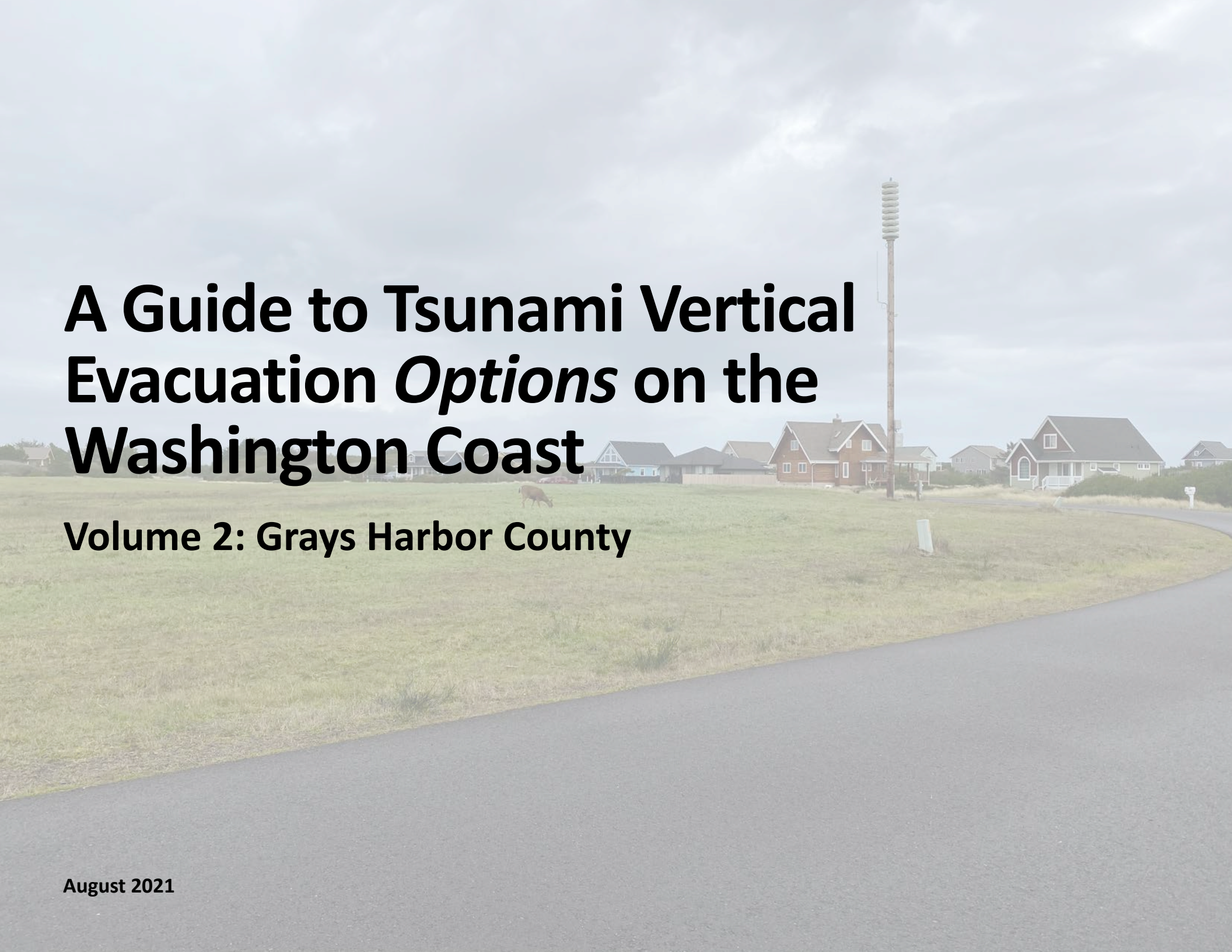

A Guide to Tsunami Vertical Evacuation *Options* on the Washington Coast

Volume 2: Grays Harbor County

August 2021

Tsunami Vertical Evacuation *Options*

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

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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).

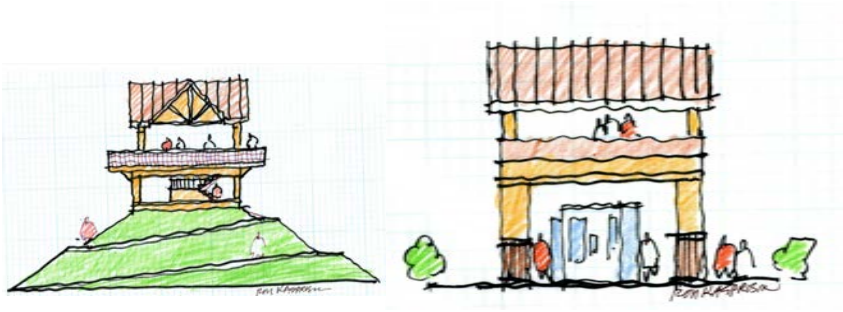
The first tsunami vertical evacuation structure built in north America is the Ocosta Elementary School. It was completed in 2016 and is near Westport, Washington. The Ocosta school district's superintendent had participated in the initial vertical evacuation planning for Westport and Grays Harbor County 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.

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

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). 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 form 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.

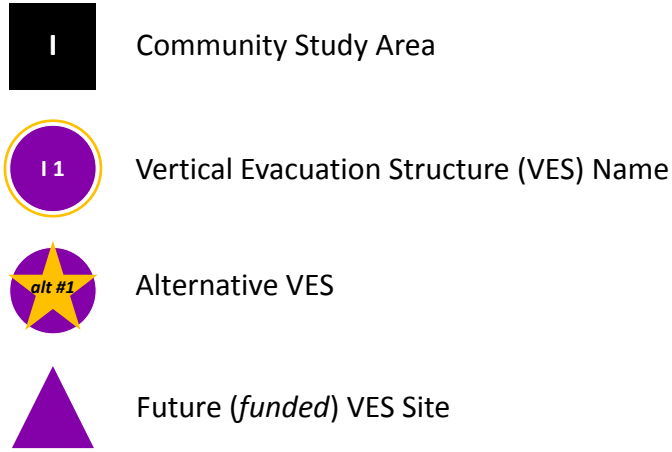
Vertical Evacuation + Pedestrian Evacuation Assessment Tool [PEAT] Results

Symbology Key

Map Icons =

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

Community Study Area Icons =

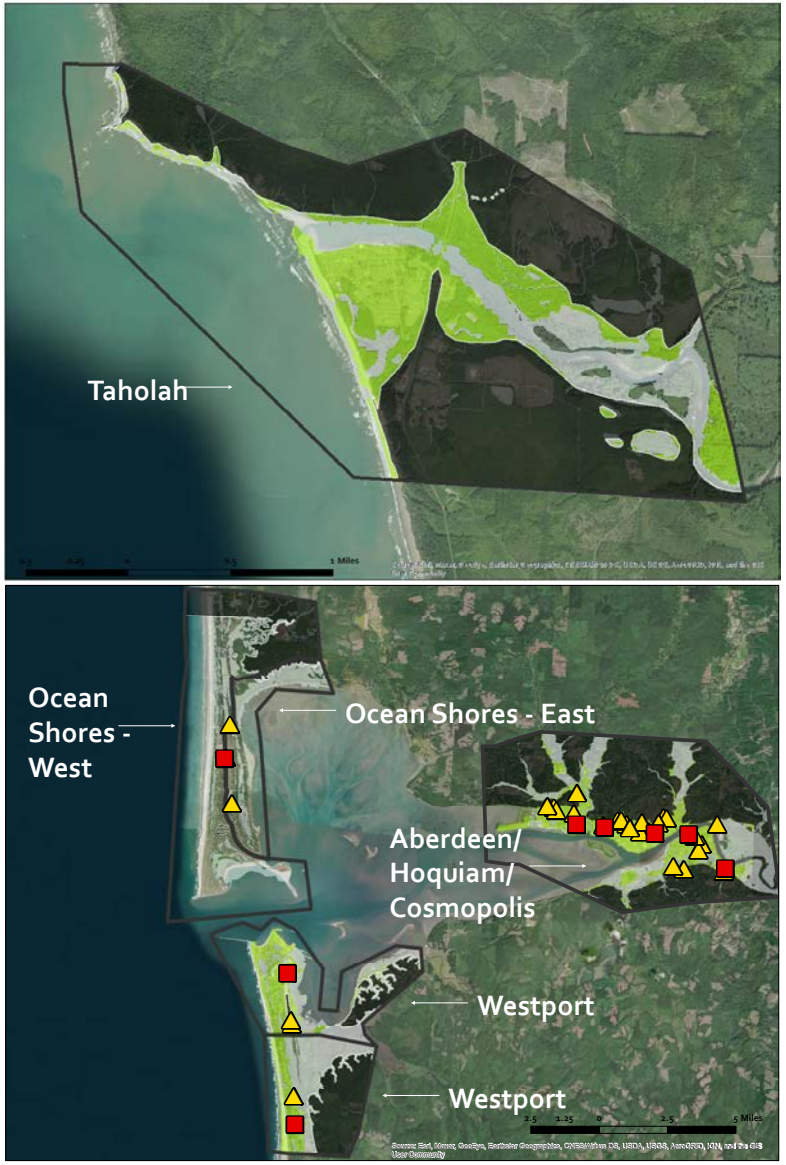


- Community Study Area
- Vertical Evacuation Structure (VES) Name
- Alternative VES
- Future (*funded*) VES Site

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

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

Grays Harbor County



Grays Harbor County: Context Map

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

G

Grayland

Grayland community study area population <u>in the tsunami hazard area</u> = ~1,722 people

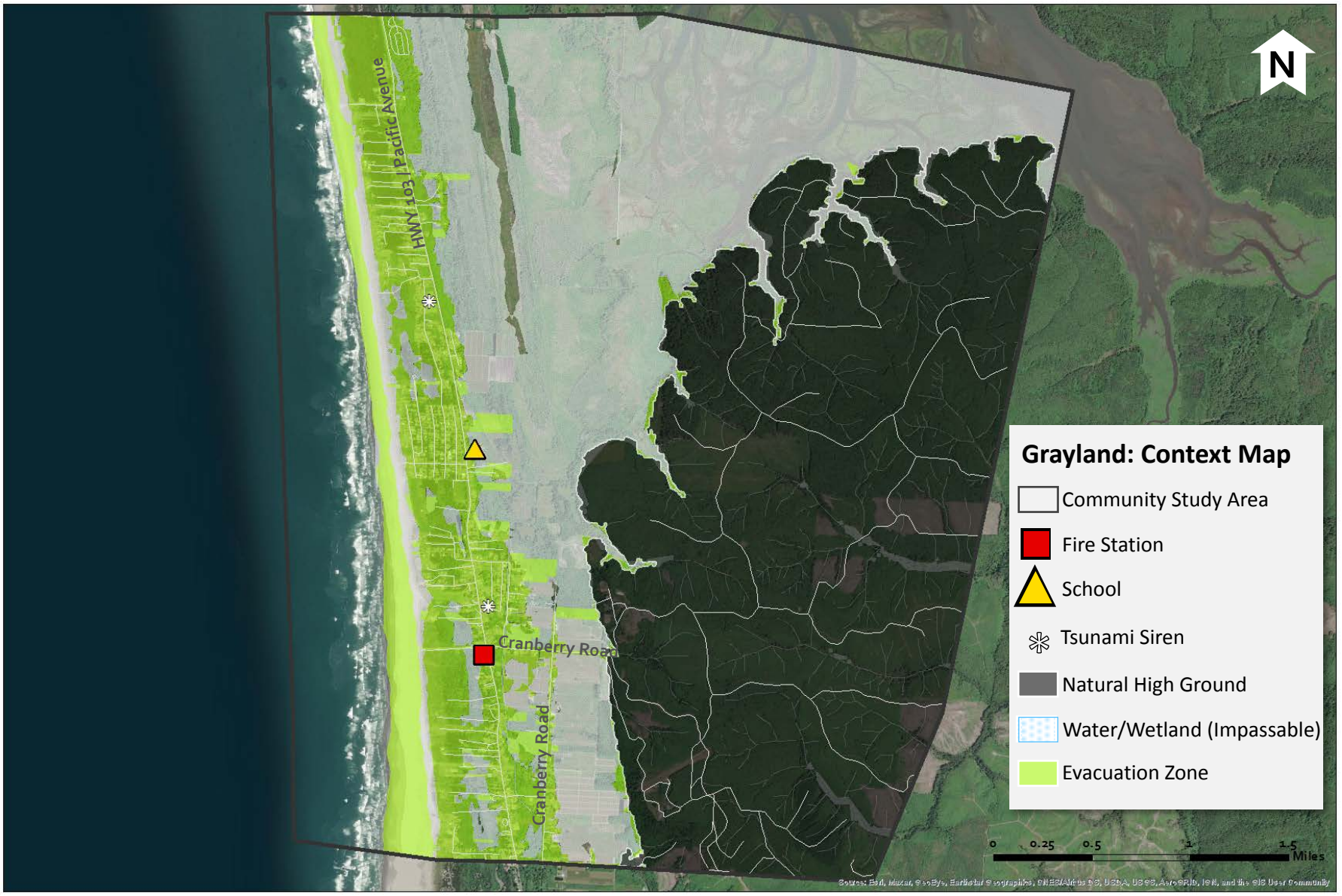
Resident/Worker/Overnight Visitor population = ~1,662 people

Fire Department occupancy = ~30 people

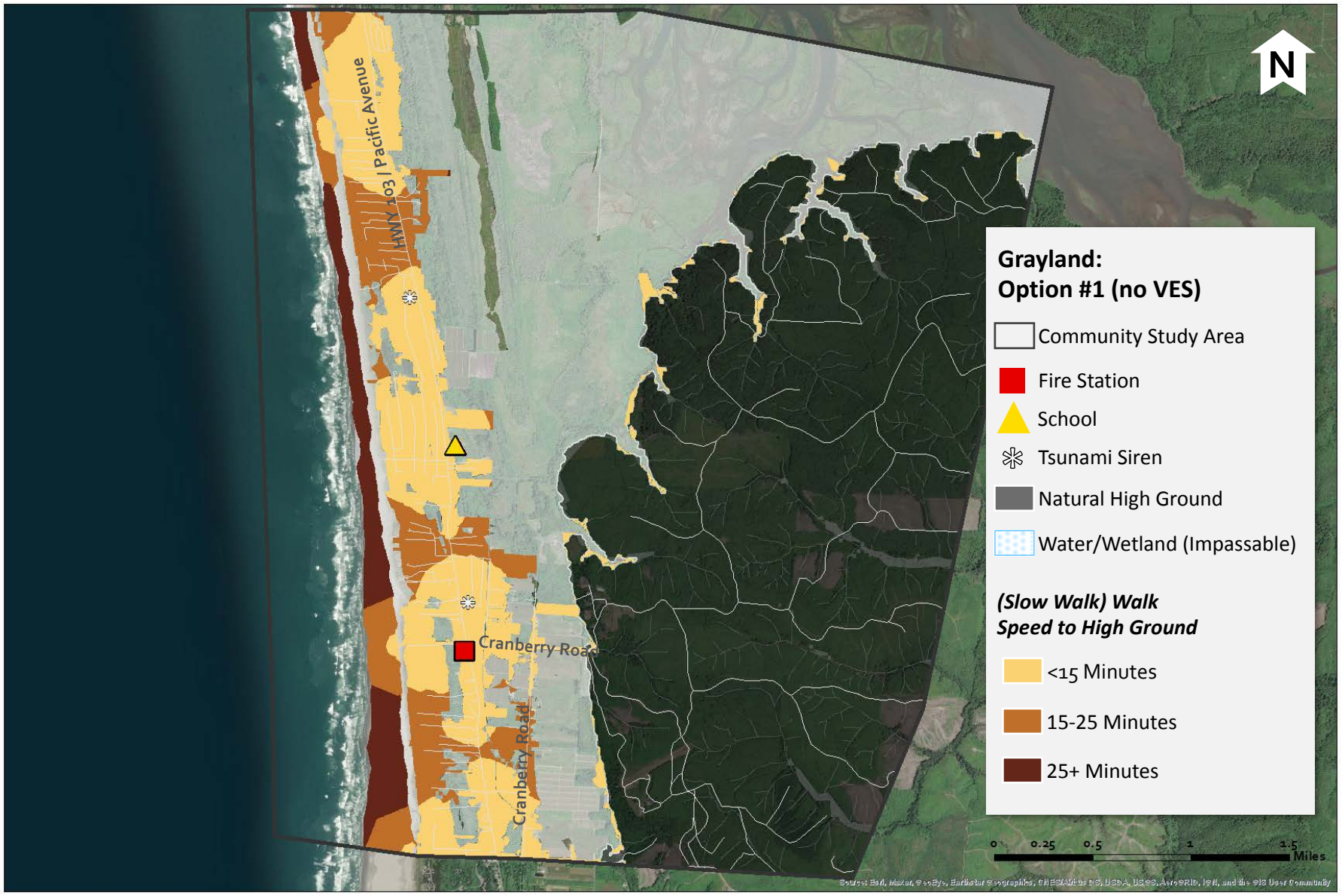
Schools occupancy = ~30 people

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

G

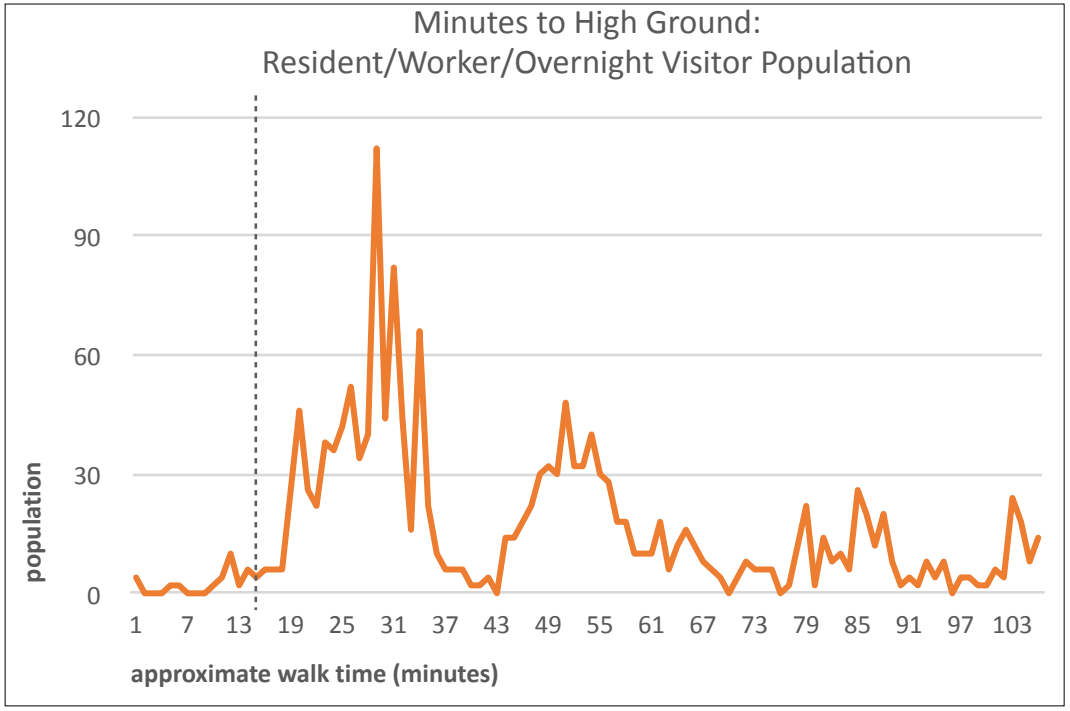

N
HWY 101 / Pacific Avenue
Cranberry Road
Cranberry Road
Grayland: Context Map
Community Study Area
Fire Station
School
Tsunami Siren
Natural High Ground
Water/Wetland (Impassable)
Evacuation Zone
0 0.25 0.5 1 1.5
Miles

G


N
HWY 103 | Pacific Avenue
Cranberry Road
Cranberry Road
Grayland:
Option #1 (no VES)
Community Study Area
Fire Station
School
Tsunami Siren
Natural High Ground
Water/Wetland (Impassable)
(Slow Walk) Walk
Speed to High Ground
<15 Minutes
15-25 Minutes
25+ Minutes
0
0.25
0.5
1
1.5
Miles

Grayland: VES Option #1 (No VES)

G



*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
32 people	288 people	1,402 people

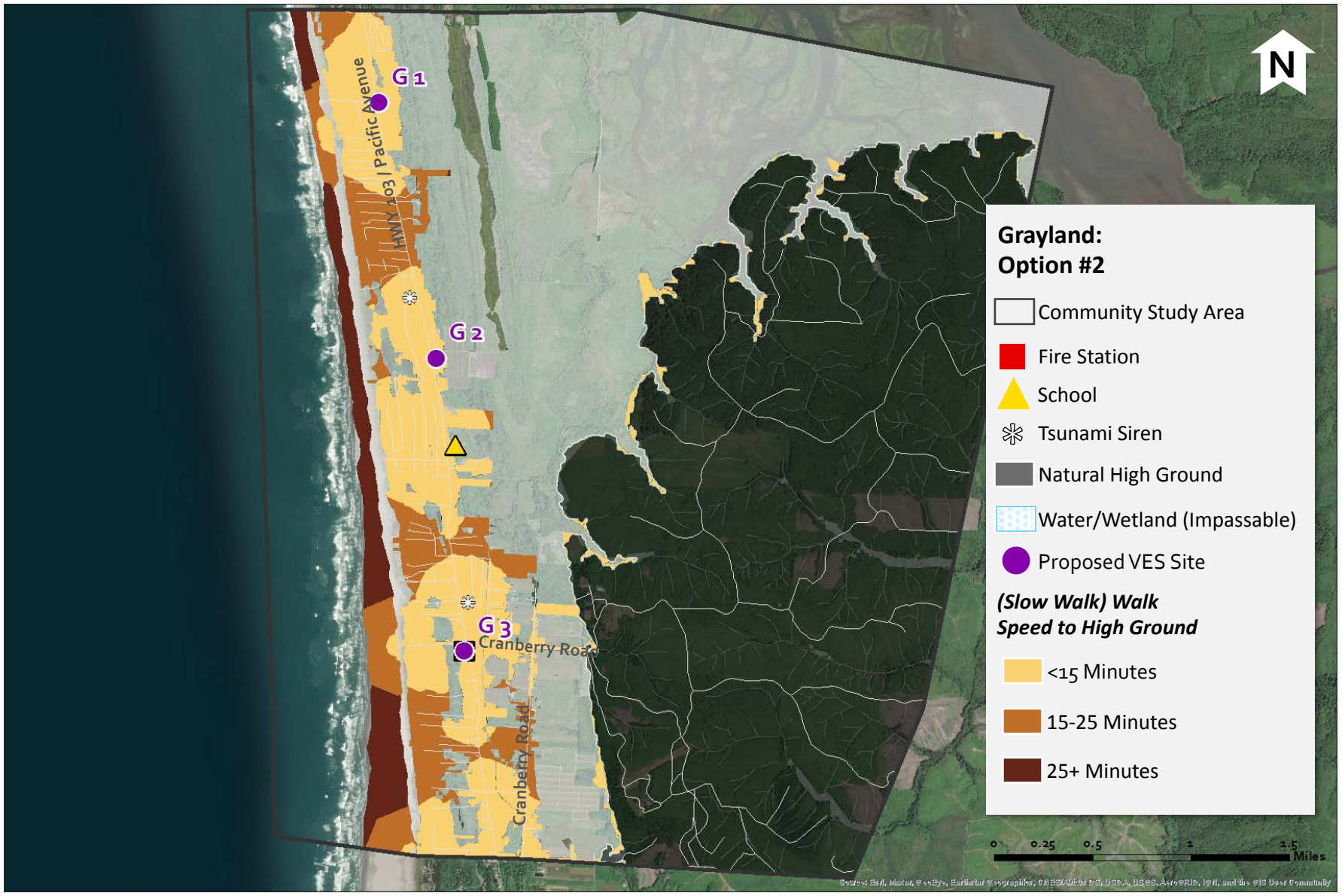
Fire Station: Approximate 20 minute walk time to high ground

Schools: Approximate 49 minute walk time to high ground

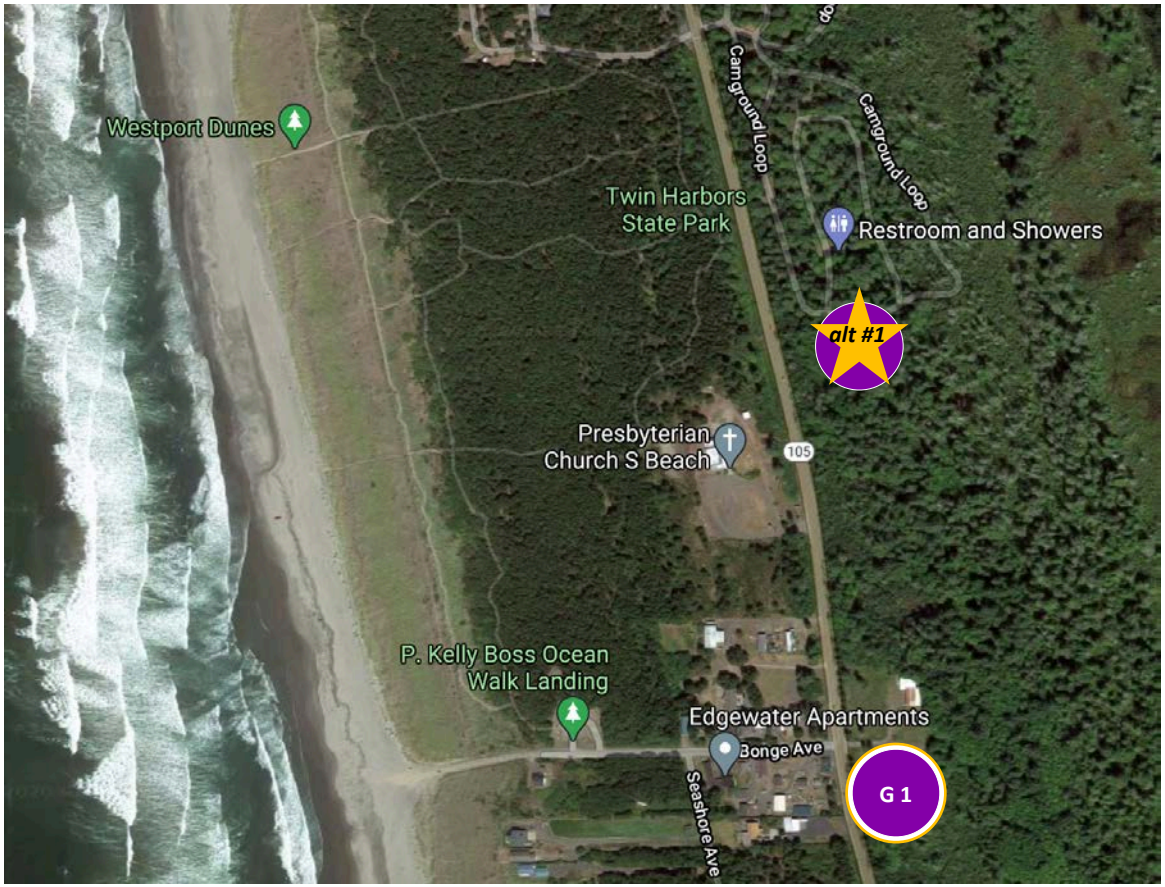
Under **Option #1:**

- approximately **1.9%** of the total estimated Grayland population are within 15 minutes to natural high ground
- approximate **maximum* walk time to natural high ground for identified population = **105** minutes

G


G 1
G 2
G 3
HWY 103 | Pacific Avenue
Cranberry Road
Cranberry Road
N
Grayland:
Option #2
Community Study Area
Fire Station
School
Tsunami Siren
Natural High Ground
Water/Wetland (Impassable)
Proposed VES Site
(Slow Walk) Walk
Speed to High Ground
<15 Minutes
15-25 Minutes
25+ Minutes
0
0.25
0.5
1
1.5
Miles

Grayland: G 1 + *alternative*



Source: *Google Maps*

G 1	
Address	4008 SR 105
Intersection	Bonge Avenue & SR 105
Options	2, 3, 4
Notes	Move north to State of Washington Parks & Recreation-owned land, same side of HWY: #161224440030

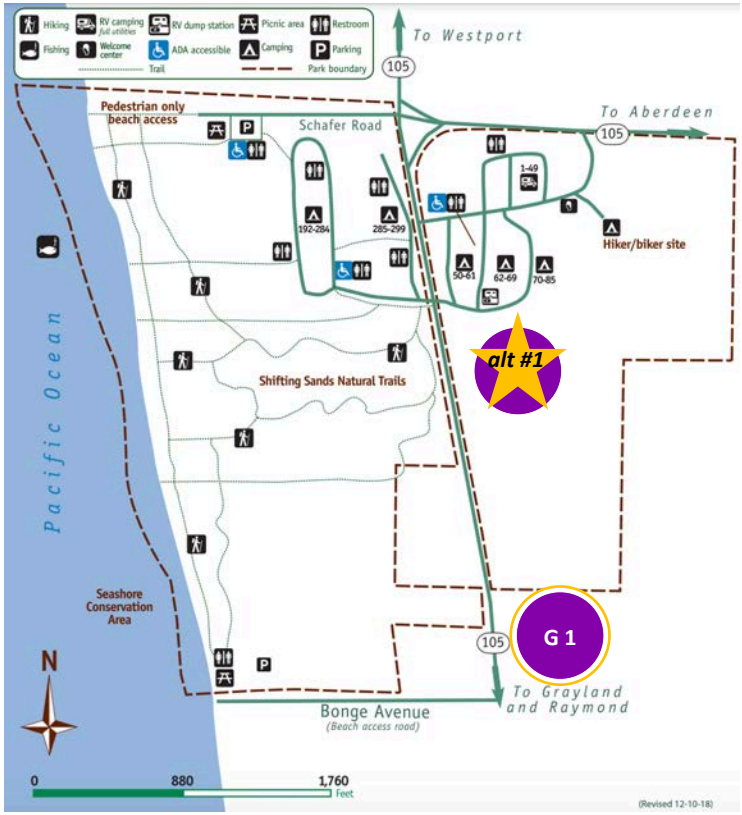
G 1 - alt #1	
Address	N/a
Intersection	HWY 105, NE of HWY 105 & Bonge Avenue
Notes	Twin Harbor State Park Campground

