A coastal landscape featuring a wide, grassy field in the foreground, a paved road curving along the right side, and a row of houses in the background. A tall, thin utility pole stands prominently in the middle ground. The sky is overcast with grey clouds.

# **A Guide to Tsunami Vertical Evacuation *Options* on the Washington Coast**

**Volume 1: Pacific County**

**August 2021**

# Tsunami Vertical Evacuation *Options*

Volume 1: Pacific County

August 2021

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Front Cover: *Spinnaker Park, Ocean Shores. Photo Credit: Jeana C. Gómez*

# Table of Contents

<u>Purpose</u>	5
<u>Project Assumptions</u>	8
<u>Methodology</u>	12
<u>Vertical Evacuation + PEAT Results</u>	19
<i>Pacific County</i>	21
<u>Ilwaco</u>	22
<u>Seaview</u>	42
<u>Long Beach - South</u>	76
<u>Long Beach - North</u>	135
<u>Ocean Park</u>	183
<u>Oysterville</u>	231
<u>Leadbetter</u>	237
<u>Tokeland</u>	254
<u>North Cove</u>	299
<i>Pacific County: Comparison Table</i>	337
<u>Summary Tables: Complete</u>	338
<u>Appendices</u>	364
<i>Appendix A: All Potential Vertical Evacuation Sites in Study Area</i>	365
<i>Appendix B: Ocean Shores Bridges</i>	371
<i>Appendix C: 2010 Census and 2019 American Community Survey (ACS) Estimates</i>	373



# Purpose

This guide was written to help Washington coastal communities save lives from tsunamis through the construction of accessible vertical evacuation structures. This effort is the product of an evolution of work began over 15 years ago. This guide builds upon prior efforts with the specific purpose being of verifying potential sites for vertical evacuation structures within coastal communities vulnerable to local source tsunamis. It is the intent of this guide to provide community leaders with a tool to save lives.

Vertical evacuation, as a strategy to reduce tsunami risk, has been explored and its applicability researched for over a decade. In the beginning, a series of community vertical evacuation planning meetings were held in Pacific County, Grays Harbor County, and Clallam County. The meetings and research efforts took place over the span of two years, which resulted in the development of a series of “SafeHaven” reports for each County. The reports are available on the State of Washington’s Emergency Management Division’s (EMD) website and are still accessible for download and review (<https://mil.wa.gov/tsunami>). Cost estimates for suggested sites were prepared in 2016 and the results are also available on the EMD website (<https://mil.wa.gov/asset/5ba41ffe1efe2>).

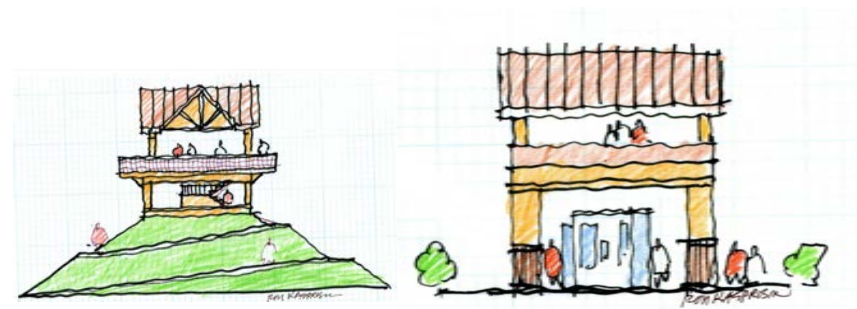
The first tsunami vertical evacuation structure built in north America is the Ocosta Elementary School. It was completed in 2016 and is near Westport, Washington. The Ocosta school district’s superintendent had participated in the initial vertical evacuation planning for Westport and Grays Harbor County in 2011 and was a key advocate for not only getting the new Ocosta school funded through a local school bond, but also making it a vertical evacuation structure.

Building upon the successes and outcomes of the first completed vertical evacuation structure and initial rounds of community meetings and subsequent increasing public awareness, a “Manual for Tsunami Vertical Evacuation Structures” was completed in 2018. The Manual guides communities through the process of constructing tsunami vertical evacuation structures using a 7-phase approach. The Manual, 7-Phase Checklist, and PowerPoint presentation are available for download from the EMD website (<https://mil.wa.gov/tsunami>).

## 10 Years in the Making:

### Community-Based Planning Process

- **2010 - 2012:** Pacific County, Grays Harbor County, Clallam County Community Planning + Visioning Process
- **2016:** Cost Estimate Report
- **2018:** Vertical Evacuation Manual for Communities
- **2020:** Site Verification and Assessment of Vertical Evacuation Options



In the 2010 “SafeHaven” reports, proposed vertical evacuation structure scenarios were developed for each participating community. Community members and other key stakeholders were the primary authors of each proposed scenario, especially the proposed locations or sites. Several vertical evacuation typologies were considered: structures, towers, berms and combinations. Technical experts and University of Washington researchers and community planners supported the process and led the report production.

This guide is an evolution of the work completed since 2010. The specific purpose of this research effort is to verify and analyze the proposed or potential sites for vertical evacuation structures in each study area using four vertical evacuation options. The 2010 “Safe Haven” reports identified multiple potential locations for vertical evacuation structures based on public land availability, walking distances/times, and population clusters (see Appendix A for a complete list of 2010 sites).

After completion of the SafeHaven reports, the USGS-developed the Pedestrian Evacuation Analyst Tool (PEAT), an ArcGIS/ArcMap extension that analyzes the walk times for each proposed vertical evacuation site. This tool was seen as a way to verify and strengthen the community-based suggestions of the earlier SafeHaven efforts, and it became the driver of this guide.

The PEAT takes into account terrain, population location, land use, water features, likely walk routes, and elevation. Additionally, the PEAT analyzes and calculates walk times and routes for communities using no added potential vertical evacuation. For the purposes of this research, the “no vertical evacuation” scenario became Option 1 and can be considered the baseline for each community. Option 2 included all proposed sites from the 2010-2011 community planning effort and Options 3 and 4 were adaptations of Option 2. Option 3 expanded the spatial coverage of Option 2 by adding additional potential vertical evacuation sites and Option 4 attempts to highlight the most efficient or lean approach to vertical evacuation for each community (often with a reduced number of sites, leaving only the most strategic locations). Each option has an

accompanying set of statistics that identify the benefits of each, and the percentage of the population accommodated by each option. Population types are broken down into residents, schools, and fire departments. The complete set of results for each community study area will serve as the basis of local decision-making.

The research results in this guide can be adapted and further explored. It is assumed that local leaders will have feedback as to how the outcomes of this work can support their decision-making and be fine-tuned for the specifics of the evolving nature of their communities. This research team looks forward to on-going engagement with the local communities highlighted in this report.

# Project Assumptions

# Tsunami Hazard

1. The scenario event is a 9.0 magnitude subduction zone earthquake approximately 80 miles off the coast of the Long Beach peninsula.
2. The earthquake shaking could last five to six minutes and will create a tsunami.
3. Six feet of subsidence is expected.
4. The warning before the tsunami will be the earthquake.
5. There will be about 15 minutes between the cessation of shaking and arrival of the first tsunami wave.
6. Although tsunami models estimate that people will have approximately 20 minutes to get to high ground once the shaking begins, the preferred strategies contained within this study are based on people having only 15 minutes due to approximately 5 minutes of expected intense shaking. This reduced response time does not take into account the following challenges that people will face in getting to high ground: people not evacuating right away due to not understanding what is happening or what to do, looking for more information, contacting loved ones, finding pets, being injured, and grabbing supplies; poor road/evacuation route conditions resulting from landslides, liquefaction, downed power lines/trees, and traffic; and possible panic. People will have 15 minutes or less to get to high ground.
7. Tsunamis consist of multiple waves over a 12-24 hour or longer time period. The first wave is often not the highest wave.
8. Tsunami refugees will need to remain on the structure until it is safe to return to the ground. This could take 24-48 hours or longer.
9. Routes to high ground, including vertical evacuation structures will be available, accessible, and discernible after the earthquake and at night.
10. Those evacuating will walk/run to high ground, which includes the vertical evacuation structures. Travel by car will not be possible.
11. Communication will be limited.
12. Many of the bridges located in the study area, hazard area are assumed to be “out” following the shaking from the earthquake. This is reflected in the walk times for each community.



## Population Capabilities

1. The majority of the population in the tsunami risk areas is physically mobile and can walk to the proposed tsunami evacuation sites.
2. The average fast walking speed of a typical individual is 1.52 meters/second or 4,488 feet in 15 minutes and the average slow walking speed of a typical individual is 1.1 meters/second or 3,248 feet in 15 minutes. For the purposes of this analysis, the slow walking speed was used. Source: FHA (2009)
3. People on the beach have average to high physical mobility.
4. Residents and visitors understand the tsunami risk, know what to do to protect themselves, know where high ground is and how to get to it as quickly as possible.

## Vertical Evacuation Tower Design + Construction

1. Vertical evacuation structures can be provided.
2. The margin of safety (distance between the height of the tsunami and the floor of the tower) is factored to be 30% of the height of the tsunami, plus 10 feet.
3. If the vertical evacuation structures are constructed on sites where wetlands are compromised, new wetlands will be developed or the compromised wetland will be mitigated in another way.
4. Each vertical evacuation structure will provide ten square feet of space per person (FEMA design standard minimum).

# Other Considerations

1. Each community will need to obtain funding to construct the vertical evacuation structures that best accommodate the needs of its resident population. This can come in the form of a local tax, federal funding, grant funding, etc.
2. In addition, the extent to which visitors are considered will need to be determined. Options 1-4 **only consider residents, workers, and overnight visitors staying at hotels/motels. The options do not include all types of visitors or peak summer day visitor populations.**
3. Options 1-4 uses a “maximum build-out” population scenario to determine population numbers and location. Meaning, the estimated population includes every residentially-zoned property with a structure and assumes *average occupancy* for each residentially-zoned property with a structure.
4. Average occupancy per residential property with a structure is based on each community’s 2010 Census “Average Household Size.” The complete set of residential properties included in the analysis are:
  - Single-family
  - 2-4 units
  - Multifamily
  - Mobile Home Park
  - Hotel/Motel (occupancy based on # of rooms)
  - Institutional
5. VES stands for “Vertical Evacuation Structure”
6. Options 1-4 assume that people within the “slow walking speed” distance of existing “natural high ground” will be able to reach it and thus not need to evacuate to a VES. These areas of “natural high ground” throughout the study areas are often small and unmarked areas of land. Some of these areas may be difficult to identify and access during a tsunami.
7. Option 2 was developed in partnership with local community members, state scientists, and researchers from the University of Washington (2010-2011).
8. Options 1, 3, and 4 were developed as an outcome of further and ongoing analysis conducted in 2020 to assess multiple options per each community study area.
9. \*Resident and visitor knowledge of existing natural high ground in each community study area is not a given. In fact, natural high ground signage and way-finding should be considered a key component of a vertical evacuation strategy. The analysis completed in this study relies upon access to existing natural high ground for some residents or visitors.

# Methodology

The methodology developed and used in the preparation of this guide leaned heavily upon the use of the Tsunami Pedestrian Evacuation Analysis Tool (PEAT), an ArcGIS extension developed by the United States Geologic Survey (USGS). The PEAT served as the primary basis for analysis of four vertical evacuation options in Pacific County, Grays Harbor County, and Clallam County. Several high-risk communities or “study areas” in each County were assessed. A complete list of the “study areas”:

- Pacific County: Ilwaco, Seaview, Long Beach South, Long Beach North, Ocean Park, Oysterville, Leadbetter, Tokeland, and North Cove
- Grays Harbor County: Grayland, Westport, Ocean Shores West, Ocean Shores East, Taholah, and Aberdeen/Hoquiam/Cosmopolis
- Clallam County: La Push and Neah Bay

In preparation for the analysis element of the project, several existing datasets and policies had to be gathered and interpreted, both to serve as a reference point and context as well as data input. This project includes the results of the 2010-2011 SafeHaven community planning effort as a starting point that developed a single vertical evacuation option or scenario, by “study area.” The various individual community scenarios were developed by the community members with support from University of Washington researchers, State technical and subject-matter experts, and local leaders. The primary driver of these SafeHaven developed scenarios included a walking circle exercise to help community members determine how many people would be able to walk (or run) to each proposed vertical evacuation structure (VES). The walking circles used the research of Kaeser and Laplante (2007) and assumed a walk speed of 4 feet/second for average able-bodied individuals and a walk speed of 3 feet/second for slower than average individuals (i.e. the elderly with limited physical mobility, etc.). The walking circles helped community members decide where the vertical evacuation structures should be located. Proposed sites were also determined based upon public or vacant land availability (as it existed in 2010-2011) and strategic locations close to population, visitor centers, schools, senior centers, etc.

Within this guide, two of the four resulting vertical evacuation options for each community were already developed going into this round of research and analysis: Option 1 (*no vertical evacuation*) and Option 2 (*community-derived*). The remaining two options are new: Option 3 (*broad spatial coverage*) and Option 4 (*efficient/lean*). All four vertical evacuation options were analyzed during this effort using the PEAT. Each “study area” required a 5-step process to analyze all vertical evacuation options, including an option without vertical evacuation. The 5-step process includes the following:

1. Context Map: Identifies tsunami risk zone, naturally-occurring high ground, impassable areas that have a land classification of either wetland or water (per the National Land Classification Database or the National Wetlands Inventory), tsunami siren locations, school locations, and fire department locations.
2. Option #1: No Vertical Evacuation
  - This option assumes no new or future vertical evacuation structures will be built. It models resident walk times as if the scenario tsunami were to happen tomorrow.
3. Option #2: Community-Derived Vertical Evacuation Structures
  - This option includes VES locations that were proposed and confirmed through a rigorous community planning process, called “Project Safe Haven.” At the time, various types of vertical evacuation structures were considered by the community (i.e. berm, tower, etc.), however for the purposes of current research effort we are assuming a generic vertical evacuation type and did not drill down to the scale of measuring or considering the merits of each potential type of structure. Rather, the placement or location of each structure is what matters most for this effort.

#### 4. Option #3: Broad Spatial Coverage

- This option attempts to achieve broad spatial coverage in each study area or community. In some cases, depending upon the study area, vertical evacuation structures were added to Option #2 to fill gaps. In other cases, Option #2 already met the goal of broad spatial coverage for the populations of primary concern (resident/worker/overnight visitor/school) so no changes were necessary.

#### 5. Option #4: Efficient/Lean

- This option attempts to strike a balance between cost and coverage. Meaning, this option presents the “biggest bang for the buck” or, “the best of both worlds.” Each proposed location in Options #2 and #3 were analyzed to determine most efficient placement to maximize coverage. Some locations were moved or even removed entirely to develop an option that is both strong (in terms of coverage, # of people in walking distance) and realistic (in terms of cost).

### Population

Estimated resident, school, fire department, and overnight visitor population was added to each study area in each expected spatial location. The population layer informed each vertical evacuation option (1-4) to calculate evacuation times and routes to “safe zones” (both naturally-occurring and proposed vertical evacuation structures). Furthermore, the addition of people helps to determine which option serves the greatest number of people with the fewest vertical evacuation structures.

Estimated population was calculated using the following process: County parcel-level data, referencing use codes. All residential parcels were selected and exported as their own layer. Then, the residential parcel layer was further refined based upon whether or not there was a structure

located in the parcel. This step was supported by the addition of Microsoft’s national Building Footprint shapefile. A spatial join was used to bring the residential parcel data and the building footprint data together to create a unique layer of residential parcels with single or multiple buildings. This calculation was used to assume occupancy and to sharpen the population estimate. Depending upon the type of residential parcel (i.e. single family, multi family, hotel, etc.), a population count was assigned using the following methodology:

1. Each study area’s average household size was calculated, based on the 2010 Census, except for Neah Bay (which was based on the 2019 ACS estimate). This set average people per single family residential parcel, or average household size (AHS) as determined by the 2010 Census:

- Single-family = average household size (AHS)
- 2-4 units = AHS \* 3
- Multifamily = AHS \* 8
- Mobile Home Park = AHS \* # of units per each park (Google Earth to identify # of units)
- Hotel/Motel = AHS \* # of rooms (hotel website or called hotel to determine # of rooms)
- Institutional = AHS \* # of rooms or occupancy for each facility (facility website or phone to determine occupancy)

The population methodology errs on the conservative estimate side because it assumes every residential parcel with a structure is occupied. We used this approach as it provides a solid basis for population estimation that may reflect a community’s future population growth. It also provides flexibility for higher counts of visitors in the summer or even several days each year with spikes in visitors due to tourist events.

Note: The 2010 Census reflects population statistics that are ten years old. 2019 ACS estimates have also been documented for each community study area in this guide and are provided in Appendix C, for comparison and awareness as to general population and household trends in the last ten years.



## Pedestrian Evacuation Analyst Tool (PEAT)

Each Option was analyzed using the ArcGIS PEAT. The PEAT uses a 9-Step process to calculate walk times, per each Option, and produce results:

### Step 1: Set the community study area boundaries.

Three State of Washington counties are most at-risk from the tsunami scenario and therefore selected to inform this research: Pacific County, Grays Harbor County, and Clallam County. The PEAT works best at a smaller scale, so each county was sub-divided into several communities. The study areas follow existing jurisdictional boundaries (where they exist) and some of the larger jurisdictions were further sub-divided into sub-areas to meet the processing constraints of PEAT.

*Note:* The sub-dividing of community study areas was required for this work to meet the constraints of the PEAT. At the same time, for some communities like Long Beach and Ocean Shores, it is assumed that the results of each community sub-area will be looked at more closely in the future before decision-making due to the limitations of sub-dividing at the community or city scale. For example, there are some proposed VES locations in Long Beach - South that are close to a proposed VES location in Long Beach - North. The current sub-division likely over estimates the necessary number of VES. To get a clearer understanding of the VES needs for the entire City of Long Beach an additional PEAT run for the entire city would need to be completed. This requires a high processing speed computer and a patient researcher. It's challenging, but certainly possible. The authors of this guide foresee additional "whole community" PEAT runs in the community for both Long Beach and Ocean Shores to sharpen the level of comprehensive analysis.

### Step 2: Pre-process digital elevation model (DEM) data.

This step took high resolution elevation data and applied it to the study area. It's an important first step because high resolution elevation data provides a basis for determining ultimate realistic evacuation routes.

<u>Pacific County</u>	<u>Grays Harbor County</u>	<u>Clallam County</u>
<u>Ilwaco</u>	<u>Grayland</u>	<u>La Push</u>
<u>Seaview</u>	<u>Ocean Shores - West</u>	<u>Neah Bay</u>
<u>Long Beach - South</u>	<u>Ocean Shores - East</u>	
<u>Long Beach - North</u>	<u>Taholah</u>	
<u>Ocean Park</u>	<u>Aberdeen/Hoquiam/Cosmopolis</u>	
<u>Oysterville</u>		
<u>Leadbetter</u>		
<u>Tokeland</u>		
<u>North Cove</u>		

DEM data from the USGS (Washington 10-meter DEM) was used for this project, set to an analysis cell size of 3 (<http://gis.ess.washington.edu/data/raster/tenmeter/byquad/index.html>). Important note: All GIS data used or created for this project used the following coordinate system and projection:

- Coordinates:  
NAD\_1983\_HARN\_StatePlane\_Washington\_South\_FIPS\_4602\_Feet
- Projection: Lambert\_Conformal\_Conic

### Step 3: Pre-process land use and land cover data.

This step referenced several land use and land cover inputs, and combined them into a single land use/land cover layer for analysis. The primary base layer is land classification data defined by the North American Land Change Monitoring System (NALCMS), set at 30 meters, with a publish date of 2015 (<http://www.cec.org/north-american-environmental-atlas/land-cover-30m-2015-landsat-and-rapideye/>  
[#:~:text=This%20map%20of%20North%20American,and%20RapidEye%20imagery%20for%20Mexico](http://www.cec.org/north-american-environmental-atlas/land-cover-30m-2015-landsat-and-rapideye/#:~:text=This%20map%20of%20North%20American,and%20RapidEye%20imagery%20for%20Mexico)). The base layer uses a system of nineteen Level II land cover classes defined using the Land Cover Classification System (LCCS) standard developed by the Food and Agriculture Organization (FAO) of the United Nations. Of the nineteen categories, only eleven are relevant to the Pacific County, Grays Harbor County, and Clallam County study areas: 1, 5, 6, 8, 10, 14, 15, 16, 17, 18, 19.

The complete list includes:

- Value 1, Temperate or sub-polar needleleaf forest (.6667)
- Value 2, Sub-polar taiga needleleaf forest
- Value 3, Tropical or sub-tropical broadleaf evergreen forest
- Value 4, Tropical or sub-tropical broadleaf deciduous forest
- Value 5, Temperate or sub-polar broadleaf deciduous forest (.6667)
- Value 6, Mixed forest (.6667)
- Value 7, Tropical or sub-tropical shrubland
- Value 8, Temperate or sub-polar shrubland (.8883)
- Value 9, Tropical or sub-tropical grassland
- Value 10, Temperate or sub-polar grassland (.8883)
- Value 11, Sub-polar or polar shrubland-lichen-moss
- Value 12, Sub-polar or polar grassland-lichen-moss
- Value 13, Sub-polar or polar barren-lichen-moss
- Value 14, Wetland, RGB (0)
- Value 15, Cropland, RGB (.5556)
- Value 16, Barren lands (.5556)
- Value 17, Urban, RGB (.9091)
- Value 18, Water, RGB (0)
- Value 19, Snow and Ice (0)

The relevant categories are also indicated with a decimal number located in parenthesis. This number categorizes the “speed” at which a pedestrian would be able to traverse this land classification on foot. A classification of **1** is fastest (i.e. roads) and a classification of **0** means travel is not possible (i.e. water).

In addition to the NALCMS land classification data, the following data was added as ancillary layers:

- Impassable Land (wetland and water). This data further clarifies land that is either currently water or would become water (current classification = wetland) post-earthquake shaking and subsequent subsidence. Because we don’t know when the scenario earthquake/tsunami will take place (i.e. winter, high tide, etc.) we made the decision to classify all wetlands as water. This is a more conservative approach, but one we are confident in making for providing a conservative baseline estimate. If any particular local jurisdiction would like to augment this approach, that would be possible following the completion of this round of analysis. The data comes from the National Wetlands Inventory, produced by the Department of Fish and Wildlife. This data was assigned a travel value of **0**.
- Sand/Beach land classification.\* This data further clarifies the land that may also have a water classification in the National Wetlands Inventory, but at times throughout the tide cycle is actually sand (or beach) and may have people located in these areas that will need to evacuate on foot. This data was assigned a travel value of **.5556**.
- Roads. The roads layer for each county was downloaded from the Pacific County, Grays Harbor County, and Clallam County GIS data download websites. The exception is that the Grays Harbor County roads layer was augmented by the Open Street Map roads layer for Grays Harbor County as we found it was more comprehensive than the roads layer from the County. A 25-foot buffer was drawn for all roads layers to represent the width of the road network more fully. This was important as the roads network is the primary or best path for

pedestrian evacuation to either high ground or proposed vertical evacuation structures. This data was assigned a travel value of **1**.

- Bridges likely to have collapsed, in an impassable condition, following earthquake shaking.\* This data layer was created after field work to confirm the location, typology, and condition of area bridges. For the purposes of this project we are assuming bridges over water bodies will collapse during the earthquake shaking and therefore will not be a reliable pathway for pedestrian evacuation. This data, therefore, was assigned a travel value of **0**.
- Parcels located in wetlands, but with residential structures.\* For the purposes of this project and the decision to err on the side of caution regarding assumptions made about land classified as wetlands (set at a travel value of **1**), some residential structures are located in travel value land classifications of **0**, meaning that the people who live in those structures were left out of the pedestrian counts. To rectify this, and to create a more comprehensive pedestrian evacuation count, the residential parcels with structures were added back into the analysis and re-assigned a travel value of **.5556**, the same travel value used for sand.

#### Step 4: **Pre-process tsunami hazard area data.**

This step includes the addition of the scenario event's (Cascadia subduction zone tsunami, 9.0 earthquake) tsunami inundation areas. This data layer tells us which area of the community will be inundated with water from the tsunami. The source of this data is from the State of Washington's Department of Natural Resources. The inverse of the inundation zone is defined as the "safe zone."

#### Step 5: **Run the "Path Distance" tool to determine likely walk paths.**

This step takes the pre-processed DEM data and the pre-processed safe zone data to determine the travel distance from every cell in the study area to the nearest safe zone.

#### Step 6: **Run the "Evacuation Time Surface" tool to determine walking time bands along likely walking paths.**

This step takes the Path Distance output and multiplies it by a set travel speed. For the purposes of this project, we are using the slowest available travel speed "slow walk" as the baseline/primary travel speed. This is to, again, err on the side of caution and account for people who walk slower than the average person. This is particularly relevant for many of the communities in the study areas as they often have a higher than average elderly population whose walking speeds may be impacted by a number of factors. The "slow walk" travel speed assumes a travel-speed value (meters/second) of 1.1. For comparison, a "slow run" travel-speed value is 1.79 and a "fast run" travel speed value is 3.85. The walking speeds come from the Federal Highway Administration (2009); running speeds from [MarathonGuide.com](http://MarathonGuide.com) (2011).

#### Step 7: **Run the "Time Map Generation" tool to convert the "Evacuation Time Surface" results into 1-minute increment bands.**

This step takes the output from Step 6 (Evacuation Time Surface) and converts it into 1-minute increment bands. This properly maps the pedestrian evacuation walking time to safety (aka. naturally-occurring high ground) from any given location in the profiled community or study area.

#### Step 8: **Run a full analysis for each proposed vertical evacuation structure/location, including a time map for each structure.**

This step is the most important for the purposes of this project. Here is where the potential vertical evacuation locations get added to Step 7's results. The potential vertical evacuation locations augment Step 7's results by creating additional "safe zones." As a result, potential vertical evacuation locations change the time map bands - producing a new time map output that is customized for each vertical evacuation option. Step 8 was completed for each unique vertical evacuation option, per each study area or community. Step 8's output is more robust than the previous steps. Here, Step 8 produces a set of new results for each vertical

evacuation option, including: a revised “safe zone” shapefile and a revised “time map” - one for each individual potential vertical evacuation location and one for the entire set of potential vertical evacuation locations, referred to as “All”.

**Step 9: Determine population counts at various travel times to safety and creates output tables to quantify # of people per # of minutes.**



The final step includes the addition of population counts for each vertical evacuation option (*see Population methodology*). This step is important because it references the estimated location of people and number people, as well as provides the starting point for pedestrian evacuation (which determines minutes to safety). The PEAT allows for differentiating between different types of populations. For the purposes of this project, we created three population categories: residents (including workers and overnight visitors), schools, and fire departments. Adding population to the potential vertical evacuation sites determines the hazard zone population served by each structure. This kind of information supports site selection decision-making. The output of Step 9 includes spreadsheets for each population type according to how many people per each minute of evacuation time increment. For example: Long Beach - North’s Vertical Evacuation Option 3 approximates 2,917 people within under 15 minutes from a “safe zone,” 1,117 people between 15 minutes and 25 minutes from a “safe zone,” and 74 people over 25 minutes from a “safe zone.” This is exactly the kind of granular data required to make informed decisions about each study area’s vertical evacuation options.

# **Vertical Evacuation + Pedestrian Evacuation Assessment Tool [PEAT] Results**







# Symbology Key




## Map Icons =

-  Community Study Areas
-  Fire Station
-  School
-  Tsunami Siren
-  Natural High Ground
-  Water/Wetland (Impassable)
-  Evacuation Zone

## Community Study Area Icons =

-  Community Study Area
-  Vertical Evacuation Structure (VES) Name
-  Alternative VES
-  Future (*funded*) VES Site

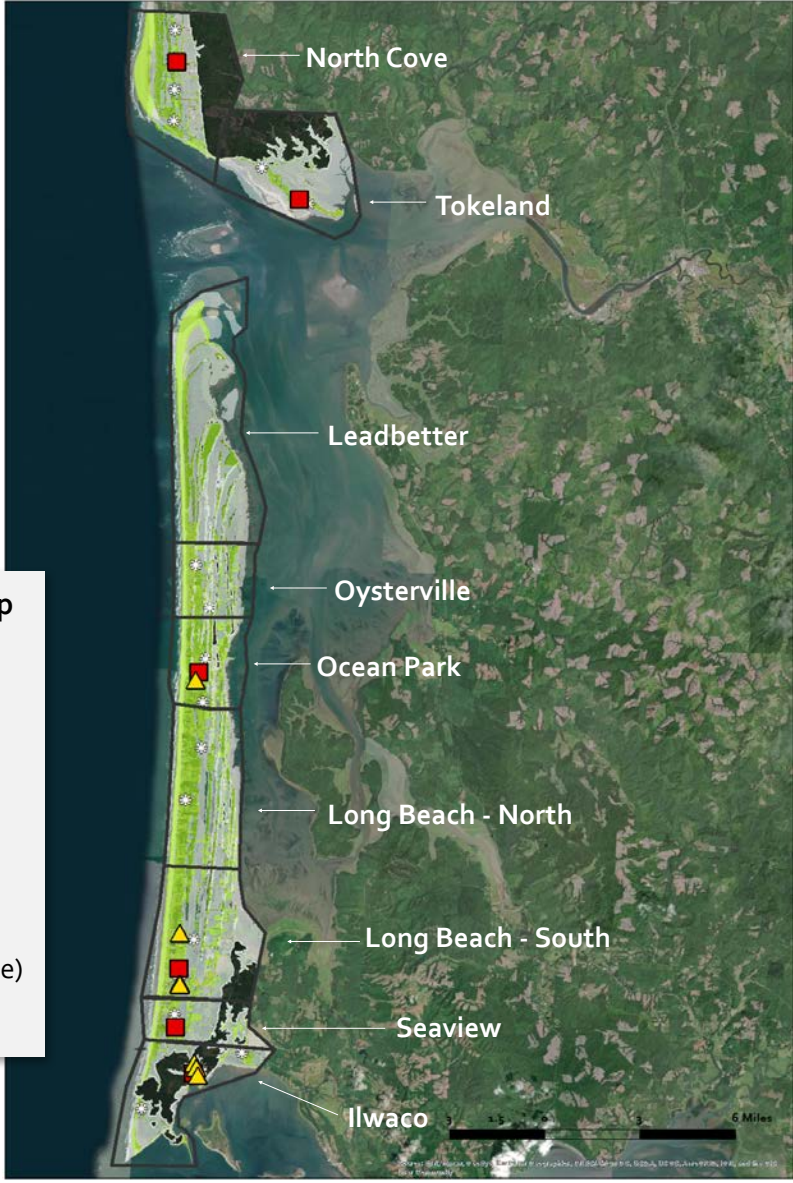
## (Slow Walk) Walk Speed to High Ground Color Scale =

-  <15 Minutes
-  15-25 Minutes
-  25+ Minutes

# Pacific County

**Pacific County: Context Map**

- Community Study Areas
- Fire Station
- School
- Tsunami Siren
- Natural High Ground
- Water/Wetland (Impassable)
- Evacuation Zone





# Ilwaco

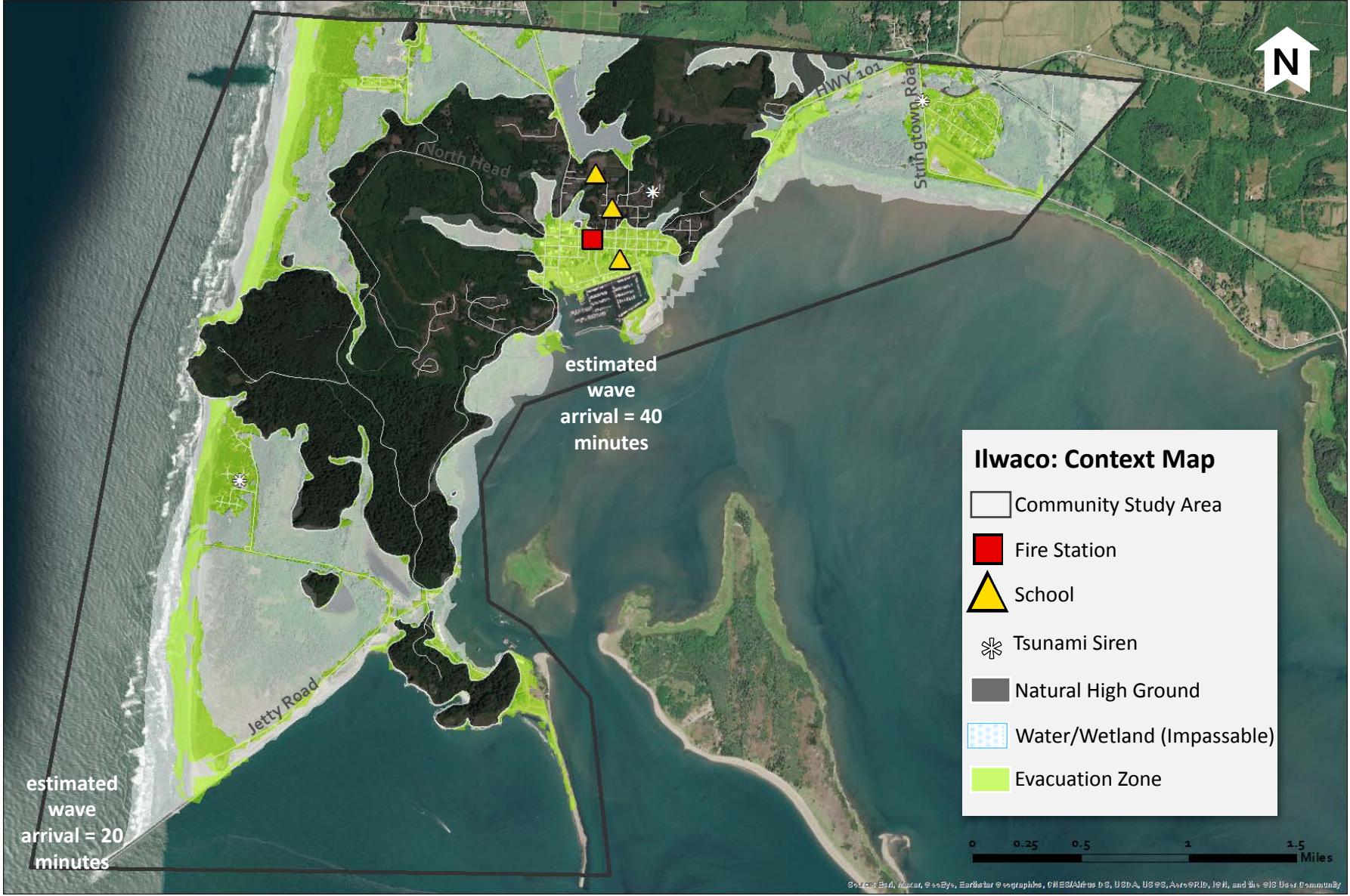
***Ilwaco community study area population in the tsunami hazard area = ~950 people***

*Resident/Worker/Overnight Visitor population = ~890 people*

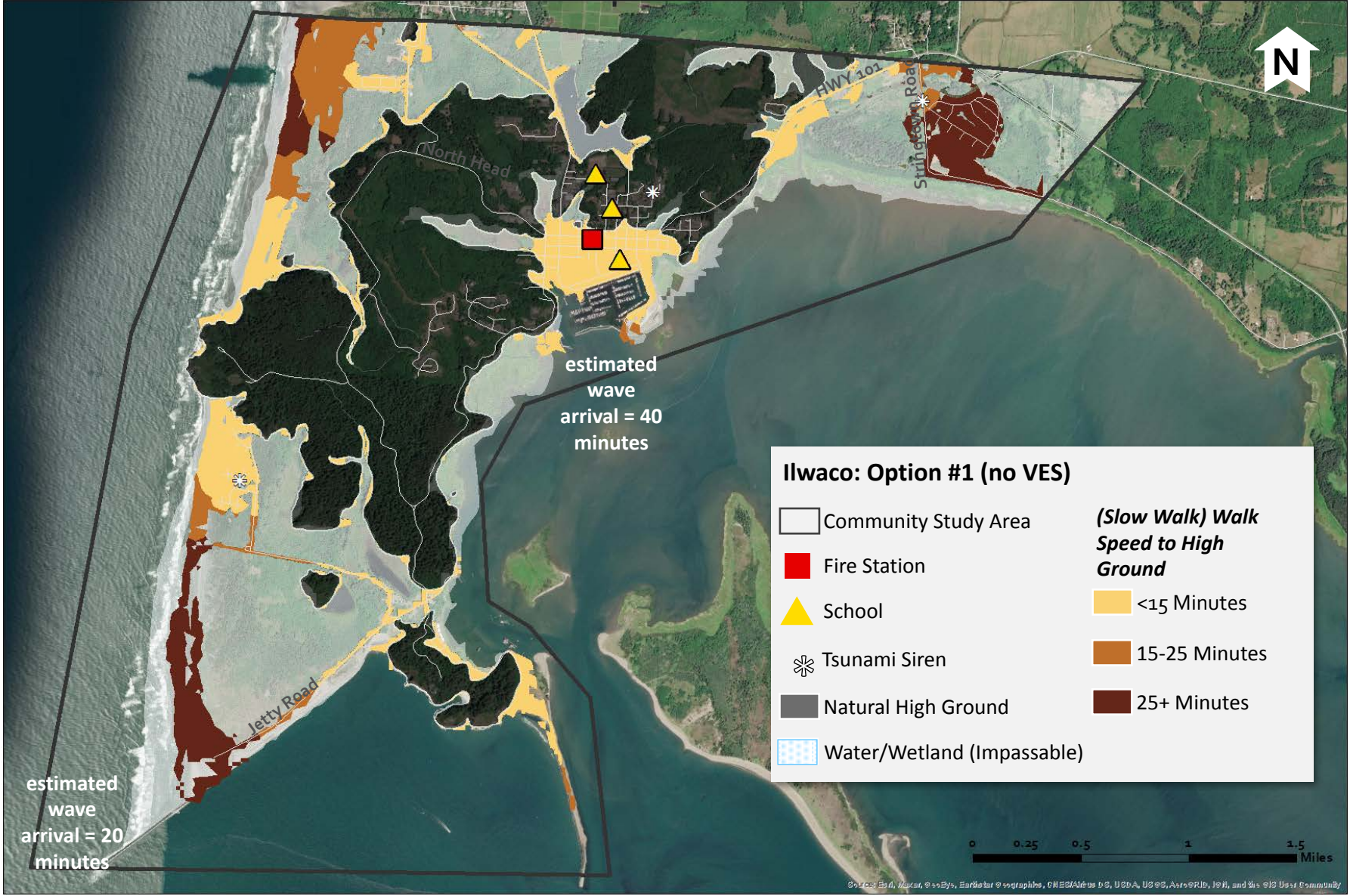
*Fire Department occupancy = ~30 people*

*Schools occupancy = ~30 people (~700 additional people located in a natural high ground area)*

Source: 2010 Census (average household size); Pacific County Residential Land Use



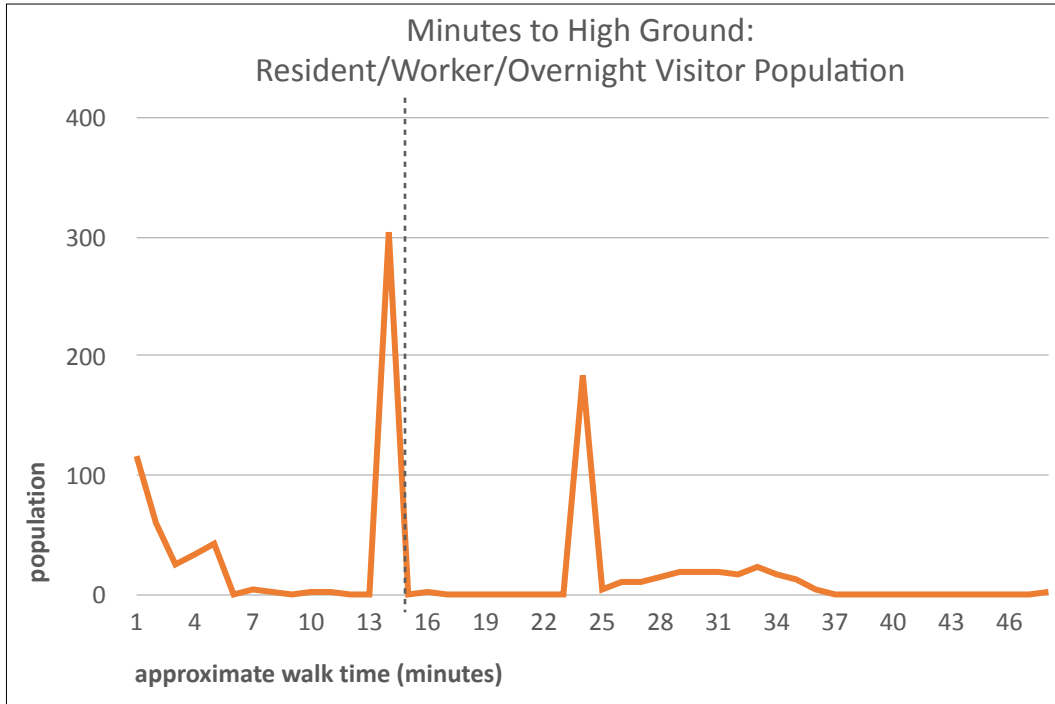








# Ilwaco: VES Option #1 (No VES)



\*Approximate *maximum* walk time accounts for the resident/worker/overnight visitor population locations only. This does not factor in daytime visitors or beach visitors, for example.

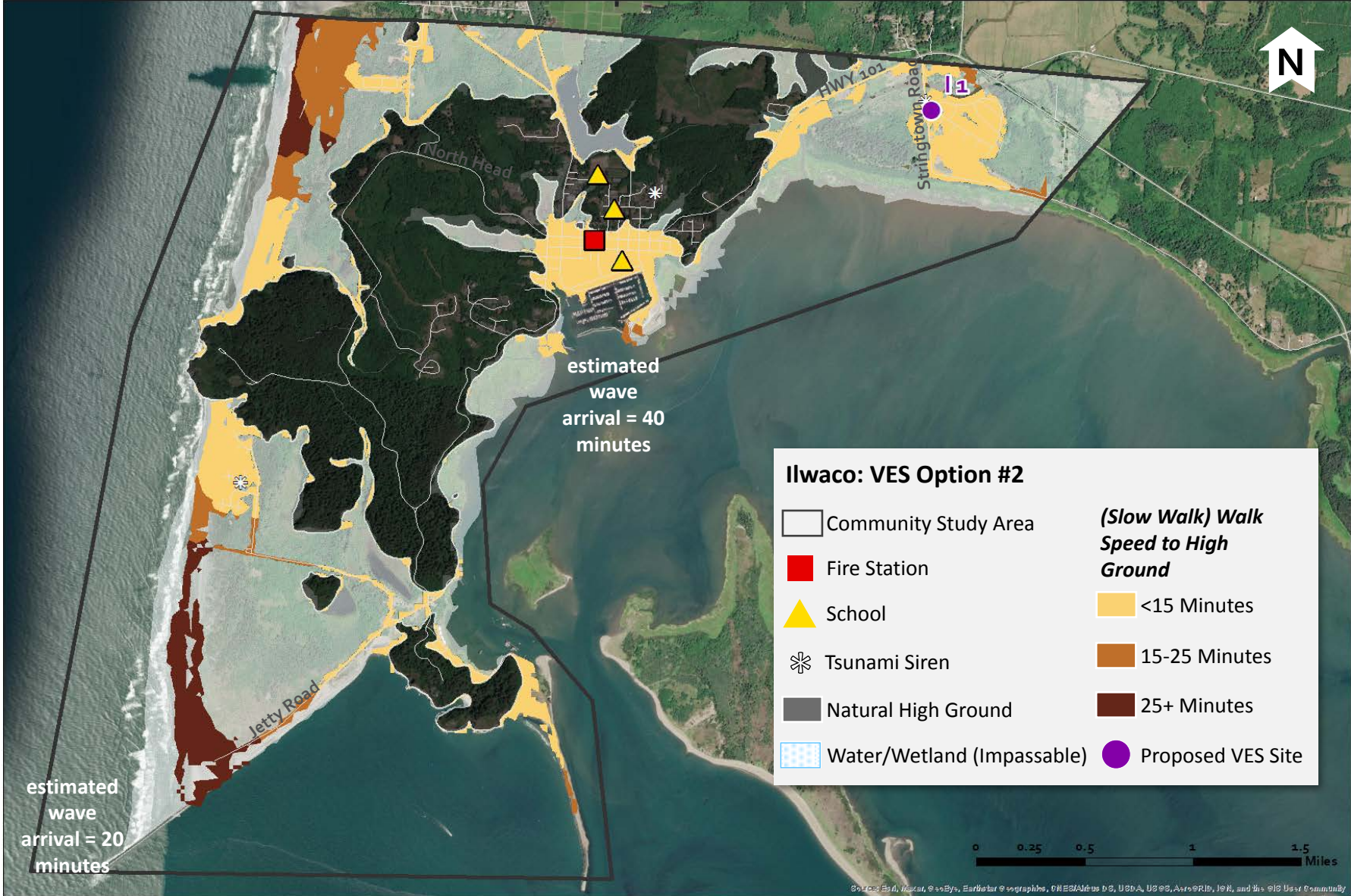
Approximate # of People, by Walking Time Bands, to High Ground

<15 minutes	15-25 minutes	25+ minutes
592 people	190 people	168 people

- *Fire Station: Approximate 2 minute walk time to high ground*
- ▲ *Schools: Approximate 5 minute walk time to high ground (approximately 700 additional people located in natural high ground)*

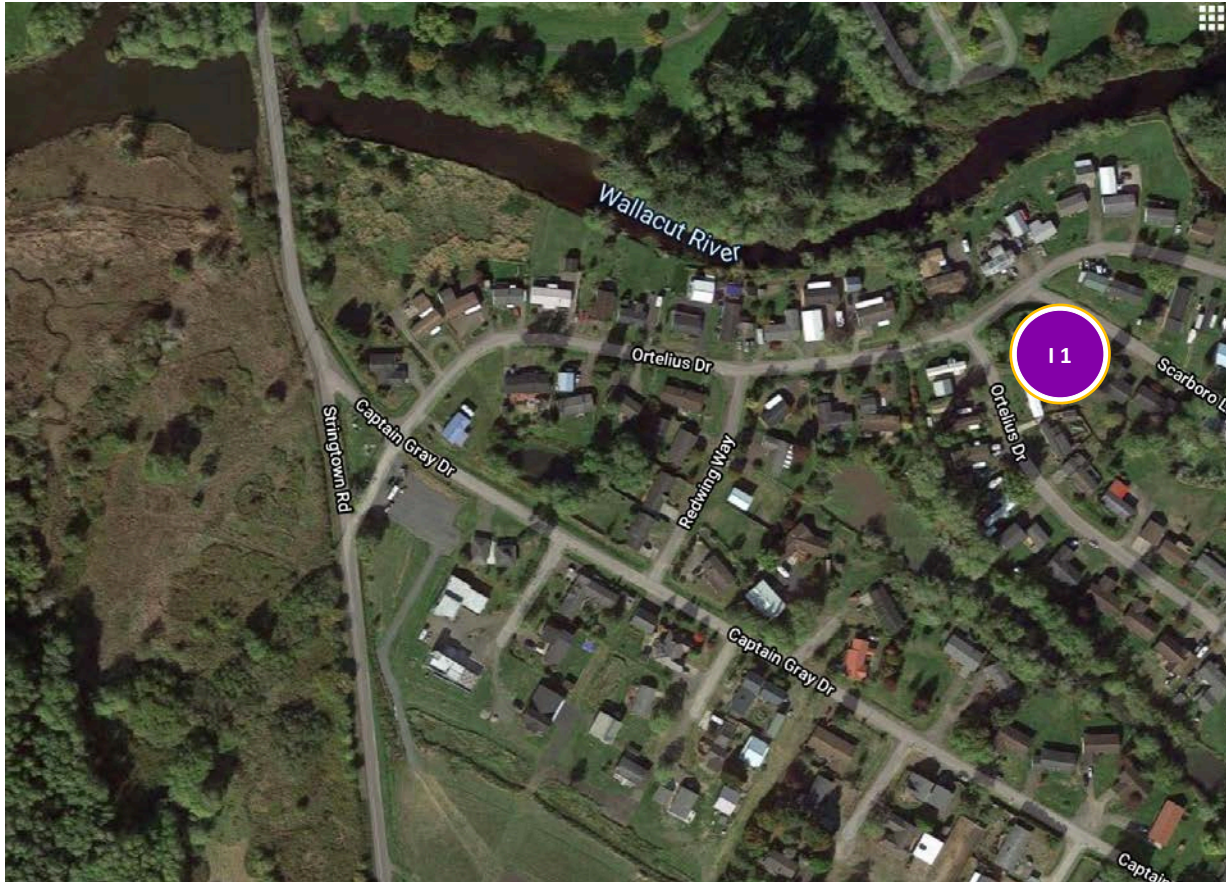
**Under Option #1:**

- approximately **62.3%** of the total estimated Ilwaco population are within 15 minutes to natural high ground
- approximate *\*maximum* walk time to natural high ground for identified population = **48 minutes**





# Ilwaco: I 1



I 1	
Address	7104 Scarborough Lane Scarborough Lane North & Ortelius Drive
Intersection	Ortelius Drive
Options	2, 3
Notes	Residential neighborhood

Source: Google Maps

# Ilwaco: I 1

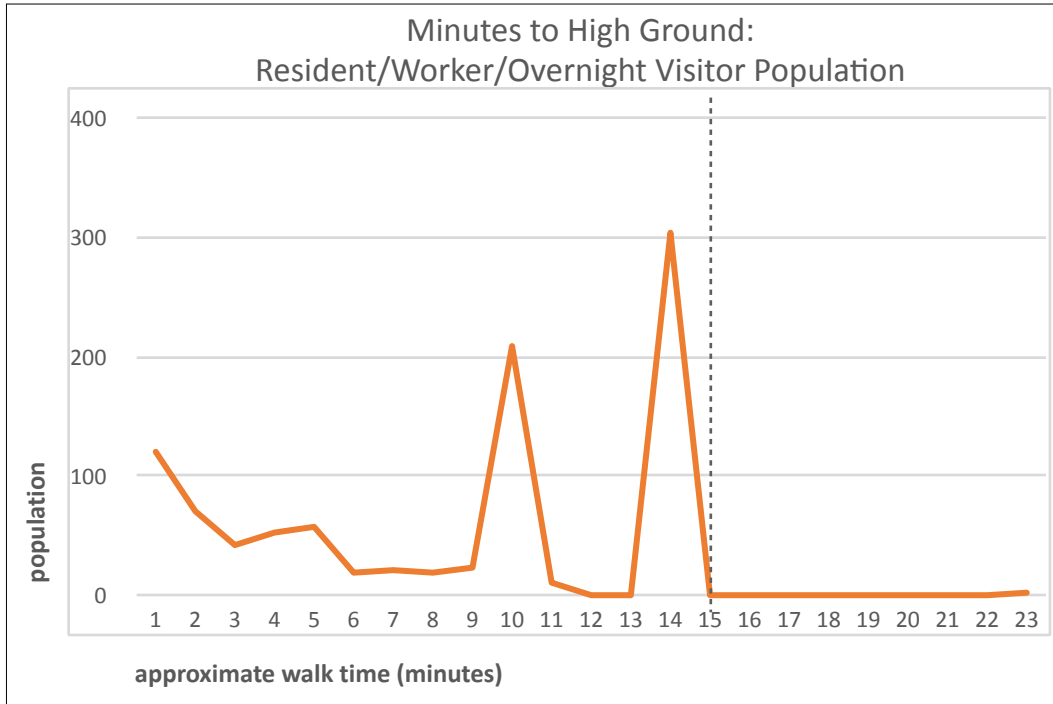


Photo Credit: *Bob Freitag*



# Ilwaco: VES Option #2 (Community-Derived)

11



Approximate # of People, by Walking Time Bands, to High Ground

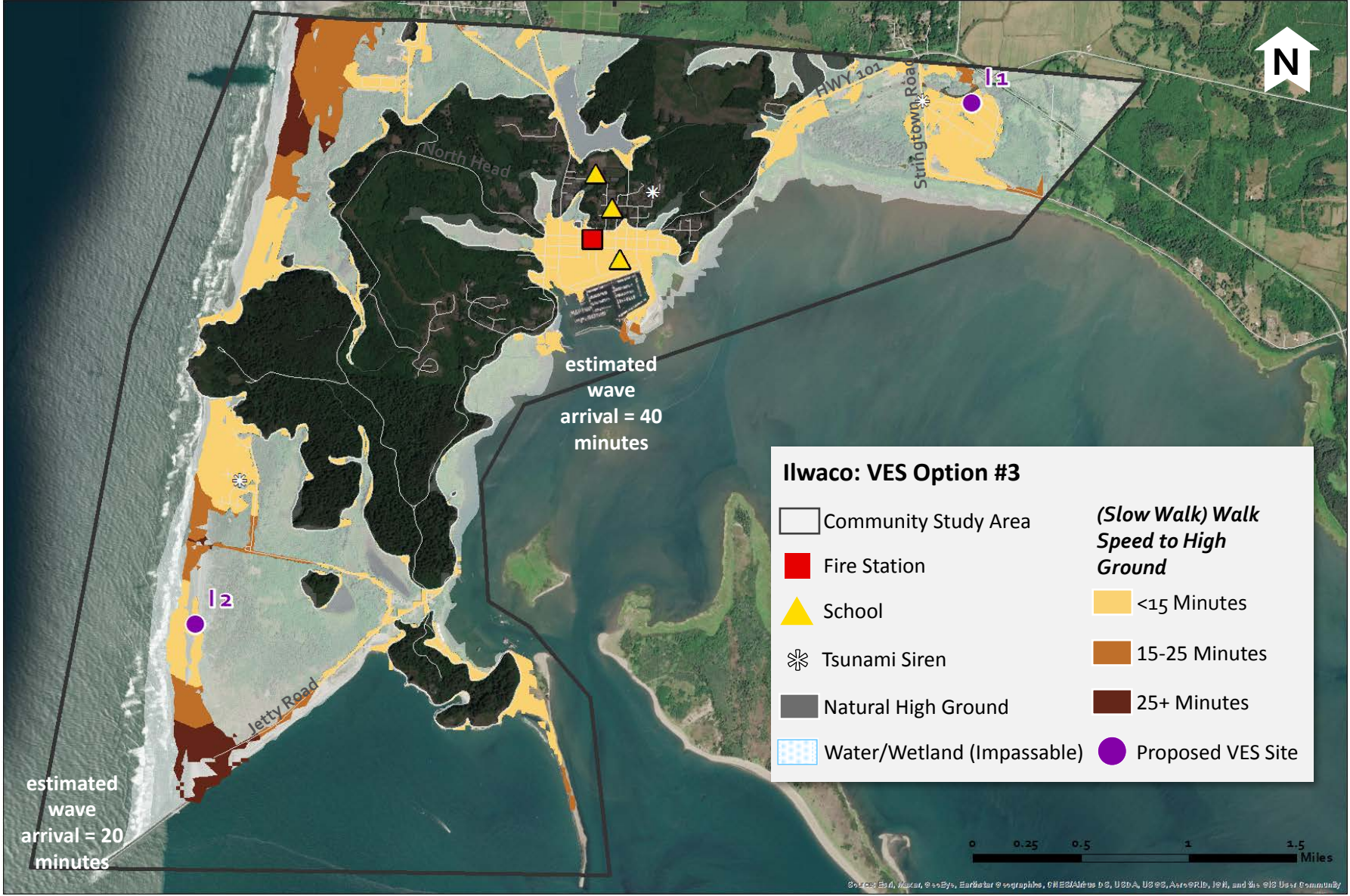
<15 minutes	15-25 minutes	25+ minutes
948 people	2 people	n/a

- *Fire Station: Approximate 2 minute walk time to high ground*
- ▲ *Schools: Approximate 5 minute walk time to high ground (approximately 700 additional people located in natural high ground)*

### Under **Option #2:**

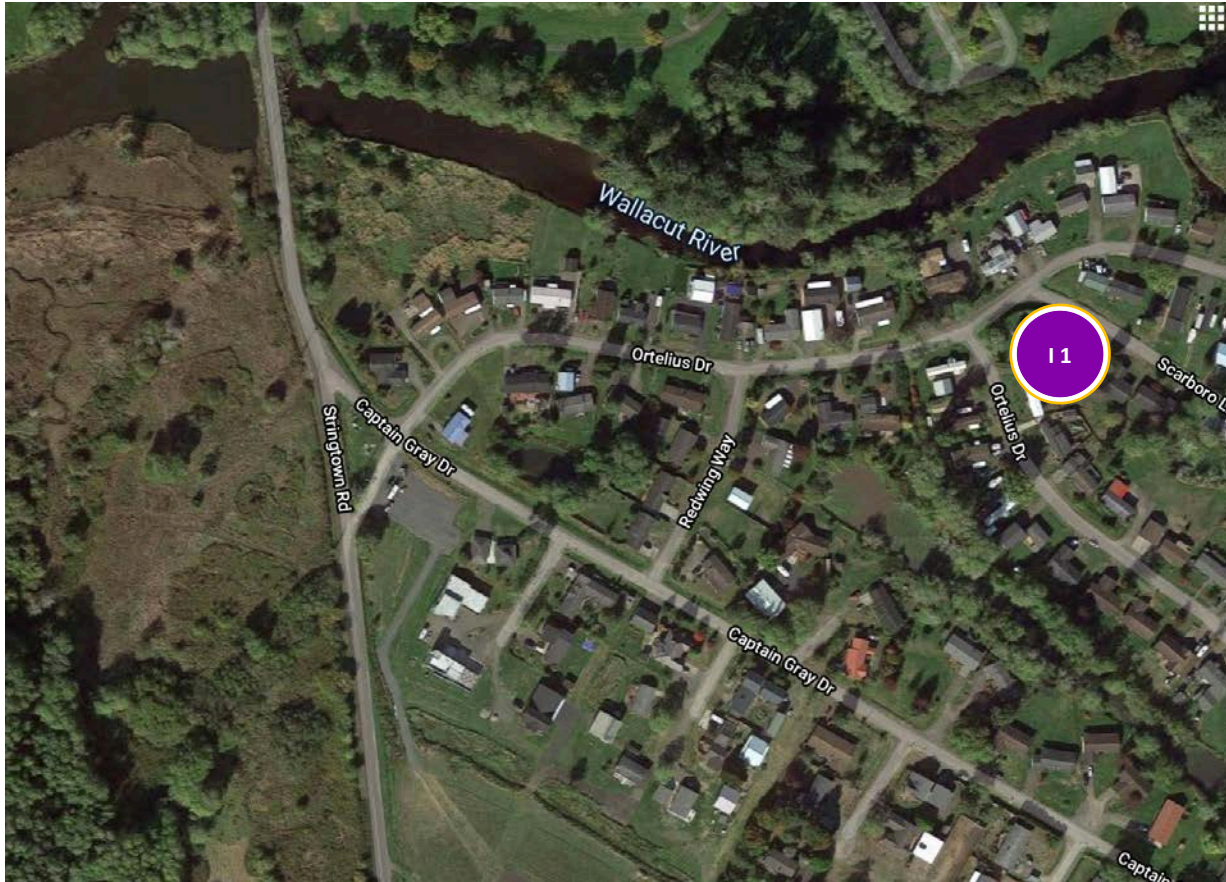
- approximately **99.8%** of the total estimated Ilwaco population are within 15 minutes to natural high ground OR vertical evacuation
- approximate *maximum* walk time to natural high ground or vertical evacuation for identified population = **23** minutes
- approximate *minimum* VES capacity need (15 minute walk time) = **356** people
- # of proposed VES = **1**







# Ilwaco: I 1



I 1	
Address	7104 Scarborough Lane Scarborough Lane North &
Intersection	Ortelius Drive
Options	2, 3
Notes	Residential neighborhood

Source: Google Maps

# Ilwaco: I 1

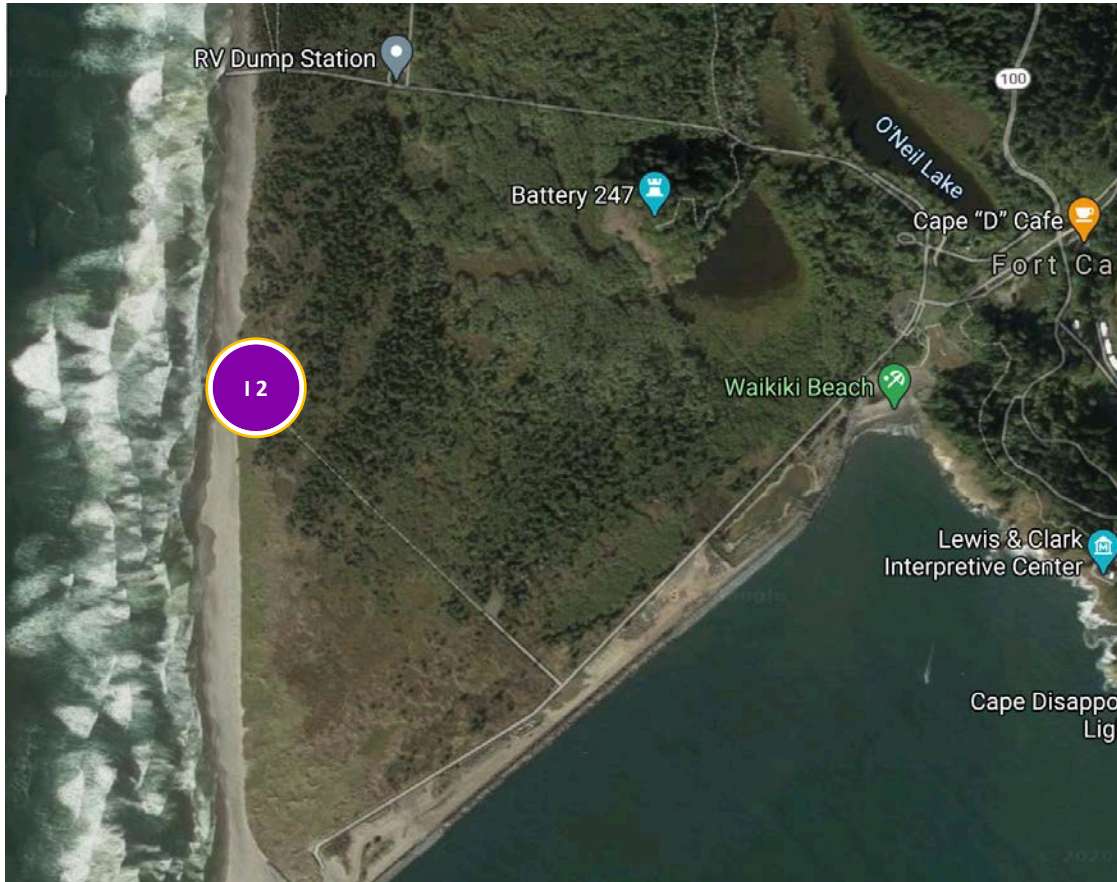


Photo Credit: *Bob Freitag*

I 1 - Privately-owned parcel with development. High visibility corner lot.



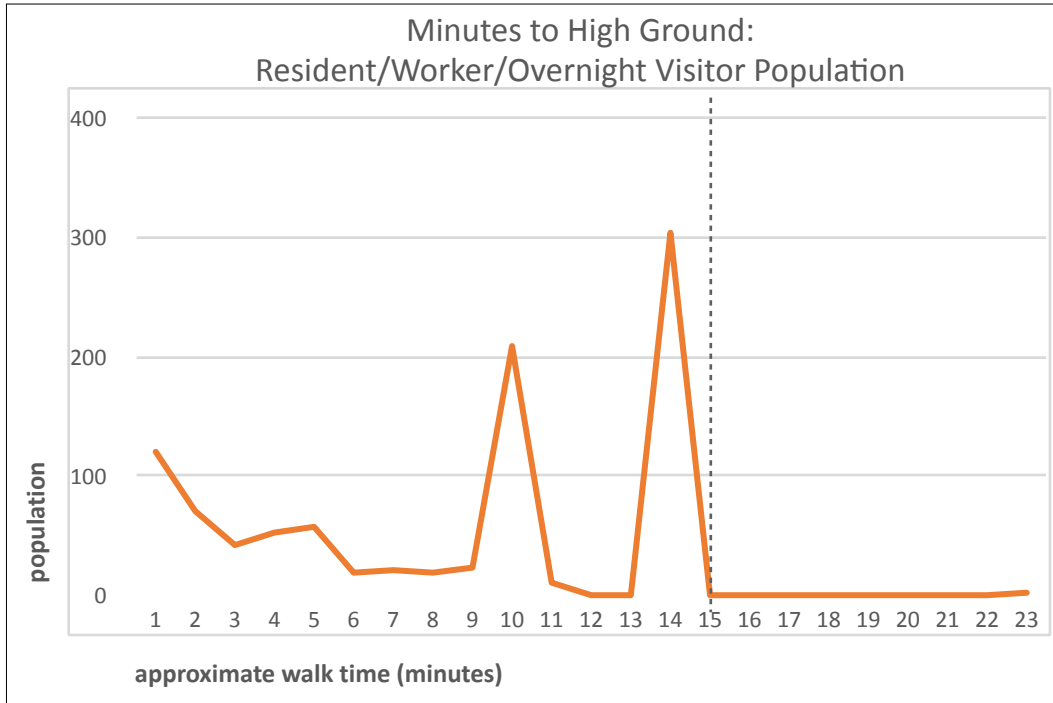
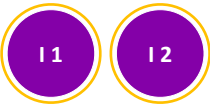
# Ilwaco: I 2



<b>I 2</b>	
<b>Address</b>	N/a
<b>Intersection</b>	End of a trail, off Jetty Road
<b>Options</b>	3
<b>Notes</b>	This is a beach site to accommodate visitors. It is located at the end of a road/trail that travels NW off Jetty Road.

Source: Google Maps

# Ilwaco: VES Option #3 (Broad Spatial Coverage)



Approximate # of People, by Walking Time Bands, to High Ground

<15 minutes	15-25 minutes	25+ minutes
948 people	2 people	n/a

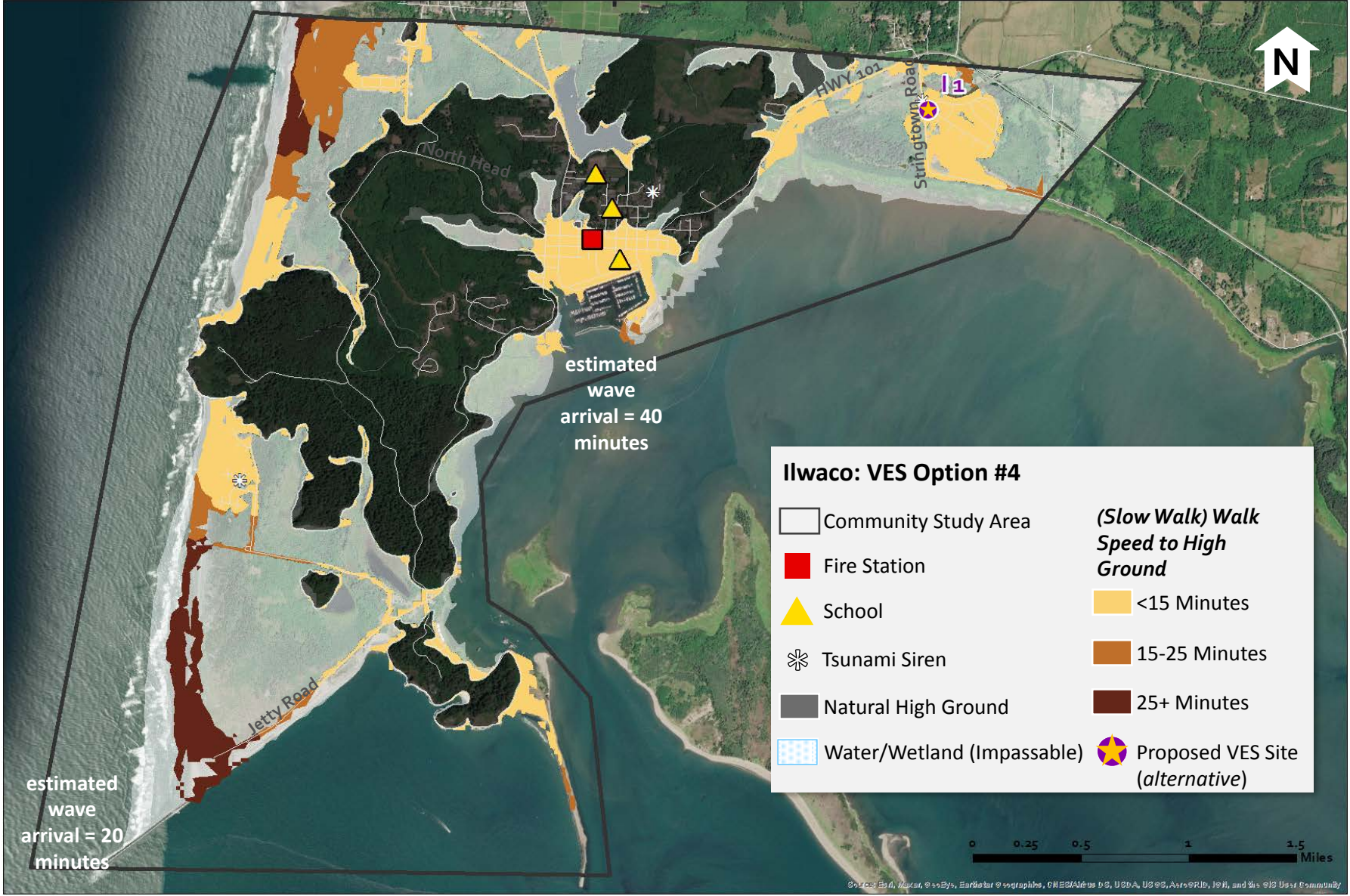
- *Fire Station: Approximate 2 minute walk time to high ground*
- ▲ *Schools: Approximate 5 minute walk time to high ground (approximately 700 additional people located in natural high ground)*

**Under Option #3:**

- approximately **99.8%** of the total estimated Ilwaco population are within 15 minutes to natural high ground OR vertical evacuation
- approximate *maximum* walk time to natural high ground or vertical evacuation for identified population = **23** minutes
- approximate *minimum* VES capacity need (15 minute walk time) = **356** people
- # of proposed VES = **2**

**Note:** Option #3 does not include **all** visitors (i.e. day trip visitors, peak summer day visitors). It does, however, factor in more thorough coverage across the community, including some popular beach areas and other locations where there may be occasional gatherings of people (i.e. parking lots, campgrounds, etc.). Local decision-makers will need to determine how (or if) to factor in that additional population.

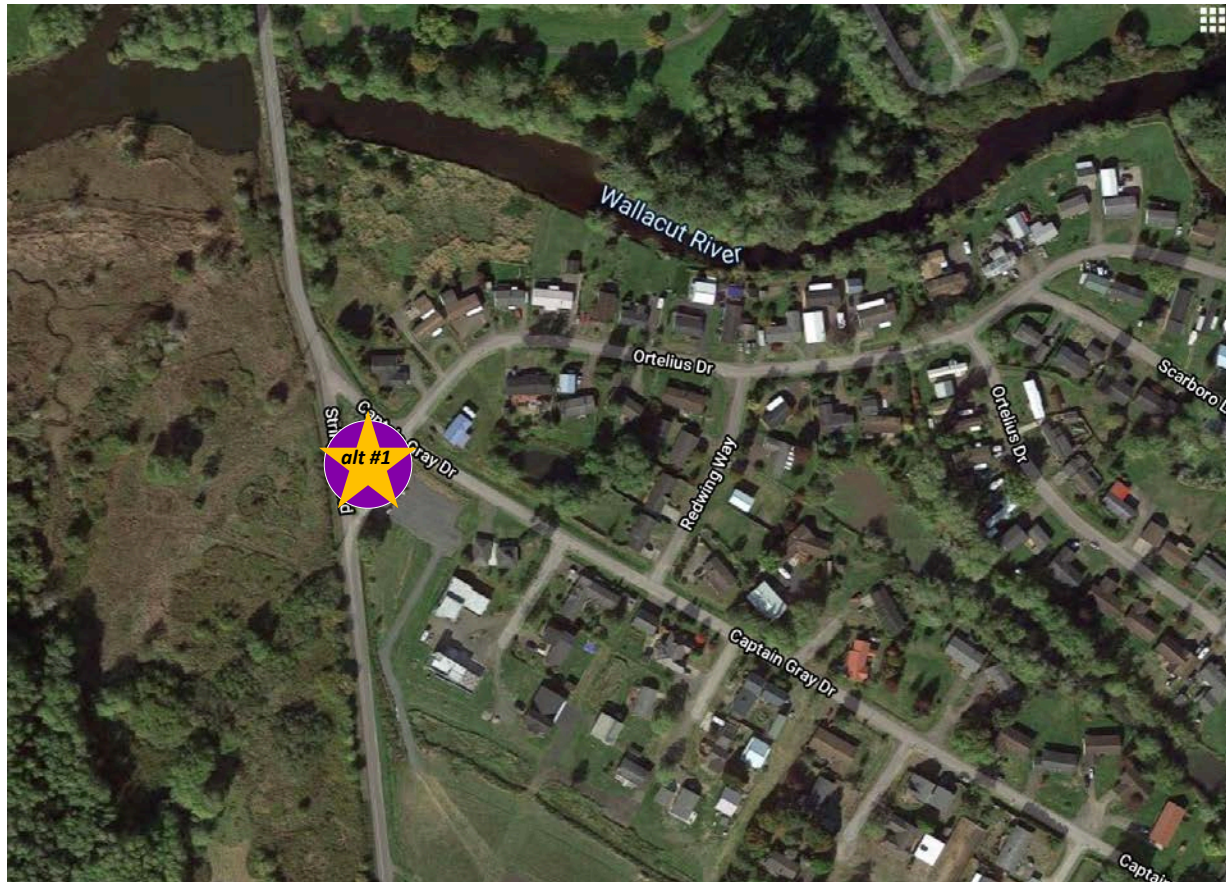








# Ilwaco: I 1 - alternative #1



I 1 - alt #1	
Address	N/a
Intersection	Captain Gray Drive & Stringtown Road
Options	4
Notes	Alternative site due to public ownership of land

Source: Google Maps



## Ilwaco: I 1 - *alternative #1*

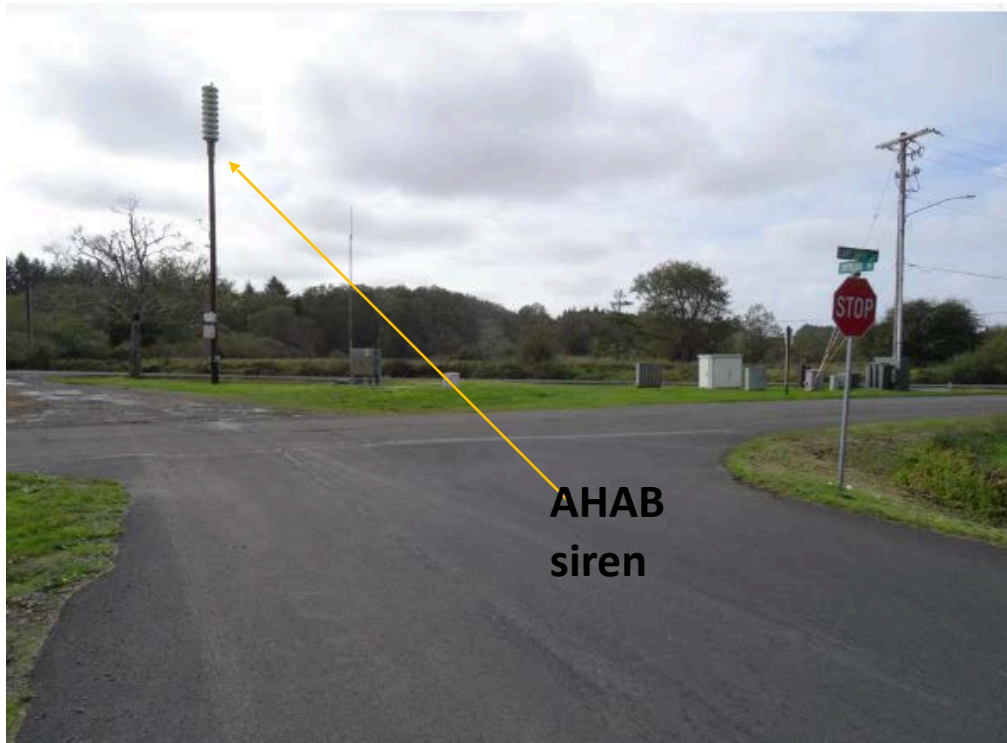
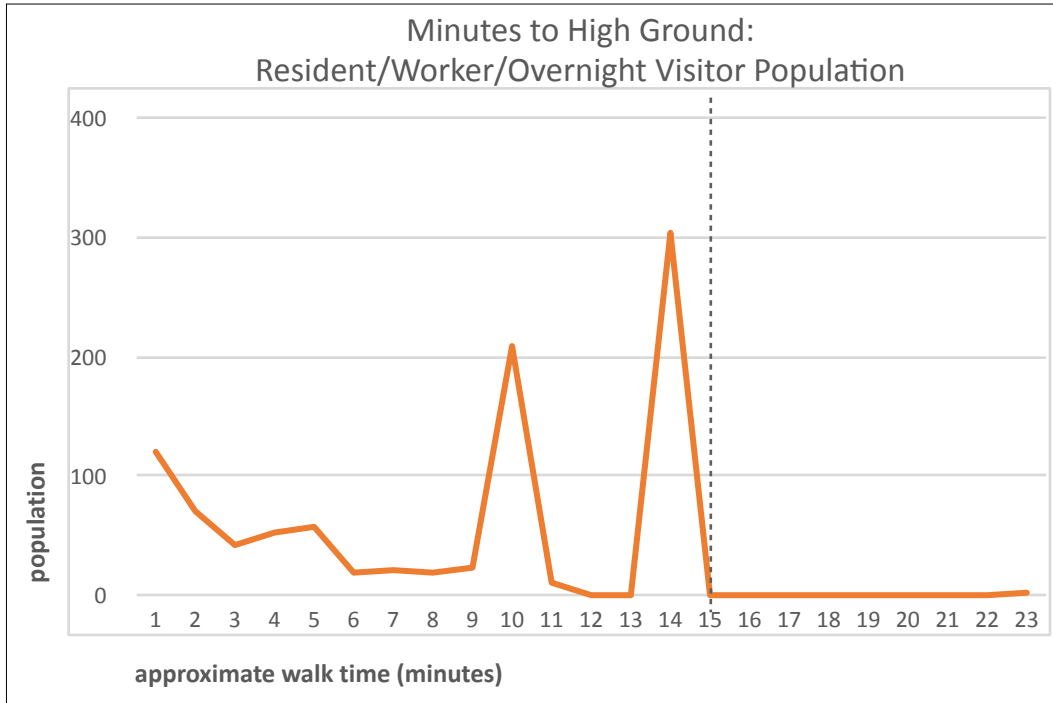


Photo Credit: *Bob Freitag*

I 1 - *Alternative #1*: The triangular parcel located at the entrance of the residential neighborhood is publicly-owned (City of Ilwaco) with an AHAB tsunami siren.

# Ilwaco: VES Option #4 (Efficient/Lean)



Approximate # of People, by Walking Time Bands, to High Ground

<15 minutes	15-25 minutes	25+ minutes
948 people	2 people	n/a

- *Fire Station: Approximate 2 minute walk time to high ground*
- ▲ *Schools: Approximate 5 minute walk time to high ground (approximately 700 additional people located in natural high ground)*

**Under Option #4:**

- approximately **99.8%** of the total estimated Ilwaco population are within 15 minutes to natural high ground OR vertical evacuation
- approximate *maximum* walk time to natural high ground or vertical evacuation for identified population = **23** minutes
- approximate *minimum* VES capacity need (15 minute walk time) = **356** people
- # of proposed VES = **1**



## Potential Ilwaco VES Locations: All Options (1-4)

VES ID	Intersection	Parcel ID	Parcel Owner	Lat   Long	Options	Notes
I 1	Scarboro Lane North & Ortelius Drive	73033000027	Keith and Carol Fogg	46.318953, -124.003979	2, 3	Residential neighborhood
I 2	End of a trail, off Jetty Road	9110800001	State of Washington	46.281534, -124.076274	3	Beach location

### Notes

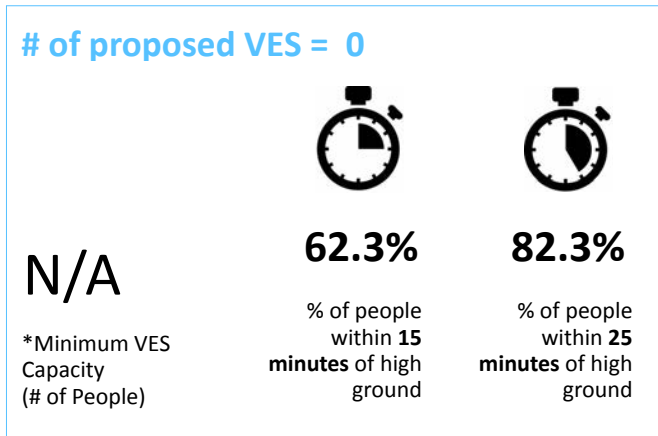
**I 1** - The original I 1 location was selected to serve the nearby residential neighborhood. The alternative site provides available vacant land for a potential VES tower on a site that is already associated with tsunamis (due to the siren).

**I 2** - The I 2 site was selected to accommodate visitors, people on the beach. It is located at the end of a trail off Jetty Road - heading out past Fort Canby.

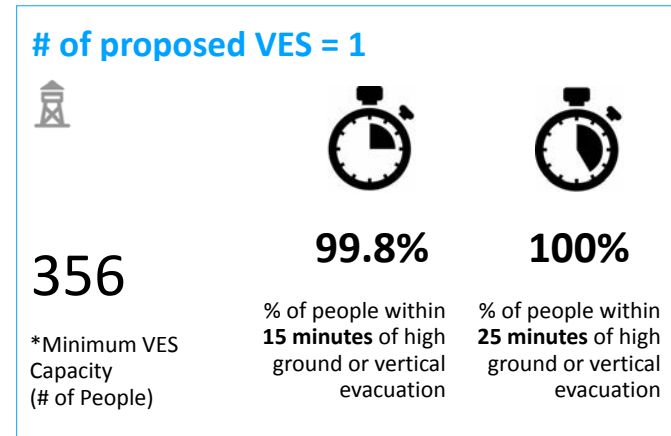


# Ilwaco: Comparison of All Options (1-4)

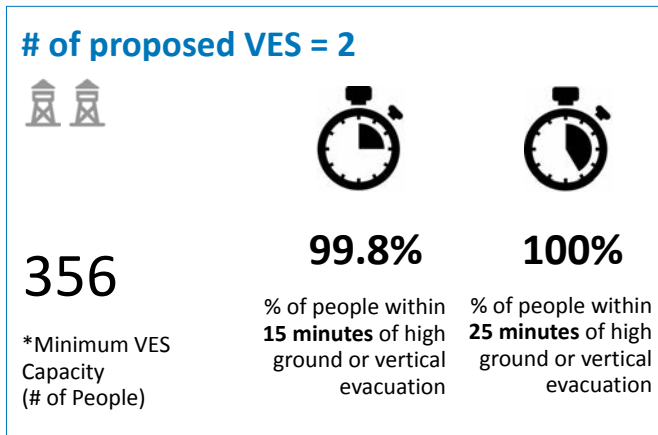
Option #1



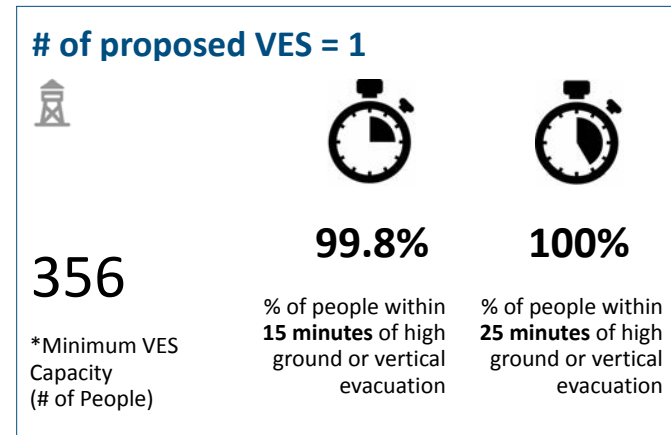
Option #2



Option #3



Option #4







## Ilwaco: Comparison of All Options (1-4)

**Notes:**

\**Minimum VES Capacity* = the delta (or difference) between Option #1 (no VES) number of people at each minute mark and Options #2, #3, and #4 number of people at each minute mark. For example: If 10 people are within 15 minutes of high ground under Option #1 but that number increases to 25 people under Option #2 - then we know that a minimum of 15 additional people have been put within 15 minutes of high ground through the addition of a Vertical Evacuation Structure. Therefore, the minimum VES capacity for this example is 15 people.

# Seaview

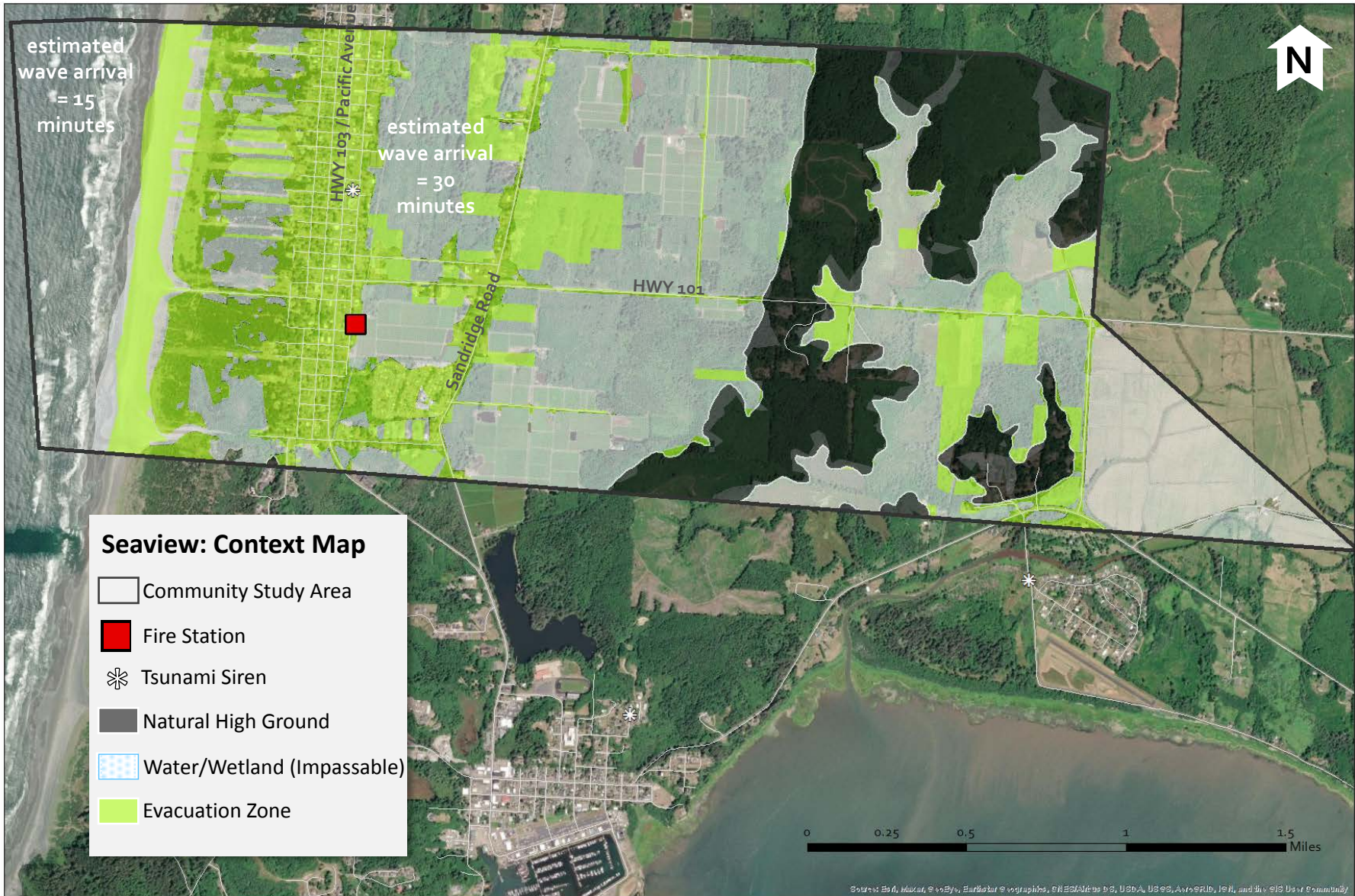
***Seaview community study area population in the tsunami hazard area = ~2,663 people***

*Resident/Worker/Overnight Visitor population = ~2,633 people*

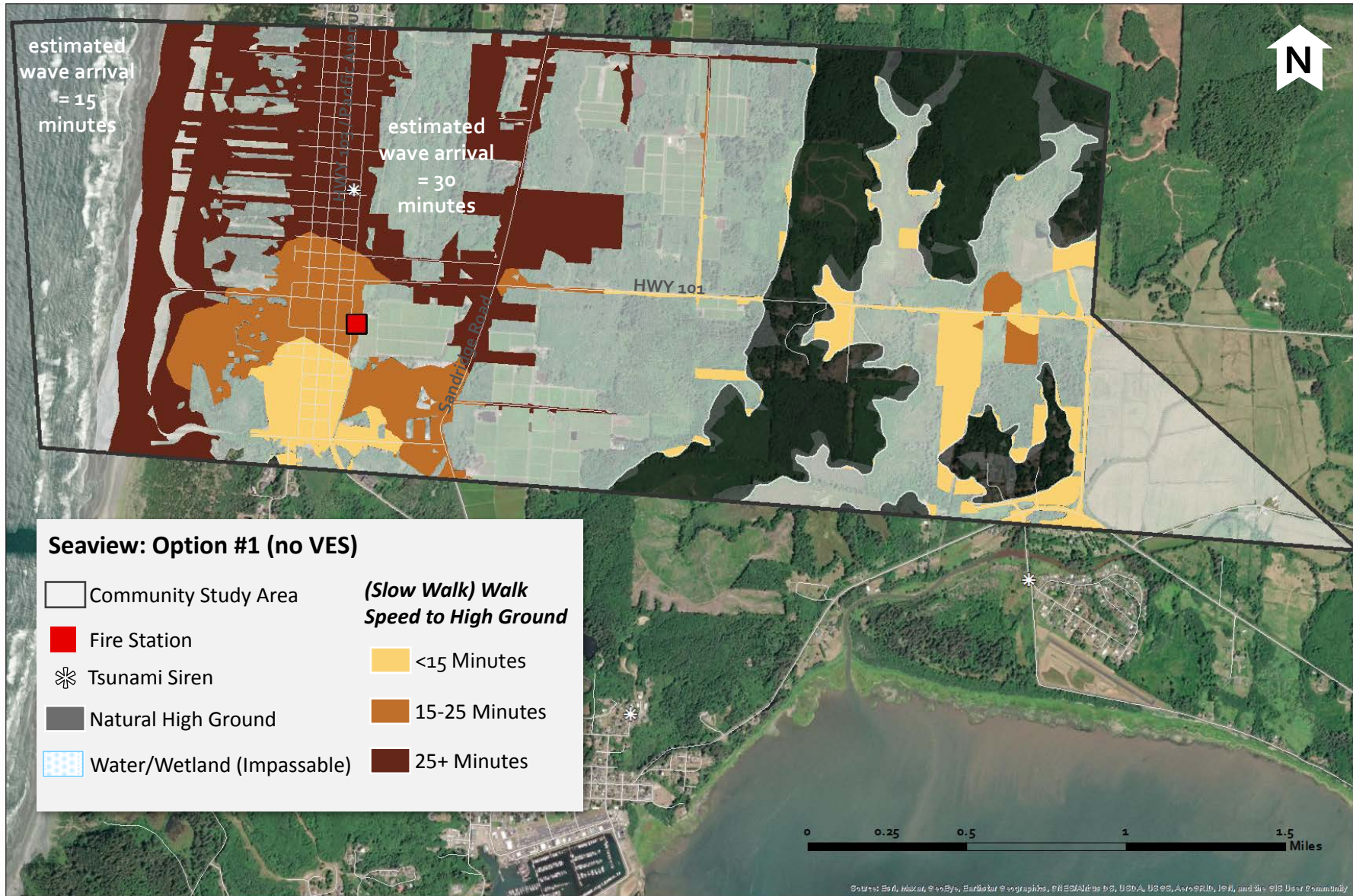
*Fire Department occupancy = ~30 people*

*Schools occupancy = N/A*

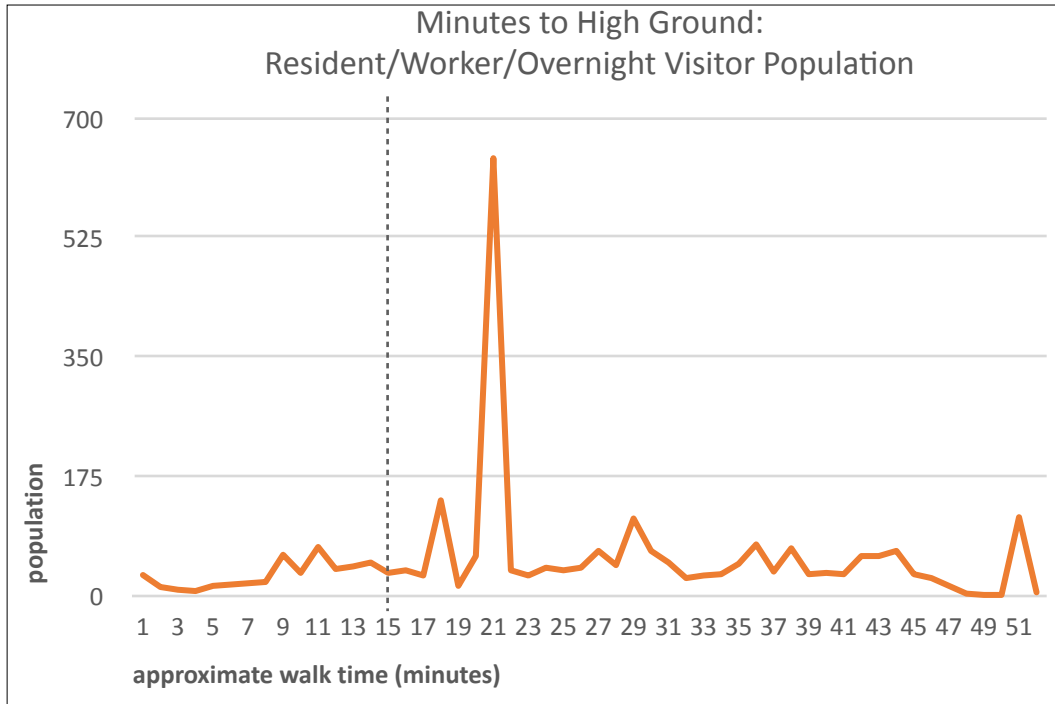
Source: 2010 Census (average household size); Pacific County Residential Land Use







# Seaview: VES Option #1 (No VES)



\*Approximate *maximum* walk time accounts for the resident/worker/overnight visitor population locations only. This does not factor in daytime visitors or beach visitors, for example.

