2.3. Noise Resources

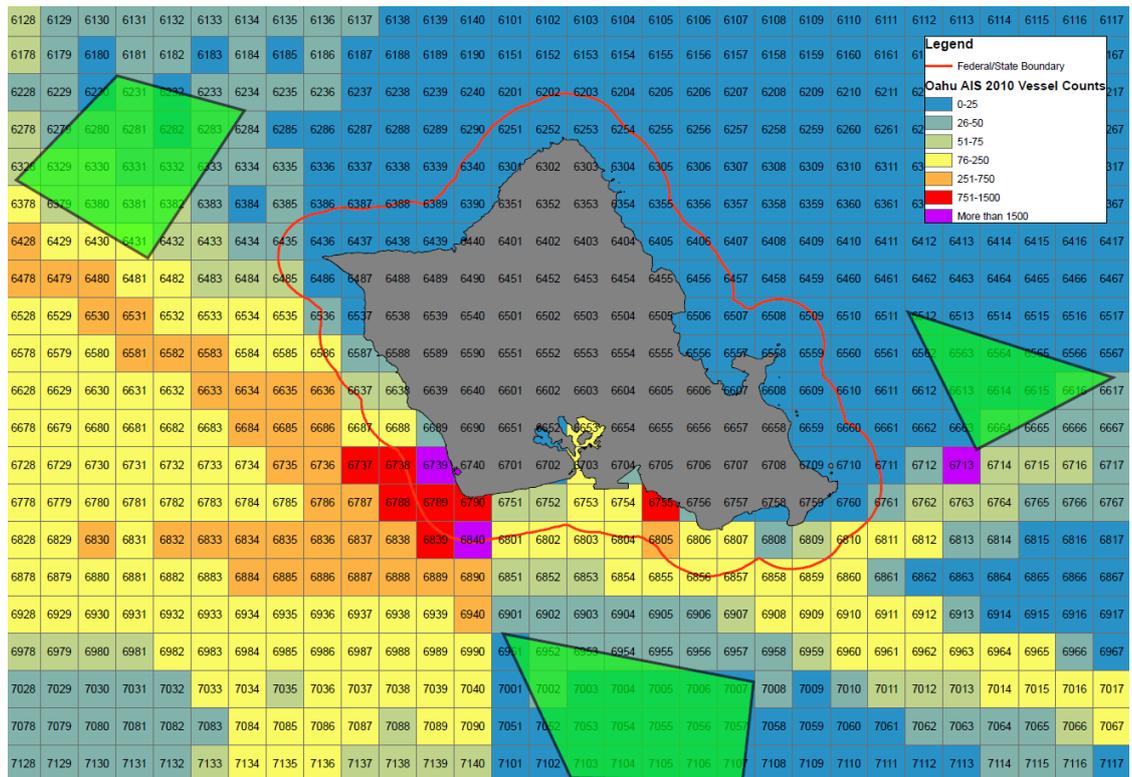
Even the most conservative noise calculation shows, that it will not be possible to hear the turbines onshore on Oahu. 20 dB is typically considered to be the absolute lower limit of what the human ear can hear, but it does require no other sound to be present. If the wind is blowing there will be substantial ambient sound. 40 dB is generally considered the level where sound is noticed. Below is a generic noise calculation for a generic wind farm in the general area of the Project using a very conservative emission noise of 112 dB.



Conservative and generic noise calculation of 50 ea. 8 MW turbines

6.2.4. Marine transportation and Commerce

AIS ship count data collected by U.S. Coast Guard indicate that there is very little ship traffic in the Southern and Eastern area.



2012 AIS Ship Count Data, US Coast Guard

7. Conformance to State or Local Energy Planning

7.1. Hawaii Clean Energy Initiative

7.1.1. The Hawaii Clean Energy Initiative calls for 70% renewable energy by 2030. Where 40% of the electricity production should come from renewable energy. The current fuel mix for electricity production on Oahu is according to HECO as follows:

Fuel Mix in HECO Service Area - 2013 Calendar Year*

Fuel Sources	Hawaiian Electric Company (Island of Oahu)
Oil	73.40%
Coal	18.92%
Biofuel	0.40%
Biomass	0
Geothermal	0
Hydro	0
Solar	0.38%
Solid Waste	5.21%
Wind	1.69%
TOTAL:	100%
Total from Renewable Resources	7.68%

7.1.1.1.