Grayland: G 1

Photo Credit: *Bob Freitag*

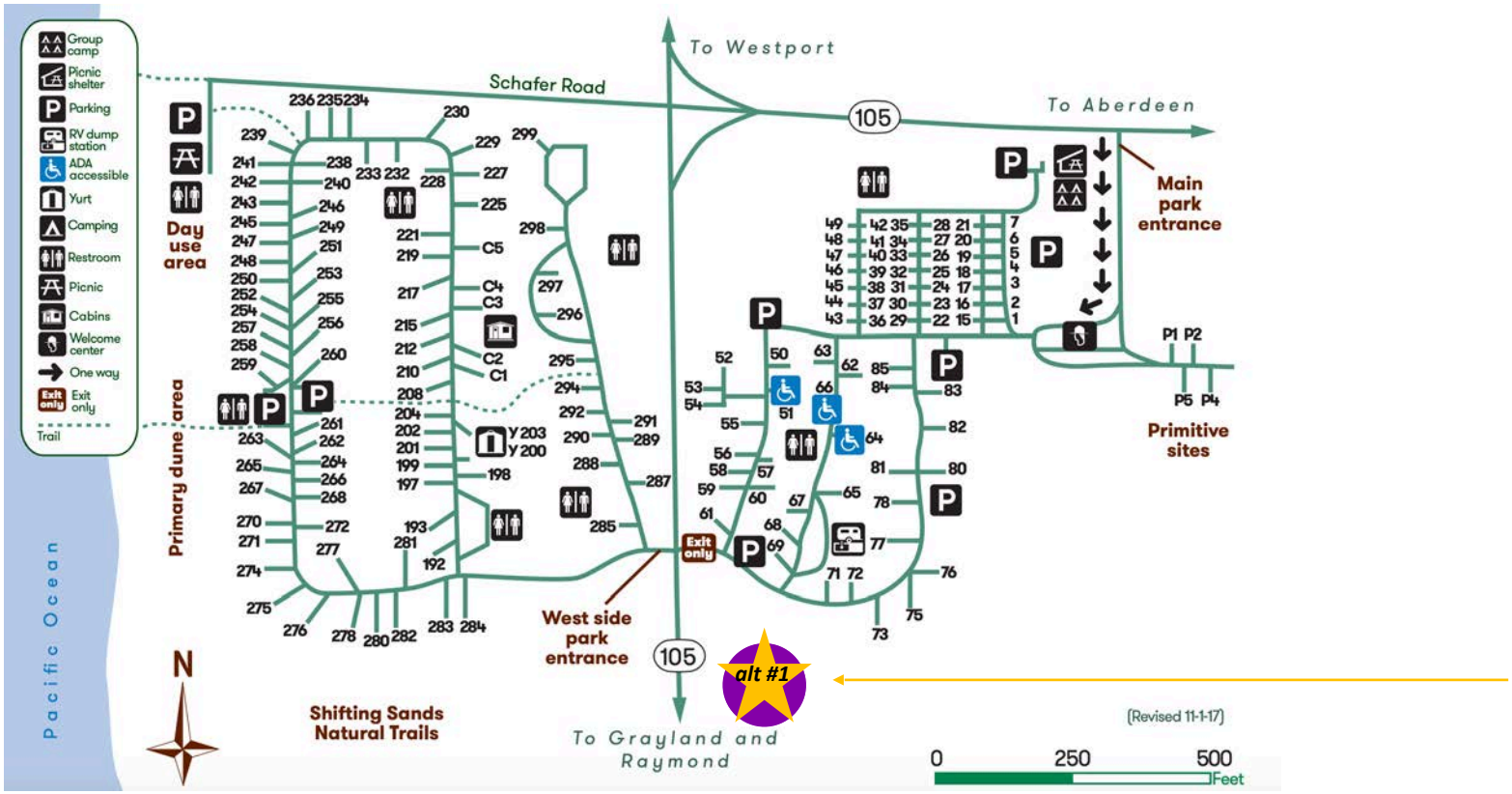
G 1 - Privately-owned parcel with some open space.

Grayland: G 1 *alternative*



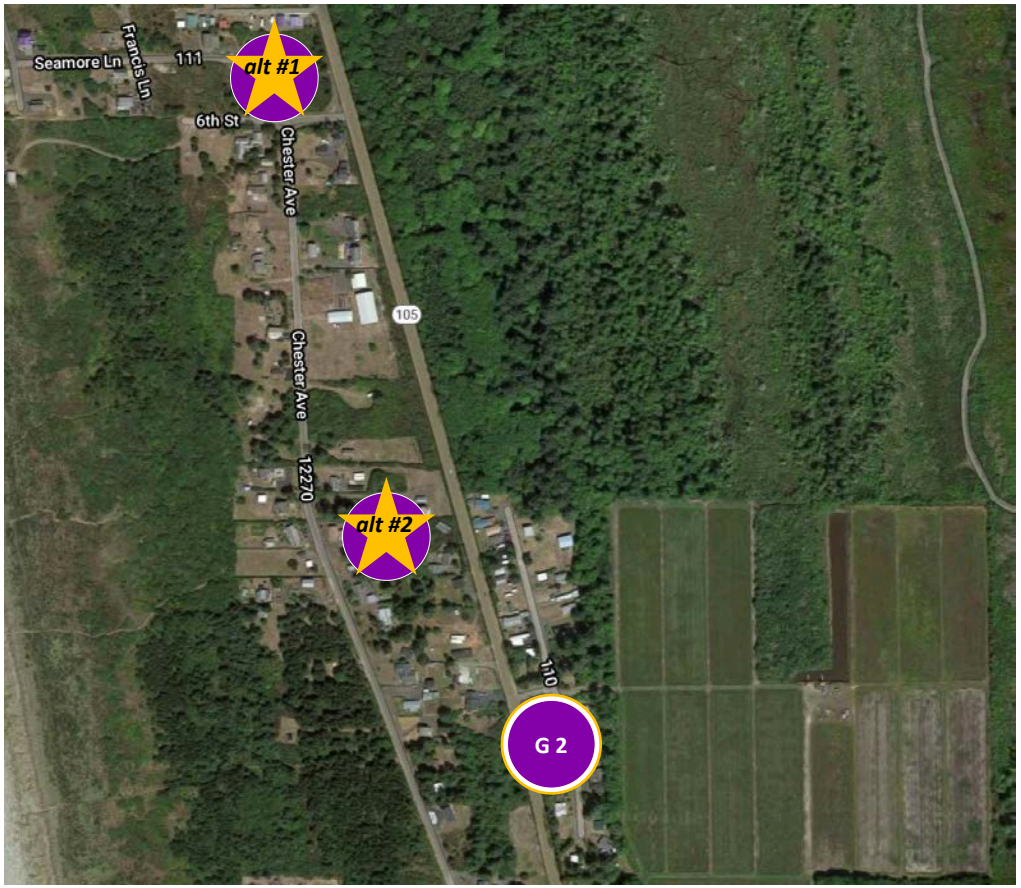
G 1 - *Alternative #1:* State recreation/camping land located to the north of G 1 in the Twin Harbors State Park Campground.

Grayland: G 1 *alternative*



G 1 - *Alternative #1:* State recreation/camping land located to the north of G 1 in the Twin Harbors State Park Campground.

Grayland: G 2 + *alternatives*



Source: *Google Maps*

G 2	
Address	N/a
Intersection	(south of) 6th Street & SR 105, east side of HWY, vacant private lot
Options	2, 3
Notes	move northwest to GHC Water District #1 parcel, west side of HWY (currently vacant lot): #161131220100

G 2 - alt #1	
Address	N/a
Intersection	Chester Avenue & SR 105
Notes	Access looks good

G 2 - alt #2	
Address	1108 Chester Avenue
Intersection	Chester Avenue, east-side
Notes	GHC Water District

Grayland: G 2

Photo Credit: *Google Maps Street View*

G 2 - private, yet vacant lot. Two alternative sites located to the north: Private, yet vacant land and GH County Water District land.

Grayland: G 2 *alternative #1*

G 2 - *Alternative #1*: vacant, private land

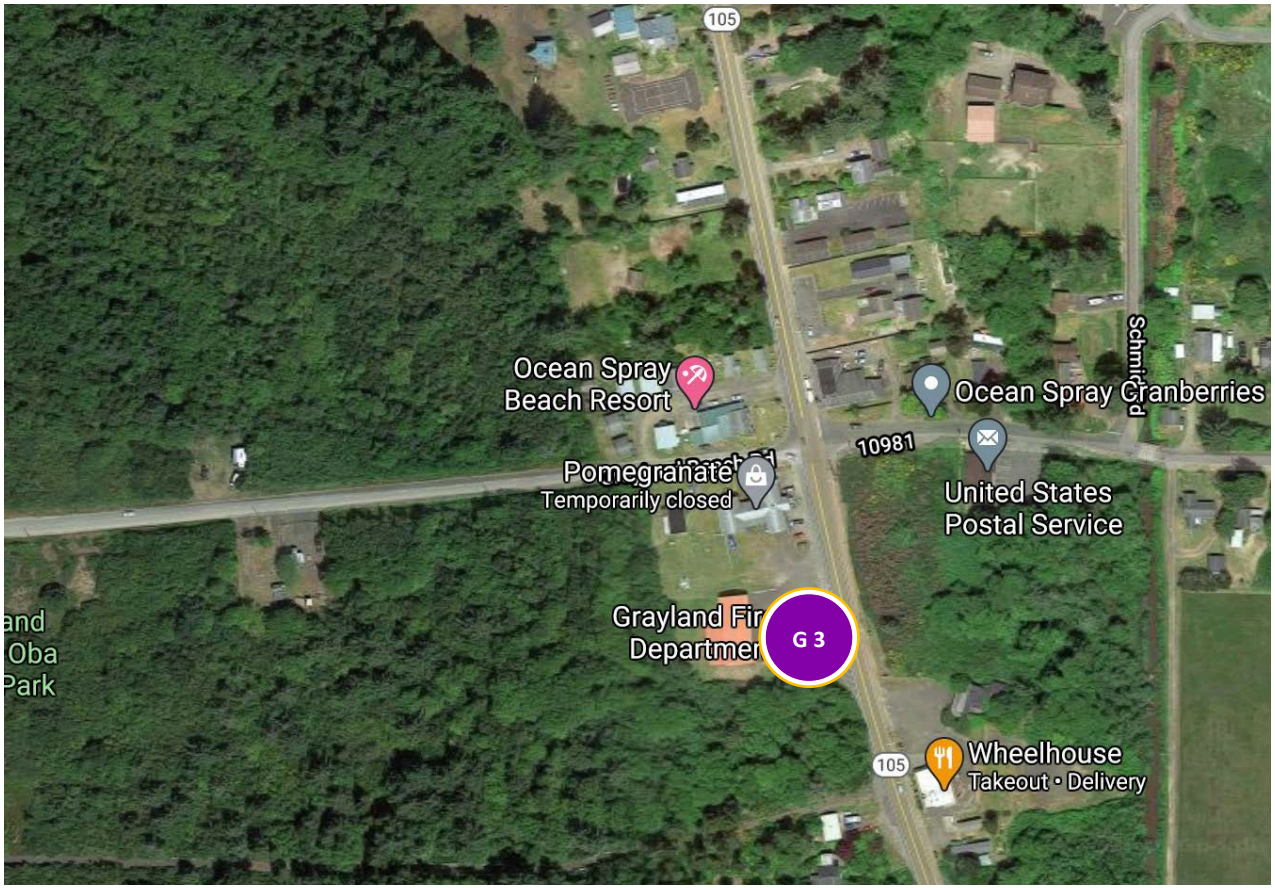
Photo Credit: *Google Maps Street View*

Grayland: G 2 *alternative #2*

G 2 - *Alternative #2*: Grays Harbor County Water District land

Photo Credit: *Google Maps Street View*

Grayland: G 3



G 3	
Address	N/a
Intersection	Cranberry Road & SR 105
Options	2, 3, 4
Notes	Fire Department

Source: *Google Maps*

Grayland: G 3

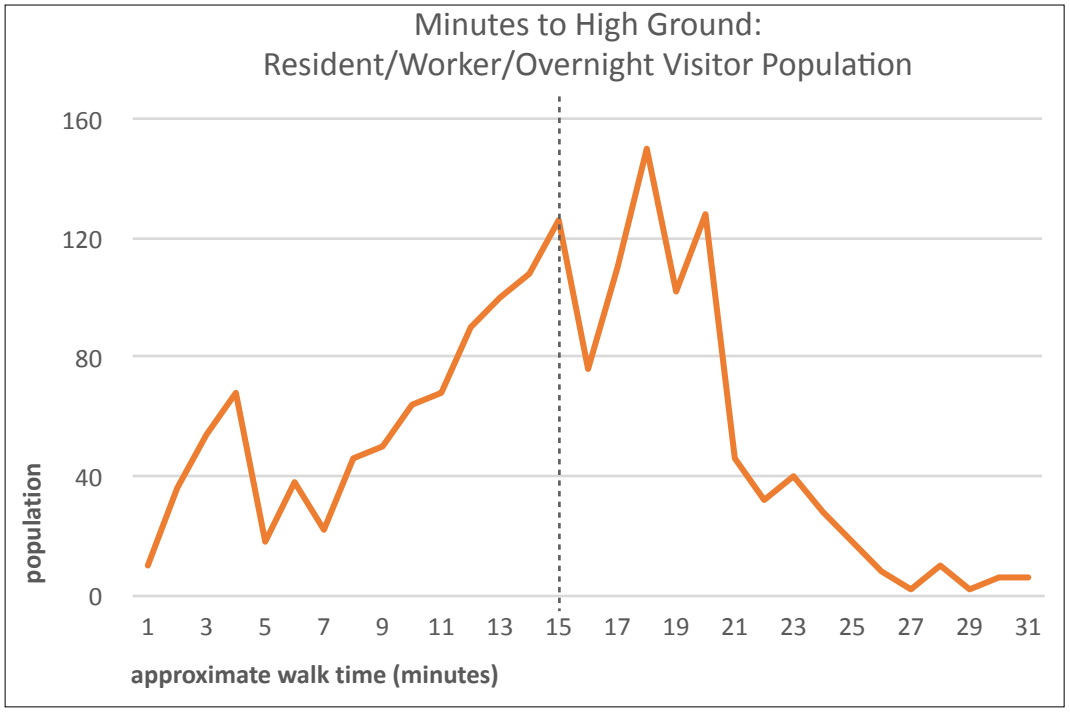
G 3 - Grayland Fire Department

Photo Credit: *Google Maps Street View*

Grayland: VES Option #2 (Community-Derived)

G

G 1 G 2 G 3



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

<15 minutes	15-25 minutes	25+ minutes
802 people	886 people	34 people

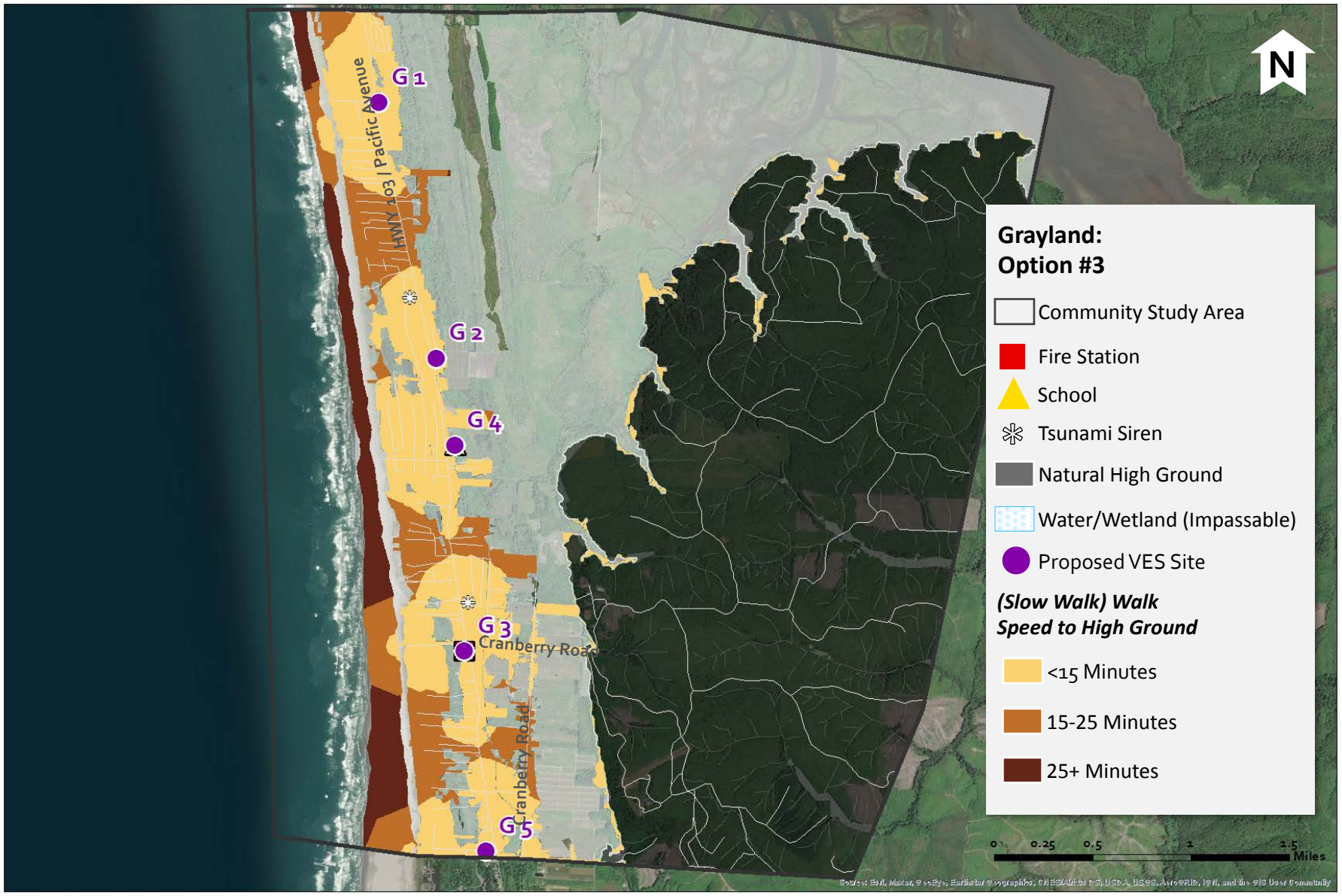
Fire Station: Approximate 1 minute walk time to high ground or VES

Schools: Approximate 15 minute walk time to high ground or VES

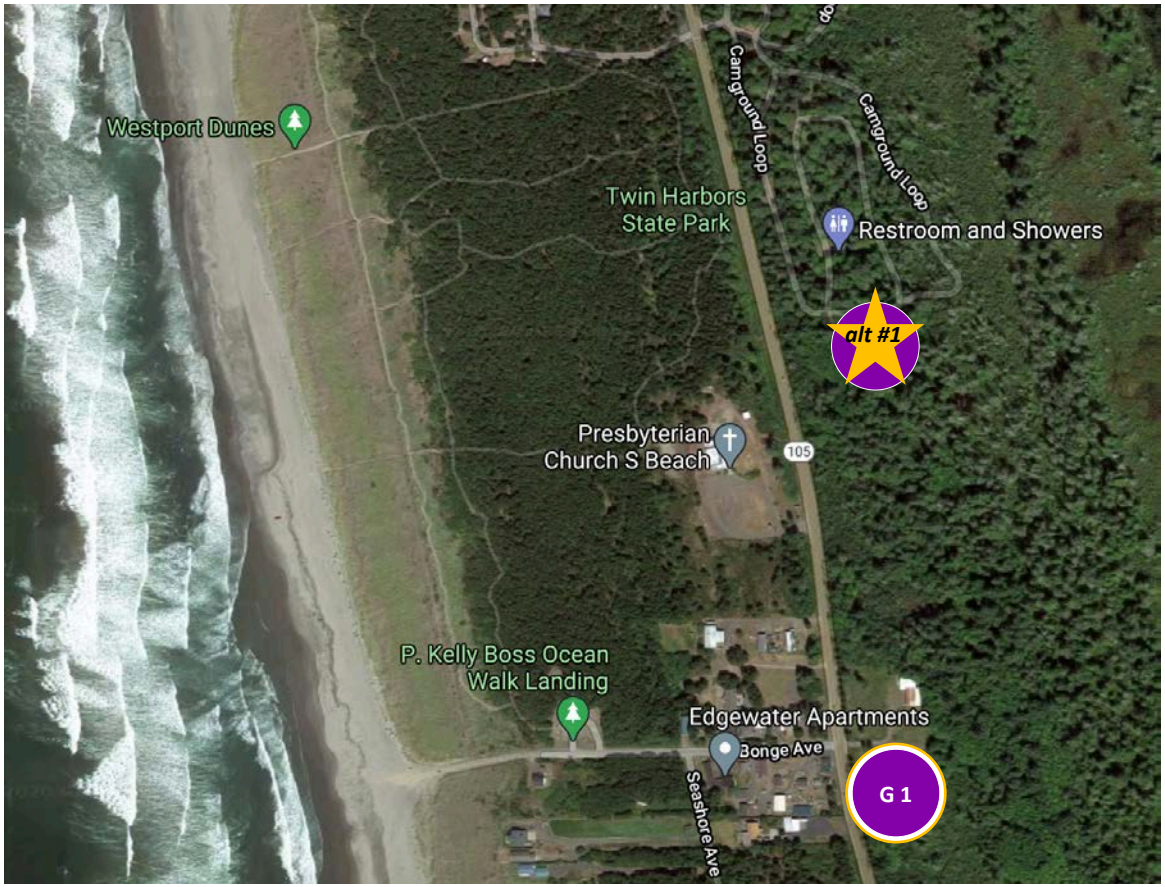
Under **Option #2:**

- approximately **46.6%** of the total estimated Grayland 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) = **770** people
- # of proposed VES = **3**

G


N
G 1
G 2
G 4
G 3
G 5
HWY 103 / Pacific Avenue
Cranberry Road
Cranberry Road
Grayland:
Option #3
Community Study Area
Fire Station
School
Tsunami Siren
Natural High Ground
Water/Wetland (Impassable)
Proposed VES Site
(Slow Walk) Walk
Speed to High Ground
<15 Minutes
15-25 Minutes
25+ Minutes
0 0.25 0.5 1 1.5
Miles

Grayland: G 1 + *alternative*



G 1	
Address	4008 SR 105
Intersection	Bonge Avenue & SR 105
Options	2, 3, 4
Notes	Move north to State of Washington Parks & Recreation-owned land, same side of HWY: #161224440030

G 1 - alt #1	
Address	N/a
Intersection	HWY 105, NE of HWY 105 & Bonge Avenue
Notes	Twin Harbor State Park Campground

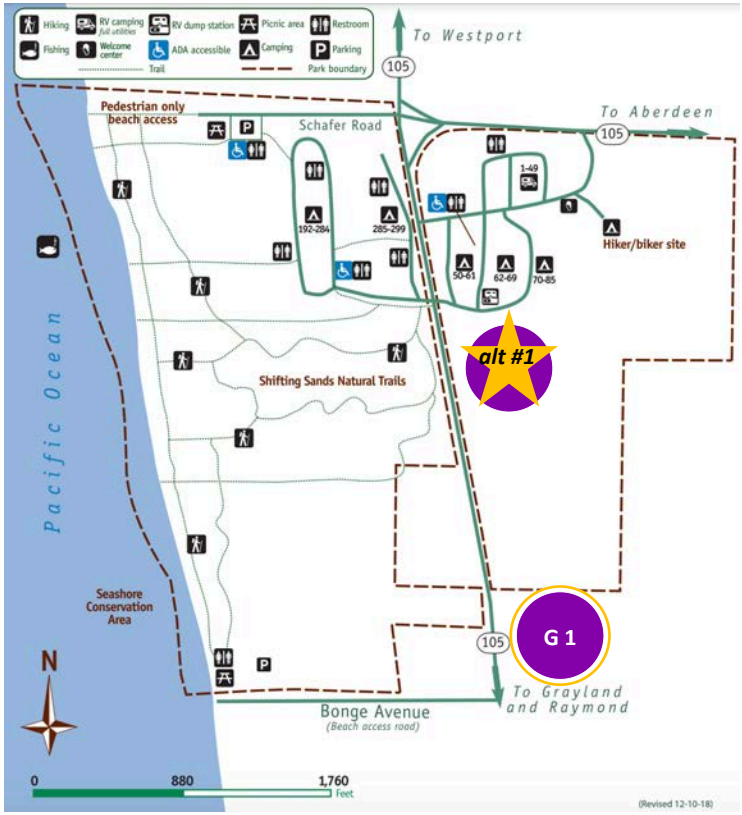
Source: *Google Maps*

Grayland: G 1

Photo Credit: *Bob Freitag*

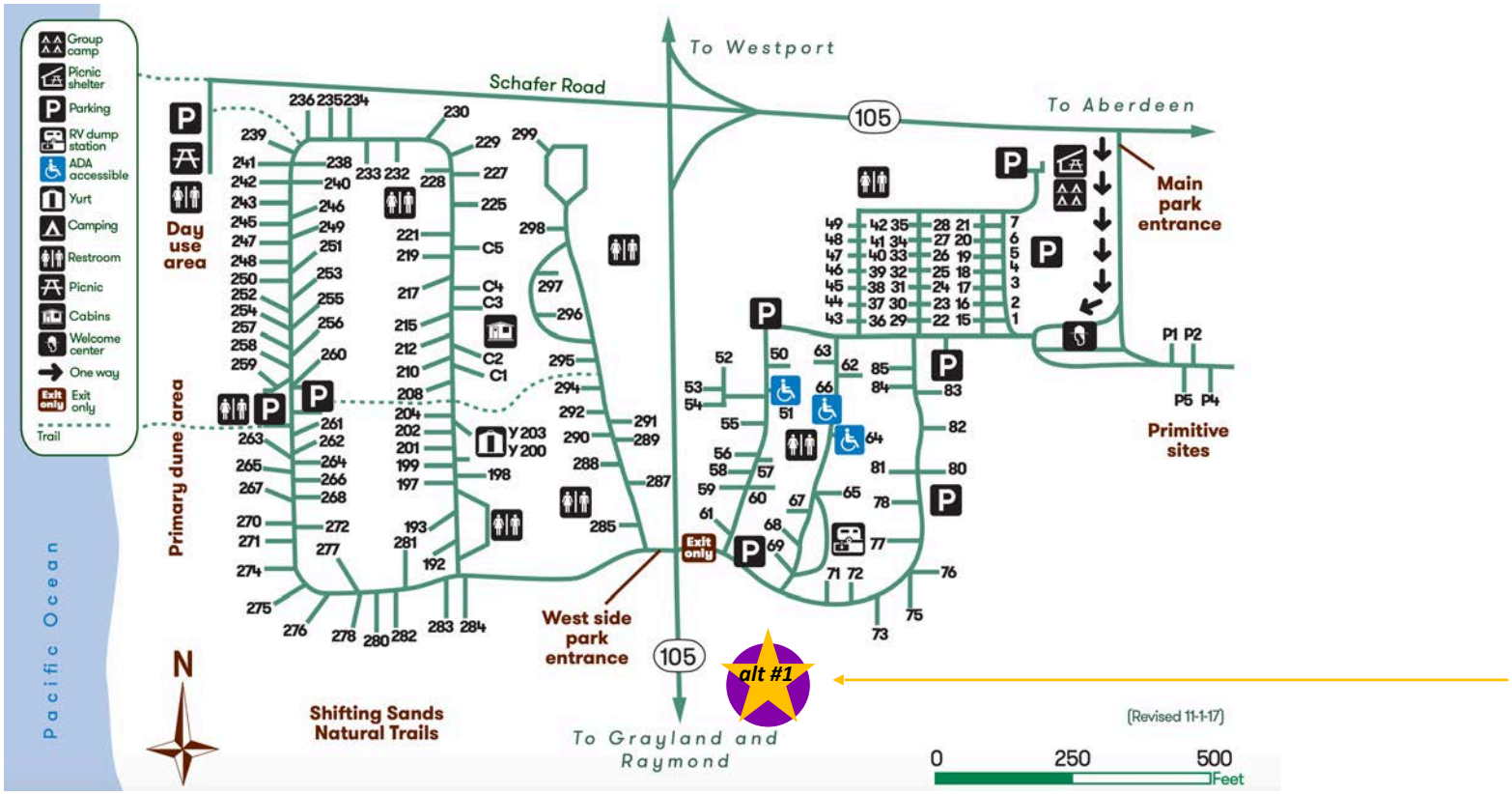
G 1 - Privately-owned parcel with some open space.

