

# ZNE Construction at Bodega Marine Laboratory

**Team:** Mark T. Lozano <sup>1</sup>  
Joyce Tse <sup>2</sup>  
Lauren Zaren <sup>3</sup>

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1. Energy and Efficiency Institute - [mtlozano@ucdavis.edu](mailto:mtlozano@ucdavis.edu)
2. College of Agricultural and Environmental Sciences, Department of Human Ecology - [ictse@ucdavis.edu](mailto:ictse@ucdavis.edu)
3. College of Letters and Science, Department of Political Science - [lizaren@ucdavis.edu](mailto:lizaren@ucdavis.edu)

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# 1. Project Background

The UC Davis Bodega Laboratory was established in 1960 by UC Berkeley, and transferred to UC Davis in 1983. It is located in the Bodega Marine Reserve within Sonoma County, and is one of four major coastal upwelling areas. These are particularly important hubs for conservation and research because they promote high biodiversity. The research conducted by Bodega Marine Lab (BML) focuses primarily on coastal health and human impacts on it. As part of their research, they pump an average 500,000 gallons of ocean water up the coastal cliff per day, and also provide the amenities required by their many research and occasional guests. As a result, their annual energy use approached 2 million kWh, which is equivalent to the consumption of 161 homes<sup>1</sup>. Especially given their close relation with the environment, they have already implemented a number of energy reduction strategies, yet they continue to search for ways to reduce energy use and emission production. In fact, they hope to become the first carbon neutral marine lab in the world.

BML is considering the replacement of their current housing facility with a new Zero Net Energy building. The existing building is almost as old as BML itself, and has worn down over the year. Its technology is outdated and inefficient compared to modern options. However, one additional benefit is that the marshland surrounding the current building has been slowly expanding, and removing the building would allow the marshland to continue its course and take over its surrounding area. However, this would warrant the construction of the ZNE building on another portion of the property. Unfortunately for the progress of this project, building along the coastline brings many logistical obstacles, particularly regulational barriers. This project aimed to define these barriers for our clients, provide previous case studies as reference points, and establish a plan for the next steps leading up to the approval of a permit for the construction of these buildings.

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<sup>1</sup> <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>

## 2. Literature Review

This section provides an overview of the main policies that will regulate this project, and of relevant case studies that can be used as guiding points.

### 2.1. Policy Review

Proposed coastal project are required to abide by the California Coastal Act (CCA) and the California Environmental Quality Act (CEQA).

#### 2.1.1. Coastal Commission Act

The CCA was enacted by the State Legislature as a set of laws to govern the decisions made by the Coastal Commission, and its primarily role is to establish standards for development within the Coastal Zone. The reason for doing so is to promote California's commitment to open access; by regulating projects along the coast, the Coastal Commission can increase public access to previously inaccessible areas. After reviewing the CCA, sections of particular importance include:

- Chapter 3: Coastal Resource and Management Policy
  - Section 30254 Public works facilities
  - Section 30212 New development projects
- Chapter 7: Development Controls

The following is an outline of the information required by the Coastal Commissions when submitting a permit application<sup>2</sup>. The first section is information about the applicant. The second section deals with the development plan, so the applicant must provide the project location, a description of the proposed development, estimated cost, dimensions of the proposed structure, and required utility extensions among other things. The following section elaborates on the development plan and asks about previously existing buildings, the need for demolition, visibility, and ultimately gauges the environmental impacts of the location in question. Section four outlines the required attachments, which include: the applicant's legal interest in the property, parcel maps, and a **copy of the Environmental Impact Report (EIR)**; note that not all required documents apply to BML, such as envelopes addresses to owners of property within 100 feet of the proposed development. We strongly suggest that leaders of the project review the Application Form to fully understand what is required by the Coastal Commission<sup>2</sup>.

#### 2.1.2. California Environmental Quality Act

CEQA often goes hand-in-hand with CCA, and is the primary force behind requiring an EIR. It is very likely that the petition process with the Coastal Commission will have to

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<sup>2</sup> [https://documents.coastal.ca.gov/assets/cdp/CDP\\_Application\\_Form\\_ncc.pdf](https://documents.coastal.ca.gov/assets/cdp/CDP_Application_Form_ncc.pdf)

abide by CEQA standards, and subsequently a separate application will have to be filed with CEQA. Applications to CEQA are essentially environmental impact reports, which are based on thorough technical analyses of the land around the proposed development that identify potential environmental hazards and list the best options the applicant will use to minimize the potential impacts. Potential environmental hazards include impacting sensitive habitats, displacing biodiversity, and proximity to fault lines or other potential geological hazards. There are ways to be exempt from this application process, but our review of these options and our understanding of the project lead us to believe that there are no applicable exemptions.