Approximate # of People, by Walking Time Bands, to High Ground

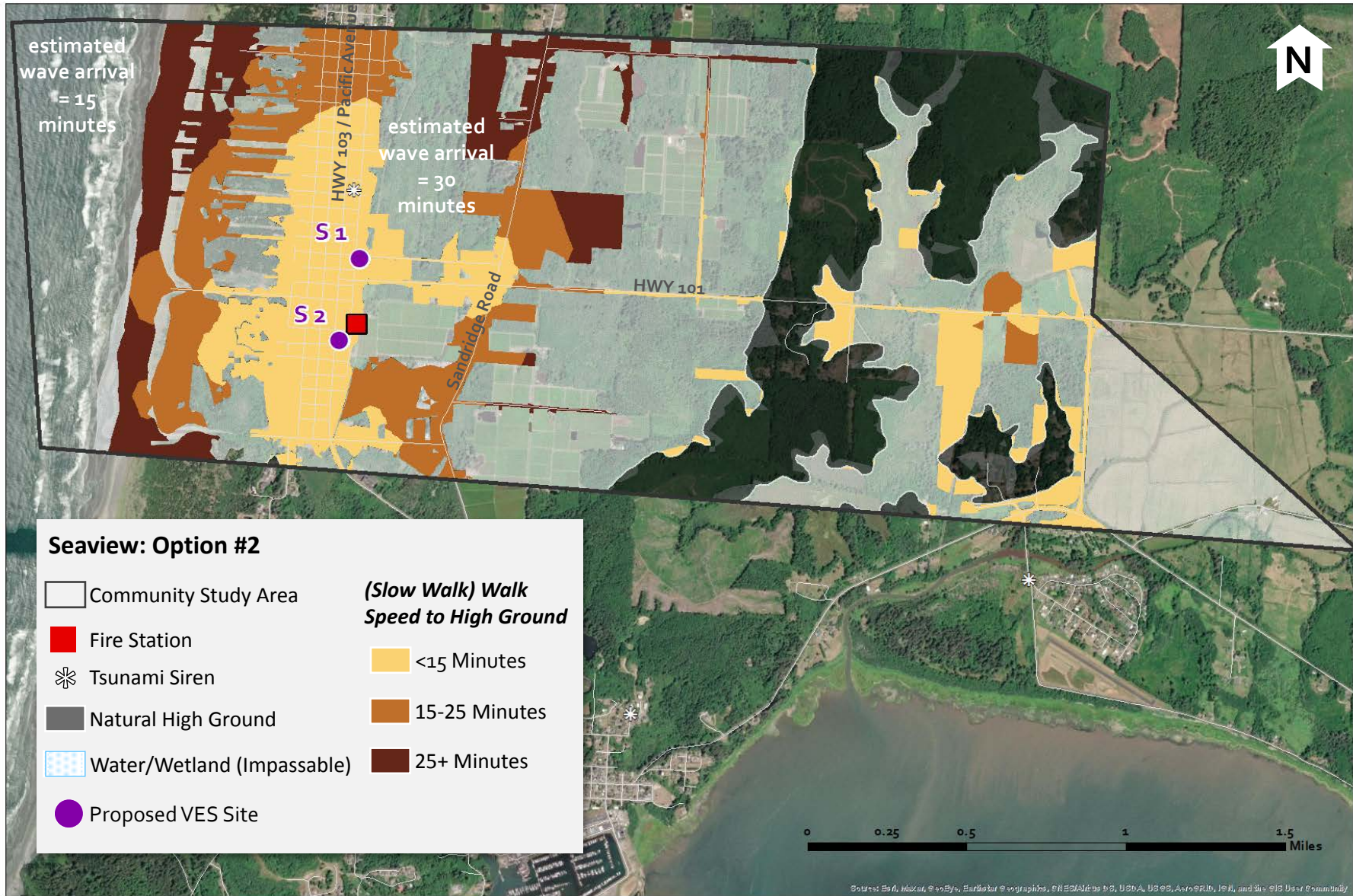
<15 minutes	15-25 minutes	25+ minutes
408 people	1,117 people	1,138 people

- Fire Station: Approximate 19 minute walk time to high ground
- ▲ Schools: N/A

**Under Option #1:**

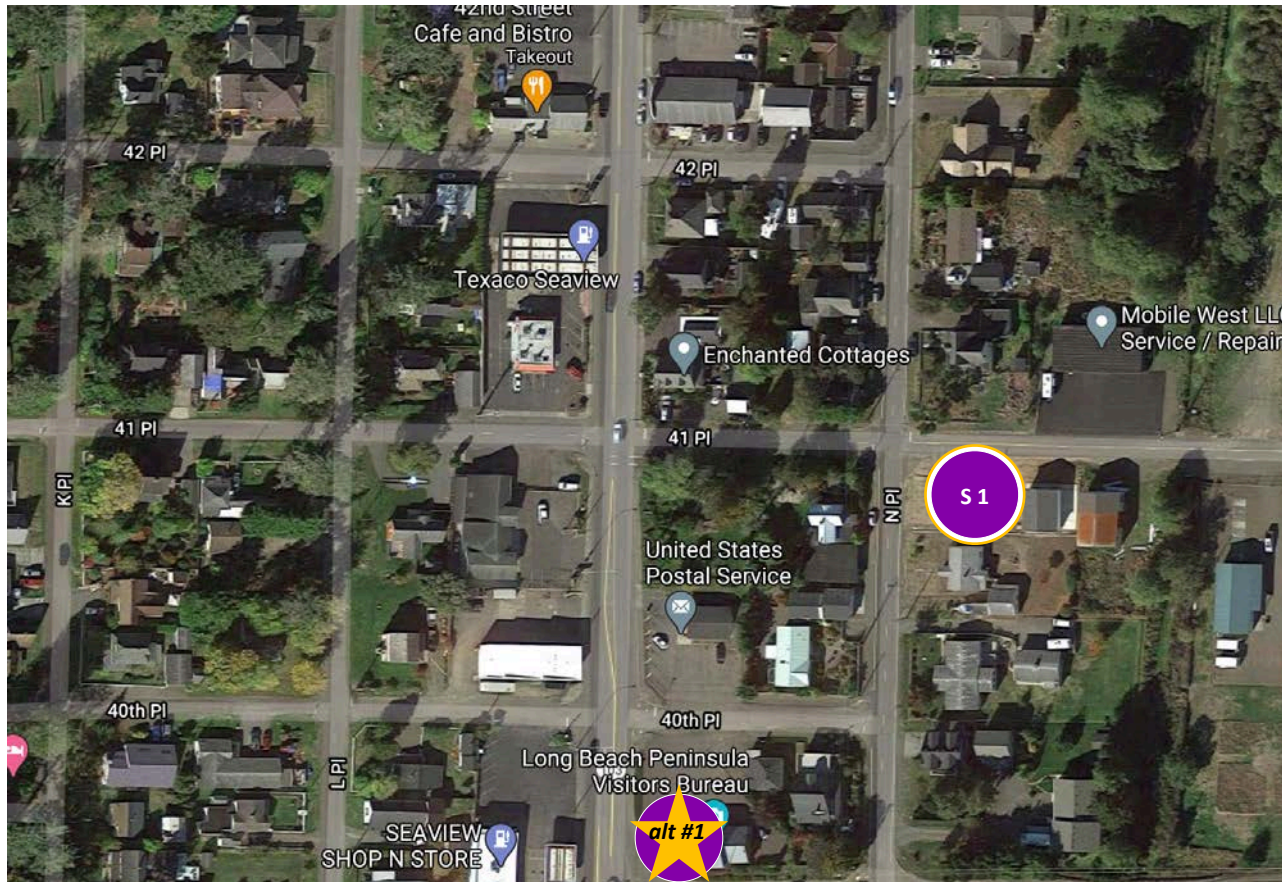
- approximately **15.3%** of the total estimated Seaview population are within 15 minutes to natural high ground
- approximate *\*maximum* walk time to natural high ground for identified population = **51** minutes







# Seaview: S 1 + *alternative*



S 1	
Address	4040 N Place
Intersection	41st Place & N Place
Options	2, 3
Notes	Private land (currently), could move to parcel: #73026063001

S 1 - alt #1	
Address	3914 Pacific Way
Intersection	HWY 101 & HWY 103
Notes	Long Beach Peninsula Visitors Bureau

Source: Google Maps

# Seaview: S 1



Photo Credit: *Bob Freitag*

S 1 - New construction on a privately-owned parcel at a high visibility intersection along 41st Place.





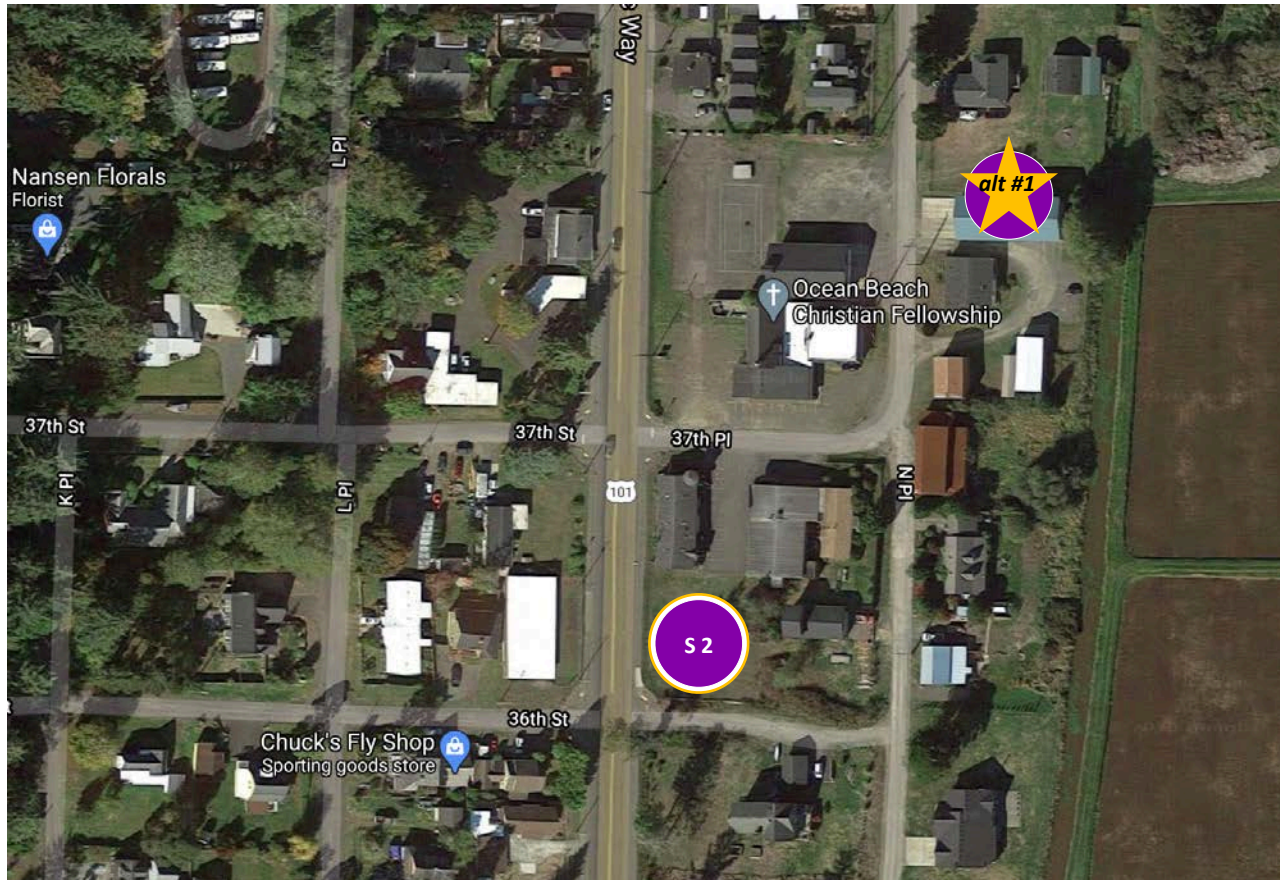
## Seaview: S 1 *alternative*



S 1 - *Alternative #1*: Nearby, State of Washington-owned parcel with Tourism Bureau building on SR 103.

Photo Credit: *Google Maps Street View*

# Seaview: S 2 + alternative



S 2	
Address	3616 Pacific Way 36th Street/Lane & SR 103
Intersection	103
Options	2, 3, 4
Notes	undeveloped, private land. could be moved to fire department parcel: 10112822229
S 2 - alt #1	
Address	3708 N Place
Intersection	37th Place & N Place
Notes	Seaview Fire Department

Source: Google Maps

# Seaview: S 2



Photo Credit: *Bob Freitag*

S 2 - Privately-owned, vacant lot facing US Highway 101/Pacific Way





# Seaview: S 2 alternative



S 2 - Alternative: Seaview Fire Department located on N Place, NE of S 2 location. AHAB siren is across the street from Fire Department.

Photo Credit: Google Maps Street View

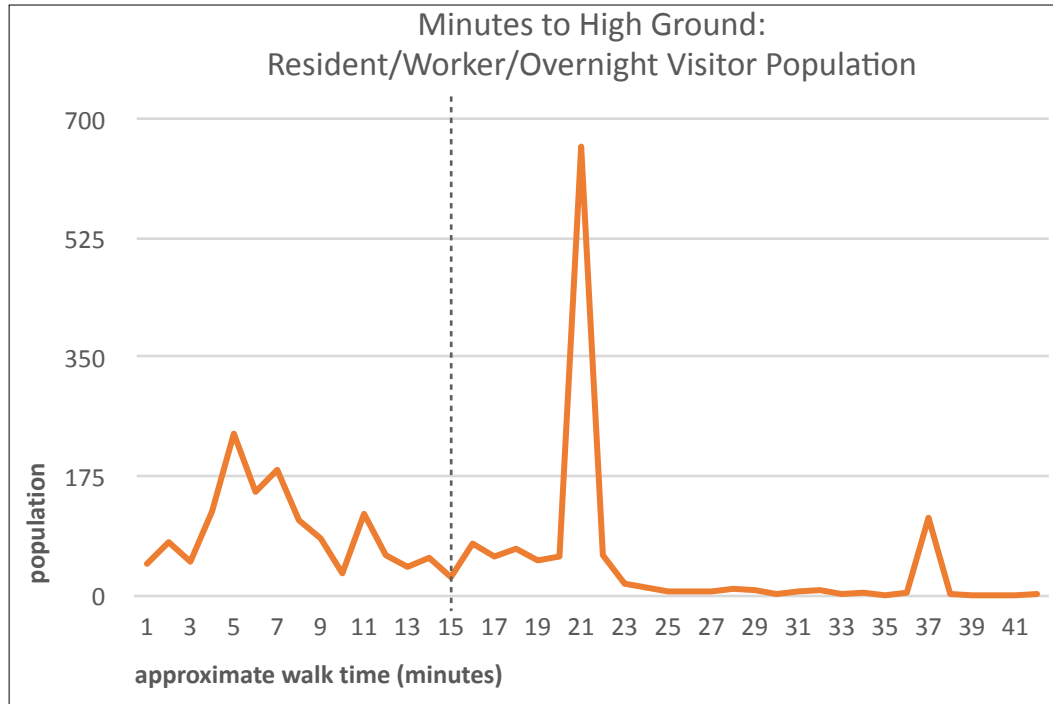


**AHAB  
siren**

## Seaview: VES Option #2 (Community-Derived)

S1

S2



Approximate # of People, by Walking Time Bands,  
to High Ground

<15 minutes	15-25 minutes	25+ minutes
1,403 people	1,089 people	171 people

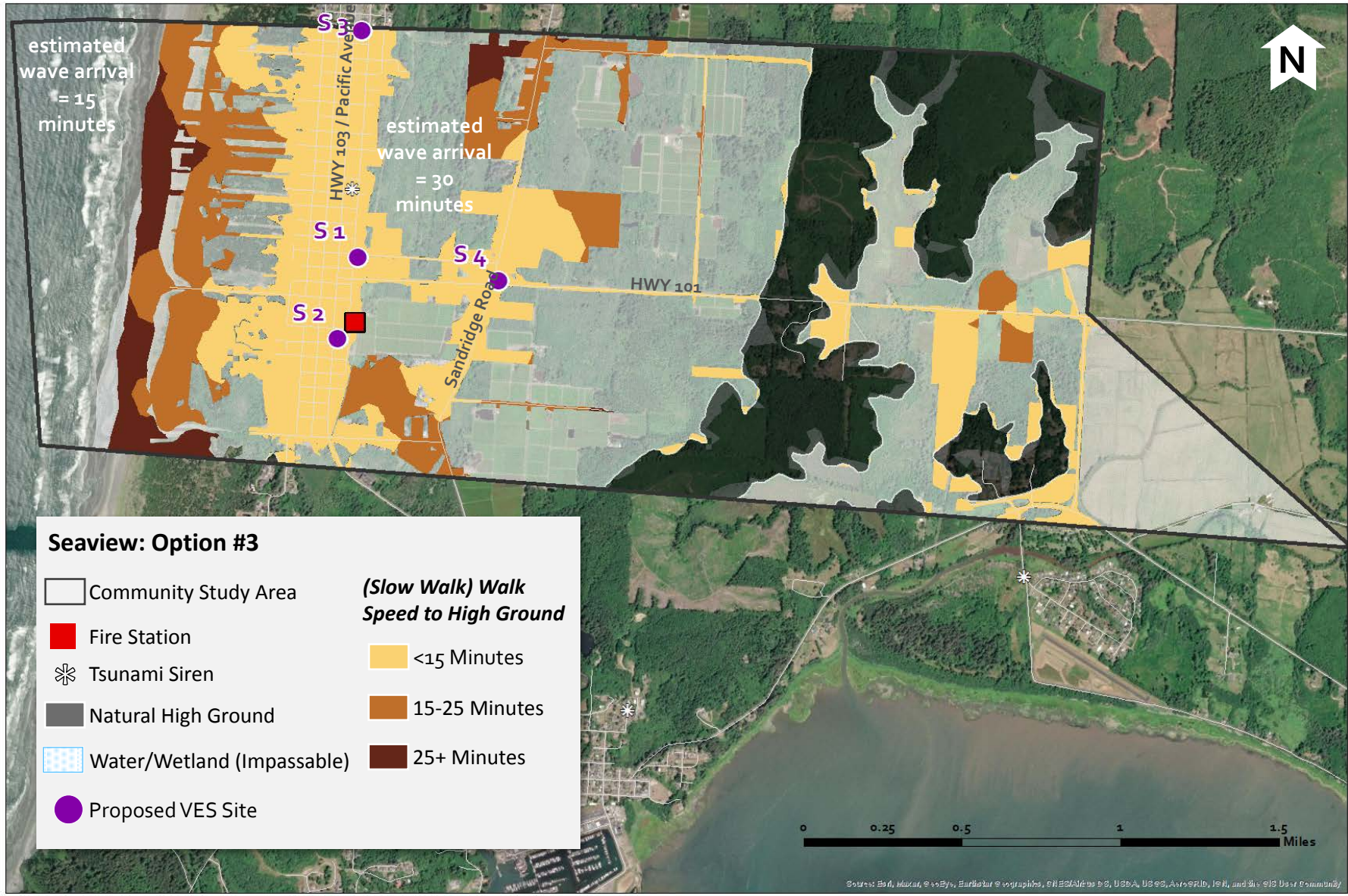
■ *Fire Station: Approximate 3 minute walk time to high ground or VES*

▲ *Schools: N/A*

### Under **Option #2:**

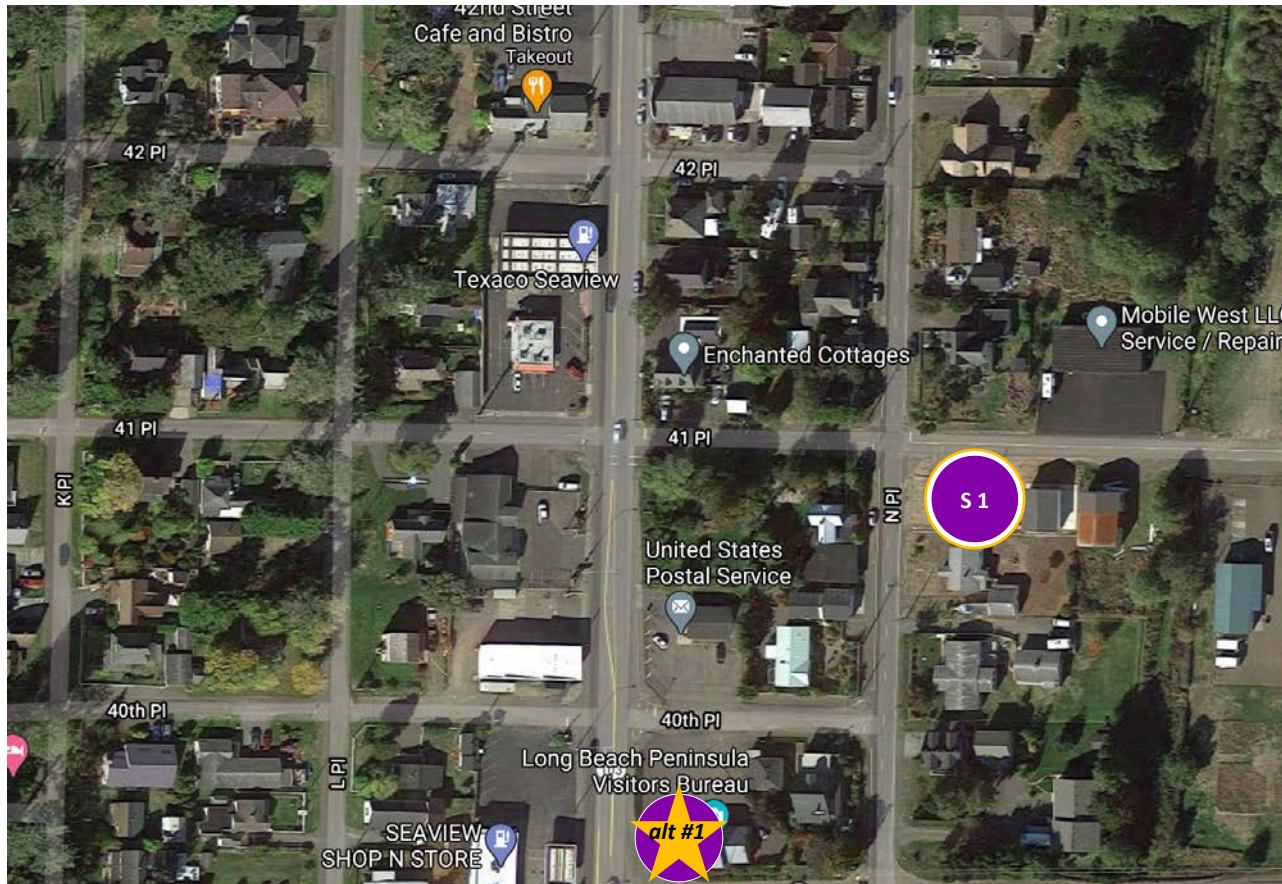
- approximately **52.7%** of the total estimated Seaview population are within 15 minutes to natural high ground OR vertical evacuation
- approximate *maximum* walk time to natural high ground or vertical evacuation for identified population = **41 minutes**
- approximate *minimum* VES capacity need (15 minute walk time) = **995 people**
- # of proposed VES = **2**







# Seaview: S 1 + *alternative*



S 1	
Address	4040 N Place
Intersection	41st Place & N Place
Options	2, 3
Notes	Private land (currently), could move to parcel: #73026063001

S 1 - alt #1	
Address	3914 Pacific Way
Intersection	HWY 101 & HWY 103
Notes	Long Beach Peninsula Visitors Bureau

Source: *Google Maps*



# Seaview: S 1



Photo Credit: *Bob Freitag*

S 1 - New construction on a privately-owned parcel at a high visibility intersection along 41st Place.



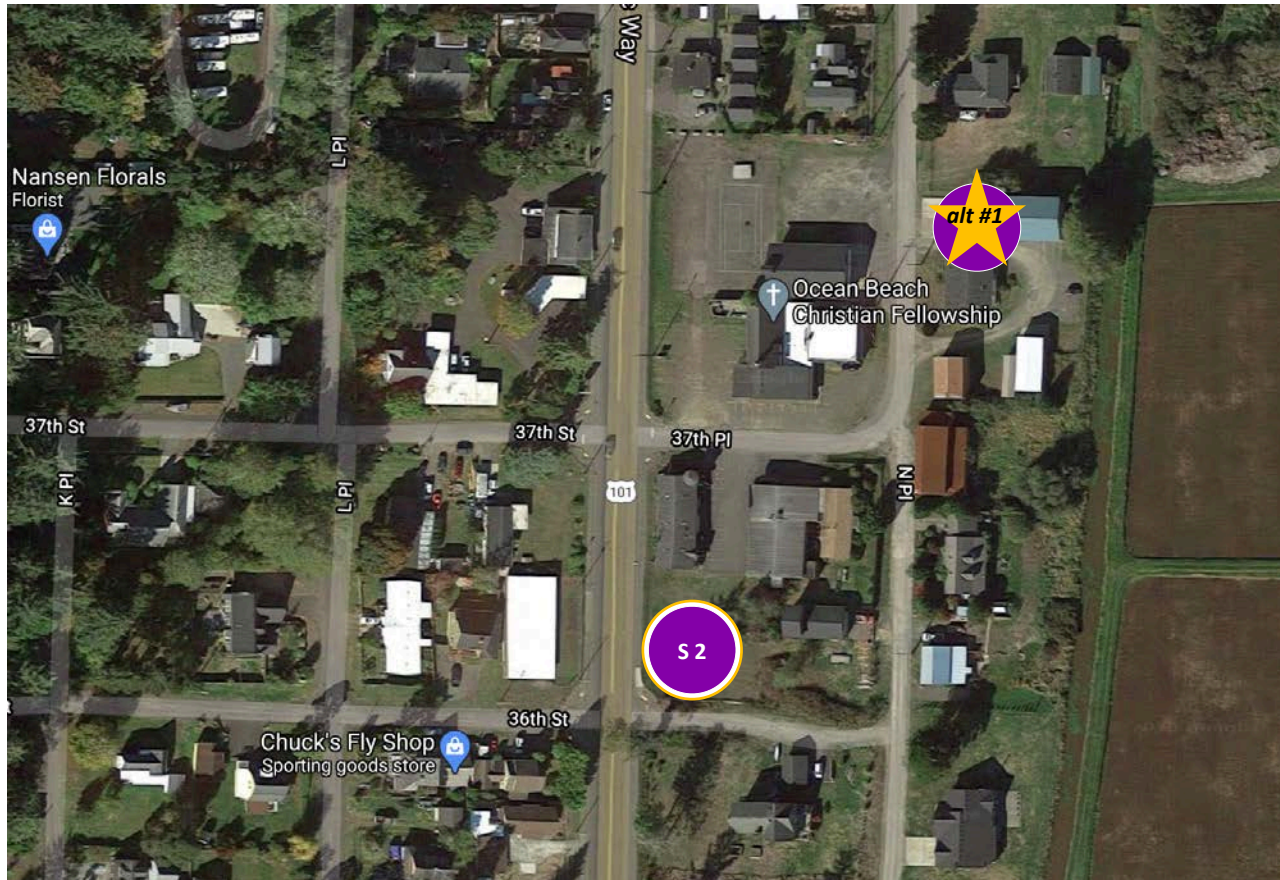
## Seaview: S 1 *alternative*



S 1 - *Alternative #1*: Nearby, State of Washington-owned parcel with Tourism Bureau building on SR 103.

Photo Credit: *Google Maps Street View*

# Seaview: S 2 + alternative



Source: Google Maps

S 2	
Address	3616 Pacific Way
Intersection	36th Street & SR 103
Options	2, 3, 4
Notes	undeveloped land. could be moved to fire department parcel: 10112822229
S 2 - alt #1	
Address	3708 N Place
Intersection	37th Place & N Place
Notes	Seaview Fire Department



# Seaview: S 2



Photo Credit: *Bob Freitag*

S 2 - Privately-owned, vacant lot facing US Highway 101/Pacific Way



# Seaview: S 2 alternative



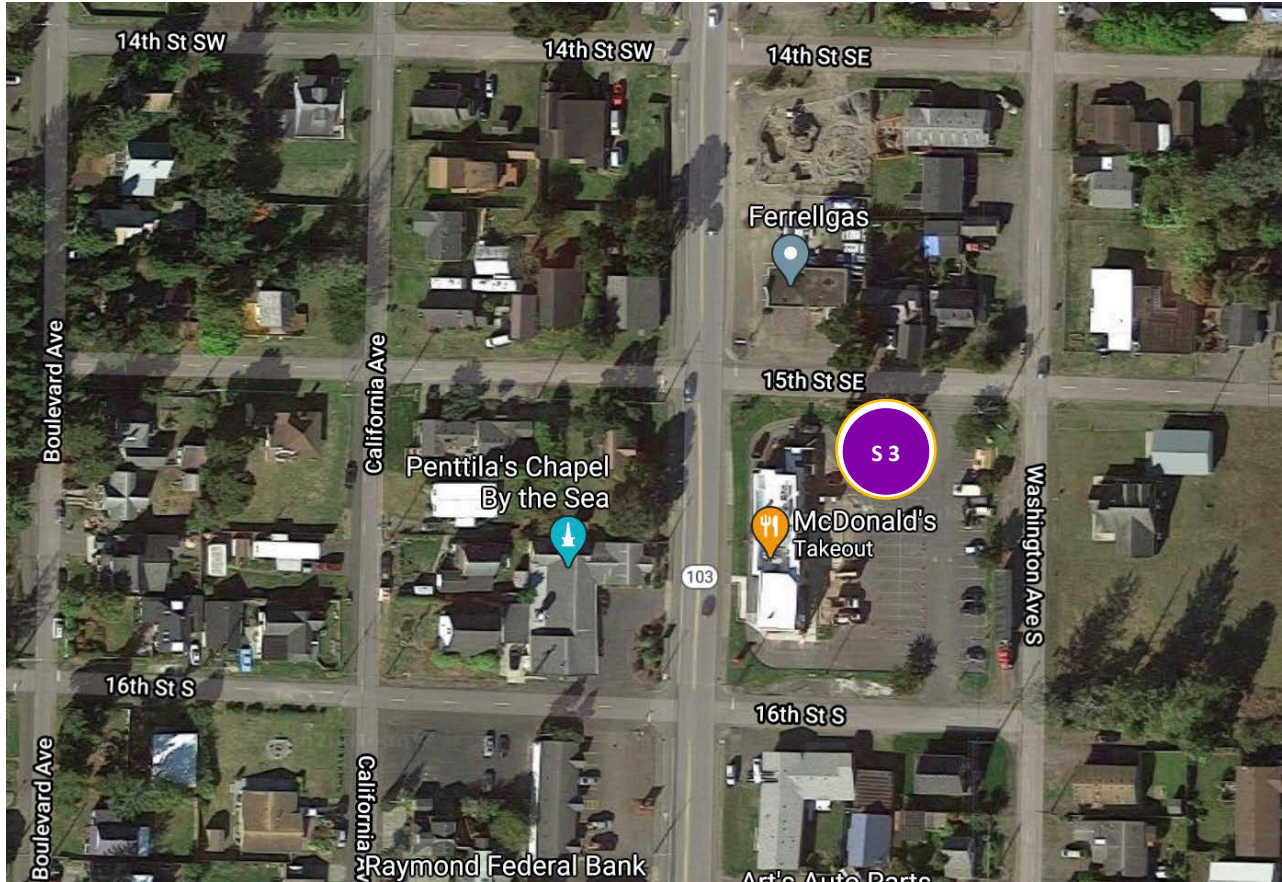
S 2 - Alternative: Seaview Fire Department located on N Place, NE of S 2 location. AHAB siren is across the street from Fire Department.

Photo Credit: Google Maps Street View



**AHAB  
siren**

# Seaview: S 3

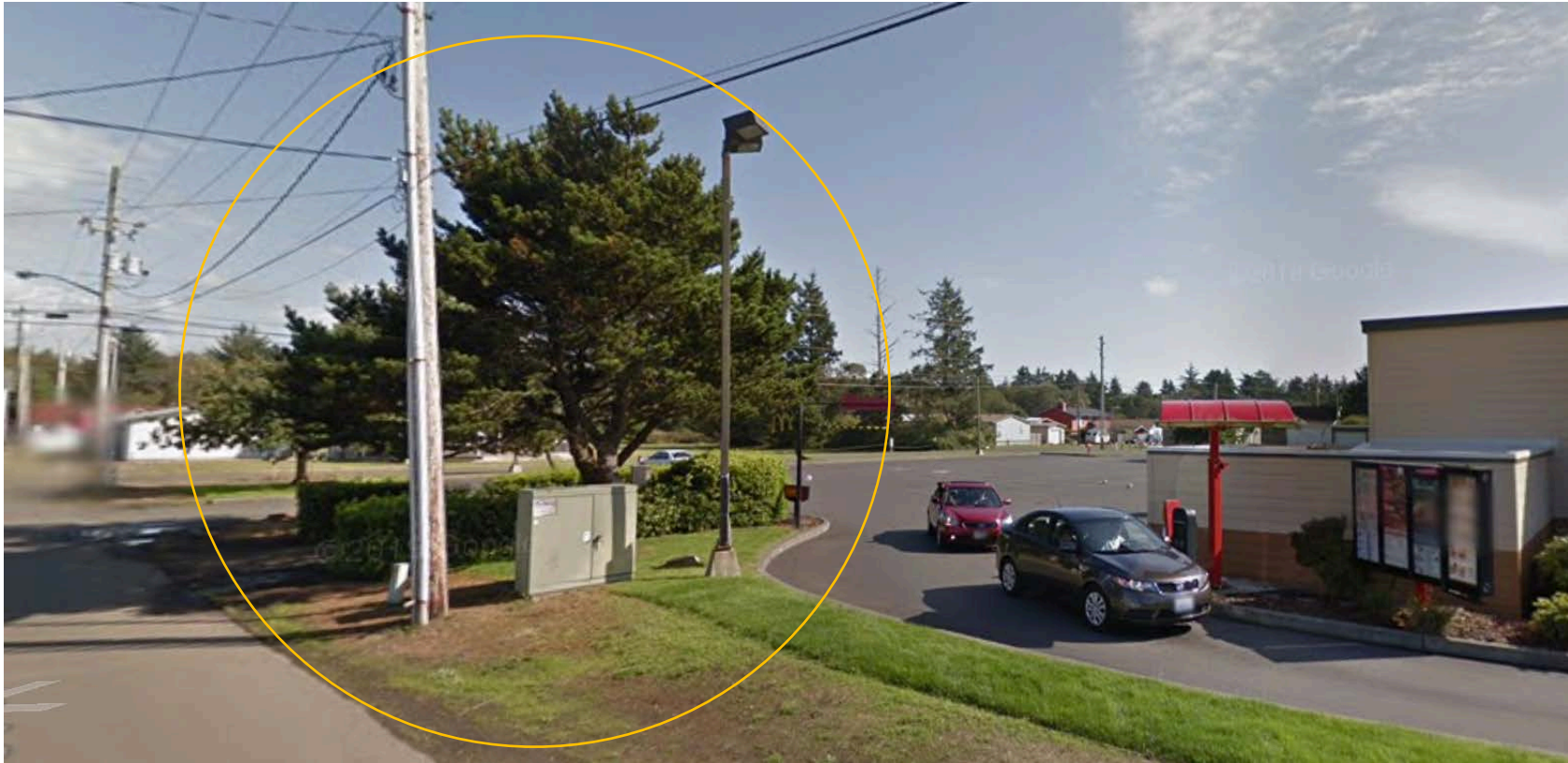


<b>S 3</b>	
<b>Address</b>	n/a
<b>Intersection</b>	15th Street SE & SR 103
<b>Options</b>	3
<b>Notes</b>	small City of Long Beach owned property, mid-block

Source: Google Maps



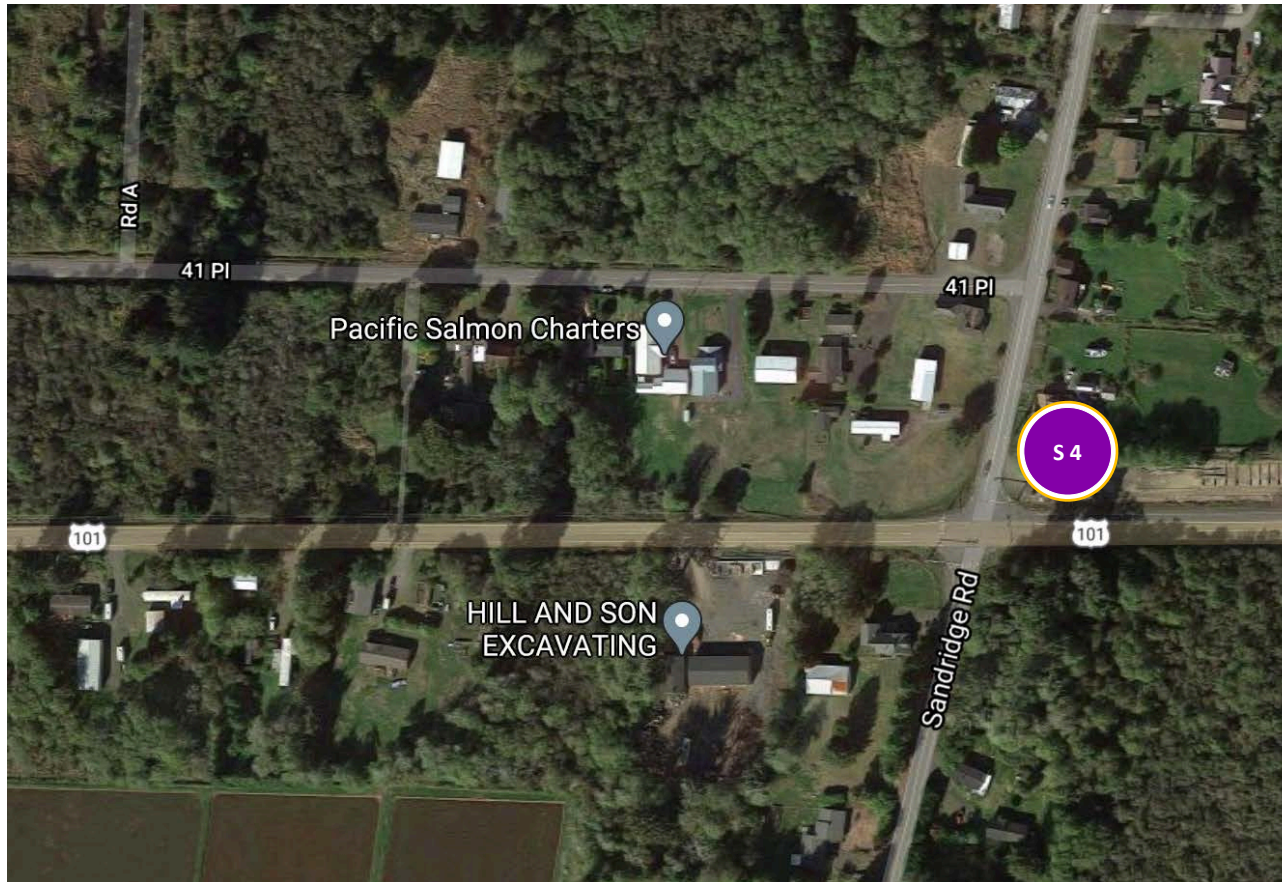
# Seaview: S 3



S 3 - Small City of Long Beach-owned parcel in the McDonald's parking lot.

Photo Credit: *Google Maps Street View*

# Seaview: S 4



<b>S 4</b>	
<b>Address</b>	4000 Sandridge Road HWY 101 & Sandridge Road
<b>Intersection</b>	Road
<b>Options</b>	3
<b>Notes</b>	located at NE corner, public utility district-owned

Source: Google Maps



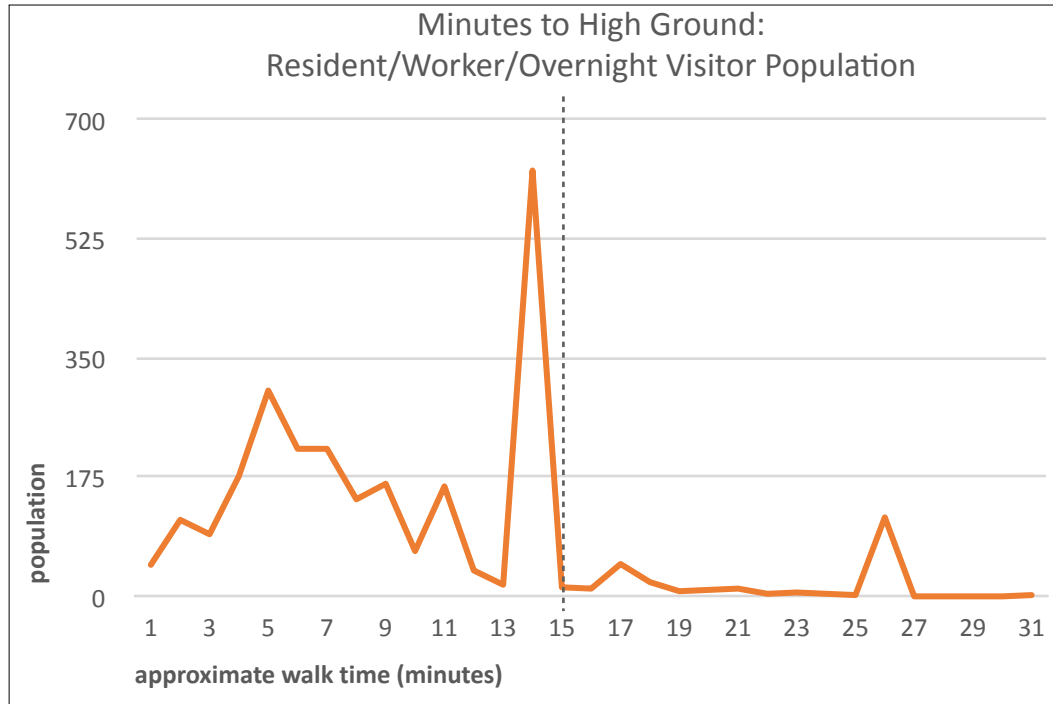
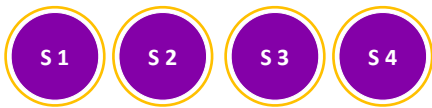
# Seaview: S 4



Photo Credit: *Bob Freitag*

S 4 - Public Utility District #2-owned land. Confirm if there is a current or future planned development here.

## Seaview: VES Option #3 (Broad Spatial Coverage)



Approximate # of People, by Walking Time Bands, to High Ground

<15 minutes	15-25 minutes	25+ minutes
2,408 people	137 people	118 people

■ Fire Station: Approximate 3 minute walk time to high ground or VES

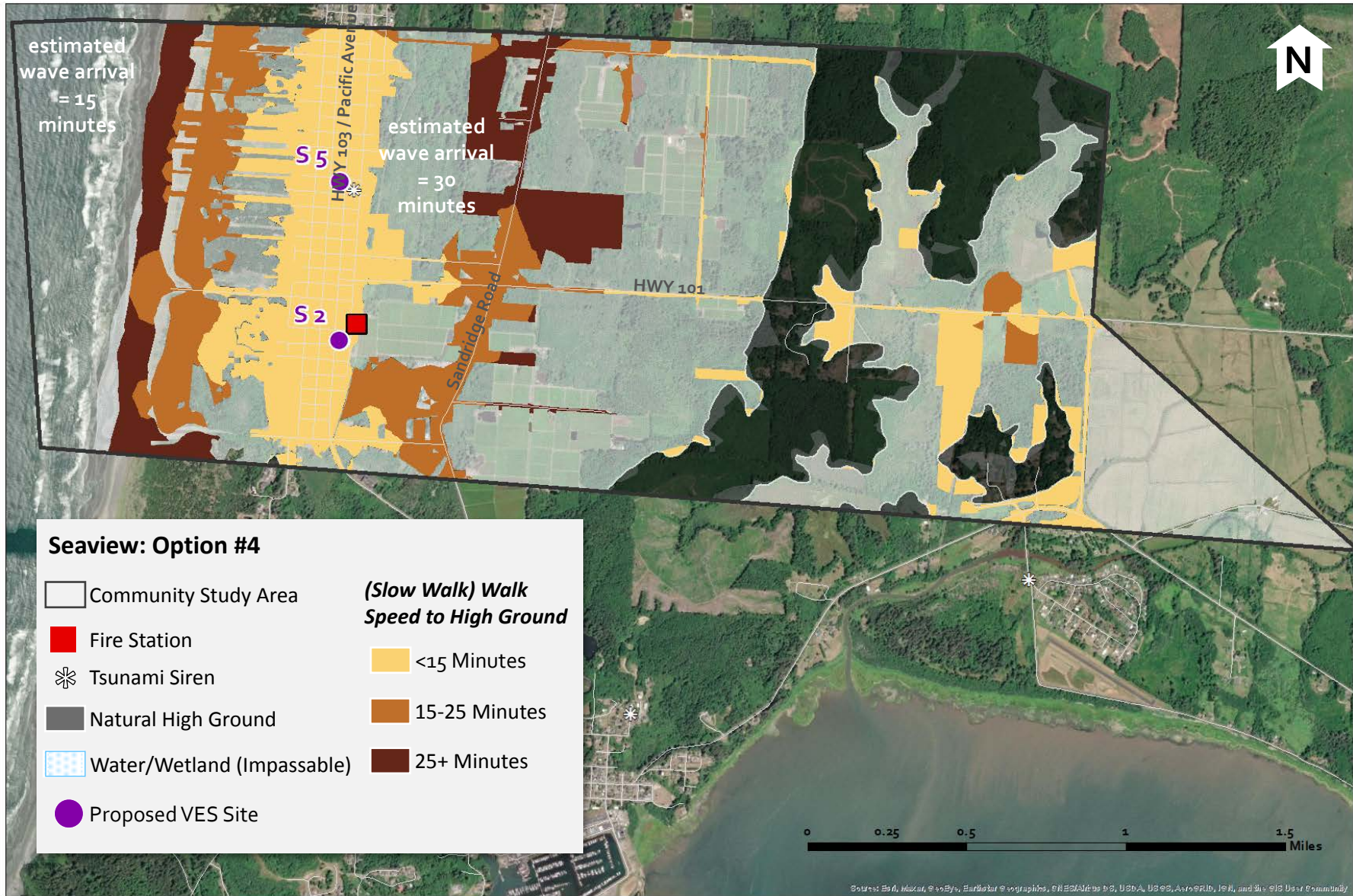
▲ Schools: N/A

**Note:** Option #3 does not include **all** visitors (i.e. day trip visitors, peak summer day visitors). It does, however, factor in more thorough coverage across the community, including some popular beach areas and other locations where there may be occasional gatherings of people (i.e. parking lots, campgrounds, etc.). Local decision-makers will need to determine how (or if) to factor in that additional population.

### Under **Option #3:**

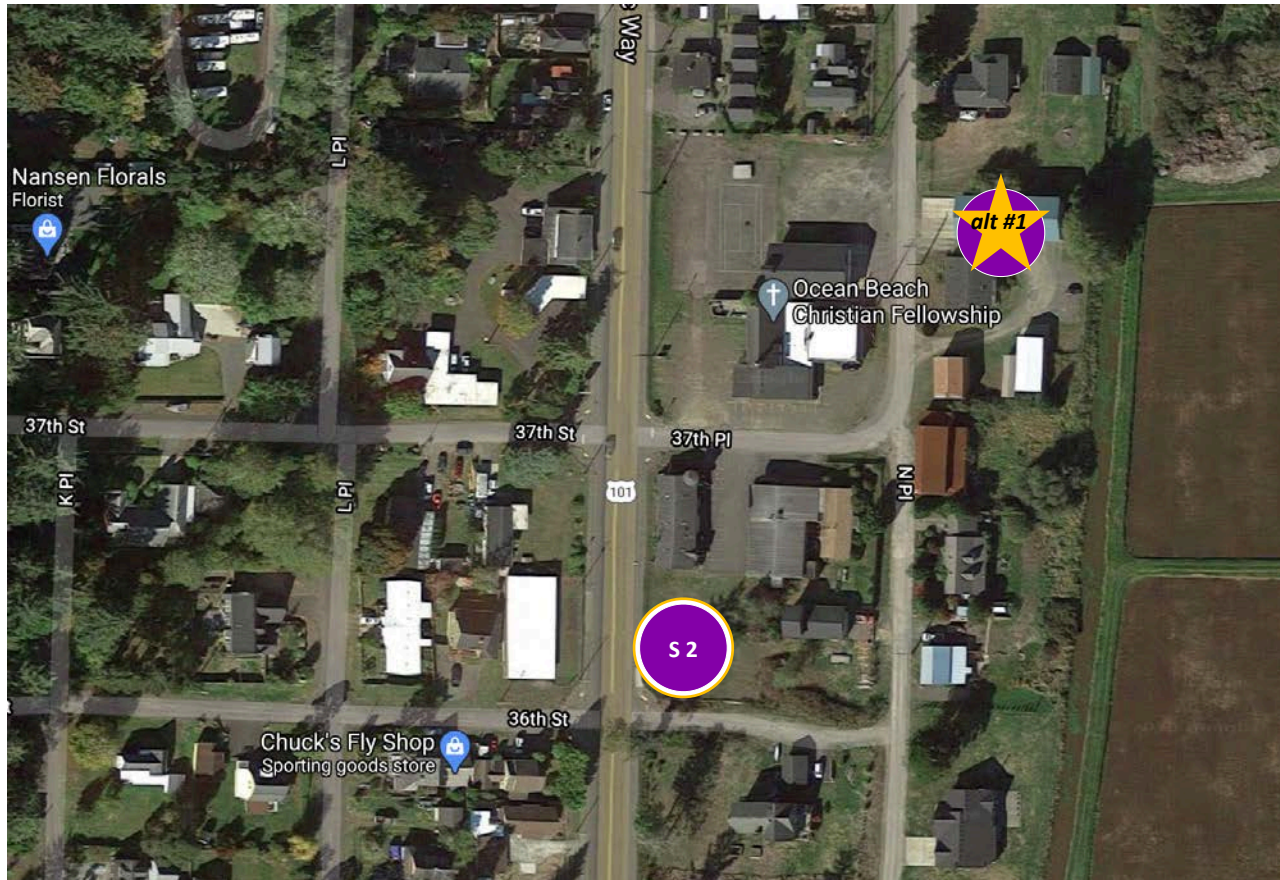
- approximately **90.4%** of the total estimated Seaview population are within 15 minutes to natural high ground OR vertical evacuation
- approximate *maximum* walk time to natural high ground or vertical evacuation for identified population = **31 minutes**
- approximate *minimum* VES capacity need (15 minute walk time) = **2,000 people**
- # of proposed VES = **4**







# Seaview: S 2 + alternative



S 2	
Address	3616 Pacific Way 36th Street/Lane & SR 103
Intersection	103
Options	2, 3, 4
Notes	undeveloped, private land. could be moved to fire department parcel: 10112822229

S 2 - alt #1	
Address	3708 N Place
Intersection	37th Place & N Place
Notes	Seaview Fire Department

Source: Google Maps

# Seaview: S 2



Photo Credit: *Bob Freitag*

S 2 - Privately-owned, vacant lot facing US Highway 101/Pacific Way

# Seaview: S 2 alternative



S 2 - Alternative: Seaview Fire Department located on N Place, NE of S 2 location. AHAB siren is across the street from Fire Department.

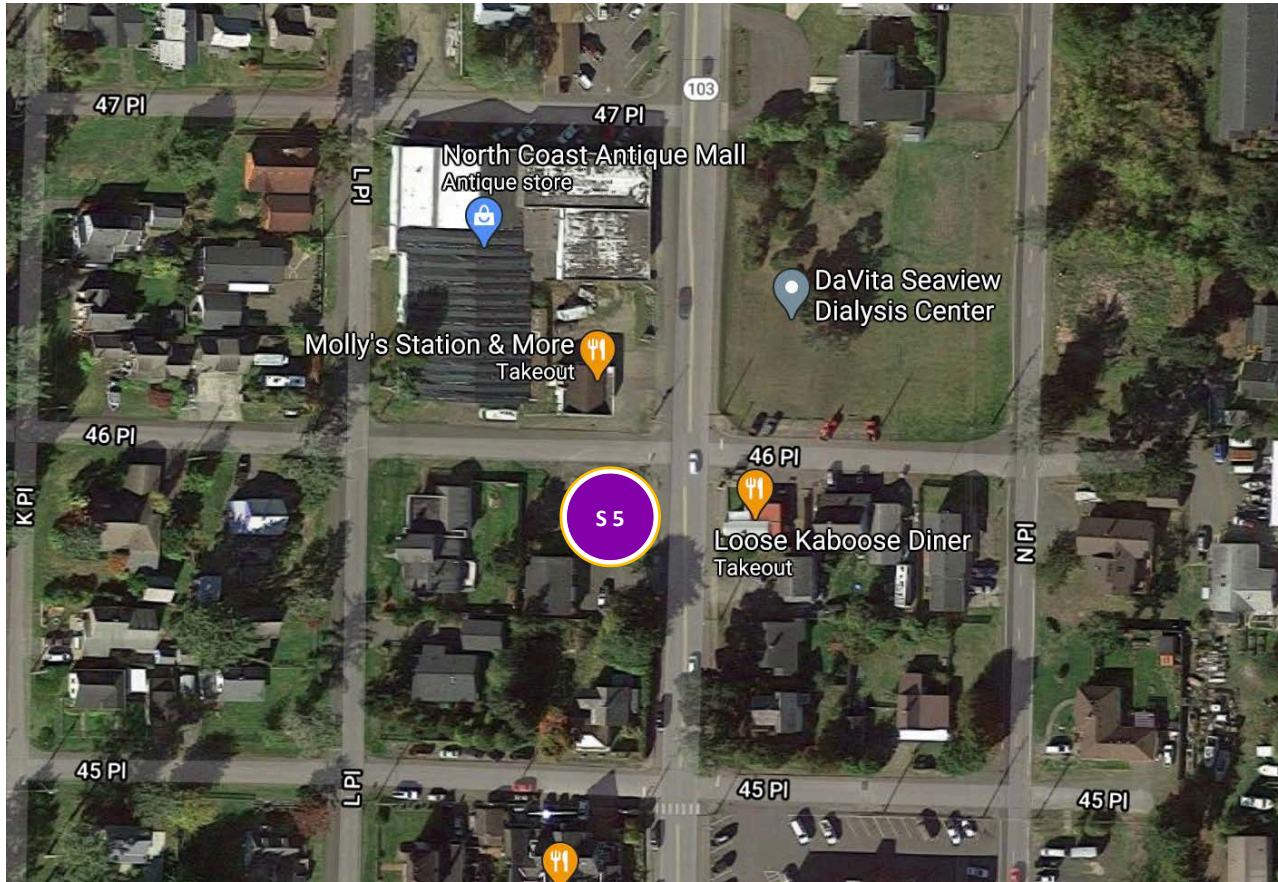
Photo Credit: Google Maps Street View



**AHAB  
siren**



# Seaview: S 5



<b>S 5</b>	
<b>Address</b>	4511 Pacific Way
<b>Intersection</b>	46th Place & SR 103
<b>Options</b>	4
<b>Notes</b>	across the street (west) from Loose Caboose. Empty lot

Source: Google Maps

# Seaview: S 5



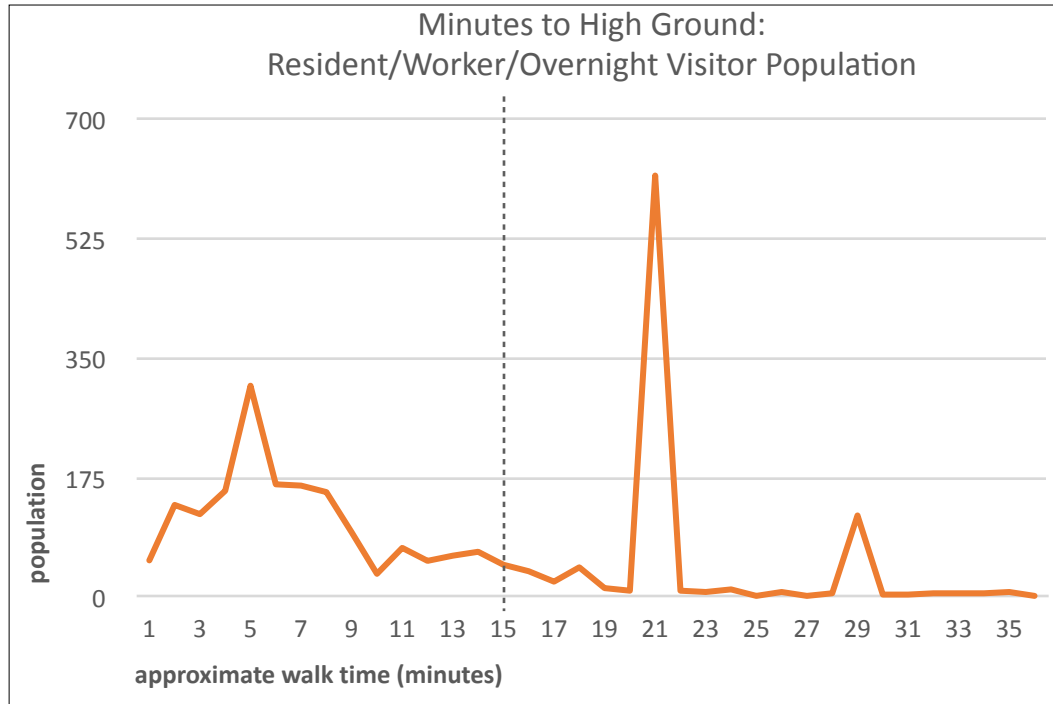
Photo Credit: *Bob Freitag*

S 5 is owned by the Seaview Sewer District. It has high visibility on the main road through town and open space.

## Seaview: VES Option #4 (Efficient/Lean)

S2

S5



Approximate # of People, by Walking Time Bands,  
to High Ground

<15 minutes	15-25 minutes	25+ minutes
1,671 people	823 people	169 people

■ Fire Station: Approximate 3 minute walk time to high ground or VES

▲ Schools: N/A

### Under **Option #4**:

- approximately **62.7%** of the total estimated Seaview population are within 15 minutes to natural high ground OR vertical evacuation
- approximate *maximum* walk time to natural high ground or vertical evacuation for identified population = **36 minutes**
- approximate *minimum* VES capacity need (15 minute walk time) = **1,263 people**
- # of proposed VES = **2**



## Potential Seaview VES Locations: All Options (1-4)

VES ID	Intersection	Parcel ID	Parcel Owner	Lat   Long	Options	Notes
S 1	41st Place & N Place	1011213317	Jerry & Barbara Bruner	46.332184, -124.053629	2, 3	private land (currently), could move to parcel: #73026063001
S 2	36th Street/Lane & SR 103	7302611100	Sheila Rank	46.328340, -124.054777	2, 3, 4	undeveloped, private land. could be moved to fire department parcel: 10112822229
S 3	15th Street SE & SR 103	7302607900	City of Long Beach	46.342519, -124.053958	3	small City of Long Beach owned property, mid-block
S 4	HWY 101 & Sandridge Road	1011214302	Public Utility District #2	46.331460, -124.044037	3	located at NE corner, public utility district-owned
S 5	46th Place & SR 103	7302604700	Seaview Sewer District	46.335643, -124.054970	4	across the street (west) from Loose Caboose. Empty lot

### Notes

**S 1** - S 1 was originally a privately-owned, vacant lot, but now has been developed. The *alternative* site is publicly-owned and located just 1 block to the SW.

**S 2** - The S 2 site is privately-owned land. Conveniently, the Seaview Fire Department is located just around the corner.

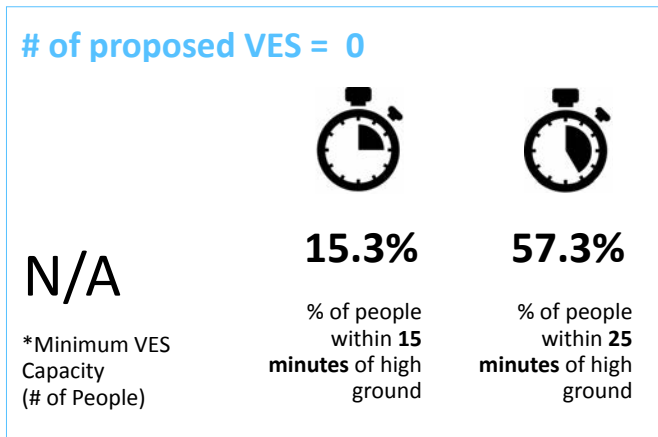
**S 3** - The S 3 is a very small, but publicly-owned parcel (in the McDonald's parking lot)

**S 4** - The S 4 site is publicly-owned and in a high visibility location. There may be an ongoing development project (*see photo*), although that would need to be confirmed.

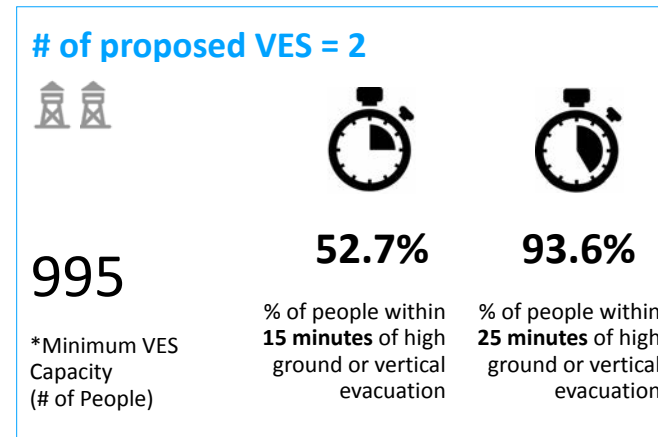
**S 5** - S 5 is located on Pacific Way (SR 103) and is highly visible from the road. There is vacant space here, confirm if large enough to accommodate a VES tower.

# Seaview: Comparison of All Options (1-4)

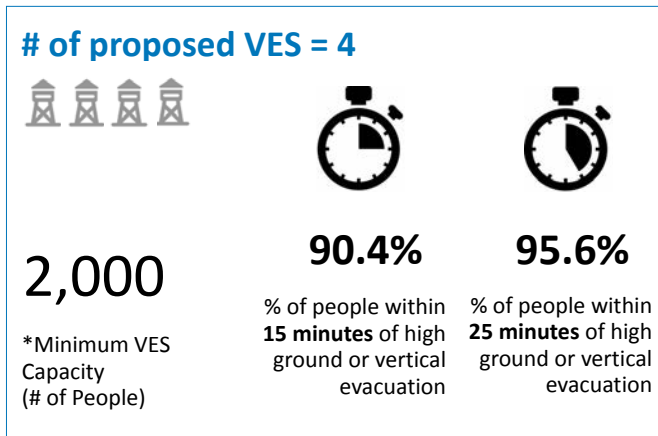
Option #1



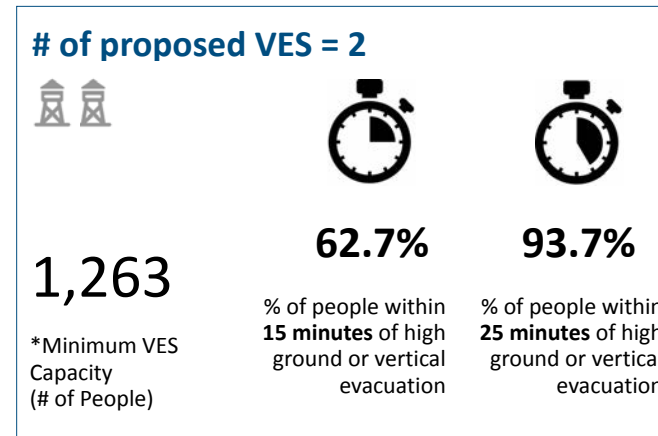
Option #2



Option #3



Option #4



## Seaview: Comparison of All Options (1-4)

**Notes:**

\**Minimum VES Capacity* = the delta (or difference) between Option #1 (no VES) number of people at each minute mark and Options #2, #3, and #4 number of people at each minute mark. For example: If 10 people are within 15 minutes of high ground under Option #1 but that number increases to 25 people under Option #2 - then we know that a minimum of 15 additional people have been put within 15 minutes of high ground through the addition of a Vertical Evacuation Structure. Therefore, the minimum VES capacity for this example is 15 people.



# Long Beach - South

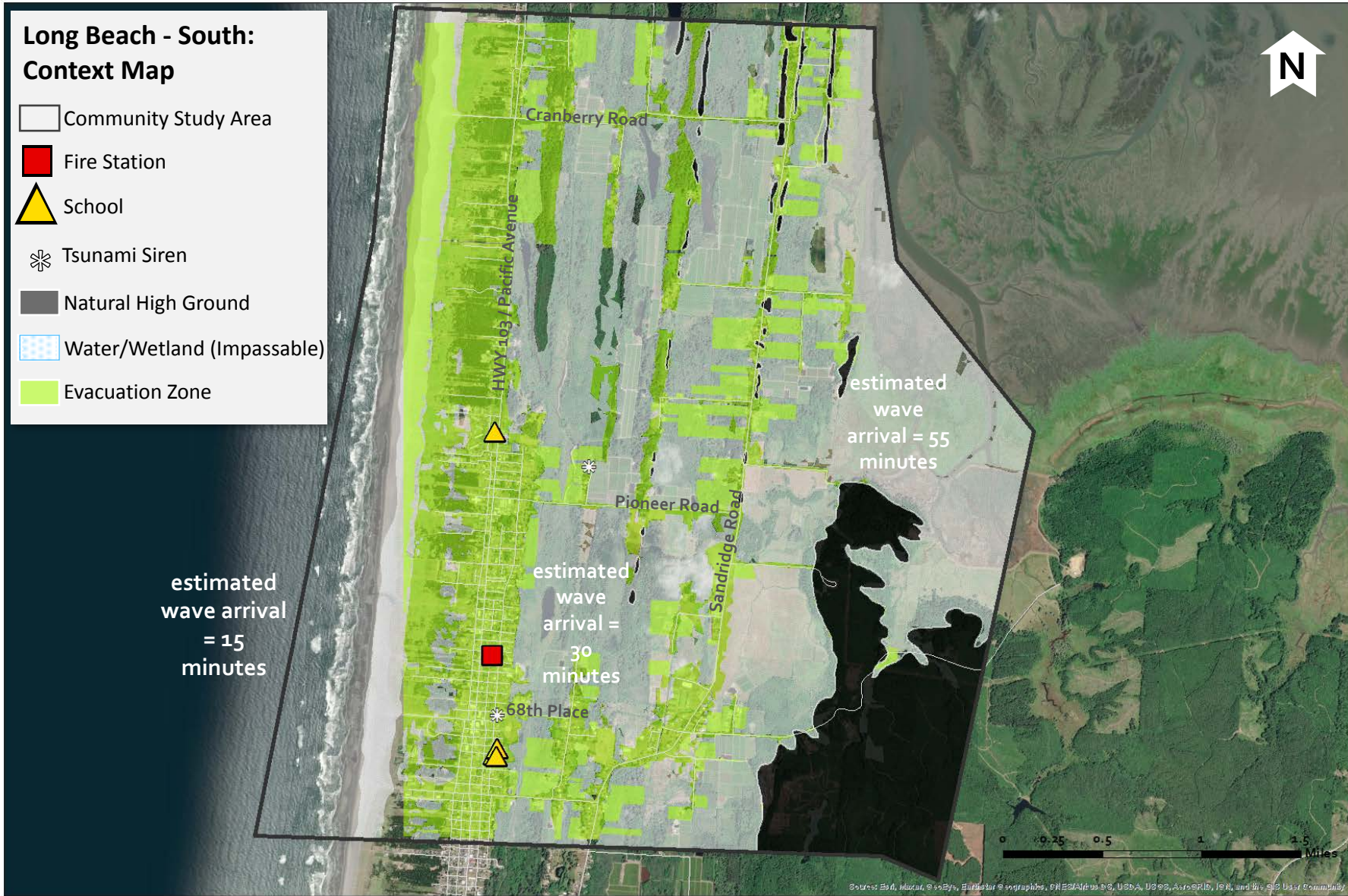
***Long Beach - South community study area population in the tsunami hazard area = ~5,218 people***

*Resident/Worker/Overnight Visitor population = ~4,728 people*

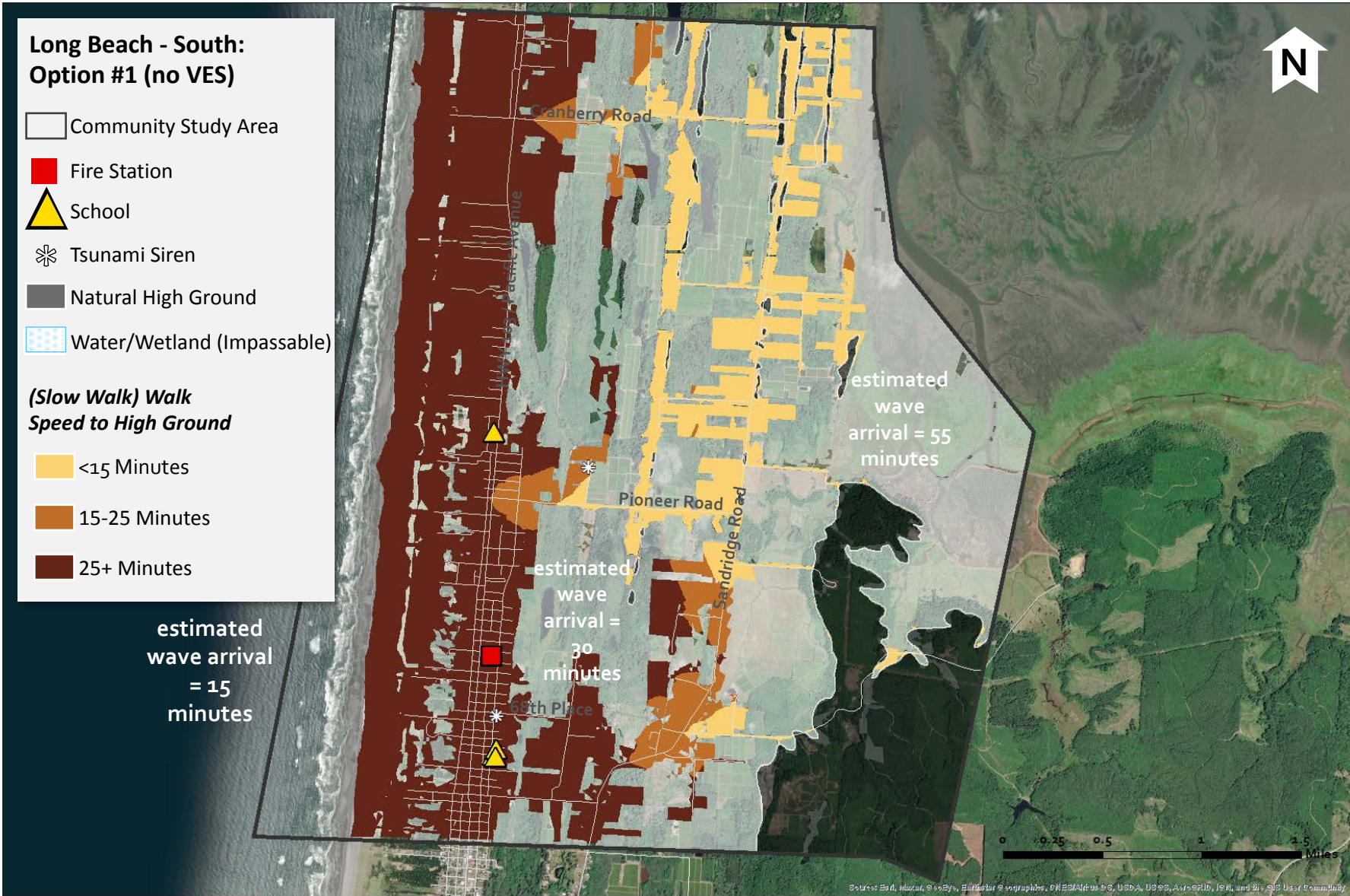
*Fire Department occupancy = ~30 people*

*Schools occupancy = ~460 people*

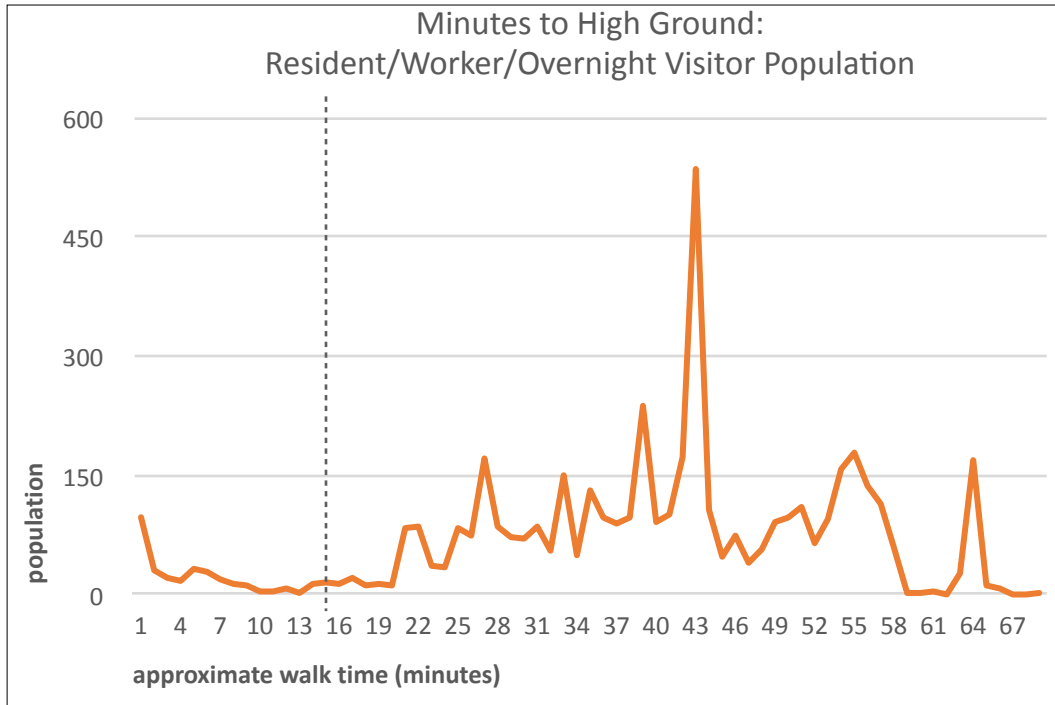
Source: 2010 Census (average household size); Pacific County Residential Land Use







# Long Beach - South: VES Option #1 (No VES)



\*Approximate *maximum* walk time accounts for the resident/worker/overnight visitor population locations only. This does not factor in daytime visitors or beach visitors, for example.

Approximate # of People, by Walking Time Bands, to High Ground

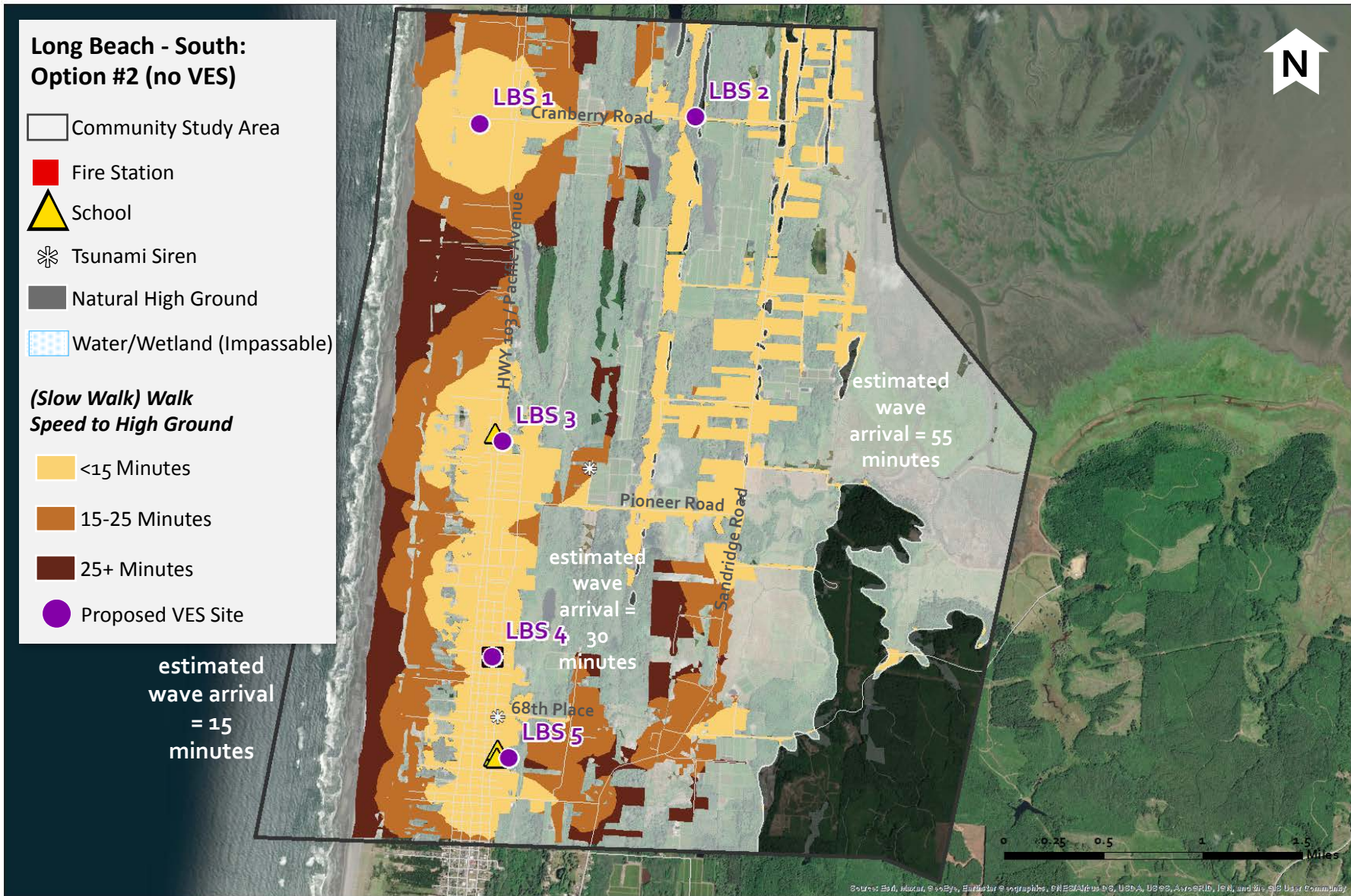
<15 minutes	15-25 minutes	25+ minutes
295 people	372 people	4,551 people

- Fire Station: Approximate 44 minute walk time to high ground or VES
- ▲ Schools: Approximate 32, 53, and 54 minute walk time to high ground or VES

**Under Option #1:**

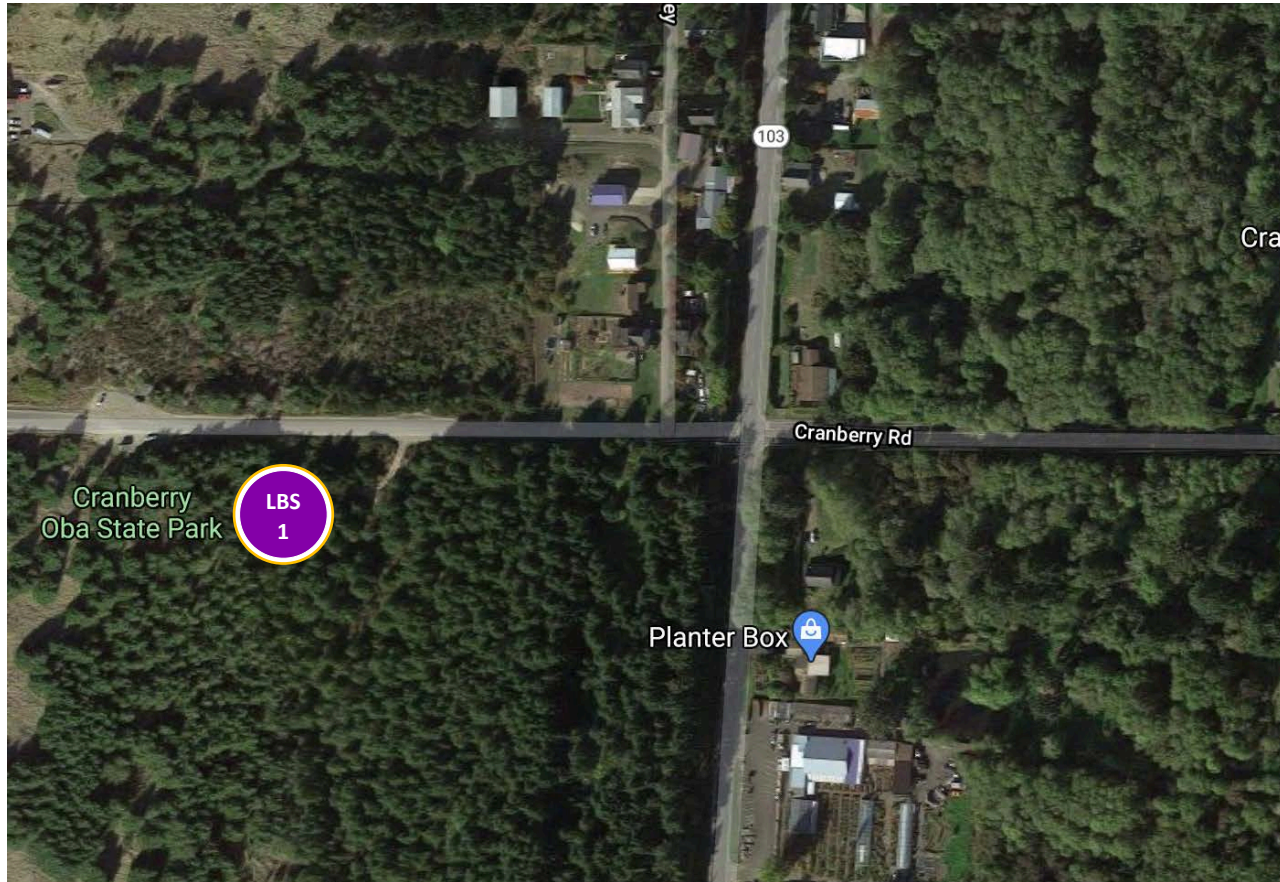
- approximately **5.7%** of the total estimated Long Beach - South population are within 15 minutes to natural high ground
- approximate *\*maximum* walk time to natural high ground for identified population = **69 minutes**







# Long Beach South: LBS 1



LBS 1	
Address	Cranberry Road Cranberry Road, just west of SR 103
Intersection	
Options	2, 3, 4
Notes	towards beach, located on vacant State land

Source: Google Maps

# Long Beach South: LBS 1



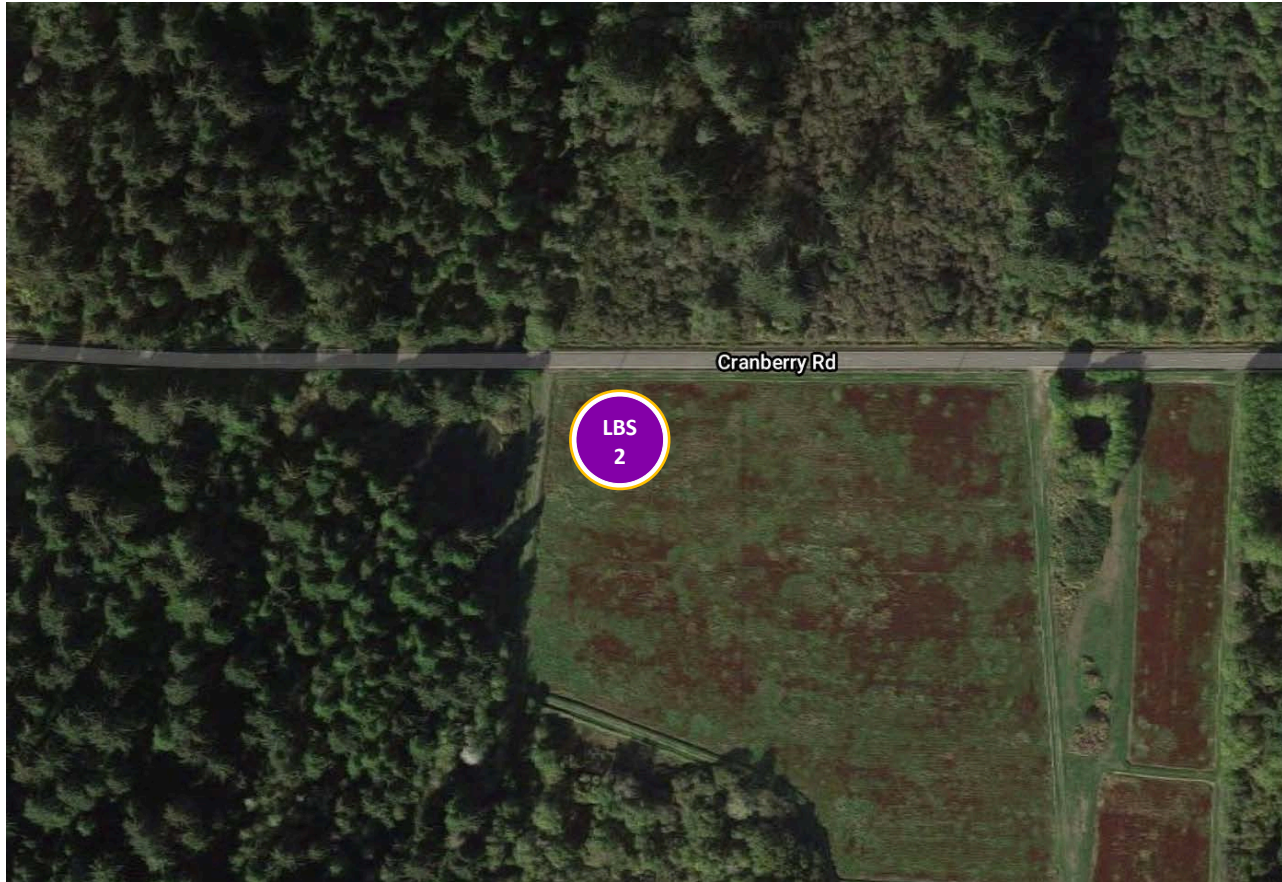
LBS 1 - Cranberry Road beach approach site, near State Park public bathrooms



Photo Credit: *Bob Freitag*



# Long Beach South: LBS 2



LBS 2	
Address	Cranberry Road
Intersection	Cranberry Road
Options	2, 3
Notes	Columbia Land Trust land, northside of Cranberry Road between Birch and Sandridge

Source: *Google Maps*

## Long Beach South: LBS 2

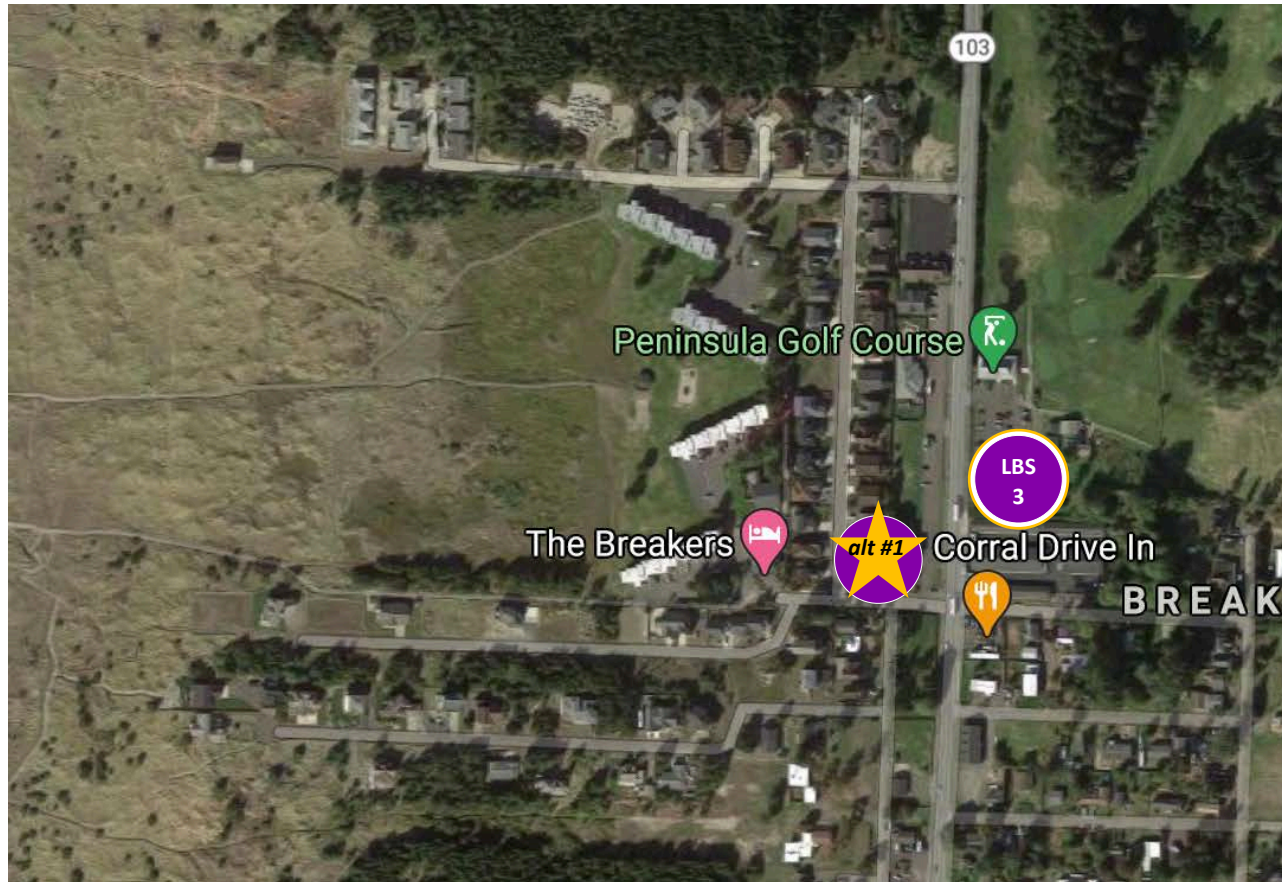


LBS 2 - Columbia Land Trust land (tax-exempt).  
Would need to clear, discuss with Land Trust.