Grayland: G 1 *alternative*



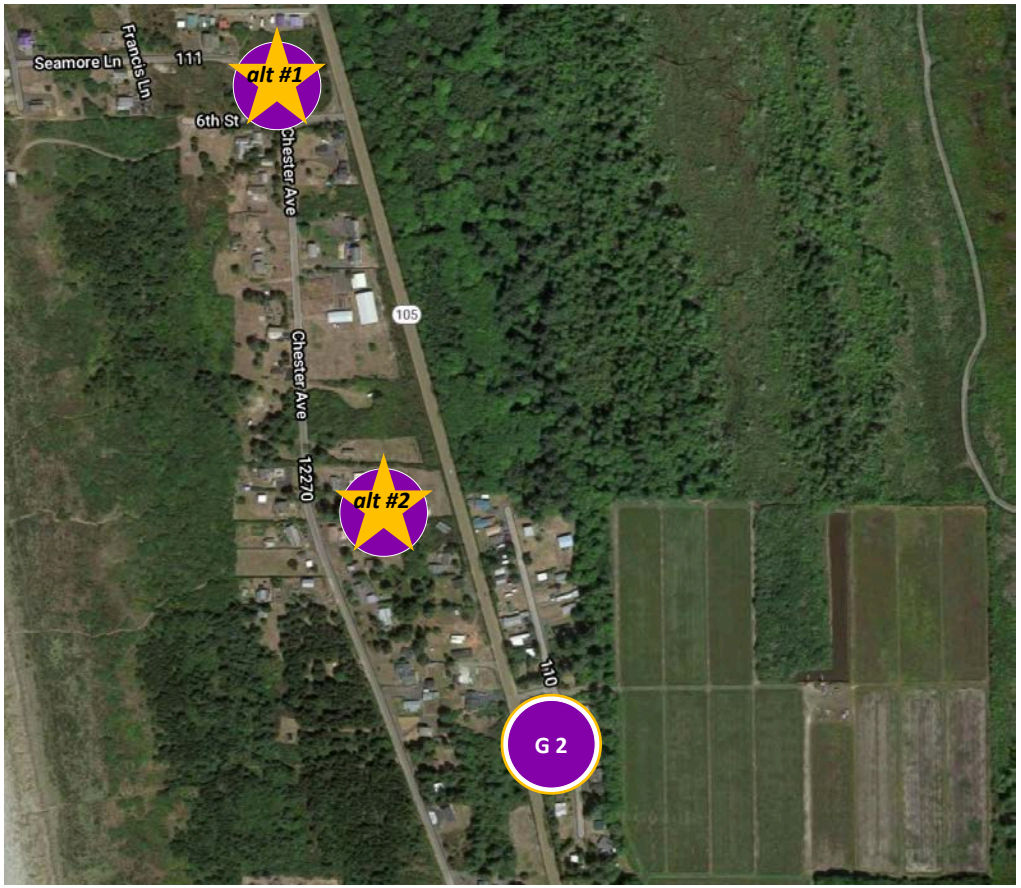
G 1 - *Alternative #1:* State recreation/camping land located to the north of G 1 in the Twin Harbors State Park Campground.

Grayland: G 1 *alternative*



G 1 - *Alternative #1:* State recreation/camping land located to the north of G 1 in the Twin Harbors State Park Campground.

Grayland: G 2 + *alternatives*



Source: *Google Maps*

G 2	
Address	N/a
Intersection	(south of) 6th Street & SR 105, east side of HWY, vacant private lot
Options	2, 3
Notes	move northwest to GHC Water District #1 parcel, west side of HWY (currently vacant lot): #161131220100

G 2 - alt #1	
Address	N/a
Intersection	Chester Avenue & SR 105
Notes	Access looks good

G 2 - alt #2	
Address	1108 Chester Avenue
Intersection	Chester Avenue, east-side
Notes	GHC Water District

Grayland: G 2

G 2 - private, yet vacant lot. Two alternative sites located to the north: Private, yet vacant land and GH County Water District land.

Photo Credit: *Google Maps Street View*

Grayland: G 2 *alternative #1*

G 2 - *Alternative #1*: vacant, private land

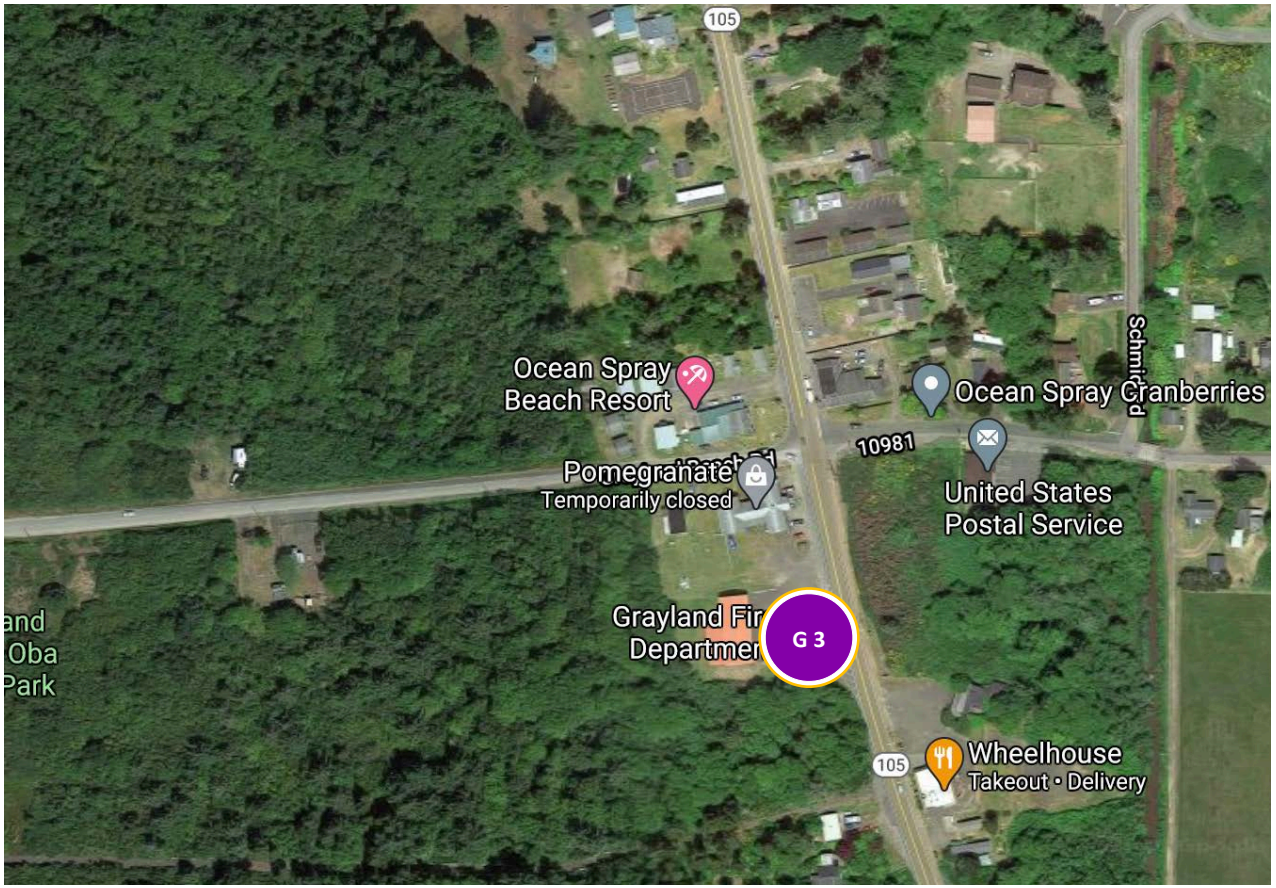
Photo Credit: *Google Maps Street View*

Grayland: G 2 *alternative #2*

G 2 - *Alternative #2*: Grays Harbor County Water District land

Photo Credit: *Google Maps Street View*

Grayland: G 3



G 3	
Address	N/a
Intersection	Cranberry Road & SR 105
Options	2, 3, 4
Notes	Fire Department

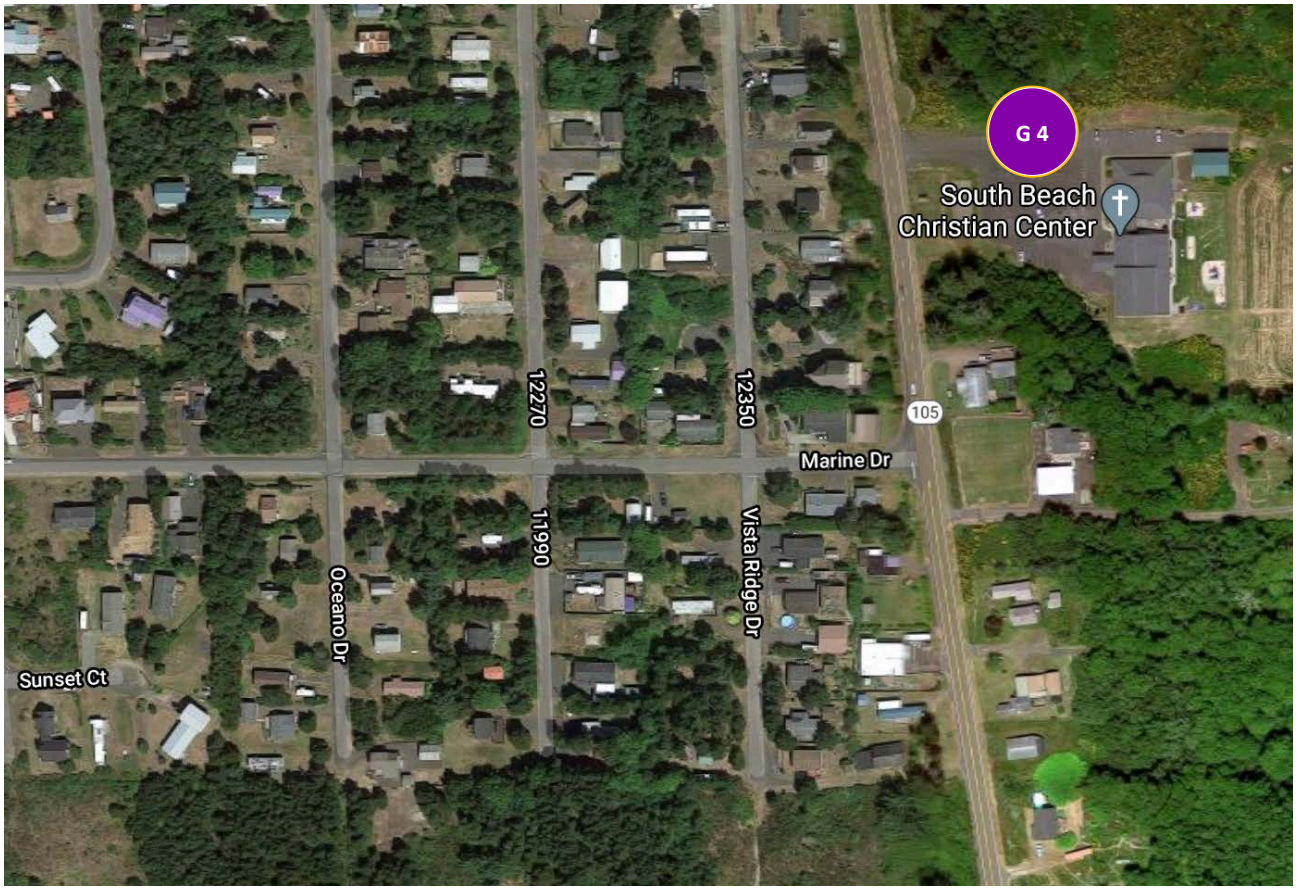
Source: *Google Maps*

Grayland: G 3

G 3 - Grayland Fire Department

Photo Credit: *Google Maps Street View*

Grayland: G 4



G 4	
Address	1360 SR 105
Intersection	Marine Drive & SR 105 (northeast of
Options	3, 4
Notes	located on private, exempt church-owned land. Private school location. South Beach Christian Center

Source: *Google Maps*

Grayland: G 4

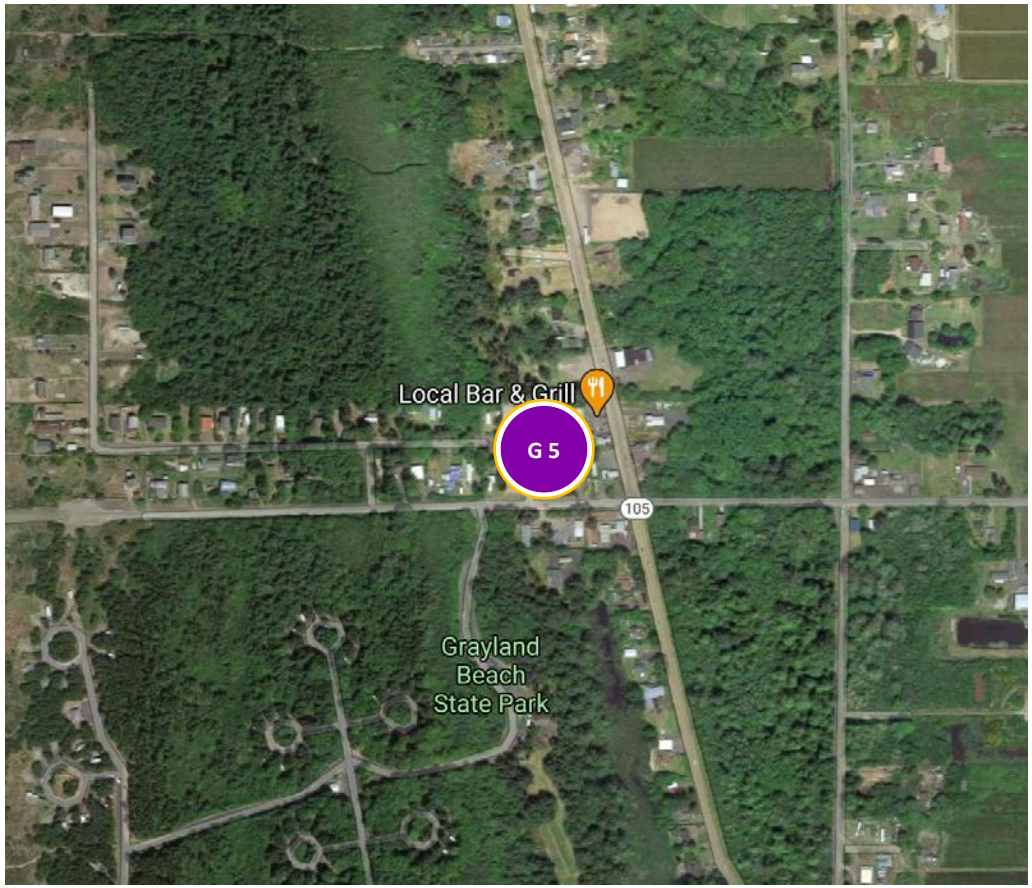
G 4 - South Beach Christian Center

Photo Credit: *Bob Freitag*

G 4 - South Beach Christian Center parking lot, view from street

Photo Credit: *Google Maps Street View*

Grayland: G 5



G 5	
Address	2193 SR 105
Intersection	SR 105 & Cranberry Beach Road
Options	3
Notes	State land, currently vacant

Source: *Google Maps*

Grayland: G 5

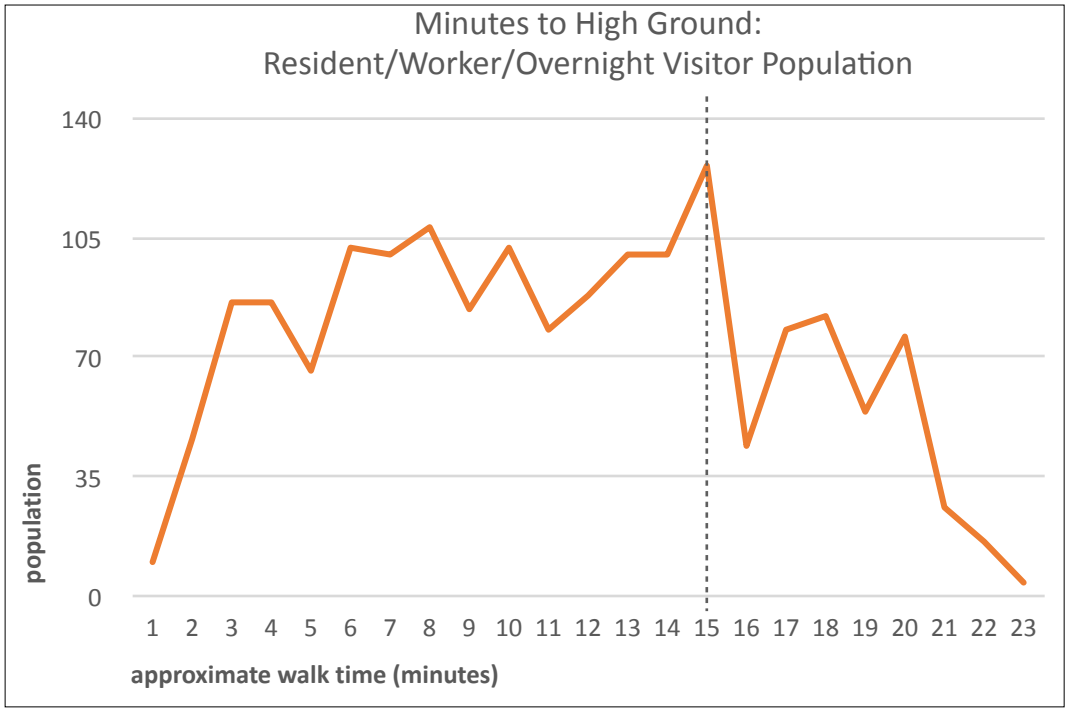
G 5 - State of Washington Parks and Recreation-owned parcel.
No permanent structures

Photo Credit: *Google Maps Street View*

Grayland: VES Option #3 (Broad Spatial Coverage)

G

G 1 G 2 G 3 G 4 G 5



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

<15 minutes	15-25 minutes	25+ minutes
1,216 people	506 people	n/a

■ *Fire Station: Approximate 1 minute walk time to high ground or VES*

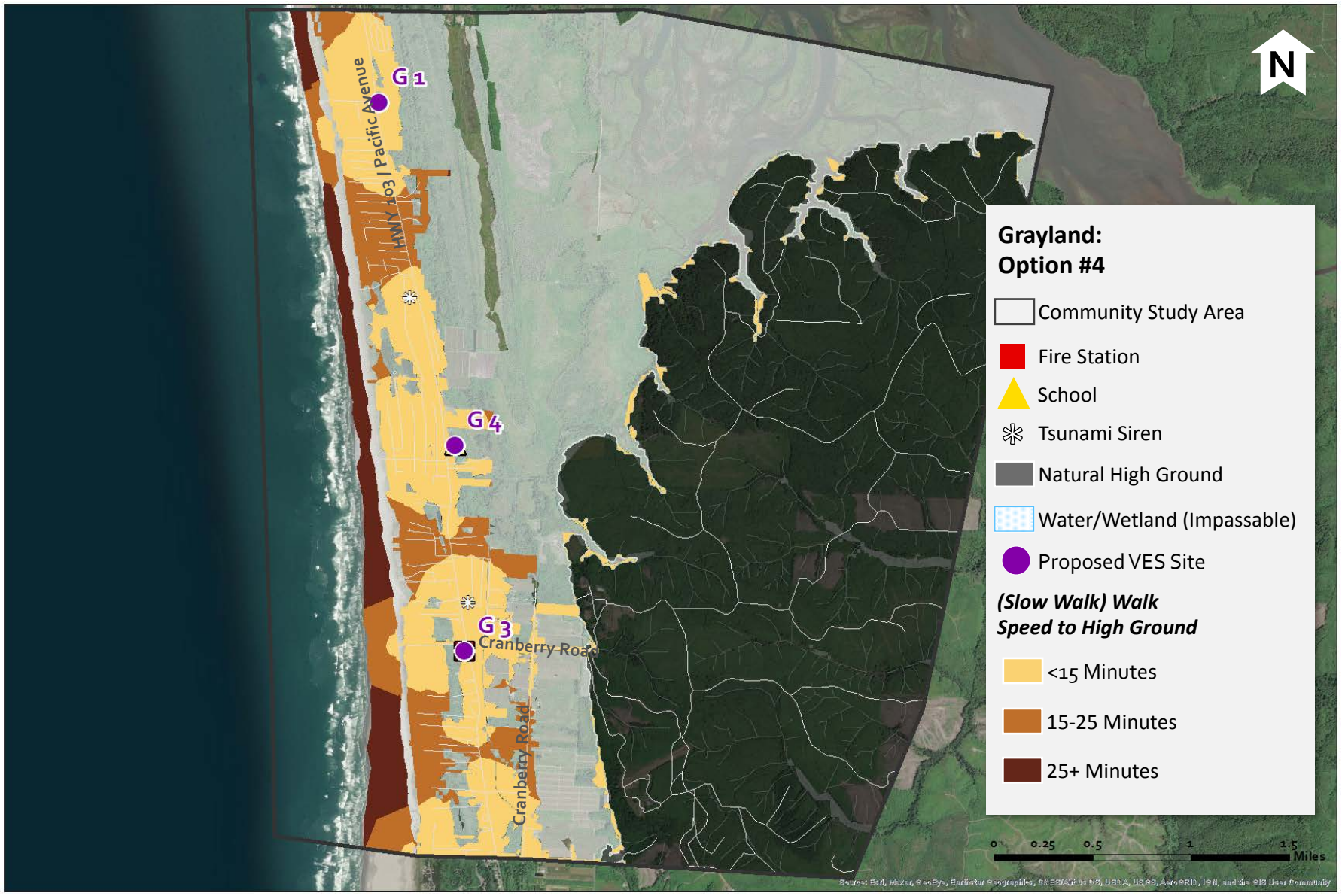
▲ *Schools: Approximate 1 minute walk time to high ground or VES*

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.

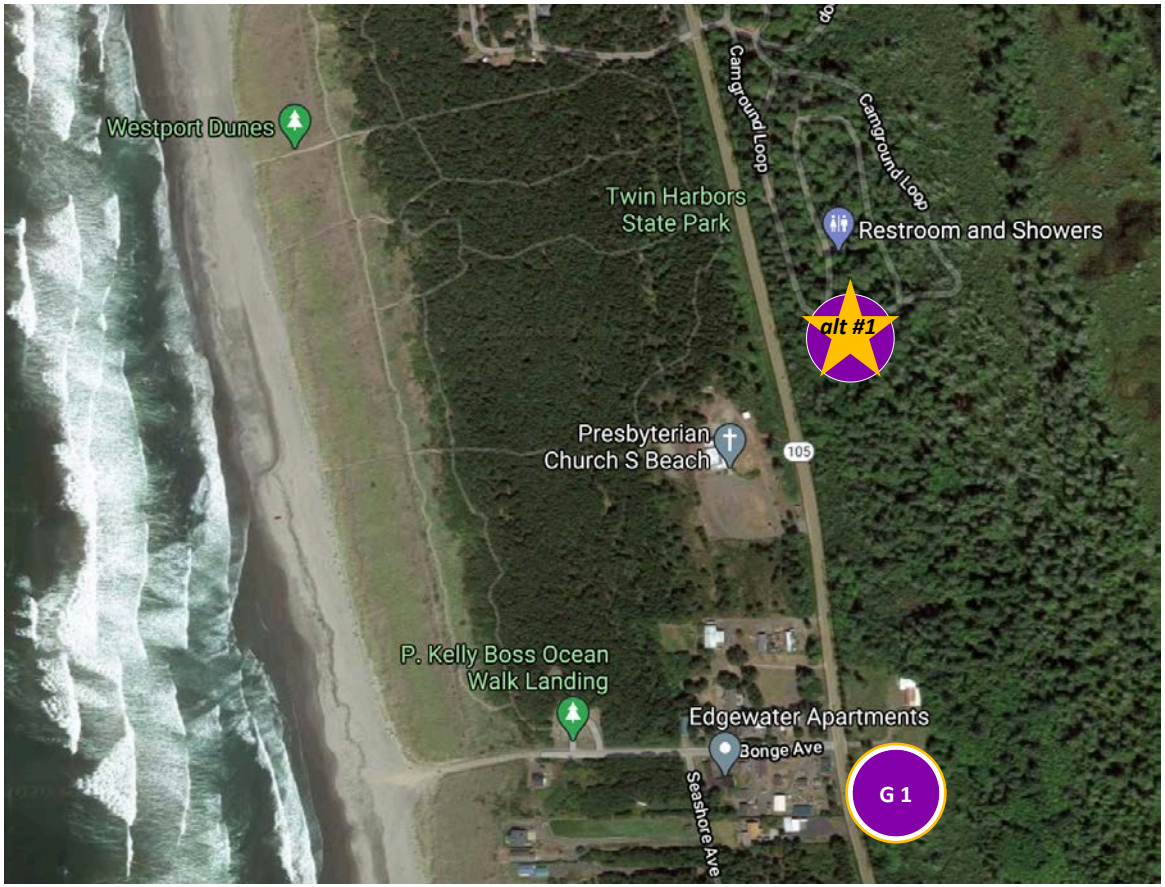
Under **Option #3:**

- approximately **70.6%** of the total estimated Grayland 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) = **1,184** people
- # of proposed VES = **5**

G


N
G1
G4
G3
HWY 103 | Pacific Avenue
Cranberry Road
Cranberry Road
Grayland:
Option #4
Community Study Area
Fire Station
School
Tsunami Siren
Natural High Ground
Water/Wetland (Impassable)
Proposed VES Site
(Slow Walk) Walk
Speed to High Ground
<15 Minutes
15-25 Minutes
25+ Minutes
0
0.25
0.5
1
1.5
Miles

Grayland: G 1 + *alternative*



Source: *Google Maps*

G 1	
Address	4008 SR 105
Intersection	Bonge Avenue & SR 105
Options	2, 3, 4
Notes	Move north to State of Washington Parks & Recreation-owned land, same side of HWY: #161224440030

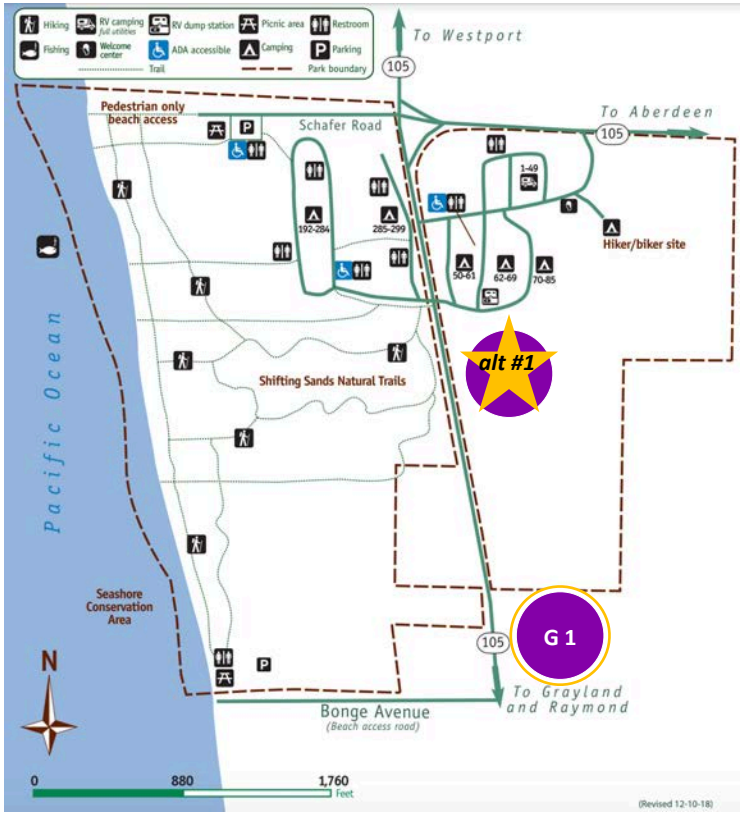
G 1 - alt #1	
Address	N/a
Intersection	HWY 105, NE of HWY 105 & Bonge Avenue
Options	
Notes	Twin Harbor State Park Campground

Grayland: G 1

Photo Credit: *Bob Freitag*

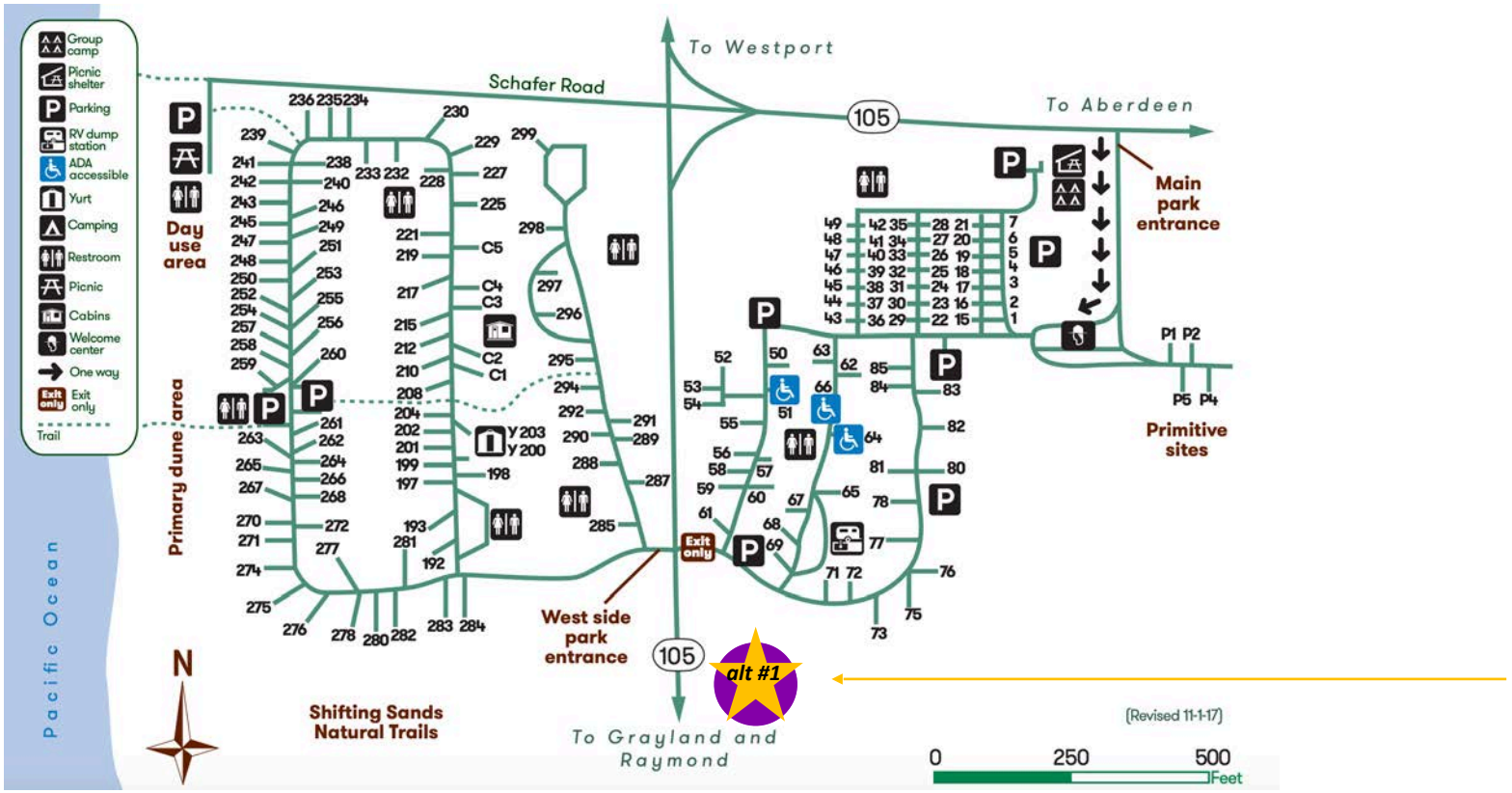
G 1 - Privately-owned parcel with some open space.