## 2.2. Case Studies

This subsection provides an overview of the relevant case studies at UC San Diego and UC Santa Barbara. While there were no available studies on ZNE-based project along the coastline, these examples offer valuable insight because they were also developed on University of California property, which exempts the projects from some local regulations.

### 2.2.1. Scripps Institute of Oceanography

Beginning in 2011, Scripps Institute of Oceanography, a research center located on University of California, San Diego property, successfully obtained approval for construction along the coastline. Scripps was interested in renovating two existing buildings and constructing three new ones within a 32,000 square foot plot of land on UC property. Both sites' presence on UC owned property exempts them from regulation from their respective Local Coastal Plans, but they must still navigate a complex legal framework. There are several commonalities between their construction goals and Bodega's ambitions, which makes them an appropriate case study to consider.

Gaining approval for new construction is difficult at best, but is complicated by the sensitive nature of the construction site. Not only is it located along the coastline, but surrounding areas are home to protected biological resources which must not be disturbed. Despite these obstacles, UCSB was able to move forward with their plans through the careful discussion and implementation of mitigative measures as well as strict construction Best Management Practices (BMPs). Specifically, the project conformed to CEQA standards due to these extensive mitigative measures. When planning for construction, special conditions were outlined for the retention of water quality as well as sensitive biological resources. One of these efforts necessitated a system to capture and treat stormwater runoff so as not to pollute the nearby environment.

When moving forward with construction plans at Bodega, it will be important to pay special attention to any and all potential mitigation opportunities. It is also important to

consider any locations that may be used for research or scientific purposes to ensure these are not disrupted during the process.

### 2.2.2. UC Santa Barbara Affordable Housing

The University of California, Santa Barbara recently completed their goal of constructing affordable housing for faculty members on the university's north parcel. Once again, this now-completed endeavor involved construction along the coastline on UC-owned property. Their original plans placed the new housing on the south parcel, a 68-acre space. In order to gain approval, UCSB chose to compromise in an effort to address environmental issues as well as allow for more public access in nearby areas. They ultimately decided to compromise and declared the 68-acre south parcel open access to satisfy these requests. Their updated plan relocated the housing facilities to the north parcel and laid out its 26-acres of land as the new construction site. They also improved public access by enhancing existing bus lines as well as adding more bike paths and walkways to the surrounding area.