Photo Credit: *Google Maps Street View*



# Long Beach South: LBS 3



LBS 3	
Address	9604 Pacific Way
Intersection	26th Street NE & SR 103
Options	2, 3, 4
Notes	golf course parking lot

LBS 3 - alt #1	
Address	2601 Pacific Way
Intersection	HWY 103 & Pacific Way
Notes	Social Services Department

Source: Google Maps



# Long Beach South: LBS 3



LBS 3 - Peninsula Golf Course parking lot.

Photo Credit: *Google Maps Street View*

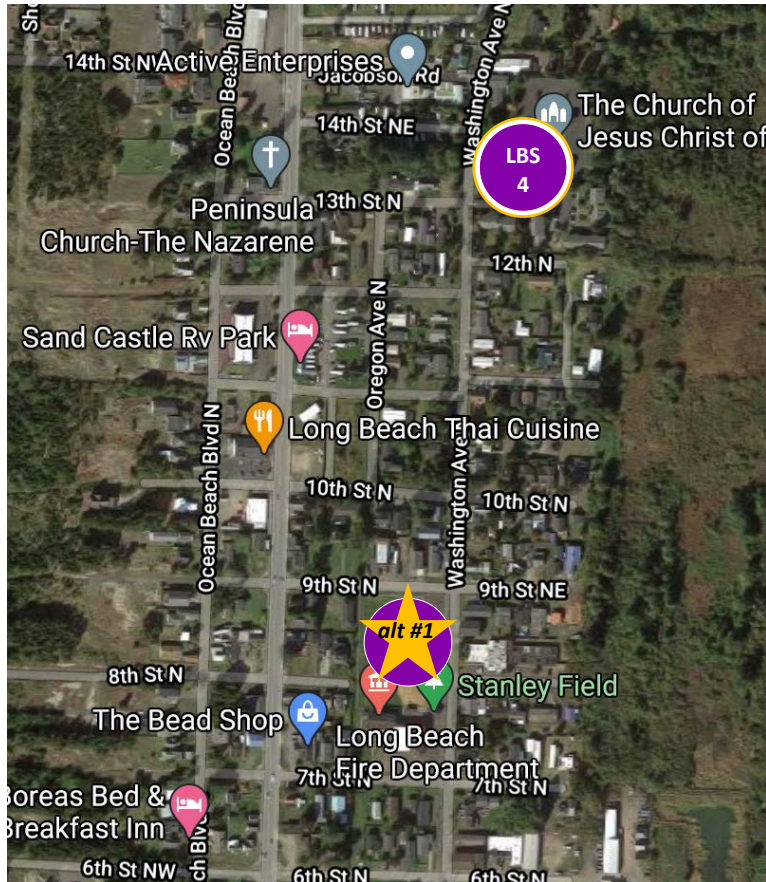
## Long Beach South: LBS 3 *alternative*



Photo Credit: *Bob Freitag*

LBS 3 - *alternative*: parking lot on west side of highway, near social services building. Publicly-owned site.

# Long Beach South: LBS 4 + *alternative*



LBS 4	
Address	1306 Washington Avenue North
Intersection	Washington Avenue North
Options	2, 3, 4
Notes	church parking lot, tax exempt parcel

LBS 4 - alt #1	
Address	701 Washington Avenue North
Intersection	Washington Avenue & 7th Street North
Notes	Long Beach Fire Department

Source: Google Maps



## Long Beach South: LBS 4



LBS 4 - Church property. Potential VES site is in the parking lot or grass adjacent to Washington Avenue North.

Photo Credit: *Google Maps Street View*



## Long Beach South: LBS 4 *alternative*

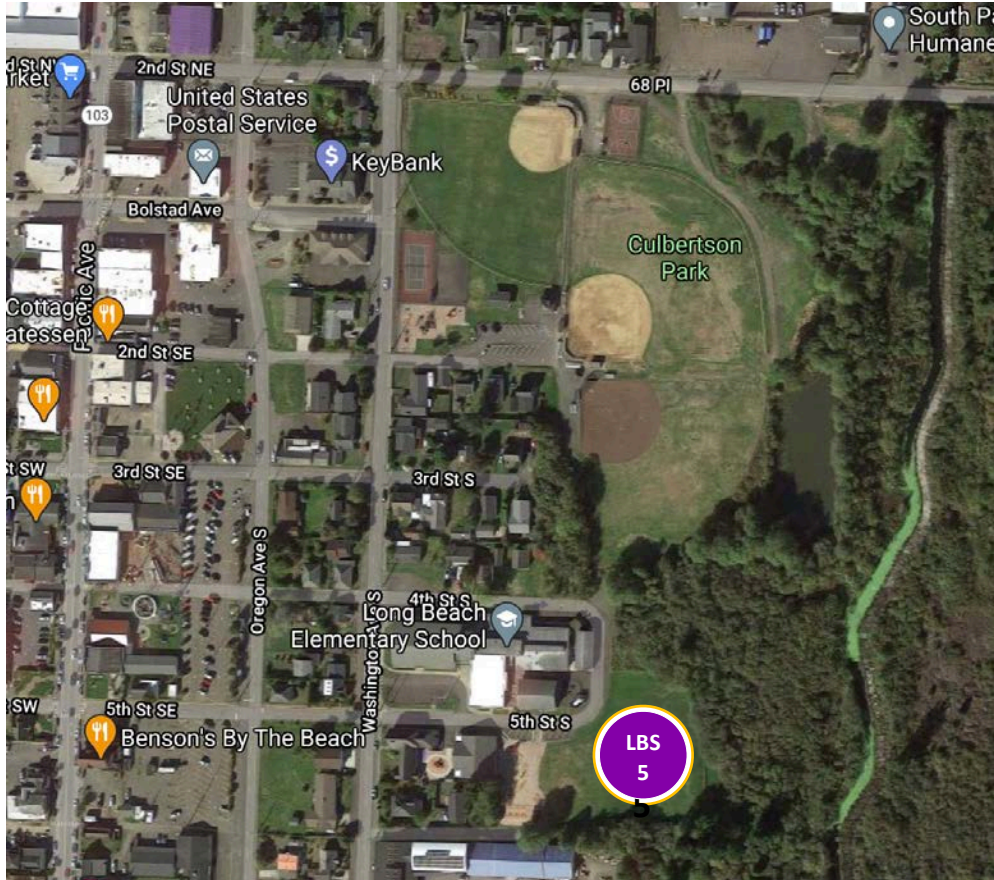


Photo Credit: *Bob Freitag*

LBS 4 - *Alternative #1*: City-owned land located 5-blocks south of LBS 4. Long Beach Fire Department next to city park Stanley Field.



# Long Beach South: LBS 5



LBS 5	
Address	N/a
Intersection	Washington Avenue S & 5th Street S
Options	2, 3, 4
Notes	school playfield location

Source: Google Maps



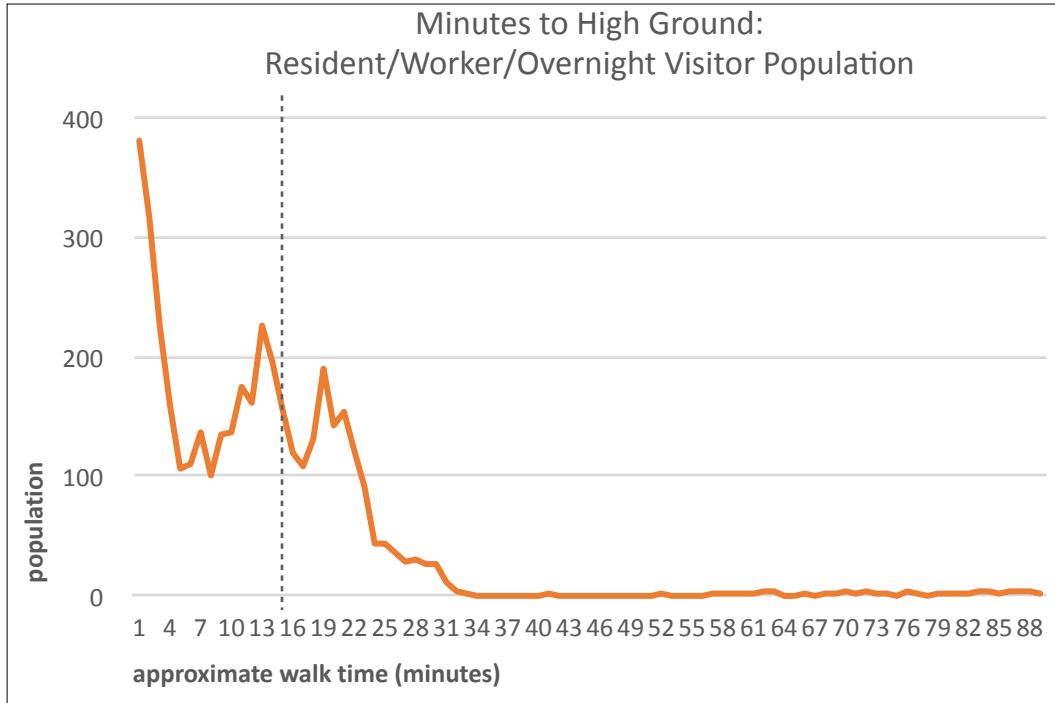
## Long Beach South: LBS 5



Photo Credit: *Bob Freitag*

LBS 5 - Empty play field lot behind (southeast) Long Beach Elementary School and Ocean Beach school district administrative building.

# Long Beach - South: VES Option #2 (Community-Derived)



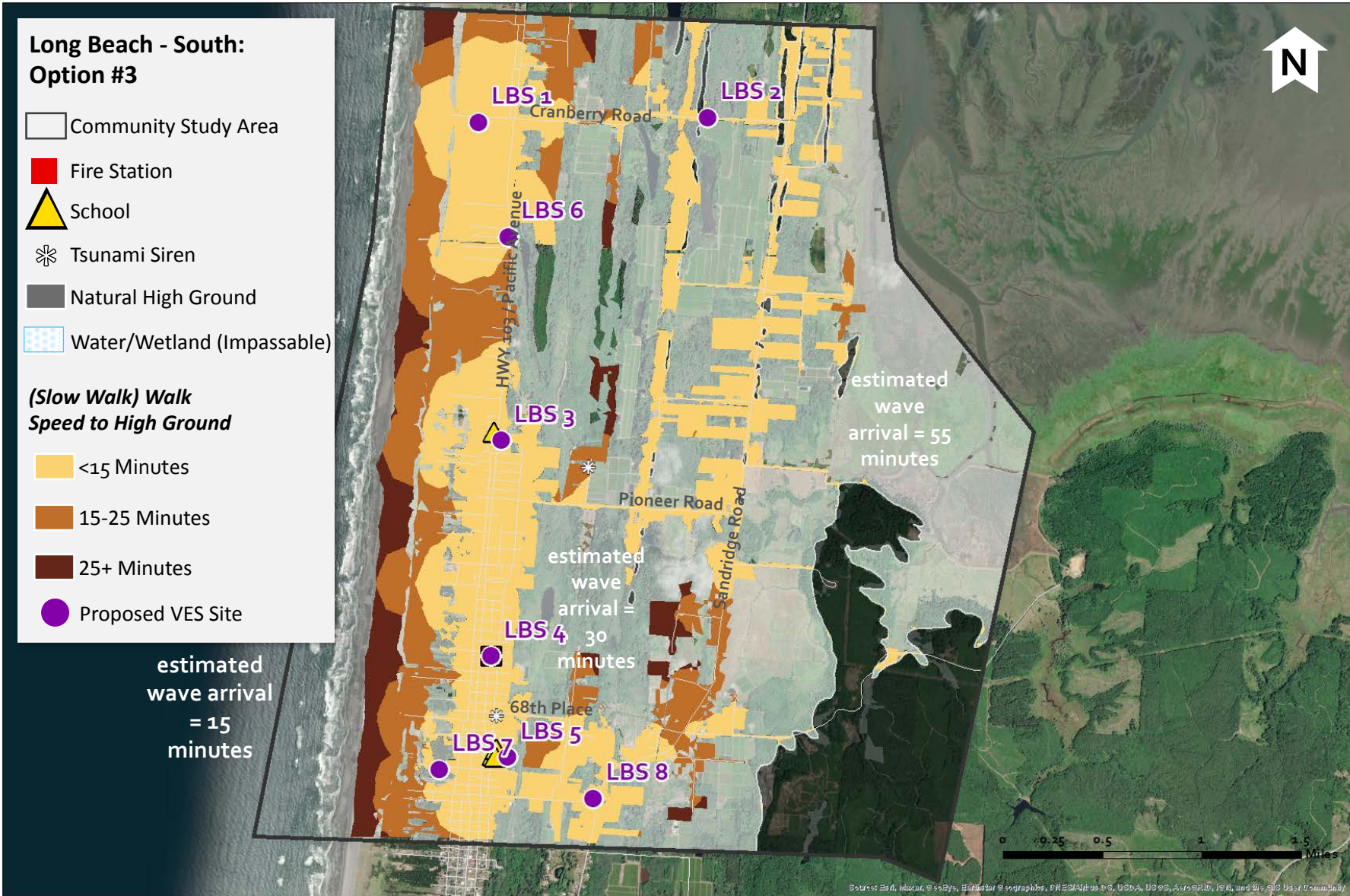
Approximate # of People, by Walking Time Bands, to High Ground

<15 minutes	15-25 minutes	25+ minutes
3,772 people	1,374 people	72 people

- Fire Station: Approximate 11 minute walk time to high ground or VES
- ▲ Schools: Approximate 2 and 3 minute walk time to high ground or VES

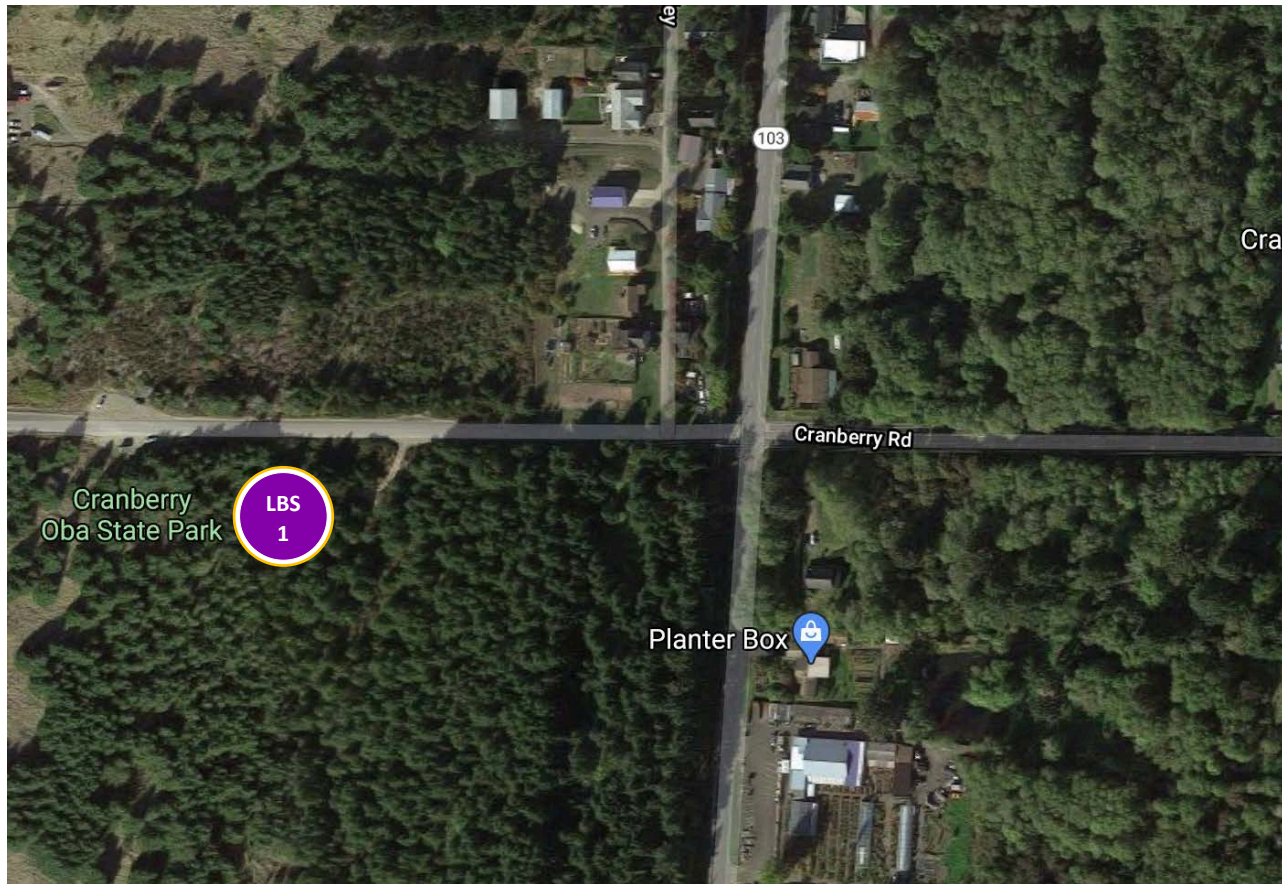
**Under Option #2:**

- approximately **72.3%** of the total estimated Long Beach - South population are within 15 minutes to natural high ground OR vertical evacuation
- approximate *maximum* walk time to natural high ground or vertical evacuation for identified population = **88** minutes
- approximate *minimum* VES capacity need (15 minute walk time) = **3,477** people
- # of proposed VES = **5**





# Long Beach South: LBS 1



LBS 1	
Address	Cranberry Road Cranberry Road, just west of SR 103
Intersection	
Options	2, 3, 4
Notes	towards beach, located on vacant State land

Source: Google Maps

# Long Beach South: LBS 1



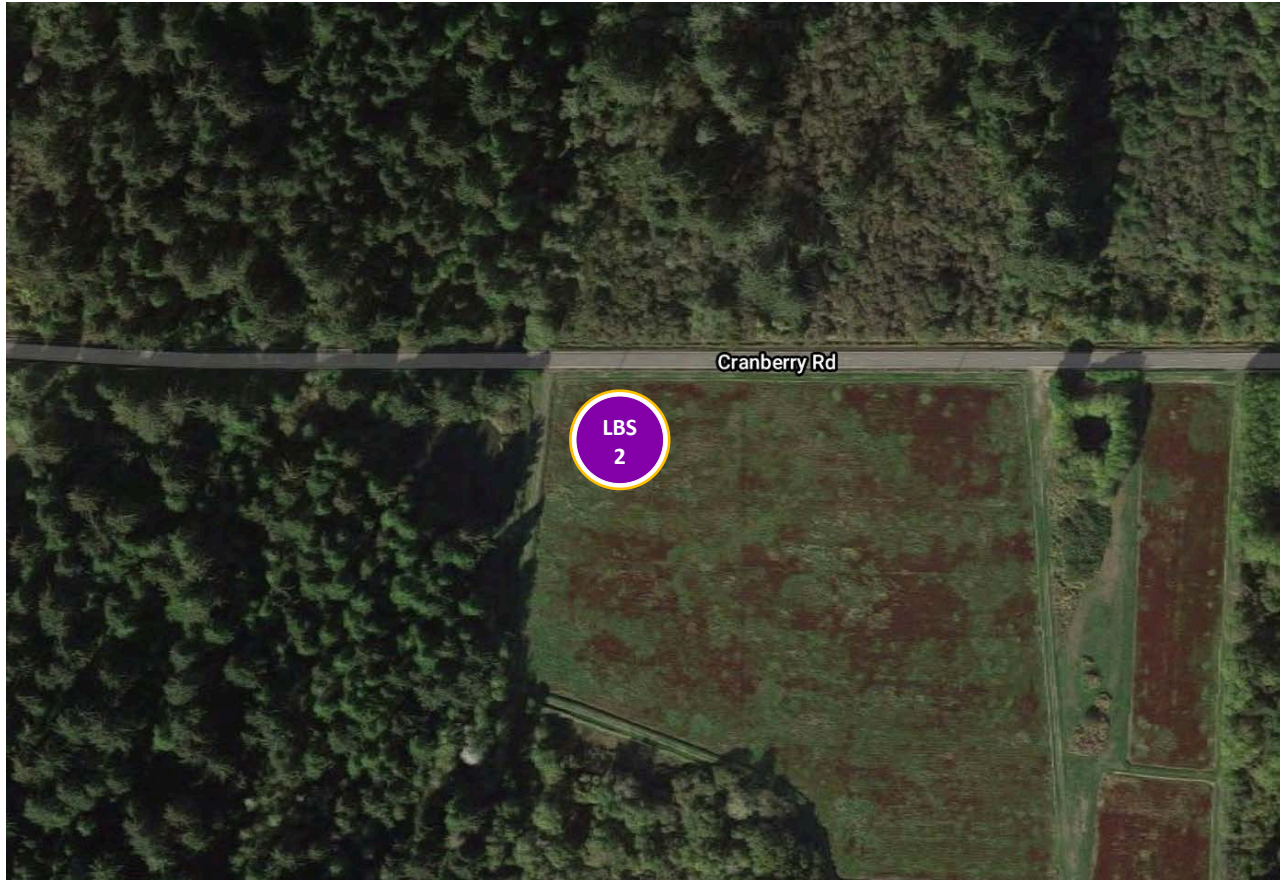
LBS 1 - Cranberry Road beach approach site, near State Park public bathrooms



Photo Credit: *Bob Freitag*



# Long Beach South: LBS 2



LBS 2	
Address	Cranberry Road
Intersection	Cranberry Road
Options	2, 3
Notes	Columbia Land Trust land, northside of Cranberry Road between Birch and Sandridge

Source: *Google Maps*



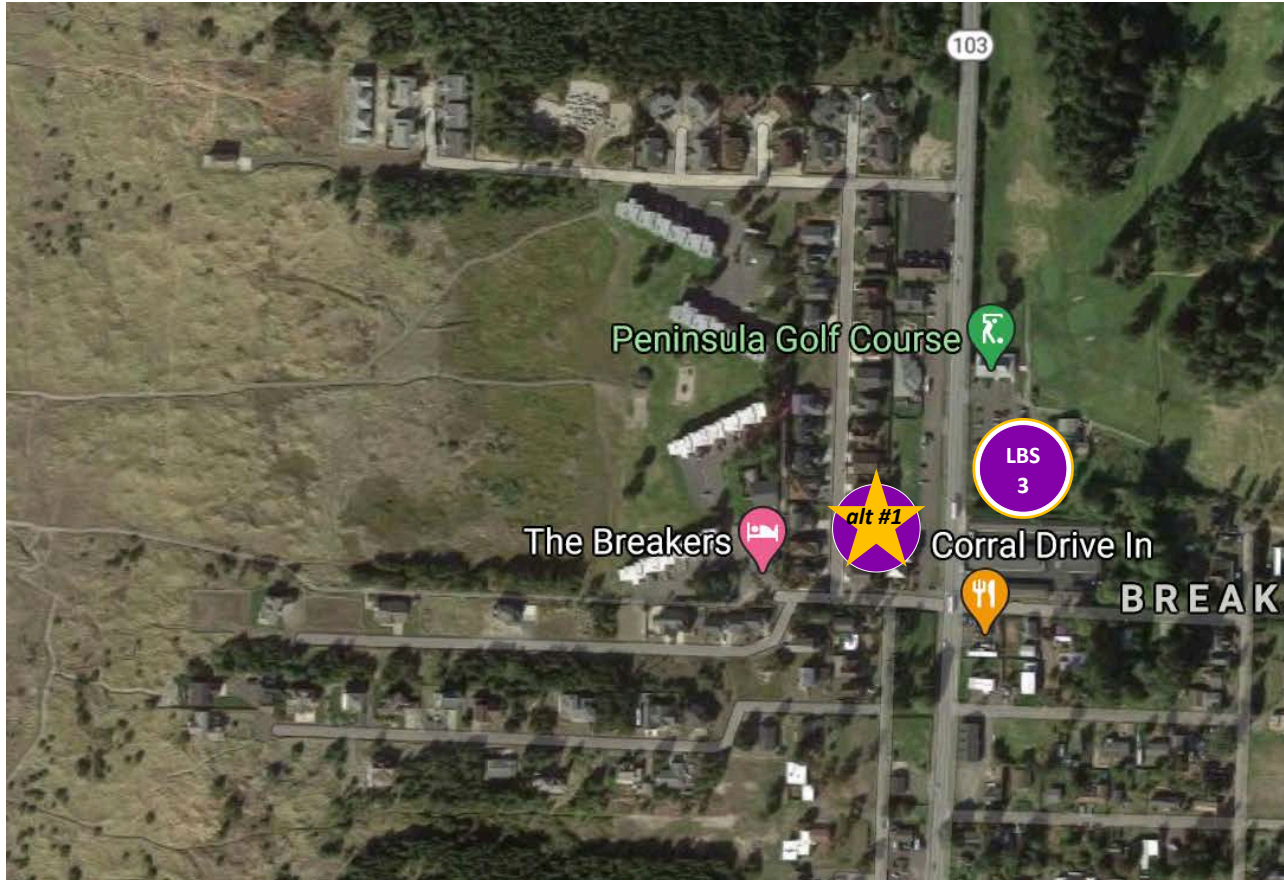
## Long Beach South: LBS 2



LBS 2 - Columbia Land Trust land (tax-exempt).  
Would need to clear, discuss with Land Trust.

Photo Credit: *Google Maps Street View*

# Long Beach South: LBS 3 + *alternative*



LBS 3	
Address	9604 Pacific Way
Intersection	26th Street NE & SR 103
Options	2, 3, 4
Notes	golf course parking lot
LBS 3 - alt #1	
Address	2601 Pacific Way
Intersection	HWY 103 & Pacific Way
Notes	Social Services Department

Source: *Google Maps*



# Long Beach South: LBS 3



LBS 3 - Peninsula Golf Course parking lot.

Photo Credit: *Google Maps Street View*



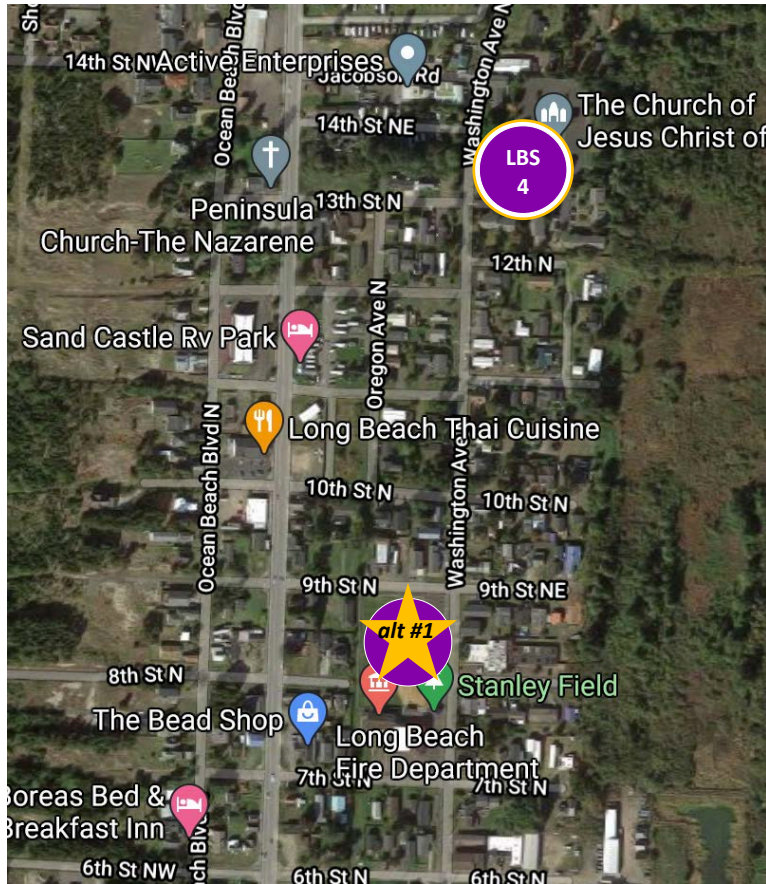
## Long Beach South: LBS 3 *alternative*



Photo Credit: *Bob Freitag*

LBS 3 - *alternative*: parking lot on west side of highway, near social services building. Publicly-owned site.

# Long Beach South: LBS 4 + *alternative*



LBS 4	
Address	1306 Washington Avenue North
Intersection	Washington Avenue North
Options	2, 3, 4
Notes	church parking lot, tax exempt parcel

LBS 4 - alt #1	
Address	701 Washington Avenue North
Intersection	Washington Avenue & 7th Street North
Notes	Long Beach Fire Department

Source: Google Maps

## Long Beach South: LBS 4



LBS 4 - Church property. Potential VES site is in the parking lot or grass adjacent to Washington Avenue North.

Photo Credit: *Google Maps Street View*





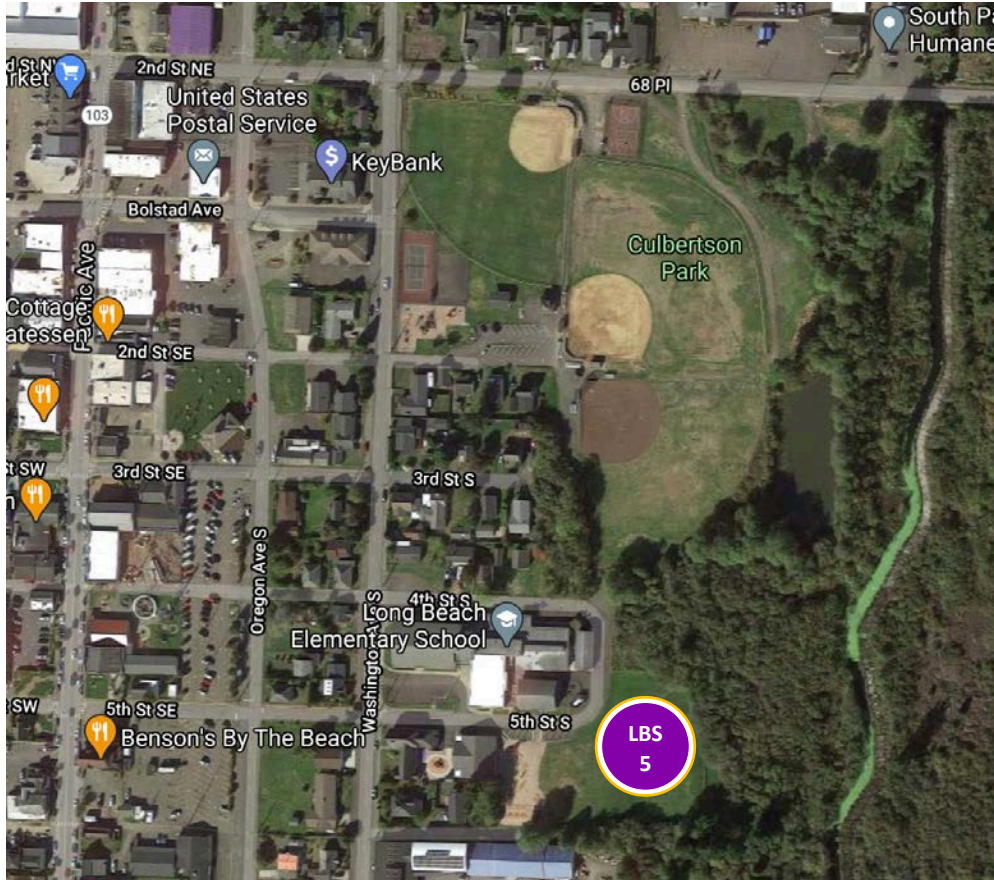
## Long Beach South: LBS 4 *alternative*



Photo Credit: *Bob Freitag*

LBS 4 - *Alternative #1*: City-owned land located 5-blocks south of LBS 4. Long Beach Fire Department next to city park Stanley Field.

# Long Beach South: LBS 5



LBS 5	
Address	N/a
Intersection	Washington Avenue S & 5th Street S
Options	2, 3, 4
Notes	school playfield location

Source: Google Maps

## Long Beach South: LBS 5

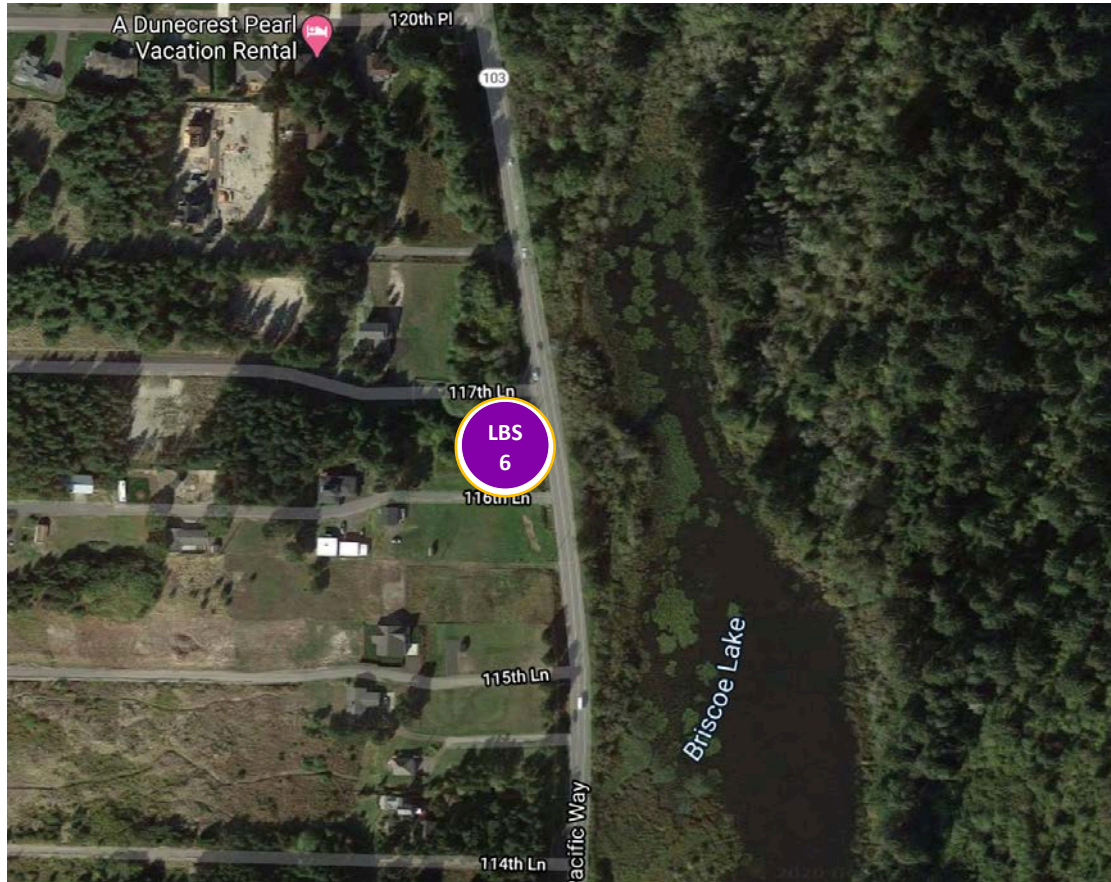


Photo Credit: *Bob Freitag*

LBS 5 - Empty play field lot behind (southeast) Long Beach Elementary School and Ocean Beach school district administrative building.



# Long Beach South: LBS 6



LBS 6	
Address	N/a
Intersection	116th Lane & SR 103
Options	3, 4
Notes	Vacant land. Common area belonging to the homeowner's association.

Source: Google Maps

# Long Beach South: LBS 6



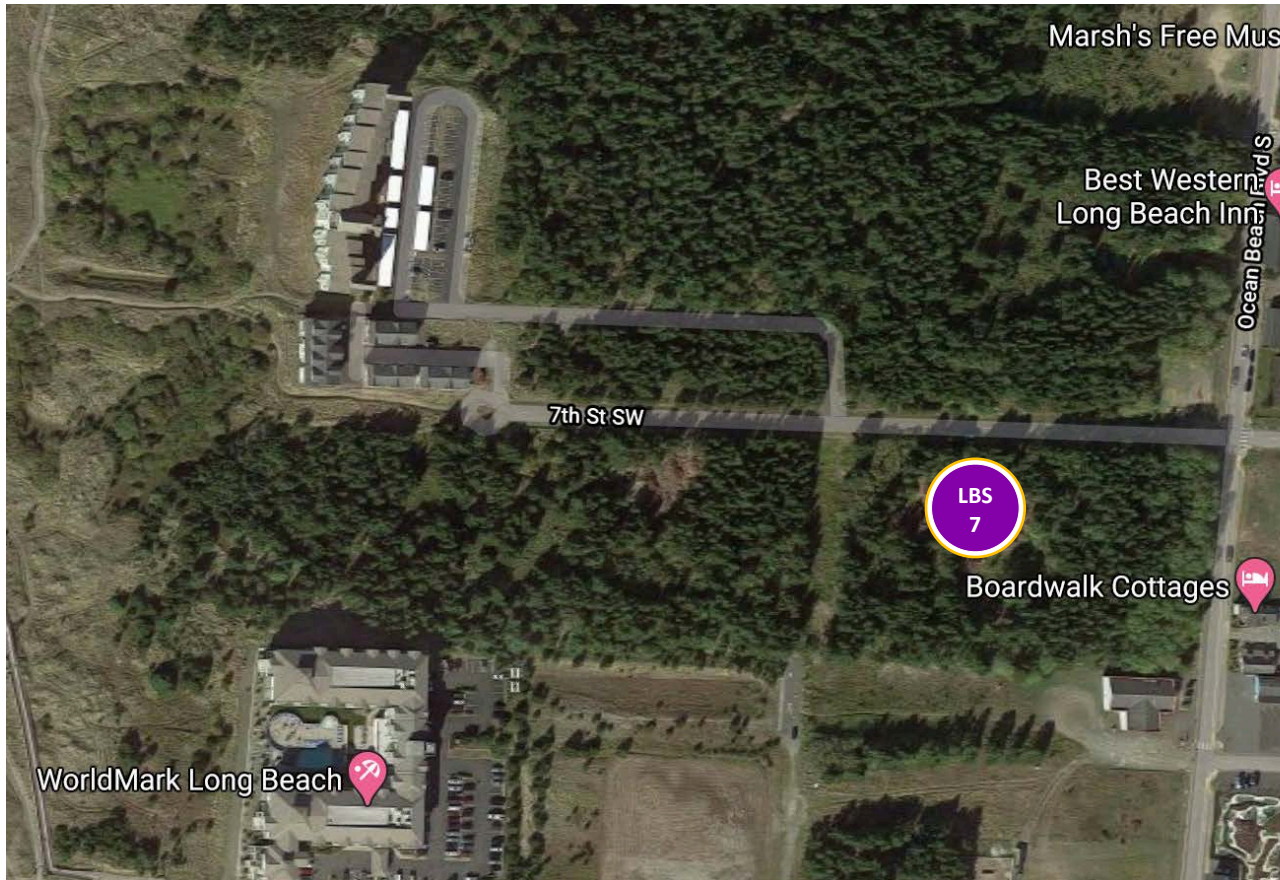
LBS 6 - This is a privately-owned, undeveloped parcel owned by a homeowner's association. This could be a site for a neighborhood VES. Located directly on SR-103.



Photo Credit: *Bob Freitag*



# Long Beach South: LBS 7



LBS 7	
Address	N/a
Intersection	7th Street SW & SR 103 - on 7th Street
Options	3, 4
Notes	Towards sand, vacant lot. Boardwalk Park.

Source: *Google Maps*



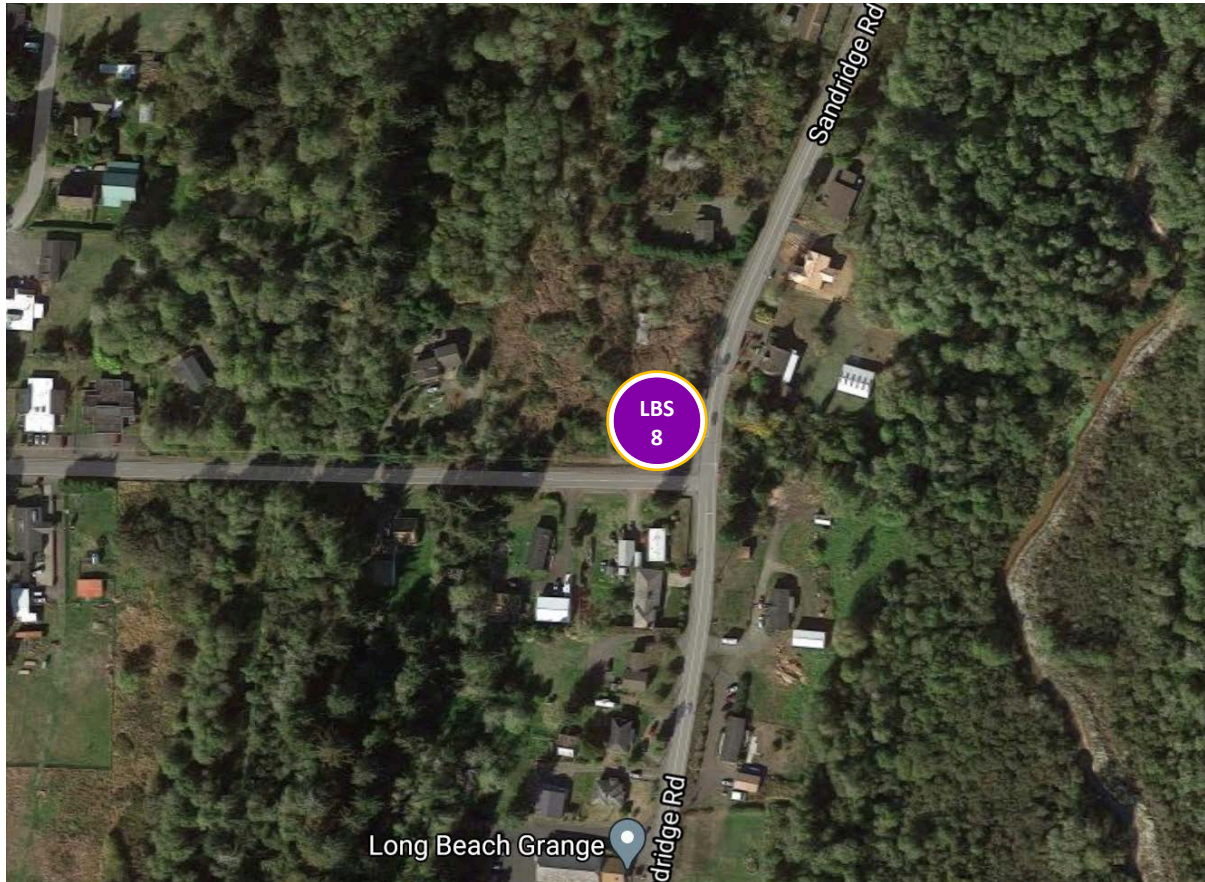
## Long Beach South: LBS 7



Photo Credit: *Bob Freitag*

LBS 7 - Potential city-owned VES site between WorldMark and large condo building. Adjacent to beach.

# Long Beach South: LBS 8



LBS 8	
Address	N/a
Intersection	Sandridge & Sid Snyder
Options	3, 4
Notes	vacant lot (privately-owned), NW corner of intersection

Source: Google Maps

# Long Beach South: LBS 8



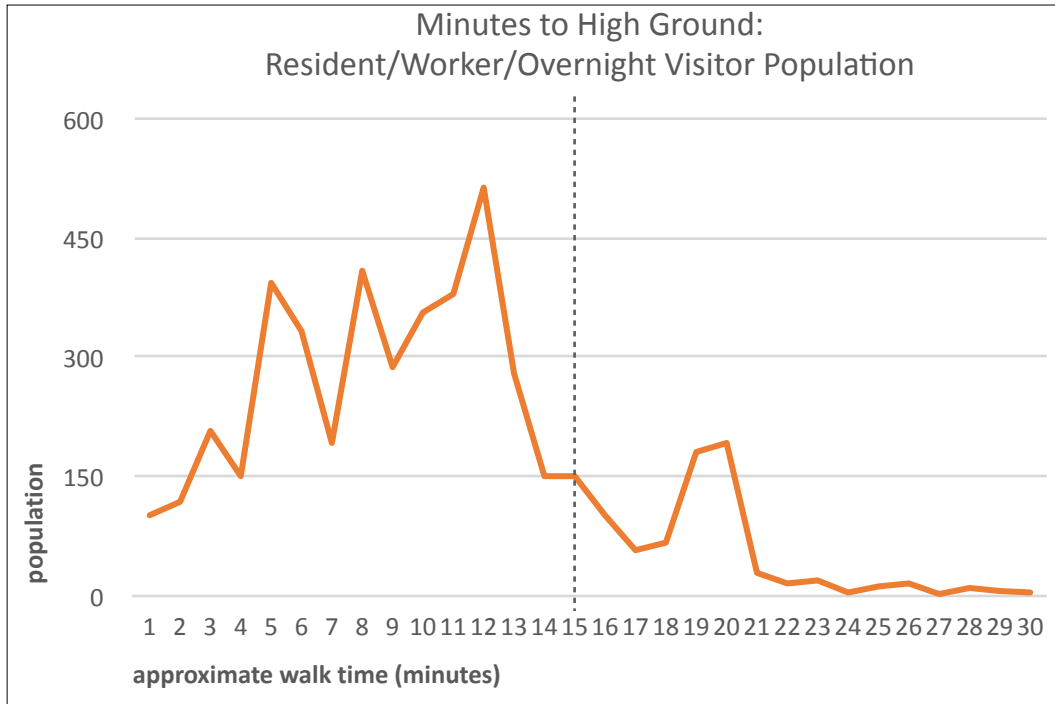
LBS 8 - Privately-owned large parcel. Currently undeveloped.



Photo Credit: *Bob Freitag*



# Long Beach - South: VES Option #3 (Broad Spatial Coverage)



Approximate # of People, by Walking Time Bands, to High Ground

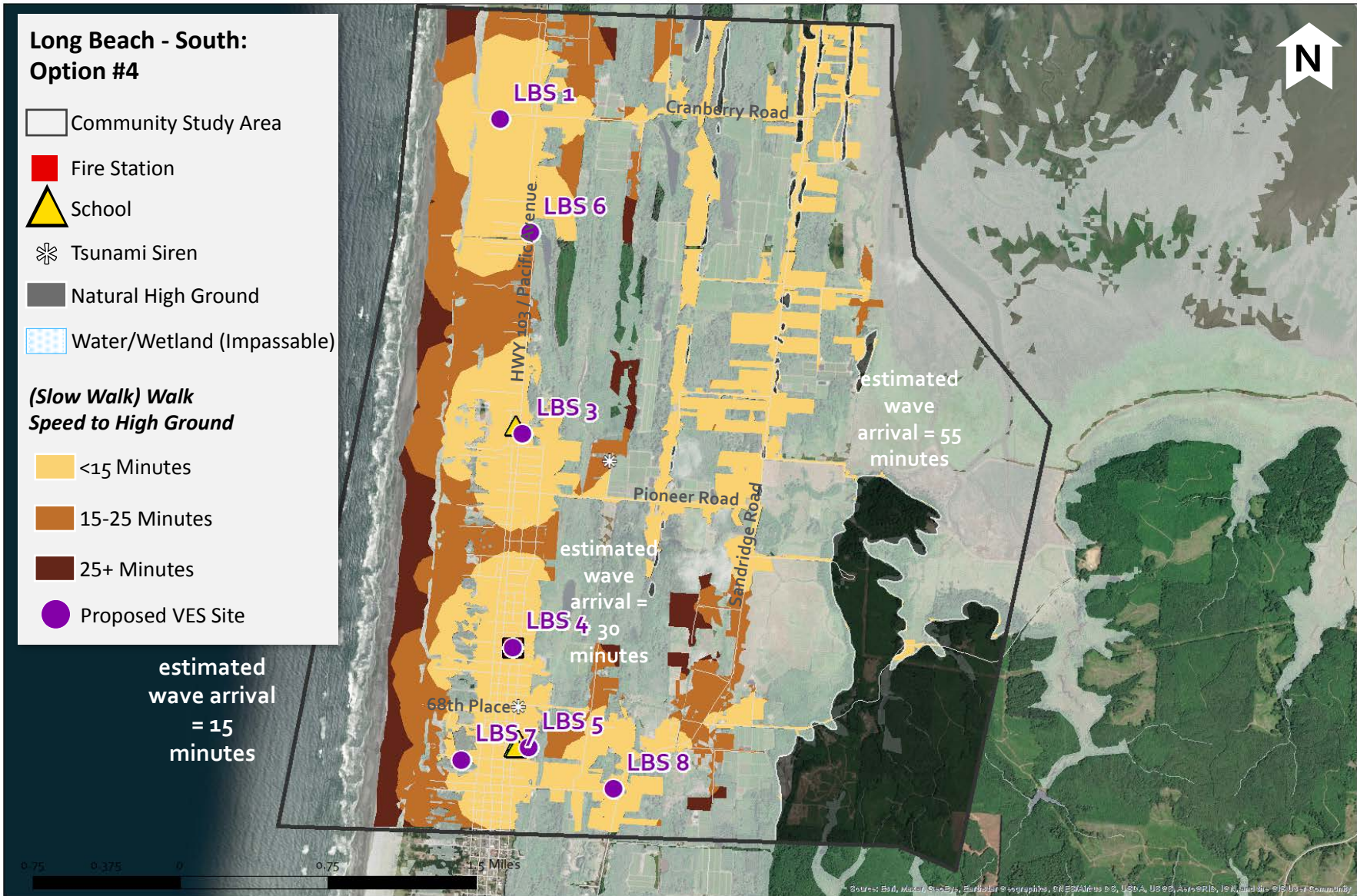
<15 minutes	15-25 minutes	25+ minutes
4,357 people	825 people	36 people

- *Fire Station: Approximate 10 minute walk time to high ground or VES*
- ▲ *Schools: Approximate 2 and 3 minute walk time to high ground or VES*

**Under Option #3:**

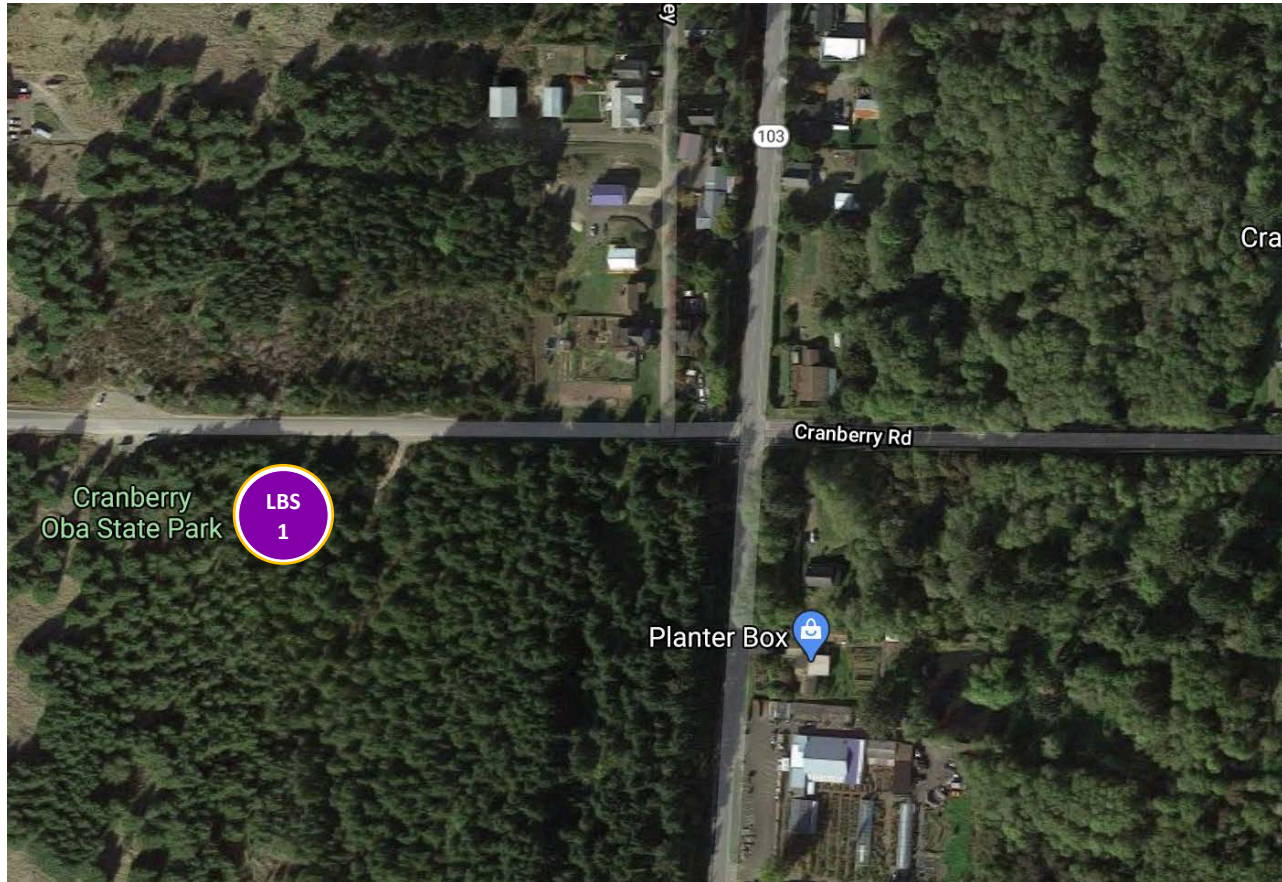
- approximately **83.5%** of the total estimated Long Beach - South population are within 15 minutes to natural high ground OR vertical evacuation
- approximate *maximum* walk time to natural high ground or vertical evacuation for identified population = **30** minutes
- approximate *minimum* VES capacity need (15 minute walk time) = **4,062** people
- # of proposed VES = **8**

**Note:** Option #3 does not include **all** visitors (i.e. day trip visitors, peak summer day visitors). It does, however, factor in more thorough coverage across the community, including some popular beach areas and other locations where there may be occasional gatherings of people (i.e. parking lots, campgrounds, etc.). Local decision-makers will need to determine how (or if) to factor in that additional population.





# Long Beach South: LBS 1



LBS 1	
Address	Cranberry Road Cranberry Road, just west of SR 103
Intersection	
Options	2, 3, 4
Notes	towards beach, located on vacant State land

Source: *Google Maps*



# Long Beach South: LBS 1

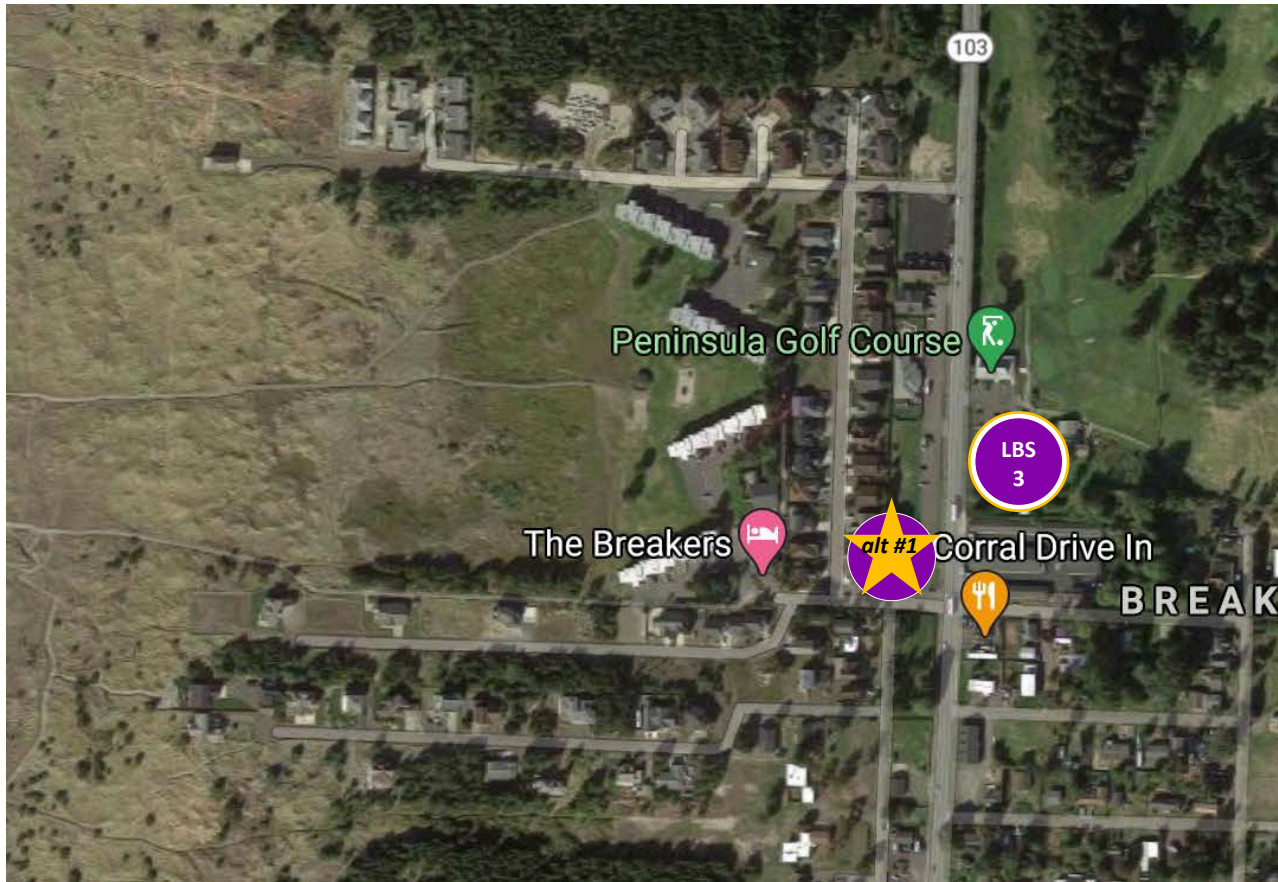


LBS 1 - Cranberry Road beach approach site, near State Park public bathrooms



Photo Credit: *Bob Freitag*

# Long Beach South: LBS 3 + *alternative*



LBS 3	
Address	9604 Pacific Way
Intersection	26th Street NE & SR 103
Options	2, 3, 4
Notes	golf course parking lot

LBS 3 - alt #1	
Address	2601 Pacific Way
Intersection	HWY 103 & Pacific Way
Notes	Social Services Department

Source: *Google Maps*

# Long Beach South: LBS 3



LBS 3 - Peninsula Golf Course parking lot.

Photo Credit: *Google Maps Street View*



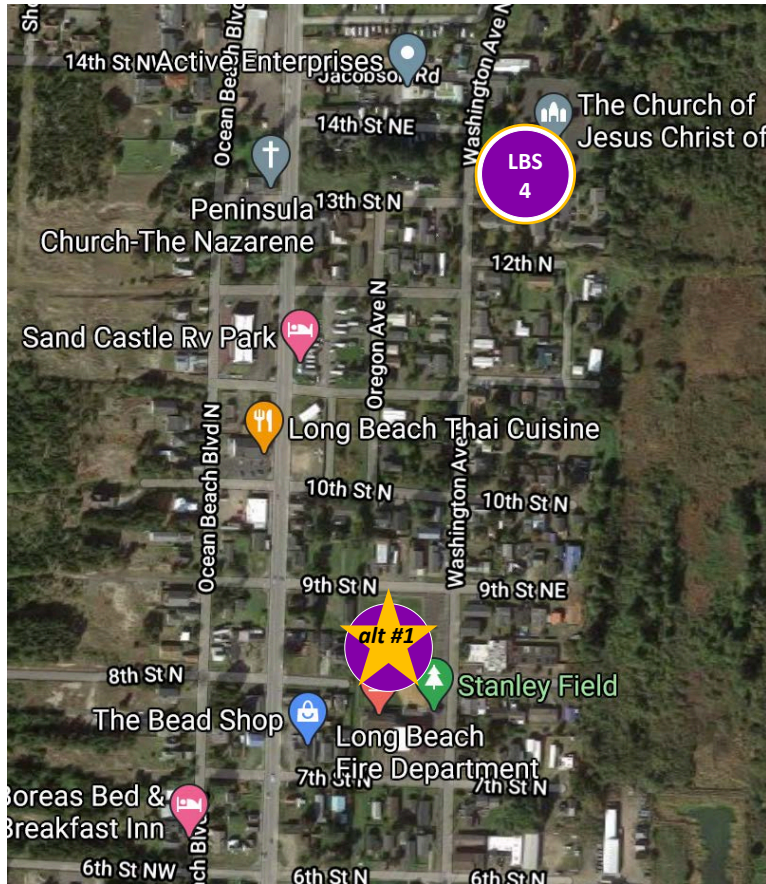
## Long Beach South: LBS 3 *alternative*



LBS 3 - *alternative*: parking lot on west side of highway, near social services building. Publicly-owned site.

Photo Credit: *Bob Freitag*

# Long Beach South: LBS 4 + *alternative*



LBS 4	
Address	1306 Washington Avenue North
Intersection	Washington Avenue North
Options	2, 3, 4
Notes	church parking lot, tax exempt parcel

LBS 4 - alt #1	
Address	701 Washington Avenue North
Intersection	Washington Avenue & 7th Street North
Notes	Long Beach Fire Department

Source: Google Maps



## Long Beach South: LBS 4



LBS 4 - Church property. Potential VES site is in the parking lot or grass adjacent to Washington Avenue North.

Photo Credit: *Google Maps Street View*





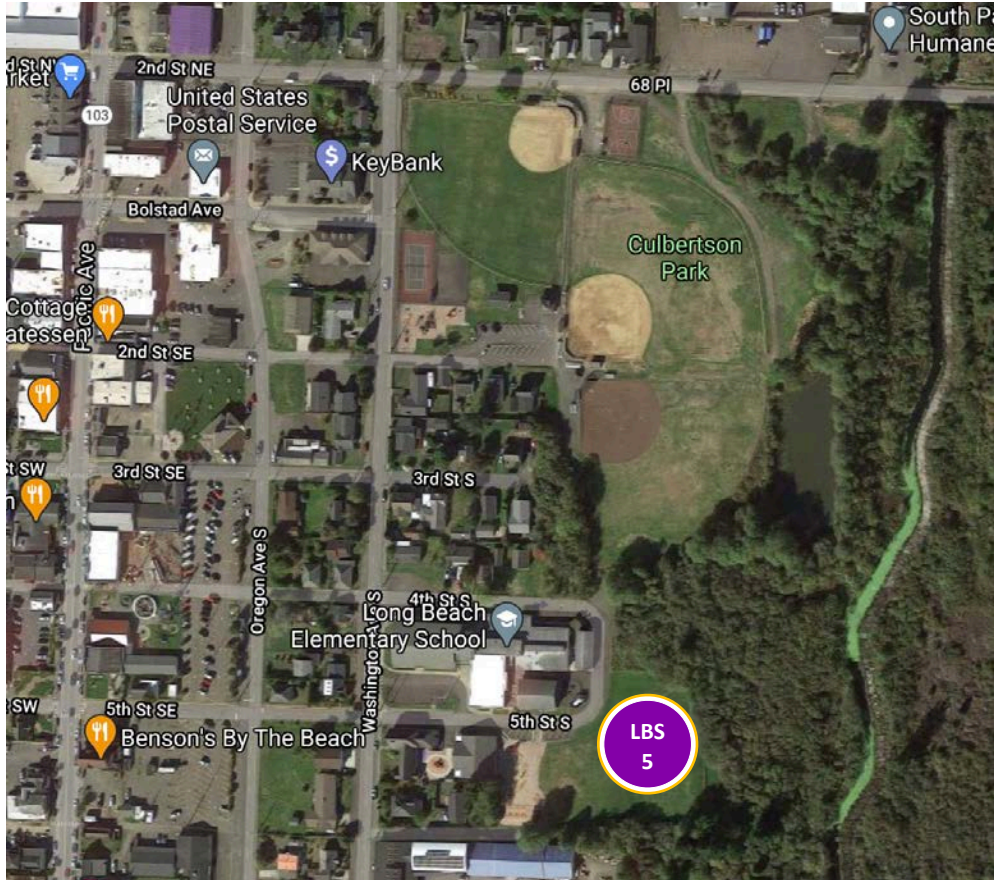
## Long Beach South: LBS 4 *alternative*



Photo Credit: *Bob Freitag*

LBS 4 - *Alternative #1*: City-owned land located 5-blocks south of LBS 4. Long Beach Fire Department next to city park Stanley Field.

# Long Beach South: LBS 5



LBS 5	
Address	N/a
Intersection	Washington Avenue S & 5th Street S
Options	2, 3, 4
Notes	school playfield location

Source: Google Maps

## Long Beach South: LBS 5

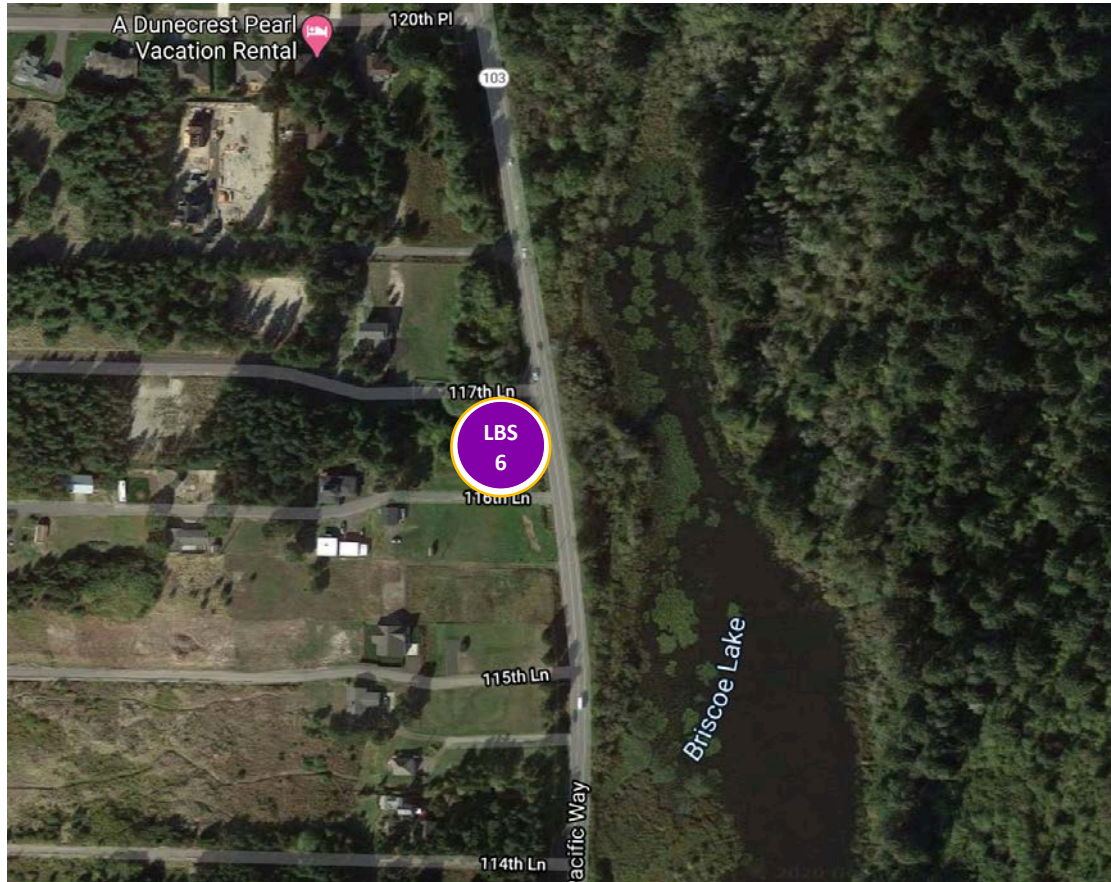


Photo Credit: *Bob Freitag*

LBS 5 - Empty play field lot behind (southeast) Long Beach Elementary School and Ocean Beach school district administrative building.



# Long Beach South: LBS 6



LBS 6	
Address	N/a
Intersection	116th Lane & SR 103
Options	3, 4
Notes	Vacant land. Common area belonging to the homeowner's association.

Source: Google Maps

# Long Beach South: LBS 6



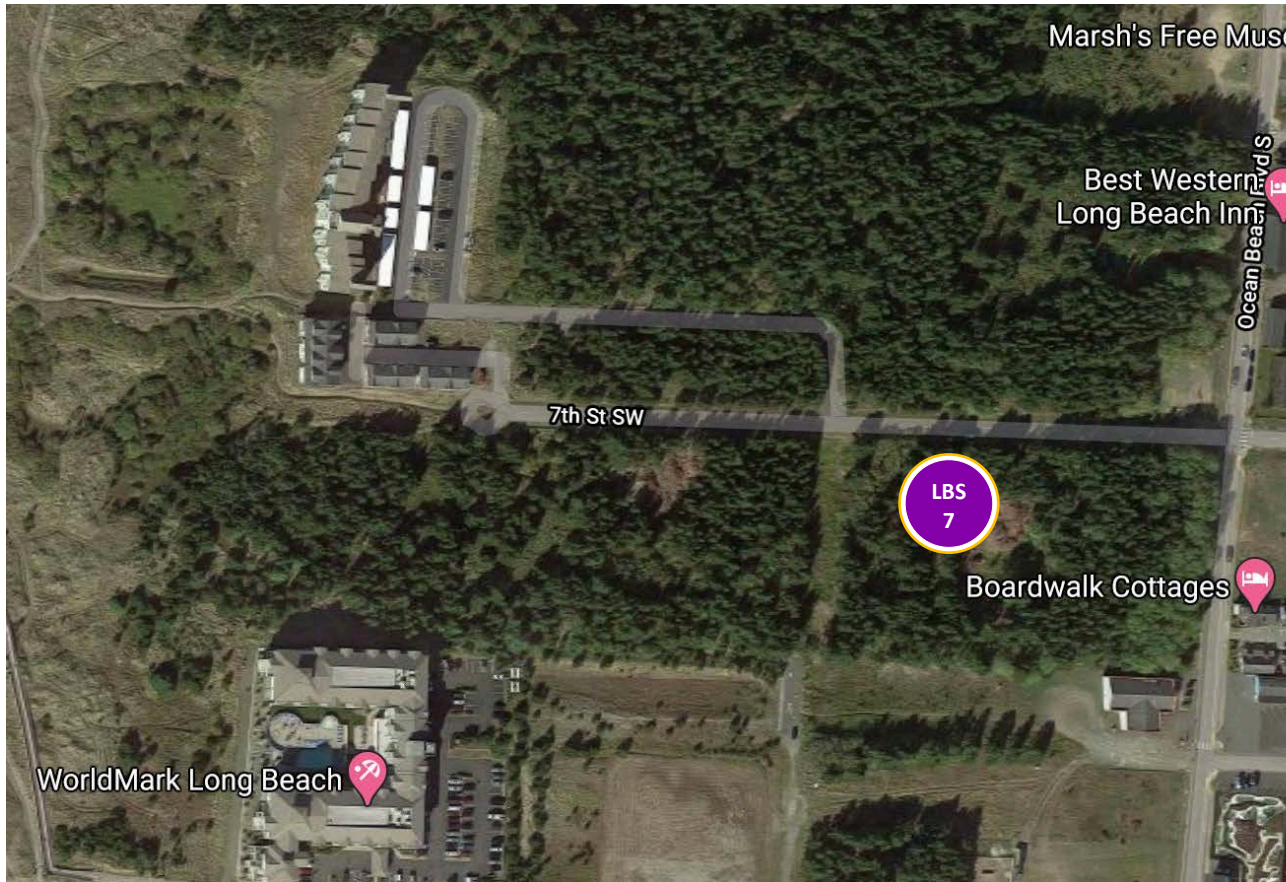
LBS 6 - This is a privately-owned, undeveloped parcel owned by a homeowner's association. This could be a site for a neighborhood VES. Located directly on SR-103.



Photo Credit: *Bob Freitag*



# Long Beach South: LBS 7



LBS 7	
Address	N/a
Intersection	7th Street SW & SR 103 - on 7th Street
Options	3, 4
Notes	Towards sand, vacant lot. Boardwalk Park.

Source: Google Maps



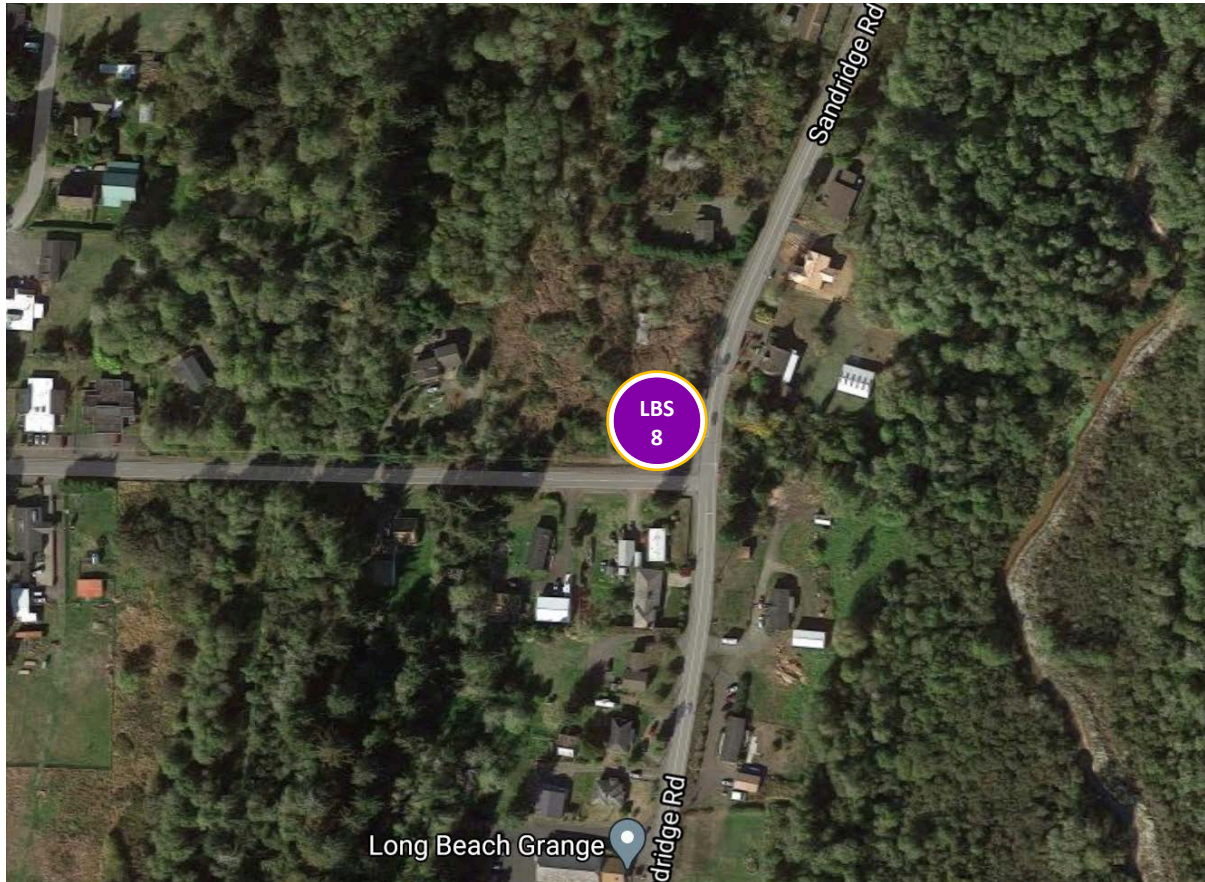
# Long Beach South: LBS 7



Photo Credit: *Bob Freitag*

LBS 7 - Potential city-owned VES site between WorldMark and large condo building. Adjacent to beach.

# Long Beach South: LBS 8



LBS 8	
Address	N/a
Intersection	Sandridge & Sid Snyder
Options	3, 4
Notes	vacant lot (privately-owned), NW corner of intersection

Source: Google Maps

# Long Beach South: LBS 8



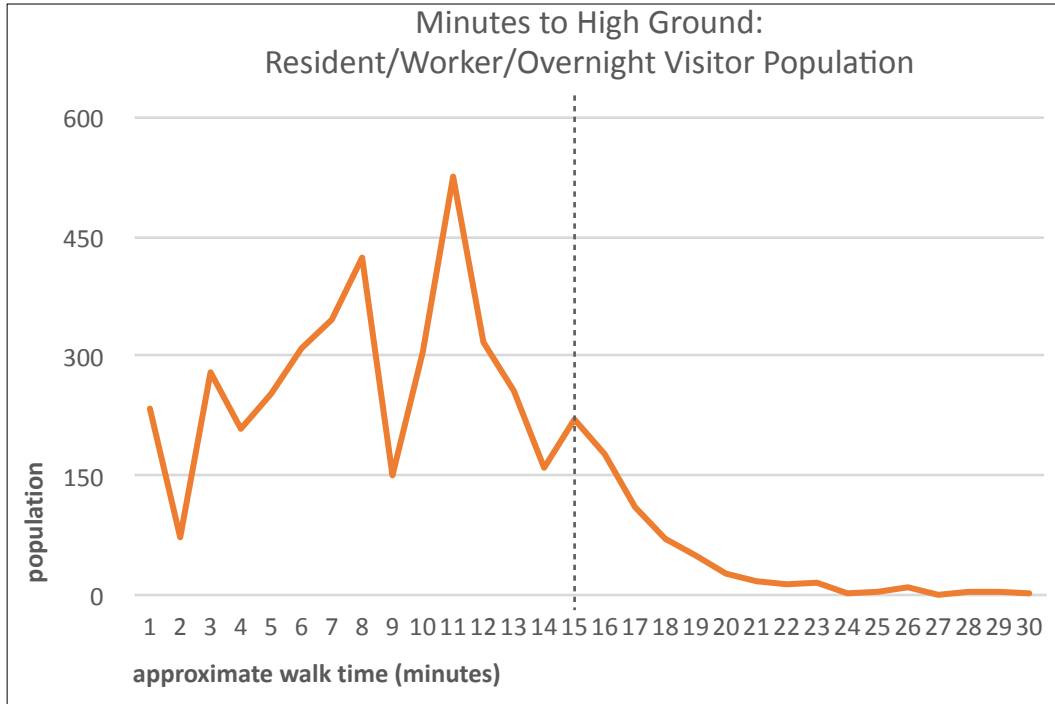
LBS 8 - Privately-owned large parcel. Currently undeveloped.



Photo Credit: *Bob Freitag*



# Long Beach - South: VES Option #4 (Efficient/Lean)



Approximate # of People, by Walking Time Bands, to High Ground

<15 minutes	15-25 minutes	25+ minutes
4,330 people	705 people	19 people

- *Fire Station: Approximate 1 minute walk time to high ground or VES*
- ▲ *Schools: Approximate 2 and 3 minute walk time to high ground or VES*

**Under Option #4:**

- approximately **83.0%** of the total estimated Long Beach - South population are within 15 minutes to natural high ground OR vertical evacuation
- approximate *maximum* walk time to natural high ground or vertical evacuation for identified population = **30 minutes**
- approximate *minimum* VES capacity need (15 minute walk time) = **4,035 people**
- # of proposed VES = **7**

## Potential Long Beach - South VES Locations: All Options (1-4)

VES ID	Intersection	Parcel ID	Parcel Owner	Lat   Long	Option	Notes
LBS 1	Cranberry Road, just west of SR 103	11113332166	State of Washington Parks & Rec	<u>46.395103, -124.057690</u>	2, 3, 4	towards beach, located on vacant State land
LBS 2	Cranberry Road	11113423016	Columbia Land Trust	<u>46.396369, -124.031711</u>	2, 3	Columbia Land Trust land, northside of Cranberry Road between Birch and Sandridge
LBS 3	26th Street NE & SR 103	10110921230	Channel West Properties, LLC	<u>46.371961, -124.053016</u>	2, 3, 4	golf course parking lot
LBS 4	1306 Washington Avenue North	10110934043	Latter-Day Saints of Jesus Christ	<u>46.355841, -124.053033</u>	2, 3, 4	church parking lot, tax exempt parcel
LBS 5	Washington Avenue S & 5th Street S	10111634649	Long Beach School District #101	<u>46.348683, -124.051201</u>	2, 3, 4	school playfield location
LBS 6	116th Lane & SR 103	73059001000	Columbia Pacific Homeowners Association	<u>46.386572, -124.053118</u>	3, 4	vacant land. Common area belonging to the homeowner's association.
LBS 7	7th Street SW & SR 103 - on 7th Street	73051000006	City of Long Beach	<u>46.347797, -124.058206</u>	3, 4	towards sand, vacant lot. Boardwalk Park.
LBS 8	Sandridge & Sid Snyder	10111688014	Fairytales Land LLC	<u>46.346029, -124.041615</u>	3, 4	vacant lot (privately-owned), NW corner of intersection

### Notes

**LBS 1** - LBS 1 is State of Washington-owned land, currently forested, but could be cleared to provide easy beach access VES for visitors and residents.

**LBS 3** - The LBS 3 site is a privately-owned golf course. The alternative site is directly across the highway (parking lot for social services department) and is tax-exempt land.

**LBS 4** - LBS 4 is currently proposed on church land (tax exempt, but private). An alternative could be 5 blocks to the south at Stanley Park and the Long Beach Fire Department.

**LBS 5** - LBS 5 is located near Long Beach Elementary School, on the undeveloped playfield just SE of the school building.

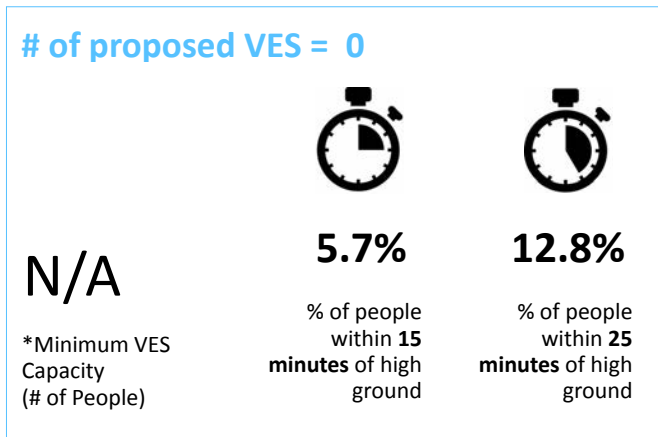
**LBS 6** - The LBS 6 site is owned by the Columbia Pacific Homeowners Association. Potential VES to serve the members of the Association?

**LBS 7** - The LBS 7 site is on city-owned property near major hotels and condo buildings.

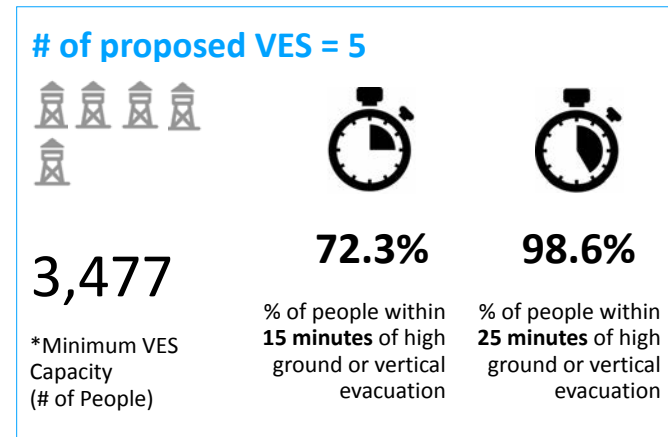
**LBS 8** - This is a privately-owned, vacant parcel located on a high traffic intersection. Nearby full-time residents and Wildwood Campground/RV Park.

# Long Beach - South: Comparison of All Options (1-4)

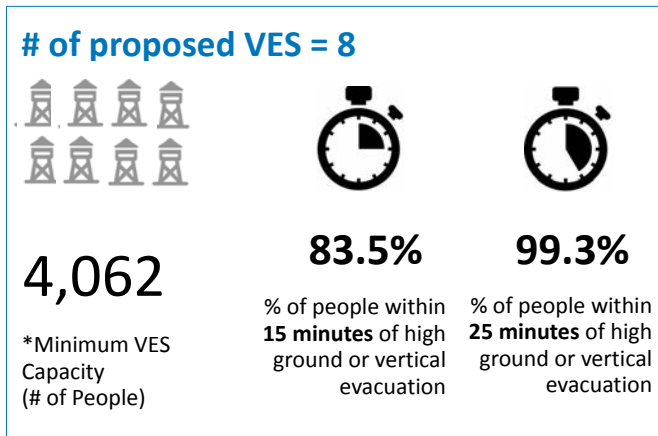
Option #1



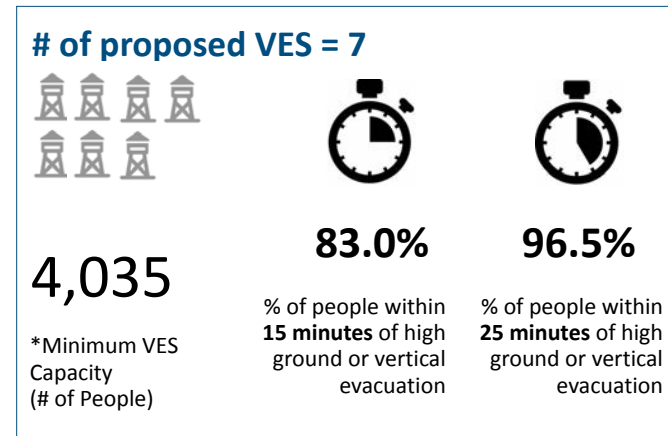
Option #2



Option #3



Option #4





## Long Beach - South: Comparison of All Options (1-4)

**Notes:**

\**Minimum VES Capacity* = the delta (or difference) between Option #1 (no VES) number of people at each minute mark and Options #2, #3, and #4 number of people at each minute mark. For example: If 10 people are within 15 minutes of high ground under Option #1 but that number increases to 25 people under Option #2 - then we know that a minimum of 15 additional people have been put within 15 minutes of high ground through the addition of a Vertical Evacuation Structure. Therefore, the minimum VES capacity for this example is 15 people.