Grayland: G 1 *alternative*



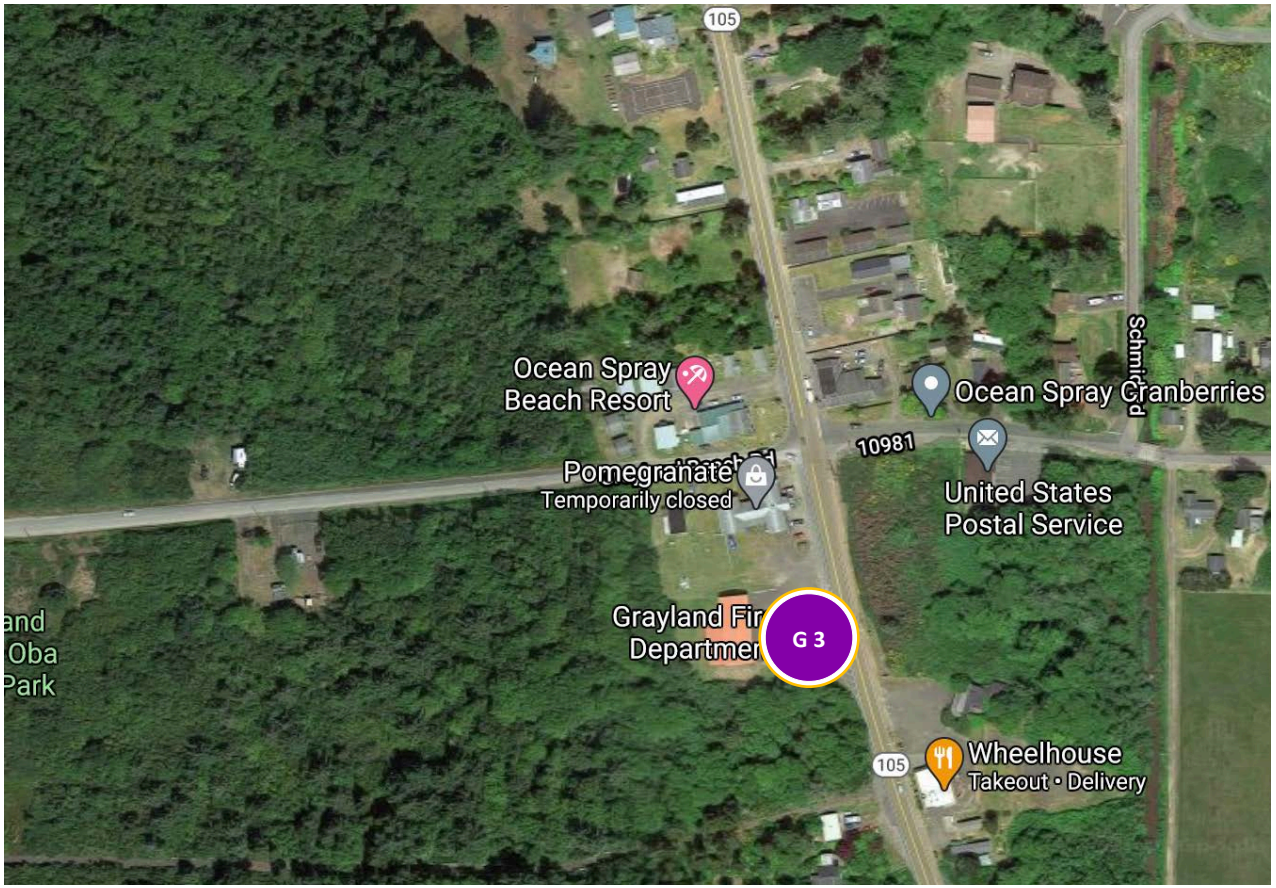
G 1 - *Alternative #1:* State recreation/camping land located to the north of G 1 in the Twin Harbors State Park Campground.

Grayland: G 1 *alternative*



G 1 - *Alternative #1:* State recreation/camping land located to the north of G 1 in the Twin Harbors State Park Campground.

Grayland: G 3



G 3	
Address	N/a
Intersection	Cranberry Road & SR 105
Options	2, 3, 4
Notes	Fire Department

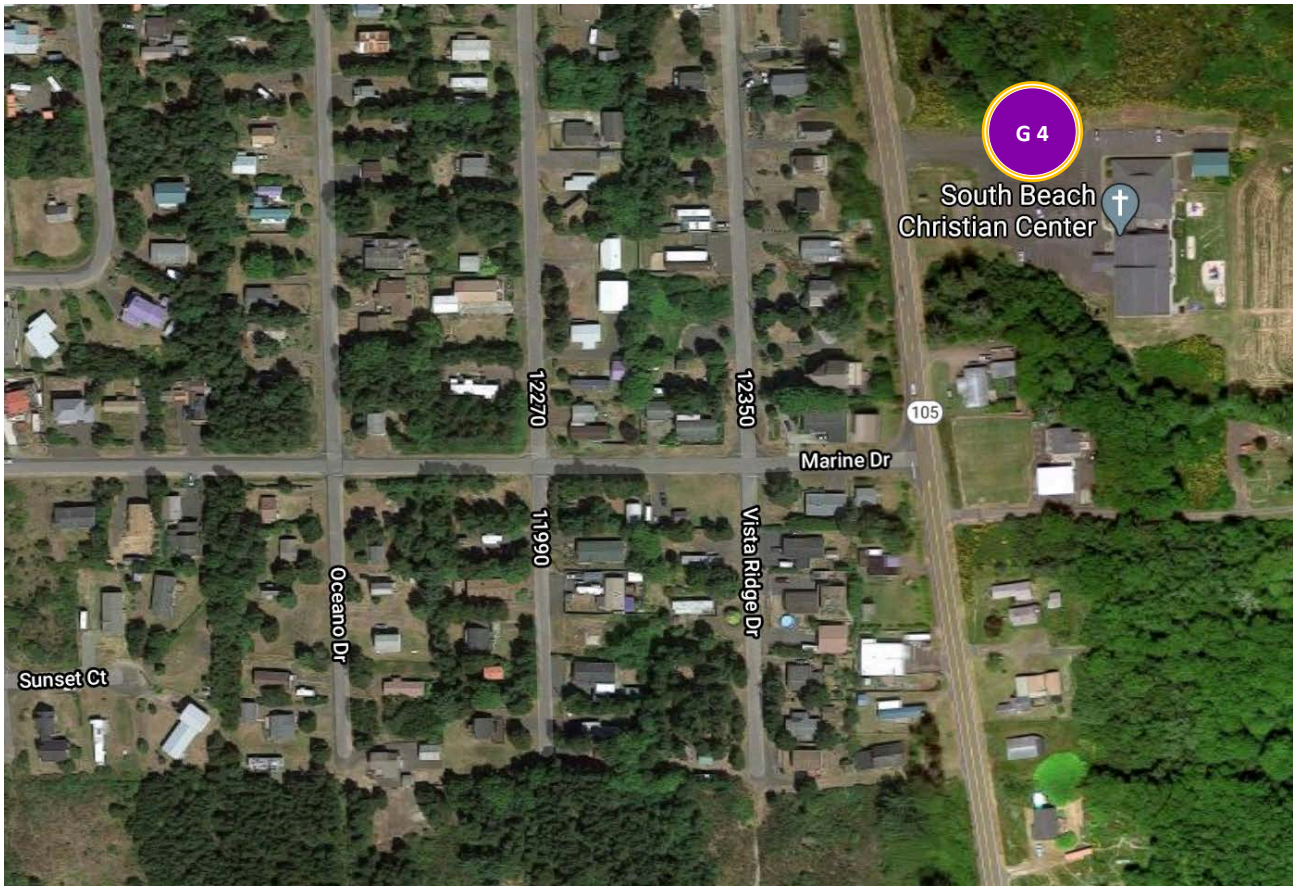
Source: *Google Maps*

Grayland: G 3

G 3 - Grayland Fire Department

Photo Credit: *Google Maps Street View*

Grayland: G 4



G 4	
Address	1360 SR 105
Intersection	Marine Drive & SR 105 (northeast of intersection)
Options	3, 4
Notes	located on private, exempt church-owned land. Private school location. South Beach Christian Center

Source: *Google Maps*

Grayland: G 4

G 4

G 4 - South Beach Christian Center

Photo Credit: *Bob Freitag*

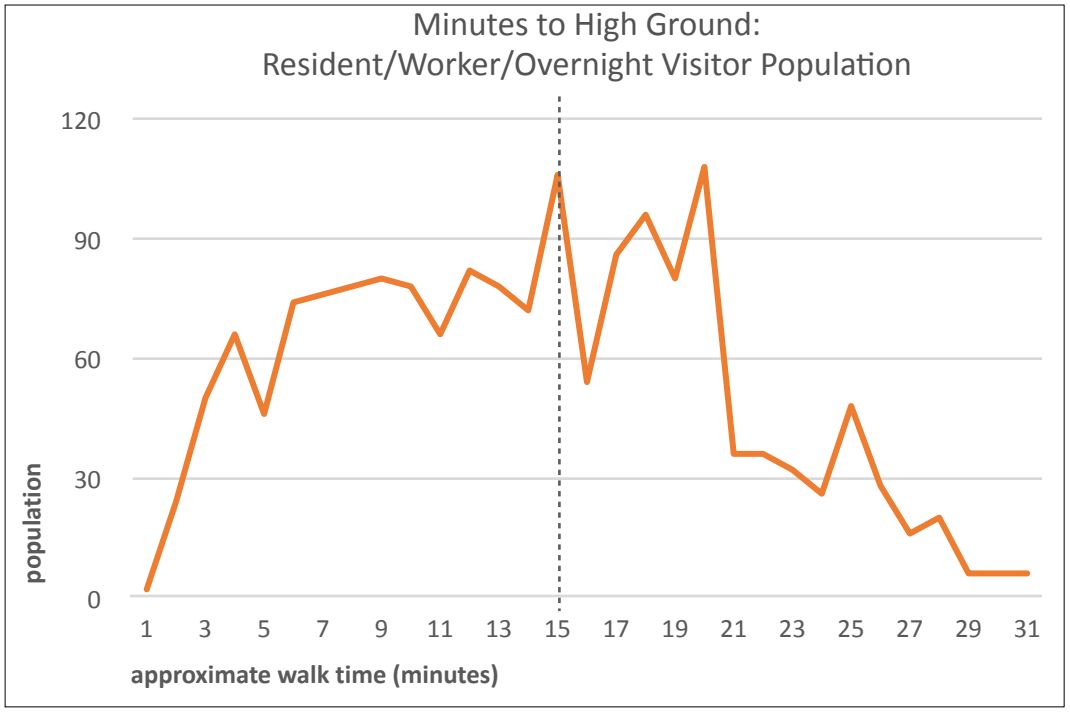
G 4 - South Beach Christian Center parking lot, view from street

Photo Credit: *Google Maps Street View*

Grayland: VES Option #4 (Efficient/Lean)

G

G 1 G 3 G 4



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

<15 minutes	15-25 minutes	25+ minutes
932 people	708 people	82 people

Fire Station: Approximate 1 minute walk time to high ground or VES

Schools: Approximate 1 minute walk time to high ground or VES

Under **Option #4:**

- approximately **54.1%** of the total estimated Grayland 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) = **900** people
- # of proposed VES = **3**

G

Potential Grayland VES Locations: All Options (1-4)

VES ID	Intersection	Parcel ID	Parcel Owner	Lat | Long	Options	Notes
G 1	Bonge Avenue & SR 105	16122511003	Donna J & Richard B Martin	46.849382, -124.105886	2, 3, 4	move north to State of Washington Parks & Recreation-owned land, same side of HWY: #161224440030
G 2	(south of) 6th Street & SR 105, east side of HWY, vacant private lot	83350000270	Patrick S & Ann R Santee	46.830837, -124.098578	2, 3	move northwest to GHC Water District #1 parcel, west side of HWY (currently vacant lot): #161131220100
G 3	Cranberry Road & SR 105	74350910000	South Beach Regional Fire Authority	46.809388, -124.094058	2, 3, 4	Fire Department
G 4	Marine Drive & SR 105 (northeast of intersection)	16113134026	South Beach Christian Center	46.824477, -124.096319	3, 4	located on private, exempt church-owned land. Private school location. South Beach Christian Center
G 5	2193 SR 105	15110743015	State of Washington Parks and Recreation	46.794627, -124.090675	3	State land, currently vacant

Notes

G 1 - The G 1 site is currently located on private, but vacant, land. An alternative could be to locate G 1 at the Twin Harbors State Park Campground on the east side of the HWY.

G 2 - This potential G 2 VES location is located on private, yet vacant land. Ideally, the site would be moved to one of the alternatives. This would provide either better access or public land.

G 3 - G 3 is the site of the Grayland Fire Department. Good visibility from the road, adjacent to residents.

G 4 - The G 4 church parking lot would be a highly visible location for a VES tower.

G

Grayland: Comparison of All Options (1-4)

Option #1

# of proposed VES = 0

N/A

*Minimum VES Capacity (# of People)

1.9%

% of people within **15 minutes** of high ground

18.6%

% of people within **25 minutes** of high ground

Option #2

# of proposed VES = 3

770

*Minimum VES Capacity (# of People)

46.6%

% of people within **15 minutes** of high ground or vertical evacuation

98.0%

% of people within **25 minutes** of high ground or vertical evacuation

Option #3

# of proposed VES = 5

1,184

*Minimum VES Capacity (# of People)

70.6%

% of people within **15 minutes** of high ground or vertical evacuation

100%

% of people within **25 minutes** of high ground or vertical evacuation

Option #4

# of proposed VES = 3

900

*Minimum VES Capacity (# of People)

54.1%

% of people within **15 minutes** of high ground or vertical evacuation

95.2%

% of people within **25 minutes** of high ground or vertical evacuation

G

Grayland: 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.

W

Westport

Westport community study area population <u>in the tsunami hazard area</u> = ~4,245 people

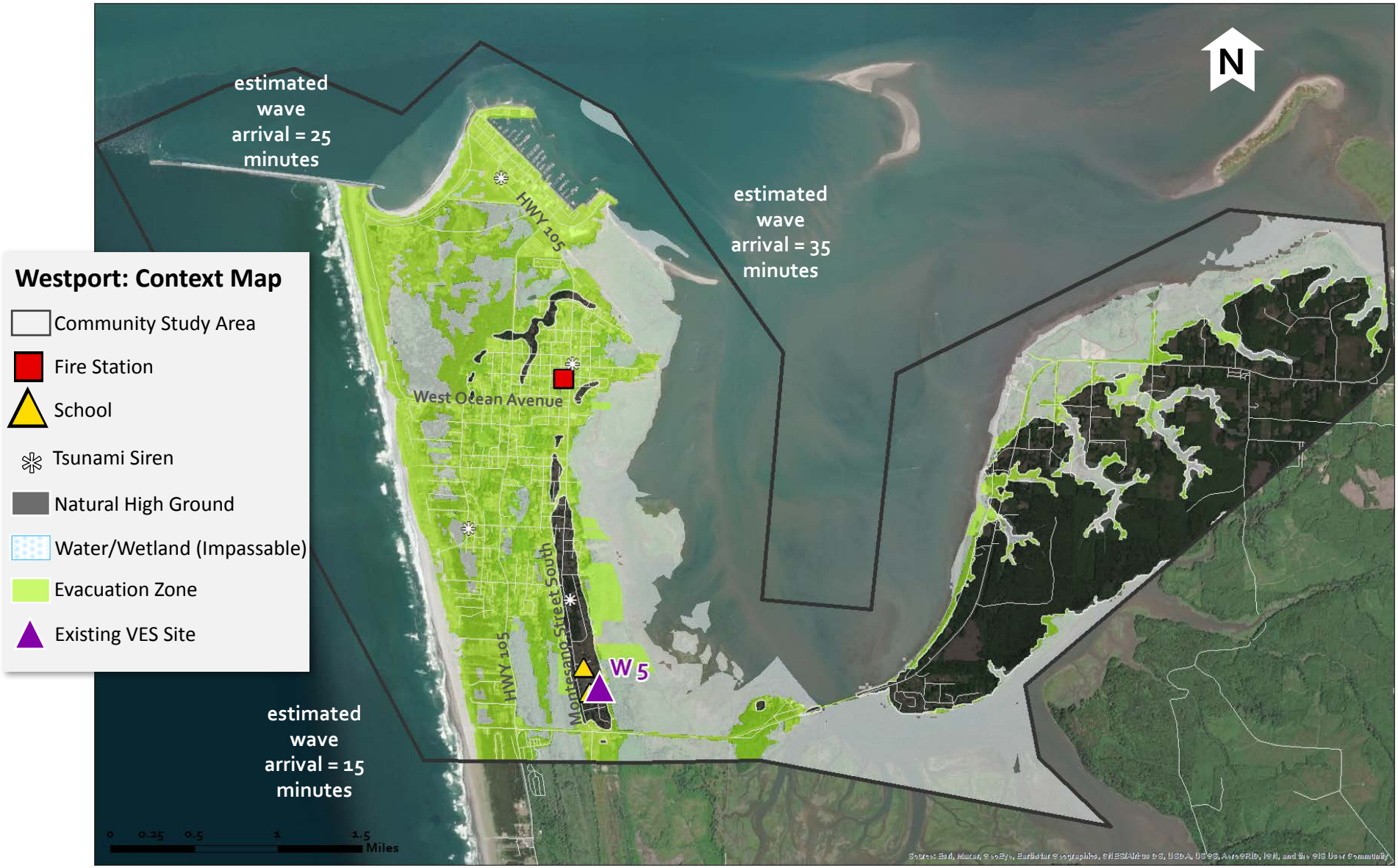
Resident/Worker/Overnight Visitor population = ~4,215 people

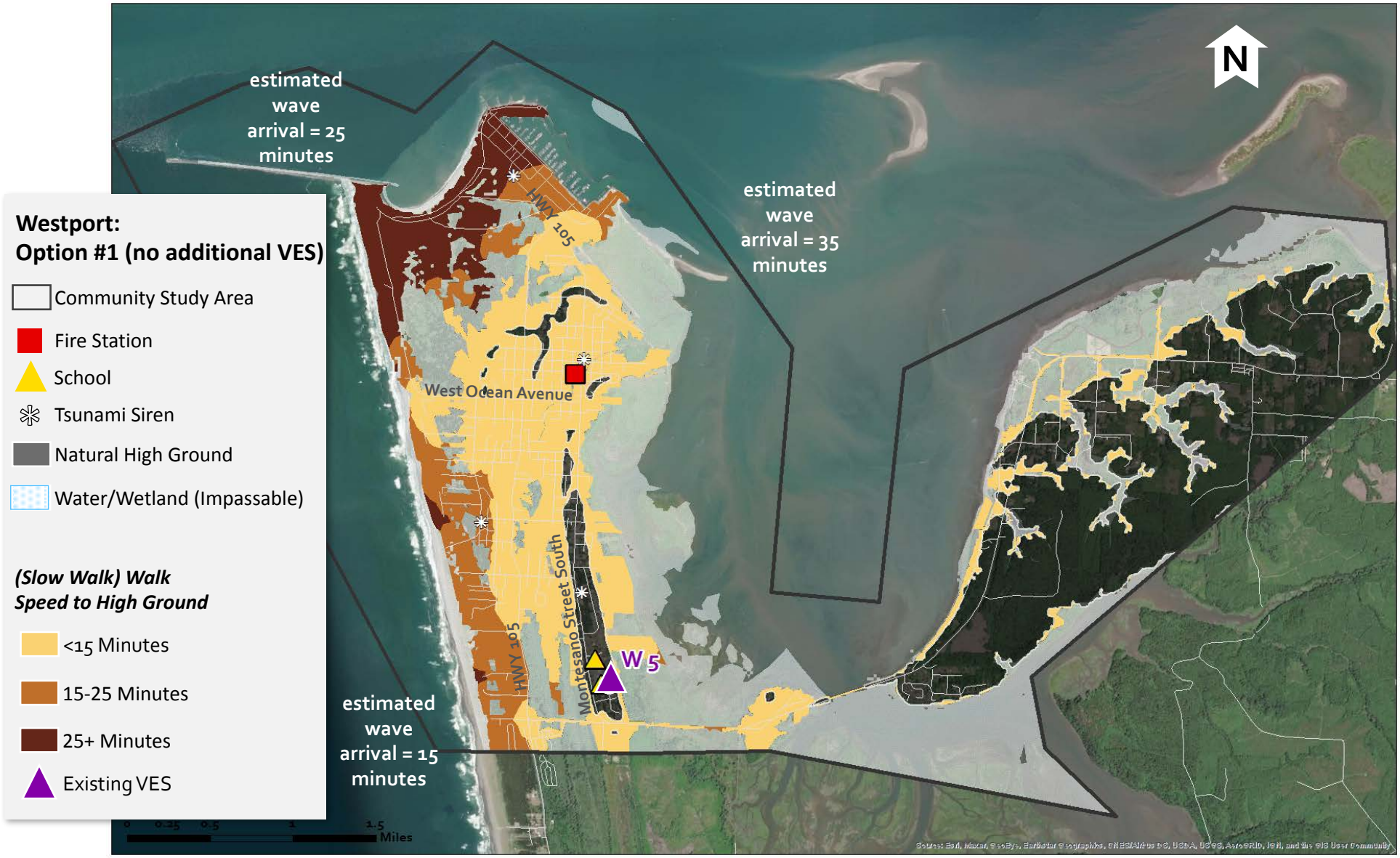
Fire Department occupancy = ~30 people

Schools occupancy = N/A (~275 additional people located in a natural high ground area)

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

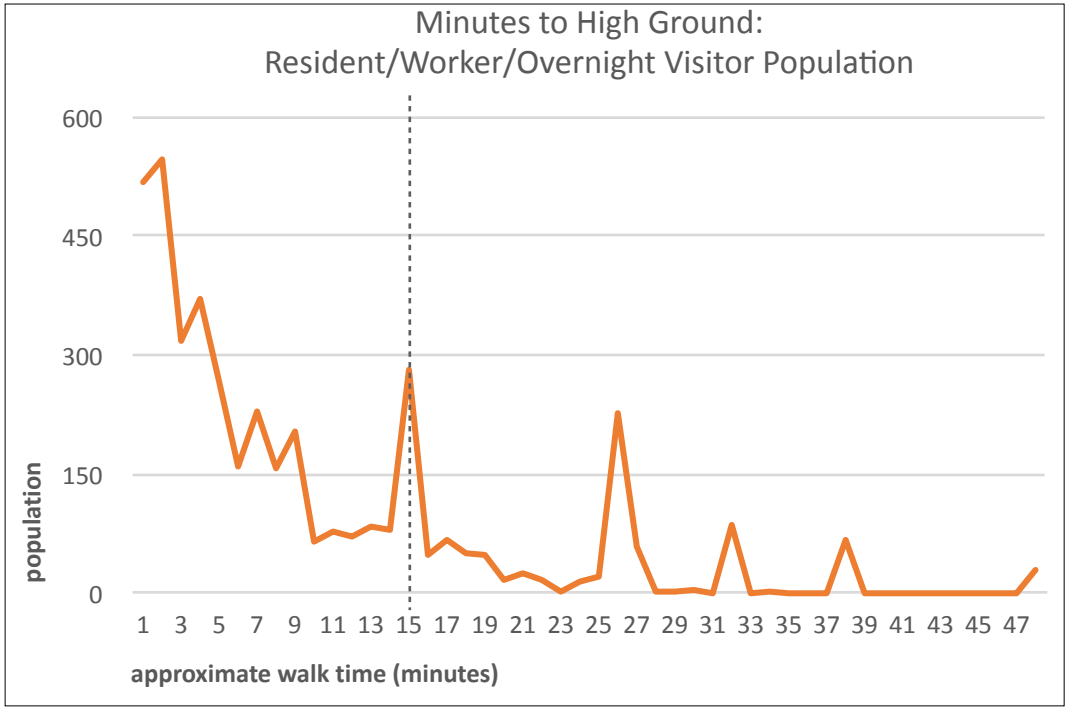
W


estimated wave arrival = 25 minutes
estimated wave arrival = 35 minutes
estimated wave arrival = 15 minutes
N
HWY 105
West Ocean Avenue
Montesano Street South
HWY 105
W 5
0 0.25 0.5 1 1.5 Miles
Westport: Context Map
Community Study Area
Fire Station
School
Tsunami Siren
Natural High Ground
Water/Wetland (Impassable)
Evacuation Zone
Existing VES Site


Westport:
Option #1 (no additional VES)
Community Study Area
Fire Station
School
Tsunami Siren
Natural High Ground
Water/Wetland (Impassable)
(Slow Walk) Walk Speed to High Ground
<15 Minutes
15-25 Minutes
25+ Minutes
Existing VES
estimated wave arrival = 25 minutes
estimated wave arrival = 35 minutes
estimated wave arrival = 15 minutes
HWY 105
West Ocean Avenue
Montesano Street South
W 5
N
0 0.25 0.5 1 1.5 Miles

Westport: VES Option #1 (No VES)

W 5



*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.