* Based on the amount of electricity generated by HECO and purchased from independent power producers in 2013

7.1.2. The Project would be designed to serve primarily the Hawaiian island of Oahu. With a population of roughly 1 Million, or 75% of the population of the State of Hawaii. Oahu is by far the most populated Hawaiian Island and consequently has the highest electricity load. Oahu has a system load typically ranging from a peak of 1,200MW to a minimum of 600MW, and an annual net generation of roughly 8,000,000 MWh (2012, US EIA). The significance of the size of the Oahu market, at first analysis, is, that it is large enough to handle a large-scale intermittent resource. For example, a 700MW offshore windfarm with a conservative 35-40% capacity factor would account for approximately 25-30% of existing net generation, which is generally considered acceptable for intermittent resource penetration. Furthermore, increased use of prediction and control methods used in Europe, electric cars, further smart grid development and implementation and possible energy storage facilities will only increase the possibility for additional wind penetration for the island.

7.1.3. Due to the scarce onshore renewable energy options and difficulty in bringing capacity from other islands in the state of Hawaii, the Project is the most likely solution to meet and exceed the goals of the Hawaiian Clean Energy Initiative at a justifiable price.

7.2. Conformance letters

7.2.1. AWH's proposed project to develop Oahu's offshore wind energy resources will directly support "Hawaii's Clean Energy Initiative" which establishes a goal of transforming Hawaii's dependence on oil imports to 70% clean energy by 2030 through energy efficiency/conservation and the development of renewable energy resources. In a July 13, 2013 letter to Secretary of the Navy, Ray Maybus, Governor Abercrombie emphasized the important role offshore wind can play in Hawaii's energy future.

8. Legal, Technical and Financial Qualifications

8.1. Legal Qualification

8.1.1. AWH has obtained legal qualification to apply for and hold Rights of Use and Easement (RUE) and Right Of Way (ROW) on the US Outer Continental Shelf (OCS) with the Bureau of Ocean Energy Management (BOEM) under BOEM Company Number 15043.

8.2. Technical Qualifications

8.2.1. The AWH group of companies Technical Qualifications are included in the classified part of the application.

8.3. Financial Qualifications

8.3.1. Cost of Project

At this early stage it is very difficult to make precise estimations of project costs. There are a number of new, difficult and possibly costly issues that needs to be taken into account. There are no significant suitable manufacturing facilities available in the State of Hawaii, there are no available Harbor facilities for the assembly work etc. However, AWH has set a target price not to exceed \$5 million/MW installed for a 400 MW project. AWH believe that this is possible.

8.3.2. Project Mobilization Cost and Running Cost

The primary mobilization cost is going to be the cost of the harbor infrastructure including office space. Initially all vessels will be leased, possibly with an option to purchase at a later stage. The project mobilization costs are estimated to be in the order of \$20 million.

8.3.3. Cost Breakdown

It is difficult at this stage to make an accurate cost breakdown, however it is very likely that the cost breakdown could look like depicted below for a 400 MW project.

CAPEX	Low	High	Base	Hawaii Adder	Incl conting.	Total Cost	per MW
Turbine Procurement/unit incl installation	8.000.000	12.000.000	10.000.000		\$12.500.000	\$625.000.000	\$1.562.500
Cost of WindFloat	3.600.000	7.700.000	5.650.000		\$7.062.500	\$353.125.000	\$882.813
WindFloat Installation Crew Vessel/unit	125.000	350.000	237.500	285.000	\$296.875	\$14.843.750	\$37.109
WindFloat Installation Harbor Tug/unit	150.000	450.000	300.000	360.000	\$375.000	\$18.750.000	\$46.875
Mooring procurement/unit	800.000	1.200.000	1.000.000		\$1.250.000	\$62.500.000	\$156.250
Mooring transportation and installation/unit	240.000	1.032.000	636.000	763.200	\$795.000	\$39.750.000	\$99.375
Marine equip for turbine installation/unit	84.000	164.000	124.000	148.800	\$155.000	\$7.750.000	\$19.375
Turbine Installation other/unit	50.000	100.000	75.000	90.000	\$93.750	\$4.687.500	\$11.719
Array cabling procurement (300 \$/meter)	15.000.000	35.000.000	25.000.000		\$31.250.000	\$31.250.000	\$78.125
Marine equip for array cabling/unit	380.000	760.000	570.000	684.000	\$712.500	\$35.625.000	\$89.063
Offshore converter station	127.000.000	130.000.000	128.500.000		\$160.625.000	\$160.625.000	\$401.563
Onshore converter station and switchyard	75.000.000	125.000.000	100.000.000		\$125.000.000	\$125.000.000	\$312.500
Undersea HVDC interconnection cable procurement	40.000.000	60.000.000	50.000.000		\$62.500.000	\$62.500.000	\$156.250
Undersea HVDC interconnection cable installation	4.000.000	6.000.000	5.000.000		\$6.250.000	\$6.250.000	\$15.625
Project Costs	50.000.000	100.000.000	75.000.000		\$93.750.000	\$93.750.000	\$234.375
Total						\$1.641.406.250	\$4.103.516
Total with project contingency	20%					\$1.969.687.500	\$4.924.219