# Long Beach - North

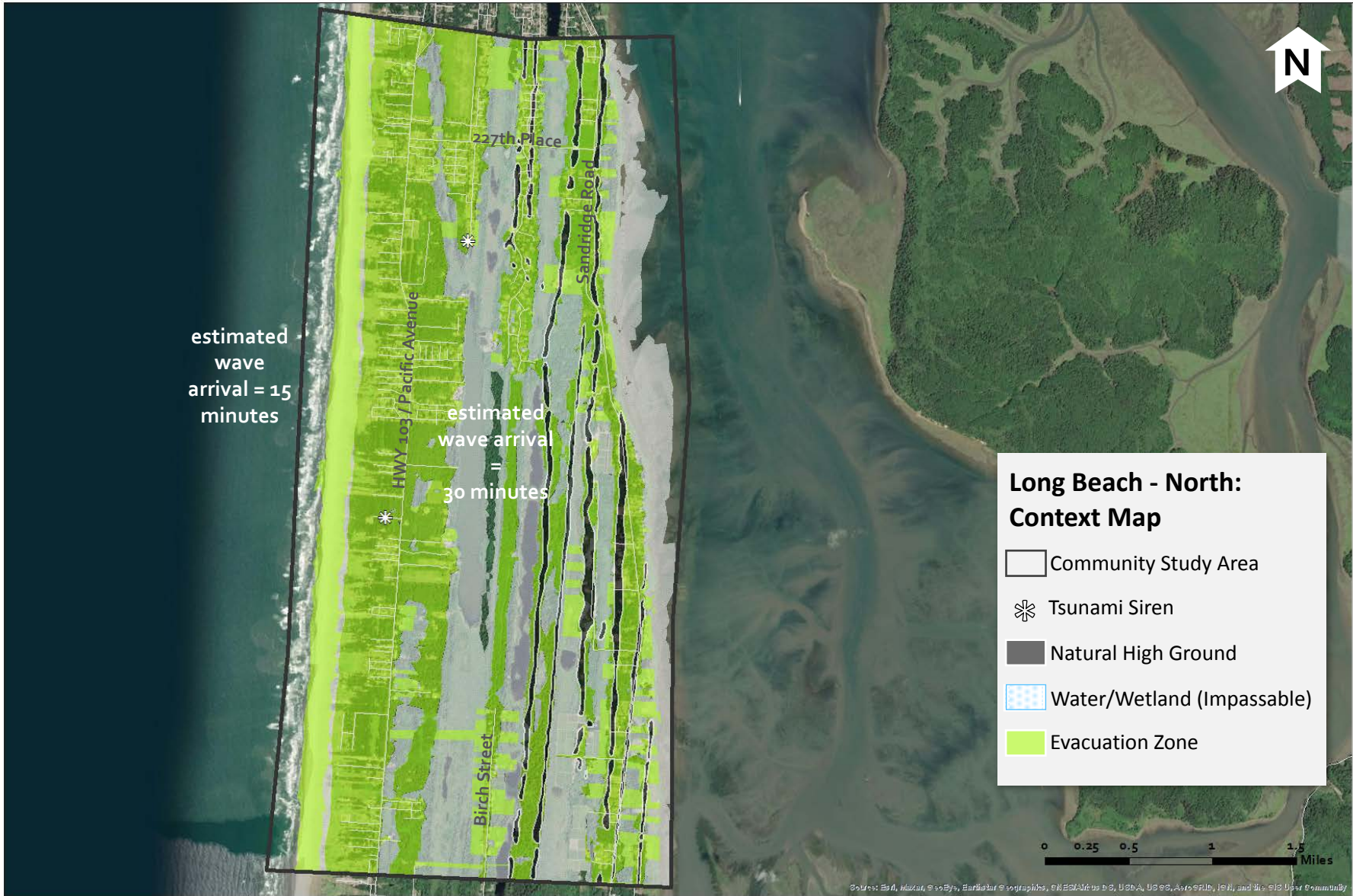
***Long Beach - North community study area population in the tsunami hazard area = ~4,108 people***

*Resident/Worker/Overnight Visitor population = ~4,108 people*

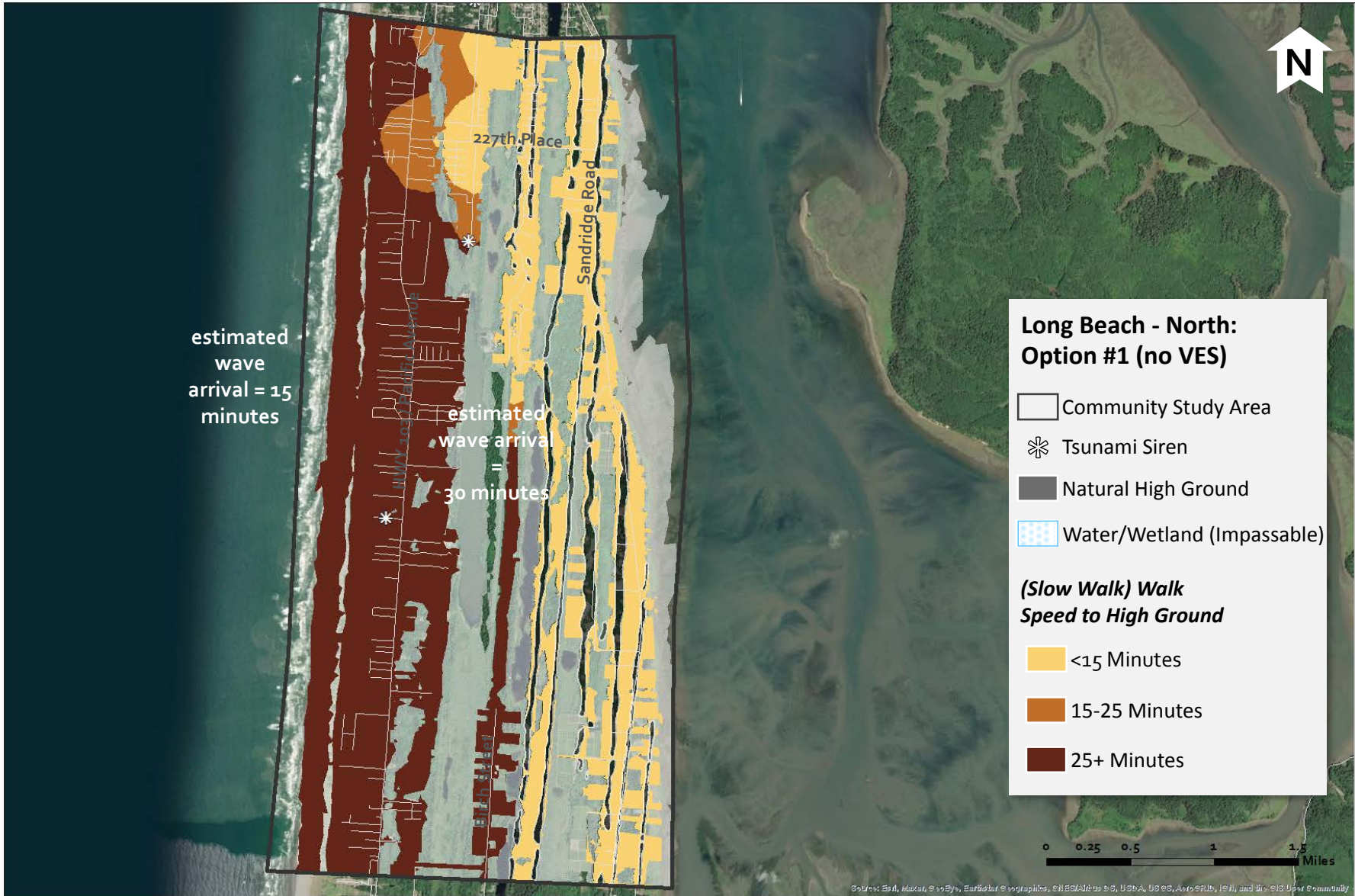
*Fire Department occupancy = N/A*

*Schools occupancy = N/A*

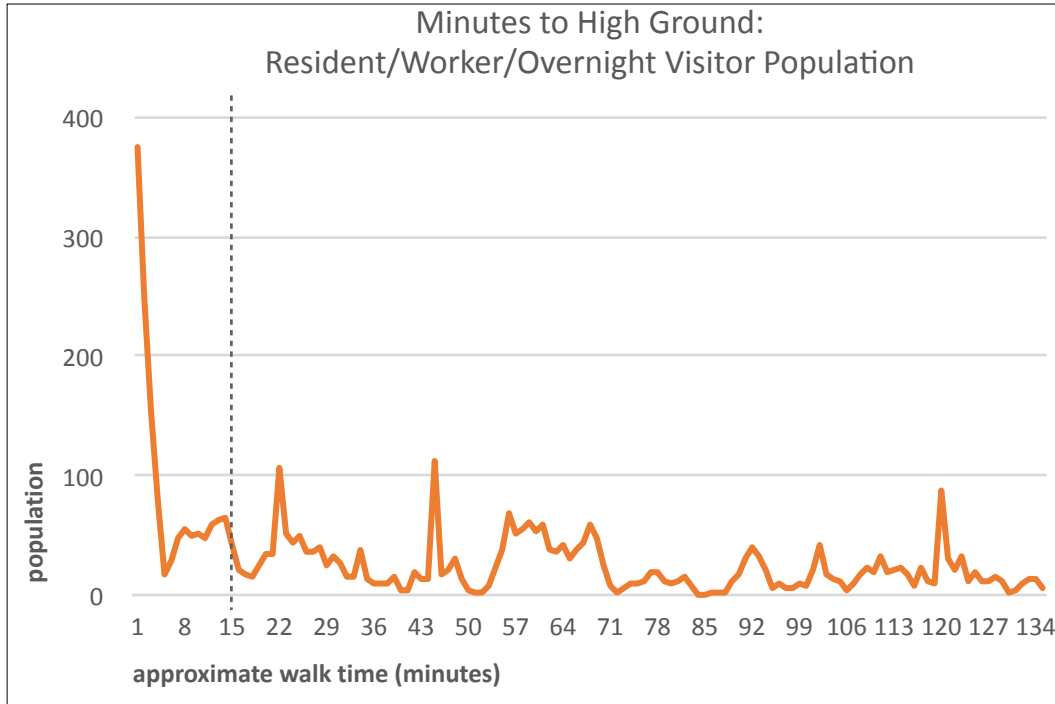
Source: 2010 Census (average household size); Pacific County Residential Land Use







# Long Beach - North: VES Option #1 (No VES)



\*Approximate *maximum* walk time accounts for the resident/worker/overnight visitor population locations only. This does not factor in daytime visitors or beach visitors, for example.

Approximate # of People, by Walking Time Bands, to High Ground

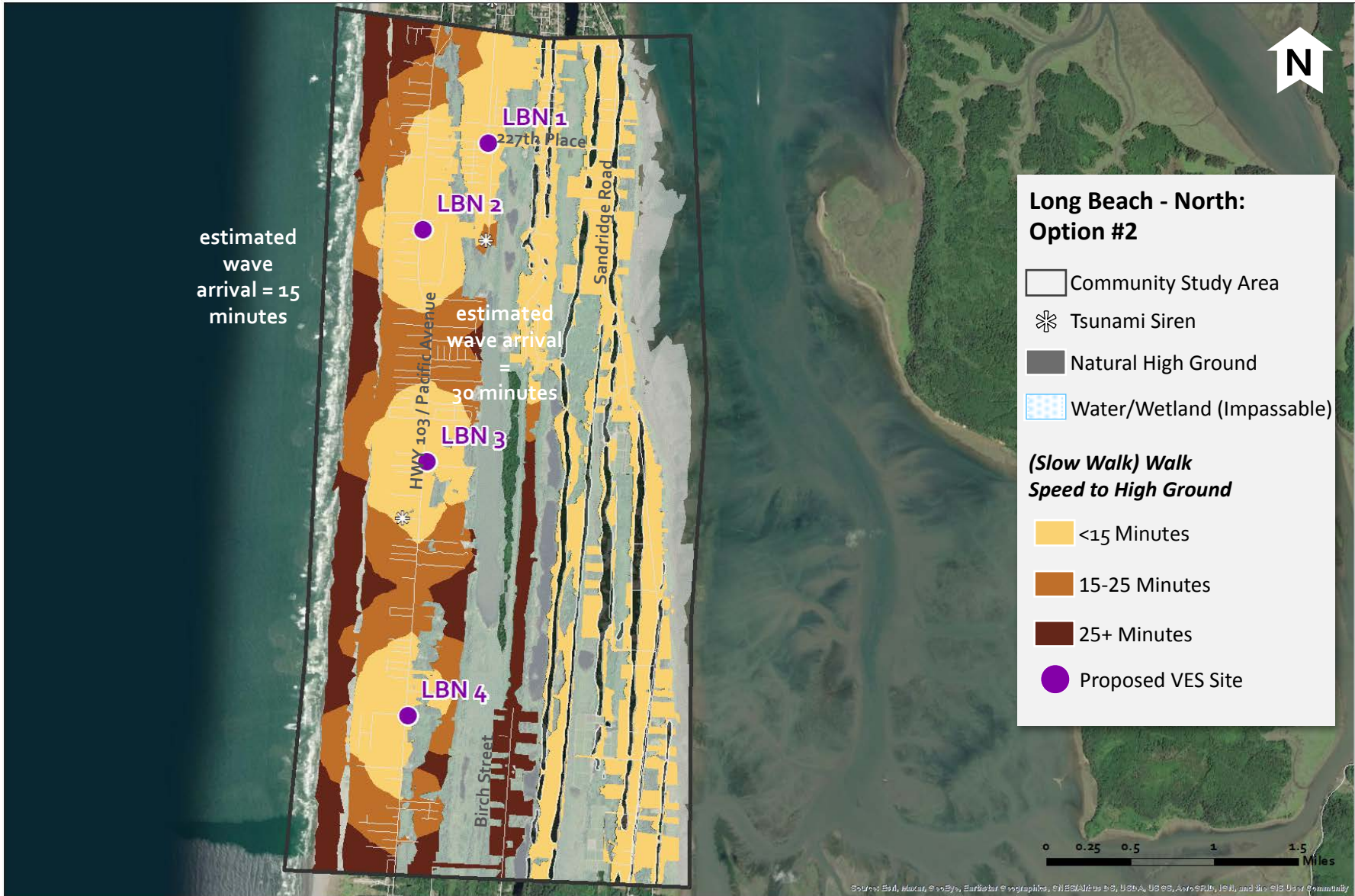
<15 minutes	15-25 minutes	25+ minutes
1,340 people	439 people	2,329 people

■ Fire Station: N/A

▲ Schools: N/A

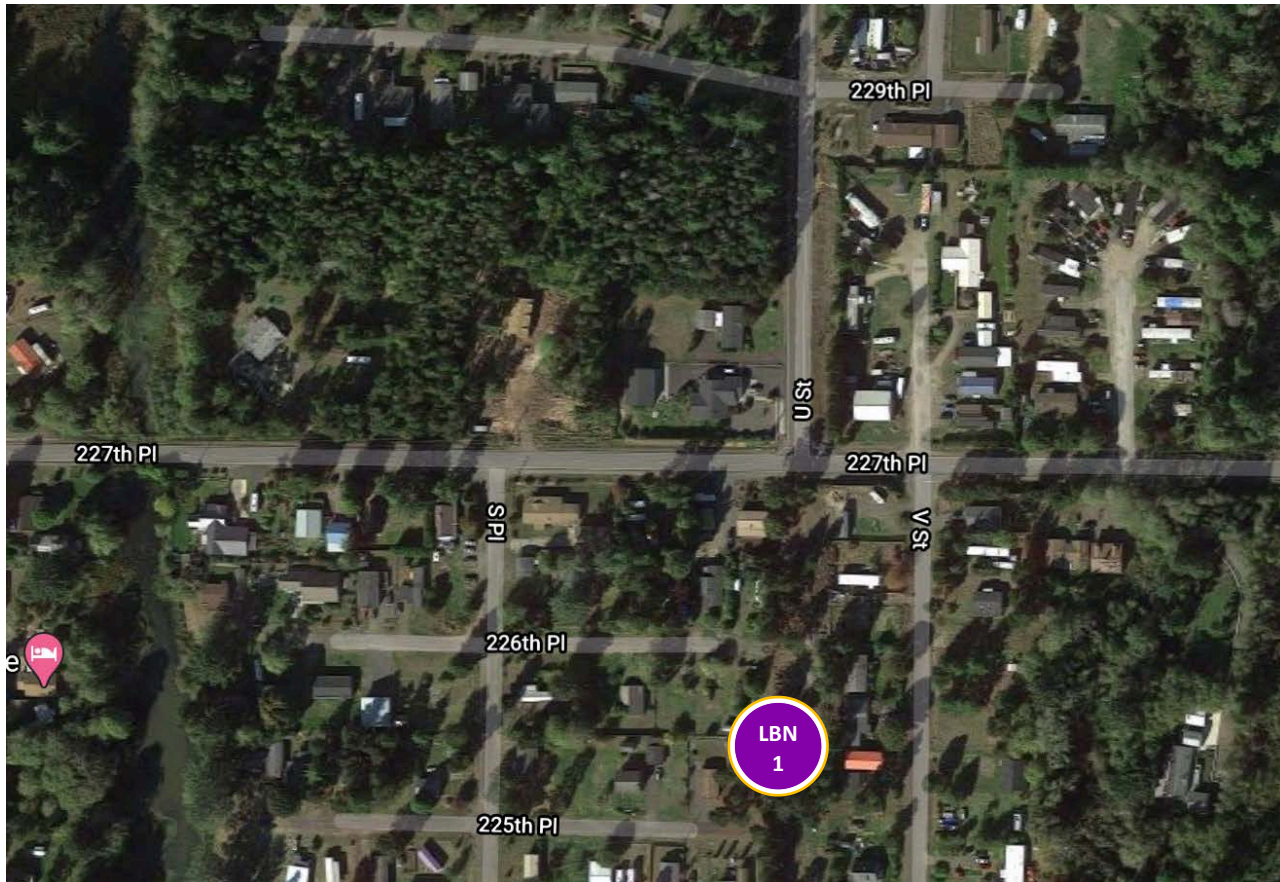
**Under Option #1:**

- approximately **32.6%** of the total estimated Long Beach - North population are within 15 minutes to natural high ground
- approximate *\*maximum* walk time to natural high ground for identified population = **134** minutes





# Long Beach North: LBN 1



LBN 1	
Address	N/a
Intersection	226th Place & U Street
Options	2, 3
Notes	south of 227th Place, on Pacific County-owned land (small strip - easement?)

Source: Google Maps

## Long Beach North: LBN 1

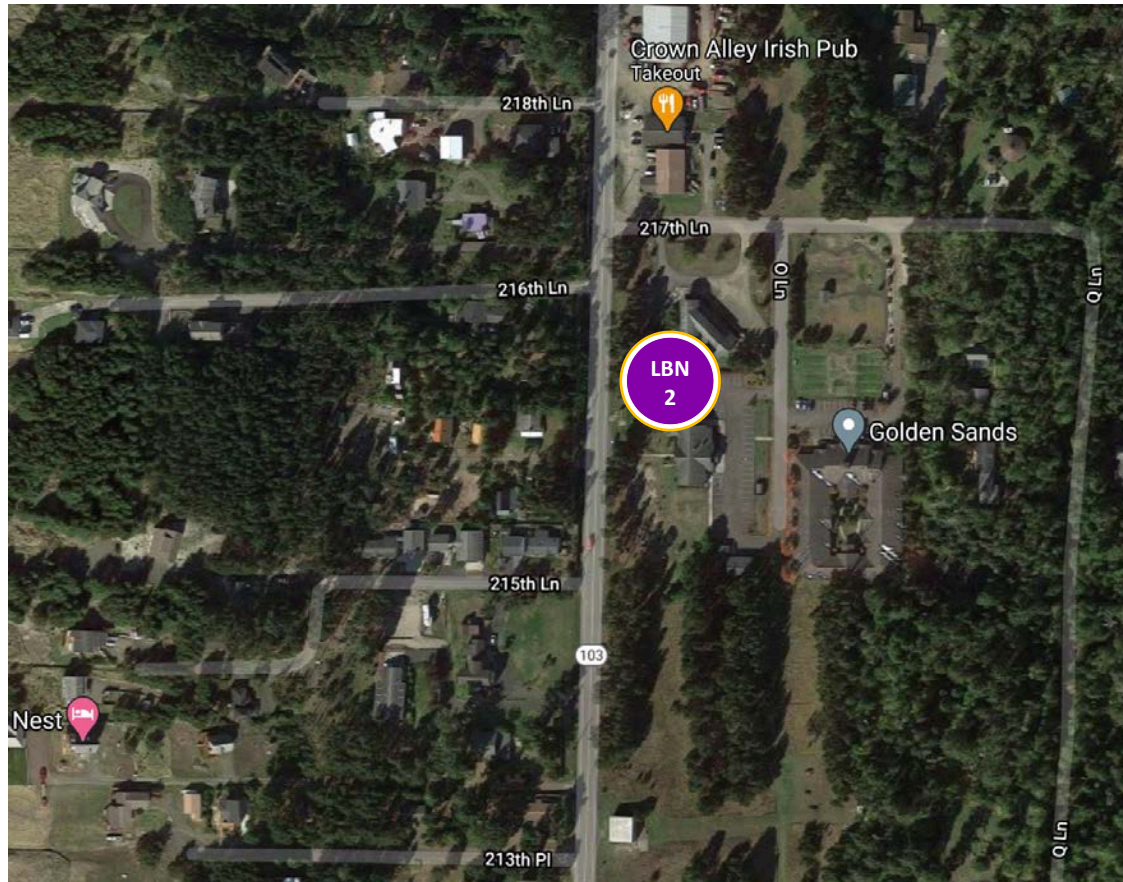


LBN 1 - slender Pacific County-owned parcel, located east of the end of 226th Place and 225th Place. Adjacent to natural high ground.

Photo Credit: *Google Maps Street View*



# Long Beach North: LBN 2



LBN 2	
Address	21603 O Place
Intersection	Peninsula Senior Center
Options	2, 3, 4
Notes	Peninsula Senior Center parking lot, tax-exempt parcel

Source: Google Maps



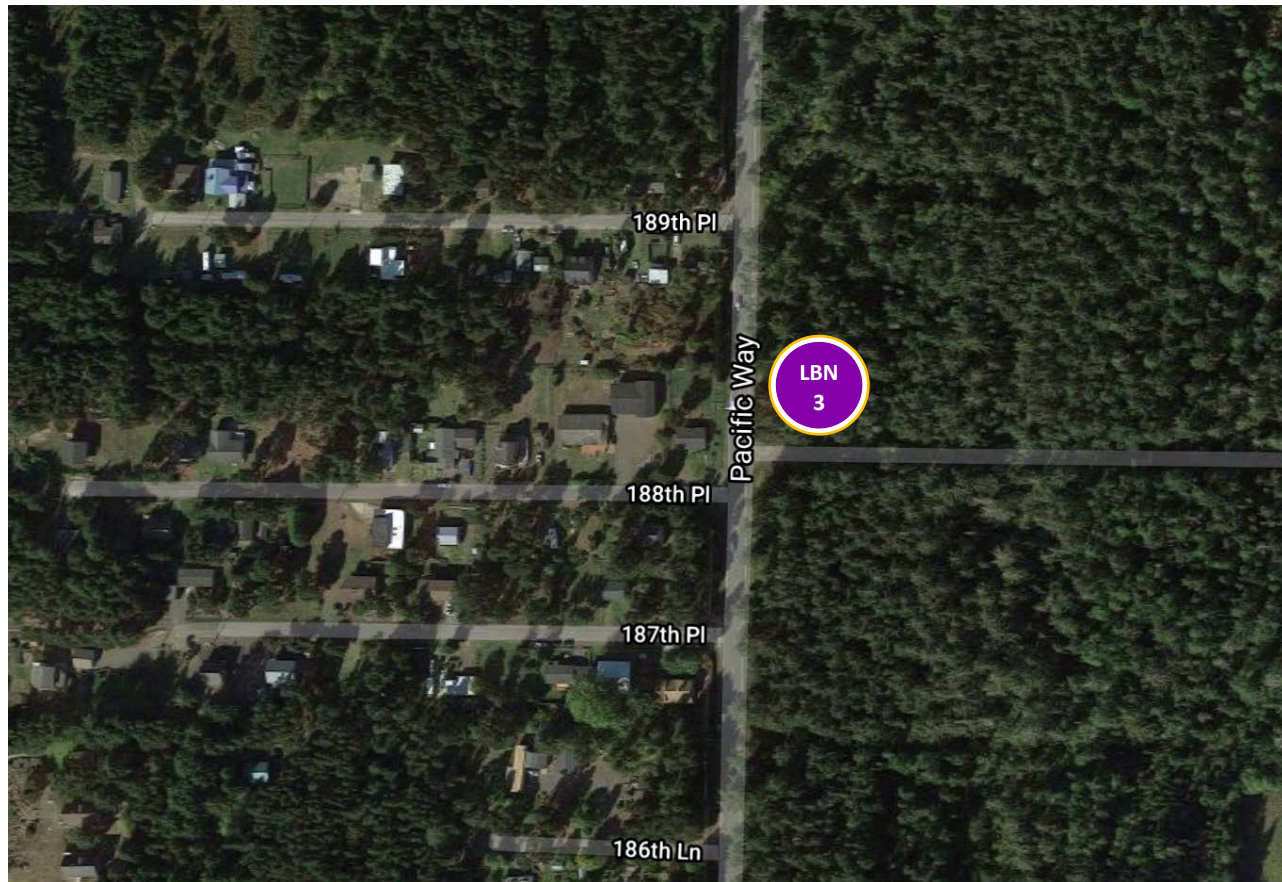
## Long Beach North: LBN 2



LBN 2 - Golden Sands retirement center site, along with other health-related services/offices. Large parking lot may be able to accommodate VES.

Photo Credit: *Google Maps Street View*

# Long Beach North: LBN 3



LBN 3	
Address	N/a
Intersection	188th Place & SR 103
Options	2, 3, 4
Notes	east side of highway, forested area - but State-owned

Source: *Google Maps*



## Long Beach North: LBN 3

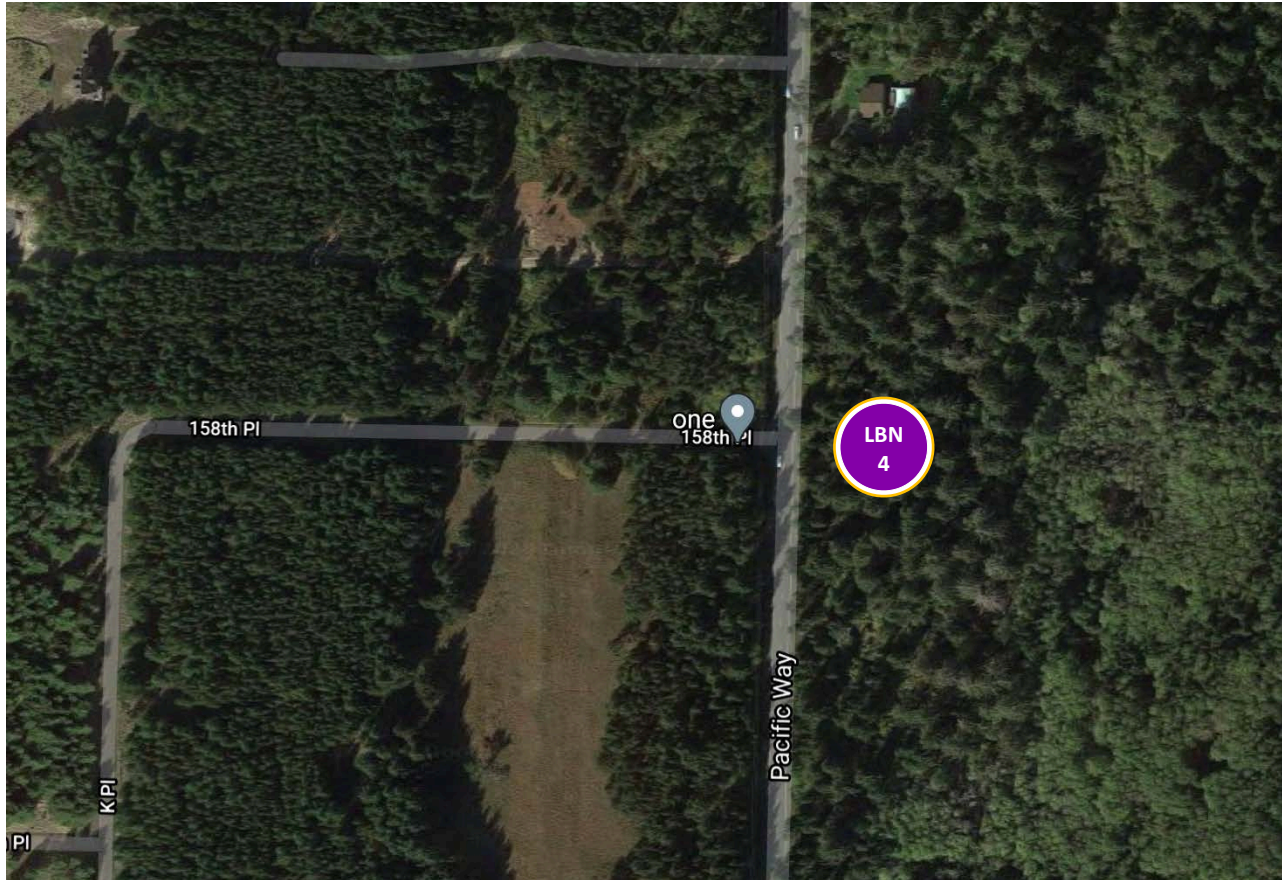


LBN 3 - This is state of Washington-owned land. Fish and Wildlife Department. Located on State Route 103 with an access road (*see photo*).

Photo Credit: *Google Maps Street View*



# Long Beach North: LBN 4



LBN 4	
Address	N/a
Intersection	158th Place & SR 103
Options	2, 3, 4
Notes	east side of highway, forested area, exempt parcel

Source: Google Maps

## Long Beach North: LBN 4

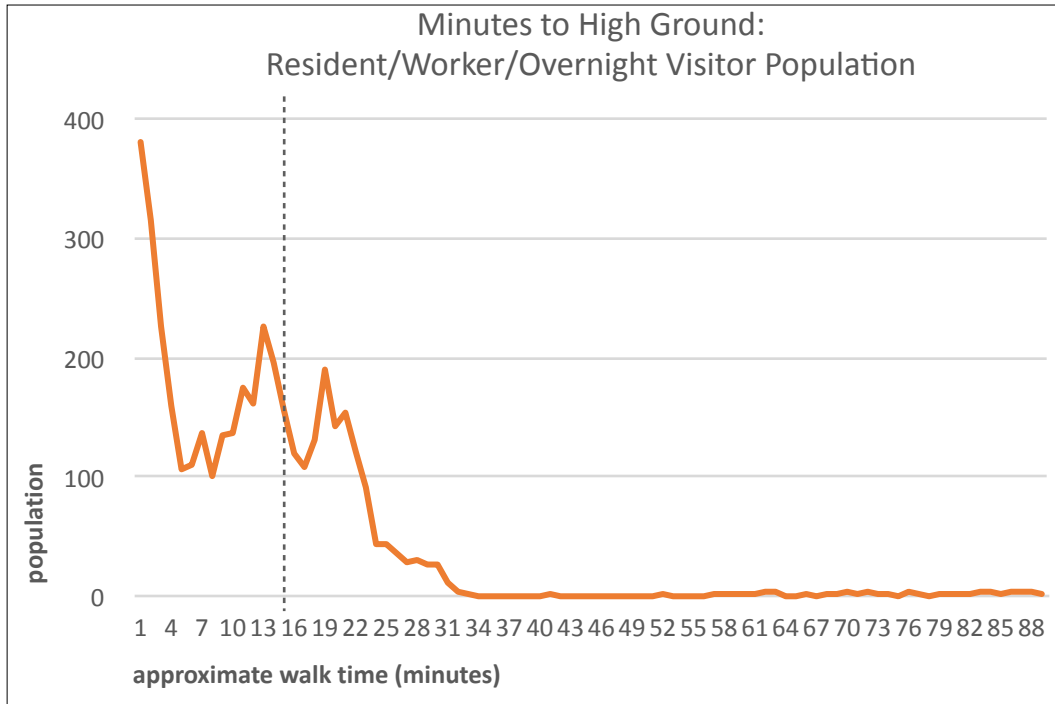


LBN 4 - This property is located on the east side of SR 103, and owned by the Columbia Land Trust. It's forested but undeveloped.

Photo Credit: *Google Maps Street View*



# Long Beach - North: VES Option #2 (Community-Derived)



Approximate # of People, by Walking Time Bands, to High Ground

<15 minutes	15-25 minutes	25+ minutes
2,566 people	1,302 people	241 people

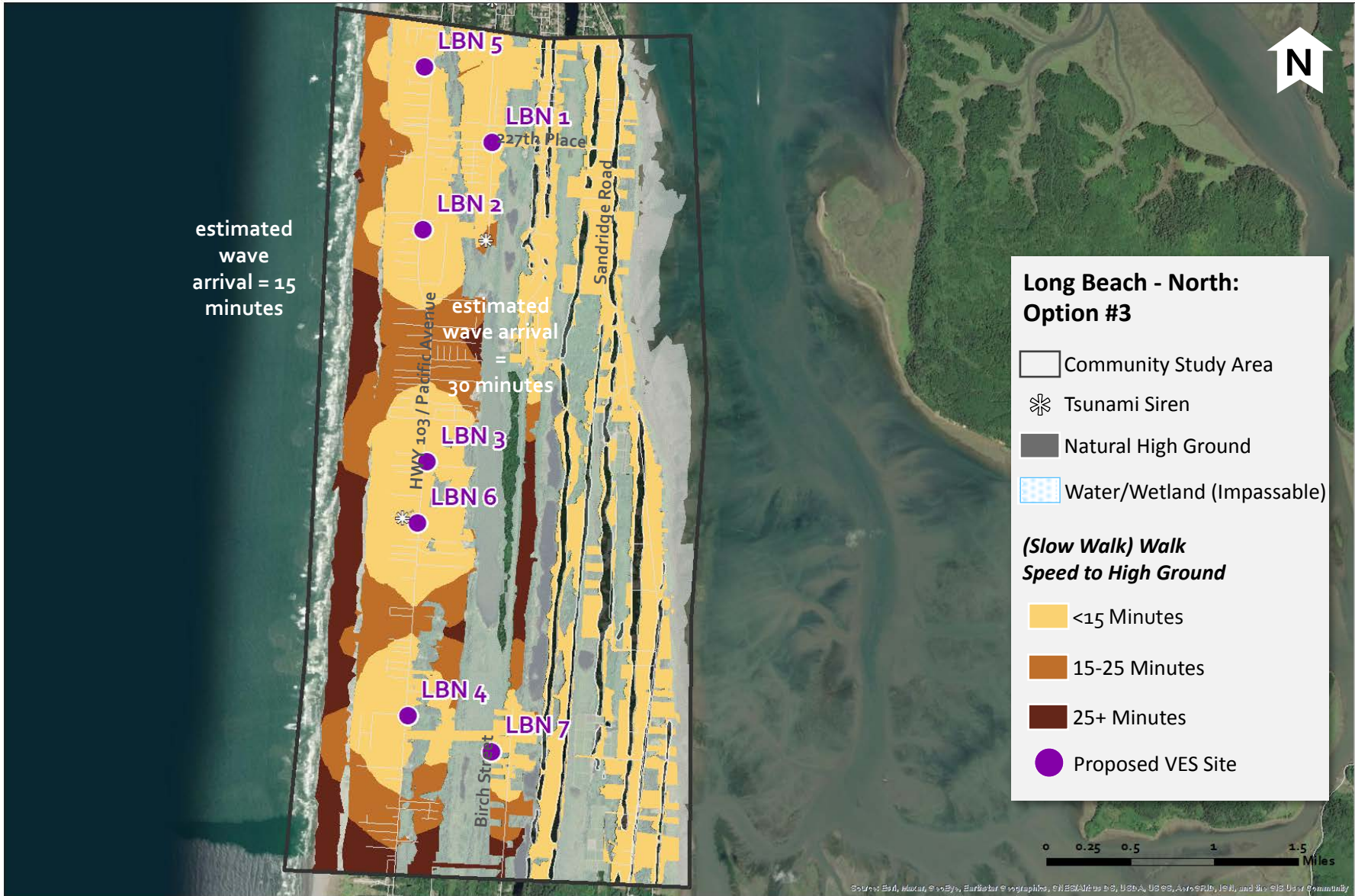
■ Fire Station: N/A

▲ Schools: N/A

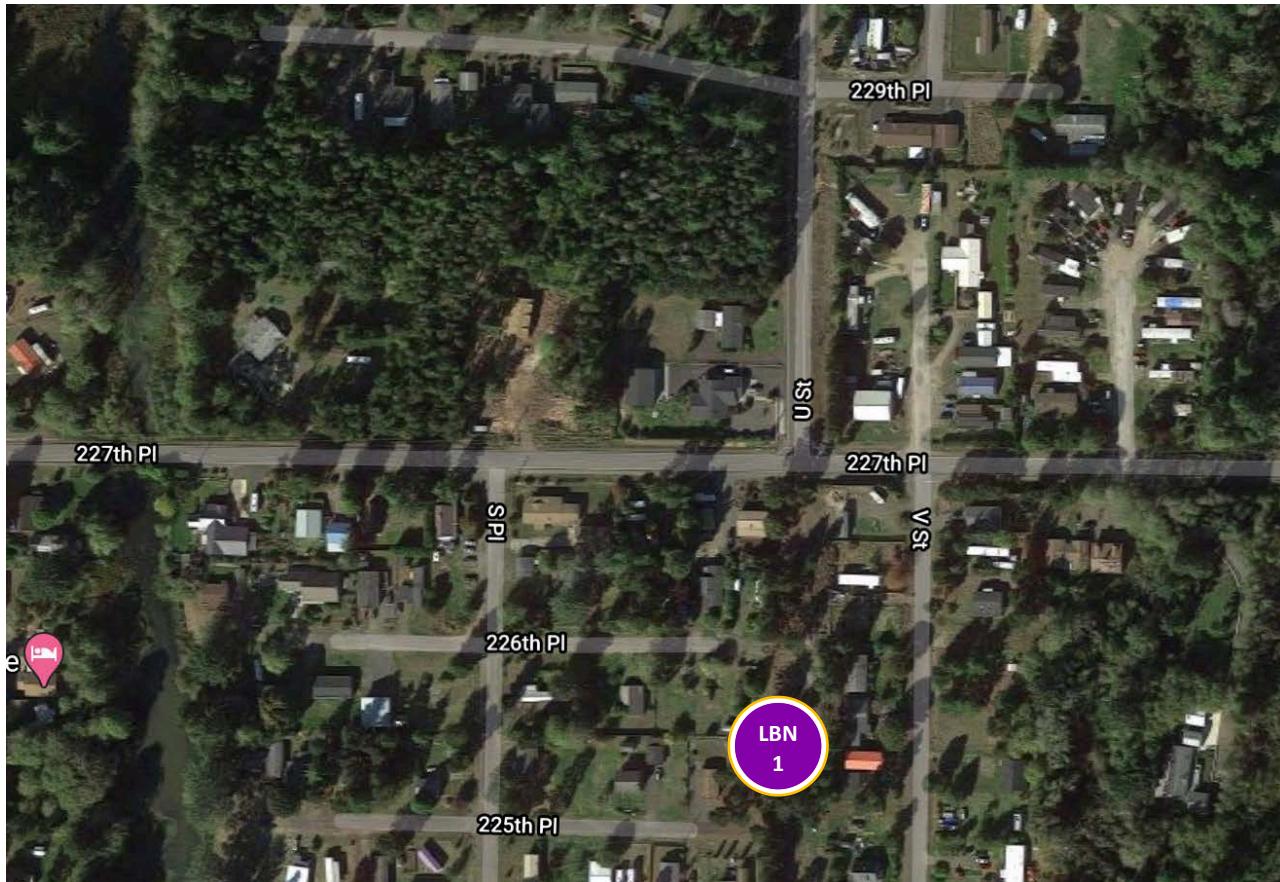
**Under Option #2:**

- approximately **62.5%** of the total estimated Long Beach - North population are within 15 minutes to natural high ground OR vertical evacuation
- approximate *maximum* walk time to natural high ground or vertical evacuation for identified population = **88** minutes
- approximate *minimum* VES capacity need (15 minute walk time) = **1,226** people
- # of proposed VES = **4**





# Long Beach North: LBN 1



LBN 1	
Address	N/a
Intersection	226th Place & U Street
Options	2, 3
Notes	south of 227th Place, on Pacific County-owned land (small strip - easement?)

Source: Google Maps



## Long Beach North: LBN 1

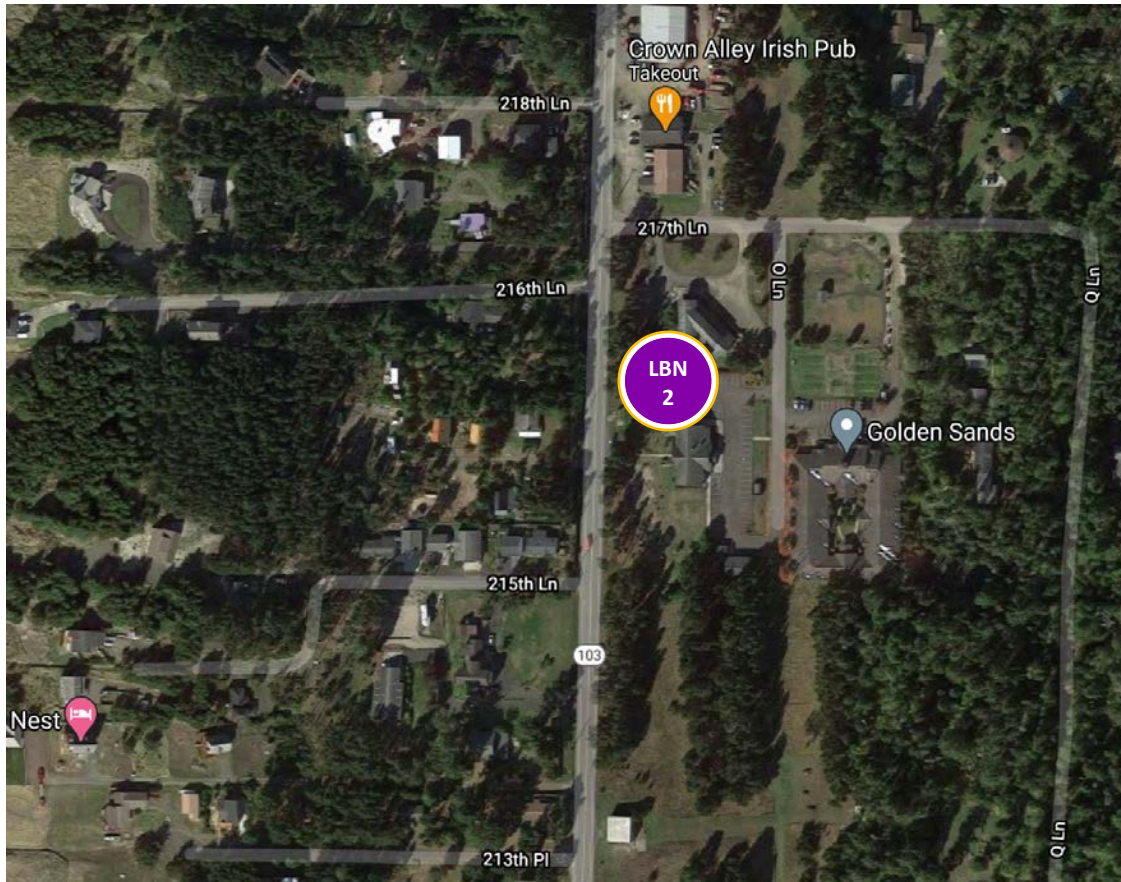


LBN 1 - slender Pacific County-owned parcel, located east of the end of 226th Place and 225th Place. Adjacent to natural high ground.

Photo Credit: *Google Maps Street View*



# Long Beach North: LBN 2



LBN 2	
Address	21603 O Place
Intersection	Peninsula Senior Center
Options	2, 3, 4
Notes	Peninsula Senior Center parking lot, tax-exempt parcel

Source: Google Maps

## Long Beach North: LBN 2

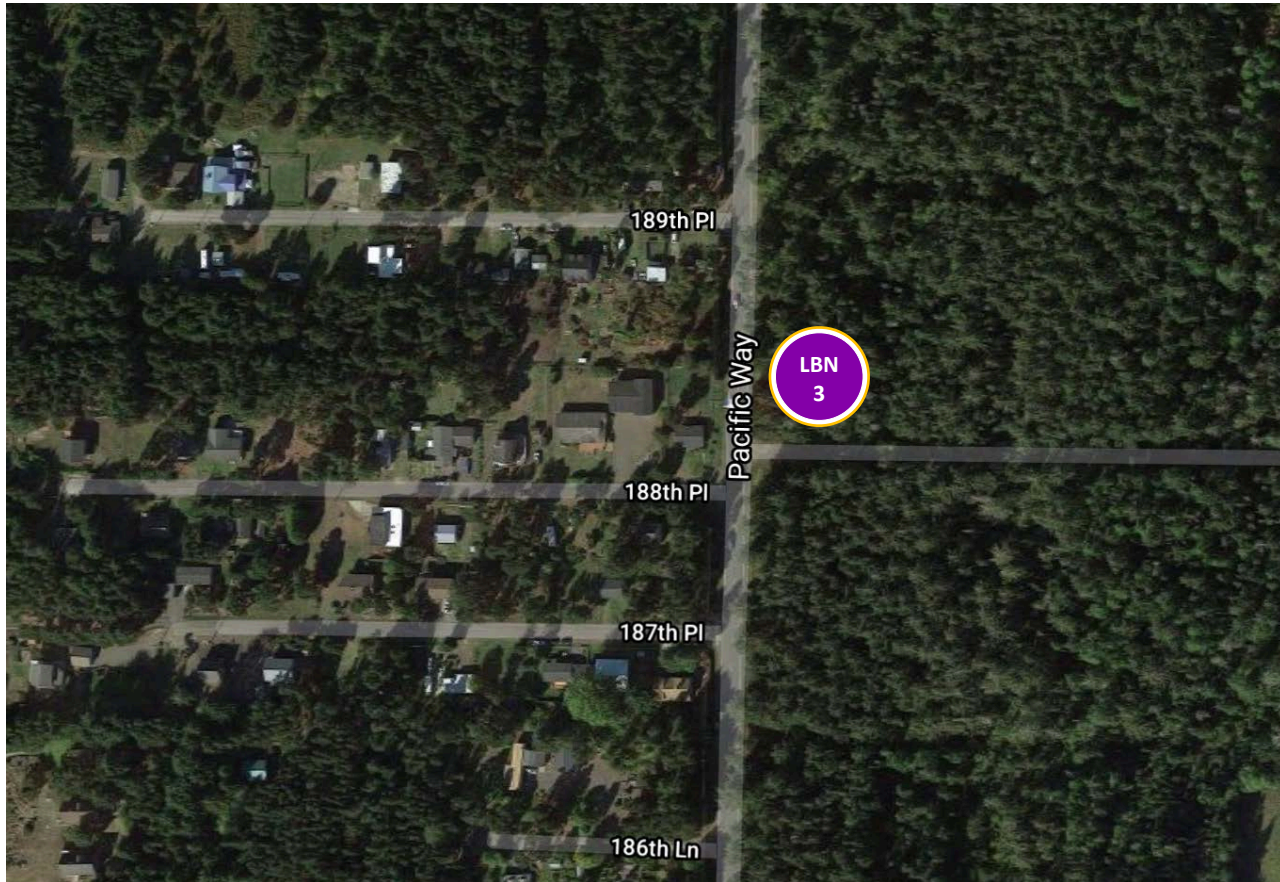


LBN 2 - Golden Sands retirement center site, along with other health-related services/offices. Large parking lot may be able to accommodate VES.

Photo Credit: *Google Maps Street View*



# Long Beach North: LBN 3



LBN 3	
Address	N/a
Intersection	188th Place & SR 103
Options	2, 3, 4
Notes	east side of highway, forested area - but State-owned

Source: Google Maps



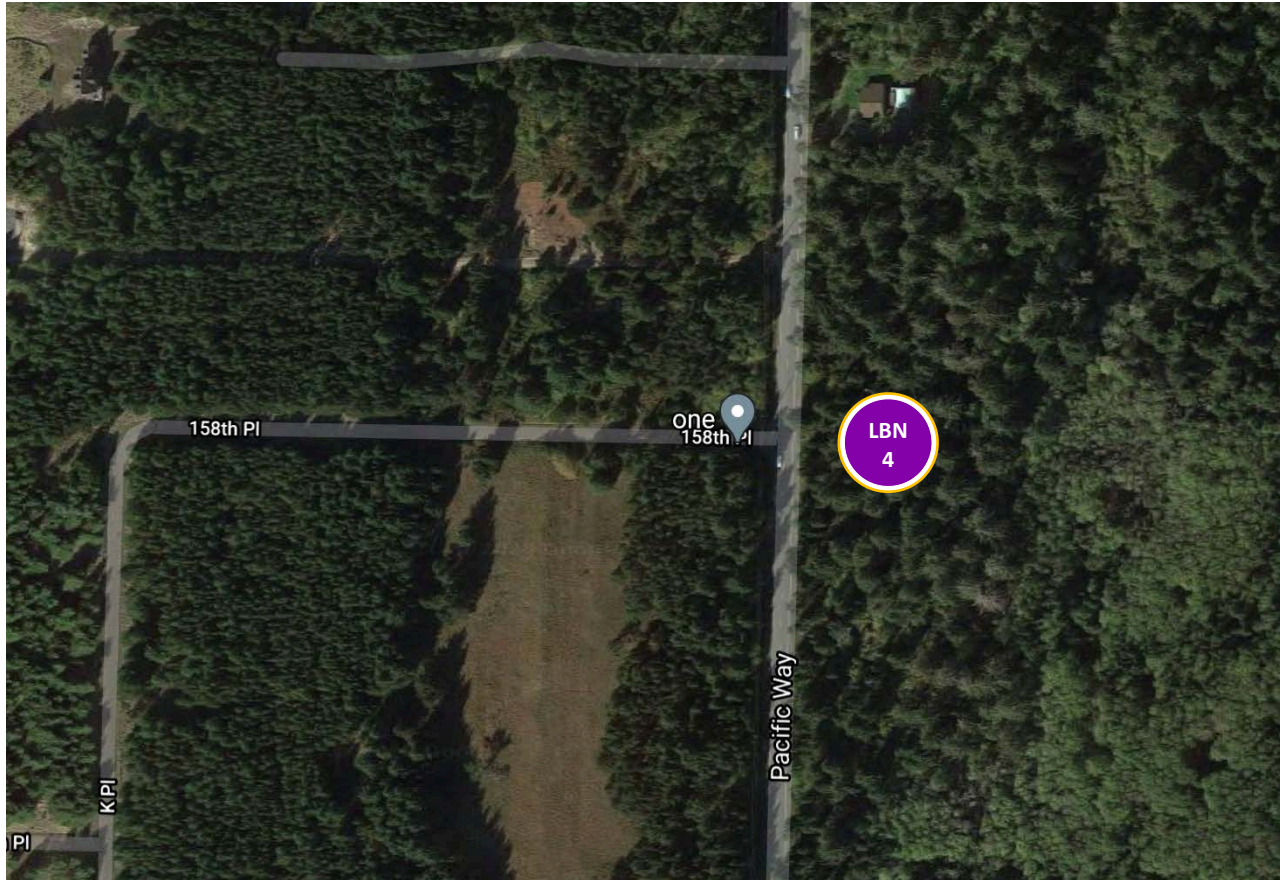
## Long Beach North: LBN 3



LBN 3 - This is state of Washington-owned land. Fish and Wildlife Department. Located on State Route 103 with an access road (*see photo*).

Photo Credit: *Google Maps Street View*

# Long Beach North: LBN 4



LBN 4	
Address	N/a
Intersection	158th Place & SR 103
Options	2, 3, 4
Notes	east side of highway, forested area, exempt parcel

Source: Google Maps



## Long Beach North: LBN 4

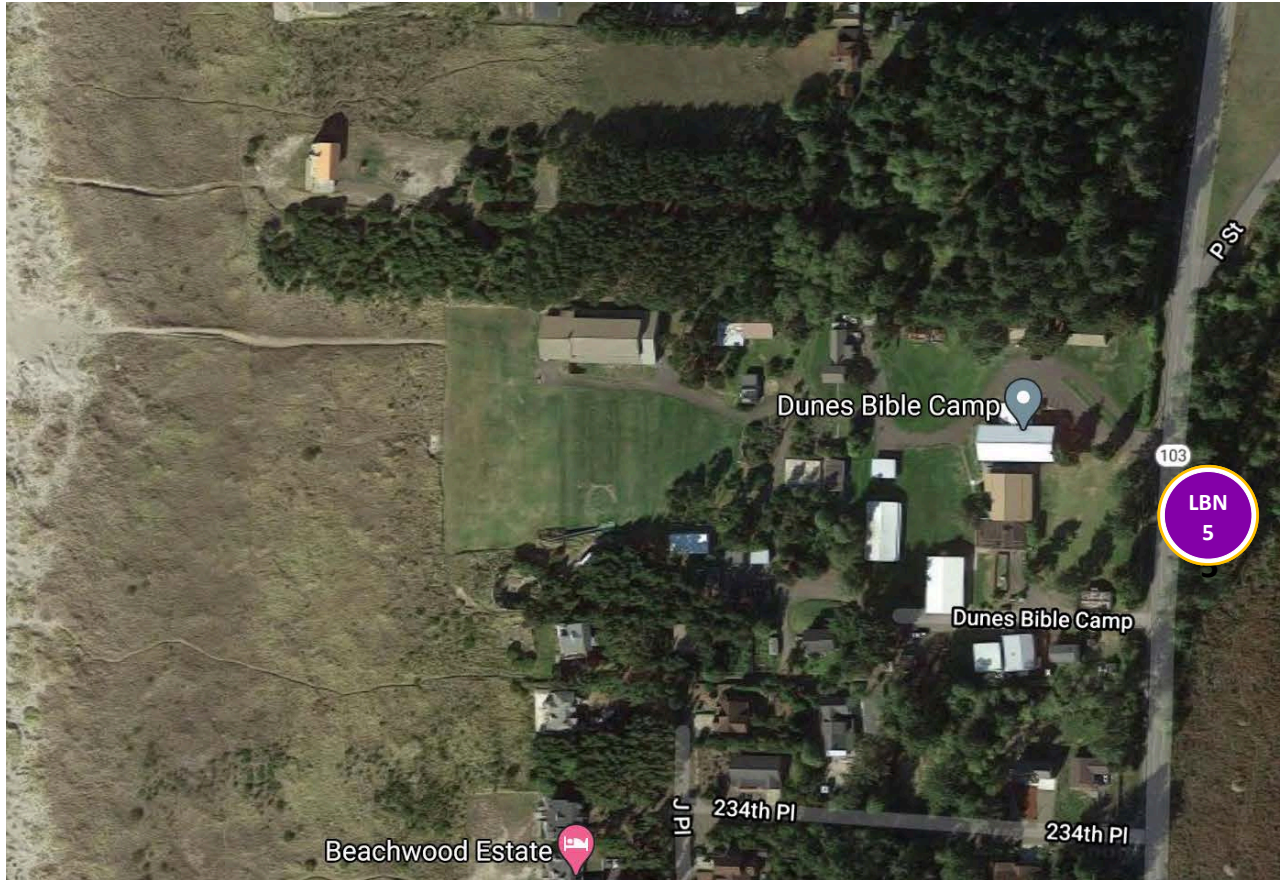


LBN 4 - This property is located on the east side of SR 103, and owned by the Columbia Land Trust. It's forested but undeveloped.

Photo Credit: *Google Maps Street View*



# Long Beach North: LBN 5



LBN 5	
Address	23515 Pacific Way Dunes Bible Camp & SR
Intersection	103
Options	3, 4
Notes	Dunes Bible Camp site

Source: Google Maps

## Long Beach North: LBN 5

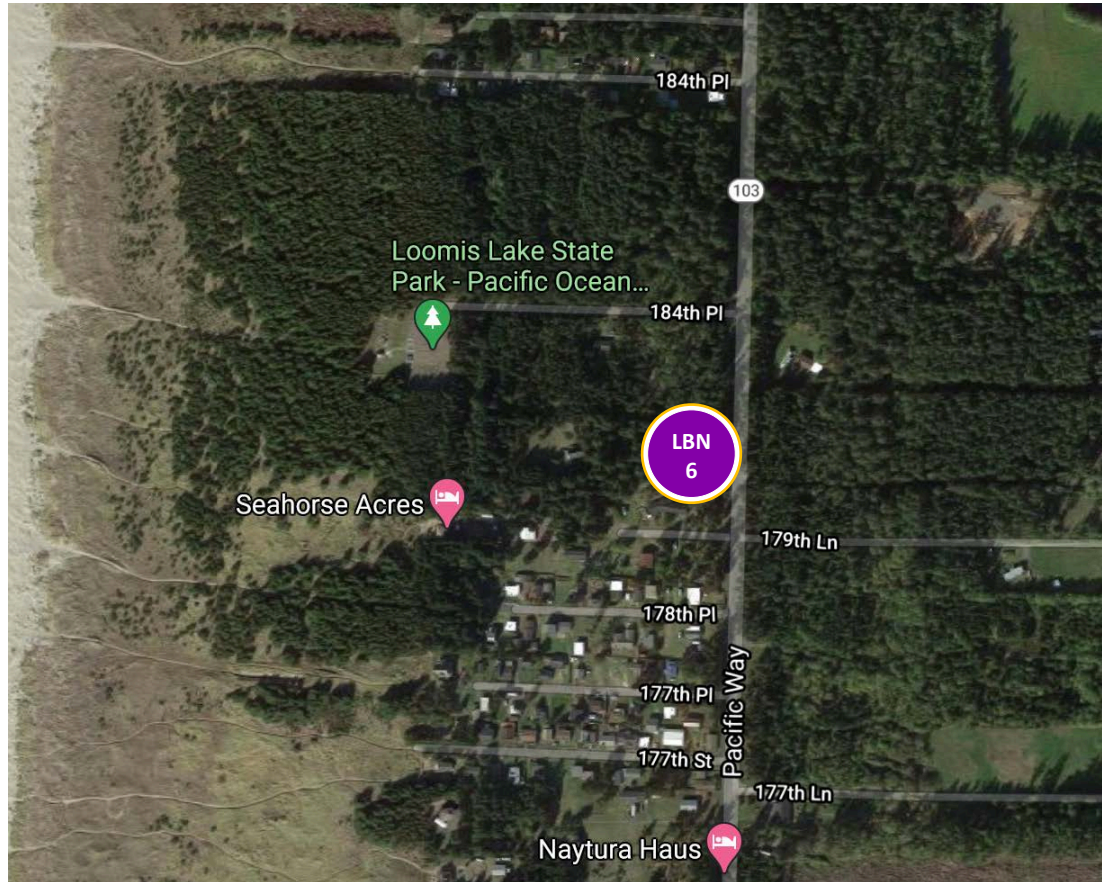


LBN 5 - Privately-owned, tax exempt lot. Photo highlights the main entrance off SR 103.

Photo Credit: *Google Maps Street View*



# Long Beach North: LBN 6



LBN 6	
Address	18109 Pacific Way
Intersection	184th Place & SR 103
Options	3, 4
Notes	west side of highway, off road to Loomis Lake State Park parking lot

Source: Google Maps



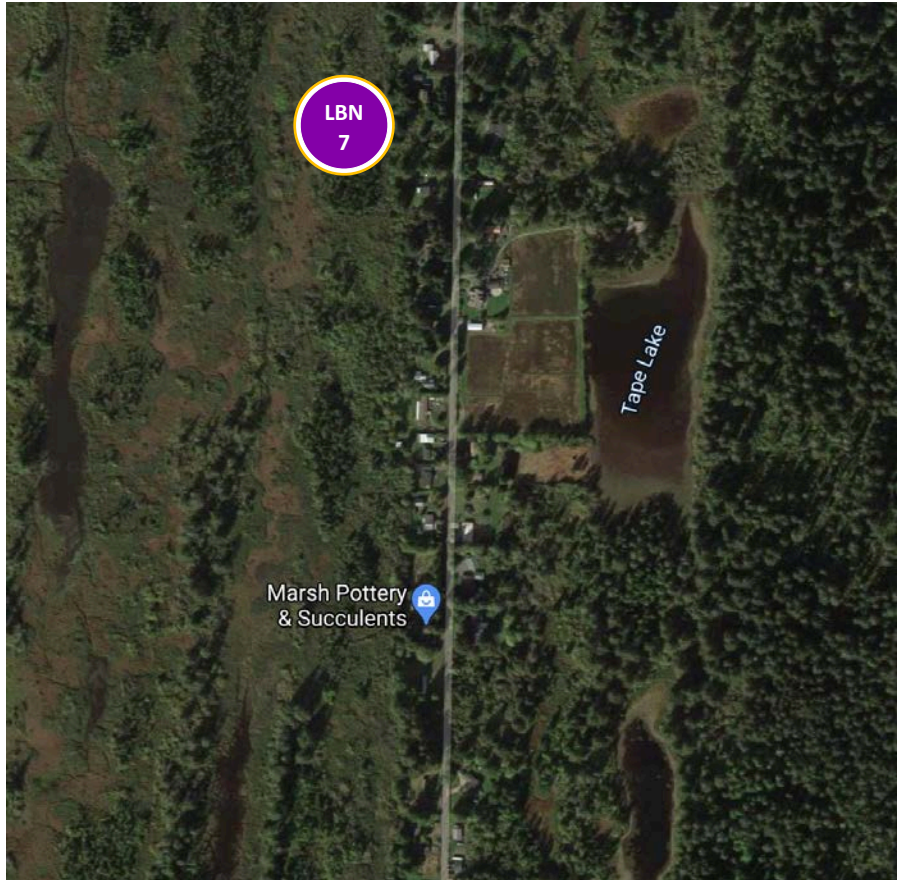
## Long Beach North: LBN 6



LBN 6 - This is Loomis Lake State Park, owned by the State of Washington's Park and Recreation. There is an access road that heads west, towards the beach and parking area (*see photo*).

Photo Credit: *Google Maps Street View*

# Long Beach North: LBN 7



LBN 7	
Address	N/a
Intersection	Birch Street (north of Cranberry road, about 1.2 miles)
Options	3, 4
Notes	West side of road. Land trust land

Source: Google Maps



## Long Beach North: LBN 7

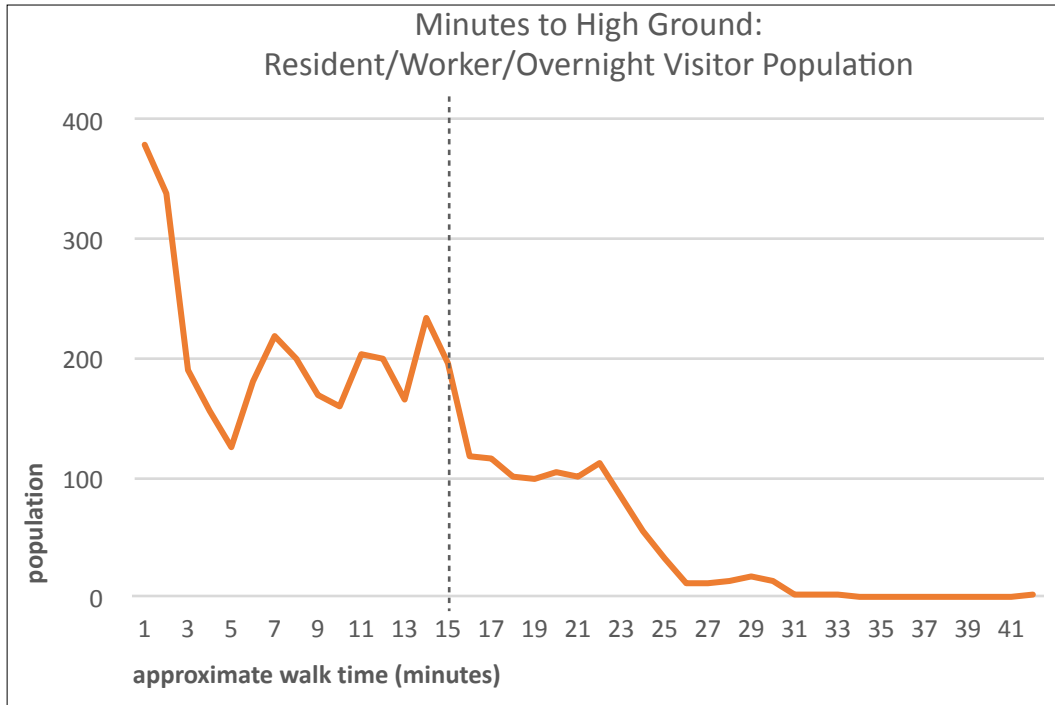


Photo Credit: *Google Maps Street View*

LBN 7 - This is forested, yet undeveloped, Columbia Land Trust land. Located on west side of Birch Street.



# Long Beach - North: VES Option #3 (Broad Spatial Coverage)



Approximate # of People, by Walking Time Bands, to High Ground

<15 minutes	15-25 minutes	25+ minutes
2,917 people	1,117 people	74

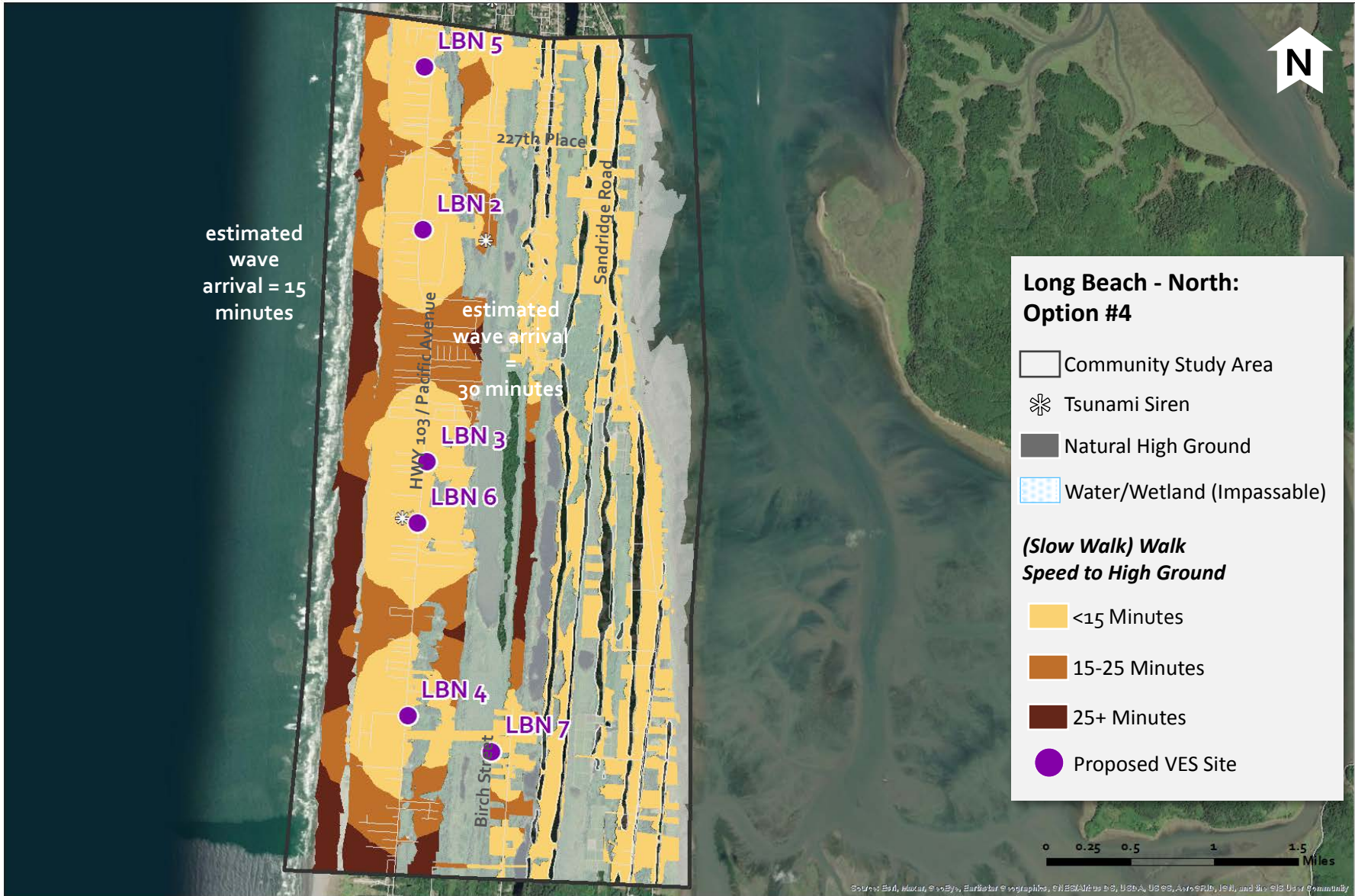
■ Fire Station: N/A

▲ Schools: N/A

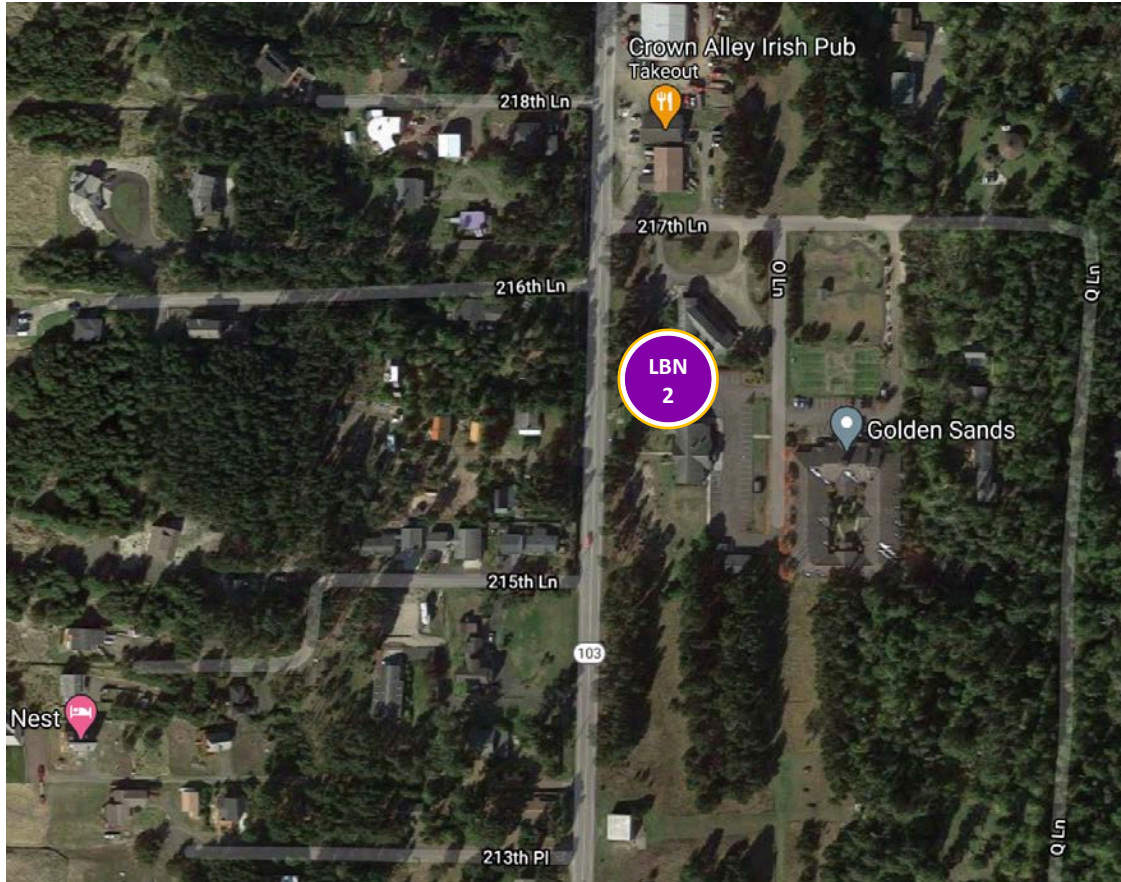
**Under Option #3:**

- approximately **71%** of the total estimated Long Beach - North population are within 15 minutes to natural high ground OR vertical evacuation
- approximate *maximum* walk time to natural high ground or vertical evacuation for identified population = **41 minutes**
- approximate *minimum* VES capacity need (15 minute walk time) = **1,577 people**
- # of proposed VES = **7**

**Note:** Option #3 does not include **all** visitors (i.e. day trip visitors, peak summer day visitors). It does, however, factor in more thorough coverage across the community, including some popular beach areas and other locations where there may be occasional gatherings of people (i.e. parking lots, campgrounds, etc.). Local decision-makers will need to determine how (or if) to factor in that additional population.



# Long Beach North: LBN 2



LBN 2	
Address	21603 O Place
Intersection	Peninsula Senior Center
Options	2, 3, 4
Notes	Peninsula Senior Center parking lot, tax-exempt parcel

Source: Google Maps



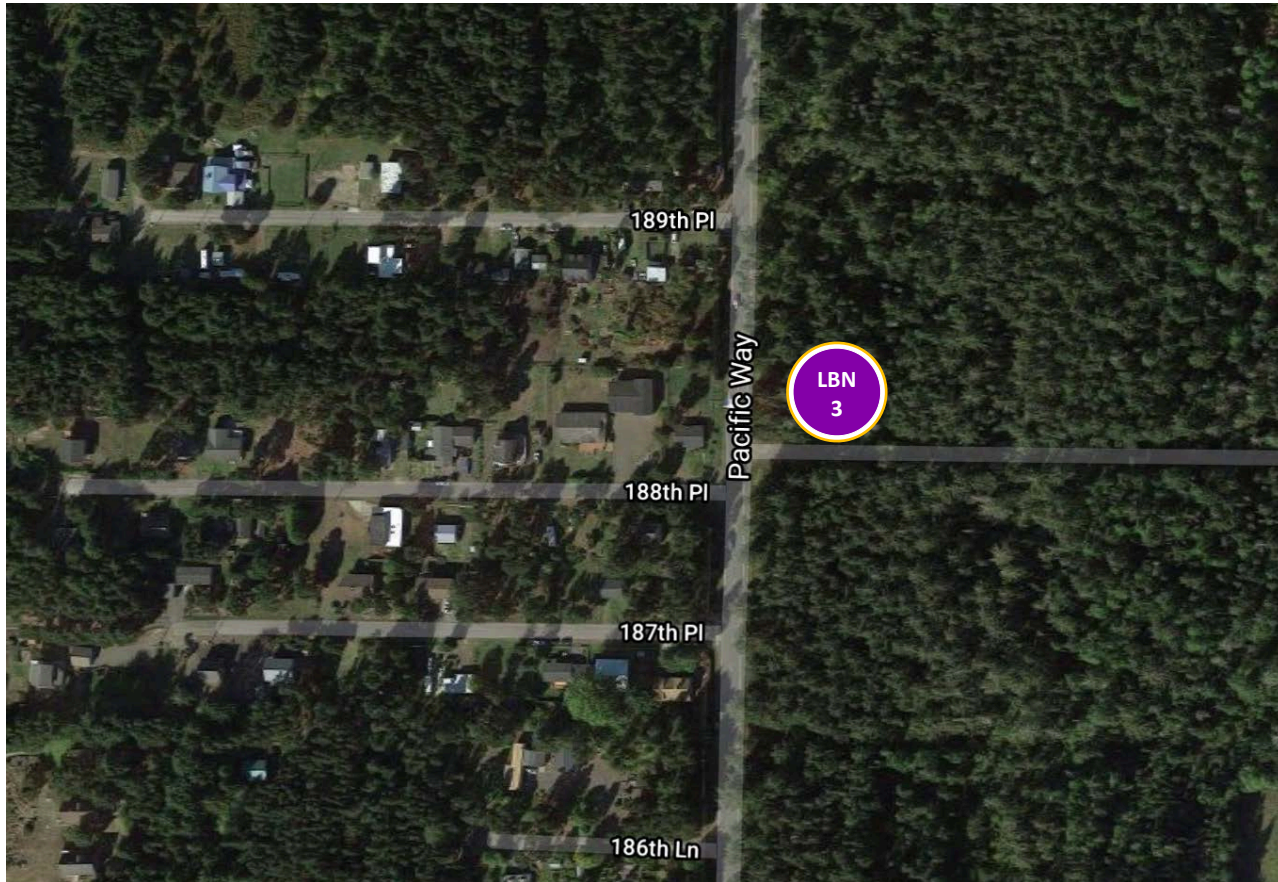
## Long Beach North: LBN 2



LBN 2 - Golden Sands retirement center site, along with other health-related services/offices. Large parking lot may be able to accommodate VES.

Photo Credit: *Google Maps Street View*

# Long Beach North: LBN 3



LBN 3	
Address	N/a
Intersection	188th Place & SR 103
Options	2, 3, 4
Notes	east side of highway, forested area - but State-owned

Source: *Google Maps*



## Long Beach North: LBN 3

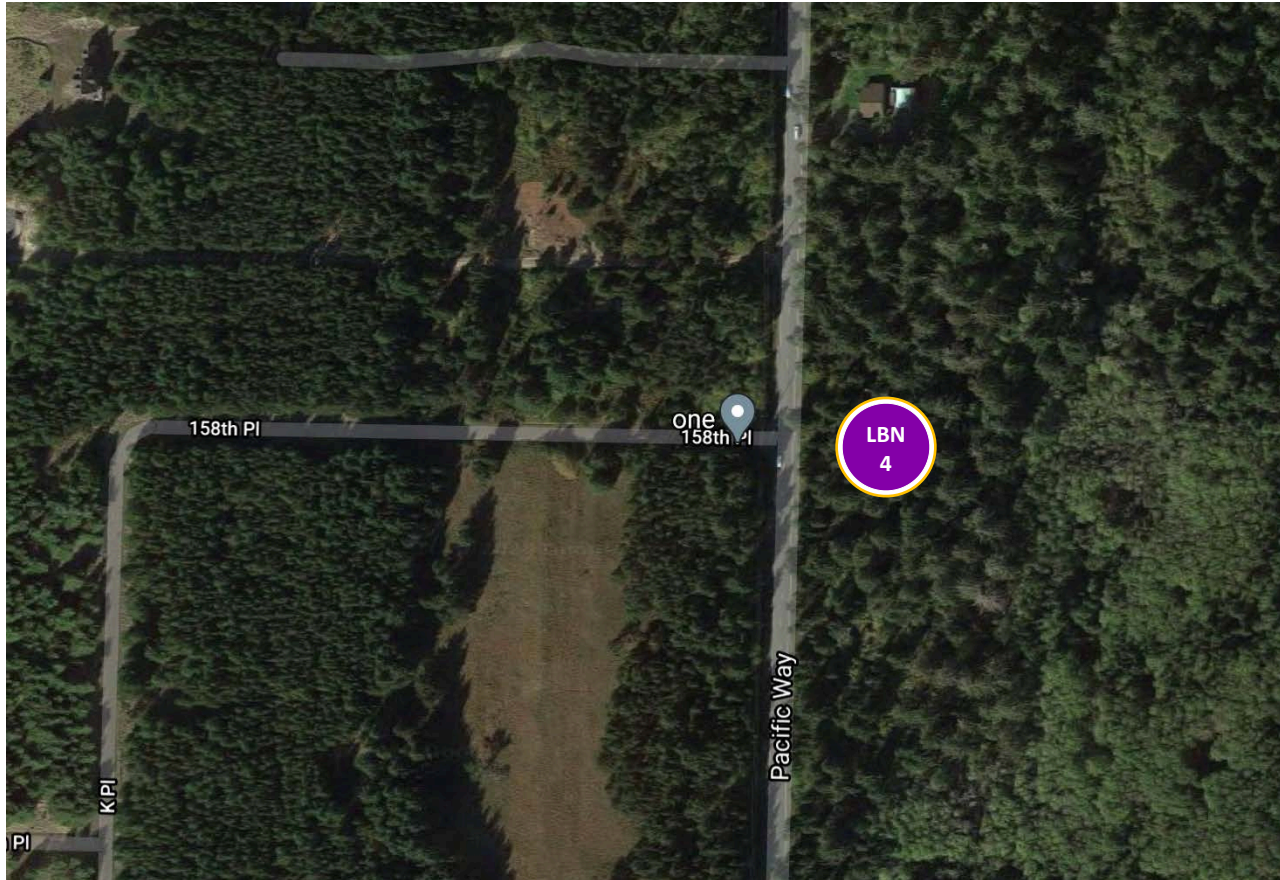


LBN 3 - This is state of Washington-owned land. Fish and Wildlife Department. Located on State Route 103 with an access road (see photo).

Photo Credit: *Google Maps Street View*



# Long Beach North: LBN 4



LBN 4	
Address	N/a
Intersection	158th Place & SR 103
Options	2, 3, 4
Notes	east side of highway, forested area, exempt parcel

Source: *Google Maps*

## Long Beach North: LBN 4

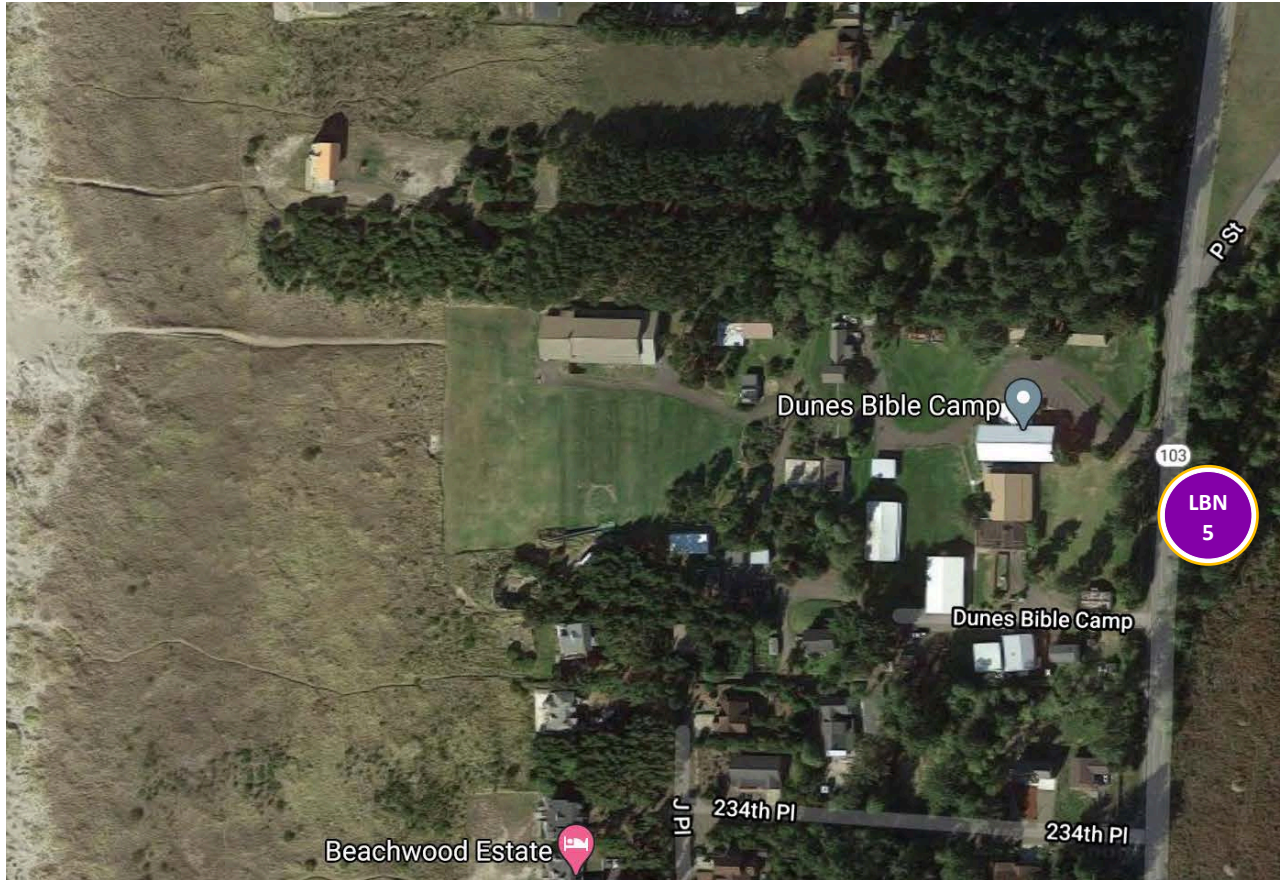


LBN 4 - This property is located on the east side of SR 103, and owned by the Columbia Land Trust. It's forested but undeveloped.

Photo Credit: *Google Maps Street View*



# Long Beach North: LBN 5



LBN 5	
Address	23515 Pacific Way Dunes Bible Camp & SR
Intersection	103
Options	3, 4
Notes	Dunes Bible Camp site

Source: *Google Maps*



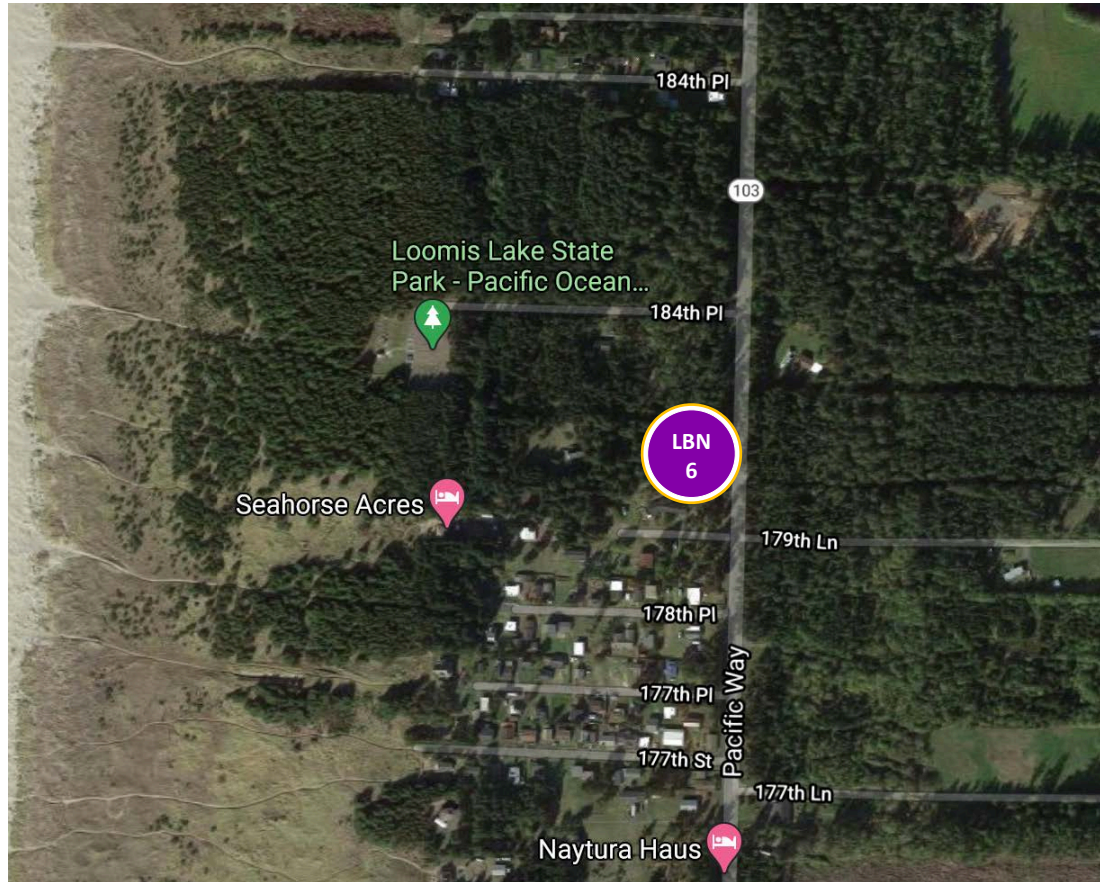
# Long Beach North: LBN 5



LBN 5 - Privately-owned, tax exempt lot. Photo highlights the main entrance off SR 103.

Photo Credit: *Google Maps Street View*

# Long Beach North: LBN 6



LBN 6	
Address	18109 Pacific Way
Intersection	184th Place & SR 103
Options	3, 4
Notes	west side of highway, off road to Loomis Lake State Park parking lot

Source: Google Maps



## Long Beach North: LBN 6

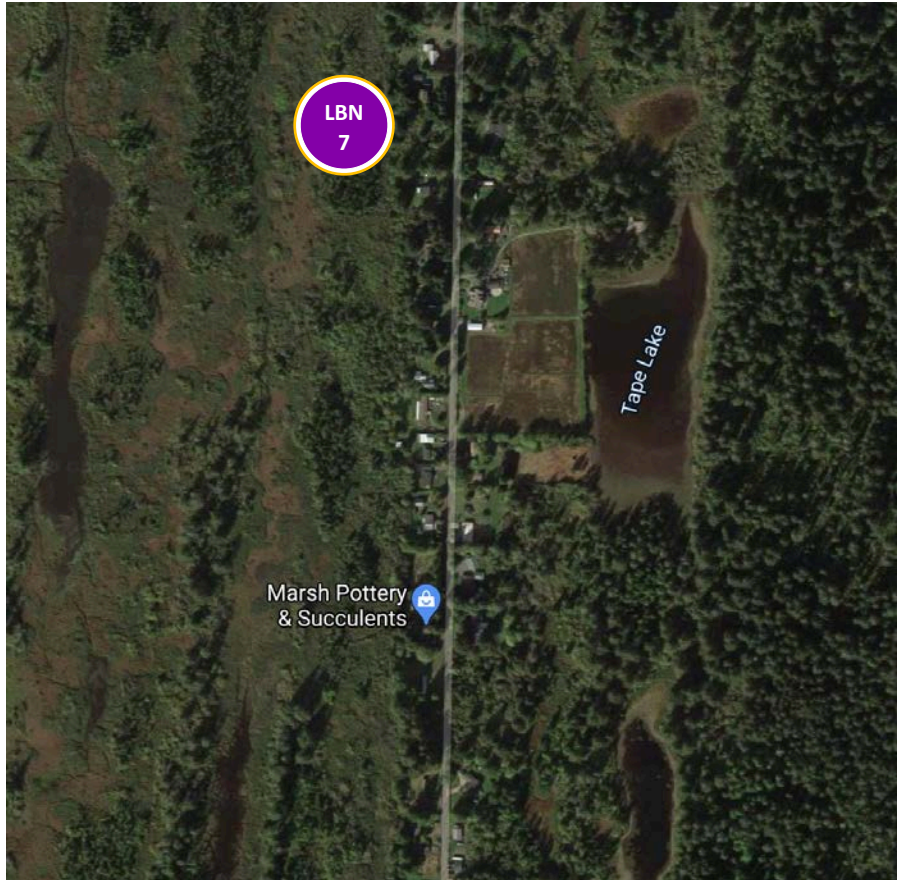


LBN 6 - This is Loomis Lake State Park, owned by the State of Washington's Park and Recreation. There is an access road that heads west, towards the beach and parking area (*see photo*).