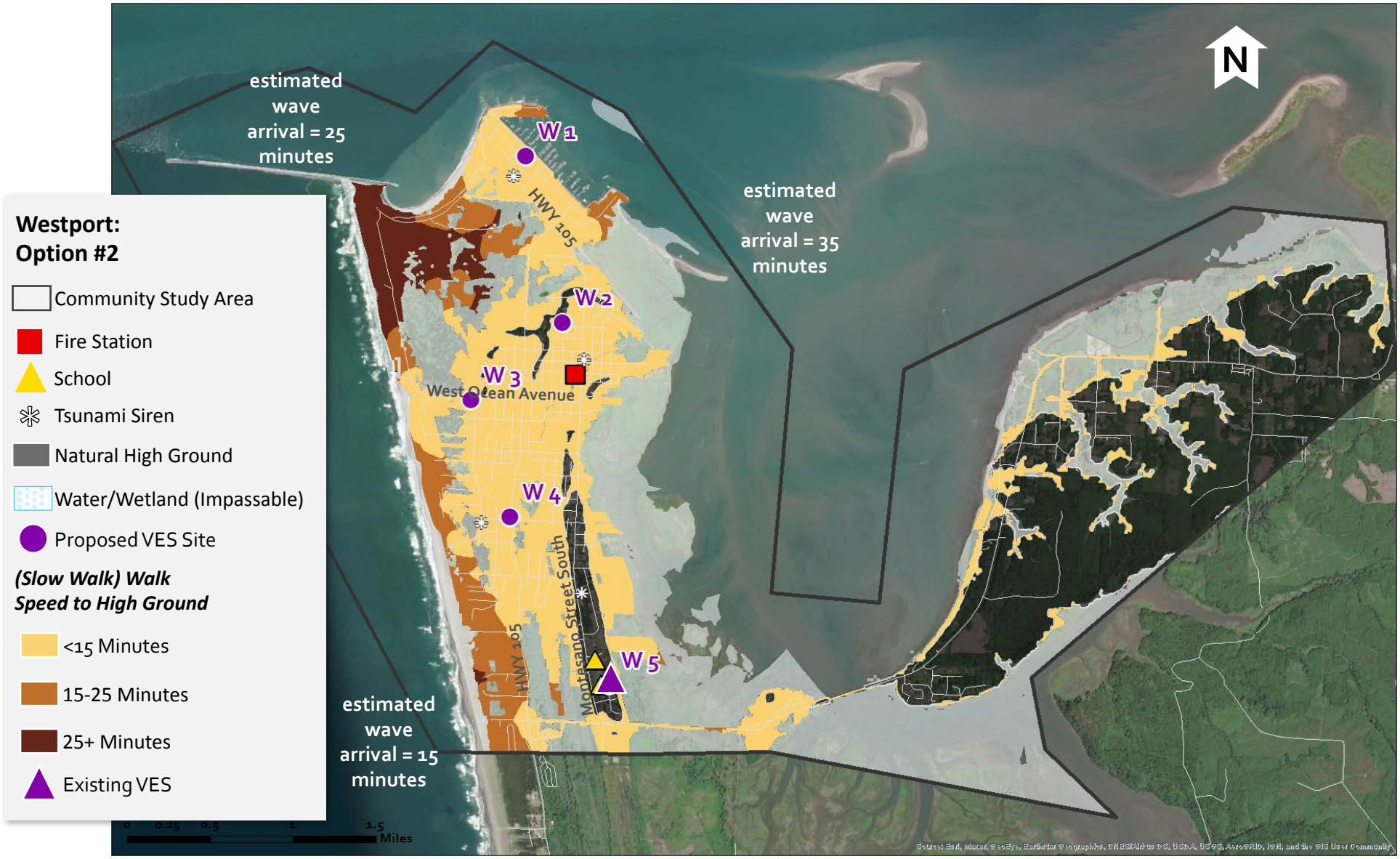
Approximate # of People, by Walking Time Bands, to High Ground

<15 minutes	15-25 minutes	25+ minutes
3,176 people	571 people	500 people

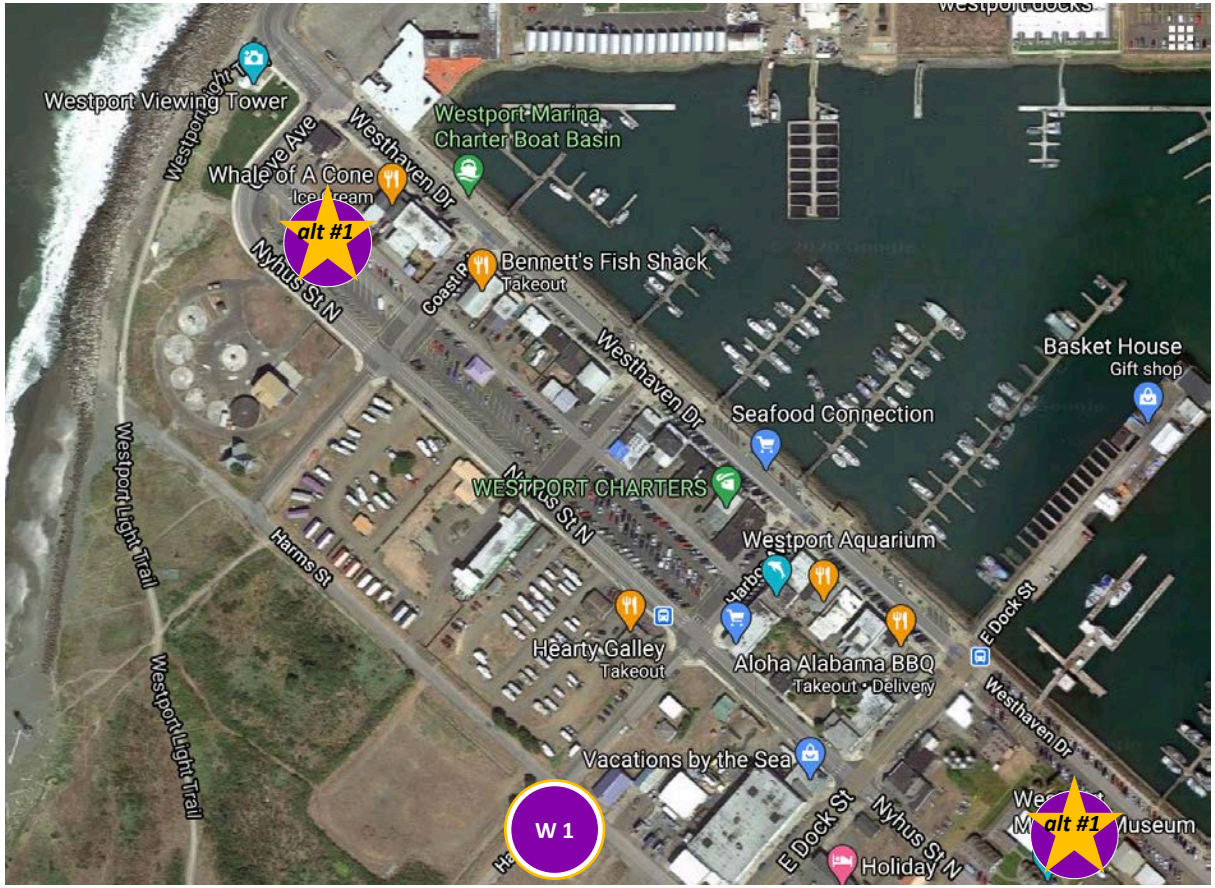
Fire Station: Approximate 4 minute walk time to high ground

Schools: Approximately 275 people located in natural high ground area, adjacent to existing VES

Under **Option #1:**
- approximately **74.8%** of the total estimated Westport population are within 15 minutes to natural high ground
- approximate **maximum* walk time to natural high ground for identified population = **48** minutes


Westport:
Option #2
Community Study Area
Fire Station
School
Tsunami Siren
Natural High Ground
Water/Wetland (Impassable)
Proposed VES Site
(Slow Walk) Walk Speed to High Ground
<15 Minutes
15-25 Minutes
25+ Minutes
Existing VES
estimated wave arrival = 25 minutes
estimated wave arrival = 35 minutes
estimated wave arrival = 15 minutes
W 1
W 2
W 3
W 4
W 5
HWY 105
West Ocean Avenue
Montesano Street South
N
0 0.25 0.5 1 1.5 Miles

Westport: W 1 + *alternatives*



Source: *Google Maps*

W 1	
Address	N/A
Intersection	Harbor Street & Harms Street
Options	2, 3, 4
Notes	Adjusted W1 site after review by City of Westport. This site was included in recent BRIC application for VES. Parcel #616120124003

W 1 - alt #1	
Address	2201 Westhaven Drive
Intersection	Westhaven Drive & E Dock Street
Notes	Westport Maritime Museum

W 1 - alt #2	
Address	N/a
Intersection	Nyhus Street North & Cove Avenue
Notes	Westport Viewing Tower parking lot

Westport: W 1

W 1 - Adjusted W1 site after review by City of Westport. This site was included in recent BRIC application for VES.
Parcel #616120124003.

Photo Credit: *Google Maps Street View*

Westport: W 1 *alternative #1*

W 1 - *Alternative #1*: The Maritime Museum is owned by the City of Westport and is centrally located near the working waterfront and tourist destinations.

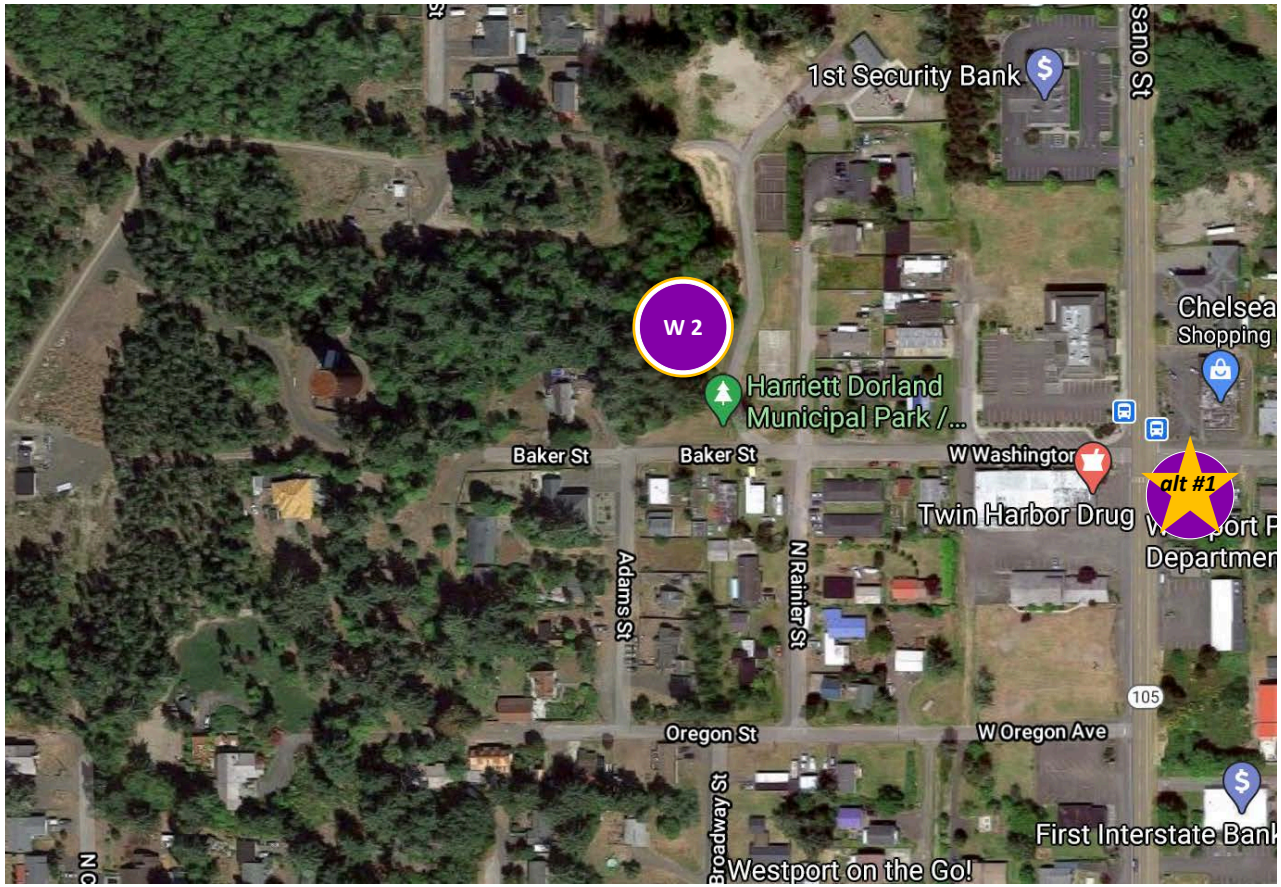
Photo Credit: *Google Maps Street View*

Westport: W 1 *alternative #2*

W 1 - *Alternative #2*: The parking lot site owned by the Port of Grays Harbor could be another potential alternate. It is further down (west) on North Nyhut Street, adjacent to the Westport viewing tower.

Photo Credit: *Bob Freitag*

Westport: W 2



Source: *Google Maps*

W 2	
Address	N/a
Intersection	Adams Street & Baker Street
Options	2, 3
Notes	Currently, park land. Owned by City of Westport, Harriett Dorland Municipal Park

W 2 - alt #1	
Address	740 North Montesano Street
Intersection	North Montesano & Washington Avenue
Notes	City has identified potential VES project here related to upcoming potential rehabilitation of city admin facility

Westport: W 2

W 2 - This potential site is located in the publicly-owned Harriett Dorland Municipal Park (owned and managed by the City of Westport), just north of Baker Street, between North Adams Street and North Rainier Street.

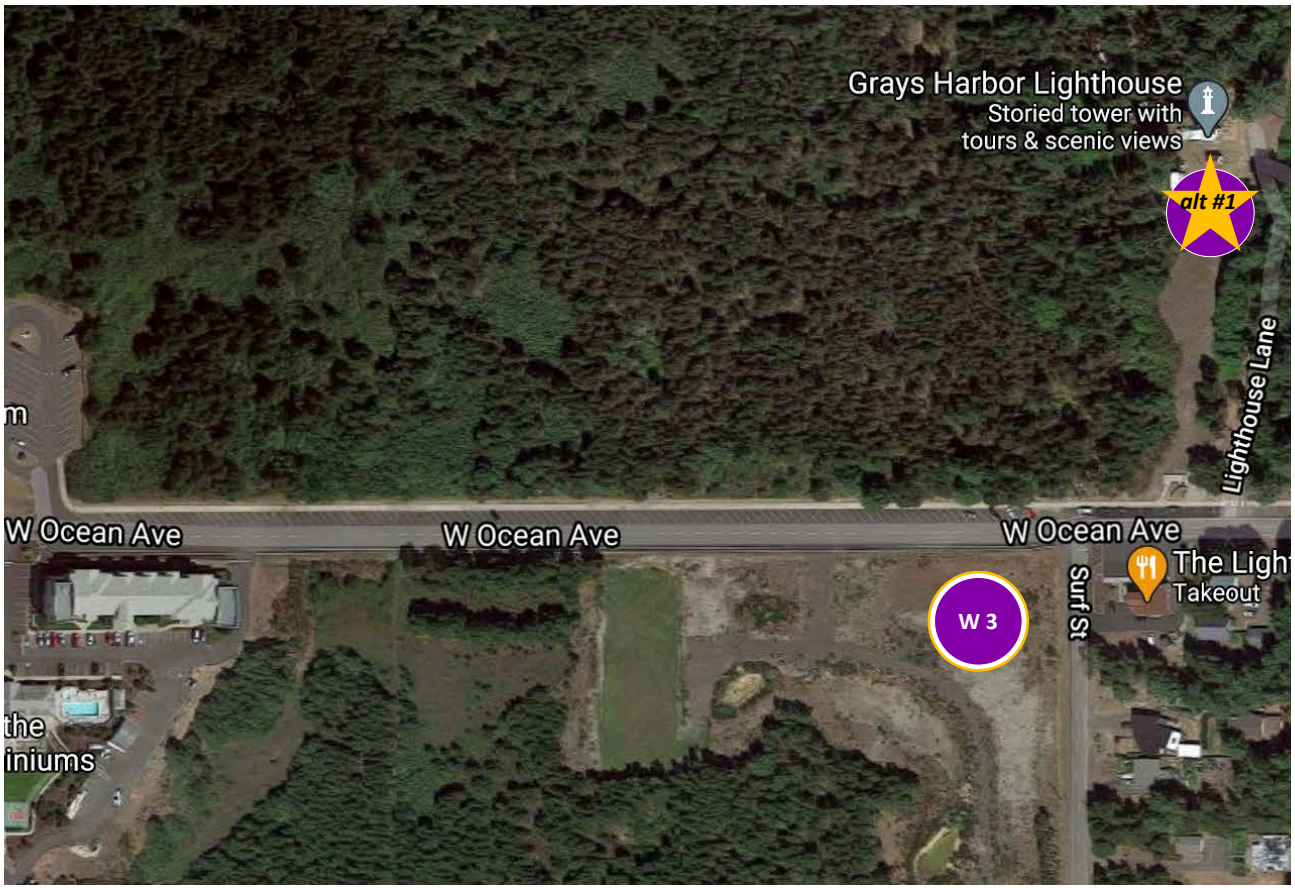
Photo Credit: *Bob Freitag*

Westport: W 2 *alternative #1*

W 2 - *Alternative #1:* This potential alternative site is the City of Westport City Hall parcel. There is a future, potential redevelopment of city facilities that could include a VES component.

Photo Credit: *Google Maps Street View*

Westport: W 3 + *alternative*



Source: *Google Maps*

W 3	
Address	N/a
Intersection	South Surf Street & West Ocean Avenue
Options	2, 3
Notes	adjacent to City and State-owned land. Could move to adjacent publically-owned land: #106501700000 (City of Westport)

W 3 - alt #1	
Address	1020 West Ocean Avenue
Intersection	North of West Ocean Avenue & Surf Street
Notes	Grays Harbor Lighthouse

Westport: W 3

W 3 - Privately-owned vacant land, SW of South Surf Street & West Ocean Avenue.

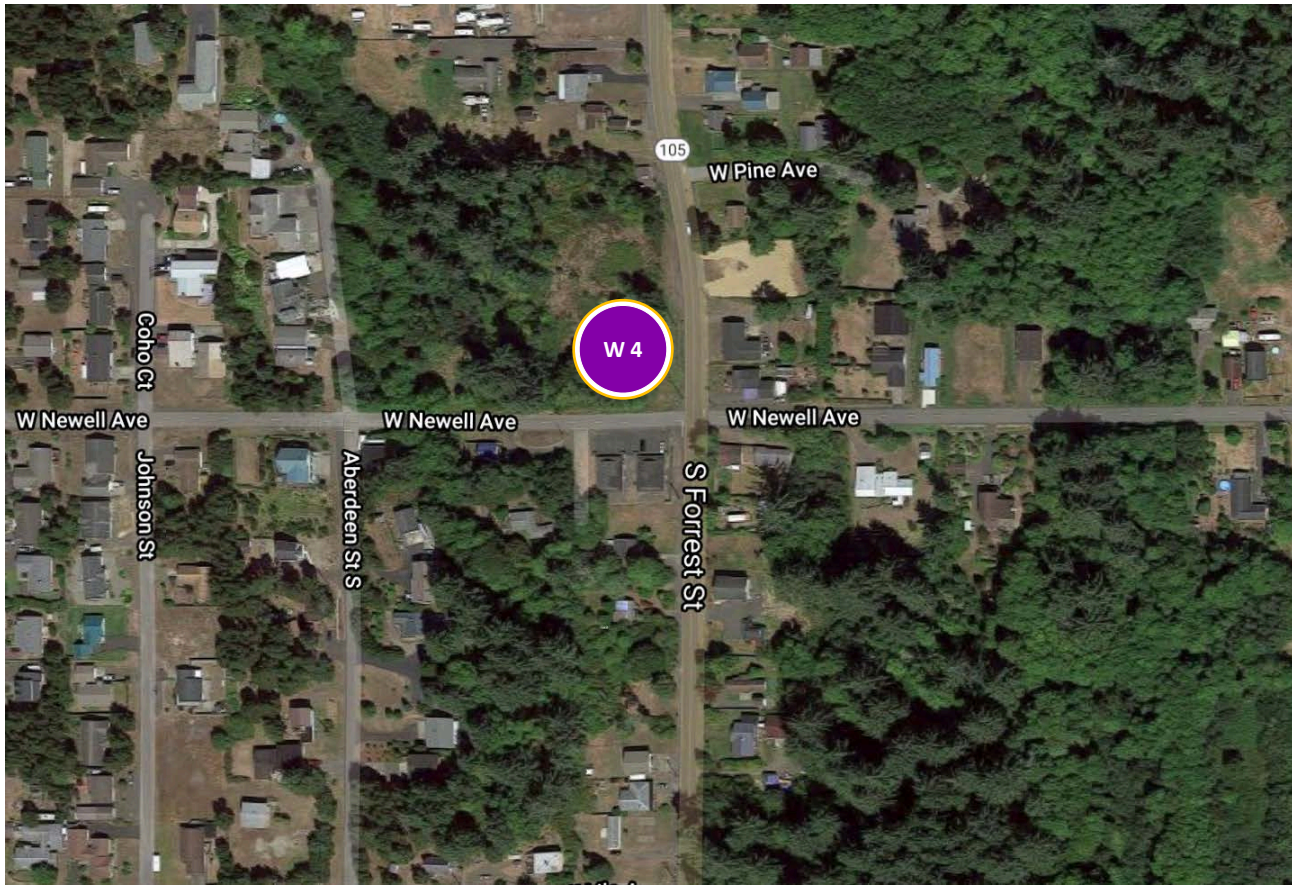
Photo Credit: *Bob Freitag*

Westport: W 3 *alternative*

Photo Credit: *Bob Freitag*

W 3 - *Alternative #1*: The Grays Harbor Lighthouse is on existing, natural high ground. The VES tower could be located here as an alternative to the original potential site. This higher site would lower the necessary height of the tower.

Westport: W 4



W 4	
Address	N/a
Intersection	SR 105 & West Newell Avenue
Options	2, 3, 4
Notes	State-owned land, NW of intersection

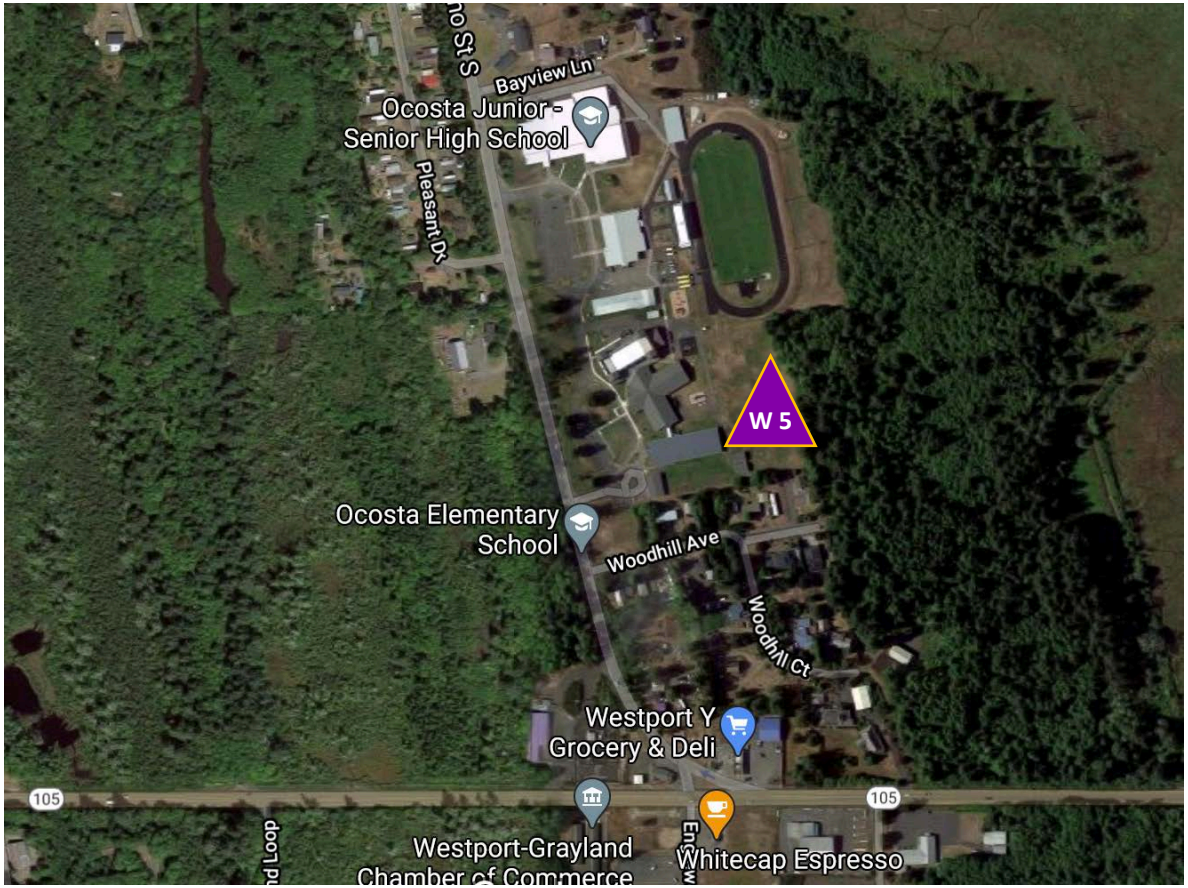
Source: *Google Maps*

Westport: W 4

Photo Credit: *Bob Freitag*

W 4 - Vacant land located at the West Newell Avenue & SR 105 intersection (NW corner). Owned by the State of Washington Tax Commission.

Westport: W 5



W 5	
Address	2580 South Montesano Street
Intersection	2580 South Montesano Street
Options	1, 2, 3, 4
Notes	Ocosta School

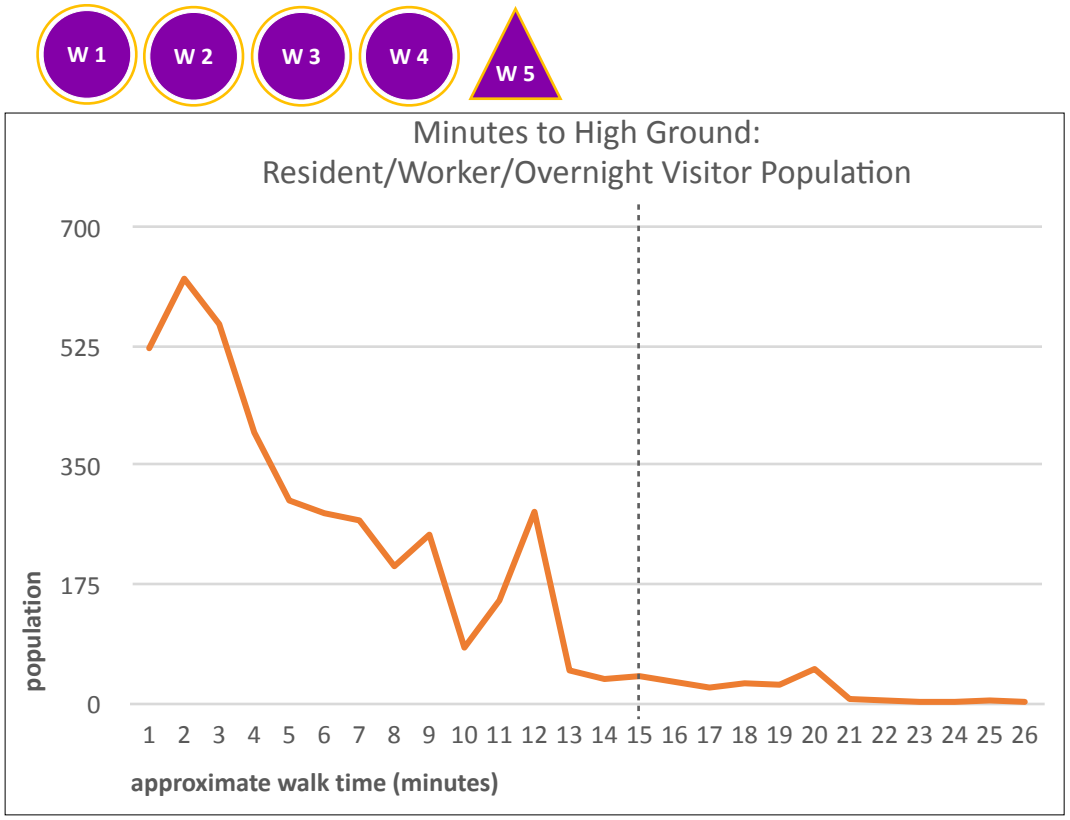
Source: *Google Maps*

Westport: W 5

W 5 - This VES is already built! The gymnasium (*see photo*) visible from the road contains a platform on the roof for tsunami evacuation purposes. This is one of the outcomes of the 2010 Project Safe Haven effort.