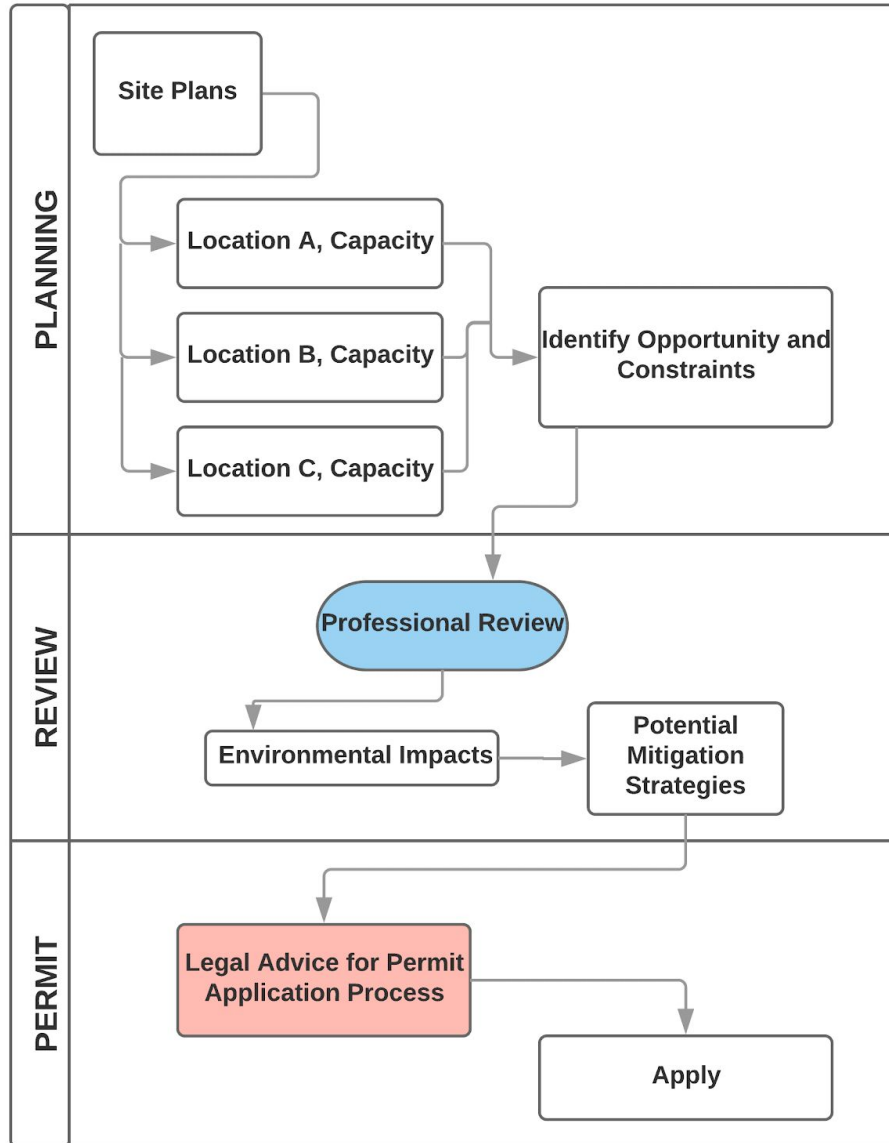
This project demonstrates the importance of flexibility while seeking permit approval for Bodega's new housing and conference facilities. It is an achievable task, but will almost definitely require some concessions, perhaps in the form of increased public access. However, this is no new territory as previous construction at Bodega was approved partially thanks to the addition of a trail along their property.

The total cost of this approval process was approximately \$250,000, with the EIR process taking between six and eight months and the Coastal Commission approval requiring one year. Note that during construction, biological and archaeological monitoring was required, which cost an additional \$100,000.

UCSB also constructed student housing in 2014, which provided 1,000 beds in apartment style housing. The EIR portion cost \$100,000 and took 6 months to prepare, with a similar timeline getting approval from the Coastal Commission but only half of that cost. Note that the project required an additional \$40,000 in archaeological monitoring during construction. Considering that this monitoring was required in both of the UCSB project we researched, there is a strong possibility that there are more regulation-related fees beyond the approval process.

### 3. Application and Approval Process

Due to the Coastal Commission's strict regulations, the process to applying and eventually receiving a permit to develop along the coast is a long and technical one. Below is an overview of a general work plan broken into three key phases, including the planning, review, and permit phase.



## 3.1. Concept Plan

As the specific site for construction has not been identified, it is critical to finalize a site plan before beginning the next phase. The location should be selected based on BML's desired capacity, as it would also determine the size of the building and the necessary renewable energy systems required to achieve zero-net energy. Overarching perspectives to consider include preliminary analysis of transportation, waste streams, energy demand and potential, and environmental hazards for each location. Comparing and weighing the costs and benefits will ease the decision process and eliminate options.

### 3.1.1. Connectivity

When exploring options, it would be useful to identify each site's connectivity and transportation network options. This will prepare for the upcoming CEQA review and EIR documentation which includes a transportation impact analysis. Conducting an audit or collecting data from previous or current automobile usage from the main research facility to the current housing site will enable comparison with projected usage from the new development. Alternatives should also be identified to indicate mitigation possibilities.

Under SB 743, the transportation analysis has shifted focus from driver delay to the reduction of greenhouse gas emissions and also the creation of multimodal networks to adhere to promotion of mixed land uses. The traffic analysis will look into "vehicle miles traveled, vehicle miles traveled per capita, and automobile trip generation rates, or automobile trips generated.

## 3.2. Opportunities and Constraints (SWOT Analysis)

Identifying and acknowledging weaknesses and threats of the project will allow for careful consideration and taking precautions moving forward. It also provides a focus for monitoring and improving existing strengths and to build upon opportunities.