Photo Credit: *Google Maps Street View*



# Long Beach North: LBN 7



LBN 7	
Address	N/a
Intersection	Birch Street (north of Cranberry road, about 1.2 miles)
Options	3, 4
Notes	West side of road. Land trust land

Source: Google Maps

## Long Beach North: LBN 7



Photo Credit: *Google Maps Street View*

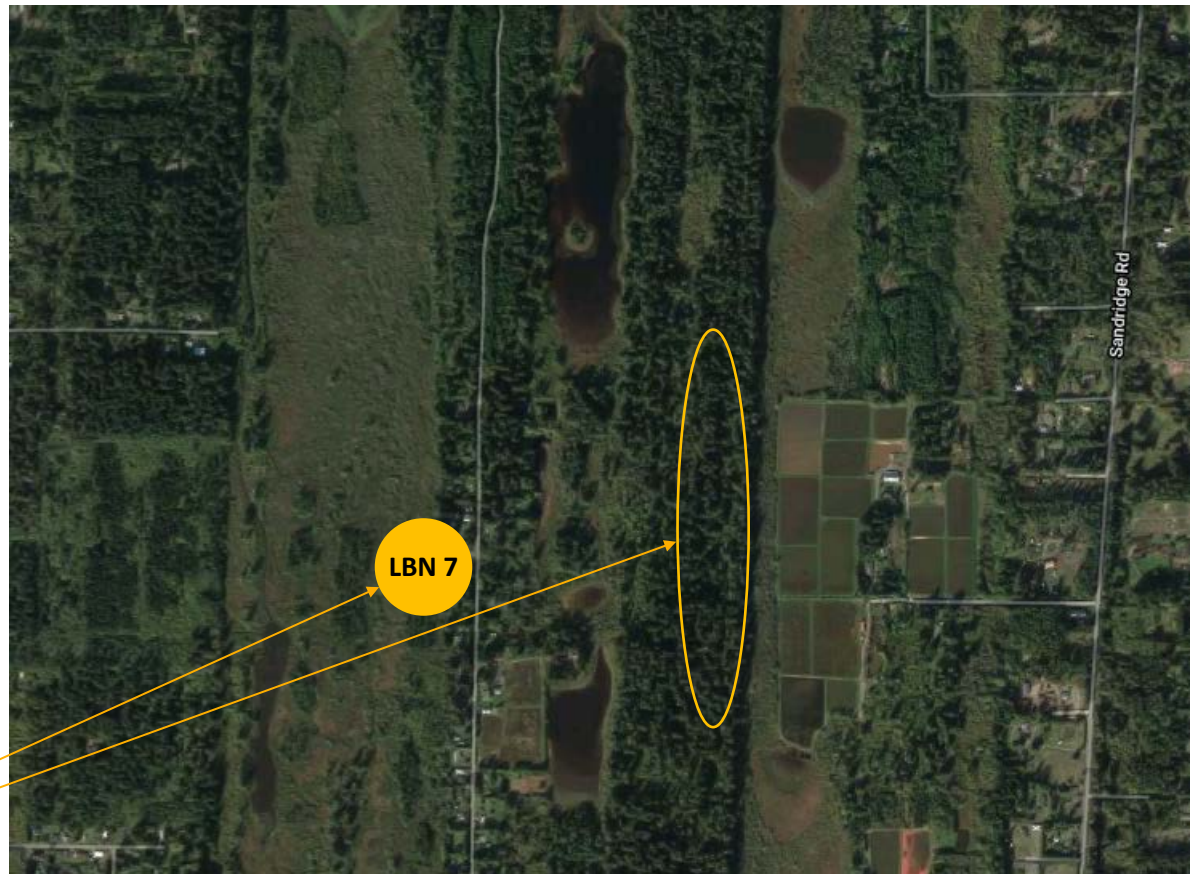
LBN 7 - This is forested, yet undeveloped, Columbia Land Trust land. Located on west side of Birch Street.



# Long Beach North: LBN 7

*Additional considerations:*

- Currently, the proposed **LBN 7** parcel is Columbia Land Trust-owned land. It's currently heavily forested, but could be cleared to provide a small tower for the residents along Birch Street. Or, a clear route could be built to adjacent high ground to the east to provide natural high ground. Assessor #73023001003

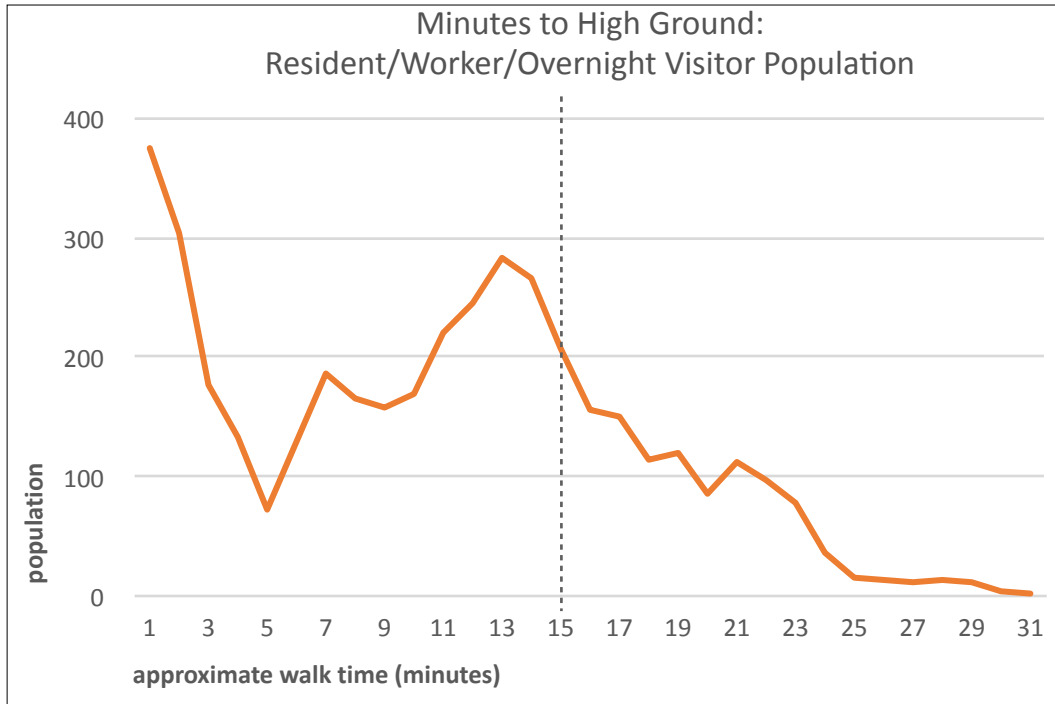


Current location, **LBN 7**. Could potentially reinforce/build paths to natural high ground nearby (east)

Source: Google Maps



# Long Beach - North: VES Option #4 (Efficient/Lean)



Approximate # of People, by Walking Time Bands, to High Ground

<15 minutes	15-25 minutes	25+ minutes
2,883 people	1,170 people	55 people

■ Fire Station: N/A

▲ Schools: N/A

**Under Option #4:**

- approximately **70.2%** of the total estimated Long Beach - North population are within 15 minutes to natural high ground OR vertical evacuation
- approximate *maximum* walk time to natural high ground or vertical evacuation for identified population = **31** minutes
- approximate *minimum* VES capacity need (15 minute walk time) = **1,543** people
- # of proposed VES = **6**

# Potential Long Beach - North VES Locations: All Options (1-4)

VES	Intersection	Parcel ID	Parcel Owner	Lat   Long	Options	Notes
LBN 1	226th Place & U Street	11110431030	Pacific County	46.465866, -124.044994	2, 3	south of 227th Place, on Pacific County-owned land (small strip - easement?)
LBN 2	Peninsula Senior Center	11110996252	Loren H Corder Foundation	46.458766, -124.052260	2, 3, 4	senior center parking lot, tax-exempt parcel
LBN 3	188th Place & SR 103	11111631070	State of Washington Fish & Wildlife	46.438037, -124.051036	2, 3, 4	east side of highway, forested area - but State-owned
LBN 4	158th Place & SR 103	11112821003	Columbia Land Trust	46.416633, -124.051699	2, 3, 4	east side of highway, forested area, exempt parcel
LBN 5	Dunes Bible Camp & SR 103	74045004000	Western Washington Conservative	46.472791, -124.052700	3, 4	Dunes Bible Camp site
LBN 6	184th Place & SR 103	11111633046	State of Washington Parks & Recreation	46.433579, -124.051831	3, 4	west side of highway, off road to Loomis Lake State Park parking lot
LBN 7	Birch Street (north of Cranberry road, about	74011059000	Columbia Land Trust	46.414846, -124.039327	3, 4	west side of road. Land trust land

Notes

**LBN 1** - LBN 1 is located on a slender north/south parcel located at the base of a ridge (natural high ground). Between 226th Place and 225th Place, to the east.

**LBN 2** - The LBN 2 site is privately owned land, but with a concentration of an elderly population and good visibility from Pacific Way (although the Senior Center and Golden Sands both are accessed off O Lane).

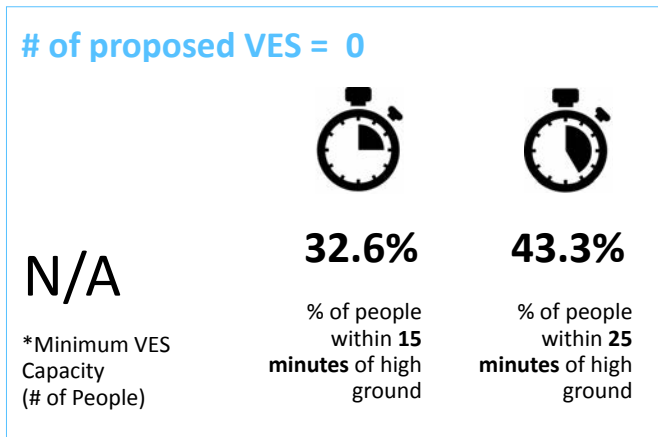
**LBN 4** - The LBN 4 site is located on Columbia Trust Owned-land. Private, but exempt property that is currently vacant.

**LBN 5** - The Dunes Bible Camp is a sprawling, tax-exempt property that has development in some areas and open space in other areas. It faces SR 103, so the visibility from the highway is high.

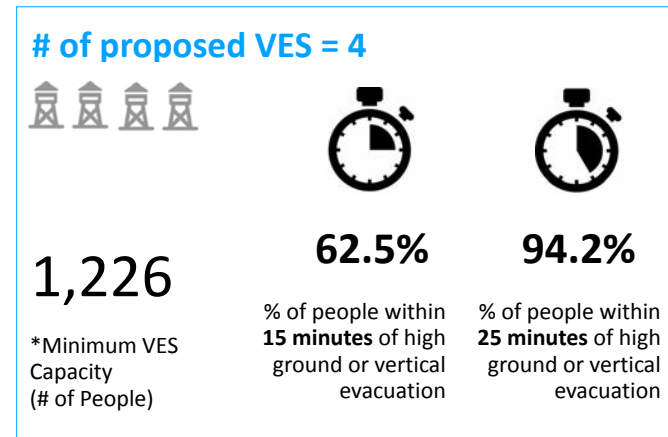
**LBN 7** - The LBN 7 site is tax-exempt land owned and managed by the Columbia Land Trust. Birch Street has a number of residences located along it with little to no access to any other potential VES. LBN 7 would serve as a neighborhood VES location.

# Long Beach - North: Comparison of All Options (1-4)

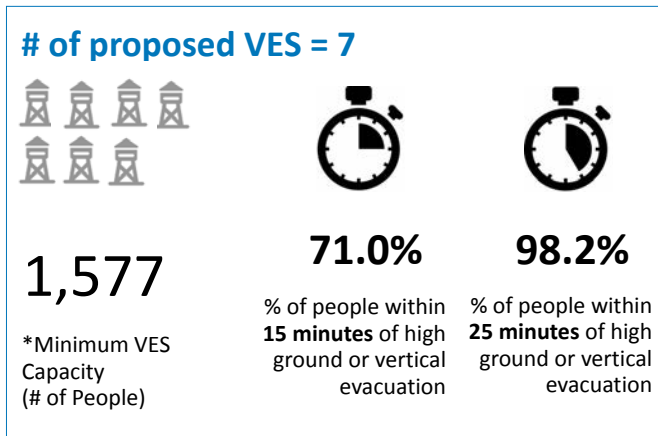
Option #1



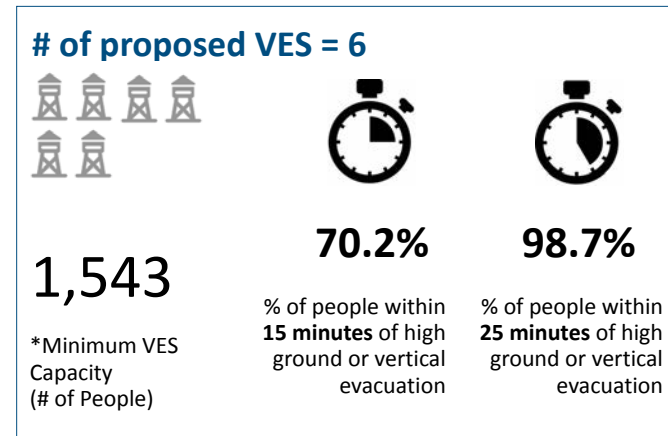
Option #2



Option #3



Option #4





## Long Beach - North: Comparison of All Options (1-4)

**Notes:**

\**Minimum VES Capacity* = the delta (or difference) between Option #1 (no VES) number of people at each minute mark and Options #2, #3, and #4 number of people at each minute mark. For example: If 10 people are within 15 minutes of high ground under Option #1 but that number increases to 25 people under Option #2 - then we know that a minimum of 15 additional people have been put within 15 minutes of high ground through the addition of a Vertical Evacuation Structure. Therefore, the minimum VES capacity for this example is 15 people.

# Ocean Park

***Ocean Park community study area population in the tsunami hazard area = ~6,275 people***

*Resident/Worker/Overnight Visitor population = ~6,045 people*

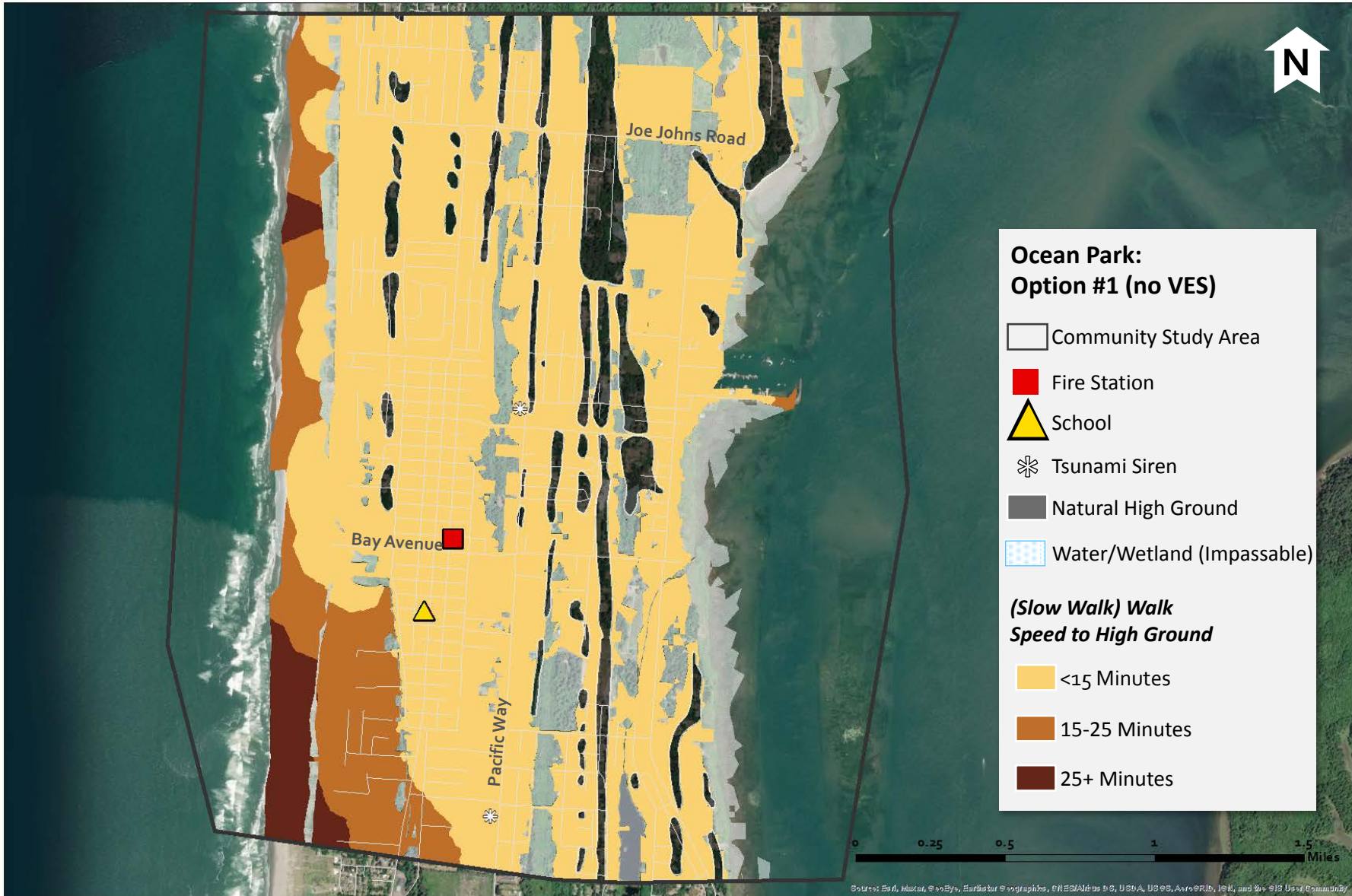
*Fire Department occupancy = ~30 people*

*Schools occupancy = ~200 people*

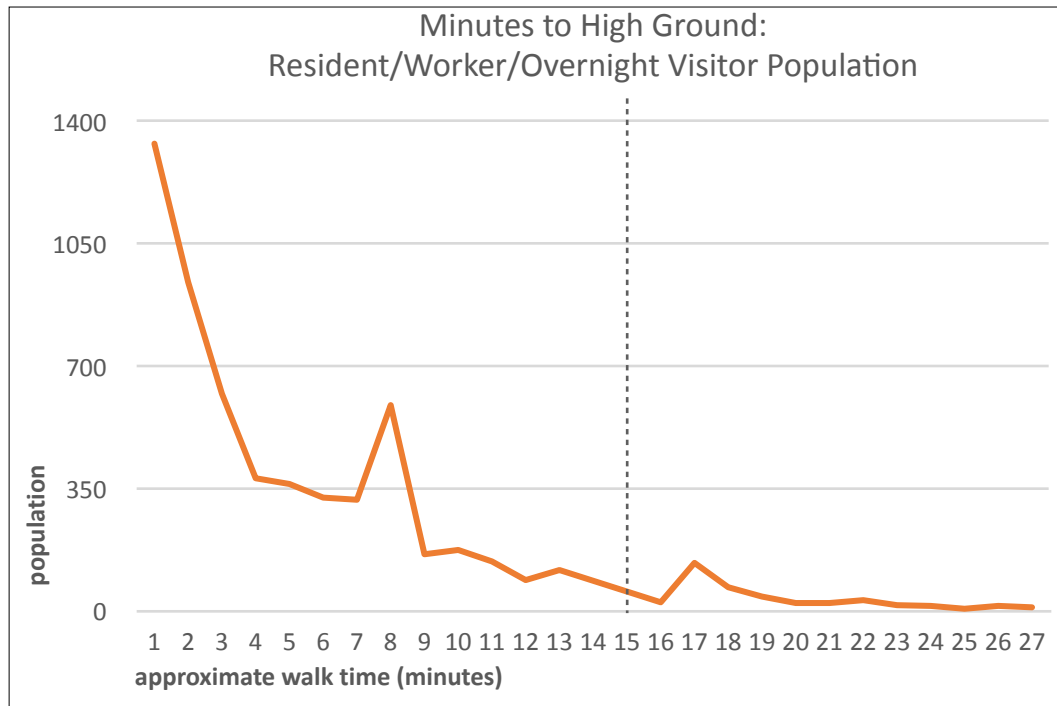
Source: 2010 Census (average household size); Pacific County Residential Land Use







# Ocean Park: VES Option #1 (No VES)



\*Approximate *maximum* walk time accounts for the resident/worker/overnight visitor population locations only. This does not factor in daytime visitors or beach visitors, for example.

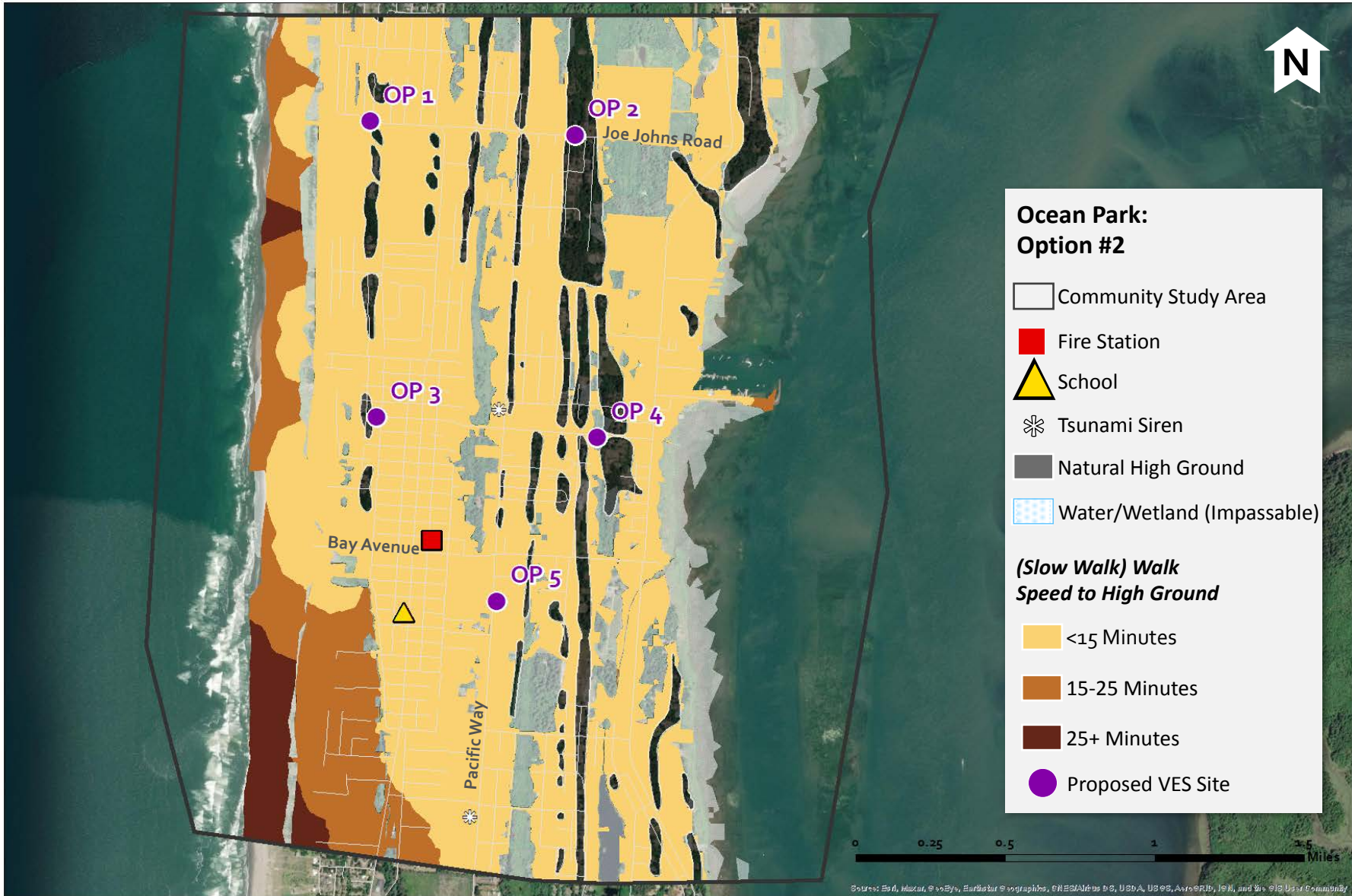
Approximate # of People, by Walking Time Bands, to High Ground

<15 minutes	15-25 minutes	25+ minutes
5,838 people	416 people	21 people

- Fire Station: Approximate 8 minute walk time to high ground or VES
- ▲ Schools: Approximate 12 minute walk time to high ground or VES

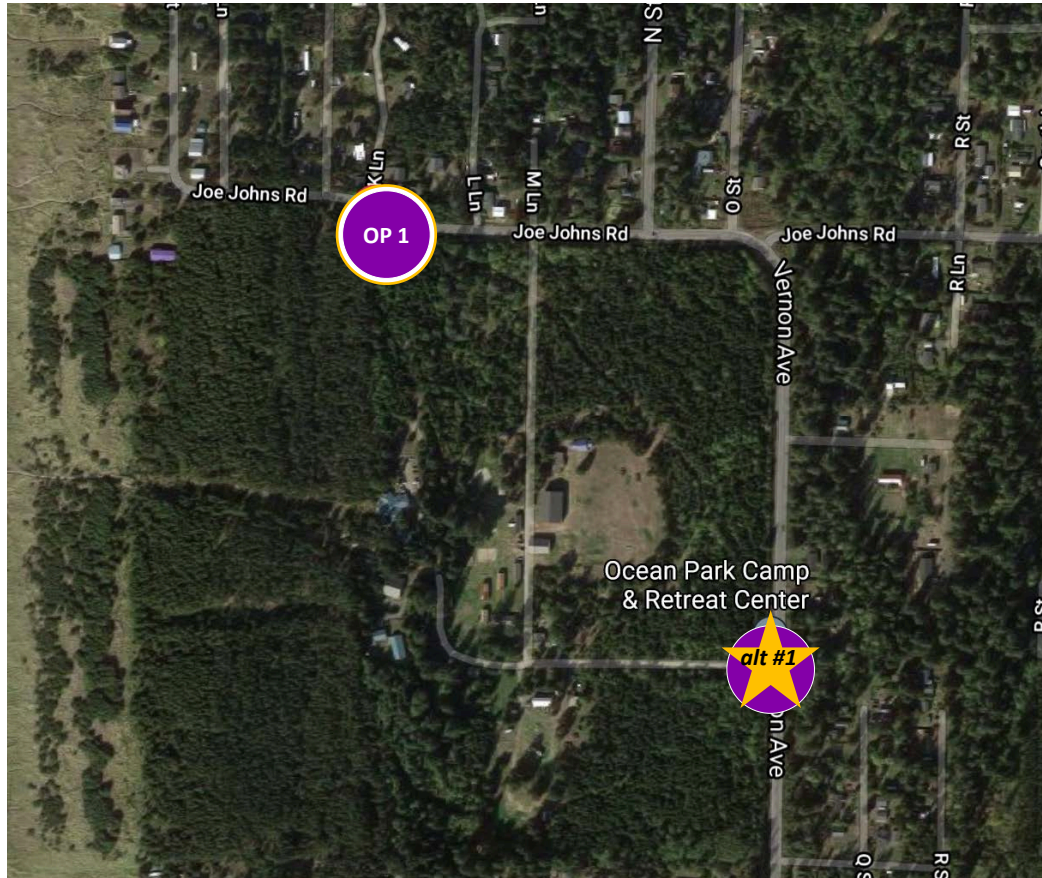
**Under Option #1:**

- approximately **93.0%** of the total estimated Ocean Park population are within 15 minutes to natural high ground
- approximate *\*maximum* walk time to natural high ground for identified population = **27** minutes





# Ocean Park: OP 1 + *alternative*



Source: Google Maps

OP 1	
Address	N/a
Intersection	Joe Johns Road & K Lane
Options	2, 3
Notes	Private lot, forested land. Near beach and residential community, or alternative adjacent church property (exempt) to the south: #76009003003.
OP 1 - alt #1	
Address	28511 Vernon Avenue
Intersection	Vernon Avenue & private camp access road
Notes	Ocean Park Camp & Retreat Center



# Ocean Park: OP 1 *alternative*

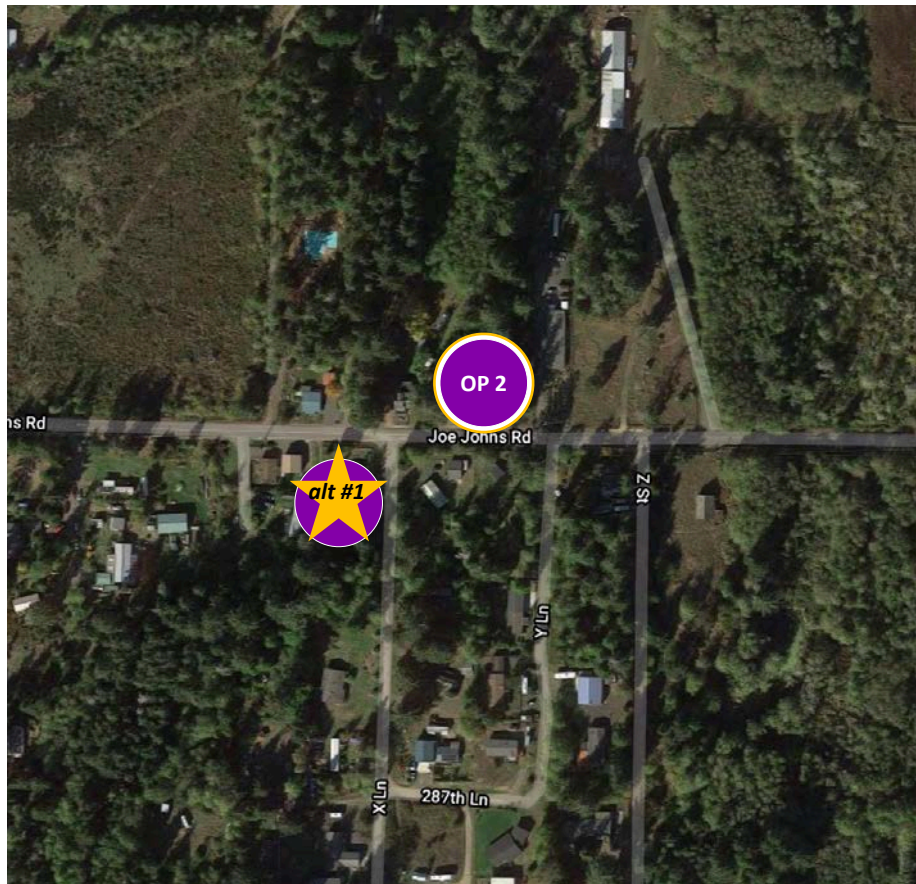


OP 1 - *Alternative #1*: Tax-exempt, church-owned land with church camp, currently. Open area accessed down private road. If built here, VES may not be visible from highway.

Photo Credit: *Google Maps Street View*



# Ocean Park: OP 2 + *alternative*



OP 2	
Address	2417 Joe Johns Road
Intersection	Joe Johns Road & X Lane
Options	2, 3
Notes	located adjacent to Pacific County-owned land: #75015003001

OP 2 - alt #1	
Address	N/a
Intersection	Joe Johns Road & X Lane
Notes	Publicly-owned (Pacific County)

Source: Google Maps



# Ocean Park: OP 2



OP 2 - Vacant, but privately-owned parcel located on Joe Johns Road.

Photo Credit: *Google Maps Street View*





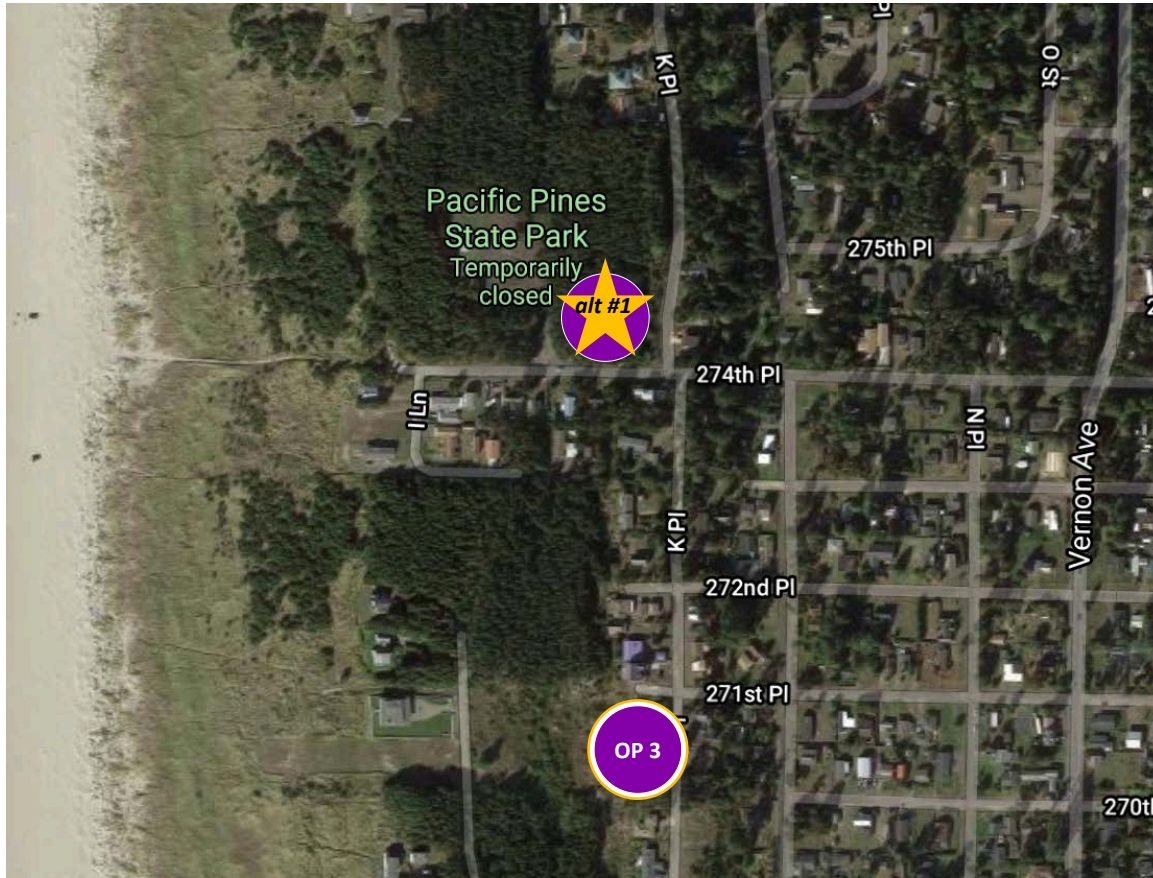
## Ocean Park: OP 2 *alternative*



OP 2 - *Alternative #1*: This small undeveloped parcel is owned by Pacific County (adjacent to road, potentially on both sides of fence)

Photo Credit: *Google Maps Street View*

# Ocean Park: OP 3 + *alternative*



Source: Google Maps

OP 3	
Address	26915 Park Avenue 270th Place & Park Avenue
Intersection	Avenue
Options	2, 3
Notes	located on private property. No nearby publically-owned land. Look for vacant land.

OP 3 - alt #1	
Address	
Intersection	K Place & 274th Place
Notes	Pacific Pines State Park



# Ocean Park: OP 3



OP 3 - This is a privately-owned parcel with no nearby publicly-owned land. May need to identify alternative.

Photo Credit: *Google Maps Street View*



# Ocean Park: OP 3 *alternative*

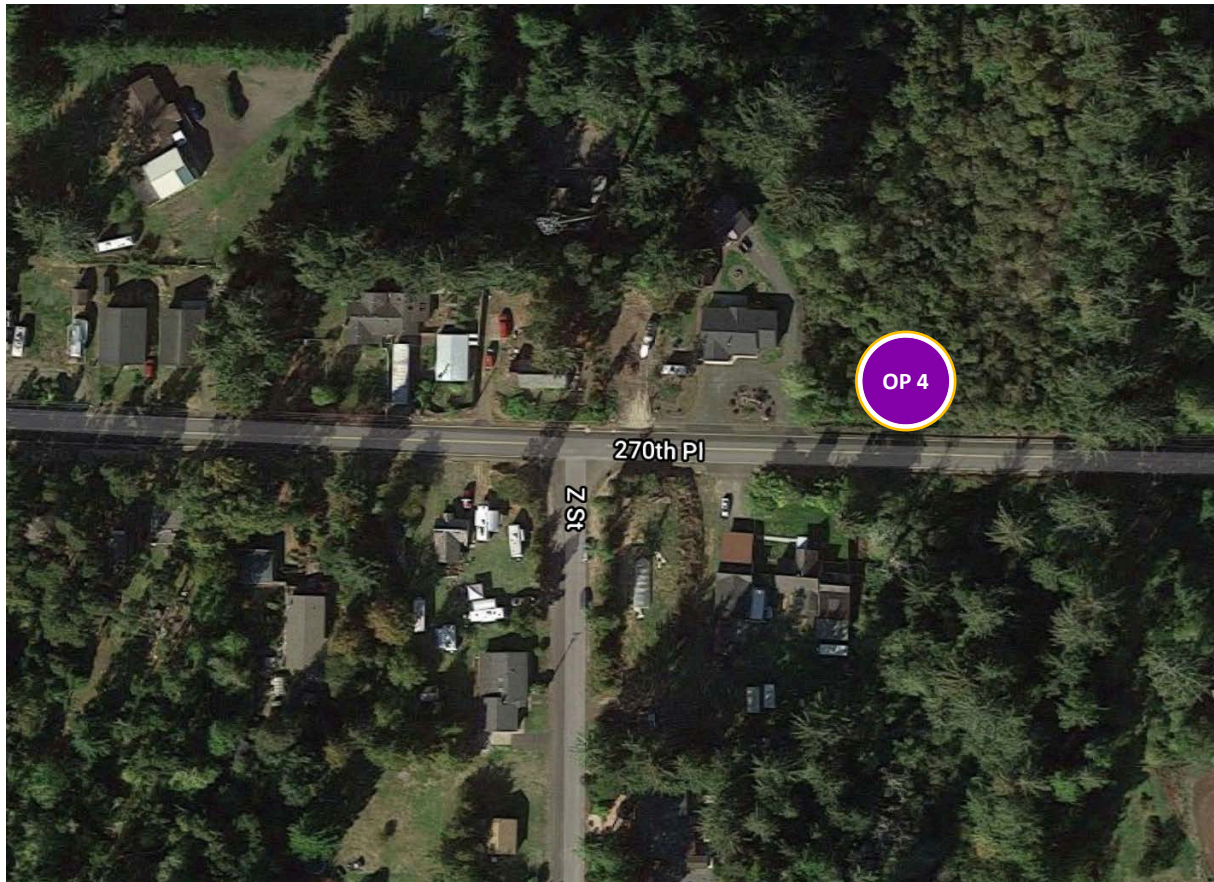


OP 3 - *Alternative #1*: The parking lot for Pacific Pines State Park may be a good location for a VES tower, as an alternative for OP 3.

Photo Credit: *Google Maps Street View*



# Ocean Park: OP 4



OP 4	
Address	N/a
Intersection	270th Street & Z Street
Options	2, 3
Notes	County-owned land, NE of intersection

Source: Google Maps



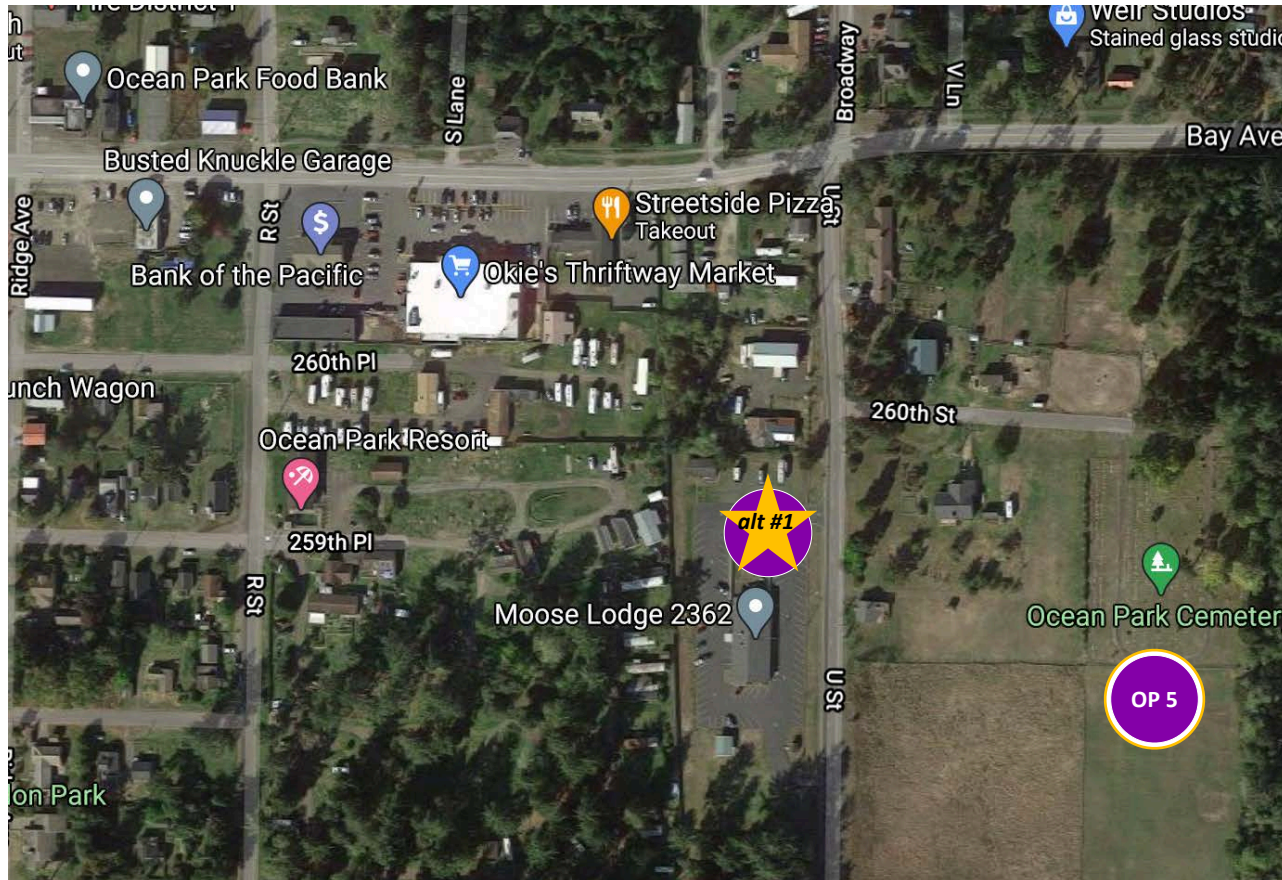
# Ocean Park: OP 4



OP 4 - Pacific County-owned land on the north side of 270th Place. Currently, vacant yet forested.

Photo Credit: *Google Maps Street View*

# Ocean Park: OP 5 + *alternative*



OP 5	
Address	2118 260th Street
Intersection	U Street & 260th Street
Options	2, 3, 4
Notes	Cemetery land. Possible back-up parcel needed.
OP 5 - alt #1	
Address	25915 U Street
Intersection	U street & 260th Street
Notes	Moose Lodge

Source: Google Maps



# Ocean Park: OP 5



OP 5 - Potential open area to the south of the cemetery (just beyond the existing house)

Photo Credit: *Google Maps Street View*





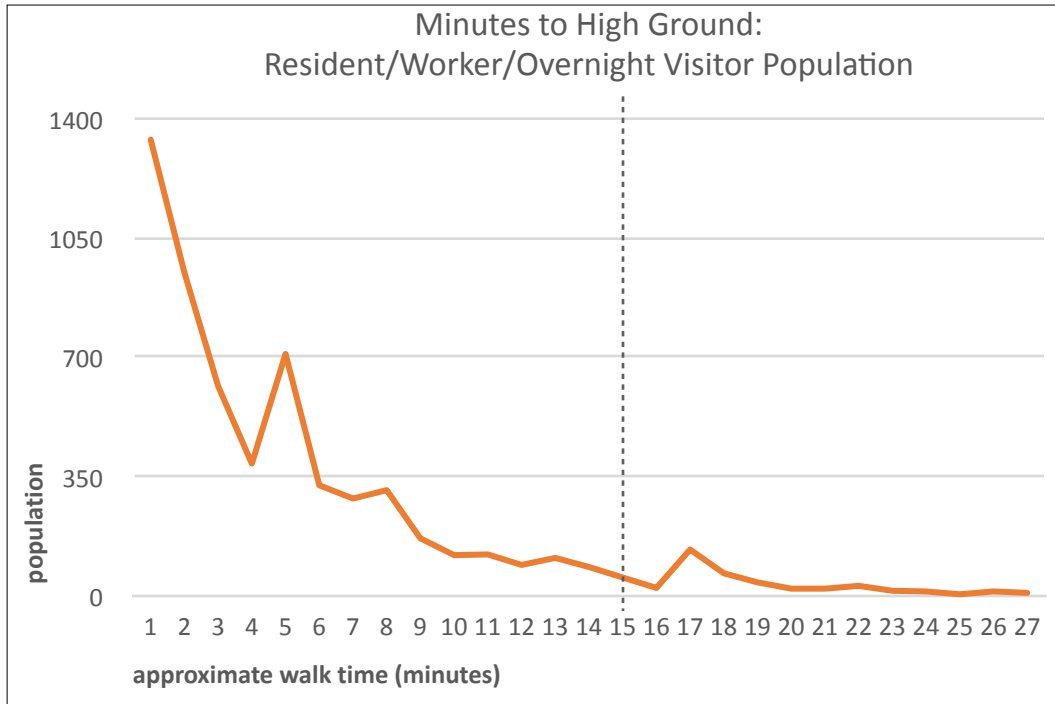
# Ocean Park: OP 5 *alternative*



OP 5 - *Alternative #1*: Moose Lodge, large parking area

Photo Credit: *Google Maps Street View*

# Ocean Park: VES Option #2 (Community-Derived)



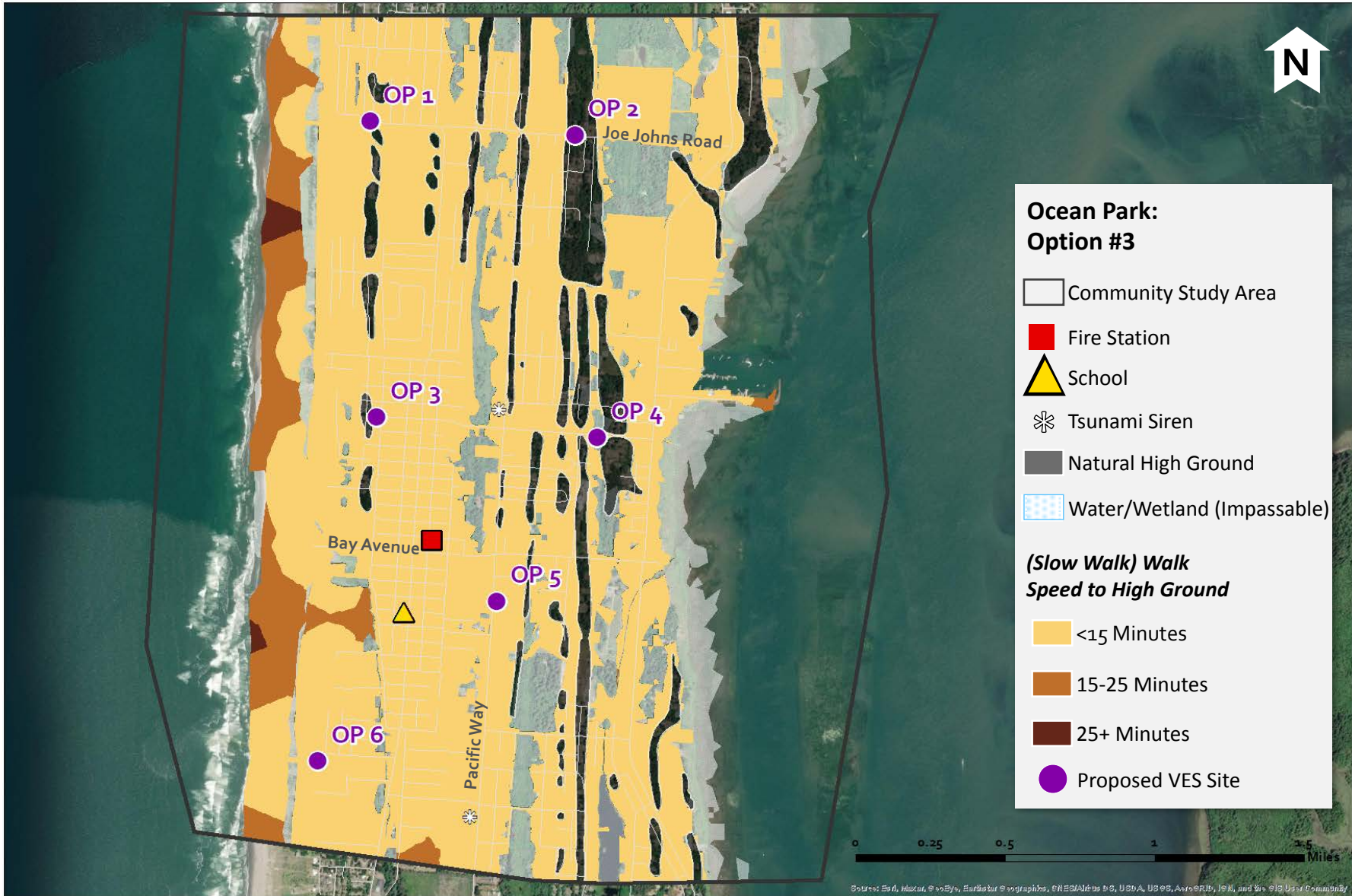
Approximate # of People, by Walking Time Bands, to High Ground

<15 minutes	15-25 minutes	25+ minutes
5,838 people	416 people	21 people

- *Fire Station: Approximate 8 minute walk time to high ground or VES*
- ▲ *Schools: Approximate 11 minute walk time to high ground or VES*

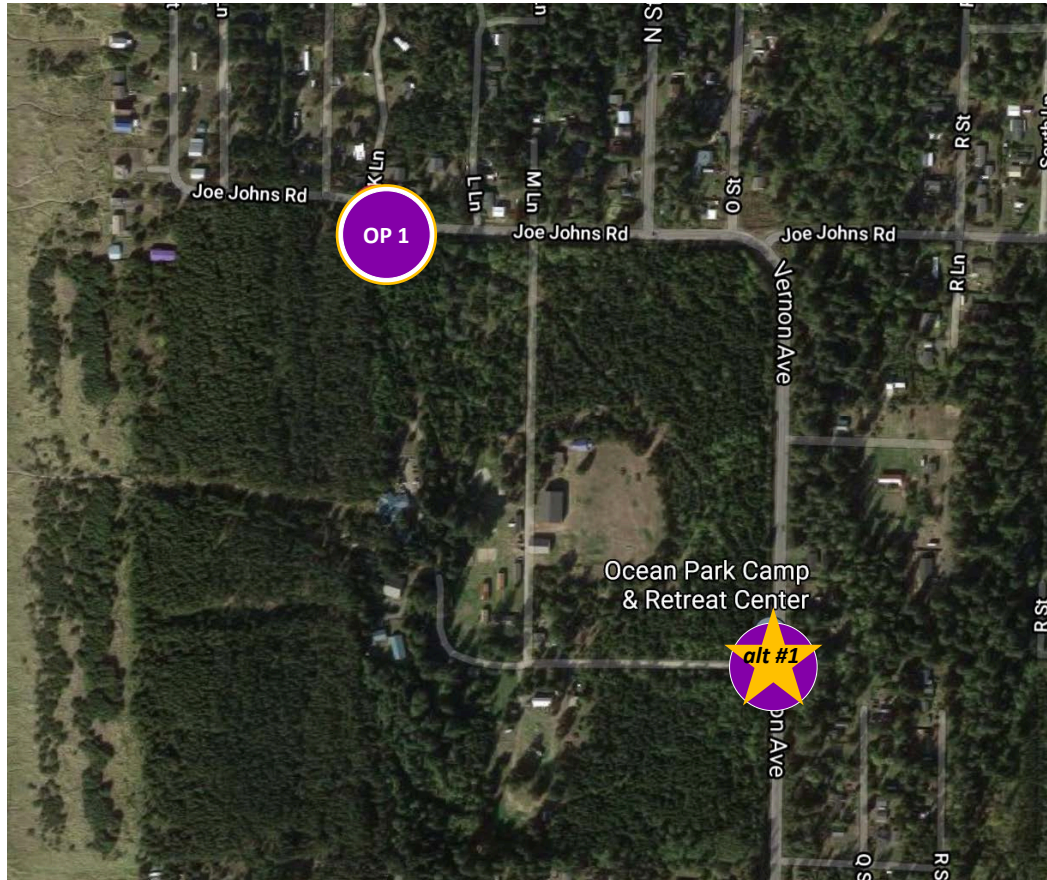
**Under Option #2:**

- approximately **93.0%** of the total estimated Ocean Park population are within 15 minutes to natural high ground OR vertical evacuation
- approximate *maximum* walk time to natural high ground or vertical evacuation for identified population = **27** minutes
- approximate *minimum* VES capacity need (15 minute walk time) = **0** people
- # of proposed VES = **5**





# Ocean Park: OP 1 + *alternative*



Source: Google Maps

OP 1	
Address	N/a
Intersection	Joe Johns Road & K Lane
Options	2, 3
Notes	located on private property, forested land. Near beach and residential community, or adjacent church property (exempt) to the south: #76009003003
OP 1 - alt #1	
Address	28511 Vernon Avenue
Intersection	Vernon Avenue & private camp access road
Notes	Ocean Park Camp & Retreat Center



# Ocean Park: OP 1 *alternative*

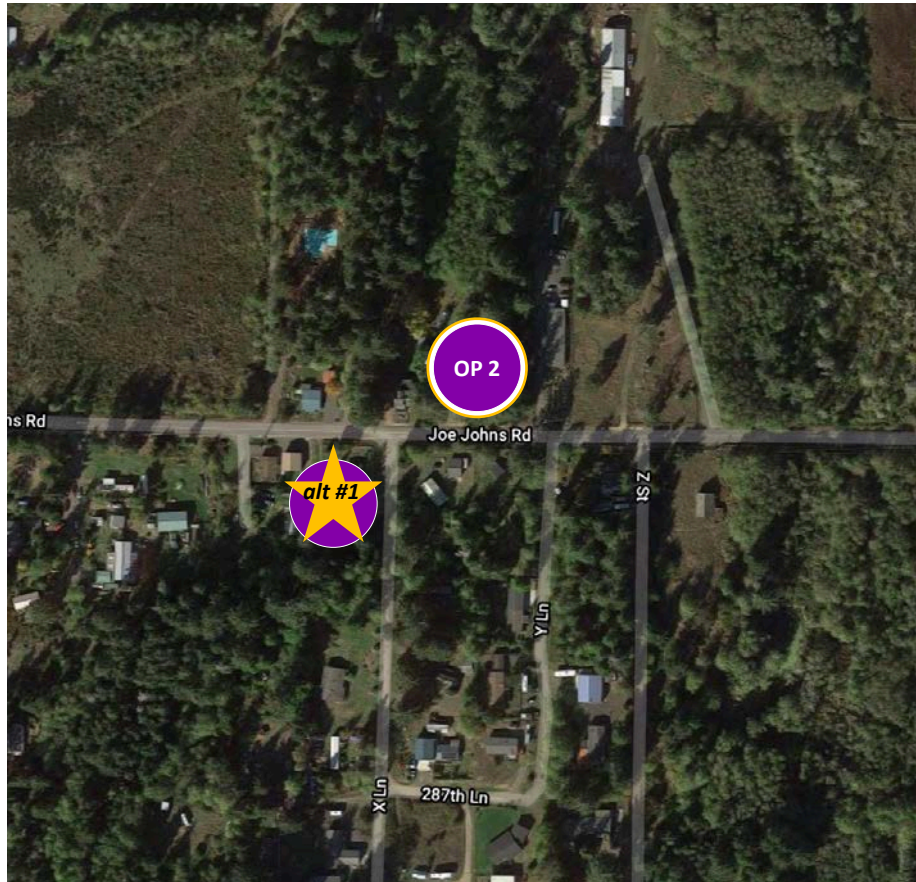


OP 1 - *Alternative #1*: Tax-exempt, church-owned land with church camp, currently. Open area accessed down private road. If built here, VES may not be visible from highway.

Photo Credit: *Google Maps Street View*



# Ocean Park: OP 2 + *alternative*



OP 2	
Address	2417 Joe Johns Road
Intersection	Joe Johns Road & X Lane
Options	2, 3
Notes	located adjacent to Pacific County-owned land: #75015003001

OP 2 - alt #1	
Address	N/a
Intersection	Joe Johns Road & X Lane
Notes	Publicly-owned (Pacific County)

Source: *Google Maps*



# Ocean Park: OP 2



OP 2 - Vacant, but privately-owned parcel located on Joe Johns Road.

Photo Credit: *Google Maps Street View*





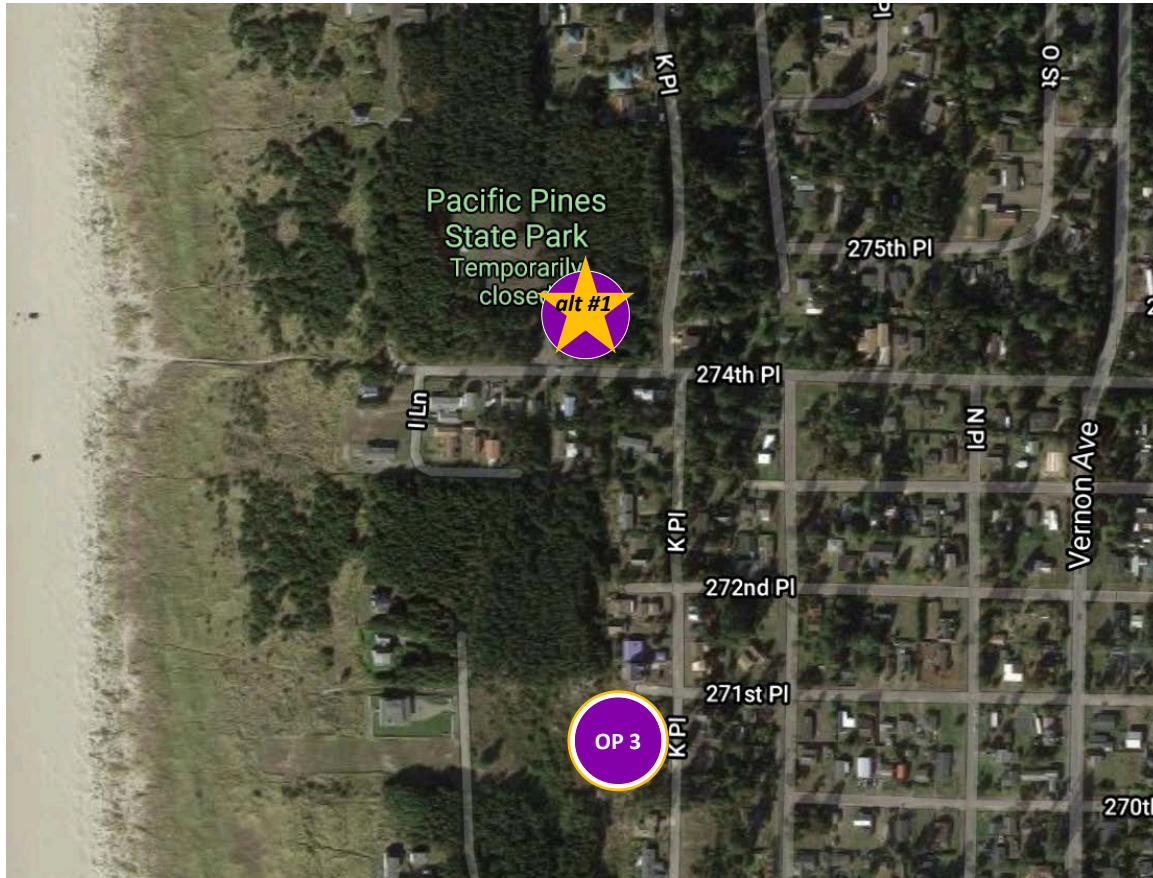
## Ocean Park: OP 2 *alternative*



OP 2 - *Alternative #1*: This small undeveloped parcel is owned by Pacific County (adjacent to road, potentially on both sides of fence)

Photo Credit: *Google Maps Street View*

# Ocean Park: OP 3 + *alternative*



Source: Google Maps

OP 3	
Address	26915 Park Avenue 270th Place & Park Avenue
Intersection	Avenue
Options	2, 3
Notes	located on private property. No nearby publically-owned land. Look for vacant land.

OP 3 - alt #1	
Address	
Intersection	K Place & 274th Place
Notes	Pacific Pines State Park



# Ocean Park: OP 3



OP 3 - This is a privately-owned parcel with no nearby publicly-owned land. May need to identify alternative.

Photo Credit: *Google Maps Street View*



## Ocean Park: OP 3 *alternative*

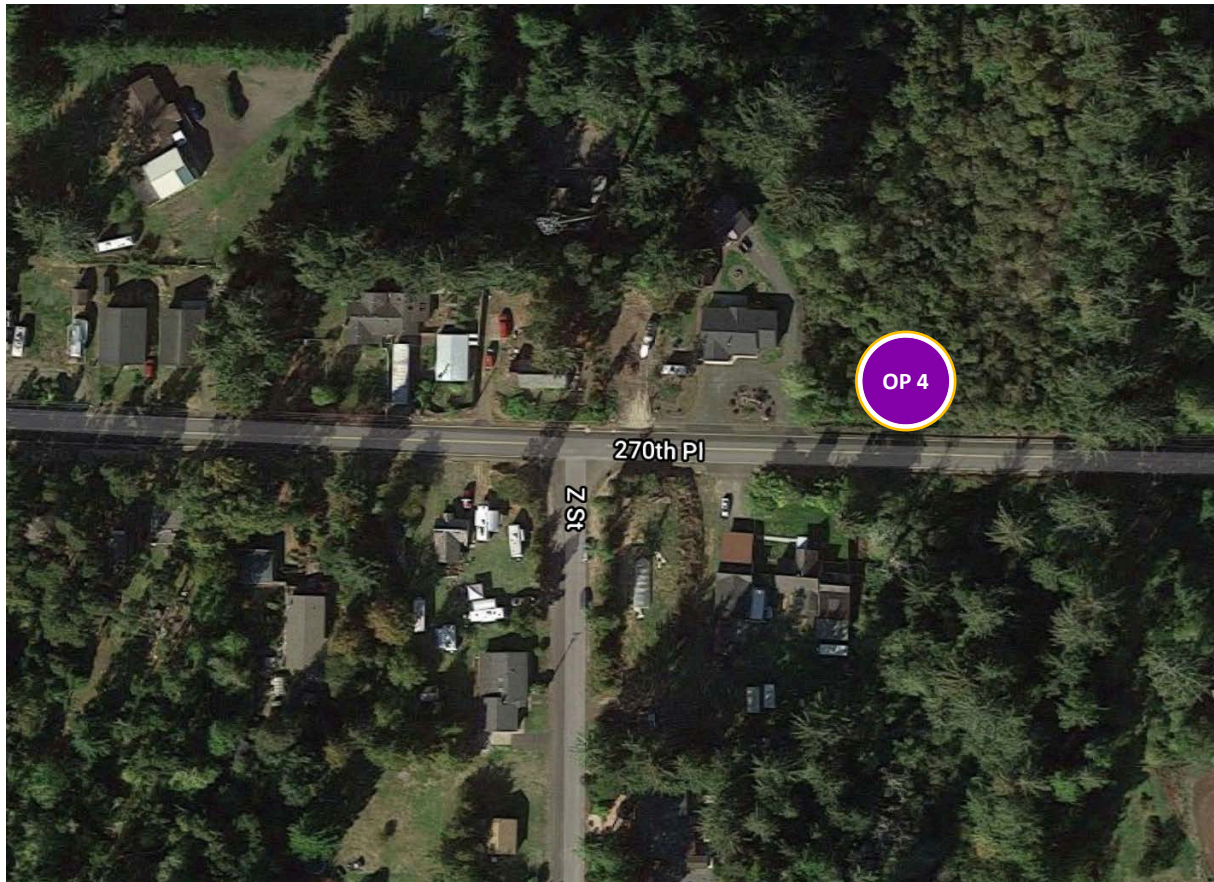


OP 3 - *Alternative #1*: The parking lot for Pacific Pines State Park may be a good location for a VES tower, as an alternative for OP 3.

Photo Credit: *Google Maps Street View*



# Ocean Park: OP 4



OP 4	
Address	N/a
Intersection	270th Street & Z Street
Options	2, 3
Notes	County-owned land, NE of intersection

Source: Google Maps



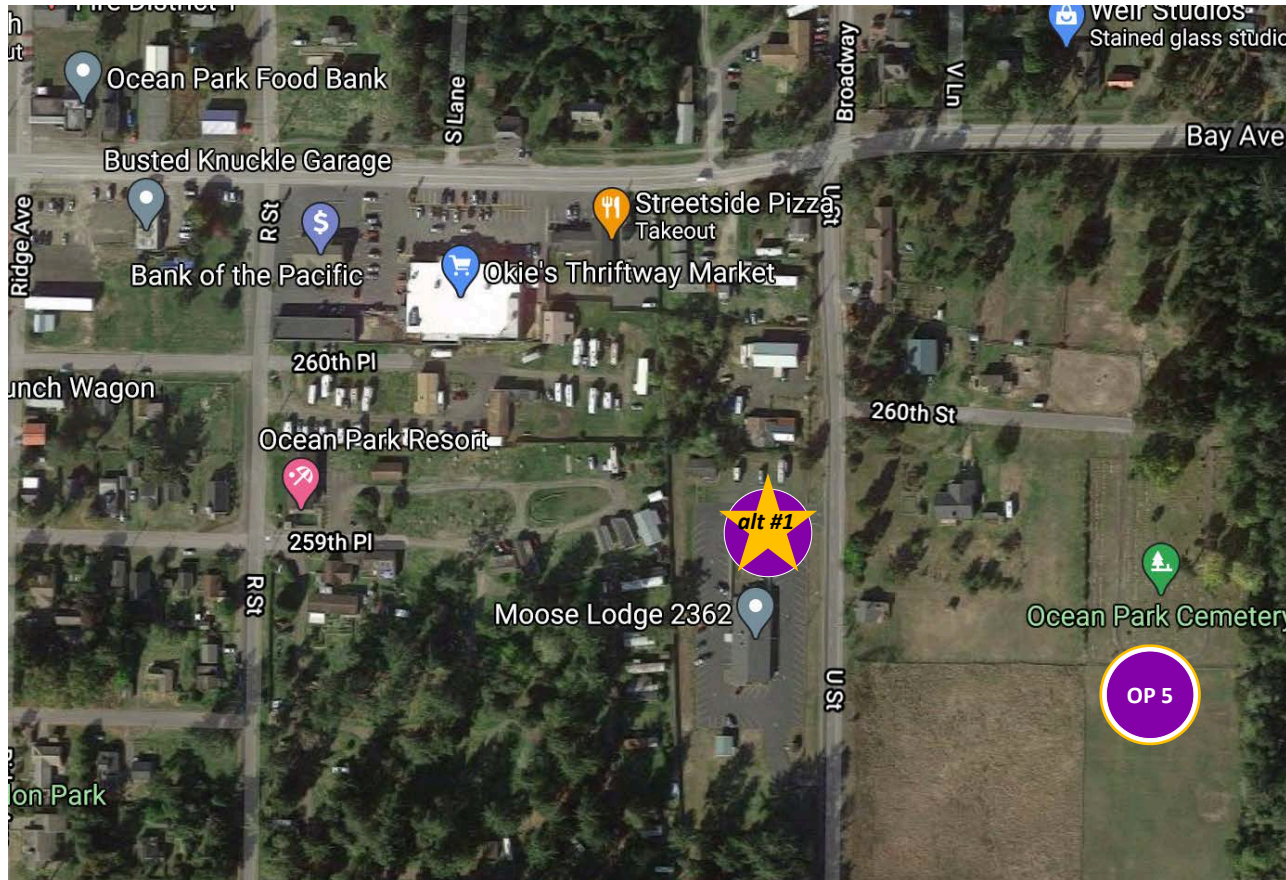
# Ocean Park: OP 4



OP 4 - Pacific County-owned land on the north side of 270th Place. Currently, vacant yet forested.

Photo Credit: *Google Maps Street View*

# Ocean Park: OP 5 + *alternative*



OP 5	
Address	2118 260th Street
Intersection	U Street & 260th Street
Options	2, 3, 4
Notes	Cemetery land. Possible back-up parcel needed.

OP 5 - alt #1	
Address	25915 U Street
Intersection	U street & 260th Street
Notes	Moose Lodge

Source: *Google Maps*



# Ocean Park: OP 5



OP 5 - Potential open area to the south of the cemetery (just beyond the existing house)

Photo Credit: *Google Maps Street View*





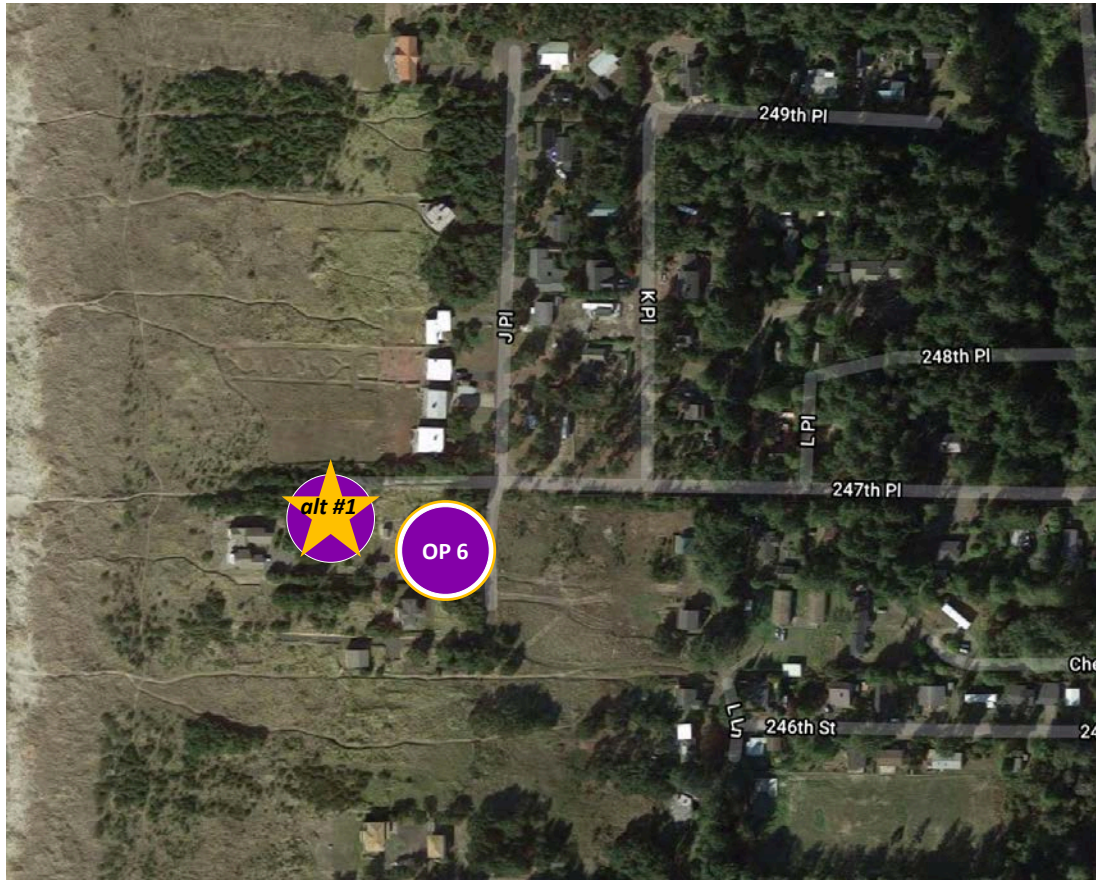
# Ocean Park: OP 5 *alternative*



OP 5 - *Alternative #1*: Moose Lodge, large parking area

Photo Credit: *Google Maps Street View*

# Ocean Park: OP 6 + *alternative*



Source: Google Maps

OP 6	
Address	24623 J Place
Intersection	247th Place & J Place
Options	3, 4
Notes	Located on private property (currently), but could be moved due west a half block to public beach land?
OP 6 - alt #1	
Address	
Intersection	End of 247th Place (beach-side)
Notes	Beach trail: located to the west (end of 247th Place)

## Ocean Park: OP 6



Photo Credit: *Bob Freitag*

OP 6 - This site is currently under private ownership, but not developed. It faces J Place to the east. The beach is located less than 1 block to the west.





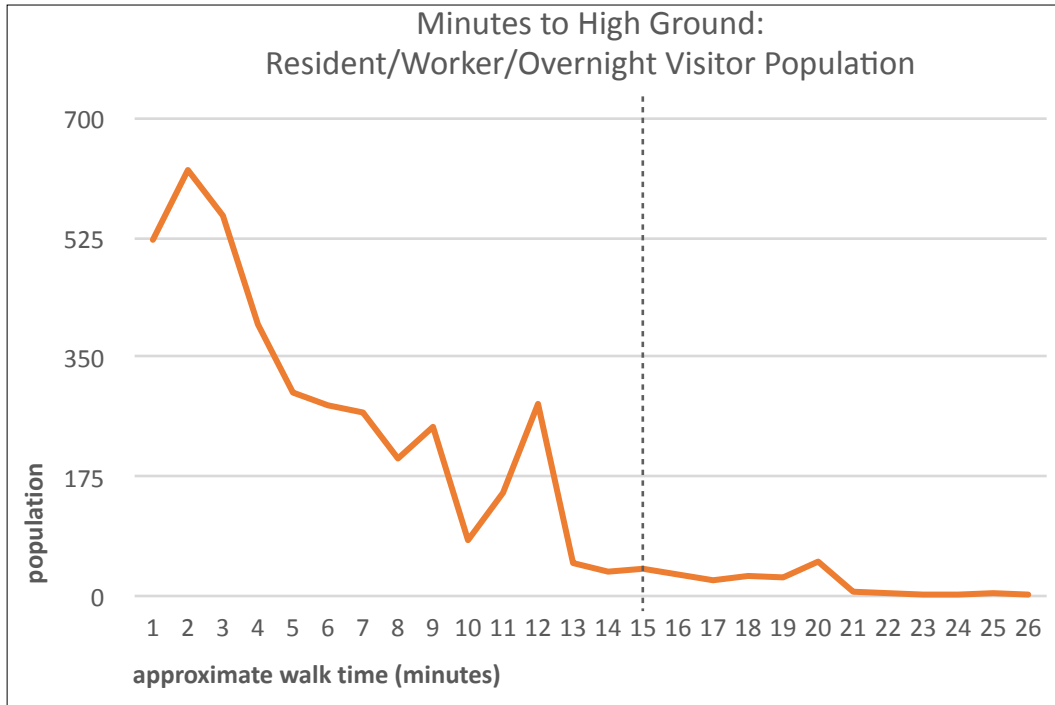
## Ocean Park: OP 6 *alternative*



Photo Credit: *Bob Freitag*

OP 6 - *Alternative #1*: This is a public trail that leads to the beach, just one parcel to the north of OP 6. Could be an alternative location for a VES tower that is designed for access to visitors on the beach and in the surrounding neighborhood.

# Ocean Park: VES Option #3 (Broad Spatial Coverage)



Approximate # of People, by Walking Time Bands, to High Ground

<15 minutes	15-25 minutes	25+ minutes
6,164 people	111 people	n/a

- Fire Station: Approximate 8 minute walk time to high ground or VES
- ▲ Schools: Approximate 11 minute walk time to high ground or VES

**Under Option #3:**

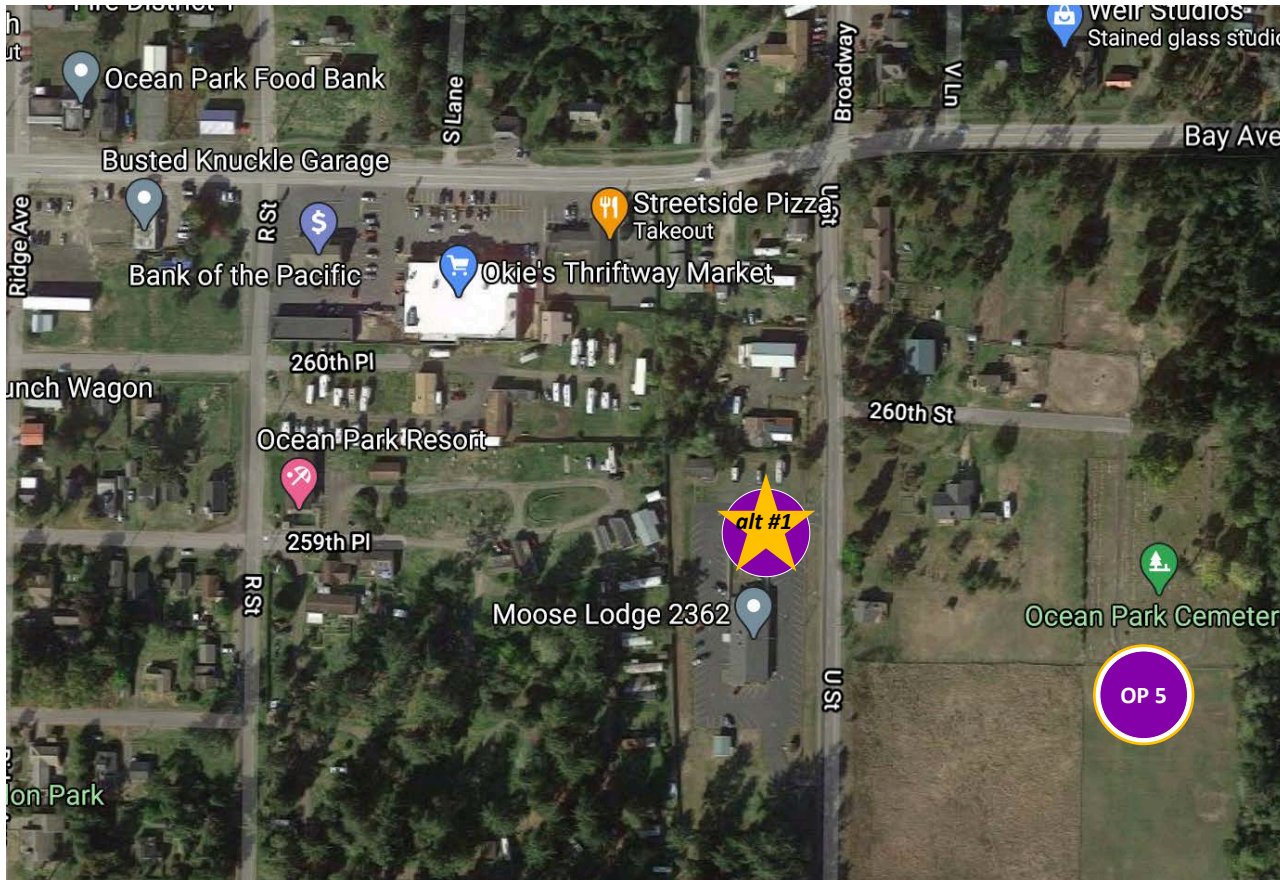
- approximately **98.2%** of the total estimated Ocean Park population are within 15 minutes to natural high ground OR vertical evacuation
- approximate *maximum* walk time to natural high ground or vertical evacuation for identified population = **26 minutes**
- approximate *minimum* VES capacity need (15 minute walk time) = **326 people**
- # of proposed VES = **6**

**Note:** Option #3 does not include **all** visitors (i.e. day trip visitors, peak summer day visitors). It does, however, factor in more thorough coverage across the community, including some popular beach areas and other locations where there may be occasional gatherings of people (i.e. parking lots, campgrounds, etc.). Local decision-makers will need to determine how (or if) to factor in that additional population.





# Ocean Park: OP 5 + *alternative*



OP 5	
Address	2118 260th Street
Intersection	U Street & 260th Street
Options	2, 3, 4
Notes	Cemetery land. Possible back-up parcel needed.
OP 5 - alt #1	
Address	25915 U Street
Intersection	U street & 260th Street
Notes	Moose Lodge

Source: Google Maps

# Ocean Park: OP 5



OP 5 - Potential open area to the south of the cemetery (just beyond the existing house)

Photo Credit: *Google Maps Street View*





# Ocean Park: OP 5 *alternative*

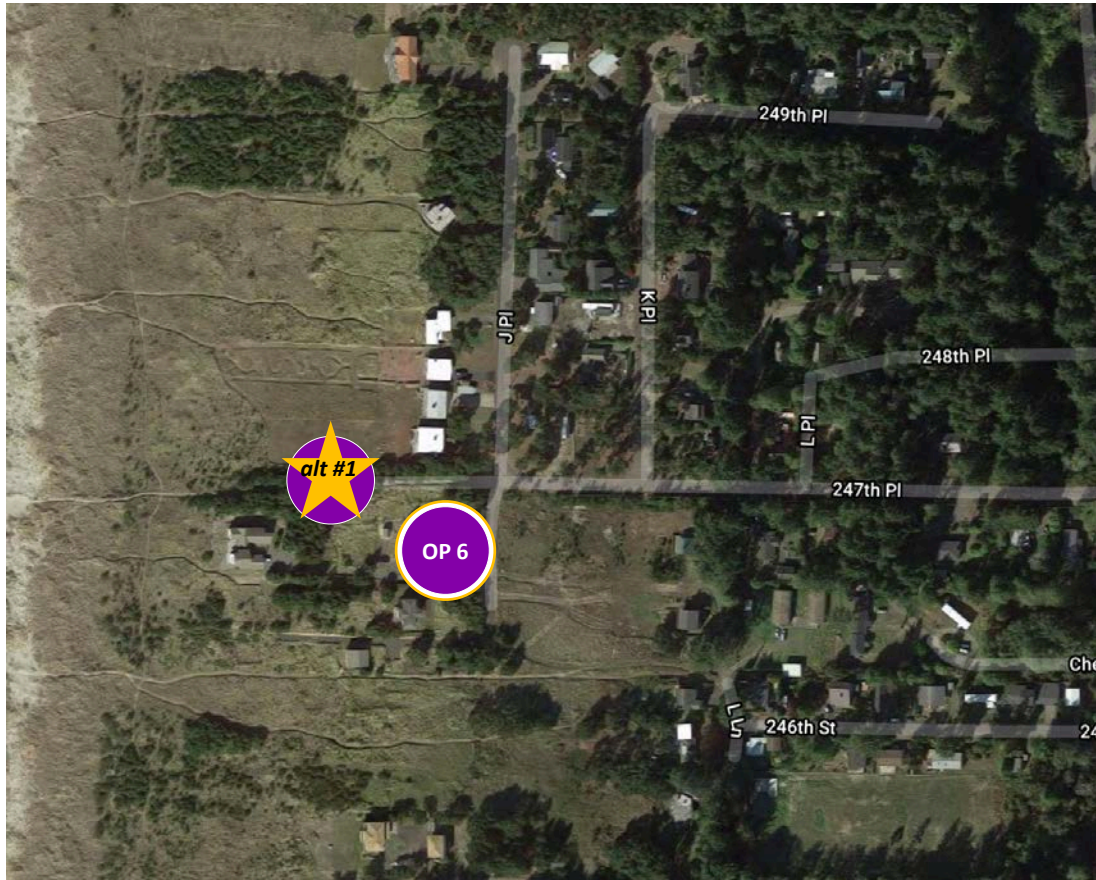


OP 5 - *Alternative #1*: Moose Lodge, large parking area

Photo Credit: *Google Maps Street View*



# Ocean Park: OP 6 + *alternative*



Source: Google Maps

OP 6	
Address	24623 J Place
Intersection	247th Place & J Place
Options	3, 4
Notes	Located on private property (currently), but could be moved due west a half block to public beach land?
OP 6 - alt #1	
Address	
Intersection	End of 247th Place (beach-side)
Options	
Notes	Beach trail: located to the west (end of 247th Place)

## Ocean Park: OP 6



Photo Credit: *Bob Freitag*

OP 6 - This site is currently under private ownership, but not developed. It faces J Place to the east. The beach is located less than 1 block to the west.



## Ocean Park: OP 6 *alternative*

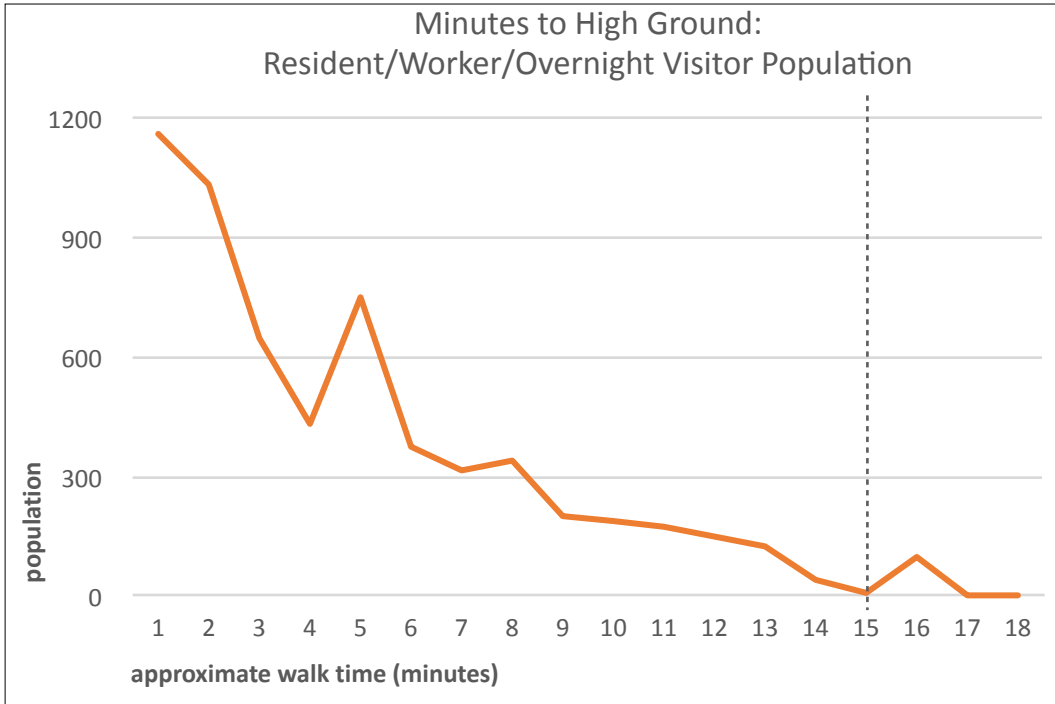


Photo Credit: *Bob Freitag*

OP 6 - *Alternative #1*: This is a public trail that leads to the beach, just one parcel to the north of OP 6. Could be an alternative location for a VES tower that is designed for access to visitors on the beach and in the surrounding neighborhood.



# Ocean Park: VES Option #4 (Efficient/Lean)



Approximate # of People, by Walking Time Bands, to High Ground

<15 minutes	15-25 minutes	25+ minutes
6,164 people	111 people	n/a

- *Fire Station: Approximate 8 minute walk time to high ground or VES*
- ▲ *Schools: Approximate 11 minute walk time to high ground or VES*

**Under Option #4:**

- approximately **98.2%** of the total estimated Ocean Park population are within 15 minutes to natural high ground OR vertical evacuation
- approximate *maximum* walk time to natural high ground or vertical evacuation for identified population = **18** minutes
- approximate *minimum* VES capacity need (15 minute walk time) = **326** people
- # of proposed VES = **2**

# Potential Ocean Park VES Locations: all options (1-4)

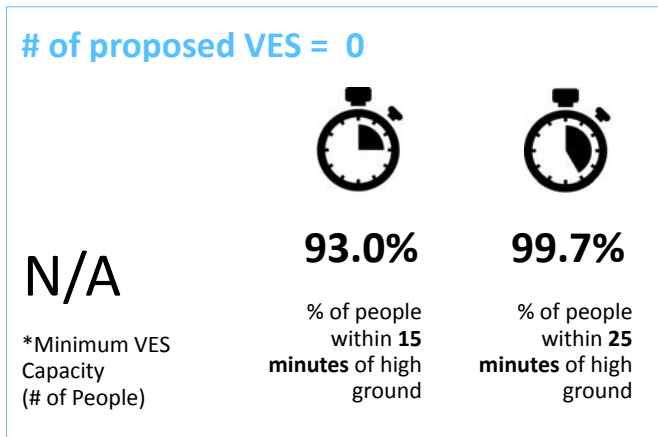
VES ID	Intersection	Parcel ID	Parcel Owner	Lat   Long	Options	Notes
OP 1	Joe Johns Road & K Lane	76010007000	Melissa Candace Thompson	46.512057, -124.054214	2, 3	located on private property, or adjacent church property (exempt) to the south: #76009003003
OP 2	Joe Johns Road & X Lane	12112113025	Gary D & J Marie McGee	46.511885, -124.040747	2, 3	located adjacent to Pacific County-owned land: #75015003001
OP 3	270th Place & Park Avenue	75004045001	Michael Mc Mahon & Shelly Hedges	46.498048, -124.052980	2, 3	located on private property. No nearby publically-owned land. Look for vacant land.
OP 4	270th Street & Z Street	76026011001	Pacific County	46.497731, -124.037659	2, 3	county-owned land, NE of intersection
OP 5	U Street & 260th Street	12113312242	Taylor-Ocean Park Cemetery	46.489357, -124.043582	2, 3, 4	cemetery land. Possible back-up parcel needed.
OP 6	247th Place & J Place	12113395083	John Forrest Bailey & Wendi Rognrud	46.481538, -124.056674	3, 4	located on private property (currently), but could be moved due west a half block to beach to public beach land?