Photo Credit: *Google Maps Street View*

Westport: VES Option #2 (Community-Derived)



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

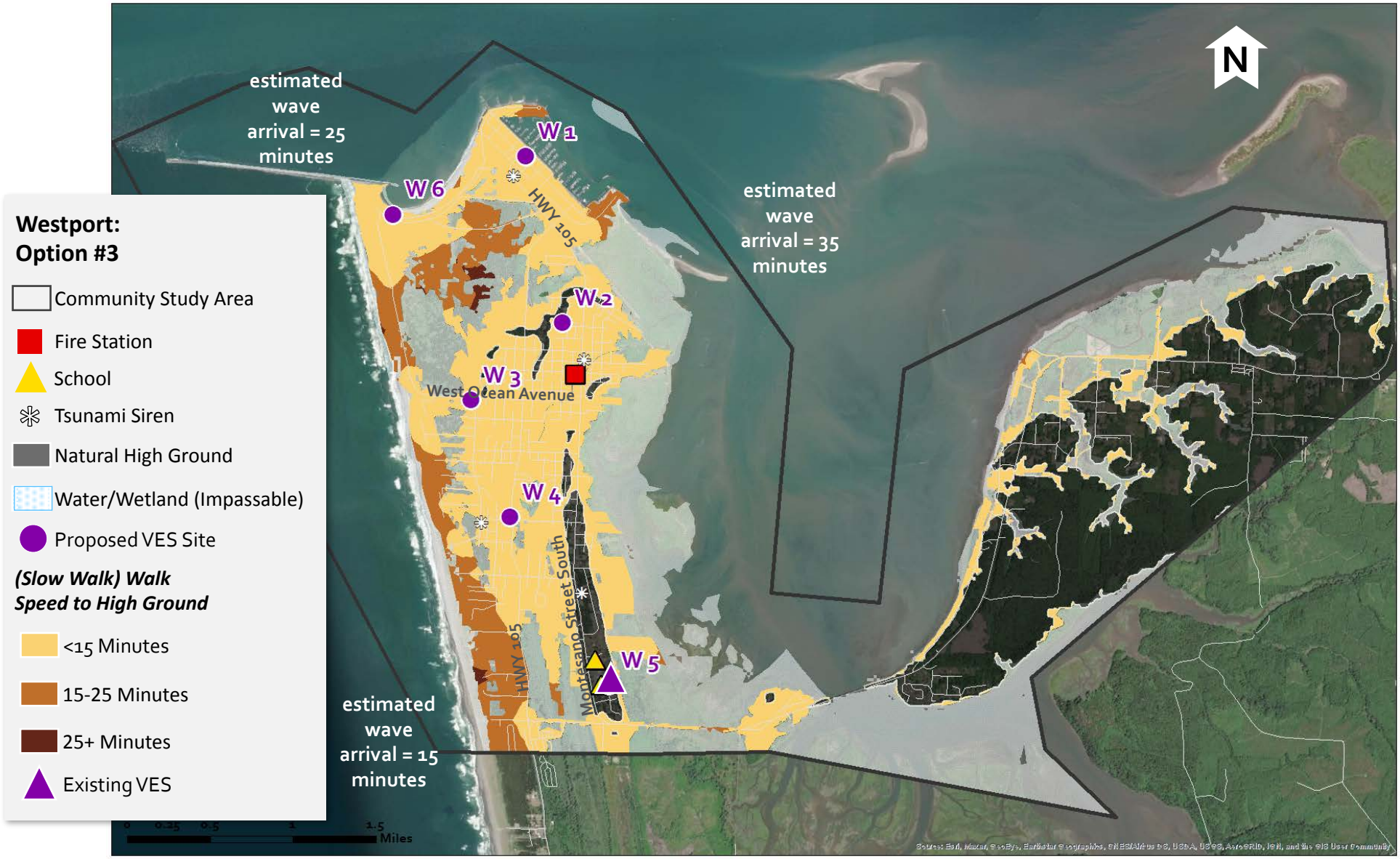
<15 minutes	15-25 minutes	25+ minutes
4,064 people	180 people	2 people

■ *Fire Station: Approximate 4 minute walk time to high ground or VES*

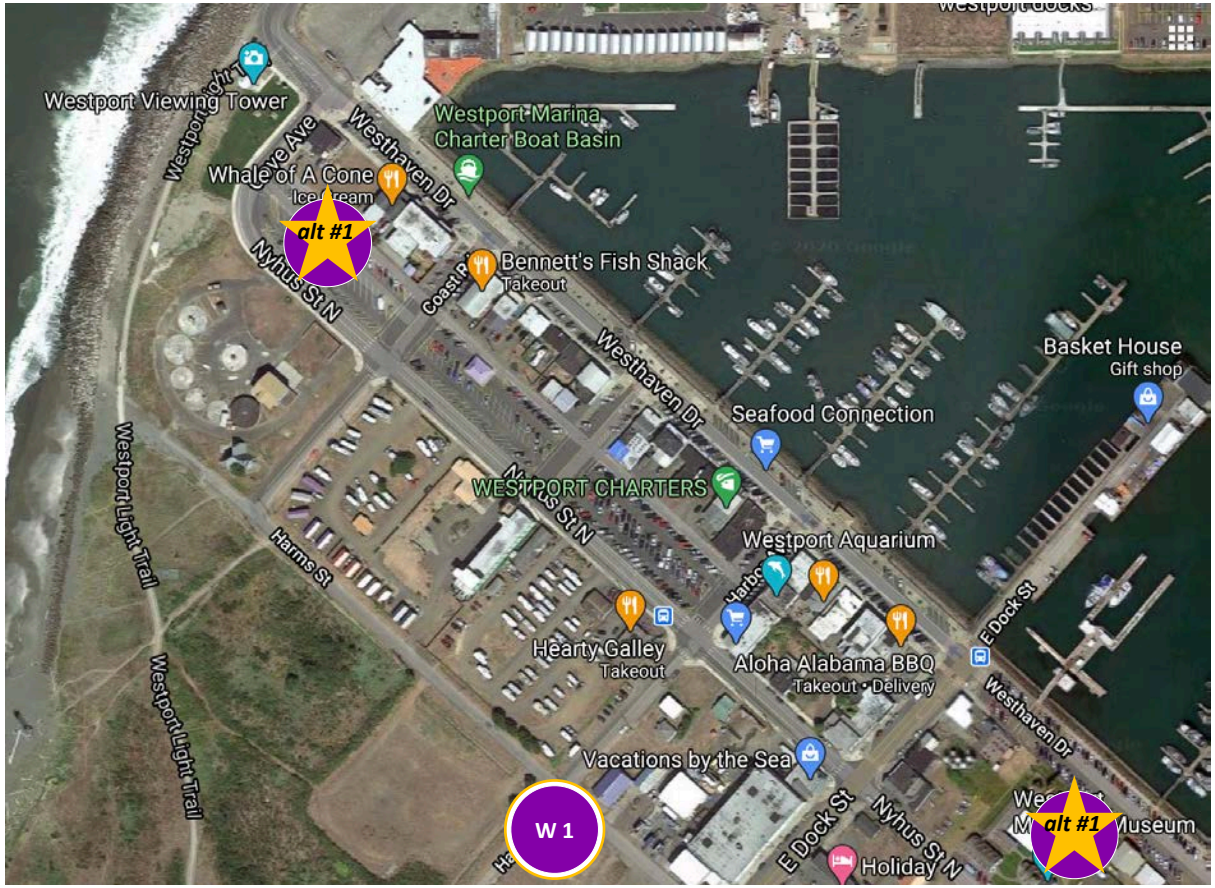
▲ *Schools: Approximately 275 people located in natural high ground area, adjacent to existing VES*

Under **Option #2:**

- approximately **95.7%** of the total estimated Westport 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) = **888** people
- # of proposed VES = **5**


Westport:
Option #3
Community Study Area
Fire Station
School
Tsunami Siren
Natural High Ground
Water/Wetland (Impassable)
Proposed VES Site
(Slow Walk) Walk Speed to High Ground
<15 Minutes
15-25 Minutes
25+ Minutes
Existing VES
estimated wave arrival = 25 minutes
estimated wave arrival = 35 minutes
estimated wave arrival = 15 minutes
W 1
W 2
W 3
W 4
W 5
W 6
HWY 105
West Ocean Avenue
Montesano Street South
N
0 0.25 0.5 1 1.5 Miles

Westport: W 1 + *alternatives*



Source: *Google Maps*

W 1	
Address	N/A
Intersection	Harbor Street & Harms Street
Options	2, 3, 4
Notes	Adjusted W1 site after review by City of Westport. This site was included in recent BRIC application for VES. Parcel #616120124003

W 1 - alt #1	
Address	2201 Westhaven Drive
Intersection	Westhaven Drive & E Dock Street
Notes	Westport Maritime Museum

W 1 - alt #2	
Address	N/a
Intersection	Nyhus Street North & Cove Avenue
Notes	Westport Viewing Tower parking lot

Westport: W 1

W 1 - Adjusted W1 site after review by City of Westport. This site was included in recent BRIC application for VES.
Parcel #616120124003.

Photo Credit: *Google Maps Street View*

Westport: W 1 *alternative #1*

W 1 - *Alternative #1*: The Maritime Museum is owned by the City of Westport and is centrally located near the working waterfront and tourist destinations.

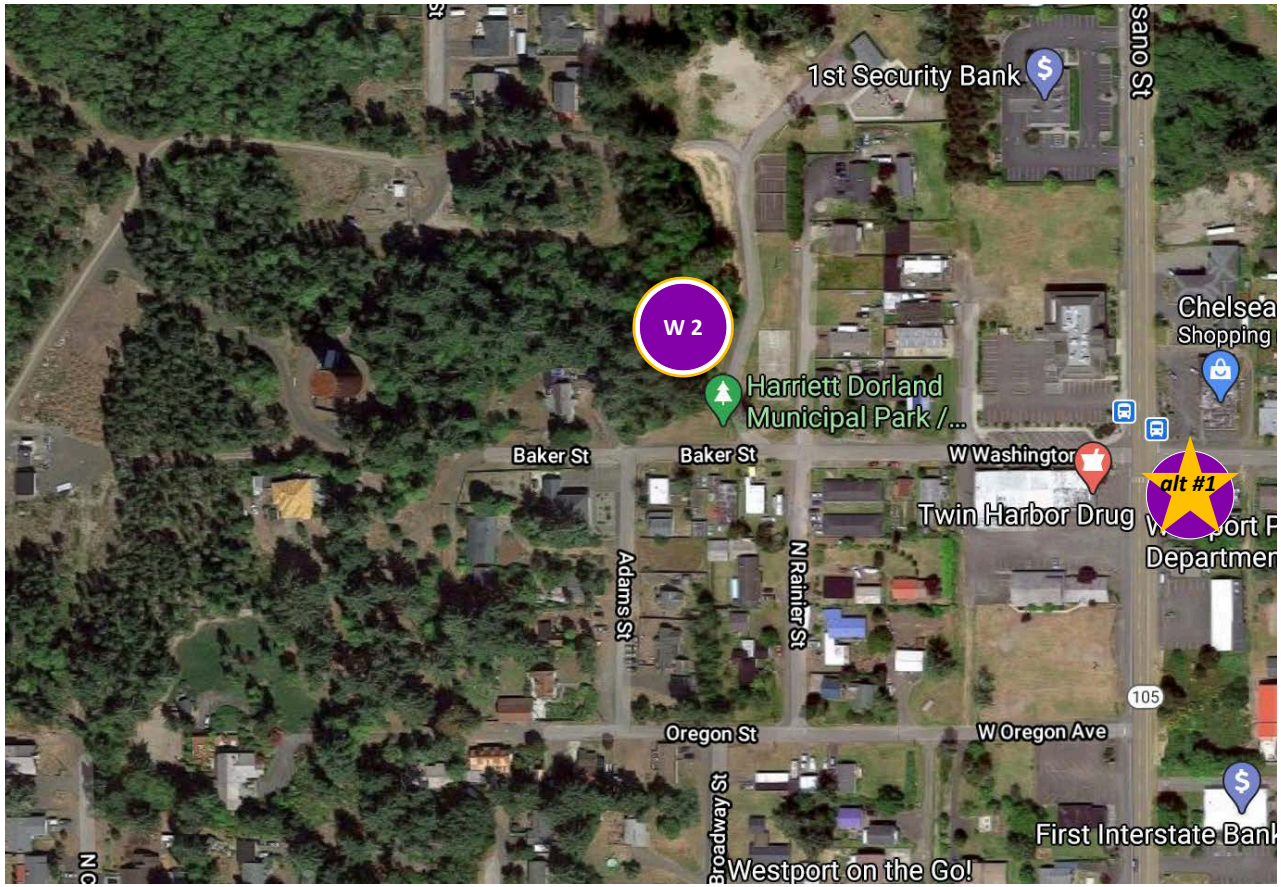
Photo Credit: *Google Maps Street View*

Westport: W 1 *alternative #2*

W 1 - *Alternative #2*: The parking lot site owned by the Port of Grays Harbor could be another potential alternate. It is further down (west) on North Nyhut Street, adjacent to the Westport viewing tower.

Photo Credit: *Bob Freitag*

Westport: W 2



Source: *Google Maps*

W 2	
Address	N/a
Intersection	Adams Street & Baker Street
Options	2, 3
Notes	Currently, park land. Owned by City of Westport, Harriett Dorland Municipal Park

W 2 - alt #1	
Address	740 North Montesano Street
Intersection	North Montesano & Washington Avenue
Notes	City has identified potential VES project here related to upcoming potential rehabilitation of city admin facility

Westport: W 2

W 2 - This potential site is located in the publicly-owned Harriett Dorland Municipal Park (owned and managed by the City of Westport), just north of Baker Street, between North Adams Street and North Rainier Street.

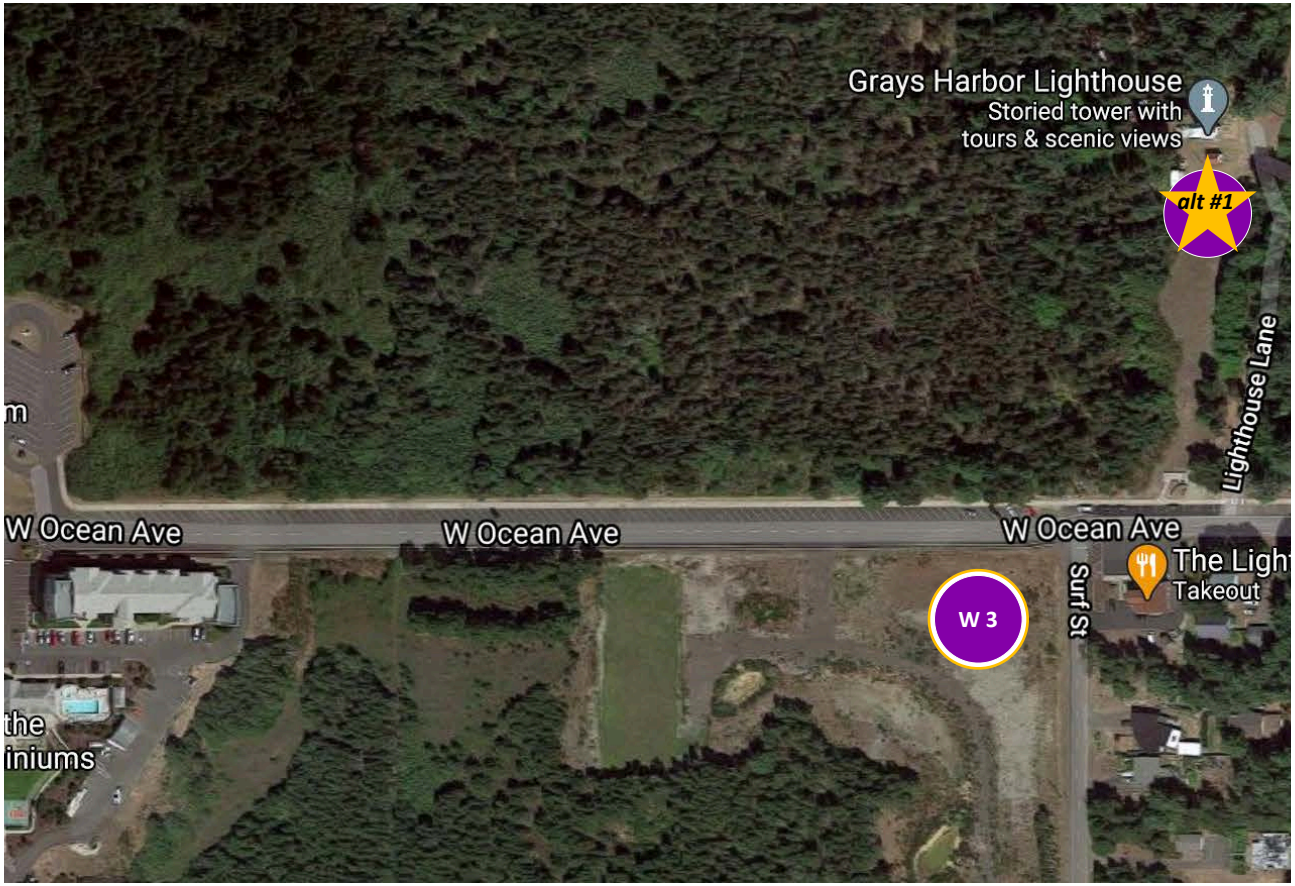
Photo Credit: *Bob Freitag*

Westport: W 2 *alternative #1*

W 2 - *Alternative #1:* This potential alternative site is the City of Westport City Hall parcel. There is a future, potential redevelopment of city facilities that could include a VES component.

Photo Credit: *Google Maps Street View*

Westport: W 3 + *alternative*



Source: *Google Maps*

W 3	
Address	N/a
Intersection	South Surf Street & West Ocean Avenue
Options	2, 3
Notes	adjacent to City and State-owned land. Could move to adjacent publically-owned land: #106501700000 (City of Westport)

W 3 - alt #1	
Address	1020 West Ocean Avenue
Intersection	North of West Ocean Avenue & Surf Street
Notes	Grays Harbor Lighthouse

Westport: W 3

W 3 - Privately-owned vacant land, SW of South Surf Street & West Ocean Avenue.

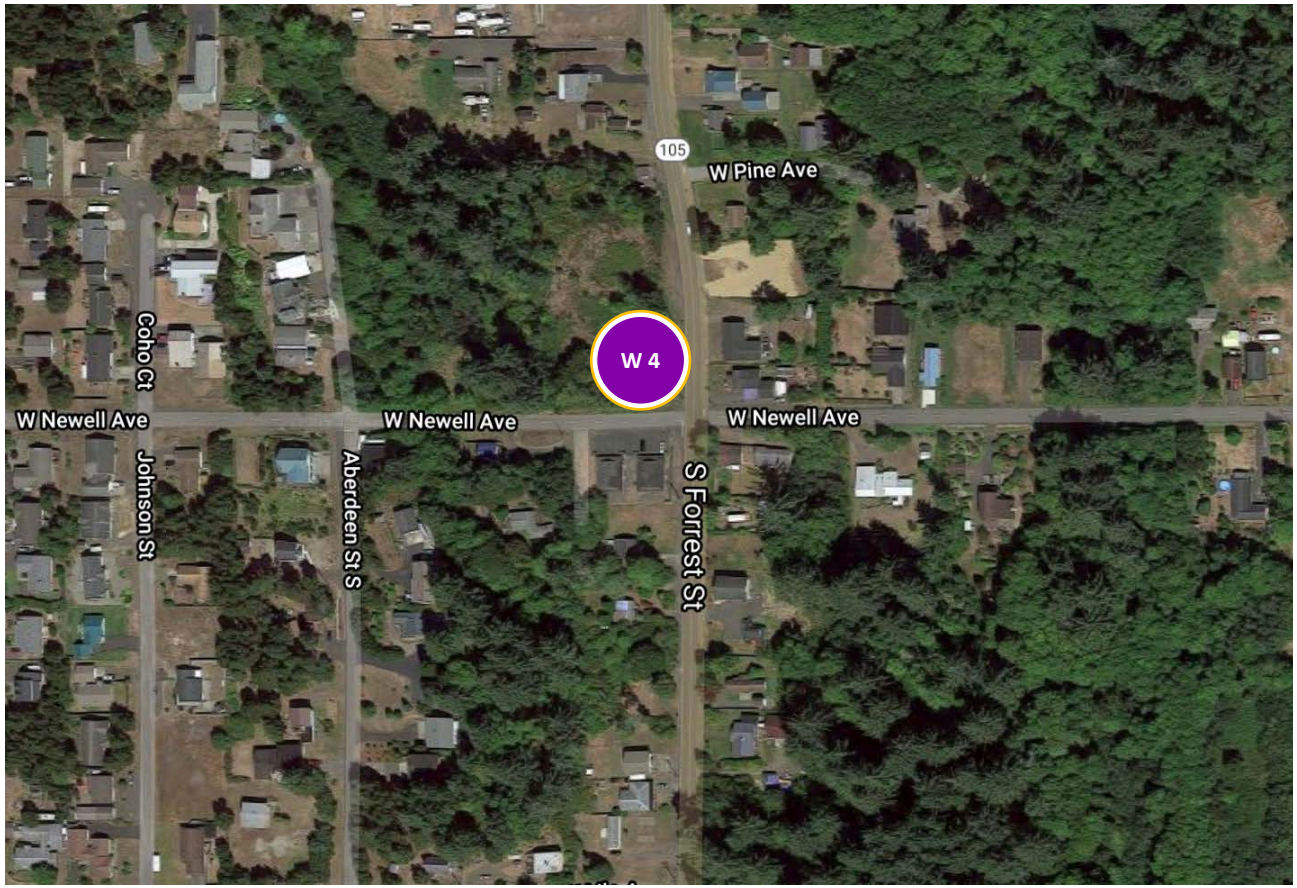
Photo Credit: *Bob Freitag*

Westport: W 3 *alternative*

Photo Credit: *Bob Freitag*

W 3 - *Alternative #1*: The Grays Harbor Lighthouse is on existing, natural high ground. The VES tower could be located here as an alternative to the original potential site. This higher site would lower the necessary height of the tower.

Westport: W 4



W 4	
Address	N/a
Intersection	SR 105 & West Newell Avenue
Options	2, 3, 4
Notes	State-owned land, NW of intersection

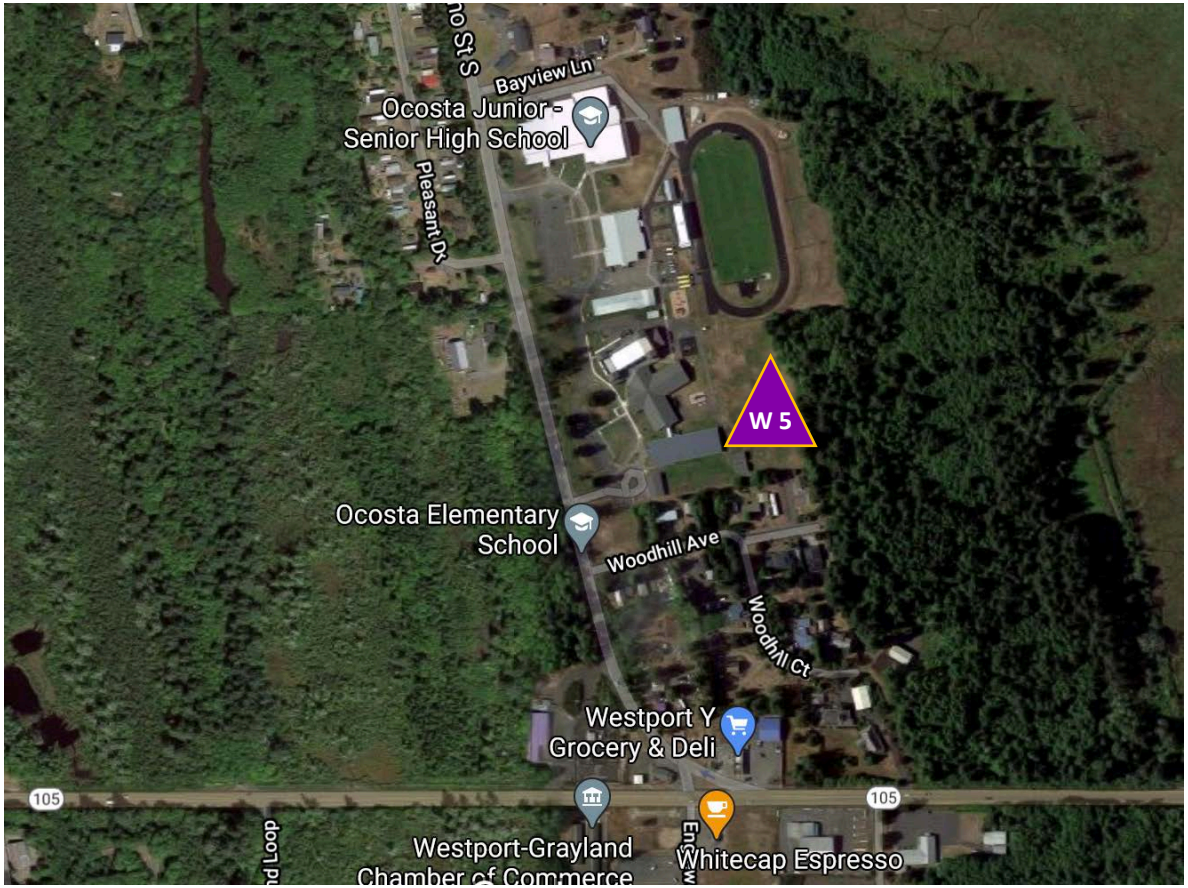
Source: *Google Maps*

Westport: W 4

Photo Credit: *Bob Freitag*

W 4 - Vacant land located at the West Newell Avenue & SR 105 intersection (NW corner). Owned by the State of Washington Tax Commission.

Westport: W 5



W 5	
Address	2580 South Montesano Street
Intersection	South Montesano Street
Options	1, 2, 3, 4
Notes	Ocosta School. Existing VES!

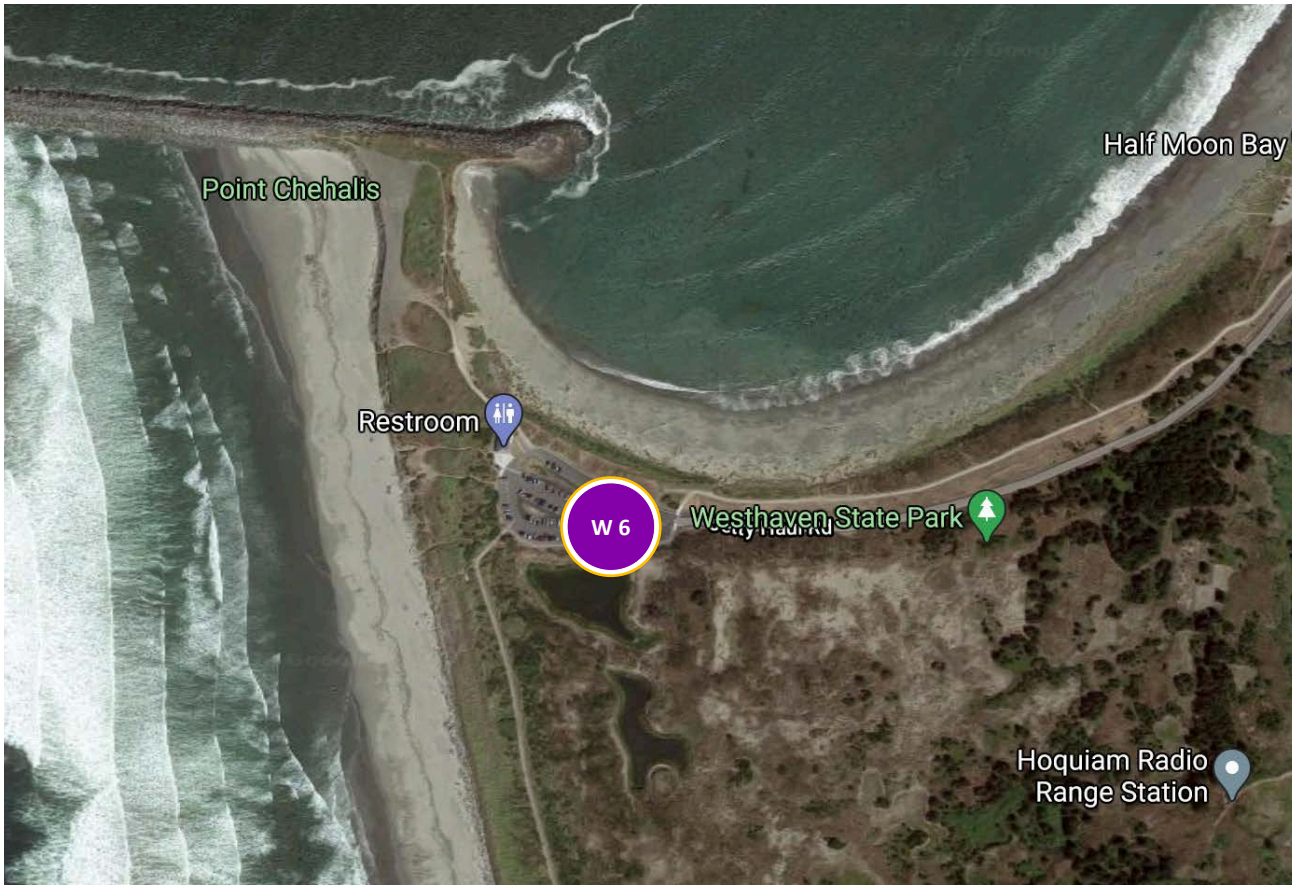
Source: *Google Maps*

Westport: W 5

W 5 - This VES is already built! The gymnasium (*see photo*) visible from the road contains a platform on the roof for tsunami evacuation purposes. This is one of the outcomes of the 2010 Project Safe Haven effort.

Photo Credit: *Google Maps Street View*

Westport: W 6



W 6	
Address	N/a
Intersection	End of Jetty Haul Road
Options	3
Notes	Westhaven State Park parking lot. State-owned.