<p><b>Strengths</b></p> <ul style="list-style-type: none"> <li>• UC property</li> <li>• Not controlled by local coastal programs</li> </ul>	<p><b>Weaknesses</b></p> <ul style="list-style-type: none"> <li>• Coastal location</li> <li>• Aesthetics</li> <li>• Recreational access</li> <li>• Funding</li> </ul>
<p><b>Opportunities</b></p> <ul style="list-style-type: none"> <li>• 2025 Carbon Neutrality Initiative</li> <li>• Zero Net Energy Infrastructure</li> <li>• LRDP // Renewal</li> <li>• Old permits</li> <li>• Evacuation routes and training</li> </ul>	<p><b>Threats</b></p> <ul style="list-style-type: none"> <li>• Seismic policy</li> <li>• Environmental impact</li> <li>• Tsunami hazards</li> <li>• Potential natural disaster</li> <li>• Limited access resource</li> </ul>

**Strengths**

Bodega Marine Laboratory is the property of University of California, and a part of UC Davis. BML is located on an unincorporated parcel of Sonoma County. This is a strength because there are fewer restrictions as they are not governed by the Local Coastal Programs.

**Weaknesses**

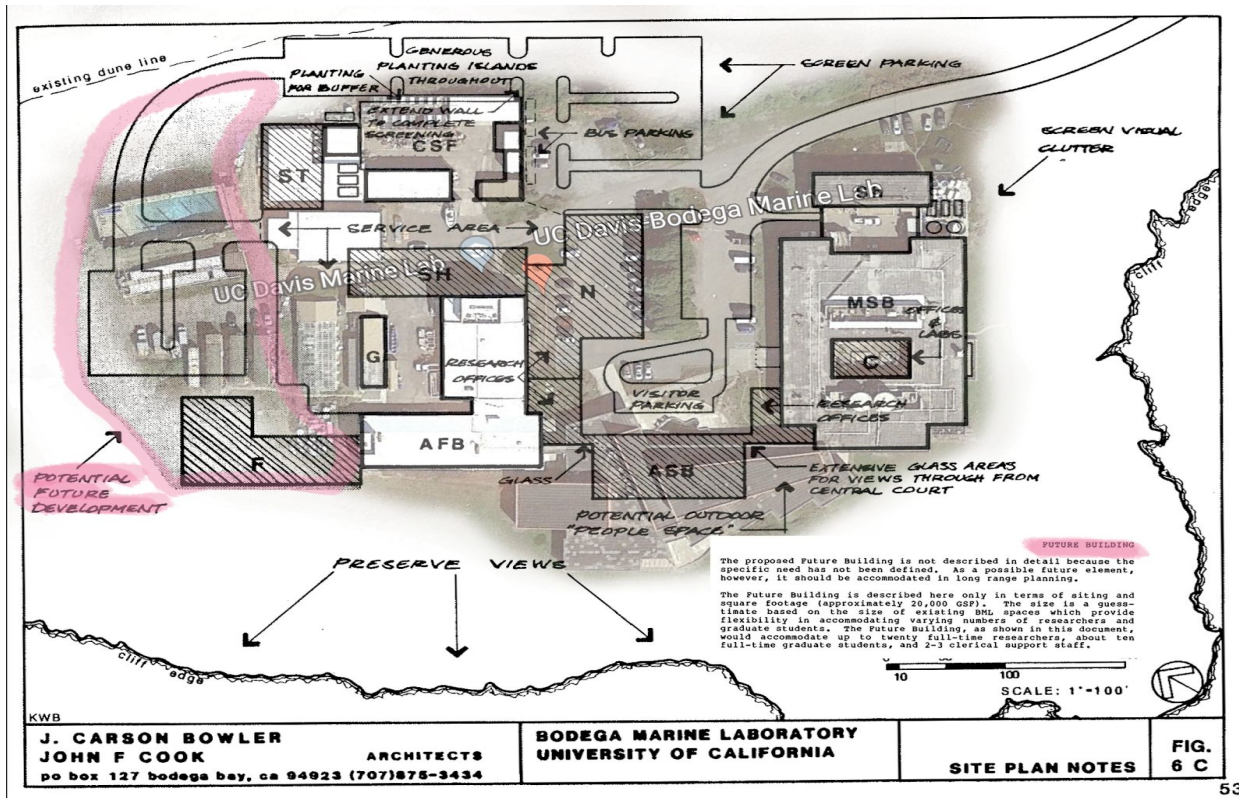
Aside from the location requiring special permitting for development, the Coastal Commission also has goals to provide recreational and public access. However, BML has strict open hours for guests as well as large areas to protect biological species of special significance. This may be overcome by expanding guest hours or providing designated trails for public access. Some other concerns include disruption of vantage points, aesthetic damage, and uncertain source of funding.