**Notes**

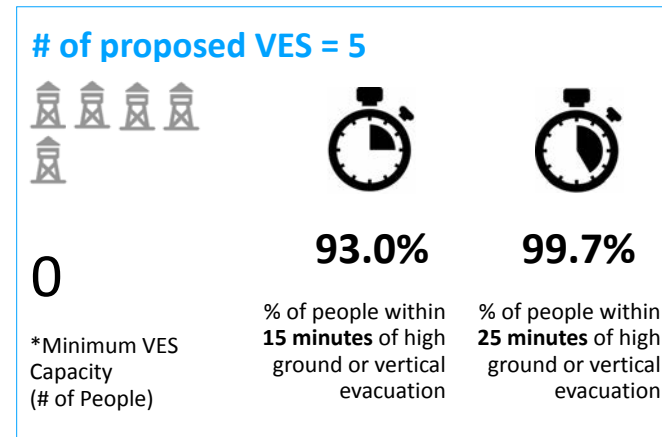
- OP 1** - The OP 1 location is currently a private parcel, although vacant. The nearby parcel at 28511 Vernon Avenue may be a good tax-exempt alternative as it is currently a church camp and has vacant space to accommodate a VES tower.
- OP 2** - The OP 2 site is currently under private ownership. Alternative #1 provides a publicly-owned alternative that is adjacent to the original recommended site.
- OP 3** - The OP 3 site is currently privately-owned and developed, although there is some open space. Pacific Pines State Park (located to the north about 4 blocks) may be a good alternative location for further explanation. There is a parking lot located north off 274th Place that could serve as a location for a VES tower.
- OP 5** - The cemetery is a tax exempt parcel, but may have space limitations (confirm). Across U Street is the Moose Lodge, which has a large parking lot.
- OP 6** - The OP 6 site is vacant, but privately-owned. It would serve the surrounding neighborhood and people at the nearby beach.

# Ocean Park: Comparison of All Options (1-4)

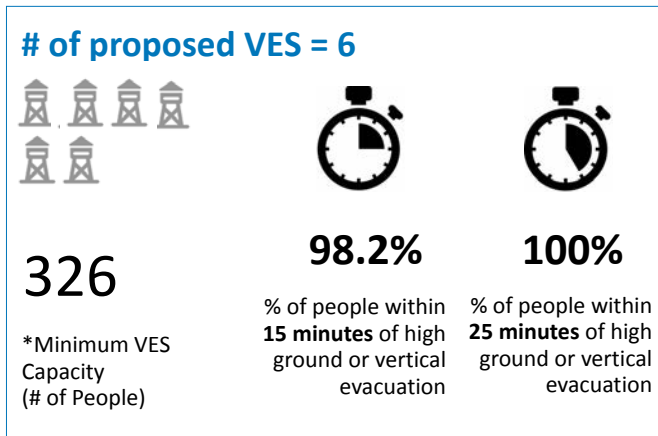
Option #1



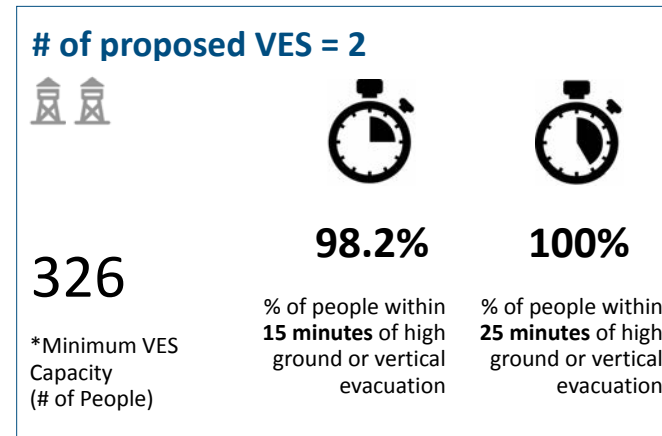
Option #2



Option #3



Option #4





## Ocean Park: Comparison of All Options (1-4)

**Notes:**

\**Minimum VES Capacity* = the delta (or difference) between Option #1 (no VES) number of people at each minute mark and Options #2, #3, and #4 number of people at each minute mark. For example: If 10 people are within 15 minutes of high ground under Option #1 but that number increases to 25 people under Option #2 - then we know that a minimum of 15 additional people have been put within 15 minutes of high ground through the addition of a Vertical Evacuation Structure. Therefore, the minimum VES capacity for this example is 15 people.

# Oysterville

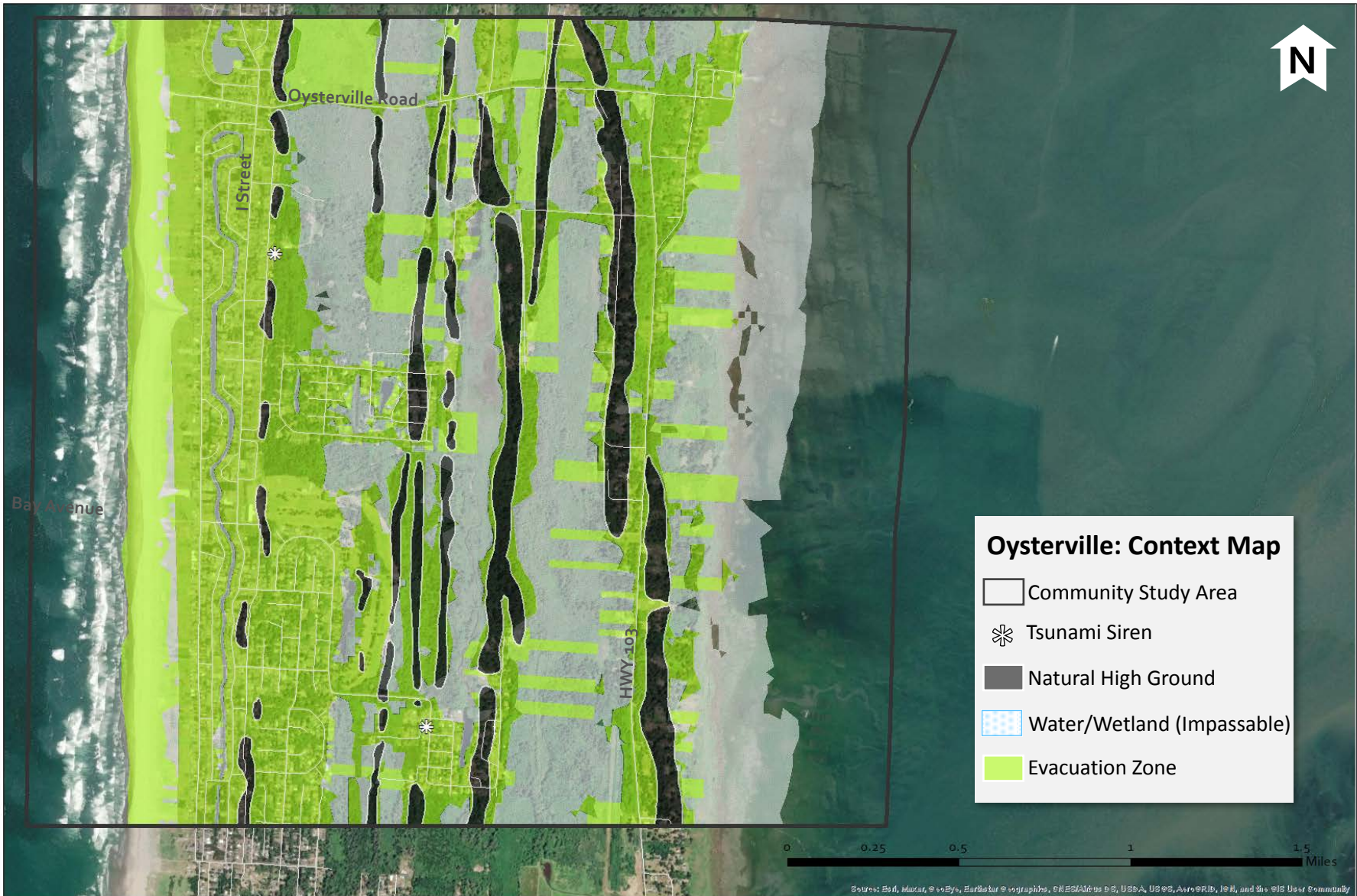
***Oysterville community study area population in the tsunami hazard area = ~4,098 people***

*Resident/Worker/Overnight Visitor population = ~4,098 people*

*Fire Department occupancy = N/A*

*Schools occupancy = N/A*

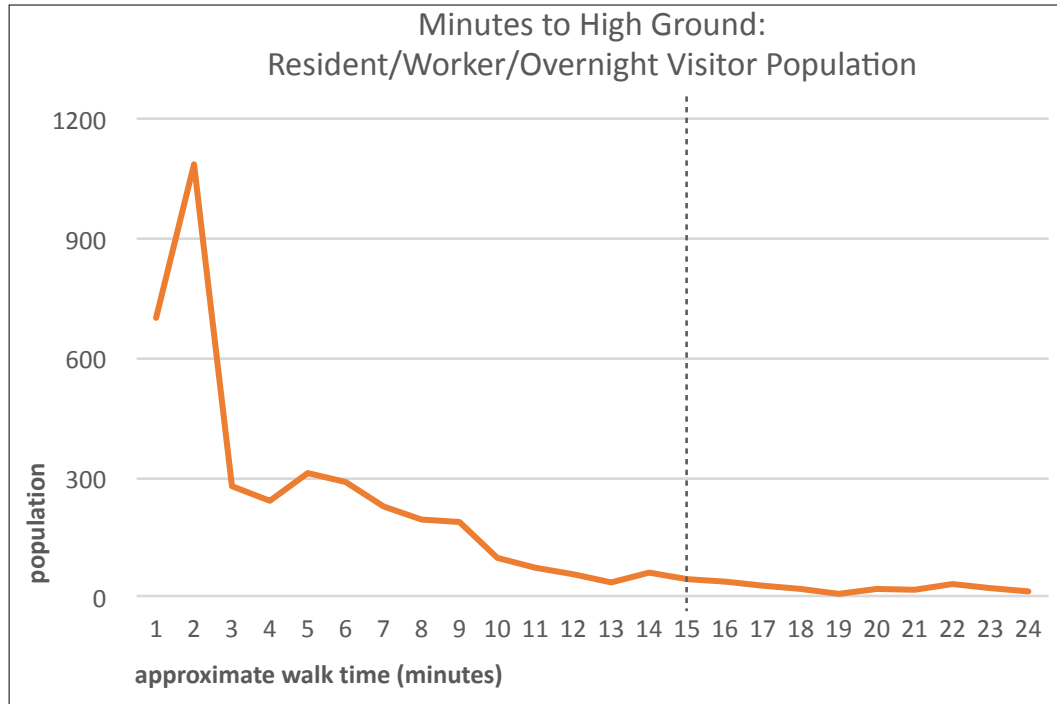
Source: 2010 Census (average household size); Pacific County Residential Land Use







# Oysterville: VES Option #1 (No VES)



\*Approximate *maximum* walk time accounts for the resident/worker/overnight visitor population locations only. This does not factor in daytime visitors or beach visitors, for example.

Approximate # of People, by Walking Time Bands, to High Ground

<15 minutes	15-25 minutes	25+ minutes
3,848 people	250 people	n/a

■ Fire Station: N/A




▲ Schools: N/A

**Under Option #1:**

- approximately **93.9%** of the total estimated Oysterville population are within 15 minutes to natural high ground
- approximate *\*maximum* walk time to natural high ground for identified population = **24** minutes

# Oysterville: VES Option #1

**# of proposed VES = 0**

		
<b>N/A</b>	<b>93.9%</b>	<b>100%</b>
<small>*Minimum VES Capacity (# of People)</small>	<small>% of people within 15 minutes of high ground</small>	<small>% of people within 25 minutes of high ground</small>

**Option #1**

**NOT COMPLETED**

**Option #2**

**NOT COMPLETED**

**Option #3**

**NOT COMPLETED**

**Option #4**



# Oysterville: VES Option #1

**Notes:**

\**Minimum VES Capacity* = the delta (or difference) between Option #1 (no VES) number of people at each minute mark and Options #2, #3, and #4 number of people at each minute mark. For example: If 10 people are within 15 minutes of high ground under Option #1 but that number increases to 25 people under Option #2 - then we know that a minimum of 20 additional people have been put within 15 minutes of high ground through the addition of a Vertical Evacuation Structure. Therefore, the minimum VES capacity for this example is 20 people.

# Leadbetter

***Leadbetter community study area population in the tsunami hazard area = ~513 people***

*Resident/Worker/Overnight Visitor population = ~513 people*

*Fire Department occupancy = N/A*

*Schools occupancy = N/A*

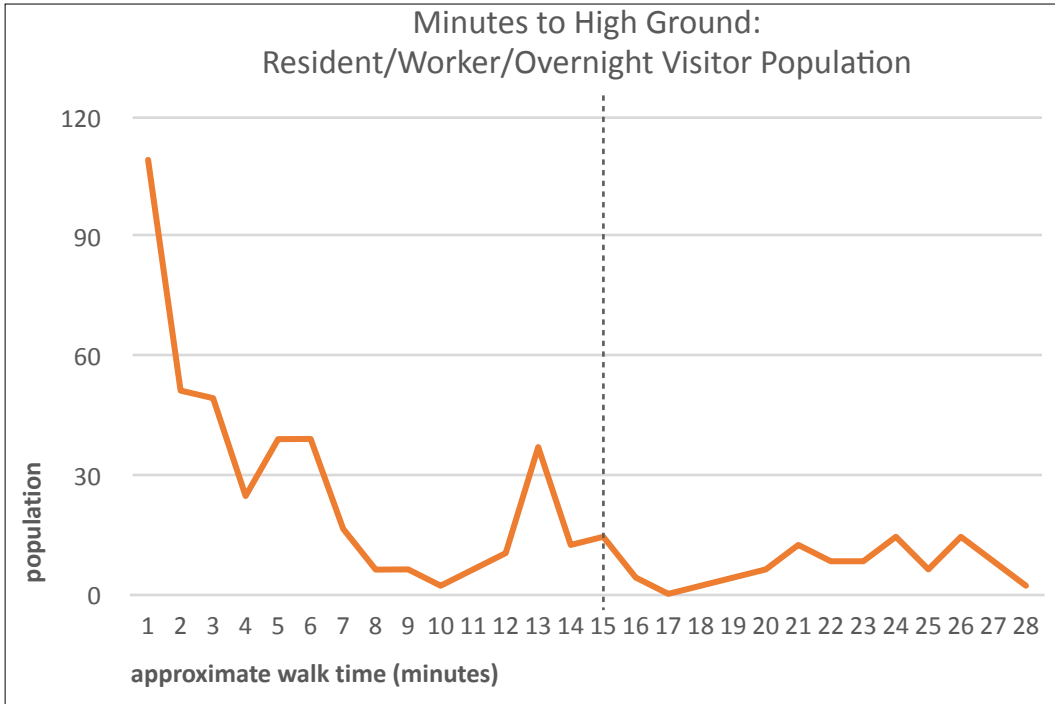
Source: 2010 Census (average household size); Pacific County Residential Land Use







# Leadbetter: VES Option #1 (No VES)



\*Approximate *maximum* walk time accounts for the resident/worker/overnight visitor population locations only. This does not factor in daytime visitors or beach visitors, for example.

Approximate # of People, by Walking Time Bands, to High Ground

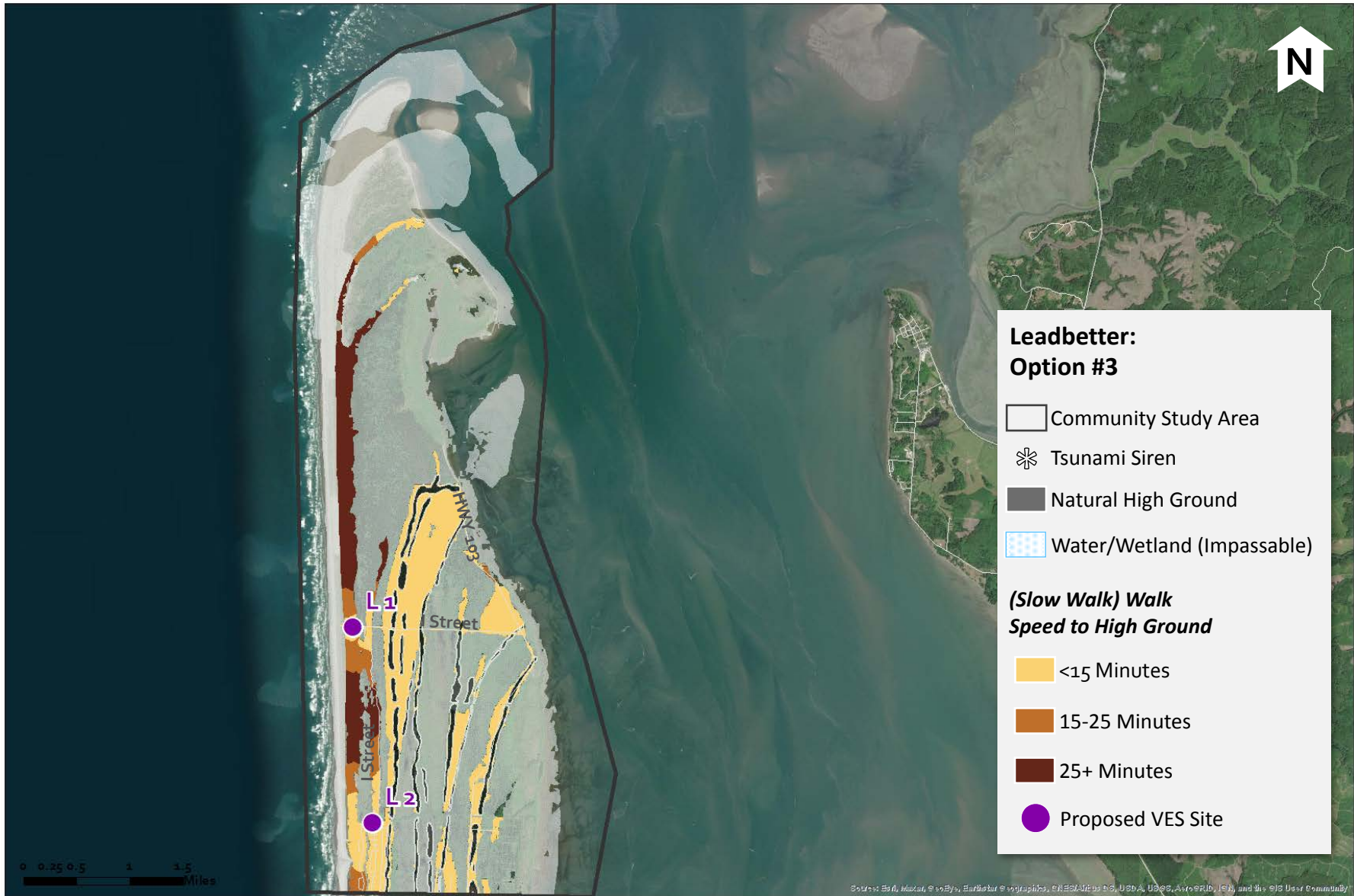
<15 minutes	15-25 minutes	25+ minutes
408 people	80 people	25 people

■ Fire Station: N/A

▲ Schools: N/A

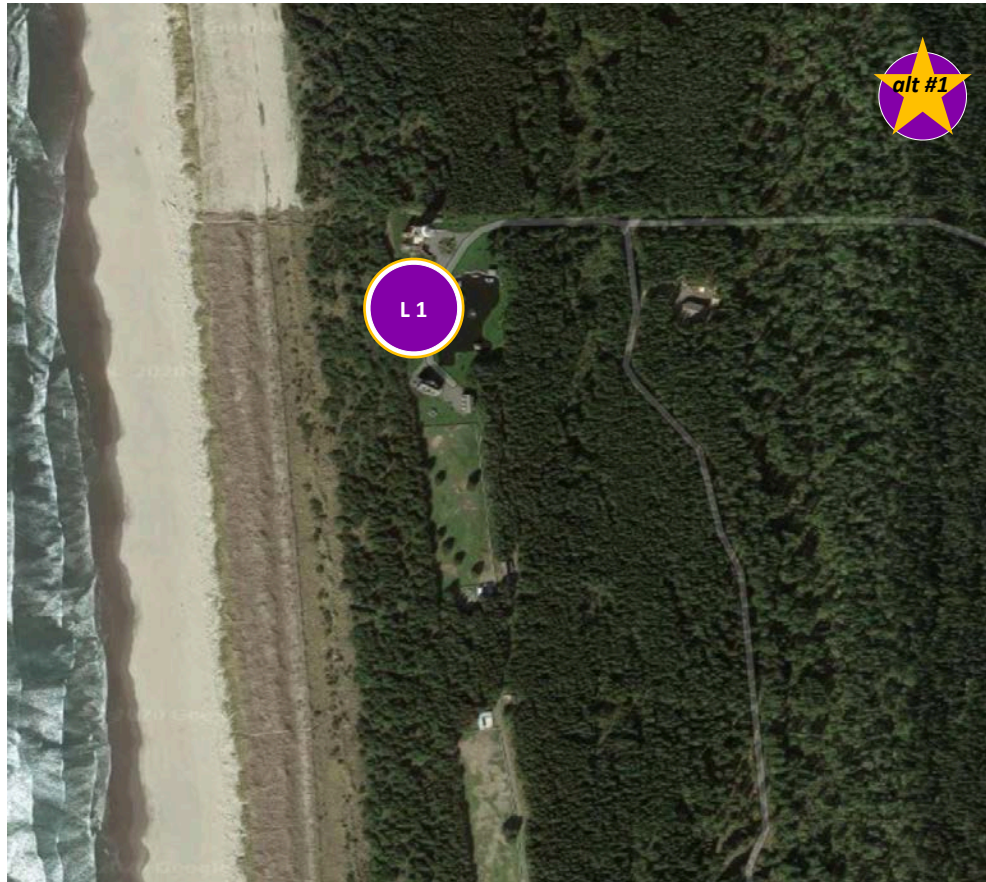
**Under Option #1:**

- approximately **79.5%** of the total estimated Leadbetter population are within 15 minutes to natural high ground
- approximate *\*maximum* walk time to natural high ground for identified population = **28** minutes





# Leadbetter: L 1 + *alternative*



Source: Google Maps

L 1	
Address	N/a
Intersection	I Street
Options	3
Notes	Located on private property/Leadbetter Farms camping (currently), but could be moved due east/northeast along 395th Lane to State of WA land: #13112950001

L 1 - alt #1	
Address	
Intersection	I Street, east of I Street & I Street
Options	
Notes	State of Washington Parks & Recreation land, undeveloped but forested

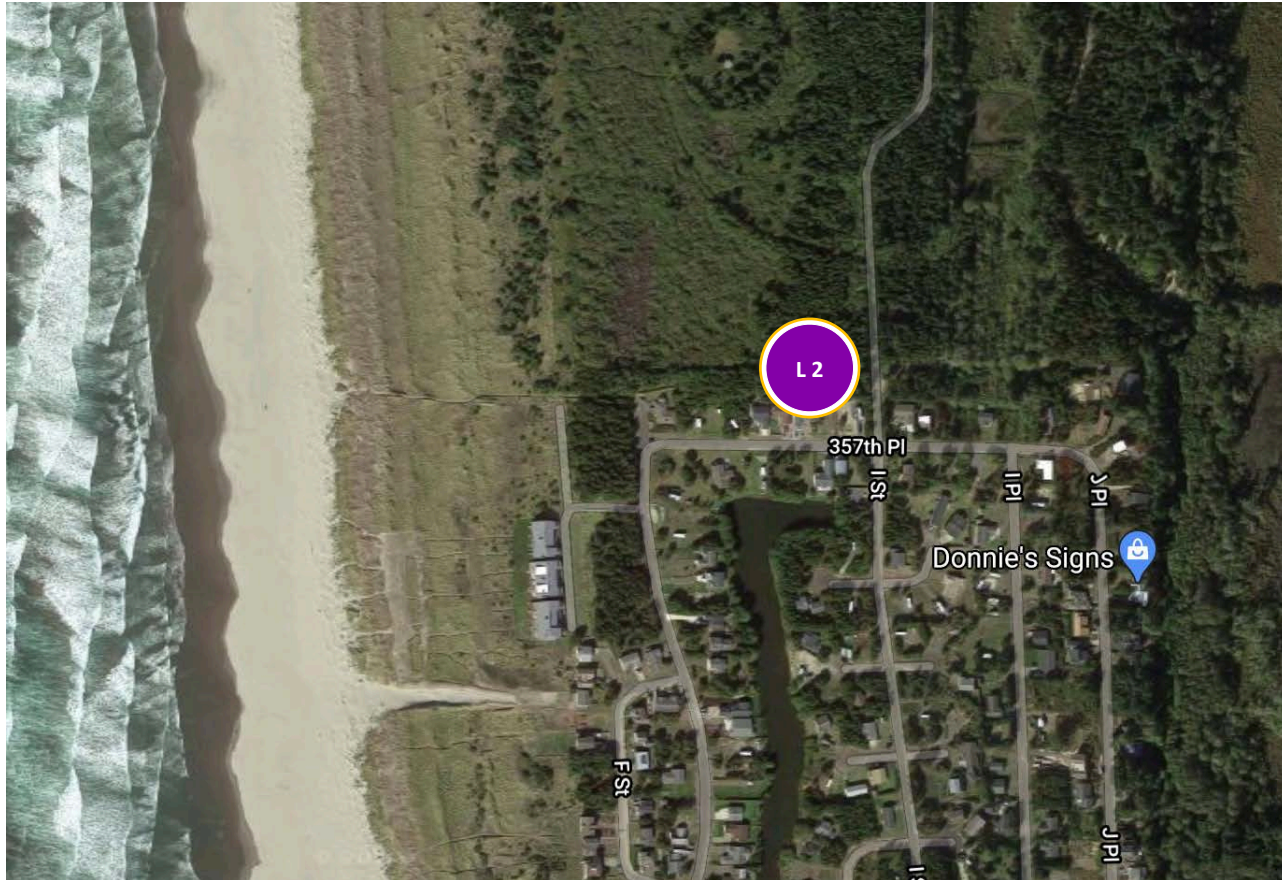
# Leadbetter: L 1



Photo Credit: unknown

L 1 - Privately-owned property (Leadbetter Farms Resort?), could provide VES site on south end of property to serve people at the beach, hikers on nearby trails, or visitors to adjacent Leadbetter Park.

# Leadbetter: L 2



L 2	
Address	N/a
Intersection	357th Street & I Street
Options	3, 4
Notes	Located on flood control district public land, NW of intersection

Source: Google Maps



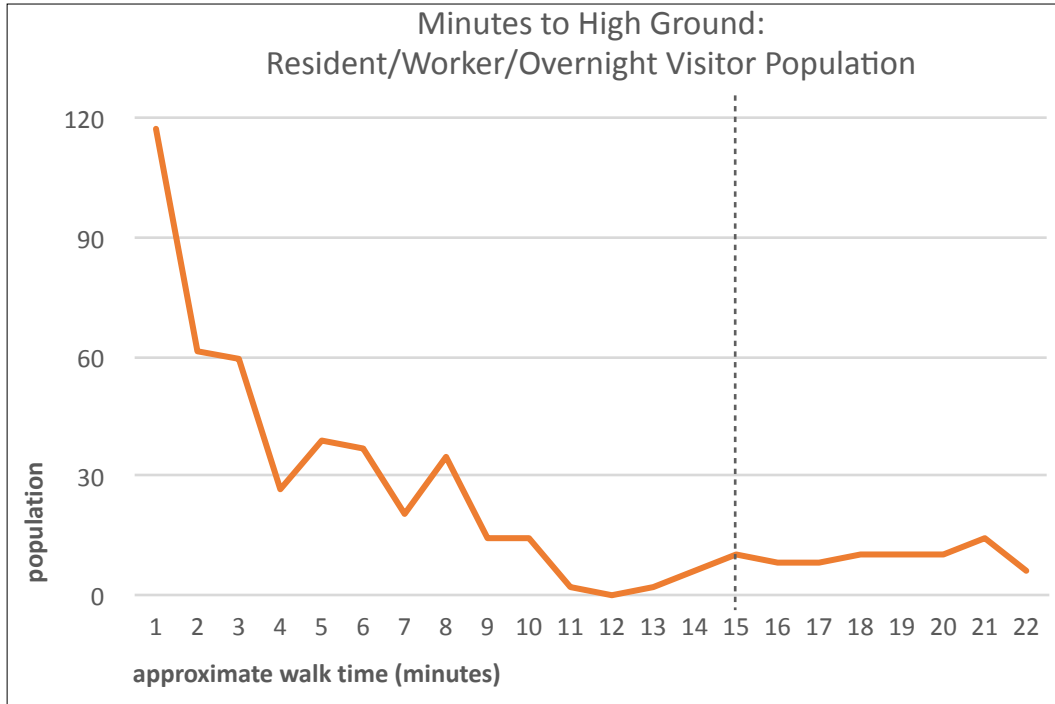
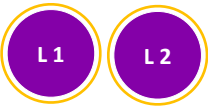
# Leadbetter: L 2



L 2 - Flood Control District-owned land (vacant), just NW of intersection

Photo Credit: *Google Maps Street View*

# Leadbetter: VES Option #3 (Broad Spatial Coverage)



Approximate # of People, by Walking Time Bands, to High Ground

<15 minutes	15-25 minutes	25+ minutes
435 people	78 people	n/a

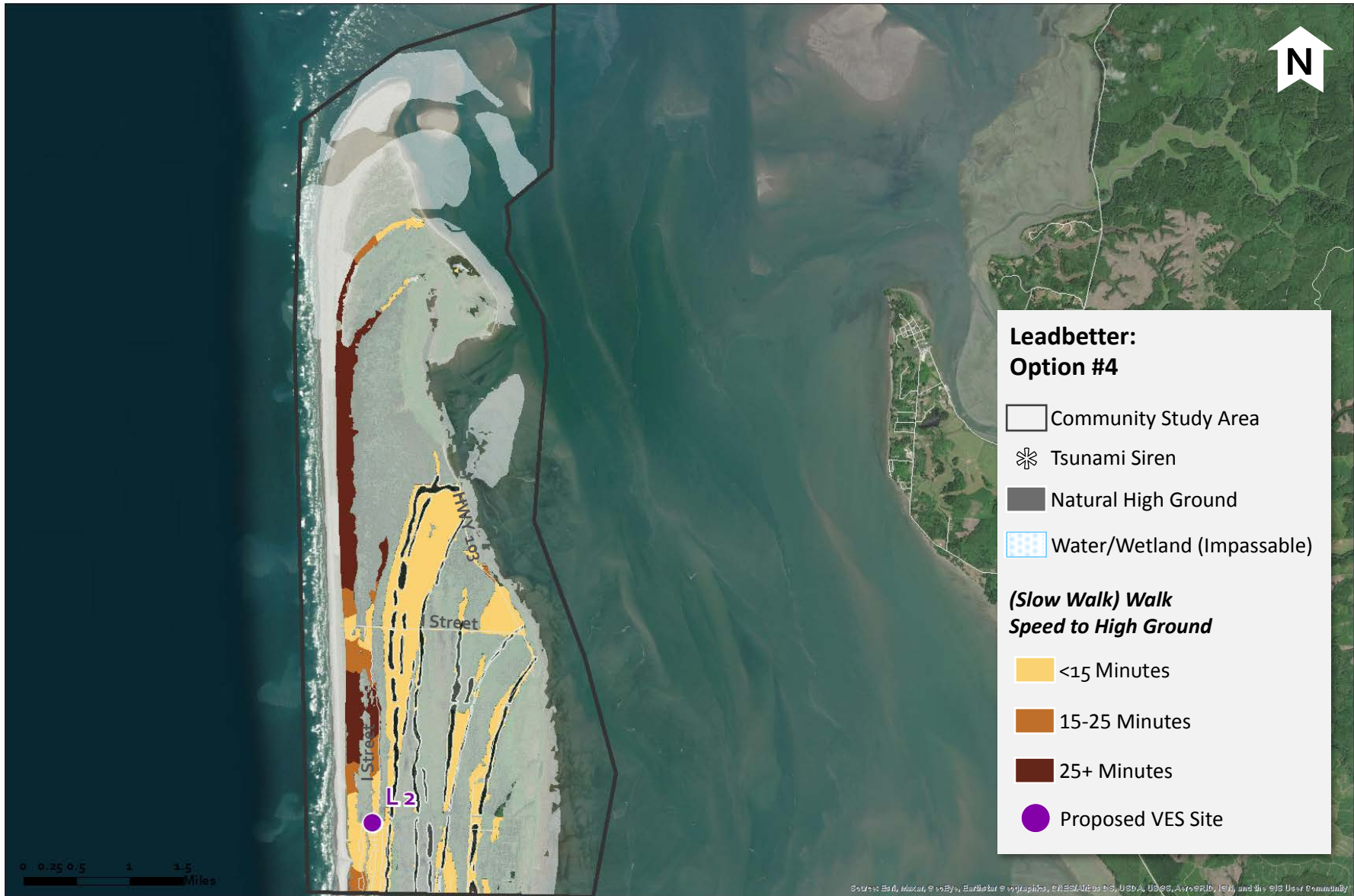
■ Fire Station: N/A

▲ Schools: N/A

**Note:** Option #3 does not include **all** visitors (i.e. day trip visitors, peak summer day visitors). It does, however, factor in more thorough coverage across the community, including some popular beach areas and other locations where there may be occasional gatherings of people (i.e. parking lots, campgrounds, etc.). Local decision-makers will need to determine how (or if) to factor in that additional population.

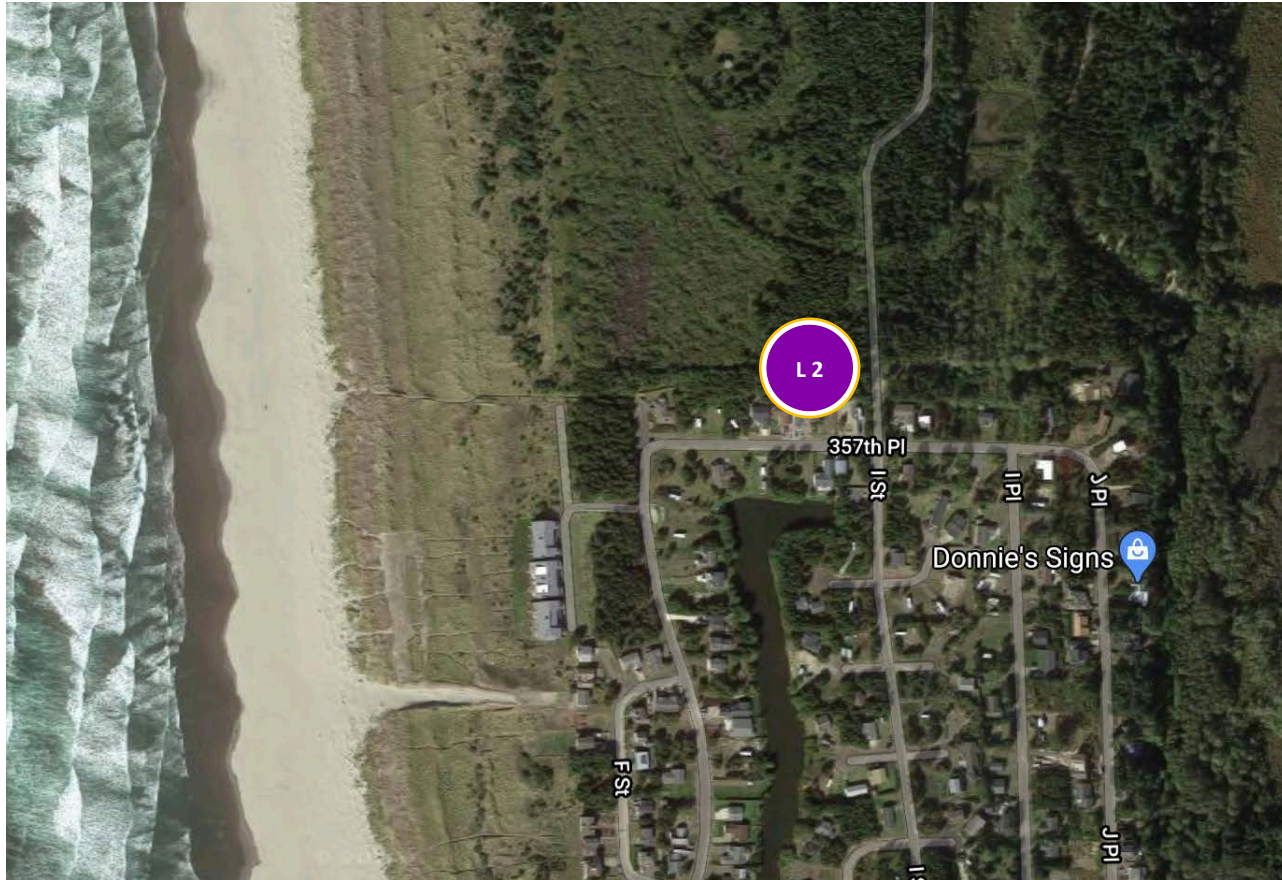
**Under Option #3:**

- approximately **84.8%** of the total estimated Leadbetter population are within 15 minutes to natural high ground OR vertical evacuation
- approximate *maximum* walk time to natural high ground or vertical evacuation for identified population = **22** minutes
- approximate *minimum* VES capacity need (15 minute walk time) = **27** people
- # of proposed VES = **2**





# Leadbetter: L 2



L 2	
Address	N/a
Intersection	357th Street & I Street
Options	3, 4
Notes	Located on flood control district public land, NW of intersection

Source: Google Maps

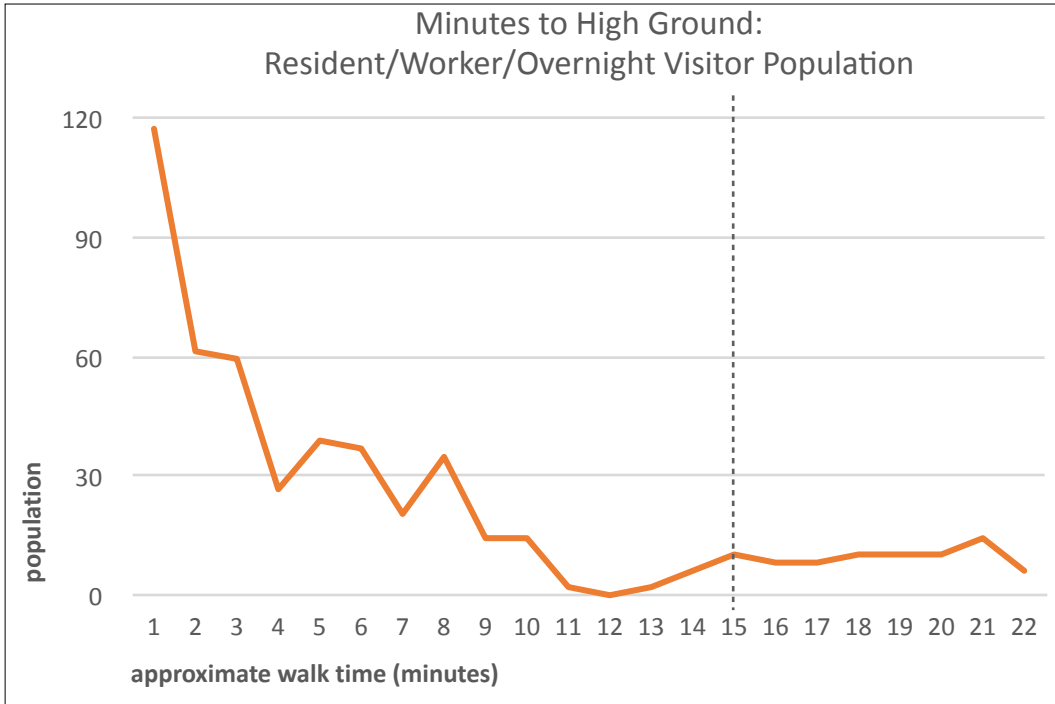
# Leadbetter: L 2



L 2 - Flood Control District-owned land (vacant), just NW of intersection

Photo Credit: *Google Maps Street View*

# Leadbetter: VES Option #4 (Efficient/Lean)



Approximate # of People, by Walking Time Bands, to High Ground

<15 minutes	15-25 minutes	25+ minutes
435 people	78 people	n/a

■ Fire Station: N/A

▲ Schools: N/A

**Under Option #4:**

- approximately **84.8%** of the total estimated Leadbetter population are within 15 minutes to natural high ground OR vertical evacuation
- approximate *maximum* walk time to natural high ground or vertical evacuation for identified population = **22** minutes
- approximate *minimum* VES capacity need (15 minute walk time) = **27** people
- # of proposed VES = **1**



## Potential Leadbetter VES Locations: All Options (1, 3, 4)

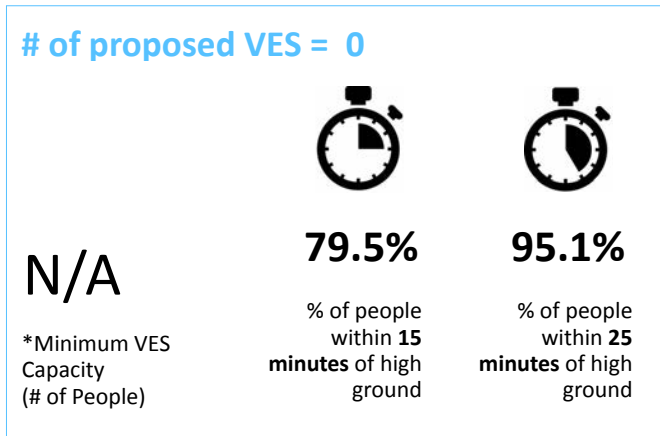
VES ID	Intersection	Parcel ID	Parcel Owner	Lat   Long	Options	Notes
L 1	I Street	13112823019	Leadbetter Farms LLC	46.587367, -124.062958	3	located on private property/Leadbetter Farms camping (currently), but could be moved due east/northeast along 395th Lane to State of WA land: #13112950001
L 2	357th Street & I Street	12110550304	Flood Control District #1	46.561065, -124.056909	3, 4	located on flood control district public land, NW of intersection

**Notes**

- L 1** - This is a private resort, owned by Leadbetter Farms. There is ample open space for a potential VES.
- L 2** - The L 2 site would serve the nearby residential community and is already located on publicly-owned land.

# Leadbetter: Comparison of All Options (1, 3, 4)

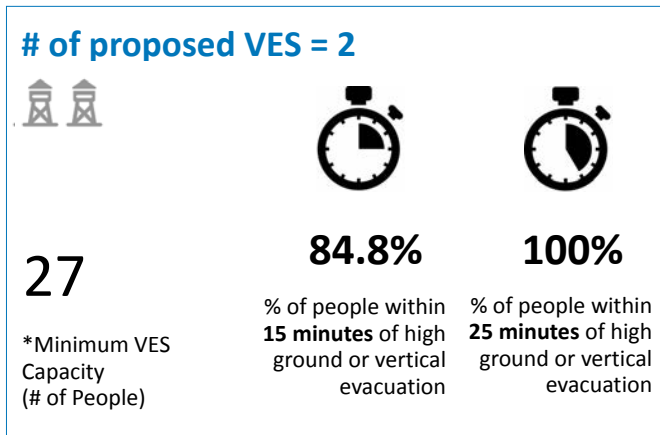
Option #1



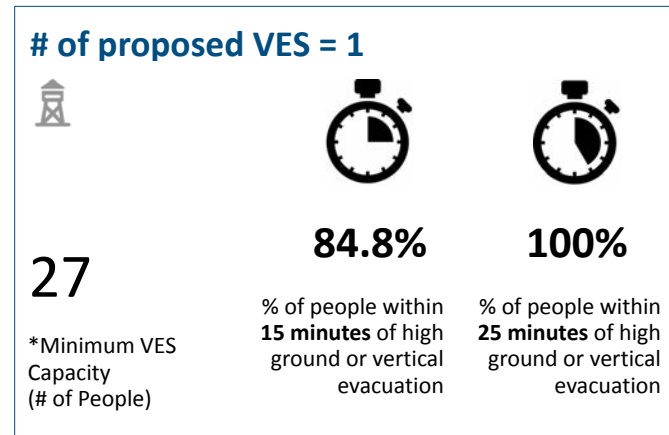
Option #2



Option #3



Option #4



## Leadbetter: Comparison of All Options (1, 3, 4)

**Notes:**

\**Minimum VES Capacity* = the delta (or difference) between Option #1 (no VES) number of people at each minute mark and Options #2, #3, and #4 number of people at each minute mark. For example: If 10 people are within 15 minutes of high ground under Option #1 but that number increases to 25 people under Option #2 - then we know that a minimum of 15 additional people have been put within 15 minutes of high ground through the addition of a Vertical Evacuation Structure. Therefore, the minimum VES capacity for this example is 15 people.



# Tokeland

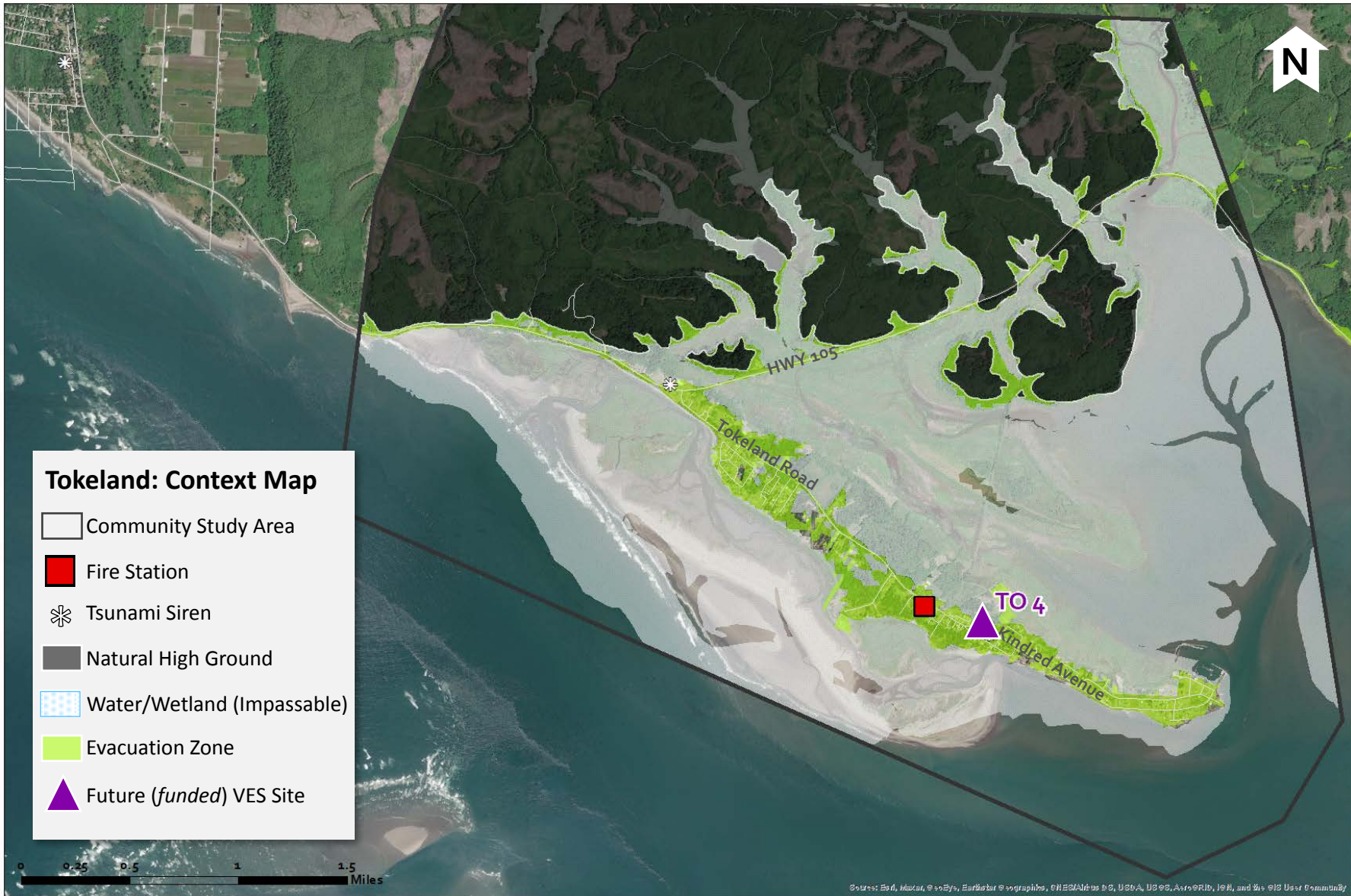
***Tokeland community study area population in the tsunami hazard area = ~1,234 people***

*Resident/Worker/Overnight Visitor population = ~1,204 people*

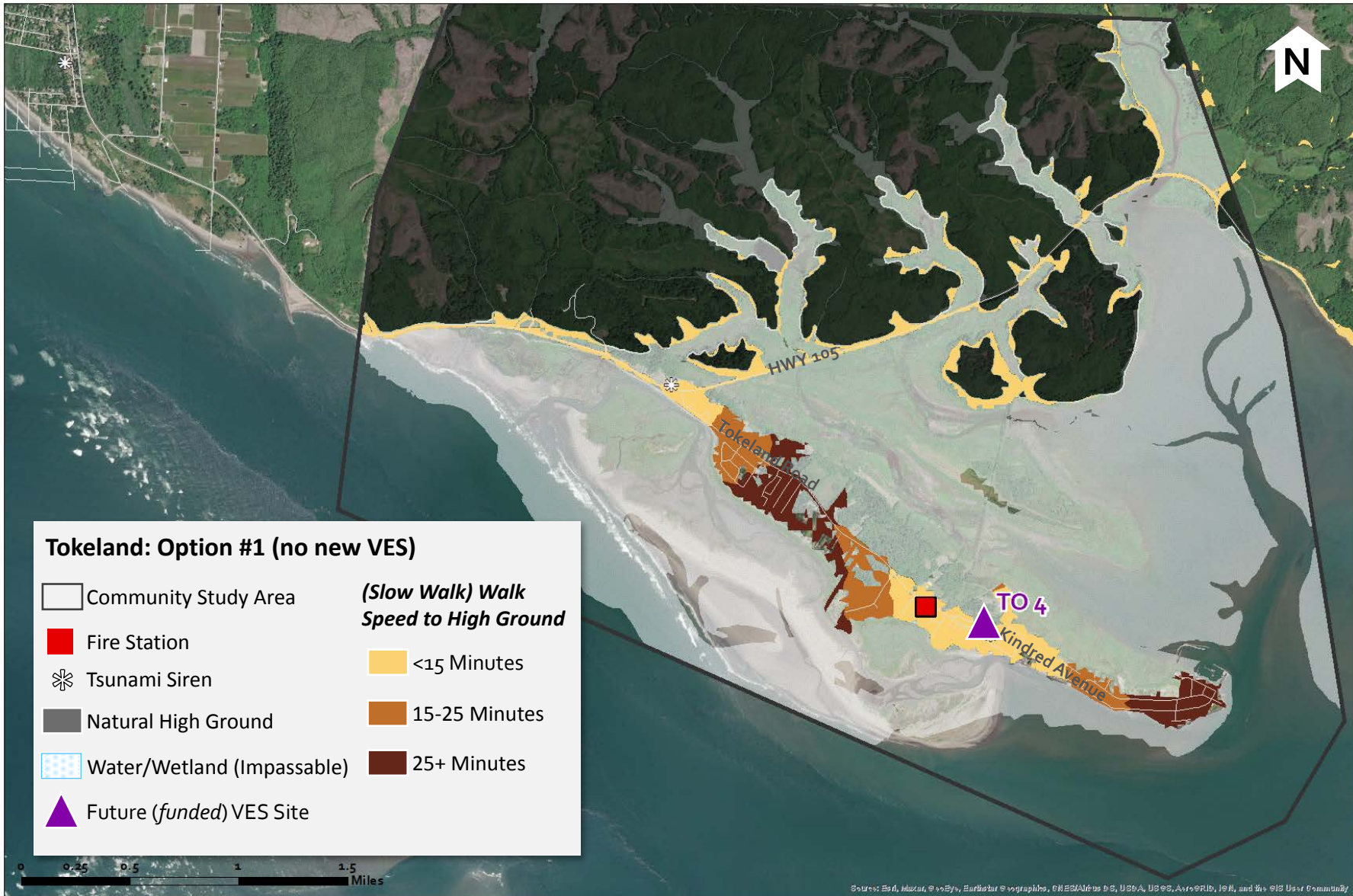
*Fire Department occupancy = ~30 people*

*Schools occupancy = N/A*

Source: 2010 Census (average household size); Pacific County Residential Land Use

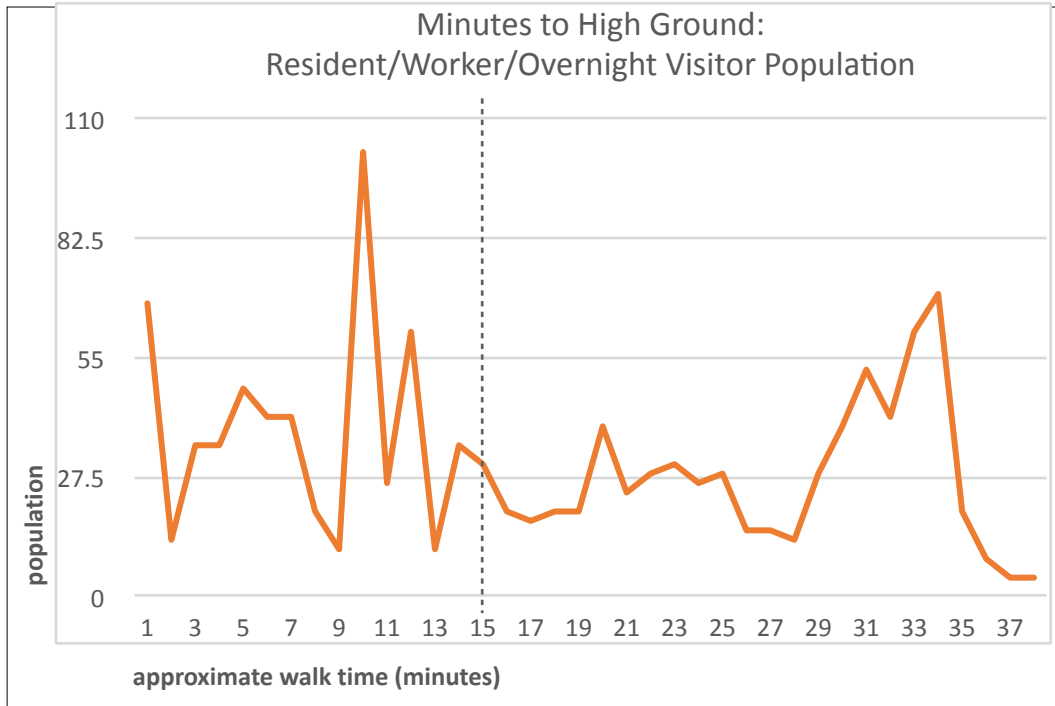








# Tokeland: VES Option #1 (No VES)



\*Approximate *maximum* walk time accounts for the resident/worker/overnight visitor population locations only. This does not factor in daytime visitors or beach visitors, for example.

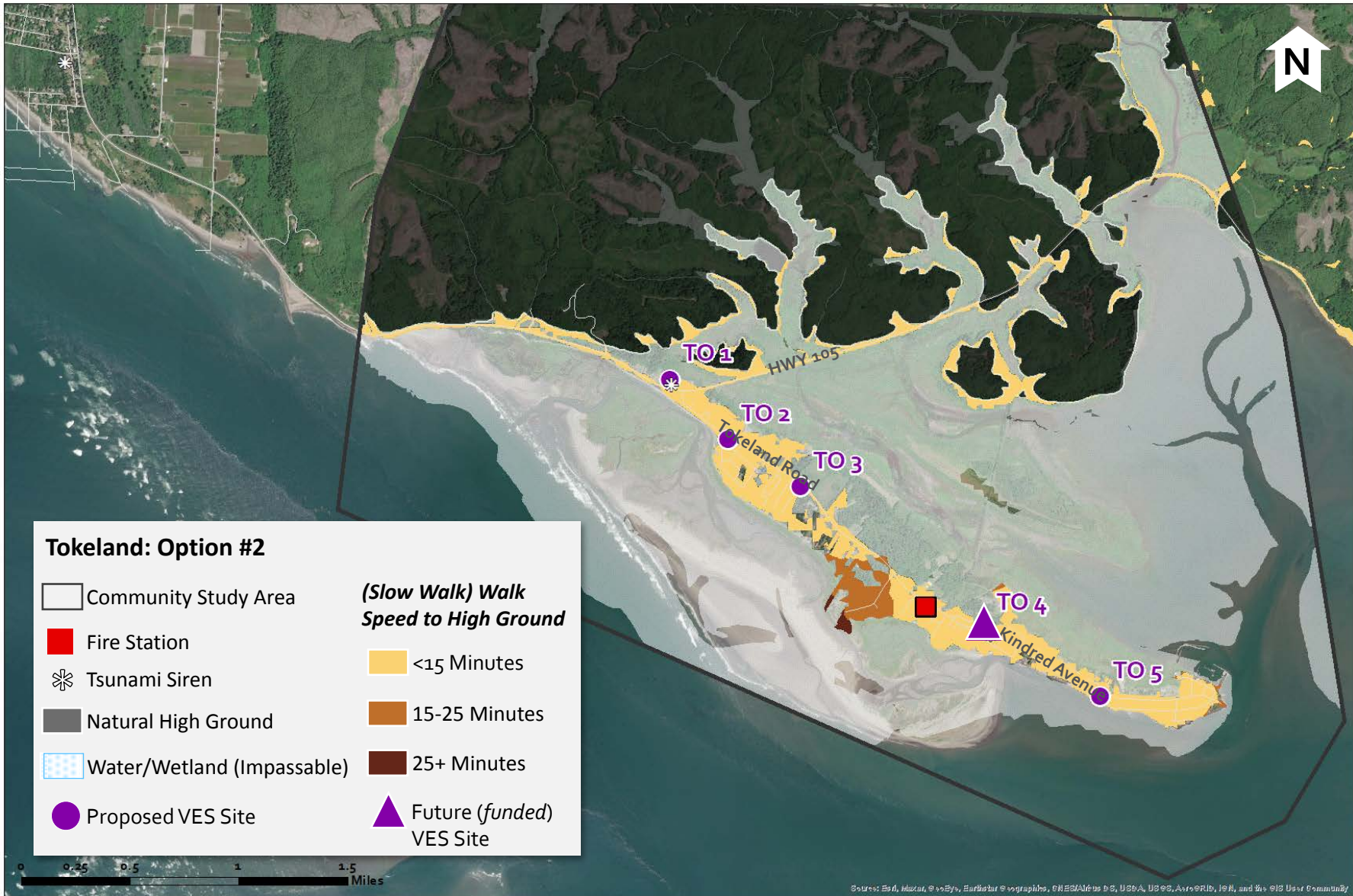
Approximate # of People, by Walking Time Bands, to High Ground

<15 minutes	15-25 minutes	25+ minutes
577 people	283 people	373 people

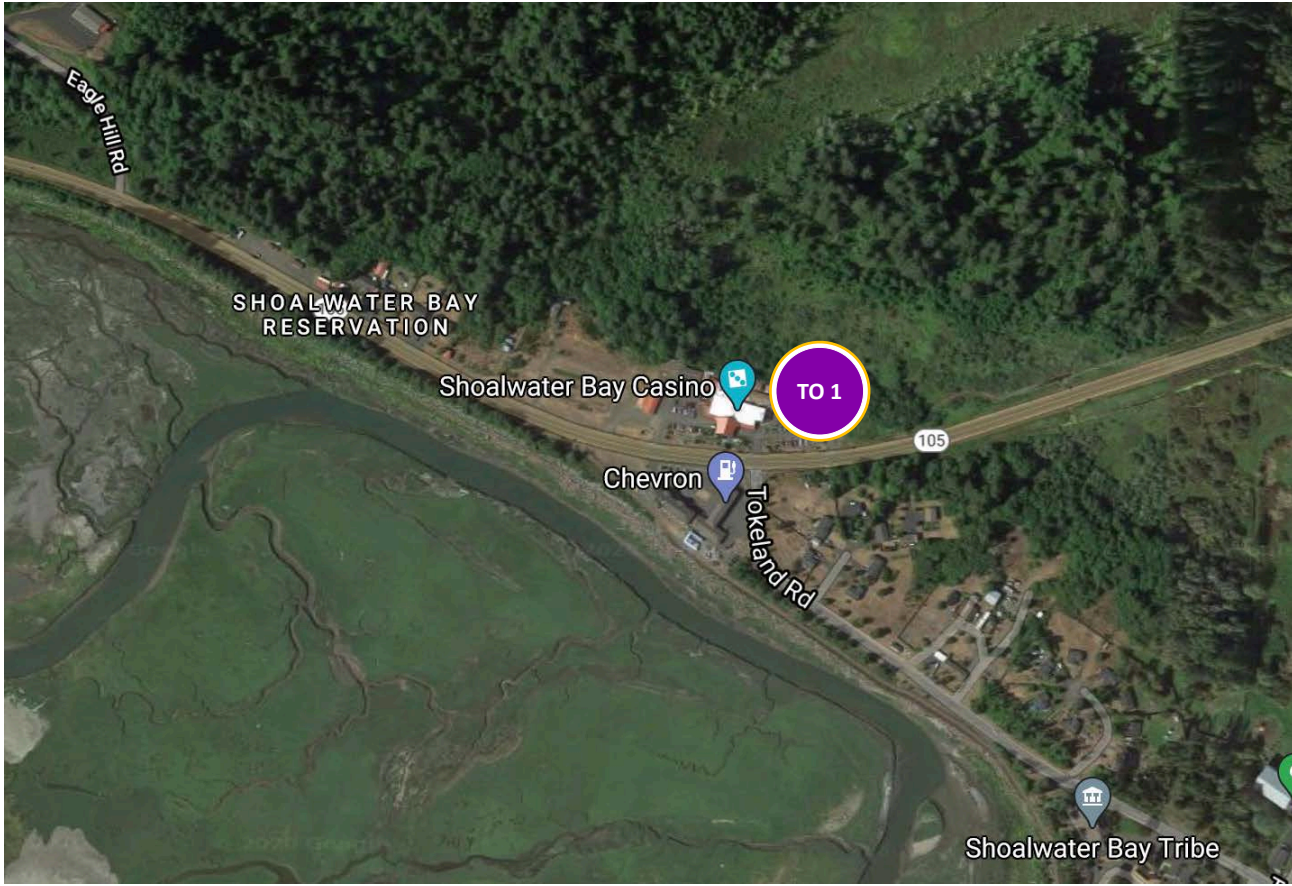
- Fire Station: Approximate 9 minute walk time to high ground or VES
- ▲ Schools: N/A

Under **Option #1**:

- approximately **46.8%** of the total estimated Tokeland population are within 15 minutes to natural high ground
- approximate *\*maximum* walk time to natural high ground for identified population = **38** minutes



# Tokeland: TO 1



TO 1	
Address	10 Eagle Hill Road State Route 105 & Tokeland Road
Intersection	Tokeland Road
Options	2, 3
Notes	Casino parking lot

Source: Google Maps



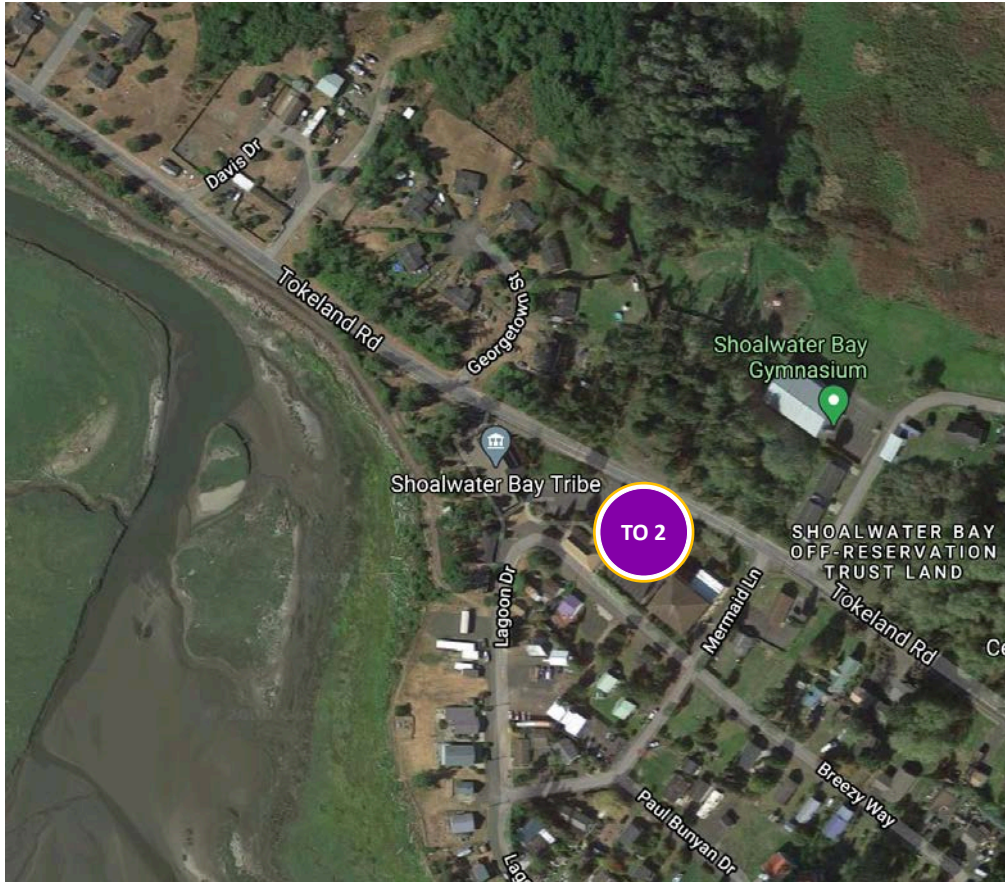
# Tokeland: TO 1



TO 1 - Shoalwater Bay Casino parking lot located to the west of the building.

Photo Credit: *Google Maps Street View*

# Tokeland: TO 2

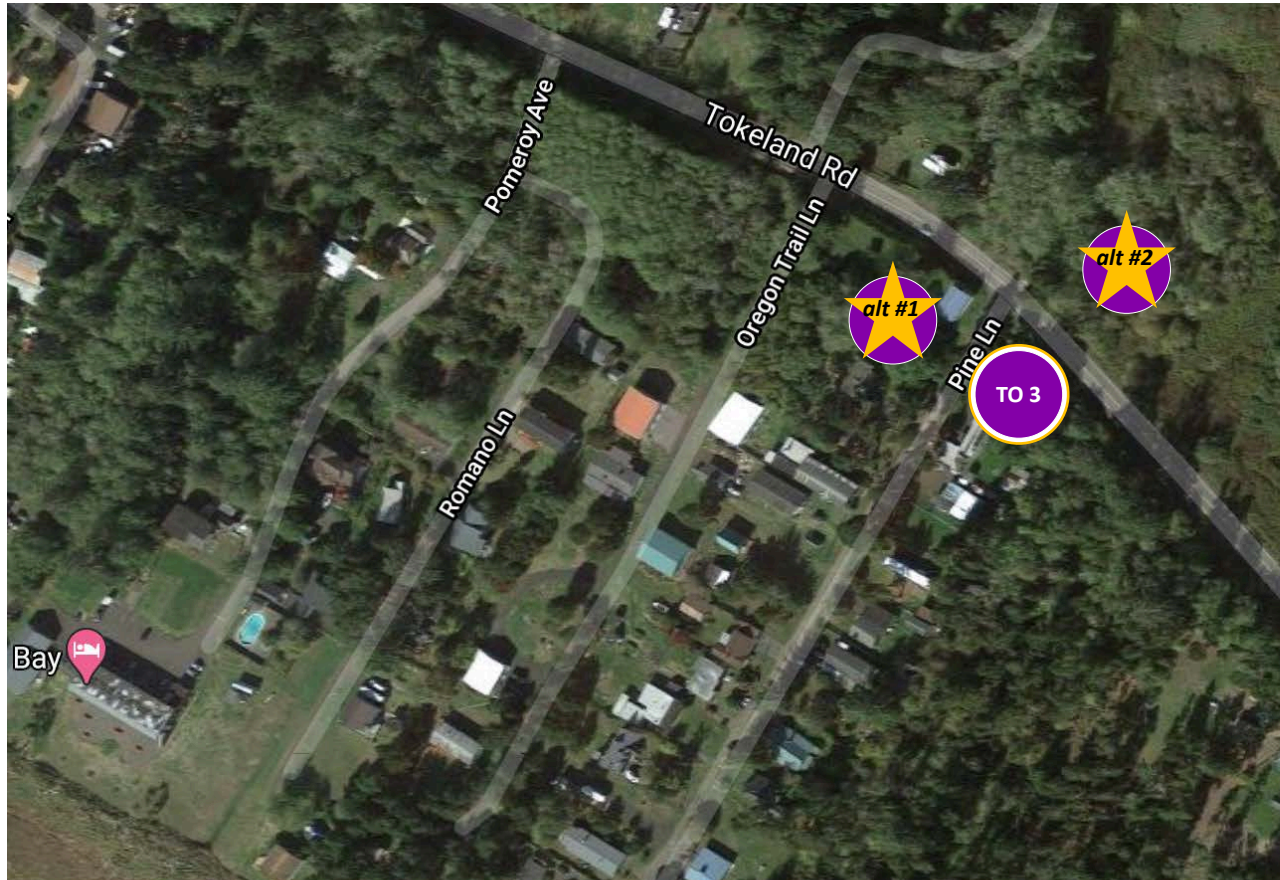


TO 2	
Address	2391 Tokeland Road
Intersection	Mermaid Lane & Tokeland Road
Options	2, 3
Notes	Tribal headquarters parking lot

Source: Google Maps



# Tokeland: TO 3 + alternatives



Source: Google Maps

TO 3	
Address	N/a
Intersection	Tokeland Road & Pine Lane
Options	2, 3, 4
Notes	Tokeland Road & Pine Lane

TO 3 - alt #1	
Address	4299 Pine Lane
Intersection	Tokeland Road & Pine Lane
Notes	Privately-owned, undeveloped land

TO 3 - alt #2	
Address	2500 Tokeland Road
Intersection	Tokeland Road & Pine Lane (north-side)
Notes	Large agricultural land



## Tokeland: TO 3



Photo Credit: *Bob Freitag*

TO 3 - Pine Lane & Tokeland Road (SE corner). Currently private land, potential adjacent vacant parcels could work well as alternative: *see subsequent photos*



## Tokeland: TO 3 *alternatives #1 + #2*



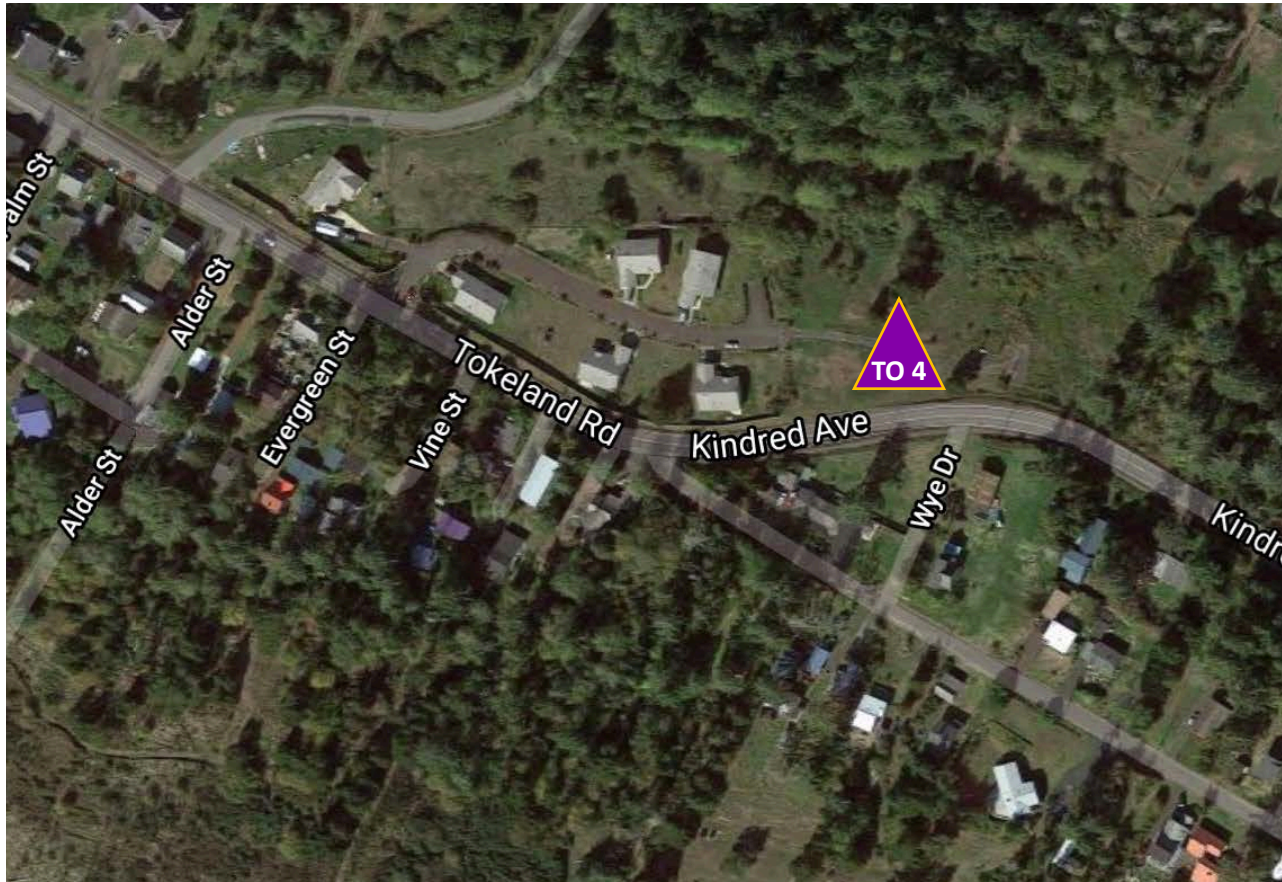
TO 3 - *Alternative #1* - Across the street (Pine Lane), to the west. Private land, but undeveloped/vacant.



TO 3 - *Alternative #2*: Across Tokeland Road, to the north. Private agricultural land, but open space available. Photo Credit: *Bob Freitag*



# Tokeland: TO 4



TO 4	
Address	2848 Fisher Avenue Kindred Avenue & Wye Drive
Intersection	Drive
Options	2, 3, 4
Notes	Current location of “in-progress” VES. Land/project owned by Tribe. Major construction on-hold during COVID.

Source: Google Maps



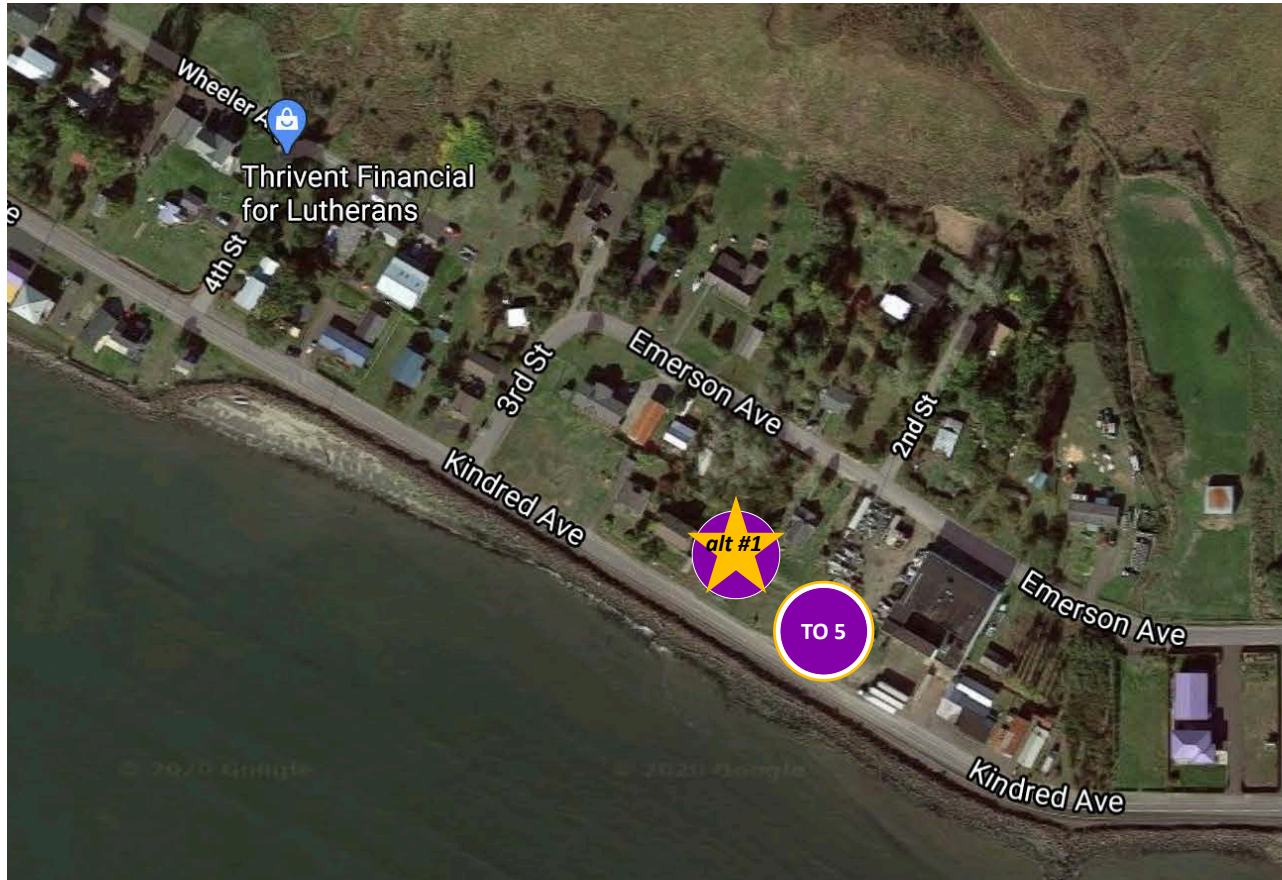
# Tokeland: TO 4



Photo Credit: *Bob Freitag*

TO 4 - Future VES location! Started construction on May 3, 2021.

# Tokeland: TO 5 + *alternative*



<b>TO 5</b>	
<b>Address</b>	3088 Kindred Avenue Kindred Avenue & 2nd Street
<b>Intersection</b>	Street
<b>Options</b>	2, 3, 4
<b>Notes</b>	Owned by Nelson Crab. Open lot.
<b>TO 5 - alt #1</b>	
<b>Address</b>	N/a
<b>Intersection</b>	SE of Kindred Avenue & 3rd Street
<b>Notes</b>	Nelson Crab, vacant lot to NW

Source: Google Maps

# Tokeland: TO 5



Photo Credit: *Bob Freitag*

TO 5 - Lot used by Nelson Crab: 3088 Kindred Avenue





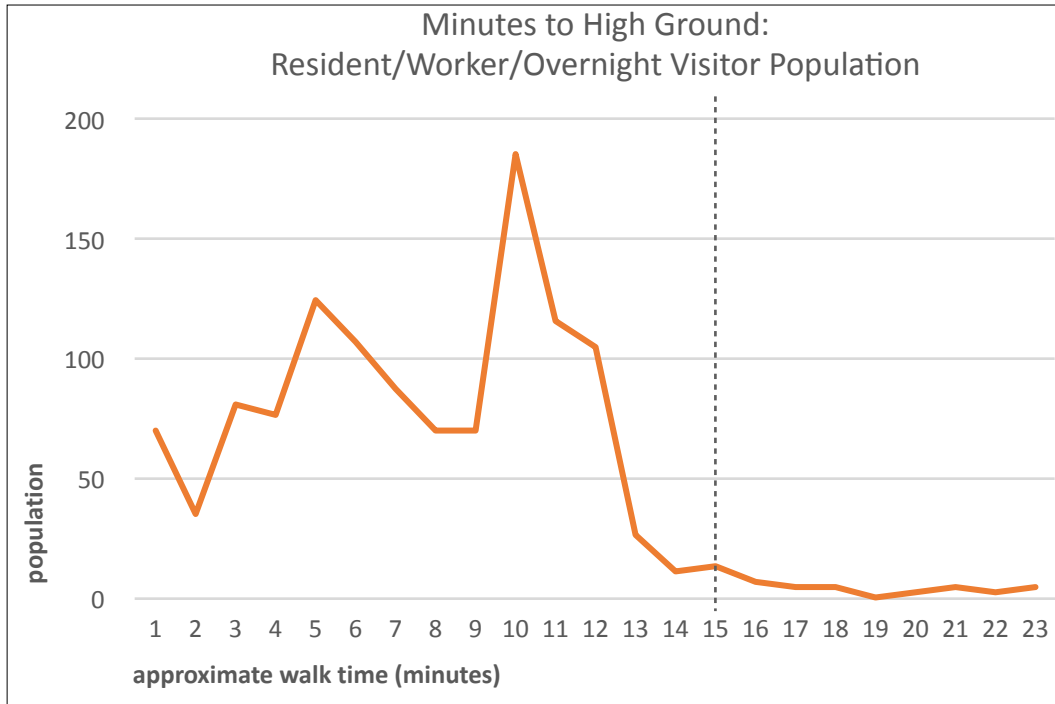
## Tokeland: TO 5 *alternative*



Photo Credit: *Bob Freitag*

TO 5 *Alternative #1* - Vacant lot owned by Nelson Crab. One parcel to the west of 3088 Kindred Avenue.

# Tokeland: VES Option #2 (Community-Derived)



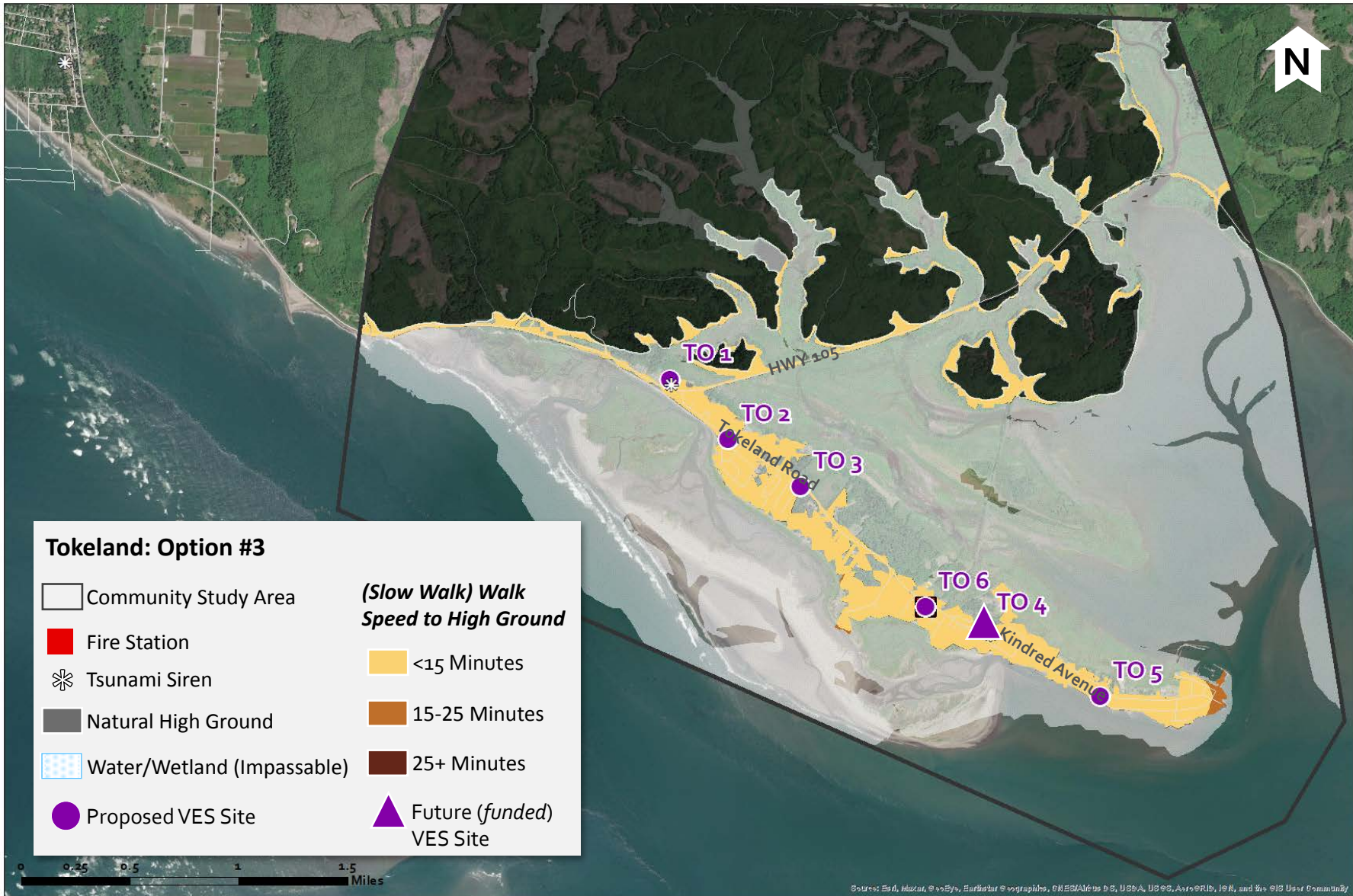
Approximate # of People, by Walking Time Bands, to High Ground

<15 minutes	15-25 minutes	25+ minutes
1,192 people	41 people	n/a

- Fire Station: Approximate 9 minute walk time to high ground or VES
- ▲ Schools: N/A

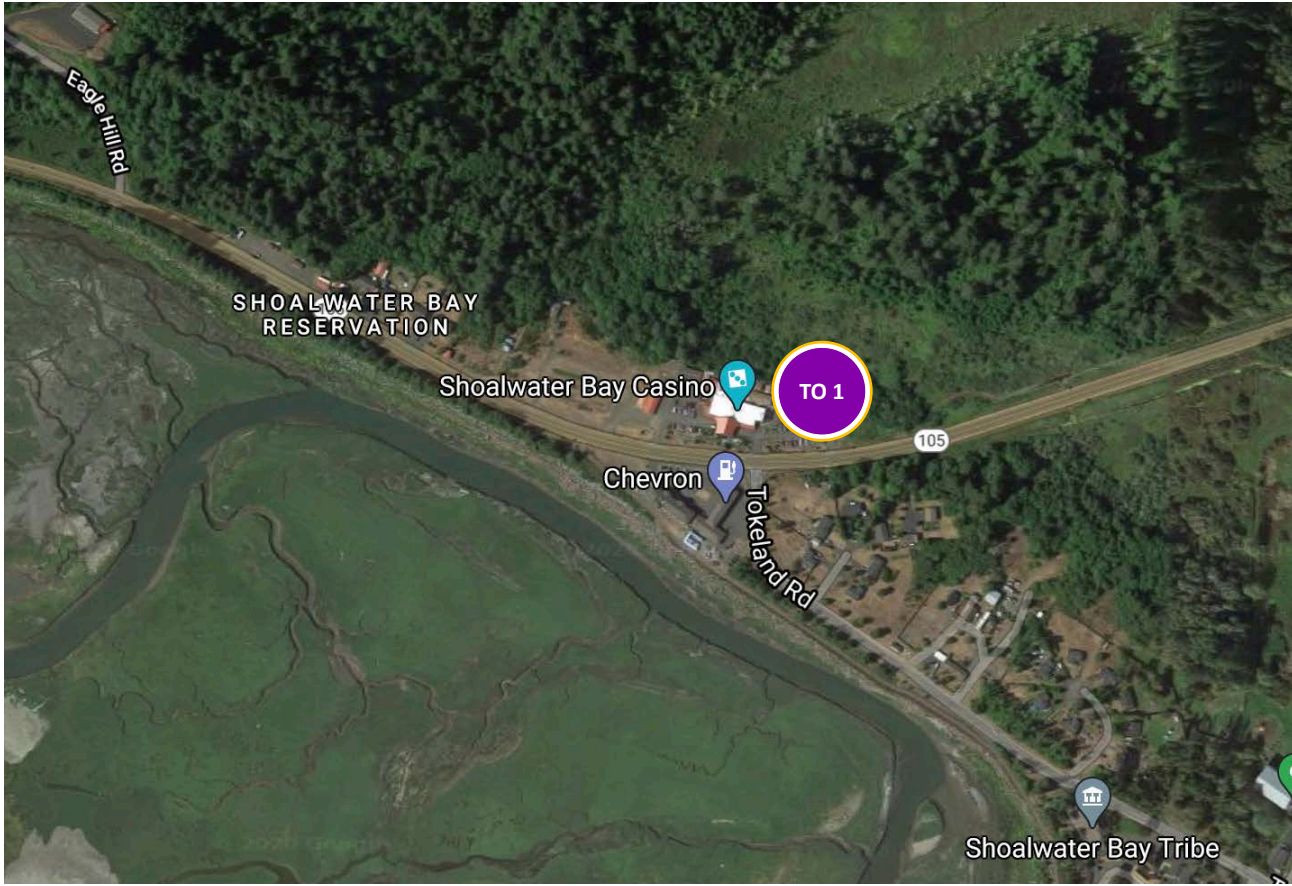
**Under Option #2:**

- approximately **96.6%** of the total estimated Tokeland population are within 15 minutes to natural high ground OR vertical evacuation
- approximate *maximum* walk time to natural high ground or vertical evacuation for identified population = **23** minutes
- approximate *minimum* VES capacity need (15 minute walk time) = **615** people
- # of proposed VES = **5**





# Tokeland: TO 1



TO 1	
Address	10 Eagle Hill Road State Route 105 &
Intersection	Tokeland Road
Options	2, 3
Notes	Casino parking lot

Source: Google Maps

# Tokeland: TO 1

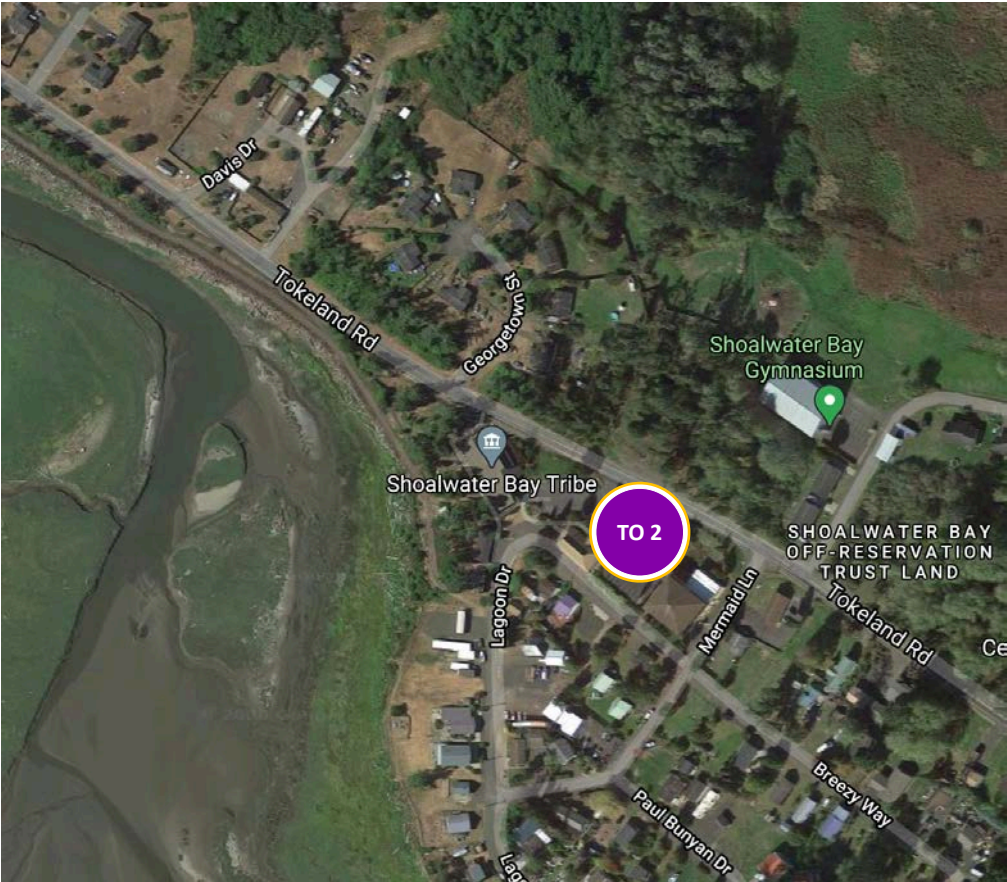


TO 1 - Shoalwater Bay Casino parking lot located to the west of the building.