Source: *Google Maps*

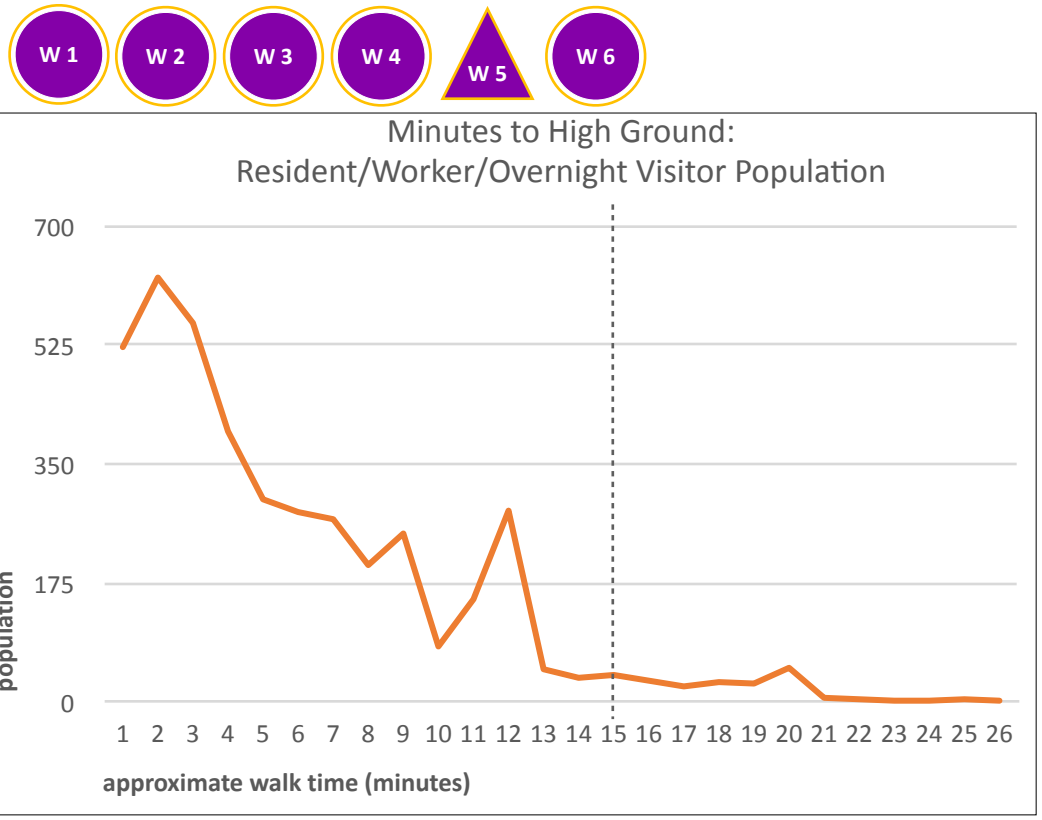
Westport: W 6



Photo Credit: *Bob Freitag*

W 6 - This potential VES site is located in the parking lot of the Westhaven State Park beach and recreation area in the far NW corner of Westport. This is a tourist destination. Also important to note is the natural dune system (*see photos*)

Westport: VES Option #3 (Broad Spatial Coverage)



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

<15 minutes	15-25 minutes	25+ minutes
4,064 people	180 people	2 people

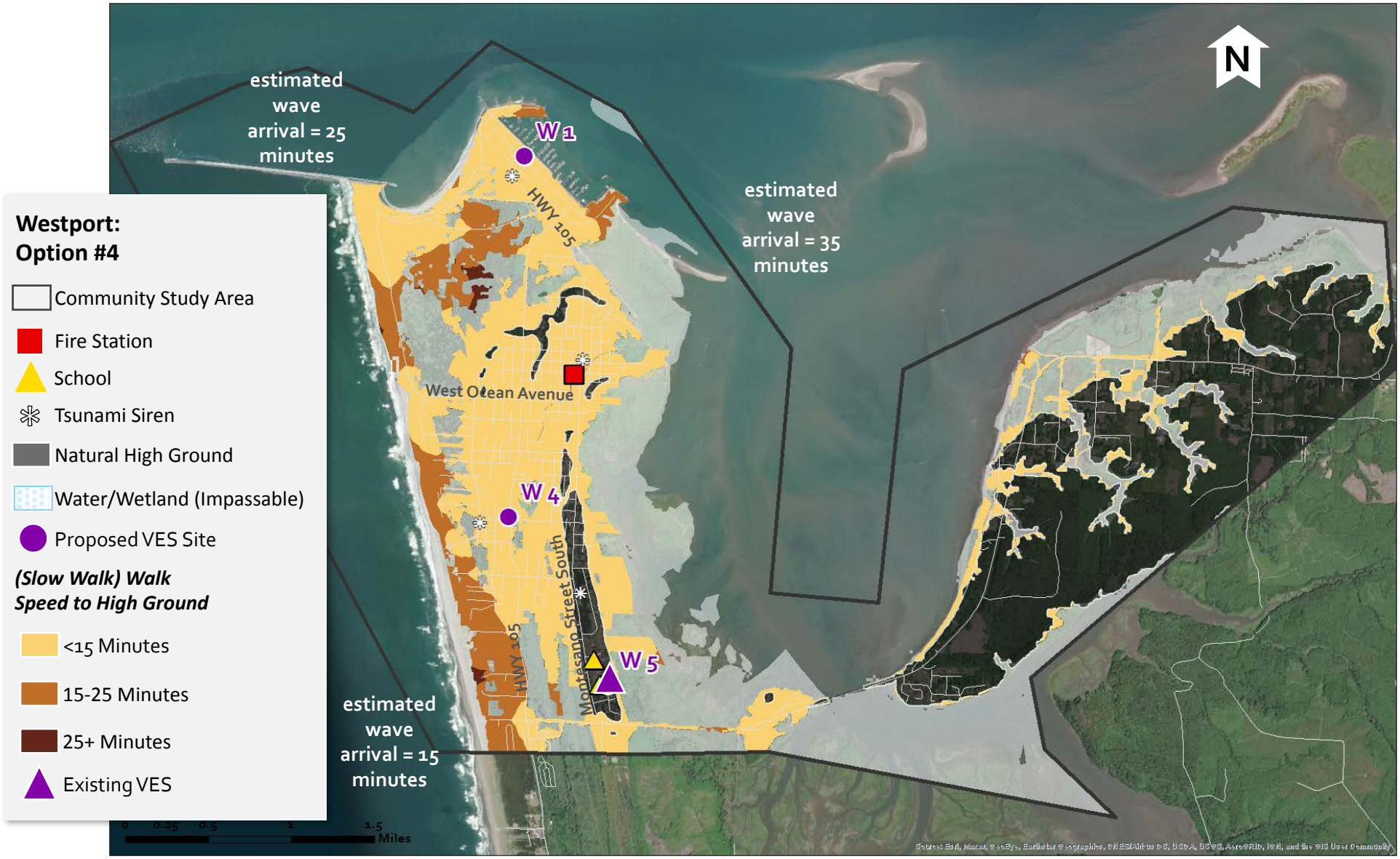
Fire Station: Approximate 4 minute walk time to high ground or VES

Schools: Approximately 275 people located in natural high ground area, adjacent to existing VES

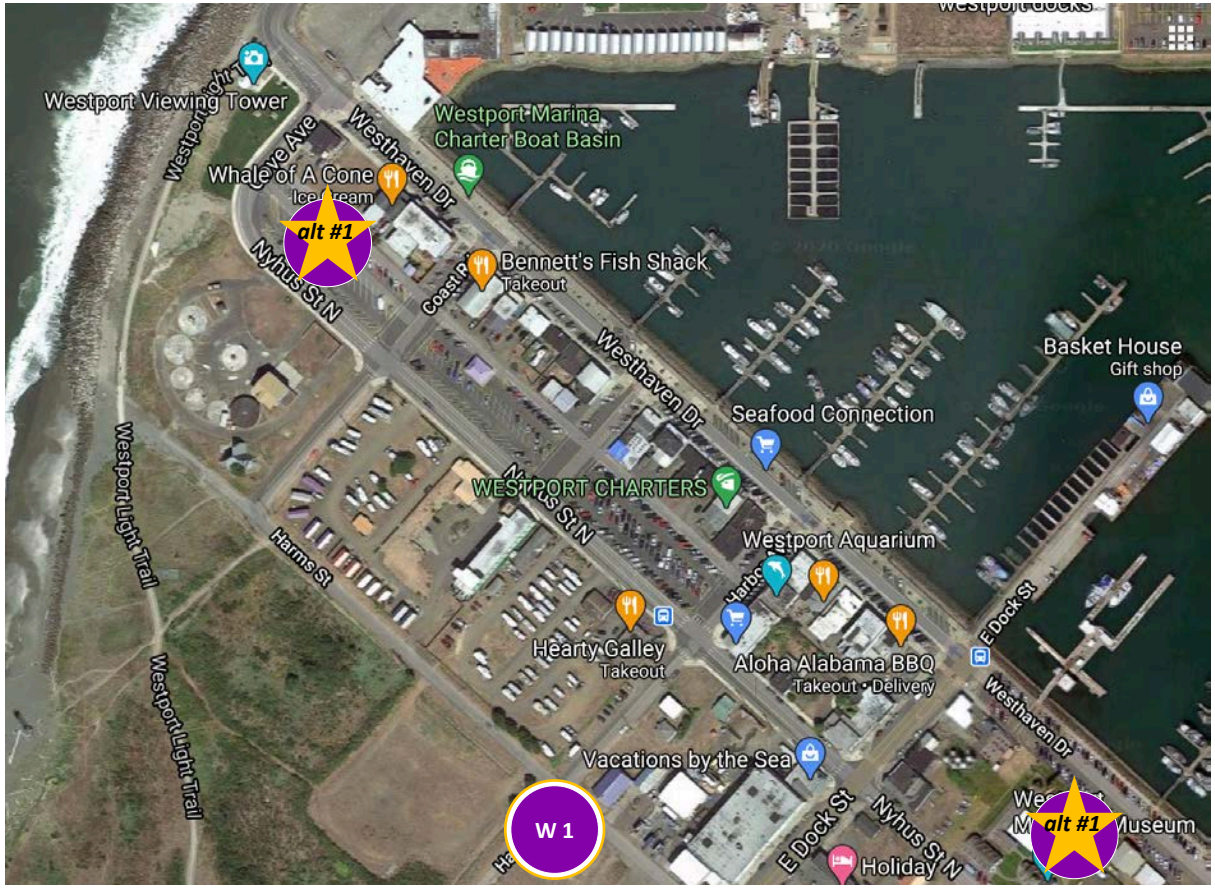
Note: Option #3 does not include **all** visitors (i.e. day trip visitors, peak summer day visitors). It does, however, factor in more thorough coverage across the community, including some popular beach areas and other locations where there may be occasional gatherings of people (i.e. parking lots,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

Under **Option #3:**

- approximately **95.7%** of the total estimated Westport 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) = **888** people
- # of proposed VES = **6**


estimated wave arrival = 25 minutes
estimated wave arrival = 35 minutes
estimated wave arrival = 15 minutes
W 1
W 4
W 5
HWY 105
West Ocean Avenue
Montesano Street South
N
Westport:
Option #4
Community Study Area
Fire Station
School
Tsunami Siren
Natural High Ground
Water/Wetland (Impassable)
Proposed VES Site
(Slow Walk) Walk Speed to High Ground
<15 Minutes
15-25 Minutes
25+ Minutes
Existing VES
0 0.25 0.5 1 1.5
Miles

Westport: W 1 + *alternatives*



Source: *Google Maps*

W 1	
Address	N/A
Intersection	Harbor Street & Harms Street
Options	2, 3, 4
Notes	Adjusted W1 site after review by City of Westport. This site was included in recent BRIC application for VES. Parcel #616120124003

W 1 - alt #1	
Address	2201 Westhaven Drive
Intersection	Westhaven Drive & E Dock Street
Notes	Westport Maritime Museum

W 1 - alt #2	
Address	N/a
Intersection	Nyhus Street North & Cove Avenue
Notes	Westport Viewing Tower parking lot

Westport: W 1

W 1 - Adjusted W1 site after review by City of Westport. This site was included in recent BRIC application for VES.
Parcel #616120124003.

Photo Credit: *Google Maps Street View*

Westport: W 1 *alternative #1*

W 1 - *Alternative #1*: The Maritime Museum is owned by the City of Westport and is centrally located near the working waterfront and tourist destinations.

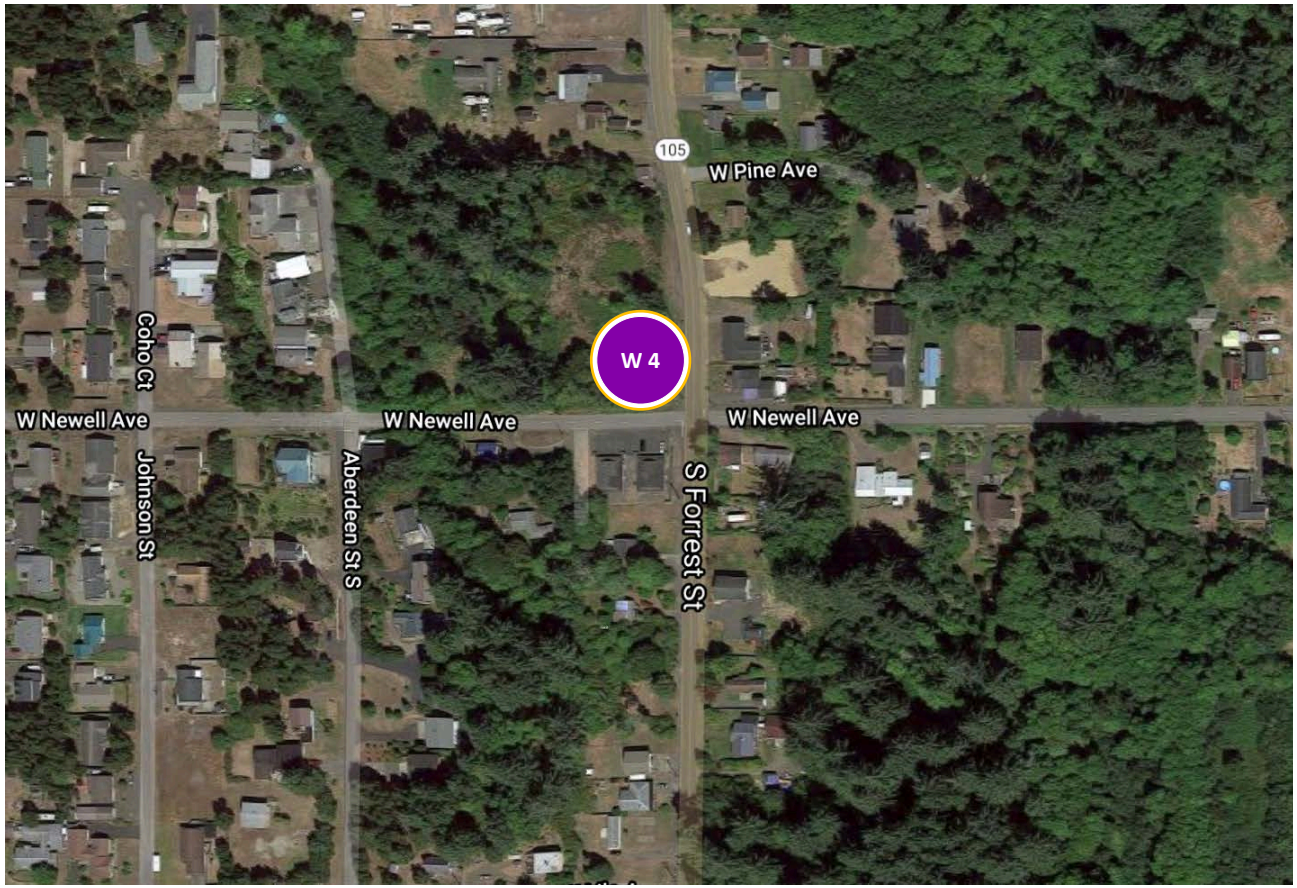
Photo Credit: *Google Maps Street View*

Westport: W 1 *alternative #2*

W 1 - *Alternative #2*: The parking lot site owned by the Port of Grays Harbor could be another potential alternate. It is further down (west) on North Nyhut Street, adjacent to the Westport viewing tower.

Photo Credit: *Bob Freitag*

Westport: W 4



W 4	
Address	N/a
Intersection	SR 105 & West Newell Avenue
Options	2, 3, 4
Notes	State-owned land, NW of intersection

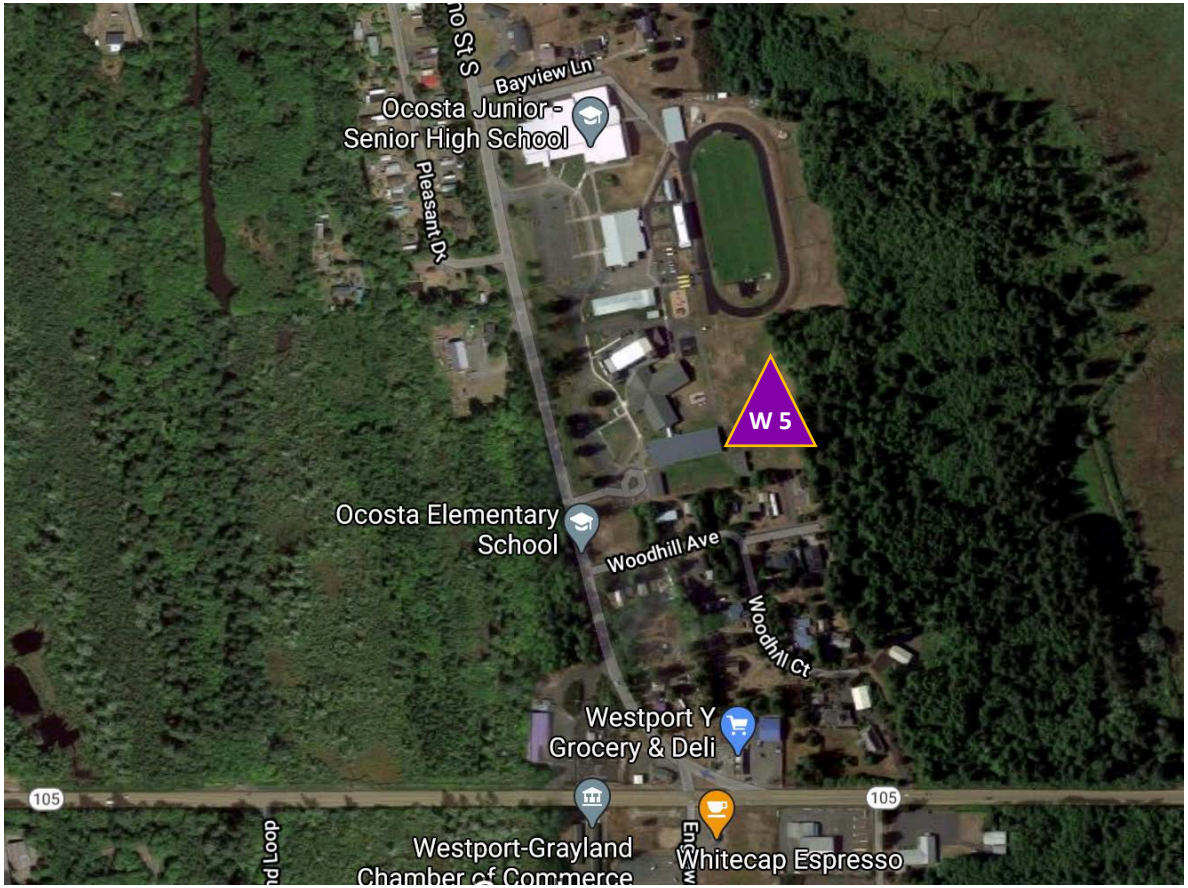
Source: *Google Maps*

Westport: W 4

Photo Credit: *Bob Freitag*

W 4 - Vacant land located at the West Newell Avenue & SR 105 intersection (NW corner). Owned by the State of Washington Tax Commission.

Westport: W 5



W 5	
Address	2580 South Montesano Street
Intersection	South Montesano Street
Options	1, 2, 3, 4
Notes	Ocosta School. Existing VES!

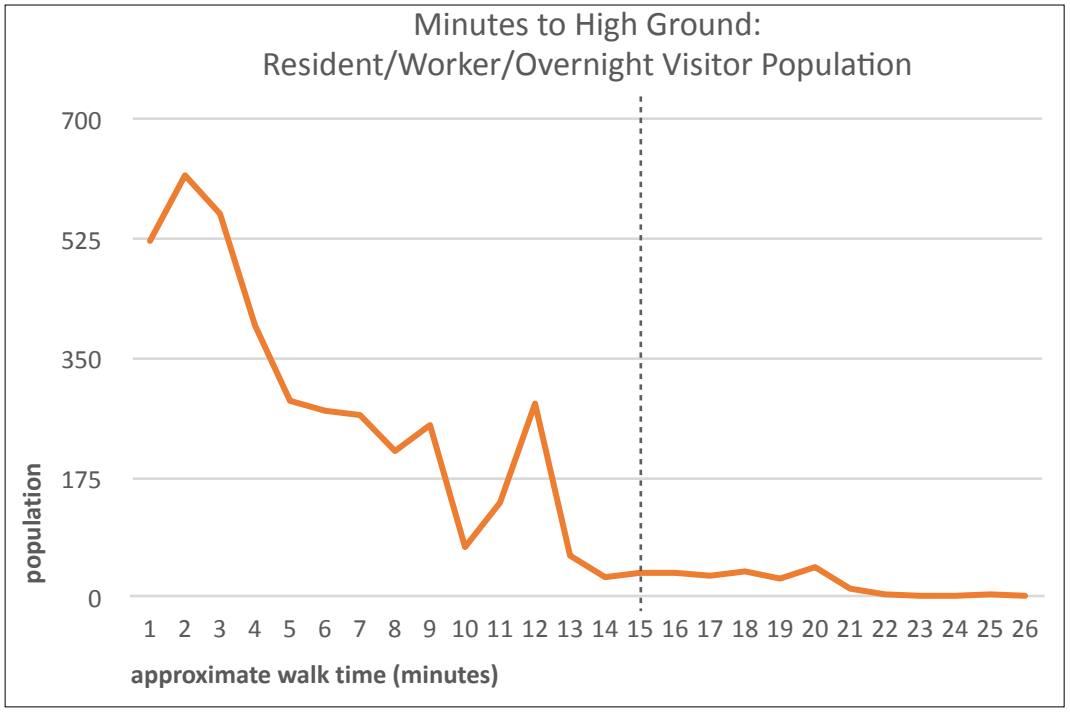
Source: *Google Maps*

Westport: W 5

W 5 - This VES is already built! The gymnasium (*see photo*) visible from the road contains a platform on the roof for tsunami evacuation purposes. This is one of the outcomes of the 2010 Project Safe Haven effort.

Photo Credit: *Google Maps Street View*

Westport: VES Option #4 (Efficient/Lean)



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

<15 minutes	15-25 minutes	25+ minutes
4,043 people	201 people	2 people

■ *Fire Station: Approximate 4 minute walk time to high ground or VES*

▲ *Schools: Approximately 275 people located in natural high ground area, adjacent to existing VES*

Under **Option #4:**

- approximately **95.2%** of the total estimated Westport 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) = **867** people
- # of proposed VES = **3**

W

Potential Westport VES Locations: All Options (1-4)

VES ID	Intersection	Parcel ID	Parcel Owner	Lat | Long	Options	Notes
W 1	East Dock Street & Nyhus Street North (parking lot)	104000200201	Darlene M Caldwell ET AL	46.907976, -124.112647	2, 3, 4	Adjacent Port and City of Westport-owned land. Could be moved to either one of those parcels: 104501000100 (Port of Grays Harbor)
W 2	Adams Street & Baker Street	103000801101	City of Westport	46.893475, -124.106909	2, 3	Currently, park land. Owned by City of Westport, Harriett Dorland Municipal Park
W 3	South Surf Street & West Ocean Avenue	106501500000	Paul B Draper & RMT LLC	46.886575, -124.118149	2, 3	adjacent to City and State-owned land. Could move to adjacent publically-owned land: #106501700000 (City of Westport)
W 4	SR 105 & West Newell Avenue	102502900900	State of Washington Tax Commission	46.876554, -124.112586	2, 3, 4	State-owned land, NW of intersection
W 5	2580 South Montesano Street	161119220080	Ocosta School District #172	46.862497, -124.099020	1, 2, 3, 4	Ocosta School
W 6	End of Jetty Haul Road	616120132002	State of Washington	46.902235, -124.130312	3	Westhaven State Park parking lot. State-owned.

Notes

W 1 - The proposed W 1 site is a parking lot, privately-owned, adjacent to the Westport Maritime Museum. An alternative publicly-owned site could either be to move the VES to the Maritime Museum or further west down Nyhus towards the Westport Viewing Tower to locate the VES in the adjacent parking lot (owned by the Port).

W 2 - The W 2 site has natural high ground in the NW section of the park. Locate potential VES in that area.

W 3 - The original potential W 3 site is currently vacant and located at a highly visible section of West Ocean Avenue, on the way to the large Westport by the Sea condominium campus. Alternatively, there is adjacent natural high ground at the same location as the historic Grays Harbor Lighthouse.

W 4 - The W 4 site is a vacant lot, publicly-owned by the State. Highly visible parcel along SR 105, exiting or entering town.

W 5 - W 5 is the existing VES at the Ocosta School. The new gymnasium roof was built according to FEMA's vertical evacuation structure guidance.

W 6 - The W 6 site is state-owned land that would serve visitors/tourists.

Westport: Comparison of All Options (1-4)

Option #1

# of proposed VES = 0

N/A

*Minimum VES Capacity (# of People)

74.8%

% of people within **15 minutes** of high ground

88.3%

% of people within **25 minutes** of high ground

Option #2

# of proposed VES = 5

888

*Minimum VES Capacity (# of People)

95.7%

% of people within **15 minutes** of high ground or vertical evacuation

99.9%

% of people within **25 minutes** of high ground or vertical evacuation

Option #3

# of proposed VES = 6

888

*Minimum VES Capacity (# of People)

95.7%

% of people within **15 minutes** of high ground or vertical evacuation

99.9%

% of people within **25 minutes** of high ground or vertical evacuation

Option #4

# of proposed VES = 3

867

*Minimum VES Capacity (# of People)

95.2%

% of people within **15 minutes** of high ground or vertical evacuation

99.9%

% of people within **25 minutes** of high ground or vertical evacuation

Westport: 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.

OSW

Ocean Shores - West

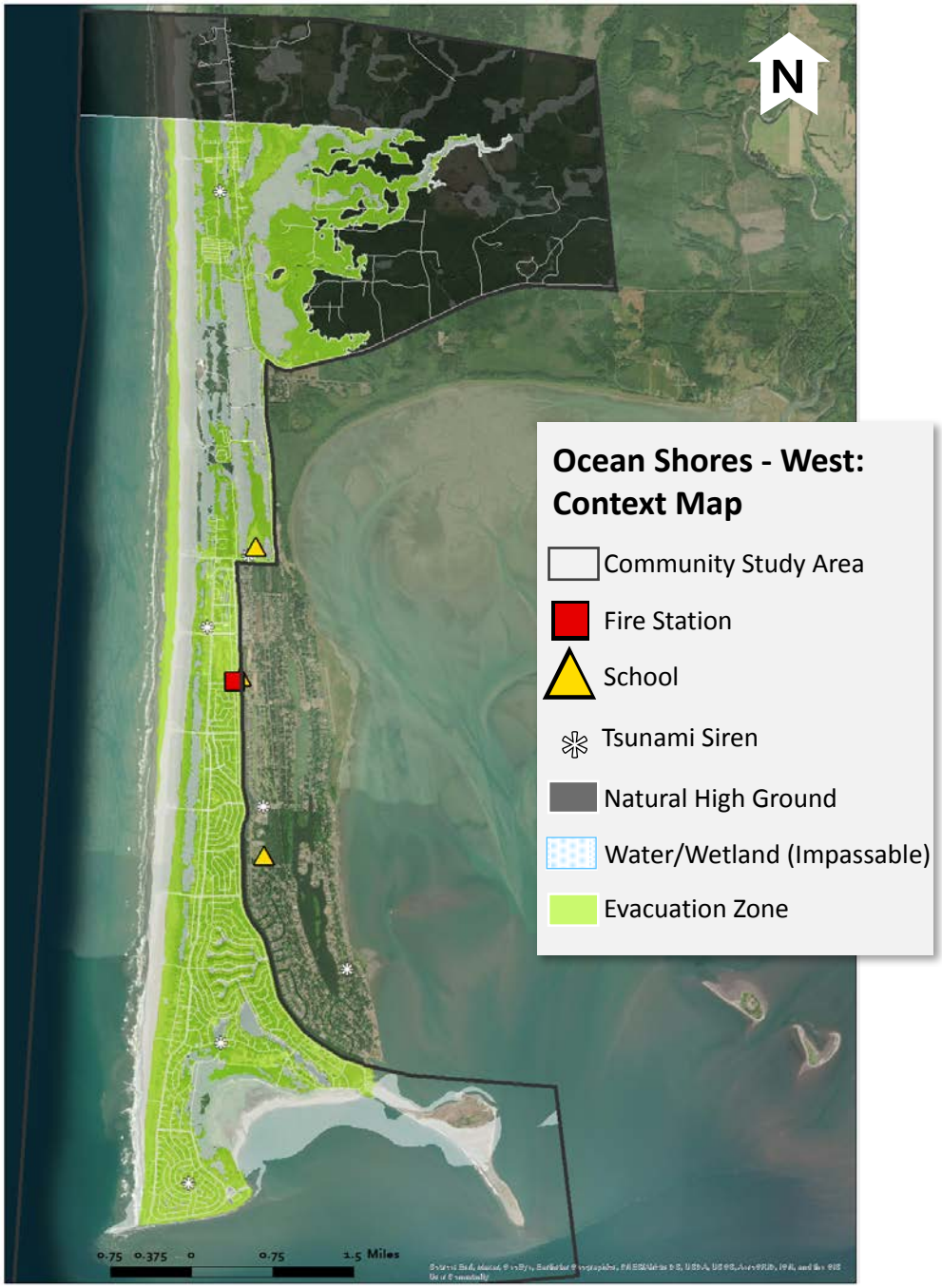
Ocean Shores - West community study area population <u>in the tsunami hazard area</u> = ~6,712 people

Resident/Worker/Overnight Visitor population = ~6,212 people

Fire Department occupancy = ~30 people

Schools occupancy = ~469 people

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


N
Ocean Shores - West: Context Map
Community Study Area
Fire Station
School
Tsunami Siren
Natural High Ground
Water/Wetland (Impassable)
Evacuation Zone
0.75 0.375 0 0.75 1.5 Miles

OSW

Ocean Shores - West: Option #1 (no VES)

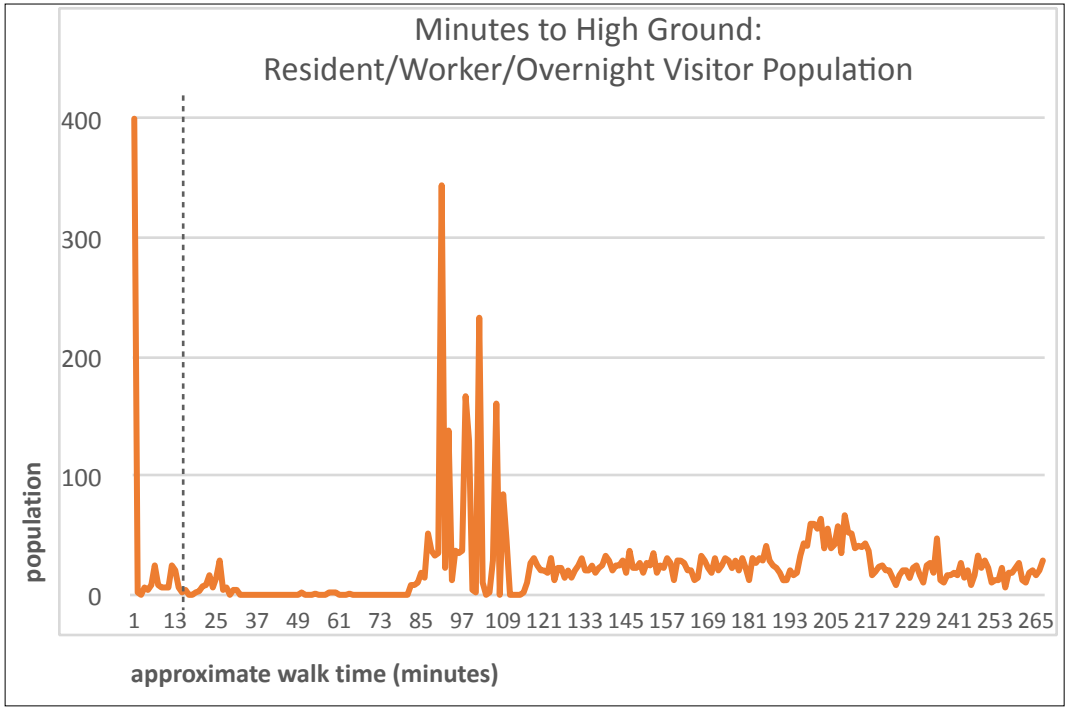
- Community Study Area
- Fire Station
- School
- Tsunami Siren
- Natural High Ground
- Water/Wetland (Impassable)