**Opportunities**

The UC Office of the President has embarked on the 2025 Carbon Neutrality Initiative to secure status as a sustainability leader. This means the UC has a goal to produce zero-net greenhouse gas emissions by 2025. Since the majority of these emissions stem from buildings and the vehicle fleet systems, expanding its energy efforts by transitioning to renewable energy infrastructures will drastically decrease the emissions load.

Currently BML's Long Range Development Plan is from 1987. Within this LRDP, there was a section discussing BML's development plans for the future. As highlighted below, there were overarching plans for future development right by the main facility. There is a possibility of developing on that proposed location, as well as a possibility of utilizing current permits to their full capacity.

As mentioned above, there could also be other potentials to convince the Coastal Commission to grant the permit if there can be a way to ensure public safety, increased access, and mitigated or reduced environmental impact.



### 3.3. Preliminary Professional Analysis

A broad environmental review will help inform site planning. While anticipating the approval process, a critical step is to consult professional help to review the following:

- i. Existing geology
- ii. Natural resources
- iii. Archaeological resources
- iv. Soil sensitivity
- v. Historic preservation
- vi. Areas of special biological significance (ASBS)
- vii. Impacts due to development
- viii. Potential mitigation strategies
- ix. Consult with locals for opinion
- x. Consult with legal team for suggestions on approaching the permitting process

The typical timeline for getting projects approved through CEQA is between 9 and 15 months according to San Jose's Department of Planning, Building and Code Enforcement<sup>3</sup>. This includes 2 to 6 months for preparing the technical report, and 7 months for CEQA to process the report. Of course, if the report isn't immediately approved, this process will take longer. The cost to file the report is \$3,168 as of the beginning of 2018<sup>4</sup>. We spoke with UC Davis' Director of Environmental Planning Matt Dulcich who has worked on approving a wide range of project, and he suggested that (given the limited scoping of the project so far) the total cost of this ZNE project could range between \$30,000 and \$300,000. Given the comparable scale of the Santa Barbara project and their incurred cost, it should be safe to assume that the cost of this project will be in the six-figure range.

## 4. Concluding Remarks

Our understanding of the approval process and analysis of approved projects leads us to believe that there is high likelihood that BML's plan to construct a new ZNE housing facility can and will be approved as long as the proper steps are taken. This includes adequate planning of the proposed construction project's scale and location, and the completion of required studies to complete the EIR. What we have learned, though, is that there are two underlying trends that influence a project's approval: supporting open access and project framing.

Approved project proposals often require the applying entity to provide land for open access, something that both BML and UCSB can attest to. BML had to allow a trail to run through its property to get past projects approved, and UCSB gave up its South Parcel to open access as it announced approval for construction on its North Parcel. While it is not a written requirement, it seems logical that considering the Coastal Commission's commitment to open access along the coast, that they may leverage project approval with increased open access.

Beyond outlining potential environmental impacts and the efforts to mitigate them, the approval process for CEQA seems to be considered on a case-by-case, potentially subjective basis. This suggests that project framing is as important a factor in getting approval as the technical requirements. Consider as an example BML's additional desire to construct a conference center. Even if the technical report checks out, framing the conference center as an opportunity to host wedding venues will not be as persuasive an argument as saying it is needed to host research conferences to promote awareness of human impacts along California's coastline. The more compelling the reason for coastal development, the more likely it is to be approved by the humans that review it.

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<sup>3</sup> <https://www.sanjoseca.gov/DocumentCenter/View/1633>

<sup>4</sup> <https://www.wildlife.ca.gov/Conservation/CEQA/Fees>

To this end, it is important to frame the construction of the ZNE housing facility as necessary for the central goal of BML--to promote research on the coastal preservation from human impact-- as well as being beneficial for the environment. The latter point is where most emphasis would be placed, since there are two compelling arguments: (1) given the Coastal Commission's concern with preserving wetlands, it is more beneficial to demolish the existing building and relocate it than to fortify the existing structure (which would be much easier to get approved); and (2) constructing a ZNE building will promote California's movement towards a cleaner grid and mitigate environmental impacts.

The aforementioned policy framework, permit approval plan, and relevant case studies are meant to make navigating the legal aspects of construction along the coastline a bit easier to understand. Moving forward, we hope our research proves useful in the process towards the creation of a permit proposal, and ultimately, in allowing for the construction Bodega wishes to complete.

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