Photo Credit: *Google Maps Street View*



# Tokeland: TO 2

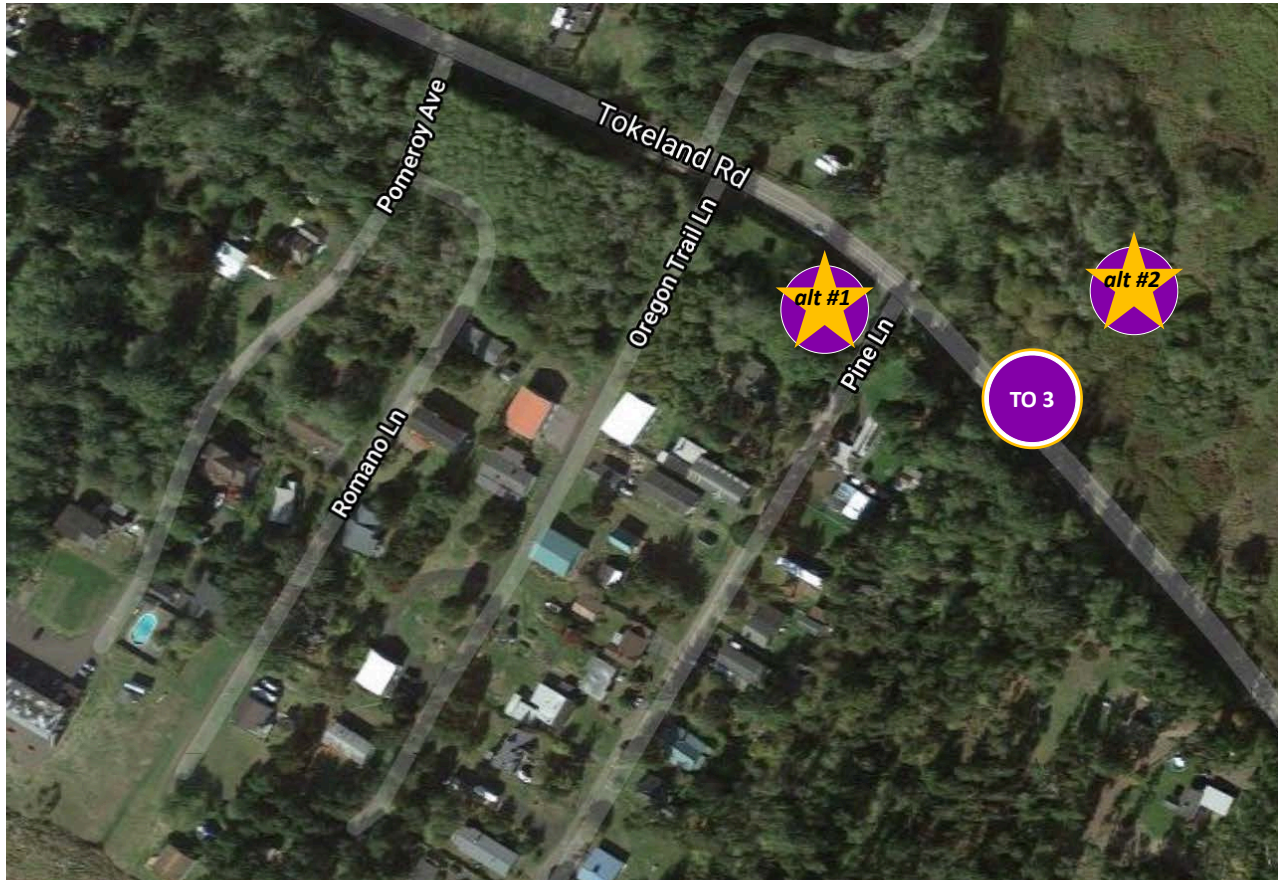


TO 2	
Address	2391 Tokeland Road
Intersection	Mermaid Lane & Tokeland Road
Options	2, 3
Notes	Parking lot at tribal headquarters.

Source: Google Maps



# Tokeland: TO 3 + alternatives



Source: Google Maps

TO 3	
Address	N/a
Intersection	Tokeland Road & Pine Lane
Options	2, 3, 4
Notes	Tokeland Road & Pine Lane

TO 3 - alt #1	
Address	4299 Pine Lane
Intersection	Tokeland Road & Pine Lane
Notes	Privately-owned, undeveloped land

TO 3 - alt #2	
Address	2500 Tokeland Road
Intersection	Tokeland Road & Pine Lane (north-side)
Notes	Large agricultural land

## Tokeland: TO 3



Photo Credit: *Bob Freitag*

TO 3 - Pine Lane & Tokeland Road (SE corner). Currently private land, potential adjacent vacant parcels could work well as alternative: *see subsequent photos*





## Tokeland: TO 3 *alternatives* #1 + #2



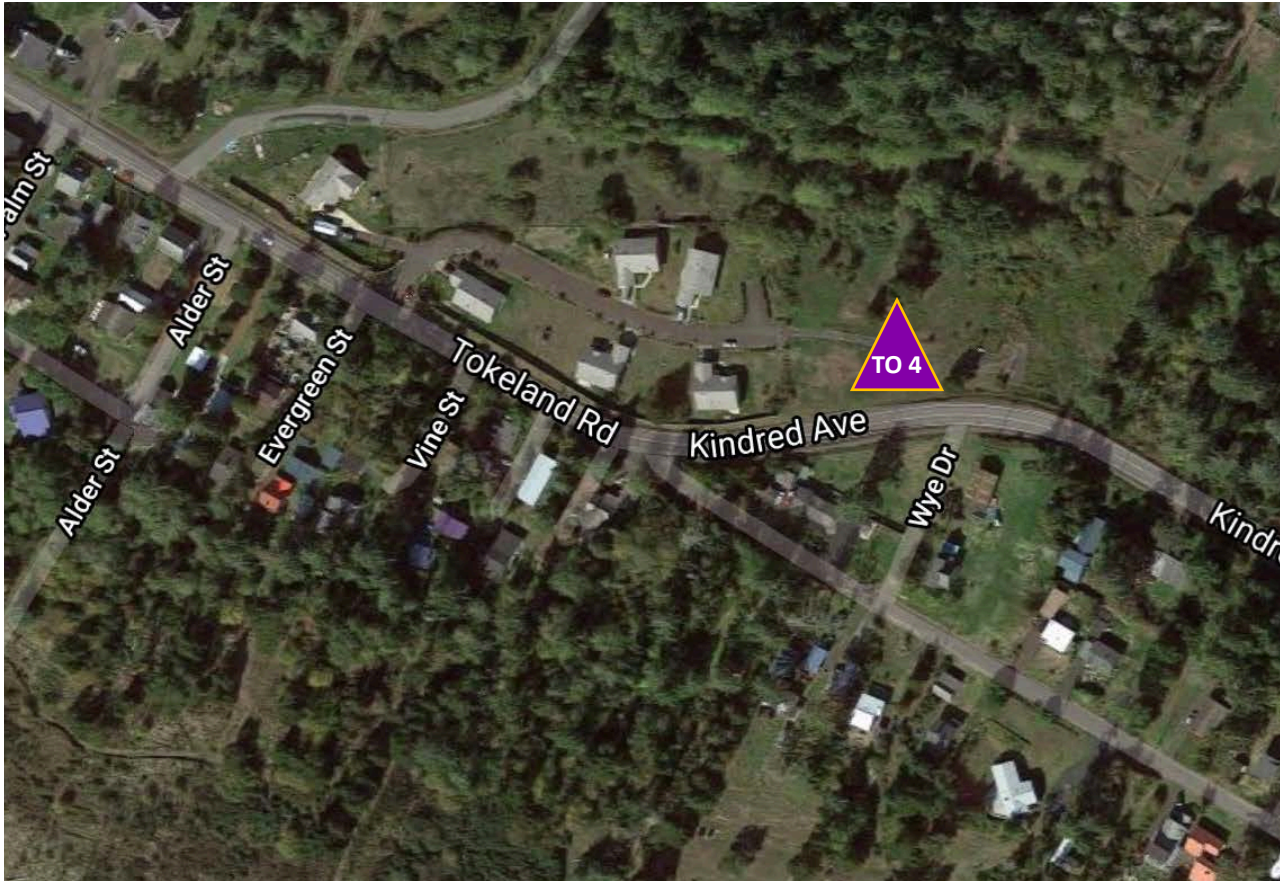
TO 3 - *Alternative #1* - Across the street (Pine Lane), to the west. Private land, but undeveloped/vacant.



TO 3 - *Alternative #2*: Across Tokeland Road, to the north. Private agricultural land, but open space available. Photo Credit: *Bob Freitag*



# Tokeland: TO 4



TO 4	
Address	2848 Fisher Avenue Kindred Avenue & Wye Drive
Intersection	Drive
Options	2, 3, 4
Notes	Current location of “in-progress” VES. Land/project owned by Tribe. Major construction on-hold during COVID.

Source: Google Maps

# Tokeland: TO 4

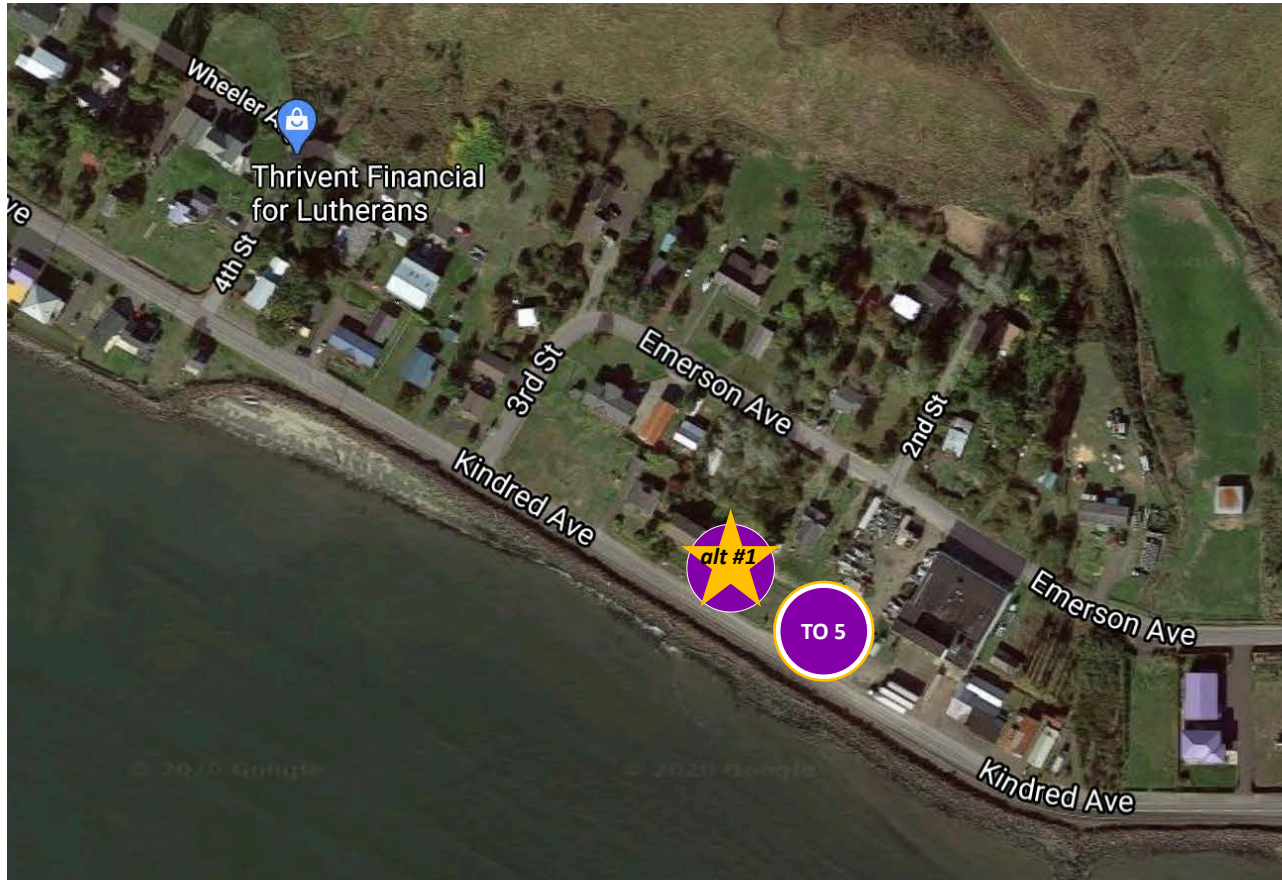


Photo Credit: *Bob Freitag*

TO 4 - Future VES location! Started construction on May 3, 2021.



# Tokeland: TO 5 + *alternative*



TO 5	
Address	3088 Kindred Avenue Kindred Avenue & 2nd Street
Intersection	Street
Options	2, 3, 4
Notes	Owned by Nelson Crab. Open lot.

TO 5 - alt #1	
Address	N/a
Intersection	SE of Kindred Avenue & 3rd Street
Notes	Nelson Crab, vacant lot to NW

Source: Google Maps



# Tokeland: TO 5



Photo Credit: *Bob Freitag*

TO 5 - Lot used by Nelson Crab: 3088 Kindred Avenue



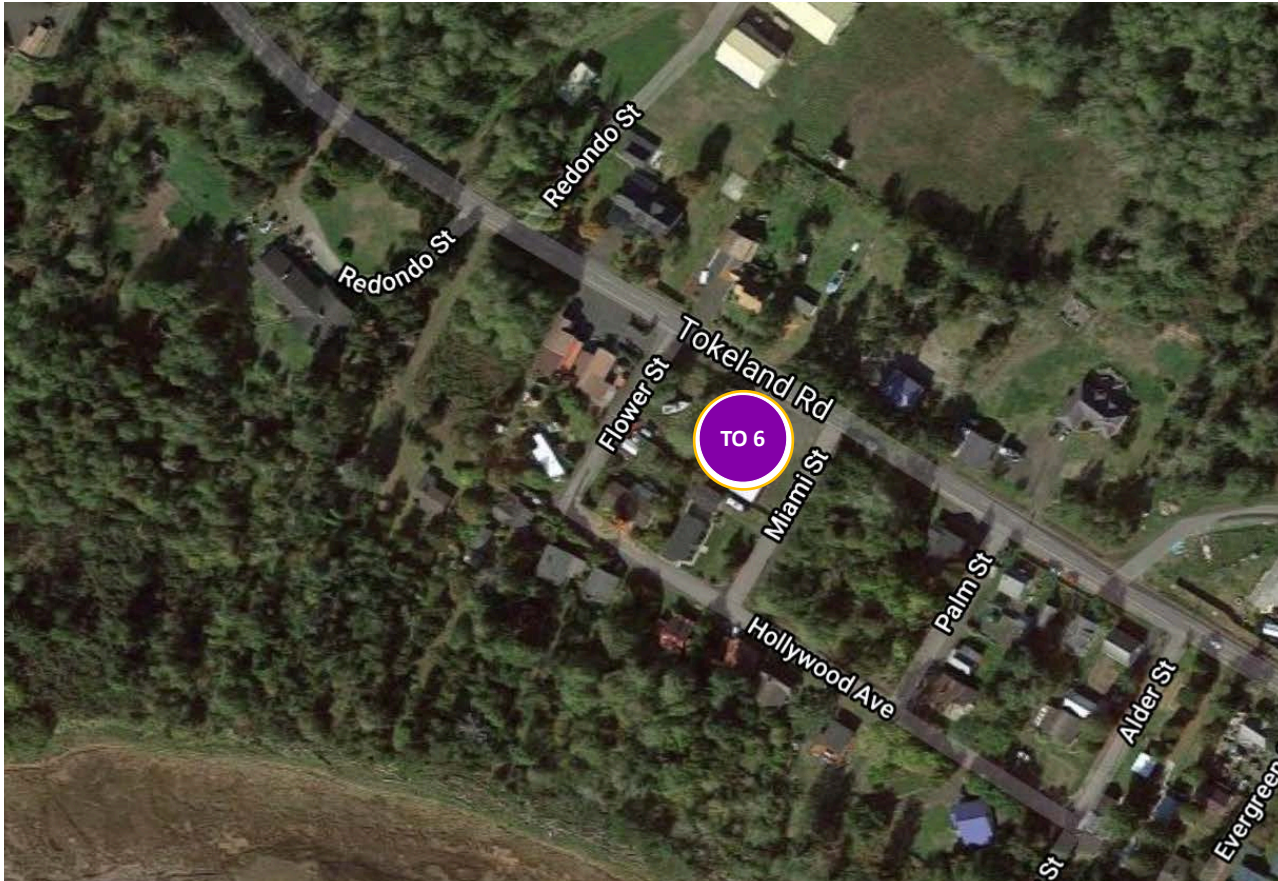
## Tokeland: TO 5 *alternative*



Photo Credit: *Bob Freitag*

TO 5 *Alternative #1* - Vacant lot owned by Nelson Crab. One parcel to the west of 3088 Kindred Avenue.

# Tokeland: TO 6



TO 6	
Address	2753 Tokeland Road
Intersection	2753 Tokeland Road
Options	3
Notes	Pacific County Fire District #5

Source: Google Maps



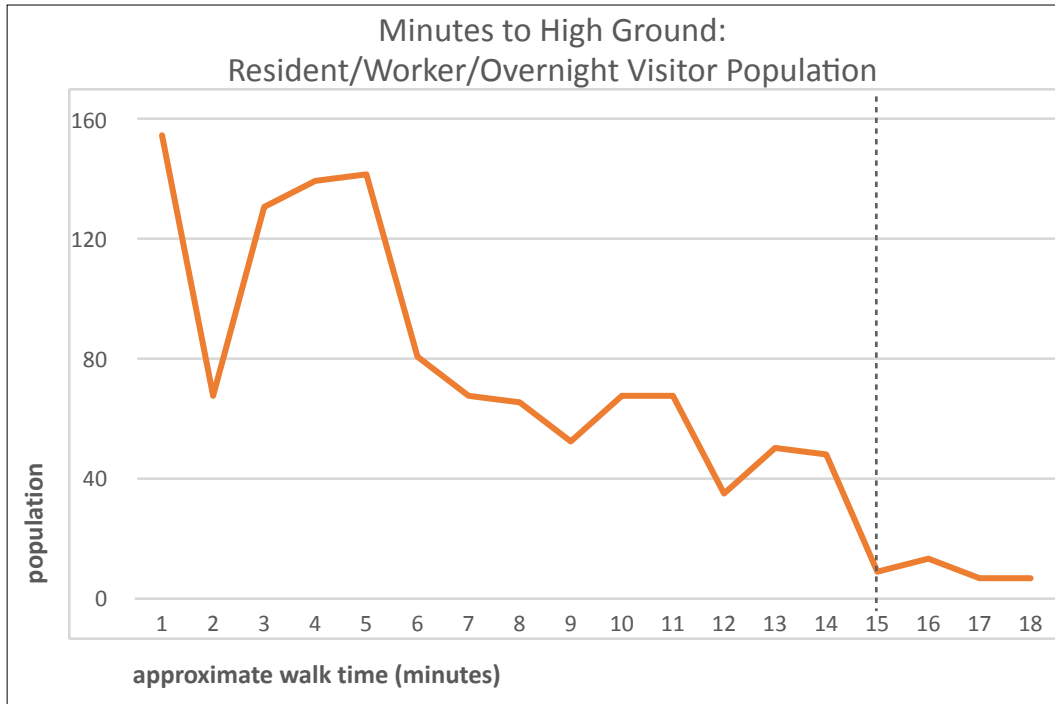
# Tokeland: TO 6



Photo Credit: *Bob Freitag*

TO 6 - Pacific County Fire District #5

# Tokeland: VES Option #3 (Broad Spatial Coverage)



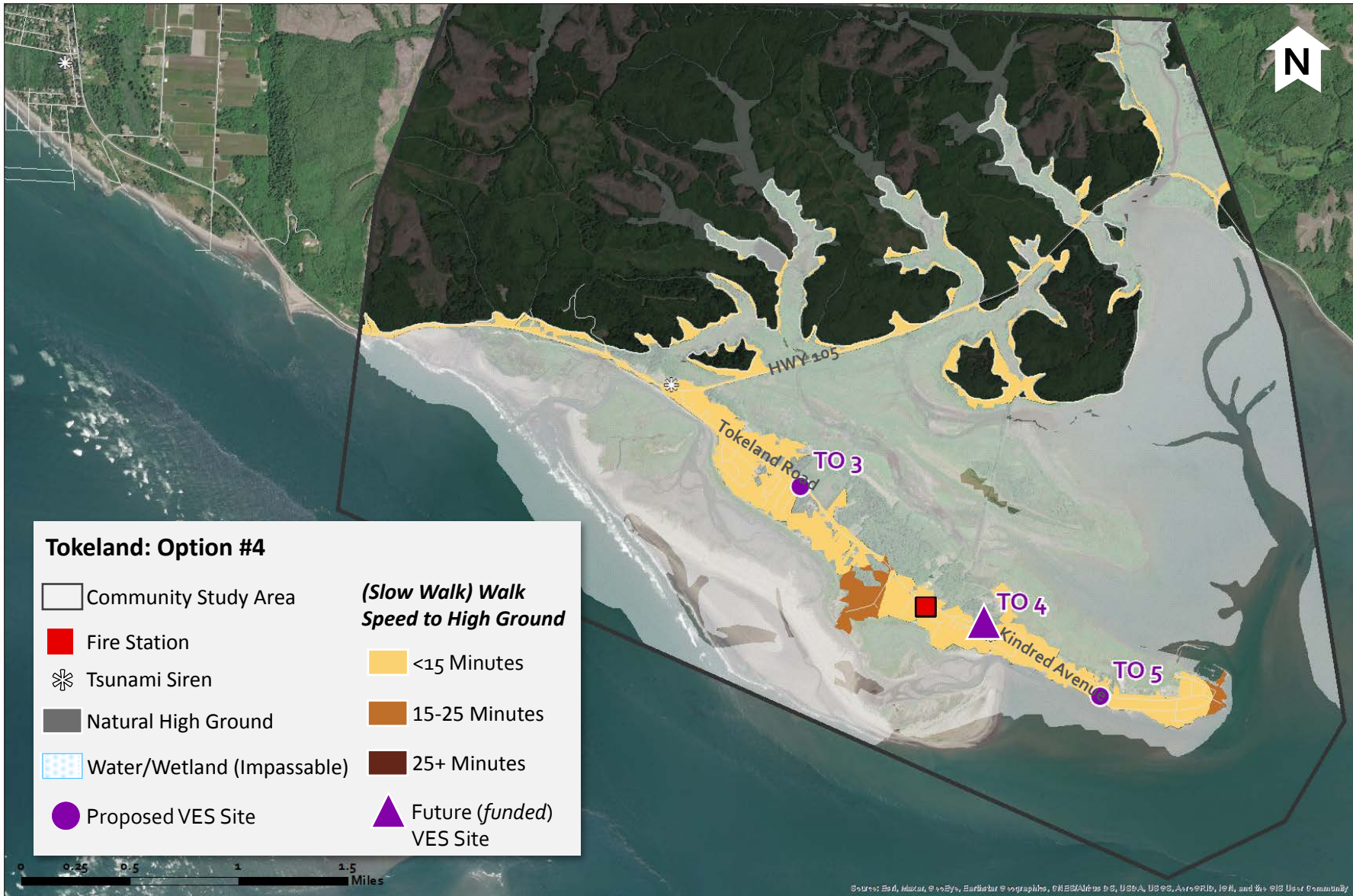
Approximate # of People, by Walking Time Bands, to High Ground

<15 minutes	15-25 minutes	25+ minutes
1,199 people	35 people	n/a

- Fire Station: Approximate 1 minute walk time to high ground or VES
- ▲ Schools: N/A

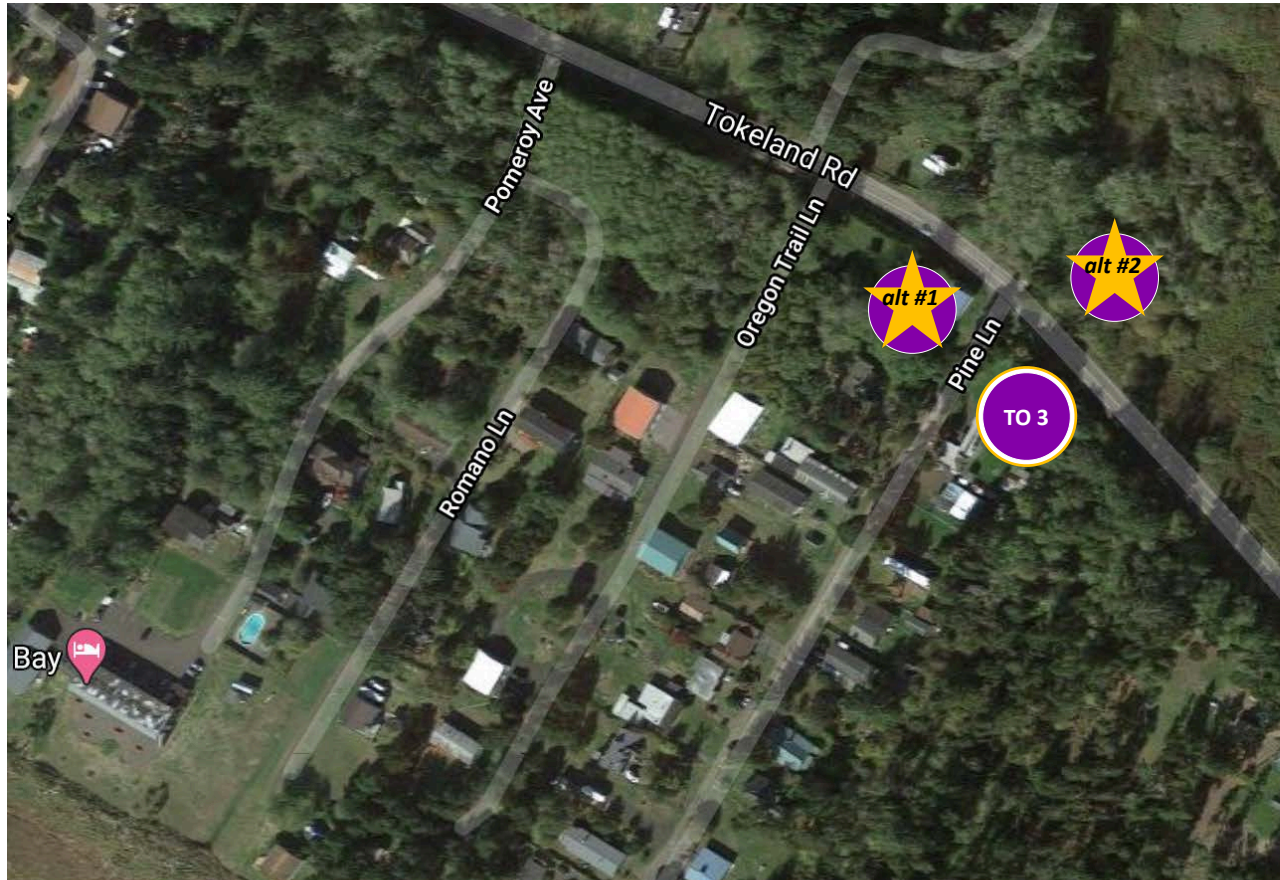
- Under Option #3:**
- approximately **97.2%** of the total estimated Tokeland population are within 15 minutes to natural high ground OR vertical evacuation
  - approximate *maximum* walk time to natural high ground or vertical evacuation for identified population = **18 minutes**
  - approximate *minimum* VES capacity need (15 minute walk time) = **643 people**
  - # of proposed VES = **6**

**Note:** Option #3 does not include **all** visitors (i.e. day trip visitors, peak summer day visitors). It does, however, factor in more thorough coverage across the community, including some popular beach areas and other locations where there may be occasional gatherings of people (i.e. parking lots, campgrounds, etc.). Local decision-makers will need to determine how (or if) to factor in that additional population.





# Tokeland: TO 3 + alternatives



Source: Google Maps

TO 3	
Address	N/a
Intersection	Tokeland Road & Pine Lane
Options	2, 3, 4
Notes	Tokeland Road & Pine Lane

TO 3 - alt #1	
Address	4299 Pine Lane
Intersection	Tokeland Road & Pine Lane
Notes	Privately-owned, undeveloped land

TO 3 - alt #2	
Address	2500 Tokeland Road
Intersection	Tokeland Road & Pine Lane (north-side)
Notes	Large agricultural land

## Tokeland: TO 3



Photo Credit: *Bob Freitag*

TO 3 - Pine Lane & Tokeland Road (SE corner). Currently private land, potential adjacent vacant parcels could work well as alternative: *see subsequent photos*





## Tokeland: TO 3 *alternatives* #1 + #2



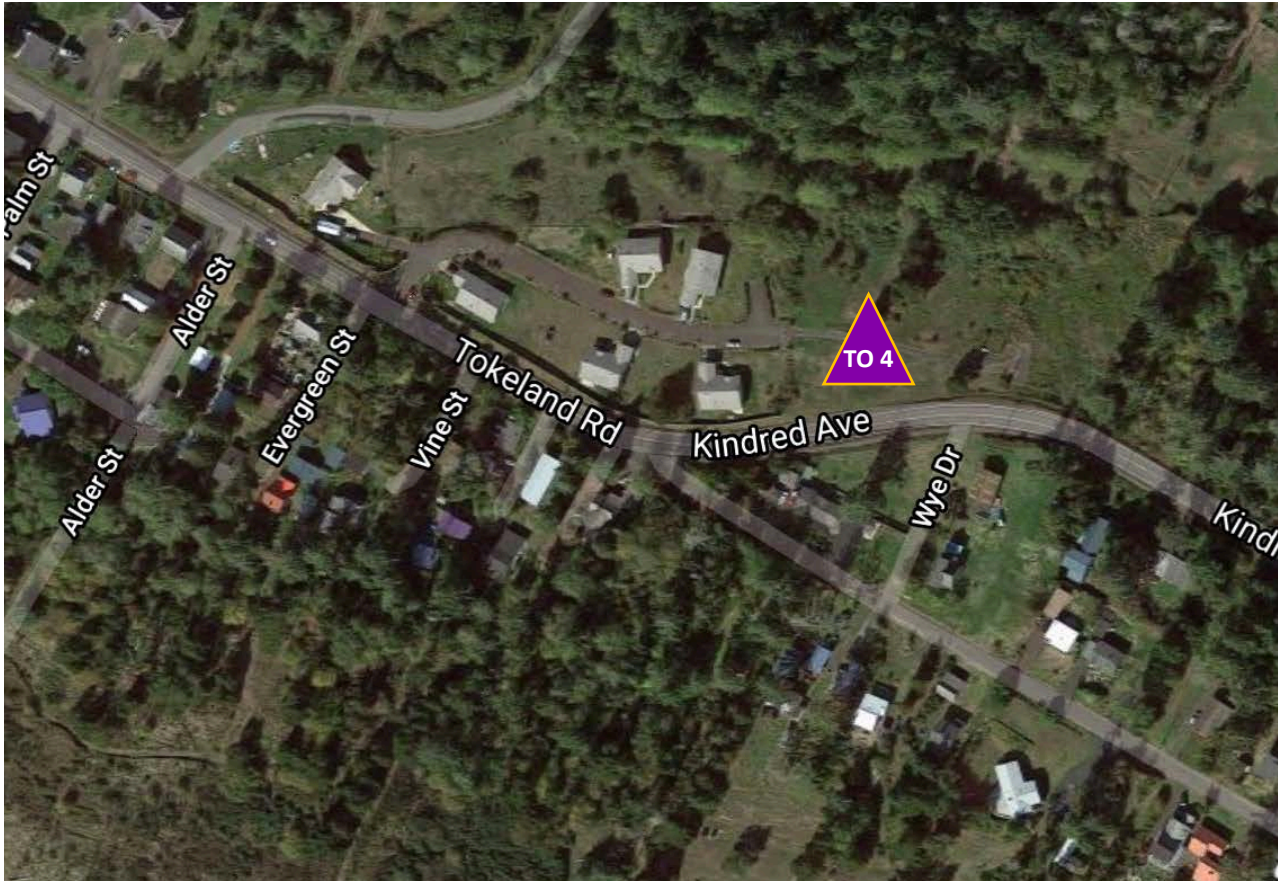
TO 3 - *Alternative #1* - Across the street (Pine Lane), to the west. Private land, but undeveloped/vacant.



TO 3 - *Alternative #2*: Across Tokeland Road, to the north. Private agricultural land, but open space available. Photo Credit: *Bob Freitag*



# Tokeland: TO 4



TO 4	
Address	2848 Fisher Avenue Kindred Avenue & Wye Drive
Intersection	Drive
Options	2, 3, 4
Notes	Current location of “in-progress” VES. Land/project owned by Tribe. Major construction on-hold during COVID.

Source: Google Maps

# Tokeland: TO 4

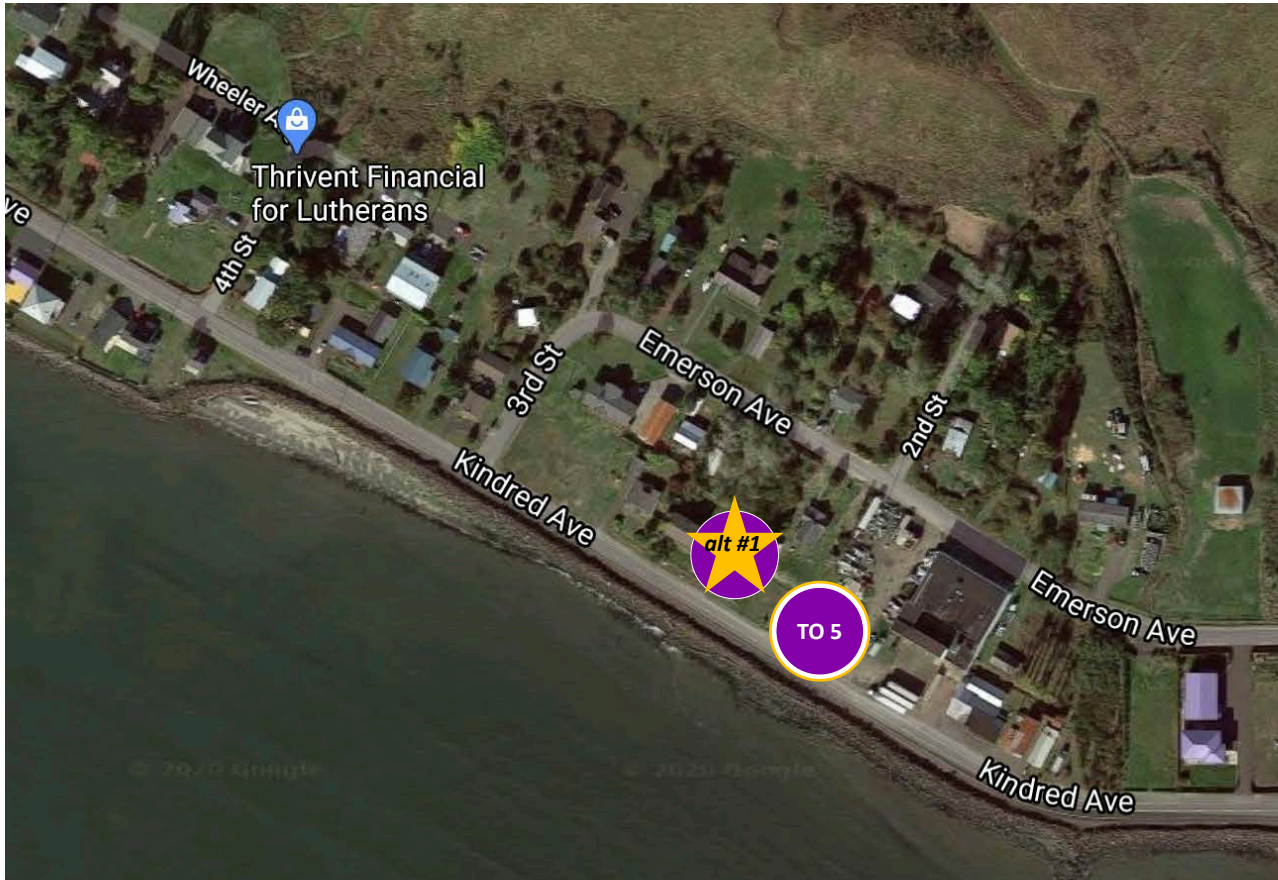


Photo Credit: *Bob Freitag*

TO 4 - Future VES location! Started construction on May 3, 2021.



# Tokeland: TO 5 + *alternative*



TO 5	
Address	3088 Kindred Avenue
Intersection	Kindred Avenue & 2nd Street
Options	2, 3, 4
Notes	Owned by Nelson Crab. Open lot.

TO 5 - alt #1	
Address	N/a
Intersection	SE of Kindred Avenue & 3rd Street
Notes	Nelson Crab, vacant lot to NW

Source: Google Maps



# Tokeland: TO 5



Photo Credit: *Bob Freitag*

TO 5 - Lot used by Nelson Crab: 3088 Kindred Avenue



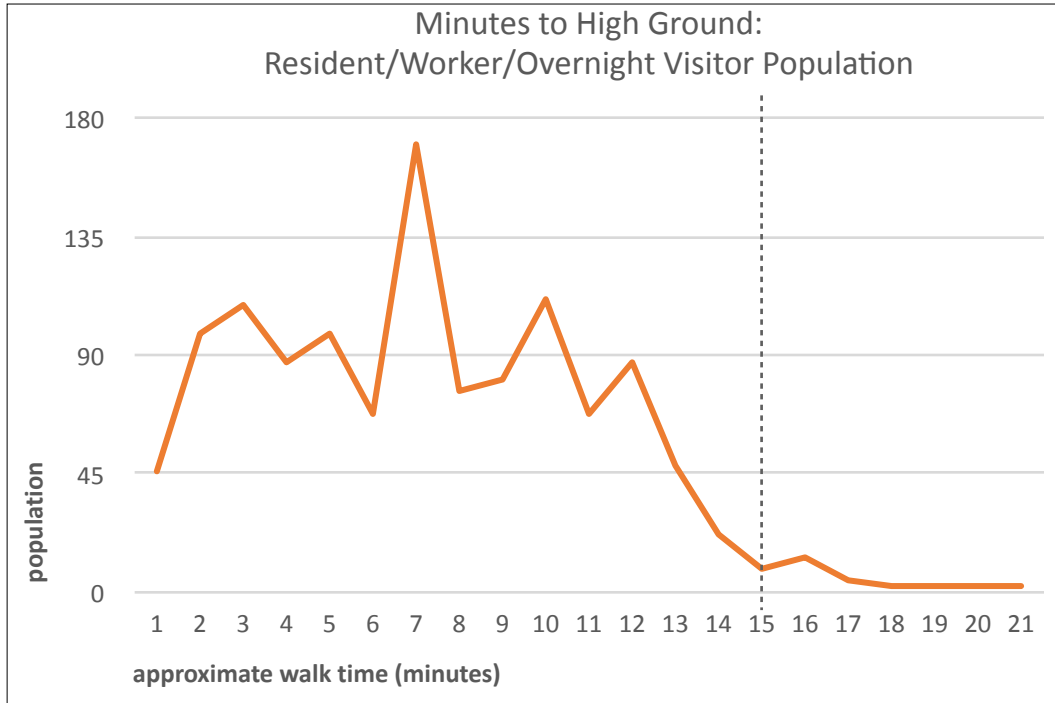
## Tokeland: TO 5 *alternative*



Photo Credit: *Bob Freitag*

TO 5 *Alternative #1* - Vacant lot owned by Nelson Crab. One parcel to the west of 3088 Kindred Avenue.

# Tokeland: VES Option #4 (Efficient/Lean)



Approximate # of People, by Walking Time Bands, to High Ground

<15 minutes	15-25 minutes	25+ minutes
1,199	35 people	n/a

- Fire Station: Approximate 9 minute walk time to high ground or VES
- ▲ Schools: N/A

**Under Option #4:**

- approximately **97.2%** of the total estimated Tokeland population are within 15 minutes to natural high ground OR vertical evacuation
- approximate *maximum* walk time to natural high ground or vertical evacuation for identified population = **21** minutes
- approximate *minimum* VES capacity need (15 minute walk time) = **521** people
- # of proposed VES = **3**



# Potential Tokeland VES Locations: All Options (1-4)

VES ID	Intersection	Parcel ID	Parcel Owner	Lat   Long	Options	Notes
TO 1	State Route 105 & Tokeland Road	14110317000	Shoalwater Indian Reservation	46.725044, -124.019800	2, 3	State Route 105 & Tokeland Road, Casino parking lot
TO 2	2373 Tokeland Road	78008002001	Shoalwater Indian Reservation	46.721536, -124.015933	2, 3	Shoalwater Bay tribal headquarter parking lot
TO 3	Tokeland Road & Pine Lane	78036000001	Kitty J Sage	46.718694, -124.008509	2, 3, 4	Tokeland Road & Pine Lane
TO 4	Kindred Avenue & Wye Drive	14111234014	USA/Trust for Shoalwater Bay	46.709750, -123.990759	2, 3, 4	Kindred Avenue & Wye Drive
TO 5	Kindred Avenue & 2nd Street	78029005017	Nelson Crab Inc	46.705469, -123.978893	2, 3, 4	Kindred Avenue & 2nd Street
TO 6	2753 Tokeland Road	78013003001	Pacific County Fire District #5	46.711119, -123.995893	3	2753 Tokeland Road

Notes

**TO 3** - TO 3 is currently under private ownership, although vacant/undeveloped. There are two adjacent parcels that could be considered as alternatives. One is private, undeveloped land across Pine Lane (#1) and the other is a large parcel of agricultural land across Tokeland Road (#2): *see photos*.

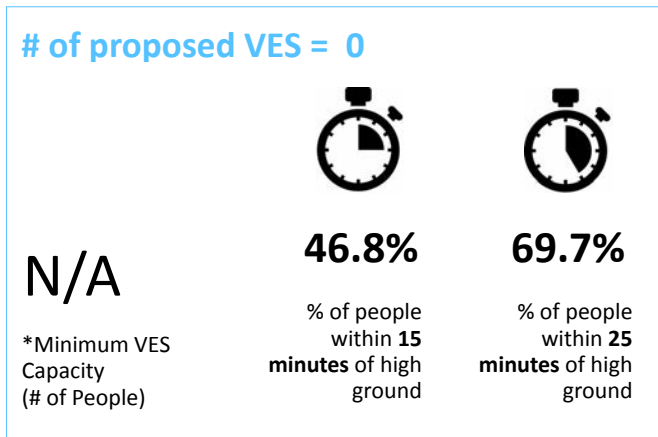
**TO 4** - TO 4 is the location of the Tribe’s first tower (*under construction*) and first for Pacific County at-large. COVID-19 has slowed construction, but still fully funded to be constructed at some point in 2021. Will hold ~384 people and is approximated to be sized at 3,800 sf (using FEMA guidance of 10 sf/person).

**TO 5** - TO 5 is the Nelson Crab processing facility site. Additionally, there is a vacant lot to the west that is also owned by Nelson Crab (*see photos*).

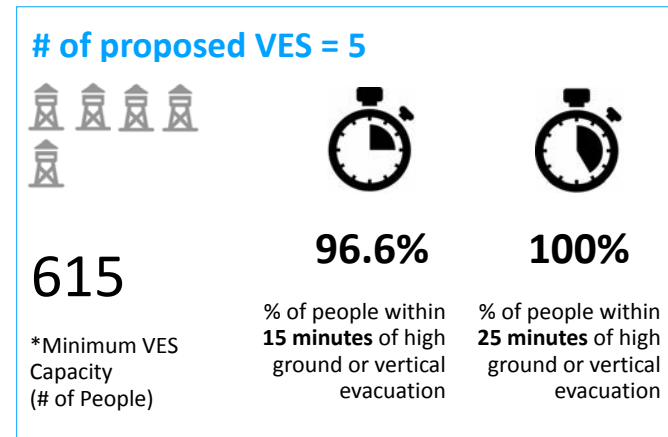
**TO 6** - The TO 6 site is the only fire department located on the peninsula. Would be a natural choice for potential second VES location.

# Tokeland: Comparison of All Options (1-4)

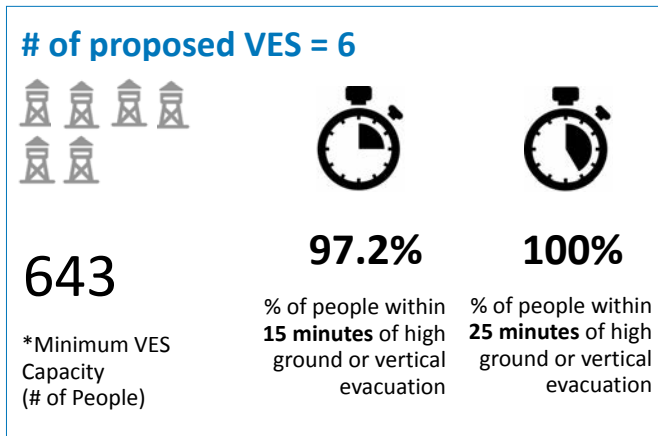
Option #1



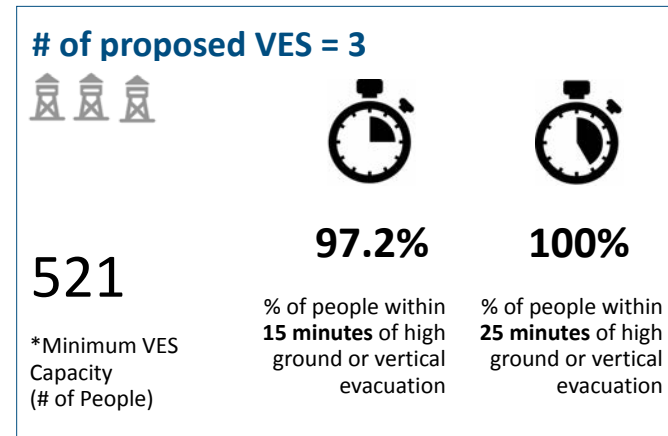
Option #2



Option #3



Option #4



## Tokeland: Comparison of All Options (1-4)

**Notes:**

\**Minimum VES Capacity* = the delta (or difference) between Option #1 (no VES) number of people at each minute mark and Options #2, #3, and #4 number of people at each minute mark. For example: If 10 people are within 15 minutes of high ground under Option #1 but that number increases to 25 people under Option #2 - then we know that a minimum of 15 additional people have been put within 15 minutes of high ground through the addition of a Vertical Evacuation Structure. Therefore, the minimum VES capacity for this example is 15 people.



# North Cove

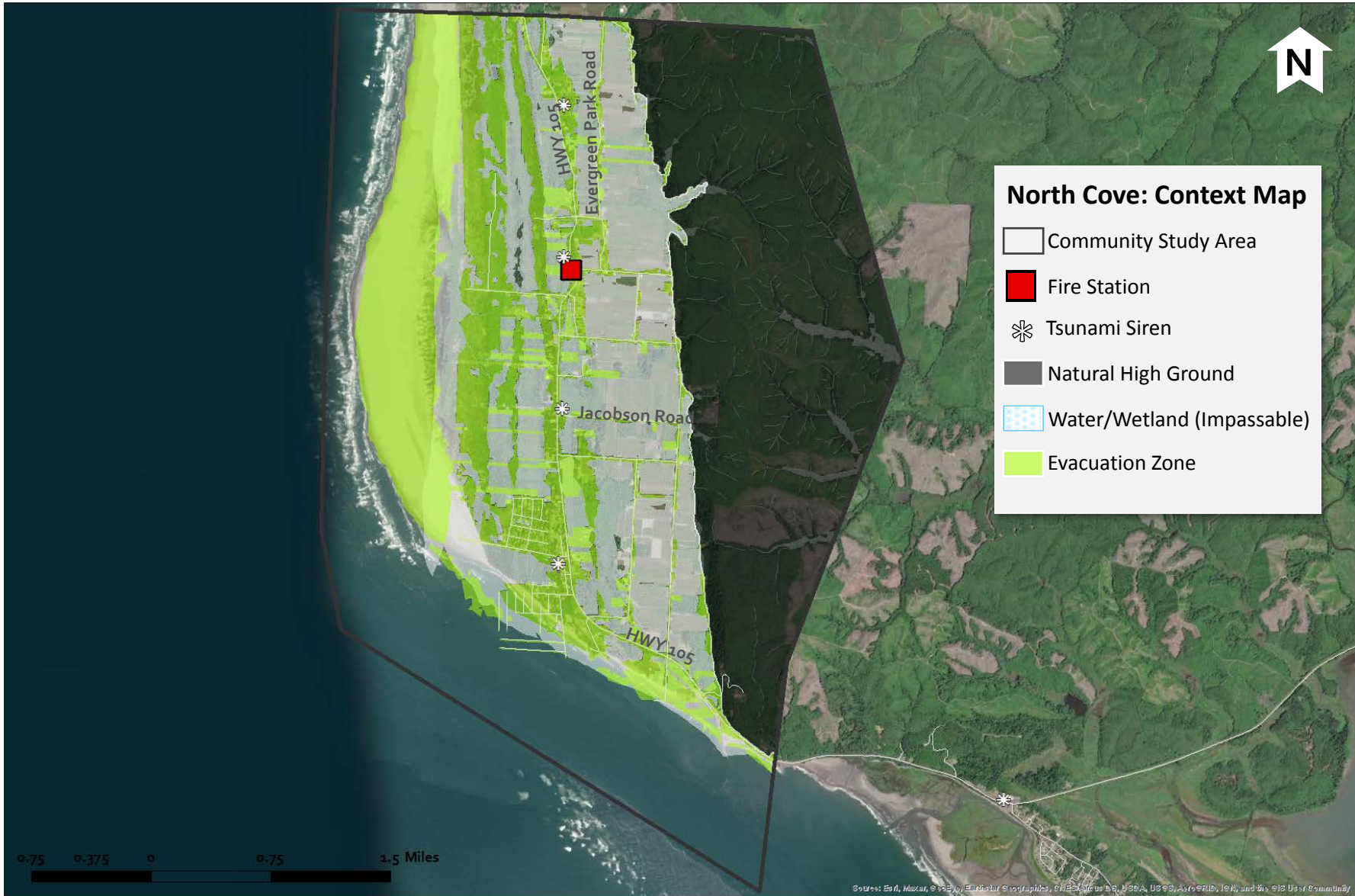
***North Cove community study area population in the tsunami hazard area = ~864 people***

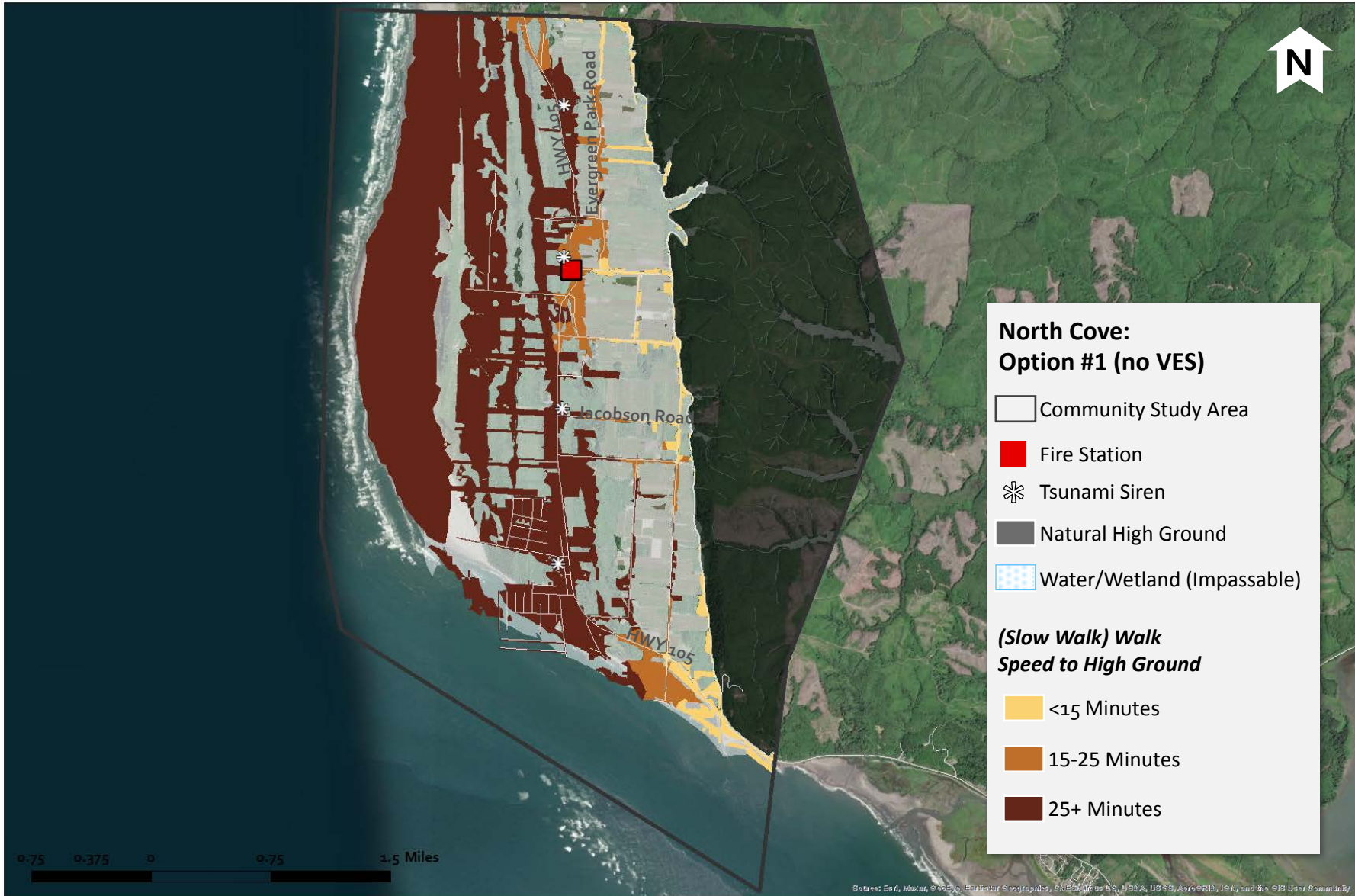
*Resident/Worker/Overnight Visitor population = ~834 people*

*Fire Department occupancy = ~30 people*

*Schools occupancy = N/A*

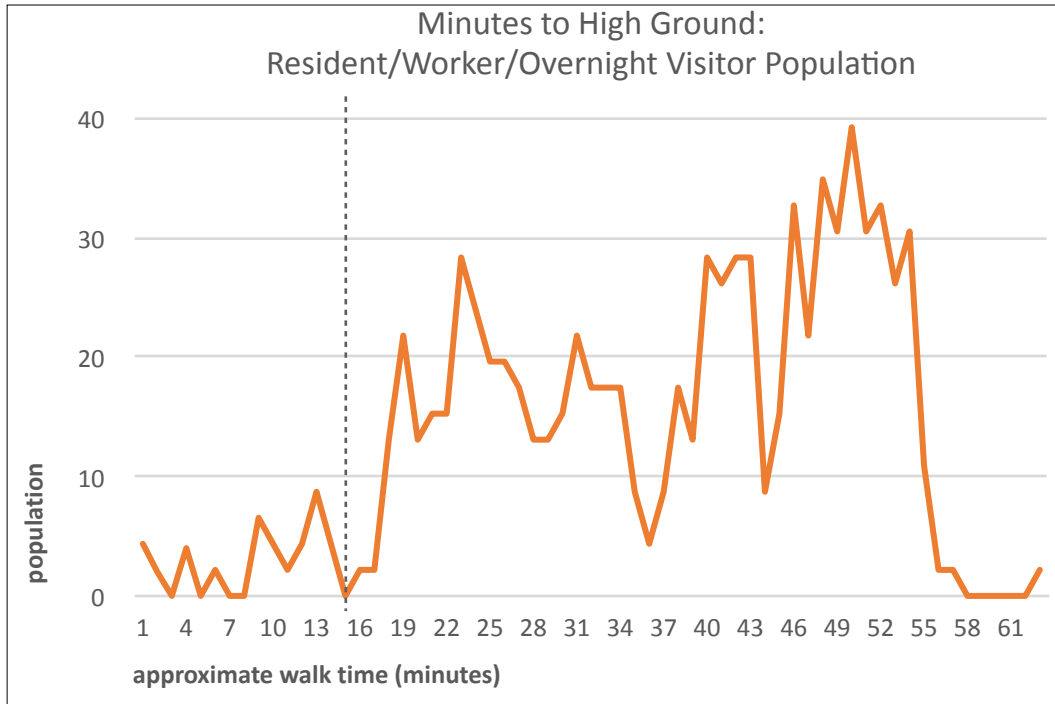
Source: 2010 Census (average household size); Pacific County Residential Land Use







# North Cove: VES Option #1 (No VES)



\*Approximate *maximum* walk time accounts for the resident/worker/overnight visitor population locations only. This does not factor in daytime visitors or beach visitors, for example.

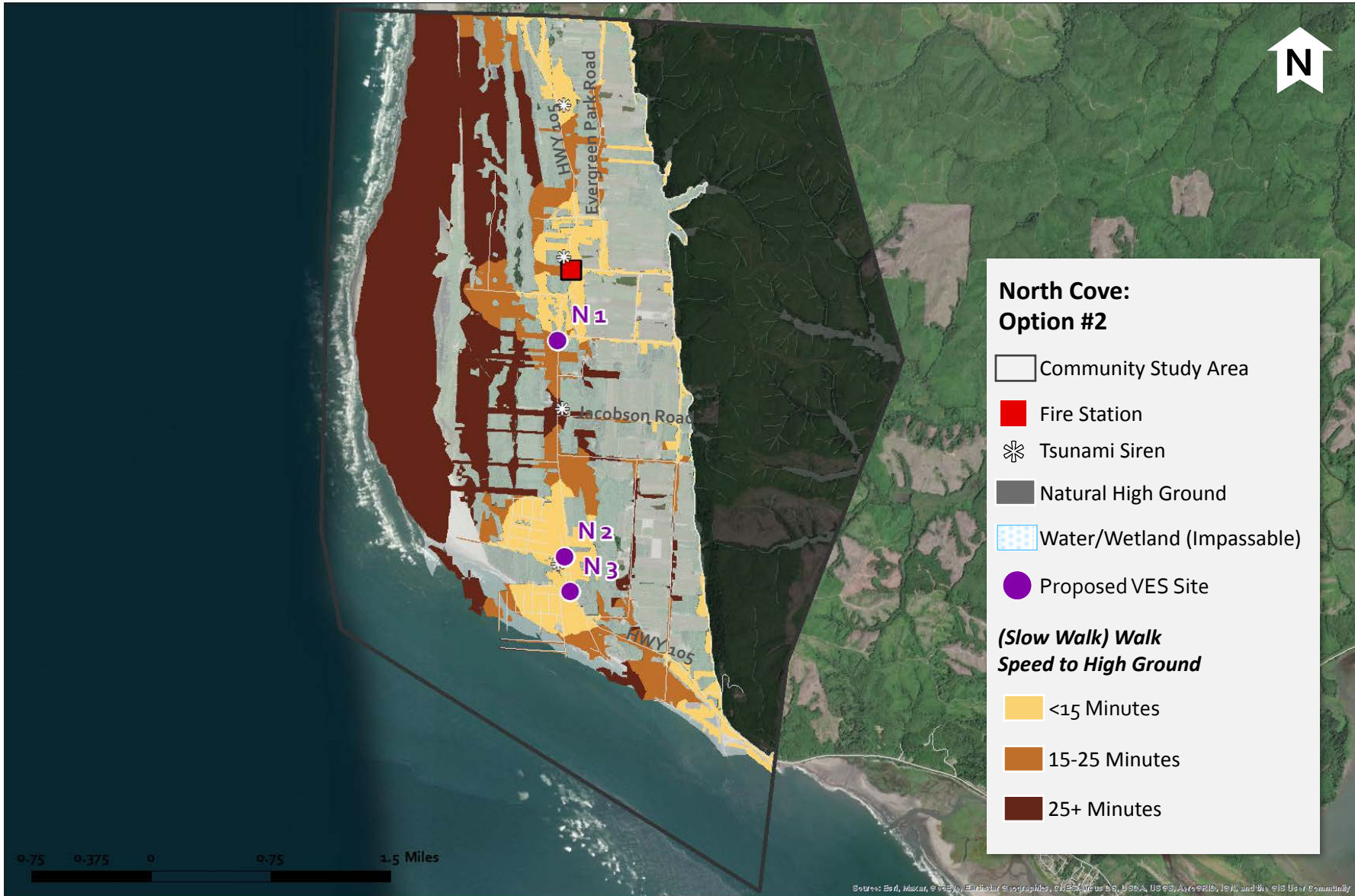
Approximate # of People, by Walking Time Bands, to High Ground

<15 minutes	15-25 minutes	25+ minutes
43 people	185 people	637 people

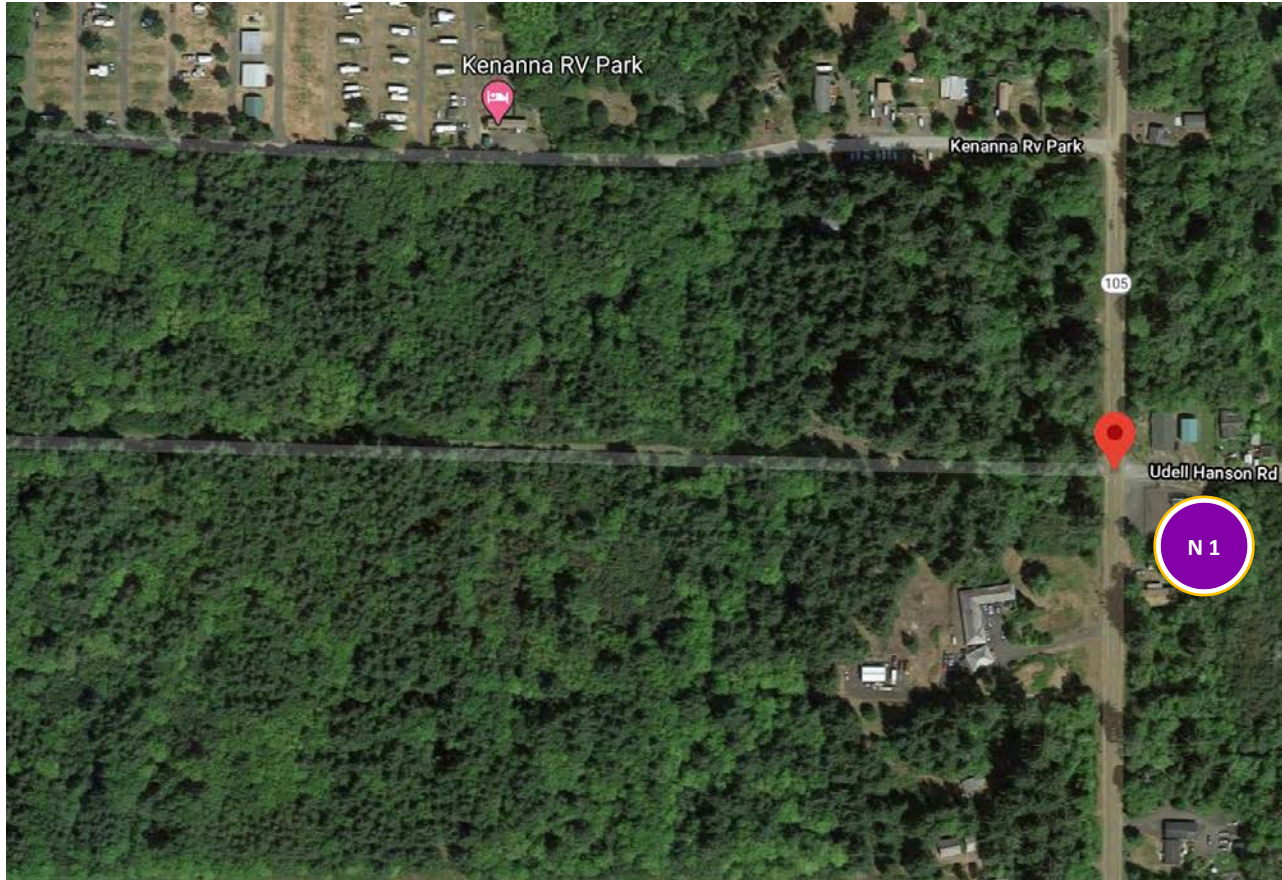
- Fire Station: Approximate 19 minute walk time to high ground
- ▲ Schools: N/A

**Under Option #1:**

- approximately **5.0%** of the total estimated North Cove population are within 15 minutes to natural high ground
- approximate *\*maximum* walk time to natural high ground for identified population = **63** minutes



# North Cove: N 1



<b>N 1</b>	
<b>Address</b>	3000 State Route 105
<b>Intersection</b>	Udell Hanson & State Route 105
<b>Options</b>	2, 3
<b>Notes</b>	Grays Harbor County public utility district property

Source: *Google Maps*



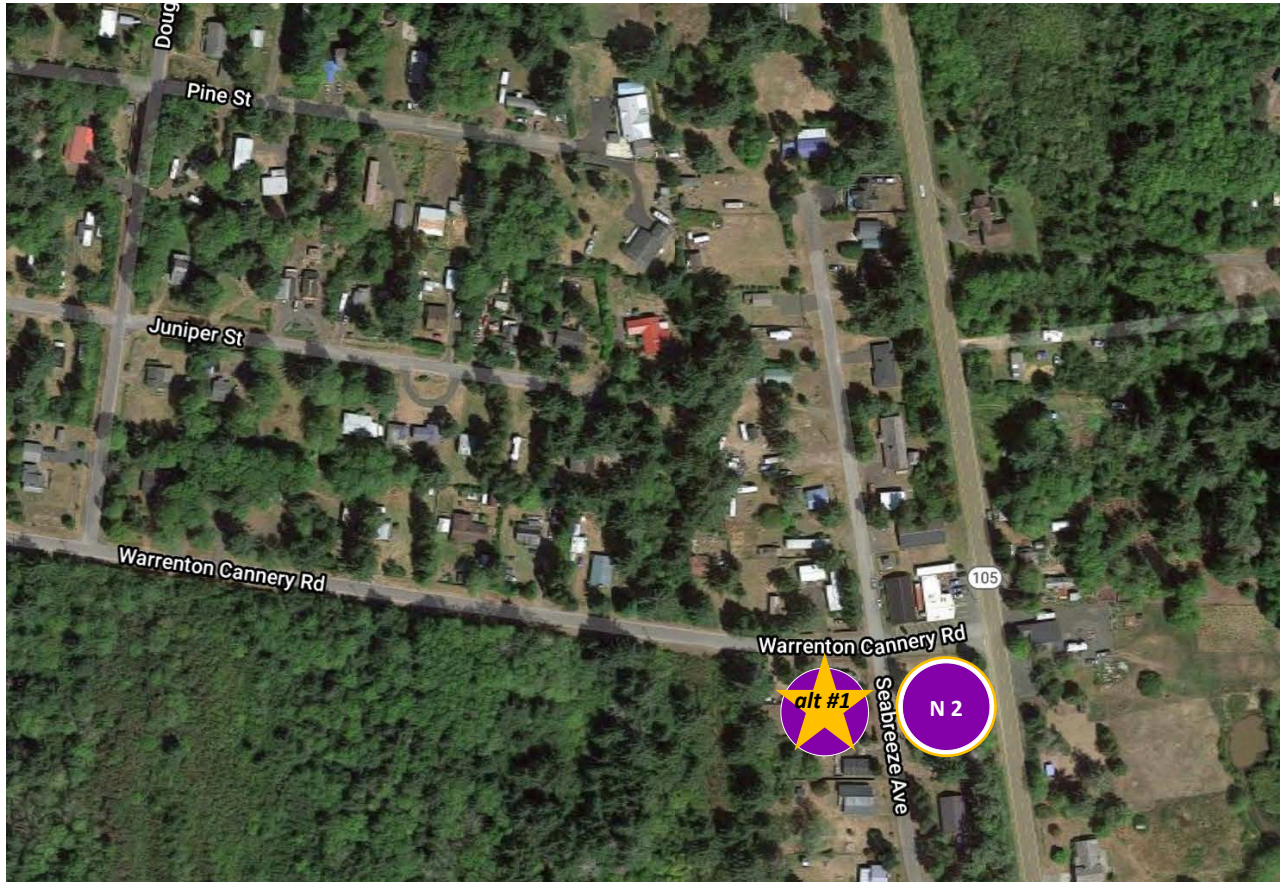
# North Cove: N 1



Photo Credit: *Bob Freitag*

N 1 - Utility district land. Confirm if large enough for relatively small VES tower.

# North Cove: N 2 + *alternative*



N 2	
Address	3561 State Route 105
Intersection	Warrenton Cannery Road & Seabreeze Avenue
Options	2, 3, 4
Notes	located on private property (currently), no nearby public/exempt

N 2 - alt #1	
Address	N/a
Intersection	SW of Seabreeze Avenue & Warrenton Cannery
Notes	Vacant parcel, yet privately-owned

Source: Google Maps



# North Cove: N 2



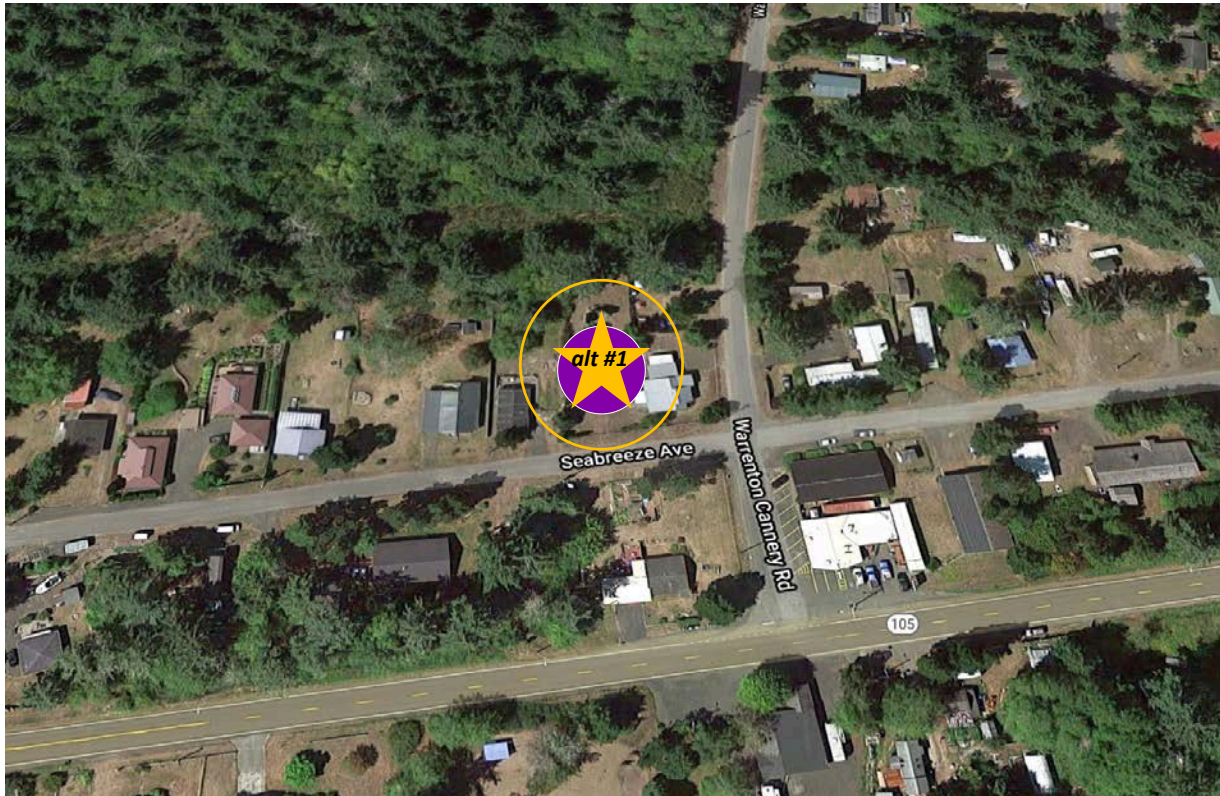
N 2 - Privately-owned land, with low density development. High visibility from the HWY. AHAB siren located behind parcel (see photo)

Photo Credit: Google Maps Street View





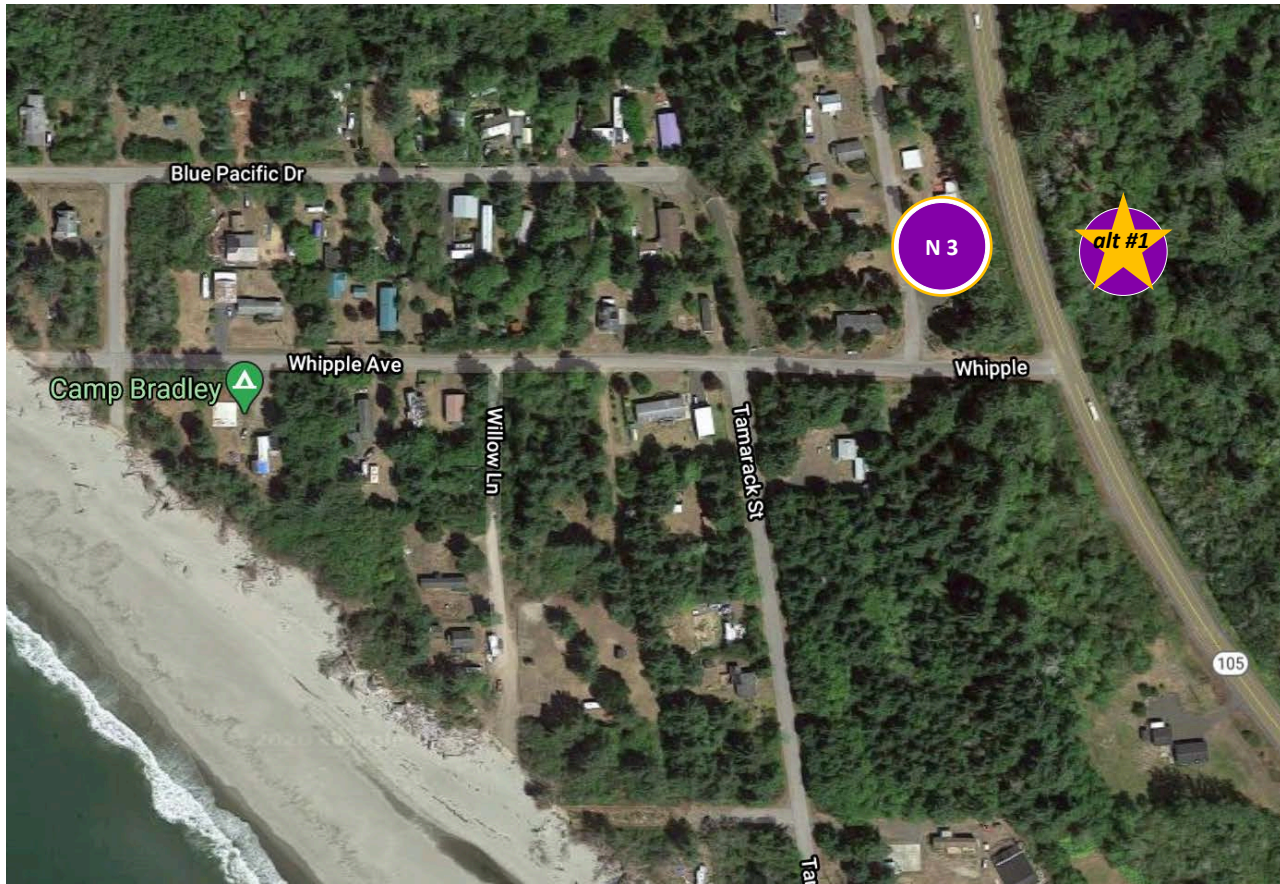
## North Cove: N 2 *alternative*



Source: *Google Maps*

N 2 - *Alternative #1*: site is located on Seabreeze Avenue. Privately-owned land, with no development. No street view photo available.

# North Cove: N 3 + *alternative*



N 3	
Address	N/a
Intersection	Whipple Avenue & SR 105
Options	2, 3
Notes	Central location for North Cove residents

N 3 - alt #1	
Address	3636 SR 105
Intersection	SR 105, east-side of highway
Notes	Privately-owned, vacant forested land

Source: *Google Maps*



# North Cove: N 3



N 3 - Privately-owned land, with low density development. High visibility from the HWY.

Photo Credit: *Google Maps Street View*



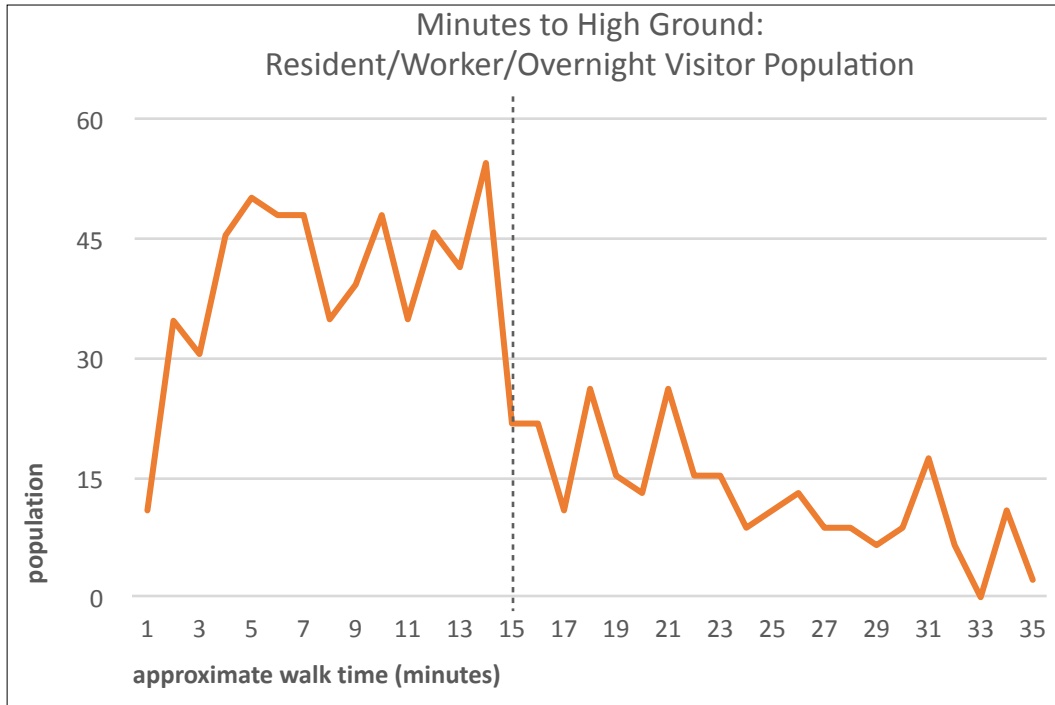
## North Cove: N 3 *alternative*



N 3 - *Alternative #1*: located across HWY 105 from N 3. Privately-owned, but vacant.

Photo Credit: *Bob Freitag*

# North Cove: VES Option #2 (Community-Derived)



Approximate # of People, by Walking Time Bands, to High Ground

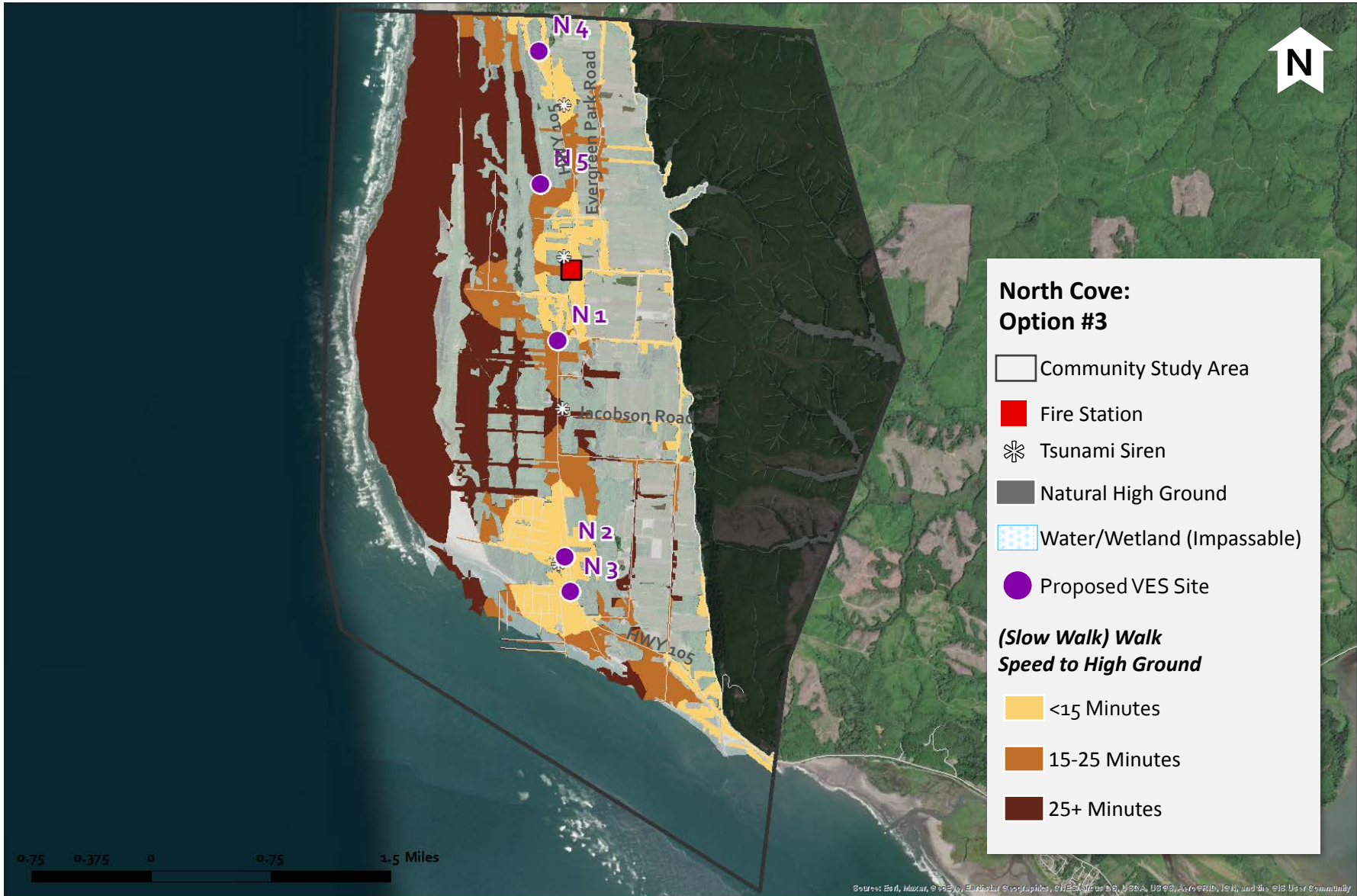
<15 minutes	15-25 minutes	25+ minutes
566 people	215 people	83 people

- Fire Station: Approximate 15 minute walk time to high ground or VES
- ▲ Schools: N/A

**Under Option #2:**

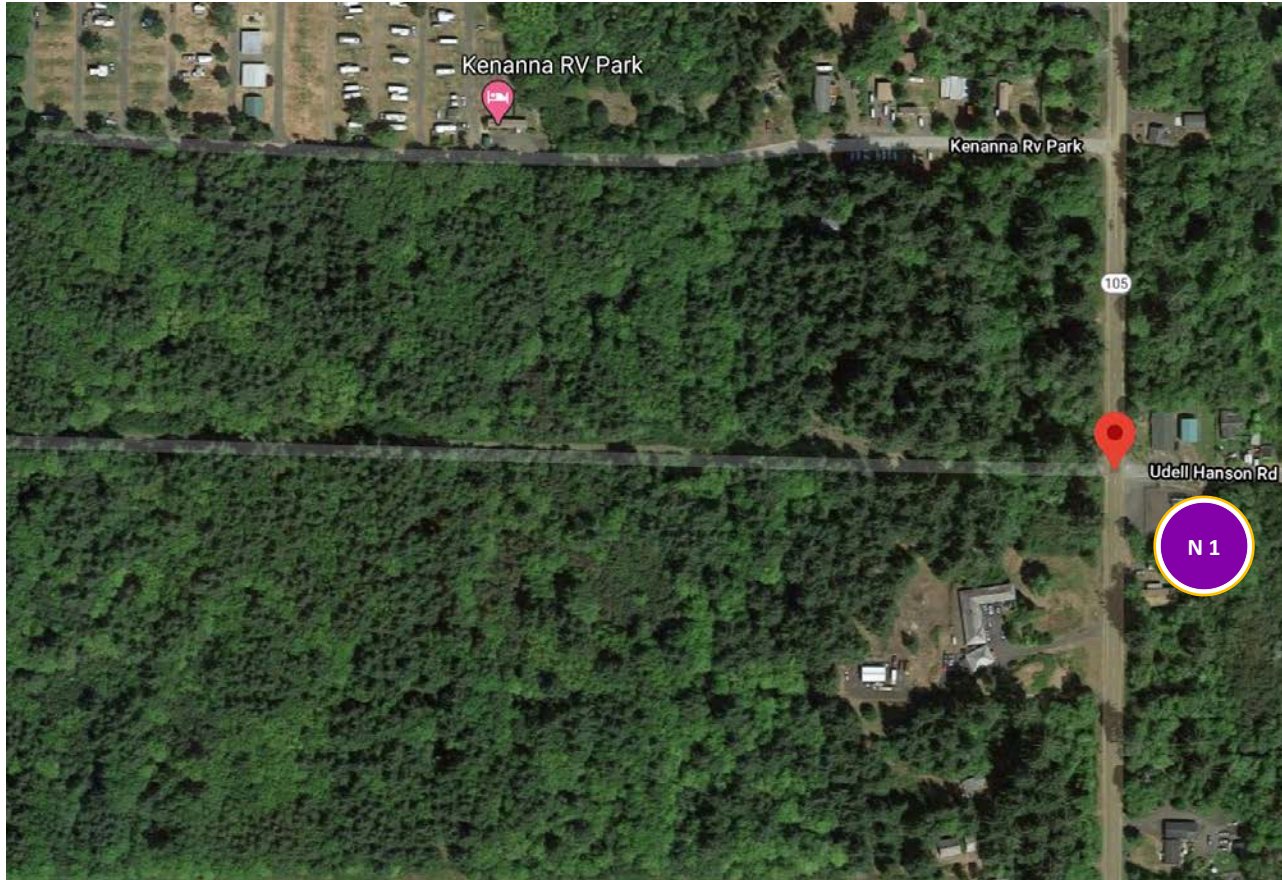
- approximately **65.5%** of the total estimated North Cove population are within 15 minutes to natural high ground OR vertical evacuation
- approximate *maximum* walk time to natural high ground or vertical evacuation for identified population = **35 minutes**
- approximate *minimum* VES capacity need (15 minute walk time) = **523 people**
- # of proposed VES = **3**







# North Cove: N 1



N 1	
Address	3000 State Route 105 Udell Hanson & State
Intersection	Route 105
Options	2, 3
Notes	Grays Harbor County public utility district property

Source: Google Maps

# North Cove: N 1

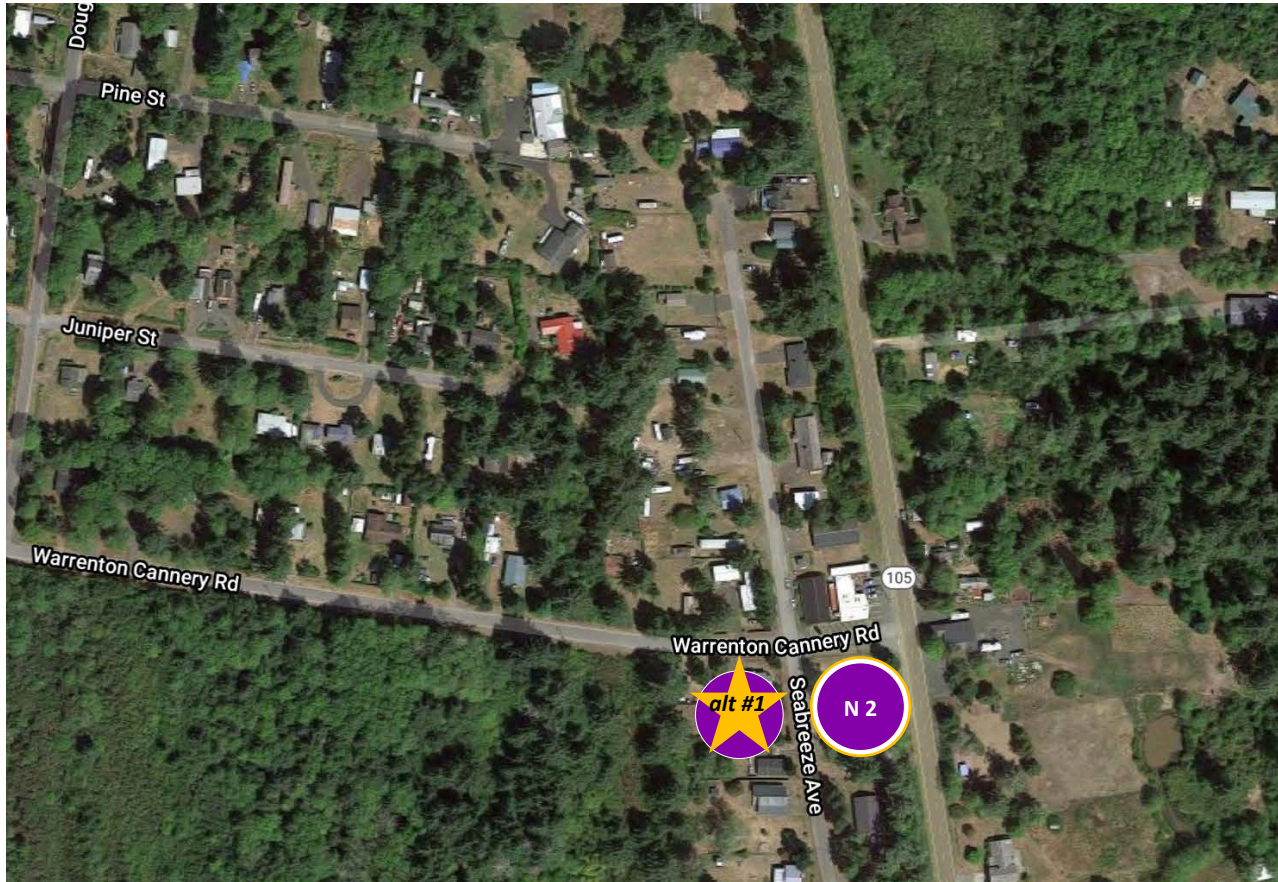


Photo Credit: *Bob Freitag*

N 1 - Utility district land. Confirm if large enough for relatively small VES tower.



# North Cove: N 2 + *alternative*



N 2	
Address	3561 State Route 105
Intersection	Warrenton Cannery Road & Seabreeze Avenue
Options	2, 3, 4
Notes	located on private property (currently), no nearby public/exempt land

N 2 - alt #1	
Address	N/a
Intersection	SW of Seabreeze Avenue & Warrenton Cannery
Notes	Vacant parcel, yet privately-owned

Source: *Google Maps*



# North Cove: N 2

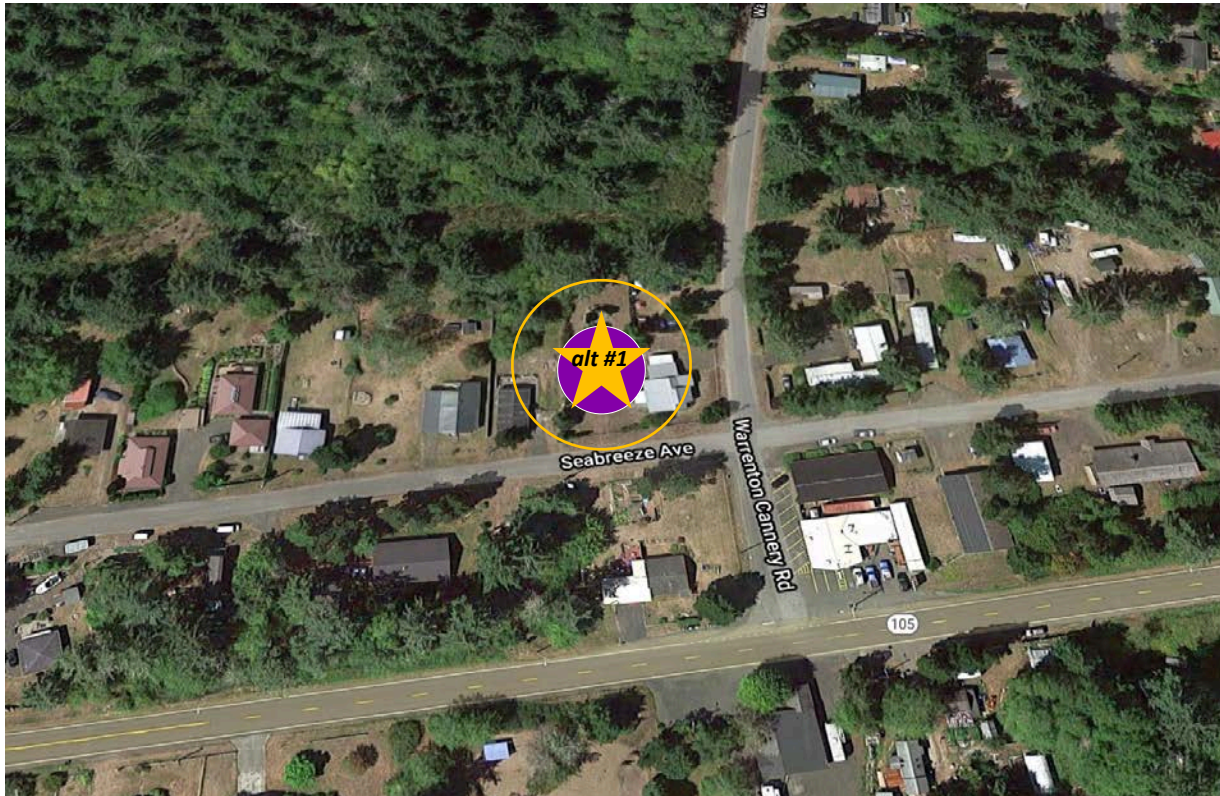


N 2 - Privately-owned land, with low density development. High visibility from the HWY. AHAB siren located behind parcel (see photo)

Photo Credit: Google Maps Street View



## North Cove: N 2 *alternative*

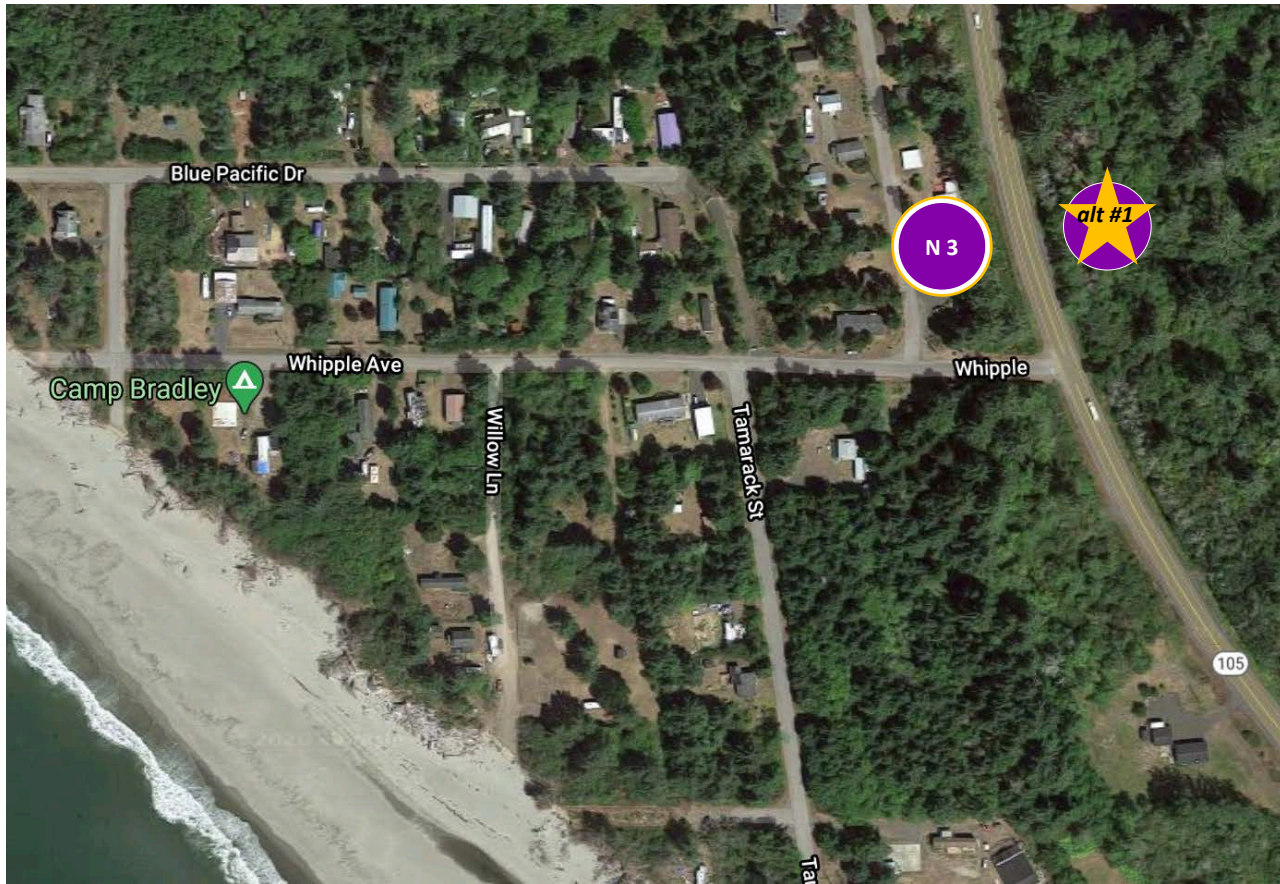


Source: *Google Maps*

N 2 - *Alternative #1*: site is located on Seabreeze Avenue. Privately-owned land, with no development. No street view photo available.



# North Cove: N 3 + *alternative*



N 3	
Address	N/a
Intersection	Whipple Avenue & SR 105
Options	2, 3
Notes	Central location for North Cove residents
N 3 - alt #1	
Address	3636 SR 105
Intersection	SR 105, east-side of highway
Notes	Privately-owned, vacant forested land

Source: *Google Maps*



# North Cove: N 3



N 3 - Privately-owned land, with low density development. High visibility from the HWY.

Photo Credit: *Google Maps Street View*





## North Cove: N 3 *alternative*

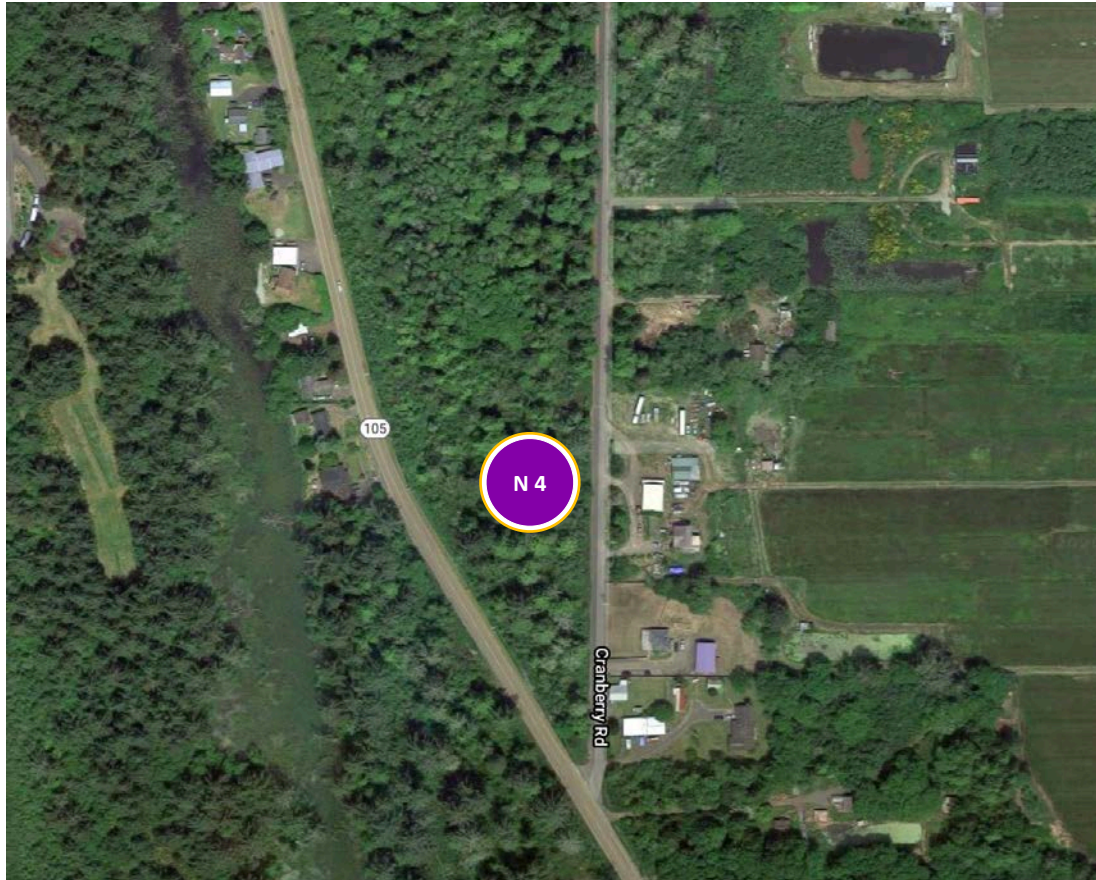


N 3 - *Alternative #1*: located across HWY 105 from NC 3. Privately-owned, but vacant.

Photo Credit: *Bob Freitag*



# North Cove: N 4



N 4	
Address	N/a
Intersection	Cranberry Road & State Route 105
Options	3, 4
Notes	Due north of intersection (west side of road) - Grays Harbor Audubon Society property

Source: Google Maps



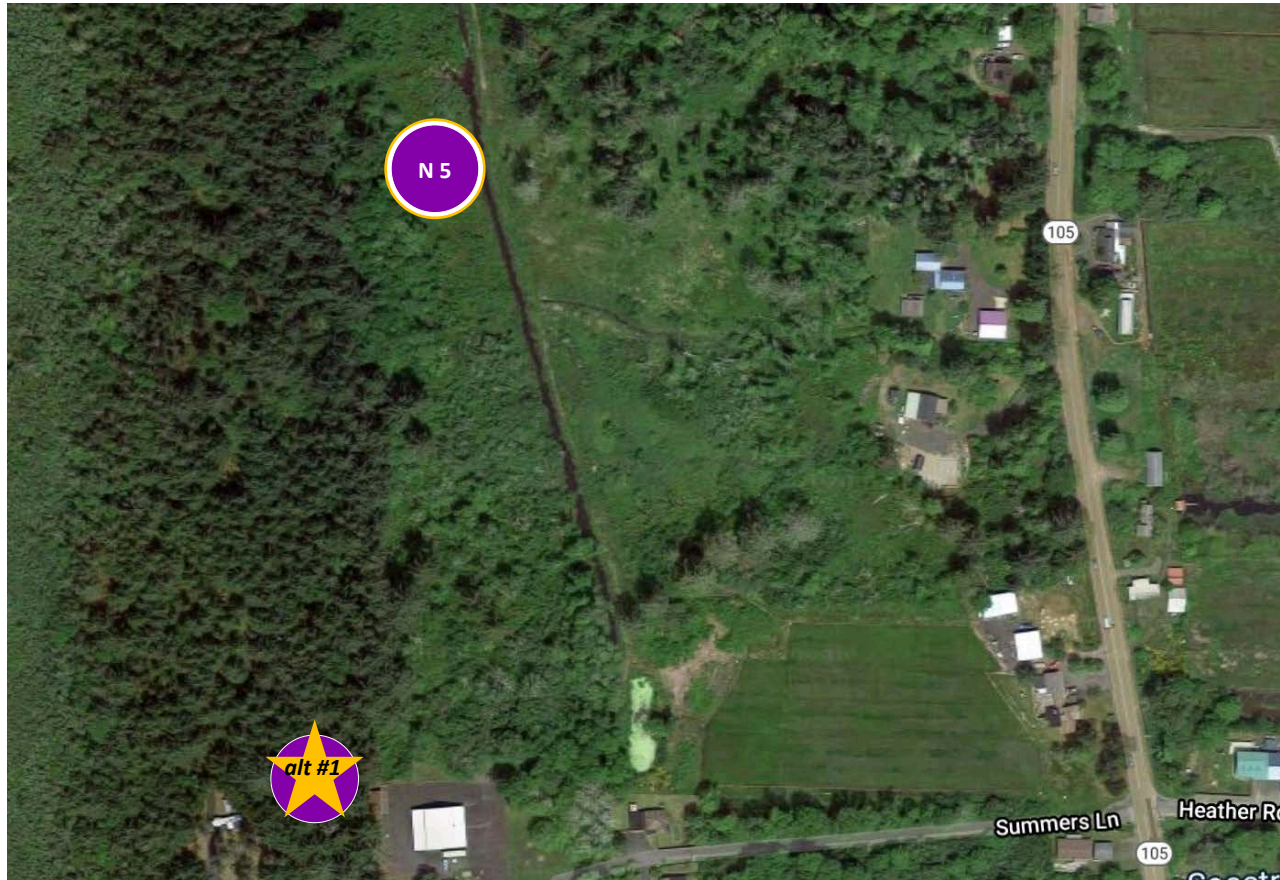
# North Cove: N 4



Photo Credit: *Bob Freitag*

N 4 - Looking north down Cranberry Road. VES site on left, about 1/10 of a mile

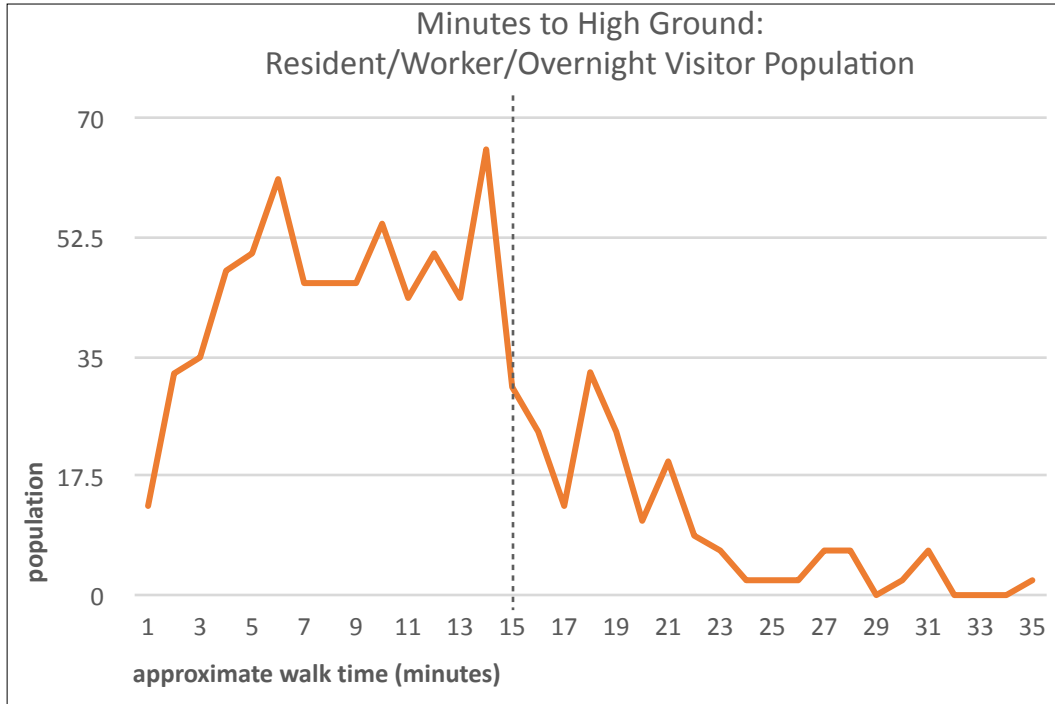
# North Cove: N 5 + *alternative*



Source: Google Maps

N 5	
Address	N/a
Intersection	SR 105 & Summers Lane
Options	3, 4
Notes	Pacific County-owned land, located NW of SR 105 & Summers Lane. Access would be tough, as a clear marked path would be needed heading north from Summers Lane, just west of SR 105.
N 5- alt #1	
Address	N/a
Intersection	Summers Lane, just west of SR 105
Notes	This site is also publicly-owned (State). The access might be better or easier as it is closer to Summers Lane but would also require a clear path and way-finding.

# North Cove: VES Option #3 (Broad Spatial Coverage)



Approximate # of People, by Walking Time Bands, to High Ground

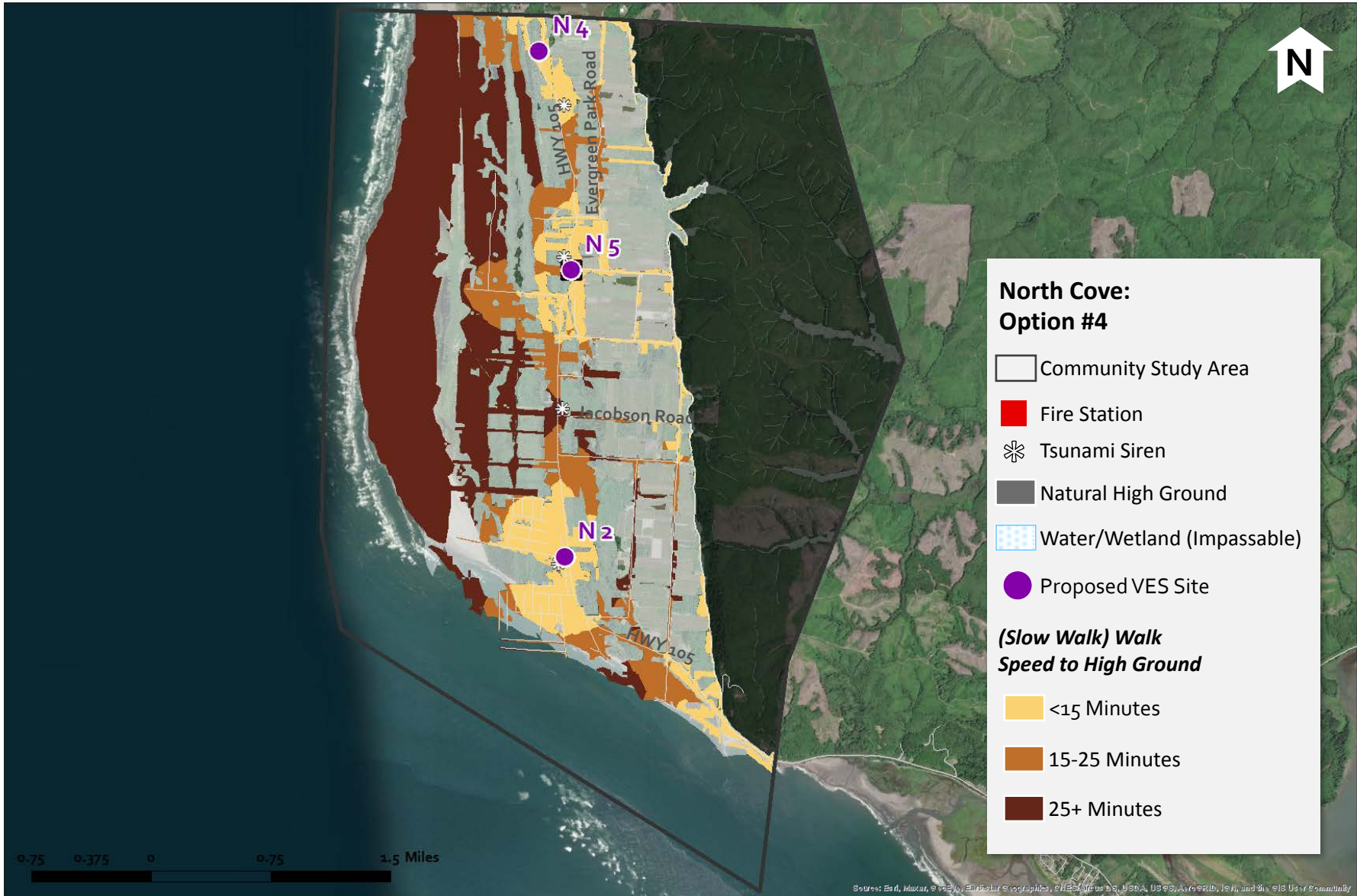
<15 minutes	15-25 minutes	25+ minutes
664 people	174 people	26 people

- Fire Station: Approximate 2 minute walk time to high ground or VES
- ▲ Schools: N/A

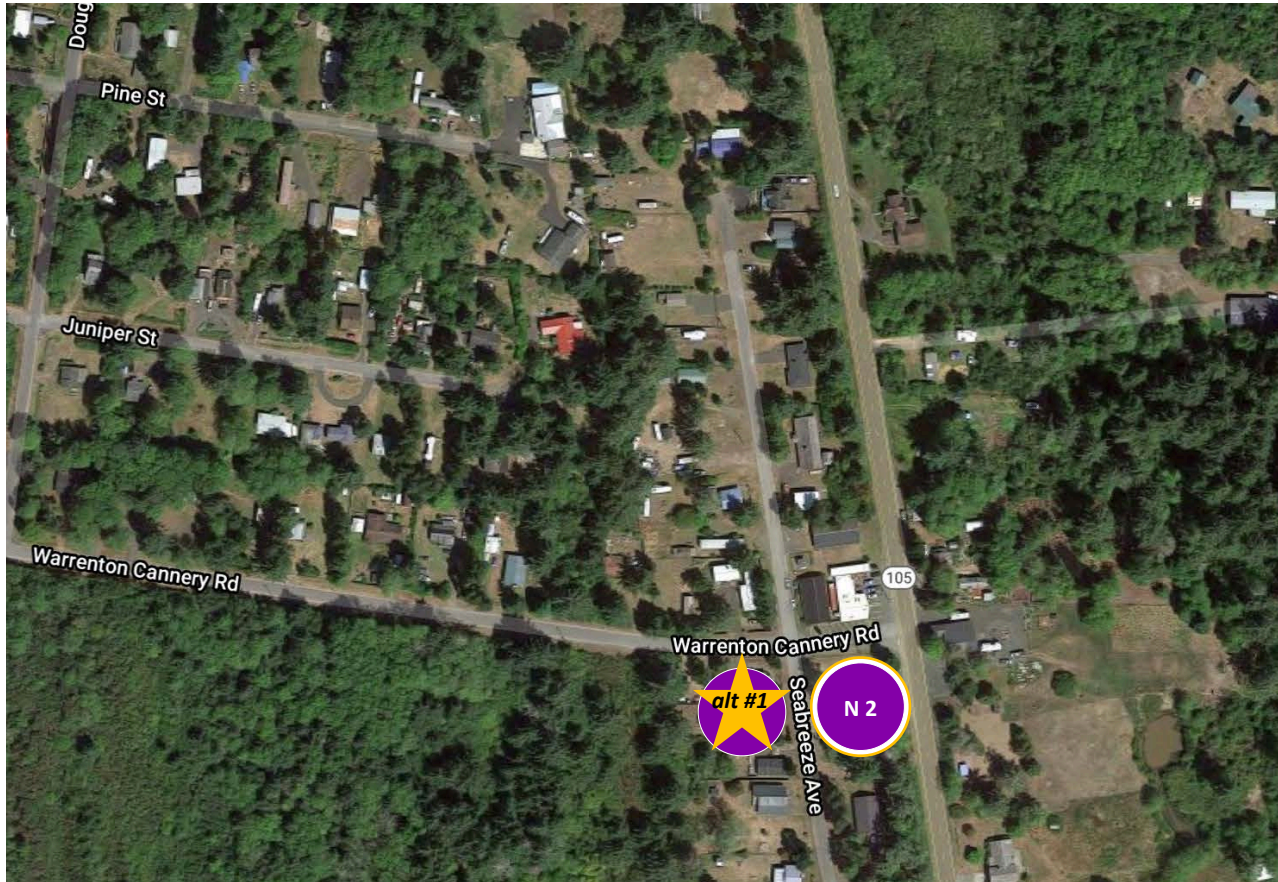
- Under Option #3:**
- approximately **76.9%** of the total estimated North Cove population are within 15 minutes to natural high ground OR vertical evacuation
  - approximate *maximum* walk time to natural high ground or vertical evacuation for identified population = **35 minutes**
  - approximate *minimum* VES capacity need (15 minute walk time) = **621 people**
  - # of proposed VES = **5**

**Note:** Option #3 does not include **all** visitors (i.e. day trip visitors, peak summer day visitors). It does, however, factor in more thorough coverage across the community, including some popular beach areas and other locations where there may be occasional gatherings of people (i.e. parking lots, campgrounds, etc.). Local decision-makers will need to determine how (or if) to factor in that additional population.





# North Cove: N 2 + *alternative*



N 2	
Address	3561 State Route 105
Intersection	Warrenton Cannery Road & Seabreeze Avenue
Options	2, 3, 4
Notes	located on private property (currently), no nearby public/exempt land

N 2 - alt #1	
Address	N/a
Intersection	SW of Seabreeze Avenue & Warrenton Cannery
Notes	Vacant parcel, yet privately-owned

Source: Google Maps



# North Cove: N 2



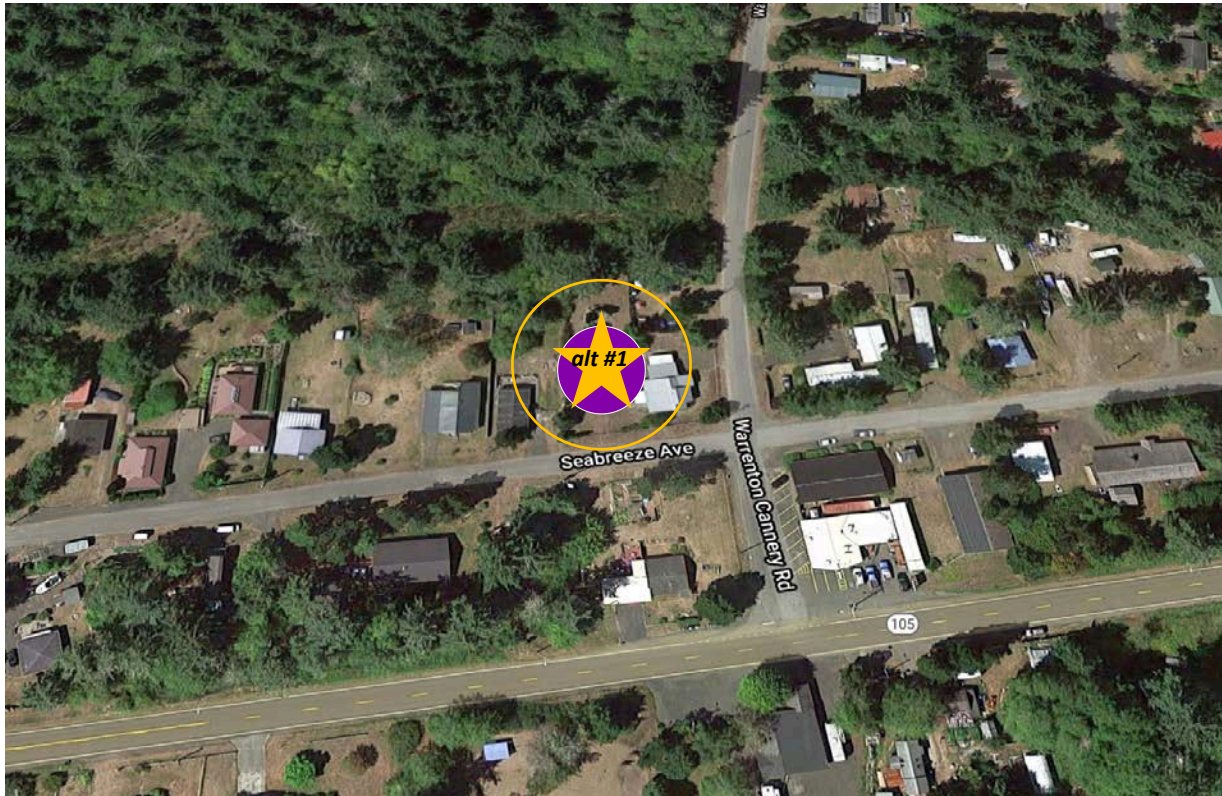
N 2 - Privately-owned land, with low density development. High visibility from the HWY. AHAB siren located behind parcel (see photo)

Photo Credit: Google Maps Street View





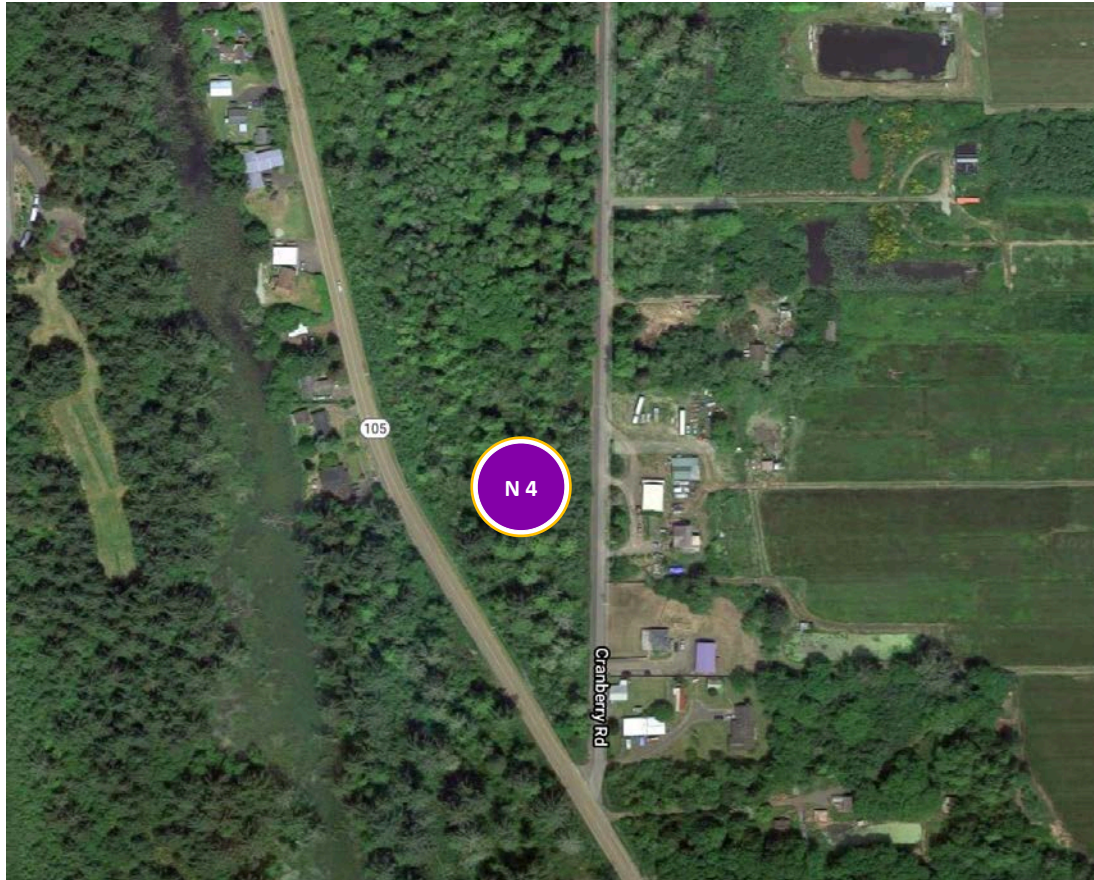
# North Cove: N 2 + *alternative*



Source: *Google Maps*

N 2 - *Alternative #1*: site is located on Seabreeze Avenue. Privately-owned land, with no development. No street view photo available.

# North Cove: N 4



N 4	
Address	N/a
Intersection	Cranberry Road & State Route 105
Options	3, 4
Notes	Due north of intersection (west side of road) - Grays Harbor Audubon Society property

Source: Google Maps



# North Cove: N 4

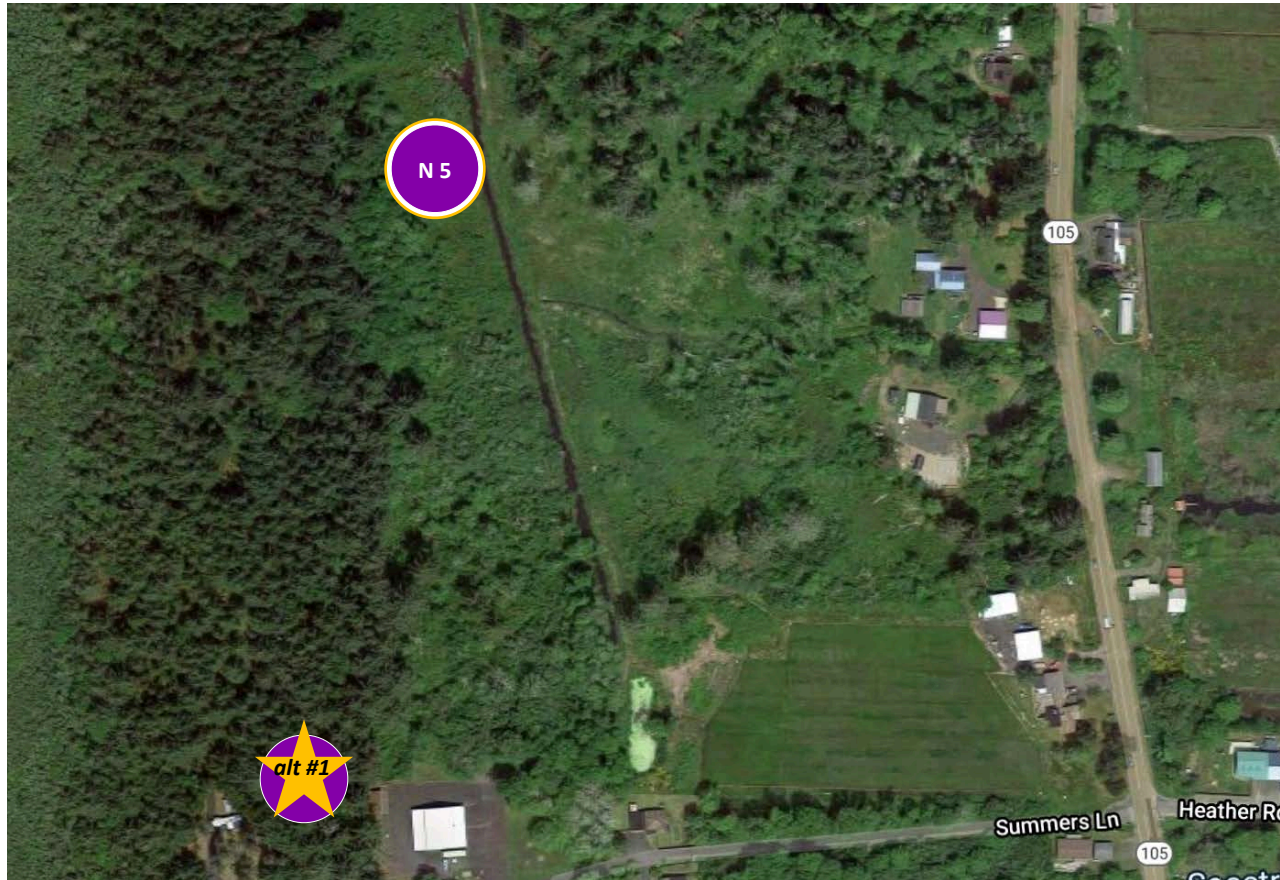


Photo Credit: *Bob Freitag*

N 4 - Looking north down Cranberry Road. VES site on left, about 1/10 of a mile



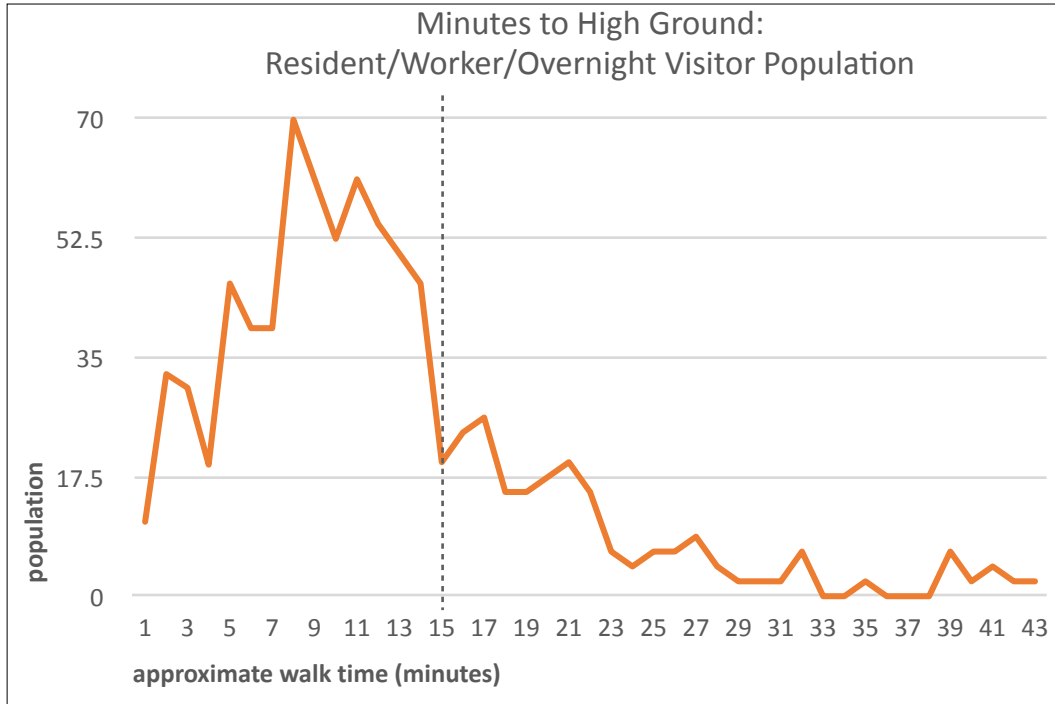
# North Cove: N 5 + *alternative*



Source: Google Maps

N 5	
Address	N/a
Intersection	SR 105 & Summers Lane
Options	3, 4
Notes	Pacific County-owned land, located NW of SR 105 & Summers Lane. Access would be tough, as a clear marked path would be needed heading north from Summers Lane, just west of SR 105.
N 5- alt #1	
Address	N/a
Intersection	Summers Lane, just west of SR 105
Notes	This site is also publicly-owned (State). The access might be better or easier as it is closer to Summers Lane but would also require a clear path and way-finding.

# North Cove: VES Option #4 (Efficient/Lean)



Approximate # of People, by Walking Time Bands, to High Ground

<15 minutes	15-25 minutes	25+ minutes
642 people	170 people	52 people

- Fire Station: Approximate 1 minute walk time to high ground or VES
- ▲ Schools: N/A

**Under Option #4:**

- approximately **74.3%** of the total estimated North Cove population are within 15 minutes to natural high ground OR vertical evacuation
- approximate *maximum* walk time to natural high ground or vertical evacuation for identified population = **43** minutes
- approximate *minimum* VES capacity need (15 minute walk time) = **599** people
- # of proposed VES = **3**

## Potential North Cove VES Locations: All Options (1-4)

VES ID	Intersection	Parcel ID	Parcel Owner	Lat   Long	Options	Notes
N 1	Udell Hanson & State Route 105	15113011003	Grays Harbor County Public Utility District, #1	46.765180, -124.082727	2, 3	Grays Harbor County public utility district property
N 2	Warrenton Cannery Road & Seabreeze Avenue	78035000034	Benjamin & Marion Bodwell	46.745150, -124.080955	2, 3, 4	located on private property (currently), no nearby public/exempt land
N 3	Whipple Avenue & State Route 105	78033000007	Sharon K & Edward A Leseman	46.742110, -124.080011	2, 3	located on private property (currently), no nearby public/exempt land
N 4	Cranberry Road & State Route 105	15111812028	Grays Harbor Audubon Society	46.790639, -124.087179	3, 4	due north of intersection (west side of road) - Grays Harbor Audubon Society property
N 5	State Route 105 & Summers Lane	15111911030	Pacific County	46.778139, -124.083352	3, 4	Pacific County-owned land, located NW of State Route 105 & Summers Lane intersection

### Notes

**N 1** - N 1 is a utility district parcel is publicly-owned and has some vacant space, potentially, for a relatively small tower.

**N 2** - The N 2 site is currently privately-owned and developed. There is some vacant space on the north side of the parcel. The alternative site is vacant and privately-owned, but next door (to the north) to an AHAB siren (3569 Seabreeze Avenue).

**N 3** - The N 3 location was selected due to high visibility from the HWY and central location for North Cove residents. Alternative location could be located on vacant forested land across the HWY. No noticeable nearby public land available.

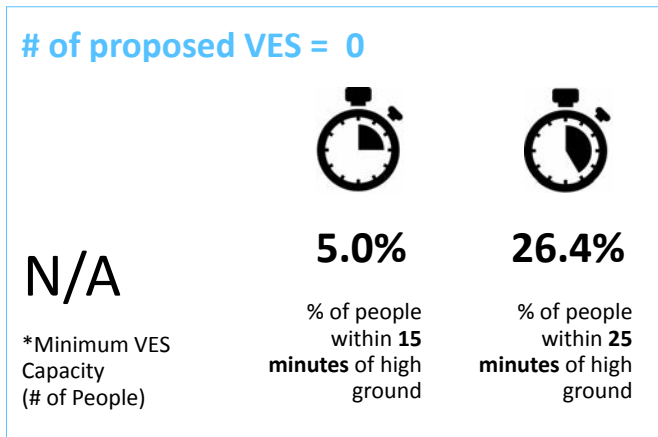
**N 4** - The N 4 site is on tax-exempt land, owned by the Grays Harbor Audubon Society. Good access off SR 105 and along residential Cranberry Road.

**N 5** - The N 5 location was selected due to relative close proximity to major intersection (Summers Lane & SR 105), and located on public land (Pacific County). Access to this location, however, might be difficult unless a stabilized trail was constructed, with clear signs. State land may be a good alternative as it is much closer to Summers Lane and would only require a much smaller investment into providing easy access.

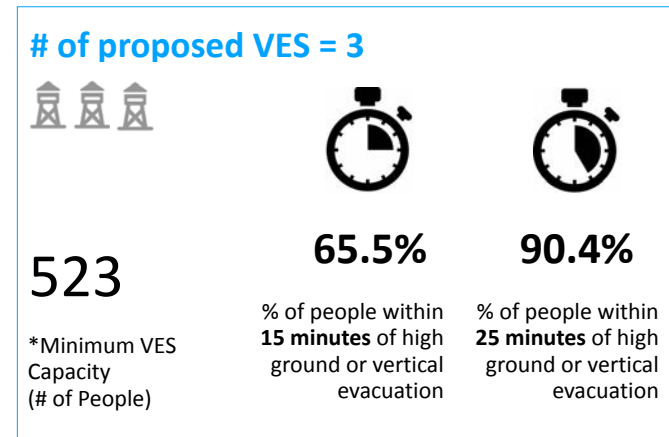


# North Cove: Comparison of All Options (1-4)

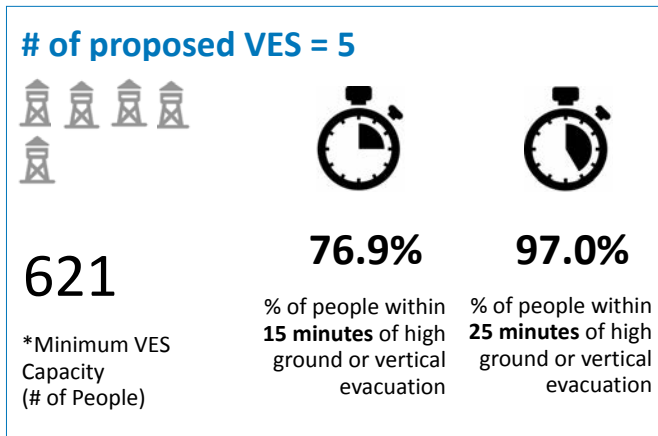
Option #1



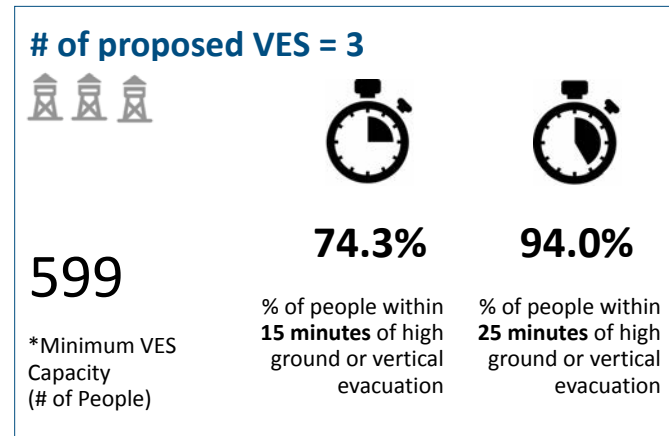
Option #2



Option #3



Option #4



## North Cove: Comparison of All Options (1-4)

**Notes:**

\**Minimum VES Capacity* = the delta (or difference) between Option #1 (no VES) number of people at each minute mark and Options #2, #3, and #4 number of people at each minute mark. For example: If 10 people are within 15 minutes of high ground under Option #1 but that number increases to 25 people under Option #2 - then we know that a minimum of 15 additional people have been put within 15 minutes of high ground through the addition of a Vertical Evacuation Structure. Therefore, the minimum VES capacity for this example is 15 people.

# Pacific County: Comparison of Community Study Area Options

Community Study Area	VES Option	# of VES	Minimum VES Capacity	% of People Within 15 Minutes to High Ground/VES	% of People Within 25 Minutes to High Ground/VES
Ilwaco	1	0	N/A	62.3%	82.3%
Ilwaco	2	1	356	99.8%	100%
Ilwaco	3	2	356	99.8%	100%
Ilwaco	4	1	356	99.8%	100%
Seaview	1	0	N/A	15.3%	57.3%
Seaview	2	2	995	52.7%	93.6%
Seaview	3	4	2,000	90.4%	95.6%
Seaview	4	2	1,263	62.7%	93.7%
LBS	1	0	N/A	5.7%	12.8%
LBS	2	5	3,477	72.3%	98.6%
LBS	3	8	4,062	83.5%	99.3%
LBS	4	7	4,035	83.0%	96.5%
LBN	1	0	N/A	32.6%	43.3%
LBN	2	4	1,226	62.5%	94.2%
LBN	3	7	1,577	71.0%	98.2%
LBN	4	6	1,543	70.2%	98.7%
Ocean Park	1	0	N/A	93.0%	99.7%
Ocean Park	2	5	0	93.0%	99.7%
Ocean Park	3	6	326	98.2%	100%
Ocean Park	4	2	326	98.2%	100%
Oysterville	1	0	N/A	93.9%	100%
Leadbetter	1	0	N/A	79.5%	95.1%
Leadbetter	3	2	27	84.8%	100%
Leadbetter	4	1	27	84.8%	100%
Tokeland	1	0	N/A	46.8%	69.7%
Tokeland	2	5	615	96.6%	100%
Tokeland	3	6	643	97.2%	100%
Tokeland	4	3	521	97.2%	100%
North Cove	1	0	N/A	5.0%	26.4%
North Cove	2	3	523	65.5%	90.4%
North Cove	3	5	621	76.9%	97.0%
North Cove	4	3	599	74.3%	94.0%



# Summary Tables

## Study Area Summary Tables, by Option: 1-4

[total estimated population in tsunami zone = ~71,186]

### OPTION 1

# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
N/A	N/A	54.9%	39,115	45.1%	32,073	66.4%	47,282

### OPTION 2

# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
58	16,302	77.9%	55,420	22.1%	15,766	95.4%	67,907

### OPTION 3

# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
82	22,804	87.0%	61,959	13.0%	9,227	99.2%	70,603

### OPTION 4

# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
58	21,049	86.3%	61,441	13.7%	9,747	98.4%	70,013

## Study Area Summary Table: ~Average VES Size

**Average Size of Each Proposed VES, per Option (#2, #3, #4)**

Option	# of Proposed VES	Minimum VES Capacity Need	Approximate # of People per VES	Approximate Average SF per VES (based on FEMA's requirement of 10 SF per person)
#2	58	16,302	281	2,810 square feet
#3	82	22,804	278	2,780 square feet
#4	58	21,049	363	3,630 square feet

For Reference:

The approved Tokeland/Shoalwater Bay Tribal tower is anticipated to have a capacity of 384 people.

Based on FEMA's guidelines, the actual refuge area will be ~3,800 square feet.

**Equation:**

$$(\text{Minimum VES Capacity Need} / \text{\# of Proposed VES}) * 10 = \text{Approximate average size per VES}$$



# Pacific County Summary Tables, by Option: 1-4

[total estimated population in tsunami zone = ~25,923]

OPTION 1							
# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
N/A	N/A	51.5%	13,349	48.5%	12,574	64.3%	16,681

OPTION 2							
# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
25	7,192	79.2%	20,541	20.8%	5,382	97.6%	25,311

OPTION 3							
# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
40	9,612	88.5%	22,940	11.5%	2,983	99.0%	25,669

OPTION 4							
# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
25	8,670	85.3%	22,120	14.7%	3,803	98.2%	25,464

# Pacific County Summary Table: ~Average VES Size

Average Size of Each Proposed VES, per Option (#2, #3, #4)				
Option	# of Proposed VES	Minimum VES Capacity Need	Approximate # of People per VES	Approximate Average SF per VES <i>(based on FEMA's requirement of 10 SF per person)</i>
#2	25	7,192	288	2,880 square feet
#3	40	9,612	240	2,403 square feet
#4	25	8,670	347	3,470 square feet

For Reference:  
 The approved Tokeland/Shoalwater Bay Tribal tower is anticipated to have a capacity of 384 people.  
  
 Based on FEMA's guidelines, the actual refuge area will be ~3,800 square feet.

**Equation:**

$$(\text{Minimum VES Capacity Need} / \text{\# of Proposed VES}) * 10 = \text{Approximate average size per VES}$$

# Grays Harbor County Summary Tables, by Option: 1-4

[total estimated population in tsunami zone = ~44,021]

<b>OPTION 1</b>							
# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
N/A	N/A	55.7%	24,524	44.3%	19,499	66.7%	29,359

<b>OPTION 2</b>							
# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
30	9,110	76.4%	33,637	23.6%	10,384	93.9%	41,354

<b>OPTION 3</b>							
# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
42	13,192	85.8%	37,777	14.2%	6,244	99.3%	43,692

<b>OPTION 4</b>							
# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
32	12,379	86.5%	38,079	13.5%	5,944	98.4%	43,307



# Grays Harbor County Summary Table: ~Average VES Size

Average Size of Each Proposed VES, per Option (#2, #3, #4)				
Option	# of Proposed VES	Minimum VES Capacity Need	Approximate # of People per VES	Approximate Average SF per VES <i>(based on FEMA's requirement of 10 SF per person)</i>
#2	30	9,110	304	3,040 square feet
#3	42	13,192	314	3,140 square feet
#4	32	12,379	387	3,870 square feet

For Reference:  
 The approved Tokeland/Shoalwater Bay Tribal tower is anticipated to have a capacity of 384 people.  
  
 Based on FEMA's guidelines, the actual refuge area will be ~3,800 square feet.

**Equation:**

$$(\text{Minimum VES Capacity Need} / \text{\# of Proposed VES}) * 10 = \text{Approximate average size per VES}$$

# Clallam County Summary Tables, by Option: 1-4

[total estimated population in tsunami zone = ~1,242]

OPTION 1							
# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
N/A	N/A	100%	1,242	0%	0	100%	1,242

OPTION 2							
# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
3	0	100%	1,242	0%	0	100%	1,242

OPTION 3							
# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
N/A	N/A	100%	1,242	0%	0	100%	1,242

OPTION 4							
# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
1	0	100%	1,242	0%	0	100%	1,242

# Clallam County Summary Table: ~Average VES Size

Average Size of Each Proposed VES, per Option (#2, #3, #4)				
Option	# of Proposed VES	Minimum VES Capacity Need	Approximate # of People per VES	Approximate Average SF per VES (based on FEMA's requirement of 10 SF per person)
#2	3	0	*0	*0
#3	N/A	N/A	N/A	N/A
#4	1	0	*0	*0

For Reference:  
 The approved Tokeland/Shoalwater Bay Tribal tower is anticipated to have a capacity of 384 people.  
  
 Based on FEMA's guidelines, the actual refuge area will be ~3,800 square feet.

*\*Clallam County does not have population in areas with a > 15 minute walk to natural high ground. Any VES would be elective to support quicker or more high visibility tsunami evacuation endpoints*

**Equation:**

$$(Minimum\ VES\ Capacity\ Need / \#\ of\ Proposed\ VES) * 10 = Approximate\ average\ size\ per\ VES$$





# Ilwaco Summary Tables, by Option: 1-4

[total estimated population in tsunami zone = ~950]

OPTION 1							
# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
N/A	N/A	62.3%	592	37.7%	358	82.3%	782

OPTION 2							
# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
1	356	99.8%	948	0.2%	2	100%	950

OPTION 3							
# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
2	356	99.8%	948	0.2%	2	100%	950

OPTION 4							
# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
1	356	99.8%	948	0.2%	2	100%	950

## Seaview Summary Tables, by Option: 1-4

[total estimated population in tsunami zone = ~2,663]

### OPTION 1

# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
N/A	N/A	15.3%	408	84.7%	2,255	57.3%	1,525

### OPTION 2

# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
2	995	52.7%	1,403	47.3%	1,260	93.6%	2,492

### OPTION 3

# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
4	2,000	90.4%	2,408	9.6%	255	95.6%	2,545

### OPTION 4

# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
2	1,263	62.7%	1,671	37.3%	992	93.7%	2,494

# Long Beach South Summary Tables, by Option: 1-4

[total estimated population in tsunami zone = ~5,218]

OPTION 1							
# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
N/A	N/A	5.7%	295	94.3%	4,923	12.8%	667

OPTION 2							
# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
5	3,477	72.3%	3,772	27.7%	1,446	98.6%	5,146

OPTION 3							
# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
8	4,062	83.5%	4,357	16.5%	861	99.3%	5,182

OPTION 4							
# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
7	4,035	83.0%	4,330	17.0%	888	96.5%	5,035



## Long Beach North Summary Tables, by Option: 1-4

[total estimated population in tsunami zone = ~4,108]

### OPTION 1

# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
N/A	N/A	32.6%	1,340	67.4%	2,768	43.3%	1,779

### OPTION 2

# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
4	1,226	62.5%	2,566	37.5%	1,542	94.2%	3,868

### OPTION 3

# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
7	1,577	71.0%	2,917	29.0%	1,191	98.2%	4,034

### OPTION 4

# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
6	1,543	70.2%	2,883	29.8%	1,225	98.7%	4,053

# Ocean Park Summary Tables, by Option: 1-4

[total estimated population in tsunami zone = ~6,275]

OPTION 1							
# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
N/A	N/A	93.0%	5,838	7.0%	437	99.7%	6,254

OPTION 2							
# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
5	0	93.0%	5,838	7.0%	437	99.7%	6,254

OPTION 3							
# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
6	326	98.2%	6,164	1.8%	111	100%	6,275

OPTION 4							
# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
2	326	98.2%	6,164	1.8%	111	100%	6,275

# Oysterville Summary Tables, by Option: 1-4

[total estimated population in tsunami zone = ~4,098]

OPTION 1							
# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
N/A	N/A	93.9%	3,848	6.1%	250	100%	4,098

OPTION 2							
# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES

OPTION 3							
# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES

OPTION 4							
# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES



## Leadbetter Summary Tables, by Option: 1-4

[total estimated population in tsunami zone = ~513]

### OPTION 1

# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
N/A	N/A	79.5%	408	20.5%	105	95.1%	488

### OPTION 2

# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES

### OPTION 3

# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
2	27	84.8%	435	15.2%	78	100%	513

### OPTION 4

# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
1	27	84.8%	435	15.2%	78	100%	513

## Tokeland Summary Tables, by Option: 1-4

[total estimated population in tsunami zone = ~1,234]

### OPTION 1

# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
N/A	N/A	46.8%	577	53.2%	657	69.7%	860

### OPTION 2

# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
5	615	96.6%	1,192	3.4%	42	100%	1,234

### OPTION 3

# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
6	643	97.2%	1,199	2.8%	35	100%	1,234

### OPTION 4

# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
3	521	97.2%	1,199	2.8%	35	100%	1,234

## North Cove Summary Tables, by Option: 1-4

[total estimated population in tsunami zone = ~864]

### OPTION 1

# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
N/A	N/A	5.0%	43	95.0%	821	26.4%	228

### OPTION 2

# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
3	523	65.5%	566	34.5%	298	90.4%	781

### OPTION 3

# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
5	621	76.9%	664	23.1%	200	97.0%	838

### OPTION 4

# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
3	599	74.3%	642	25.7%	222	94.0%	812



## Grayland Summary Tables, by Option: 1-4

[total estimated population in tsunami zone = ~1,722]

### OPTION 1

# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
N/A	N/A	1.9%	32	98.1%	1,690	18.6%	320

### OPTION 2

# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
3	770	46.6%	802	53.4%	920	98.0%	1,688

### OPTION 3

# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
5	1,184	70.6%	1,216	29.4%	506	100%	1,722

### OPTION 4

# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
3	900	54.1%	932	45.9%	790	95.2%	1,640

# Westport Summary Tables, by Option: 1-4

[total estimated population in tsunami zone = ~4,245]

OPTION 1							
# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
N/A	N/A	74.8%	3,176	25.2%	1,069	88.3%	3,747

OPTION 2							
# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
5	888	95.7%	4,064	4.3%	181	99.9%	4,244

OPTION 3							
# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
6	888	95.7%	4,064	4.3%	181	99.9%	4,244

OPTION 4							
# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
3	867	95.2%	4,043	4.8%	202	99.9%	4,244

# Ocean Shores West Summary Tables, by Option: 1-4

[total estimated population in tsunami zone = ~6,712]

<b>OPTION 1</b>							
# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
N/A	N/A	7.8%	524	92.2%	6,188	8.8%	588

<b>OPTION 2</b>							
# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
11	4,633	76.9%	5,159	23.1%	1,553	99.4%	6,674

<b>OPTION 3</b>							
# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
14	5,027	82.7%	5,550	17.3%	1,162	99.6%	6,682

<b>OPTION 4</b>							
# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
11	4,860	80.2%	5,384	19.8%	1,328	99.5%	6,677



# Ocean Shores East Summary Tables, by Option: 1-4

[total estimated population in tsunami zone = ~5,558]

OPTION 1							
# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
N/A	N/A	8.8%	490	91.2%	5,068	10.2%	568

OPTION 2							
# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
8	2,819	59.5%	3,310	40.5%	2,248	83.0%	4,612

OPTION 3							
# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
13	4,140	83.3%	4,630	16.7%	928	95.2%	5,291

OPTION 4							
# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
12	4,018	81.1%	4,508	18.9%	1,050	95.2%	5,291

# Taholah Summary Tables, by Option: 1-4

[total estimated population in tsunami zone = ~579]

<b>OPTION 1</b>							
# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
N/A	N/A	100%	579	N/A	N/A	100%	579

<b>OPTION 2</b>							
# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
3	0	100%	579	N/A	N/A	100%	579

<b>OPTION 3</b>							
# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES

<b>OPTION 4</b>							
# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
N/A	N/A	100%	579	N/A	N/A	100%	579

# Aberdeen, Hoquiam, Cosmopolis Summary Tables, by Option: 1-4

[total estimated population in tsunami zone = ~25,205]

OPTION 1							
# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
N/A	N/A	78.3%	19,723	21.7%	5,482	93.5%	23,557

OPTION 2							
# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES

OPTION 3							
# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
4	1,953	86.2%	21,738	13.8%	3,467	99.9%	25,174

OPTION 4							
# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
3	1,734	89.8%	22,633	10.2%	2,573	98.7%	24,876



# La Push Summary Tables, by Option: 1-4

[total estimated population in tsunami zone = ~325]

OPTION 1							
# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
N/A	N/A	100%	325	N/A	N/A	100%	325

OPTION 2							
# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
1	0	100%	325	N/A	N/A	100%	325

OPTION 3							
# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES

OPTION 4							
# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES

# Neah Bay Summary Tables, by Option: 1-4

[total estimated population in tsunami zone = ~917]

OPTION 1							
# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
N/A	N/A	100%	917	N/A	N/A	100%	917

OPTION 2							
# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
2	0	100%	917	N/A	N/A	100%	917

OPTION 3							
# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES

OPTION 4							
# of VES	Minimum VES Capacity Need	% of People Within 15 Minutes to High Ground or VES	# of People Within 15 Minutes to High Ground or VES	% of People <u>Not</u> Within 15 Minutes to High Ground or VES	# of People <u>Not</u> Within 15 Minutes of High Ground or VES	% of People Within 25 Minutes to High Ground or VES	# of People Within 25 Minutes to High Ground or VES
1	0	100%	917	N/A	N/A	100%	917

# Appendices



# **Appendix A: All Potential Vertical Evacuation Sites in Study Area (Pacific, Grays Harbor, and Clallam Counties)**

# Pacific County VES Locations: all Options

<i>Community</i>	<i>VES ID</i>	<i>Location</i>	<i>Parcel Number</i>	<i>Parcel Owner</i>	<i>Intersection</i>
<b>ILWACO</b>	<u>I 1</u>	<u>46.318953, -124.003979</u>	<u>73033000027</u>	<u>Keith and Carol Fogg</u>	<u>Scarboro Lane North &amp; Ortelius Drive</u>
	<u>I 2</u>	<u>46.281534, -124.076274</u>	<u>09110800001</u>	<u>State of Washington</u>	<u>End of a trail, off Jetty Road</u>
<b>SEAVIEW</b>	<u>S 1</u>	<u>46.332184, -124.053629</u>	<u>10112133176</u>	<u>Jerry &amp; Barbara Bruner</u>	<u>41st Place &amp; N Place</u>
	<u>S 2</u>	<u>46.328340, -124.054777</u>	<u>73026111001</u>	<u>Sheila Rank</u>	<u>36th Street &amp; SR 103</u>
	<u>S 3</u>	<u>46.342519, -124.053958</u>	<u>73026079008</u>	<u>City of Long Beach</u>	<u>15th Street SE &amp; SR 103</u>
	<u>S 4</u>	<u>46.331460, -124.044037</u>	<u>10112143021</u>	<u>Public Utility District #2</u>	<u>HWY 101 &amp; Sandridge Road</u>
	<u>S 5</u>	<u>46.335643, -124.054970</u>	<u>73026047007</u>	<u>Seaview Sewer District</u>	<u>46th Place &amp; SR 103</u>
<b>LONG BEACH - SOUTH</b>	<u>LBS 1</u>	<u>46.395103, -124.057690</u>	<u>11113332166</u>	<u>State of Washington Parks &amp; Rec</u>	<u>Cranberry Road, just west of SR 103</u>
	<u>LBS 2</u>	<u>46.396369, -124.031711</u>	<u>11113423016</u>	<u>Columbia Land Trust</u>	<u>Cranberry Road (between Birch &amp; Sandridge)</u>
	<u>LBS 3</u>	<u>46.371961, -124.053016</u>	<u>10110921230</u>	<u>Channel West Properties, LLC</u>	<u>26th Street NE &amp; SR 103</u>
	<u>LBS 4</u>	<u>46.355841, -124.053033</u>	<u>10110934043</u>	<u>Latter-Day Saints of Jesus Christ</u>	<u>1306 Washington Avenue North</u>
	<u>LBS 5</u>	<u>46.348683, -124.051201</u>	<u>10111634649</u>	<u>Long Beach School District #101</u>	<u>Washington Avenue S &amp; 5th Street S</u>
	<u>LBS 6</u>	<u>46.386572, -124.053118</u>	<u>73059001000</u>	<u>Columbia Pacific Homeowners Association</u>	<u>116th Lane &amp; SR 103</u>
	<u>LBS 7</u>	<u>46.347797, -124.058206</u>	<u>73051000006</u>	<u>City of Long Beach</u>	<u>7th Street SW &amp; SR 103 - on 7th Street</u>
	<u>LBS 8</u>	<u>46.346029, -124.041615</u>	<u>10111688014</u>	<u>Fairytale Land LLC</u>	<u>Sandridge &amp; Sid Snyder</u>
<b>LONG BEACH - NORTH</b>	<u>LBN 1</u>	<u>46.465866, -124.044994</u>	<u>11110431030</u>	<u>Pacific County</u>	<u>226th Place &amp; U Street</u>
	<u>LBN 2</u>	<u>46.458766, -124.052260</u>	<u>11110996252</u>	<u>Loren H Corder Foundation</u>	<u>Peninsula Senior Center / Golden Sands</u>
	<u>LBN 3</u>	<u>46.438037, -124.051036</u>	<u>11111631070</u>	<u>State of Washington Fish &amp; Wildlife</u>	<u>188th Place &amp; SR 103</u>
	<u>LBN 4</u>	<u>46.416633, -124.051699</u>	<u>11112821003</u>	<u>Columbia Land Trust</u>	<u>158th Place &amp; SR 103</u>
	<u>LBN 5</u>	<u>46.472791, -124.052700</u>	<u>74045004000</u>	<u>Western Washington Conservative Baptist Camping Association</u>	<u>Dunes Bible Camp &amp; SR 103</u>
	<u>LBN 6</u>	<u>46.433579, -124.051831</u>	<u>11111633046</u>	<u>State of Washington Parks &amp; Recreation</u>	<u>184th Place &amp; SR 103</u>
	<u>LBN 7</u>	<u>46.414846, -124.039327</u>	<u>74011059000</u>	<u>Columbia Land Trust</u>	<u>Birch Street (north of Cranberry road, about 1.2 miles)</u>

# Pacific County VES Locations: all Options

<i>Community</i>	<i>VES ID</i>	<i>Location</i>	<i>Parcel Number</i>	<i>Parcel Owner</i>	<i>Intersection</i>
<b>OCEAN PARK</b>	OP 1	<a href="#">46.512057, -124.054214</a>	<a href="#">76010007000</a>	<a href="#">Melissa Candace Thompson</a>	<a href="#">Joe Johns Road &amp; K Lane</a>
	OP 2	<a href="#">46.511885, -124.040747</a>	<a href="#">12112113025</a>	<a href="#">Gary D &amp; J Marie McGee</a>	<a href="#">Joe Johns Road &amp; X Lane</a>
	OP 3	<a href="#">46.498048, -124.052980</a>	<a href="#">75004045001</a>	<a href="#">Michael Mc Mahon &amp; Shelly Hedges</a>	<a href="#">270th Place &amp; Park Avenue</a>
	OP 4	<a href="#">46.497731, -124.037659</a>	<a href="#">76026011001</a>	<a href="#">Pacific County</a>	<a href="#">270th Street &amp; Z Street</a>
	OP 5	<a href="#">46.489357, -124.043582</a>	<a href="#">12113312242</a>	<a href="#">Taylor-Ocean Park Cemetery</a>	<a href="#">U Street &amp; 260th Street</a>
	OP 6	<a href="#">46.481538, -124.056674</a>	<a href="#">12113395083</a>	<a href="#">John Forrest Bailey &amp; Wendi Rogrud</a>	<a href="#">247th Place &amp; J Place</a>
<b>LEADBETTER</b>	L 1	<a href="#">46.587367, -124.062958</a>	<a href="#">13112823019</a>	<a href="#">Leadbetter Farms LLC</a>	<a href="#">I Street</a>
	L 2	<a href="#">46.561065, -124.056909</a>	<a href="#">12110550304</a>	<a href="#">Flood Control District #1</a>	<a href="#">357th Street &amp; I Street</a>
<b>TOKELAND</b>	TO 1	<a href="#">46.725044, -124.019800</a>	<a href="#">14110317000</a>	<a href="#">Shoalwater Indian Reservation</a>	<a href="#">State Route 105 &amp; Tokeland Road</a>
	TO 2	<a href="#">46.721536, -124.015933</a>	<a href="#">78008002001</a>	<a href="#">Shoalwater Indian Reservation</a>	<a href="#">2373 Tokeland Road</a>
	TO 3	<a href="#">46.718694, -124.008509</a>	<a href="#">78036000001</a>	<a href="#">Kitty J Sage</a>	<a href="#">Tokeland Road &amp; Pine Lane</a>
	TO 4	<a href="#">46.709750, -123.990759</a>	<a href="#">14111234014</a>	<a href="#">USA/Trust for Shoalwater Bay</a>	<a href="#">Kindred Avenue &amp; Wye Drive</a>
	TO 5	<a href="#">46.705469, -123.978893</a>	<a href="#">78029005017</a>	<a href="#">Nelson Crab Inc</a>	<a href="#">Kindred Avenue &amp; 2nd Street</a>
	TO 6	<a href="#">46.711119, -123.995893</a>	<a href="#">78013003001</a>	<a href="#">Pacific County Fire District #5</a>	<a href="#">2753 Tokeland Road</a>
<b>NORTH COVE</b>	N 1	<a href="#">46.765180, -124.082727</a>	<a href="#">15113011003</a>	<a href="#">Grays Harbor County Public Utility District, #1</a>	<a href="#">Udell Hanson &amp; State Route 105</a>
	N 2	<a href="#">46.745150, -124.080955</a>	<a href="#">78035000034</a>	<a href="#">Benjamin &amp; Marion Bodwell</a>	<a href="#">Warrenton Cannery Road &amp; Seabreeze Avenue</a>
	N 3	<a href="#">46.742110, -124.080011</a>	<a href="#">78033000007</a>	<a href="#">Sharon K &amp; Edward A Leseman</a>	<a href="#">Whipple Avenue &amp; State Route 105</a>
	N 4	<a href="#">46.790639, -124.087179</a>	<a href="#">15111812028</a>	<a href="#">Grays Harbor Audubon Society</a>	<a href="#">Cranberry Road &amp; State Route 105</a>
	N 5	<a href="#">46.778139, -124.083352</a>	<a href="#">15111911030</a>	<a href="#">Pacific County</a>	<a href="#">State Route 105 &amp; Summers Lane</a>



# Grays Harbor County VES Locations: all Options

Community	VES ID	Location	Parcel Number	Parcel Owner	Intersection
<b>GRAYLAND</b>	<u>G 1</u>	<u>46.849382, -124.105886</u>	<u>161225110030</u>	<u>Donna J &amp; Richard B Martin</u>	<u>Bonge Avenue &amp; SR 105</u>
	<u>G 2</u>	<u>46.830837, -124.098578</u>	<u>833500002700</u>	<u>Patrick S &amp; Ann R Santee</u>	<u>Wood Lane: south of 6th Street &amp; SR 105, east side of HWY, vacant private lot</u>
	<u>G 3</u>	<u>46.809388, -124.094058</u>	<u>743509100008</u>	<u>South Beach Regional Fire Authority</u>	<u>Cranberry Road &amp; SR 105</u>
	<u>G 4</u>	<u>46.824477, -124.096319</u>	<u>161131340260</u>	<u>South Beach Christian Center</u>	<u>Marine Drive &amp; SR 105 (northeast of intersection)</u>
	<u>G 5</u>	<u>46.794627, -124.090675</u>	<u>151107430150</u>	<u>State of Washington Parks and Recreation</u>	<u>2193 SR 105</u>
<b>WESTPORT</b>	<u>W 1</u>	<u>46.907976, -124.112647</u>	<u>104000200201</u>	<u>Darlene M Caldwell ET AL</u>	<u>East Dock Street &amp; Nyhus Street North (parking lot)</u>
	<u>W 2</u>	<u>46.893475, -124.106909</u>	<u>103000801101</u>	<u>City of Westport</u>	<u>Adams Street &amp; Baker Street</u>
	<u>W 3</u>	<u>46.886575, -124.118149</u>	<u>106501500000</u>	<u>Paul B Draper &amp; RMT LLC</u>	<u>South Surf Street &amp; West Ocean Avenue</u>
	<u>W 4</u>	<u>46.876554, -124.112586</u>	<u>102502900900</u>	<u>State of Washington Tax Commission</u>	<u>SR 105 &amp; West Newell Avenue</u>
	<u>W 5</u>	<u>46.862497, -124.099020</u>	<u>161119220080</u>	<u>Ocosta School District #172</u>	<u>2580 South Montesano Street</u>
	<u>W 6</u>	<u>46.902235, -124.130312</u>	<u>616120132002</u>	<u>State of Washington</u>	<u>End of Jetty Haul Road</u>
<b>OCEAN SHORES - EAST</b>	<u>OSE 2</u>	<u>46.998326, -124.143688</u>	<u>94900900100</u>	<u>City of Ocean Shores</u>	<u>Duck Lake Drive NE &amp; Albatross Street NE</u>
	<u>OSE 1</u>	<u>46.997690, -124.157170</u>	<u>90500079700</u>	<u>City of Ocean Shores</u>	<u>Octopus Avenue NE &amp; Albatross Street NE</u>
	<u>OSE 3</u>	<u>46.978038, -124.155899</u>	<u>617121014001</u>	<u>North Beach School District #64</u>	<u>300 Mt Olympus Avenue SE</u>
	<u>OSE 4</u>	<u>46.978869, -124.141928</u>	<u>94700118200</u>	<u>Darlene J &amp; Roland J Bahr Trust</u>	<u>Duck Lake Drive SE &amp; Lake Bay Loop SE</u>
	<u>OSE 5</u>	<u>46.967208, -124.138620</u>	<u>94700500100</u>	<u>Diane Siebert &amp; Chris Blackwell</u>	<u>Blue Wing Loop SE &amp; Duck Lake Drive SE</u>
	<u>OSE 6</u>	<u>46.963596, -124.143383</u>	<u>91900061601</u>	<u>Ocean Shores Community Club</u>	<u>Mt Olympus Avenue SE &amp; Cakesosta Street SE</u>
	<u>OSE 7</u>	<u>46.958165, -124.145076</u>	<u>92700016600</u>	<u>Lori &amp; Brent Gambriell</u>	<u>Cormorant Street &amp; Island Circle SE</u>
	<u>OSE 8</u>	<u>46.952658, -124.130549</u>	<u>92900060102</u>	<u>Quinault Land &amp; Timber Enterprises</u>	<u>1020 Catala Avenue SE</u>
	<u>OSE 9</u>	<u>47.044871, -124.158170</u>	<u>181215440030</u>	<u>Public Utility District #1</u>	<u>State Route 109 &amp; State Route 115</u>
	<u>OSE 10</u>	<u>47.012392, -124.153125</u>	<u>95101300000</u>	<u>City of Ocean Shores</u>	<u>E Rain Street NE &amp; Cardinal Avenue NE</u>
	<u>OSE 11</u>	<u>46.991065, -124.149693</u>	<u>94901206100</u>	<u>Shelly &amp; Derek Kane</u>	<u>Ponderosa Loop NE &amp; Bass Avenue NE</u>
	<u>OSE 12</u>	<u>46.989265, -124.143273</u>	<u>94900601400</u>	<u>Harold Wiebenga Jr. Et Al</u>	<u>Olympic View Avenue &amp; Hutton Street NE</u>
	<u>OSE 13</u>	<u>46.972591, -124.152807</u>	<u>91900061500</u>	<u>Ocean Shores Community Club</u>	<u>Skookumchuck Street SE &amp; Makah Avenue SE</u>

# Grays Harbor County VES Locations: all Options

Community	VES ID	Location	Parcel Number	Parcel Owner	Intersection
<b>OCEAN SHORES - WEST</b>	<u>OSW 1</u>	<u>47.070668, -124.168939</u>	<u>786501000500</u>	<u>Screamin' Eagle Campground</u>	<u>2nd Avenue &amp; Ocean Boulevard</u>
	<u>OSW 2</u>	<u>47.042118, -124.170174</u>	<u>181222120010</u>	<u>Quinault Land &amp; Timber</u>	<u>78 SR 115</u>
	<u>OSW 3</u>	<u>47.032457, -124.165071</u>	<u>181222420000</u>	<u>State of Washington</u>	<u>Ocean City State Park Campground</u>
	<u>OSW 4</u>	<u>47.018080, -124.159587</u>	<u>181227110010</u>	<u>North Beach School District #64</u>	<u>336 SR 115</u>
	<u>OSW 5</u>	<u>47.008412, -124.163416</u>	<u>90100700004</u>	<u>City of Ocean Shores</u>	<u>120 West Chance a La Mer NW</u>
	<u>OSW 6</u>	<u>46.984810, -124.162445</u>	<u>90300014900</u>	<u>Richard T Duffy</u>	<u>Ocean Lake Way SW &amp; North Port Loop NW</u>
	<u>OSW 7</u>	<u>46.962666, -124.164543</u>	<u>92100028800</u>	<u>Pamala J &amp; Michael A Cobb</u>	<u>North Razor Clam Drive &amp; Butterclam Street SW</u>
	<u>OSW 8</u>	<u>46.971723, -124.166264</u>	<u>91700005800</u>	<u>Lisa &amp; Randy Seal</u>	<u>Ocean Shores Boulevard SW &amp; Taurus Boulevard SW</u>
	<u>OSW 9</u>	<u>46.952215, -124.168749</u>	<u>93300300700</u>	<u>Amy J Wolner</u>	<u>Ocean Shores Boulevard SW &amp; Marine View Drive SW</u>
	<u>OSW 10</u>	<u>46.952514, -124.145951</u>	<u>93101209000</u>	<u>Christopher B Miller</u>	<u>Wowona Avenue SW &amp; Tonquin Avenue SW</u>
	<u>OSW 11</u>	<u>46.934499, -124.166225</u>	<u>93900102100</u>	<u>City of Ocean Shores</u>	<u>South Spinnaker Street</u>
	<u>OSW 12</u>	<u>46.955773, -124.162348</u>	<u>93100705500</u>	<u>Ocean Shores Community Club</u>	<u>Torrisdale Avenue SW &amp; Seashore Street SW</u>
	<u>OSW 13</u>	<u>46.993884, -124.166182</u>	<u>618122758170</u>	<u>City of Ocean Shores</u>	<u>Ocean Shores Blvd NW &amp; Pacific Blvd NW</u>
	<u>OSW 14</u>	<u>47.056828, -124.167127</u>	<u>181210330010</u>	<u>Ocean Shores Outdoor Rec Club</u>	<u>Dunes Lane &amp; Pine Lane</u>
<b>ABERDEEN, HOQUIAM, COSMOPOLIS</b>	<u>AHC 1</u>	<u>46.97174, -123.80099</u>	<u>027400400000</u>	<u>Grays Harbor Historical Seaport Authority</u>	<u>West Curtis Street &amp; North Clark Street</u>
	<u>AHC 2</u>	<u>46.97789, -123.77931</u>	<u>317091011006</u>	<u>Grays Harbor County</u>	<u>Junction City Road</u>
	<u>AHC 3</u>	<u>46.96688, -123.82948</u>	<u>029407400000</u>	<u>City of Aberdeen</u>	<u>South Garfield Street &amp; West State Street</u>
	<u>AHC 4</u>	<u>46.96561, -123.78971</u>	<u>317091521001</u>	<u>Aberdeen School District #5</u>	<u>South Farragut Street &amp; East Perry Street</u>
	<u>AHC 5</u>	<u>46.97346, -123.83141</u>	<u>010400100100</u>	<u>Aberdeen School District #5</u>	<u>Pacific Avenue &amp; North Division Street</u>
	<u>AHC 6</u>	<u>46.97461, -123.92440</u>	<u>056401200100</u>	<u>Port of Grays Harbor</u>	<u>Airport Way (near Bowerman Airport)</u>
<b>TAHOLAH</b>	<u>TA 1</u>	<u>47.346217, -124.289532</u>	<u>unknown</u>	<u>unknown</u>	<u>5th Avenue &amp; Commux Street</u>
	<u>TA 2</u>	<u>47.344442, -124.293106</u>	<u>unknown</u>	<u>unknown</u>	<u>2nd Avenue &amp; Spruce Street</u>
	<u>TA 3</u>	<u>47.345159, -124.284176</u>	<u>unknown</u>	<u>unknown</u>	<u>Park Place</u>

# Clallam County VES Locations: all Options

<i>Community</i>	<i>VES ID</i>	<i>Location</i>	<i>Parcel Number</i>	<i>Parcel Owner</i>	<i>Intersection</i>
<b>LA PUSH</b>	<u>LP 1</u>	<u>47.908355, -124.637894</u>	<u>N/A</u>	<u>Quileute Tribe</u>	<u>Ocean Drive &amp; River Drive</u>
<b>NEAH BAY</b>	<u>NB 1</u>	<u>48.364337, -124.621179</u>	<u>TBD</u>	<u>Neah Bay School District</u>	<u>Elk Street &amp; Deer Street</u>
	<u>NB 2</u>	<u>48.365846, -124.606190</u>	<u>TBD</u>	<u>TBD</u>	<u>Buchanan Street &amp; Bayview Avenue</u>



# Appendix B: Ocean Shores Bridges

# Ocean Shores: Bridge Inventory + Locations

<i>Bridge ID</i>	<i>Community/Study Area</i>	<i>Location (Lat/Long)</i>	<i>Street</i>	<i>Notes</i>
<u>1</u>	<u>Ocean Shores - East</u>	<u>47.005633, -124.150603</u>	<u>E Chance a La Mer</u>	<u>Located between Cardinal Avenue NE &amp; Rainbow Court</u>
<u>2</u>	<u>Ocean Shores - East</u>	<u>46.998026, -124.148508</u>	<u>Albatross Street NE</u>	<u>Located between Sunset Avenue &amp; E Chance a La Mer NE</u>
<u>3</u>	<u>Ocean Shores - East</u>	<u>46.988842, -124.146176</u>	<u>Overlake Street NE</u>	<u>Located just SW of Duck Lake Drive NE</u>
<u>4</u>	<u>Ocean Shores - East</u>	<u>46.984694, -124.156552</u>	<u>Ocean Lake Way NE</u>	<u>Located between Point Brown Avenue &amp; Canal Drive</u>
<u>5</u>	<u>Ocean Shores - East</u>	<u>46.951139, -124.132280</u>	<u>Point Brown Avenue SW</u>	<u>Located between North Razor Clam Drive SW &amp; South Razor Clam Drive SW</u>
<u>6</u>	<u>Ocean Shores - East</u>	<u>46.952582, -124.134914</u>	<u>Mount Olympus Avenue</u>	<u>Located between Falls of Clyde Loop SE &amp; Hassalo Avenue SE</u>
<u>7</u>	<u>Ocean Shores - West</u>	<u>46.951540, -124.146702</u>	<u>Tonquin Avenue SW</u>	<u>Located between Wawona Avenue &amp; Marine View Drive</u>
<u>8</u>	<u>Ocean Shores - West</u>	<u>47.071072, -124.167795</u>	<u>Second Avenue</u>	<u>Located between Pacific Boulevard &amp; Ocean Boulevard</u>

# **Appendix C: 2010 Census and 2019 American Community Survey (ACS) Estimates**



# Population Comparisons: 2010 Census vs. 2019 ACS

<i>Community</i>	<i>Type</i>	<i>2010 Census - Median Household Size</i>	<i>2019 ACS Estimate - Median Household Size</i>	<i>Difference (2019 ACS - 2010 Census)</i>
<b>Ilwaco</b>	<u>Town</u>	<u>2.1</u>	<u>2.6</u>	<u>0.5</u>
<b>Seaview (98644)</b>	<u>Zip Code</u>	<u>1.9</u>	<u>2.3</u>	<u>0.4</u>
<b>Long Beach</b>	<u>Town</u>	<u>1.9</u>	<u>2</u>	<u>0.1</u>
<b>Ocean Park</b>	<u>Town</u>	<u>2.05</u>	<u>2.3</u>	<u>0.25</u>
<b>Oysterville (98640)</b>	<u>Zip Code</u>	<u>2.05</u>	<u>2.1</u>	<u>0.05</u>
<b>Leadbetter (98640)</b>	<u>Zip Code</u>	<u>2.05</u>	<u>2.1</u>	<u>0.05</u>
<b>Tokeland (98590)</b>	<u>Zip Code</u>	<u>2.18</u>	<u>2.4</u>	<u>0.22</u>
<b>North Cove (98547)</b>	<u>Zip Code</u>	<u>2.18</u>	<u>2</u>	<u>(0.18)</u>
<b>Grayland</b>	<u>Town</u>	<u>2.0</u>	<u>1.8</u>	<u>(0.2)</u>
<b>Westport</b>	<u>Town</u>	<u>2.1</u>	<u>2.1</u>	<u>0</u>
<b>Ocean Shores</b>	<u>Town</u>	<u>2.06</u>	<u>1.9</u>	<u>(0.16)</u>
<b>Taholah</b>	<u>Town</u>	<u>*Tribal population estimate used instead</u>	<u>*Tribal population estimate used instead</u>	<u>N/A</u>
<b>La Push (98350)</b>	<u>Zip Code</u>	<u>*Tribal population estimate used instead</u>	<u>*Tribal population estimate used instead</u>	<u>N/A</u>
<b>Neah Bay</b>	<u>Town</u>	<u>2.76</u>	<u>3.2</u>	<u>0.44</u>