(Slow Walk) Walk Speed to High Ground

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

Ocean Shores - West: VES Option #1 (No VES)

OSW



*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

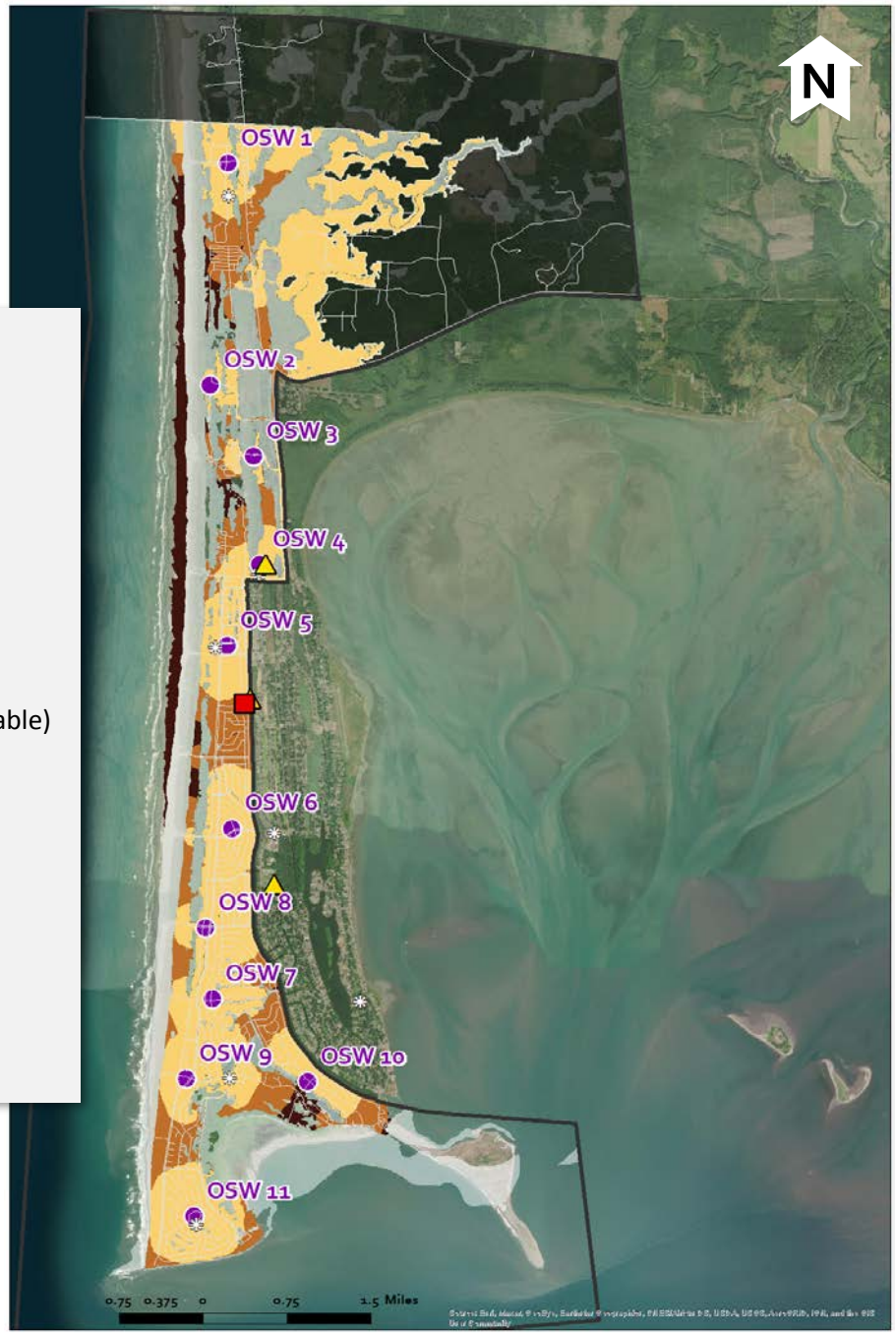
<15 minutes	15-25 minutes	25+ minutes
524 people	64 people	6,124 people

Fire Station: Approximate 114 minute walk time to high ground

Schools: Approximate 70 and 113 minute walk time to high ground

Under **Option #1:**

- approximately **7.8%** of the total estimated Ocean Shores - West population are within 15 minutes to natural high ground
- approximate **maximum* walk time to natural high ground for identified population = **267** minutes



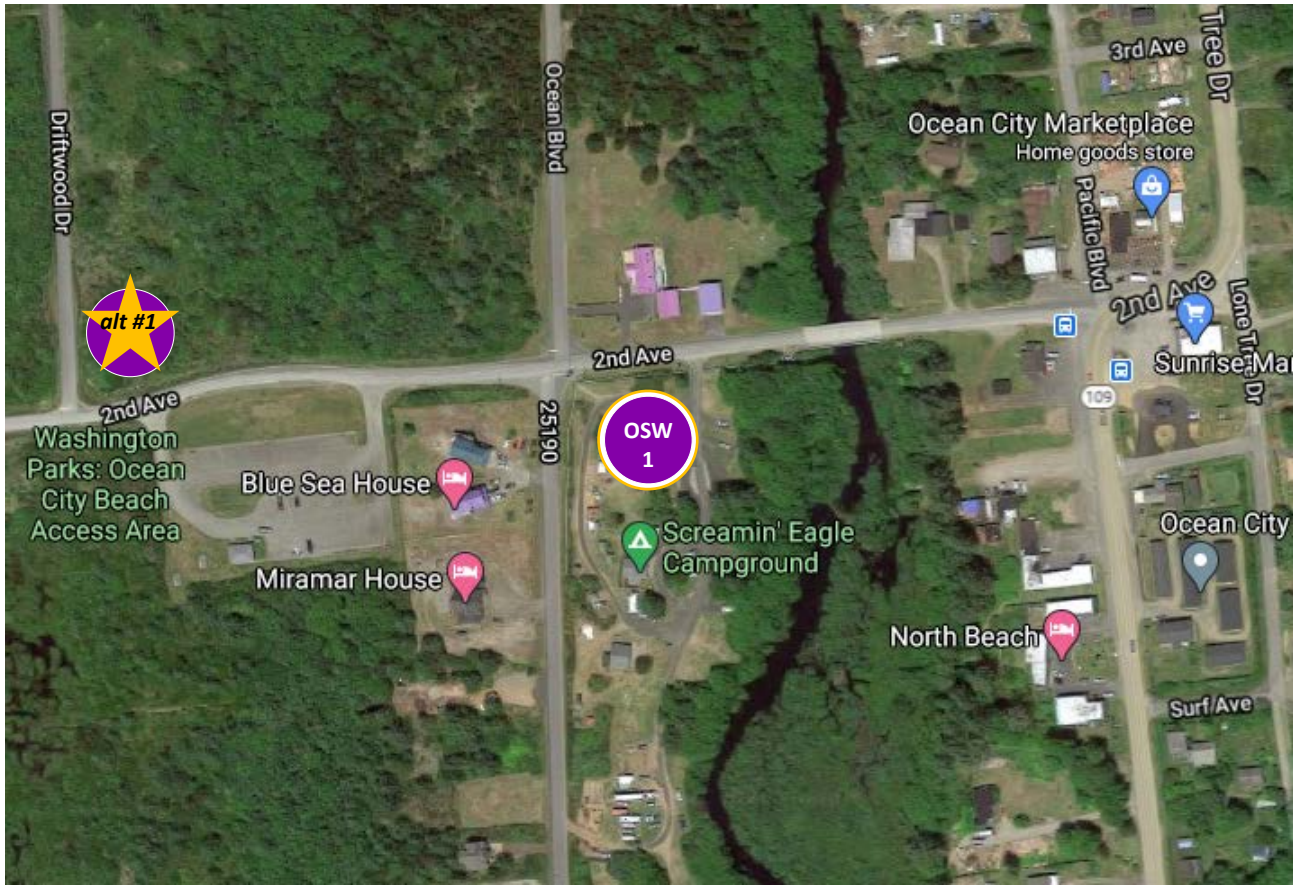
Ocean Shores - West: Option #2

- Community Study Area
- Fire Station
- School
- Tsunami Siren
- Natural High Ground
- Water/Wetland (Impassable)
- Proposed VES Site

(Slow Walk) Walk Speed to High Ground

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

Ocean Shores West: OSW 1 + *alternative*



Source: *Google Maps*

OSW 1	
Address	17 Second Avenue
Intersection	2nd Avenue & Ocean Boulevard
Options	2
Notes	Ocean City Beach Access Area (currently Screamin' Eagle Campground) - State of WA-owned land

OSW 1 - alt #1	
Address	N/a
Intersection	Second Avenue & Driftwood Drive
Notes	Second Avenue, vacant land. Owned by State of Washington Parks & Recreation

Ocean Shores West: OSW 1

OSW 1 - Screamin' Eagle Campground. Looking at Campground entrance and NW corner.

Photo Credit: *Jeana Gómez*

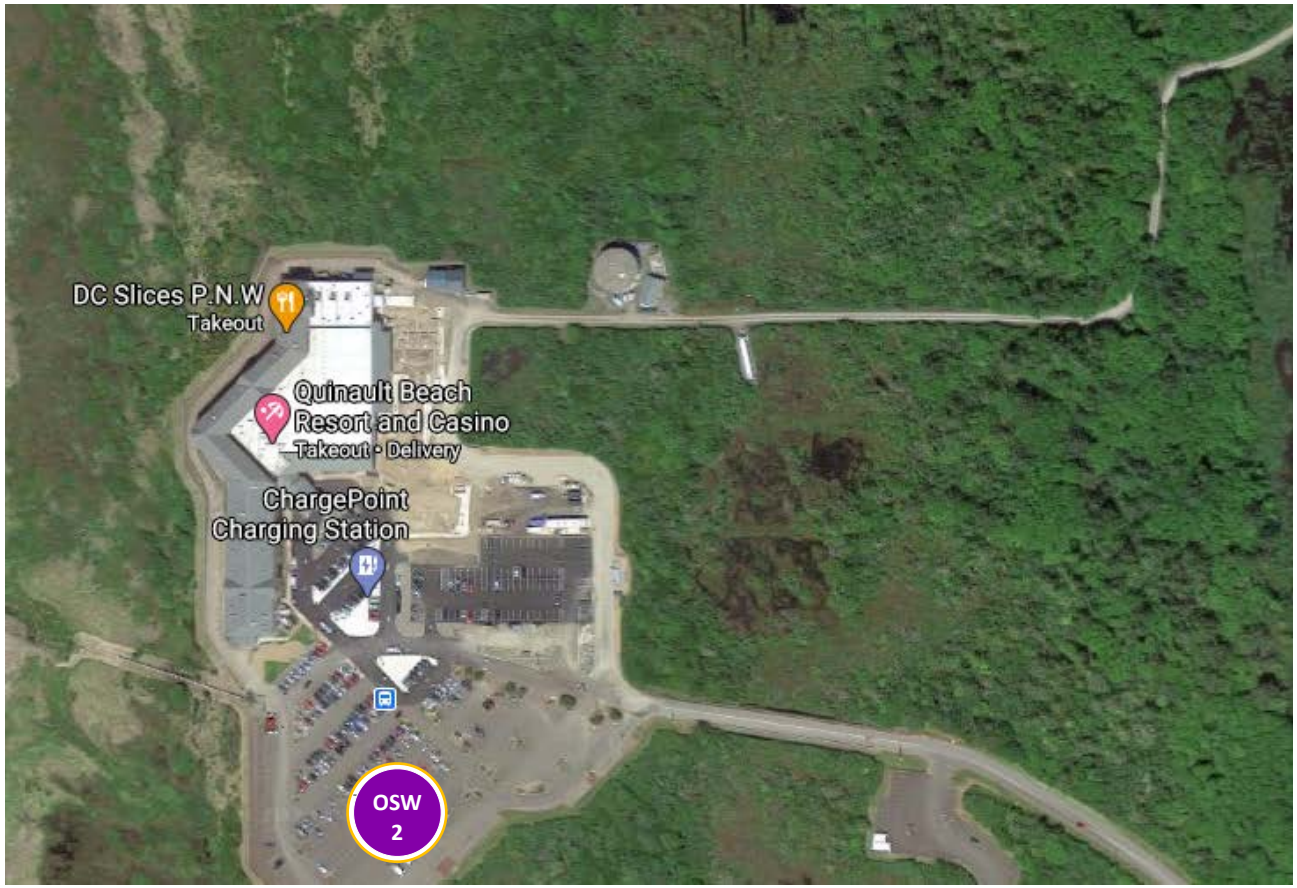
OSW 1 - Looking SE and W, Ocean Boulevard & Second Avenue intersection

Ocean Shores West: OSW 1 *alternative*

Photo Credit: *Jeana Gómez*

OSW 1 - *Alternative #1*: State of Washington-owned Parks & Recreation land. Same side of road as Campground (south).

Ocean Shores West: OSW 2



OSW 2	
Address	N/a
Intersection	78 State Route 115
Options	2
Notes	Quinault Beach Resort and Casino, tribal-owned land

Source: *Google Maps*

Ocean Shores West: OSW 2

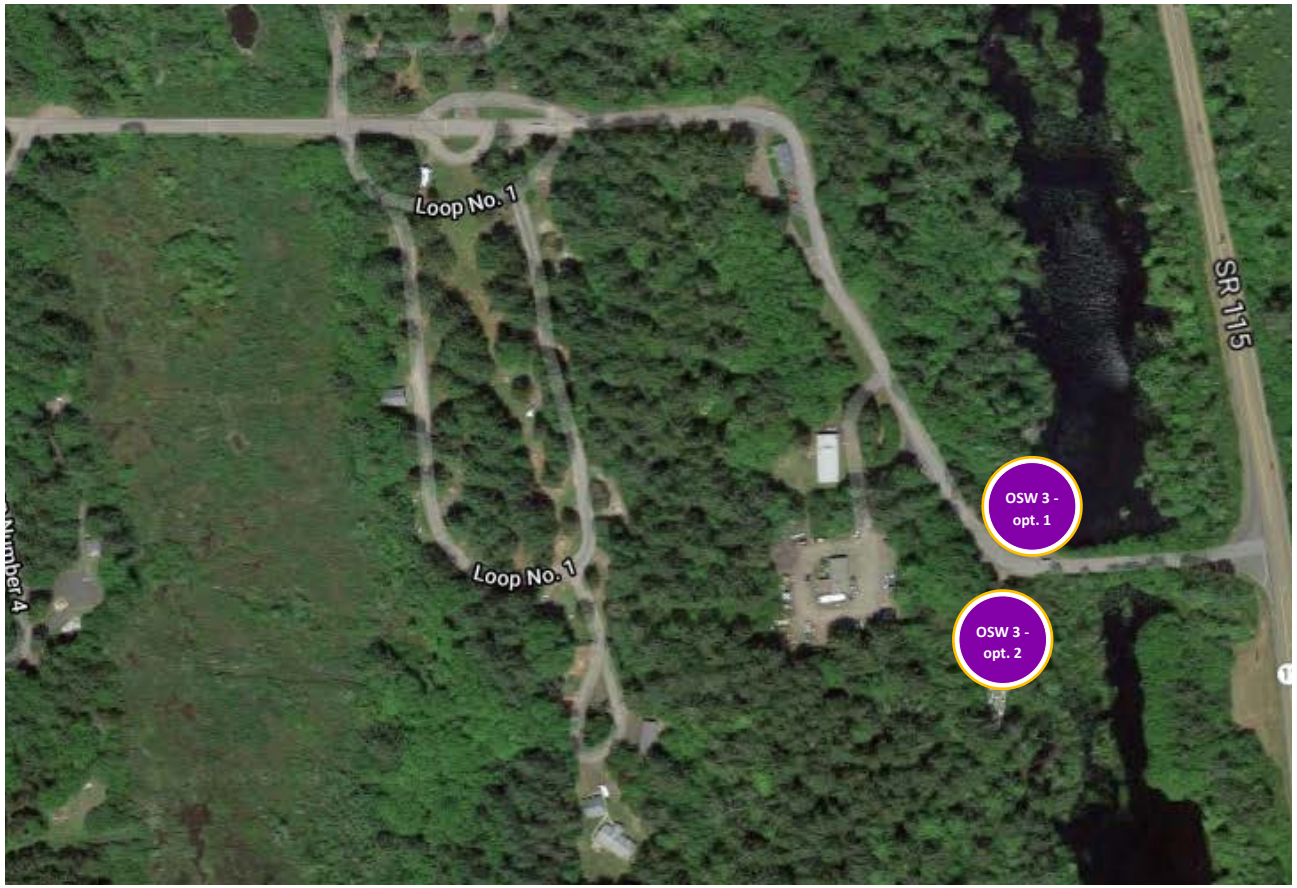


OSW 2 - Quinault Beach Resort & Casino complex, from parking lot

Photo Credit: *Jeana Gómez*

OSW 2 - Quinault Beach Resort & Casino complex, panoramic view looking west

Ocean Shores West: OSW 3



Source: *Google Maps*

OSW 3 - option 1	
Address	148 State Route 115
Intersection	Ocean City State Park Campground
Notes	State-owned land, Ocean City campground (south side of street)

OSW 3 - option 2	
Address	148 State Route 115
Intersection	Ocean City State Park Campground
Notes	State-owned land, Ocean City campground (north side of street)

Ocean Shores West: OSW 3

OSW 3 - opt. 1

Photo Credit: *Jeana Gómez*

OSW 3 - *option 1*: clearing or camp area near campground entrance

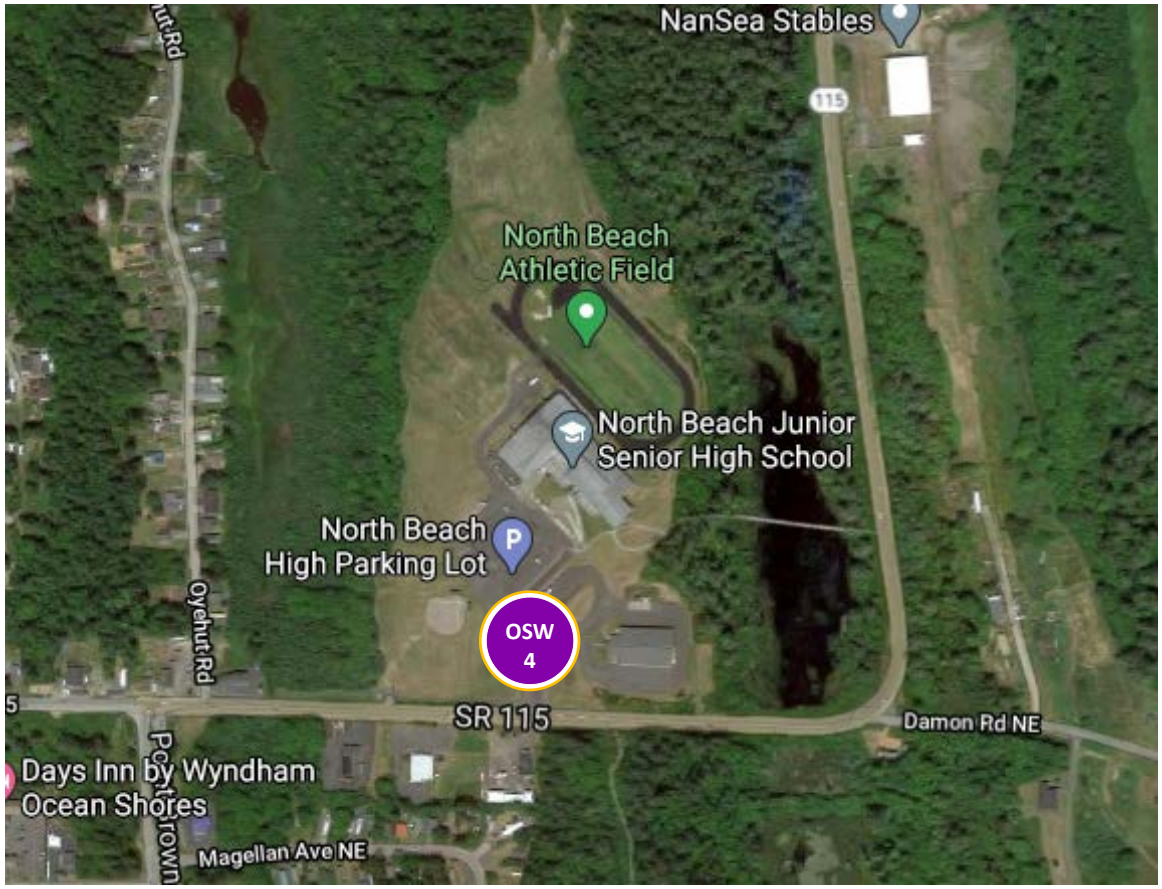
Ocean Shores West: OSW 3

OSW 3 - opt. 2

Photo Credit: *Jeana Gómez*

OSW 3 - *option 2*: Round-about near entrance to park.

Ocean Shores West: OSW 4



OSW 4	
Address	336 State Route 115
Intersection	SR 115 & Oyehut Road
Options	2
Notes	North Beach Junior/ Senior High School

Source: *Google Maps*

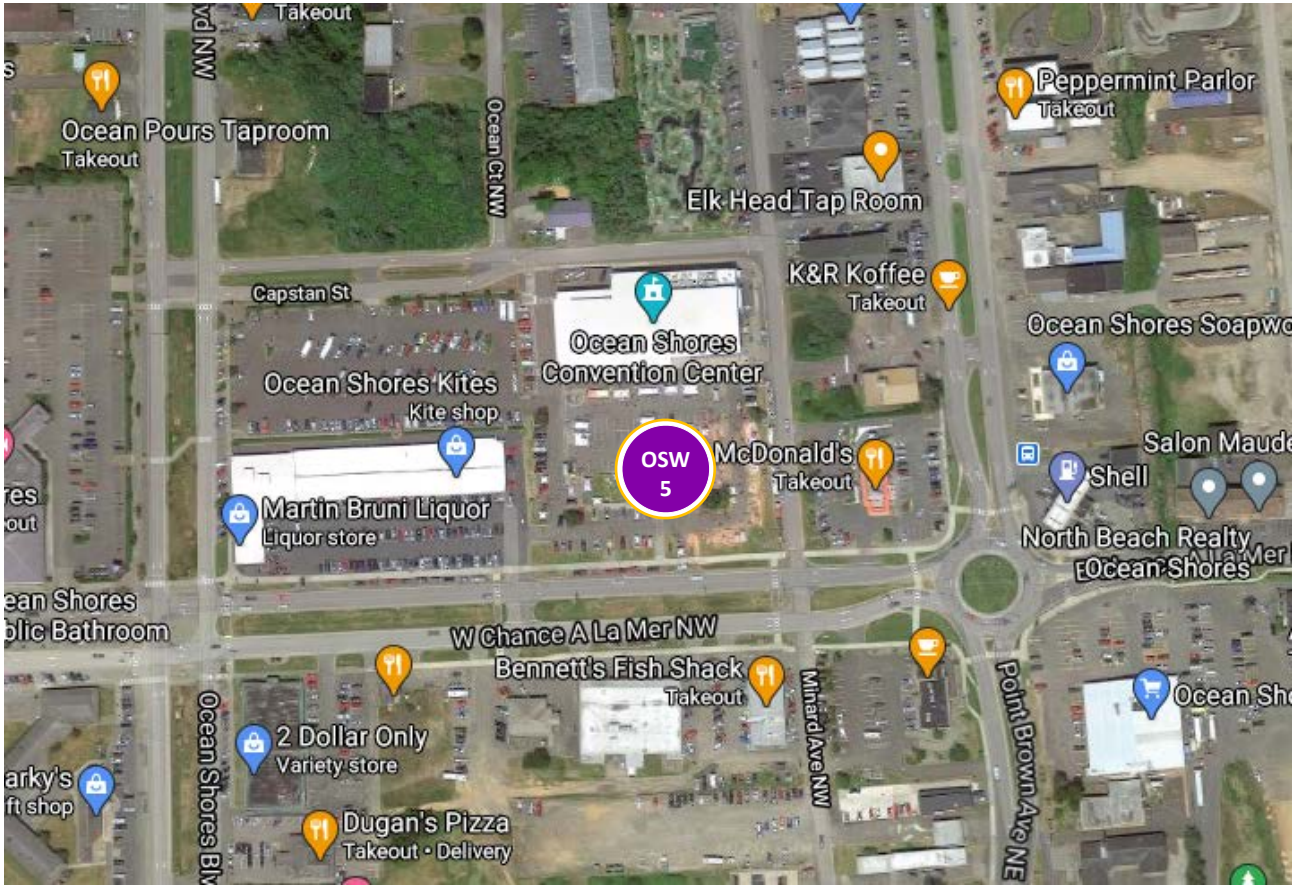
Ocean Shores West: OSW 4

OSW 4 - North Beach Junior/Senior High School (from left to right: admin building, school, sports field)

OSW 4 - North Beach Junior/Senior High School, panoramic view, looking west

Photo Credit: *Jeana Gómez*

Ocean Shores West: OSW 5



OSW 5	
Address	120 West Chance a La Mer NW
Intersection	West Chance a La Mer NW & Minard Avenue NW
Options	2
Notes	Ocean Shores Convention Center and parking lot. City-owned land.

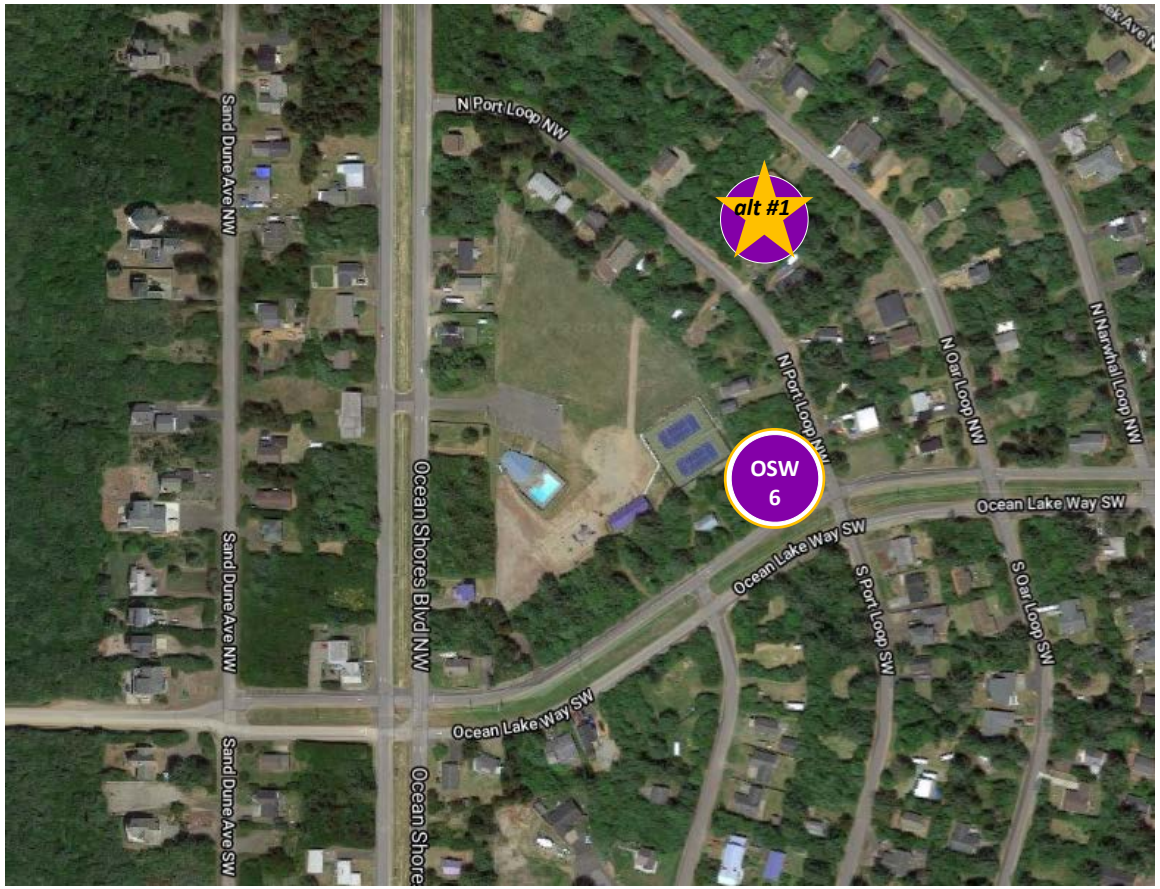
Source: *Google Maps*

Ocean Shores West: OSW 5

OSW 5 - Ocean Shores Convention Center. Looking northwest and north. Large parking lot located in front, to the south of the building.

Photo Credit: *Jeana Gómez*

Ocean Shores West: OSW 6 + *alternative*



Source: *Google Maps*

OSW 6	
Address	134 Ocean Lake Way SW
Intersection	Ocean Lake Way SW & North Port Loop NW
Options	2
Notes	Currently located on private land, but some City-owned land on North Port Loop NW, to the north: #090300018200

OSW 6- alt #1	
Address	146 N Port Loop NW
Intersection	North Port Loop NW
Notes	City-owned land

Ocean Shores West: OSW 6

Photo Credit: *Jeana Gómez*

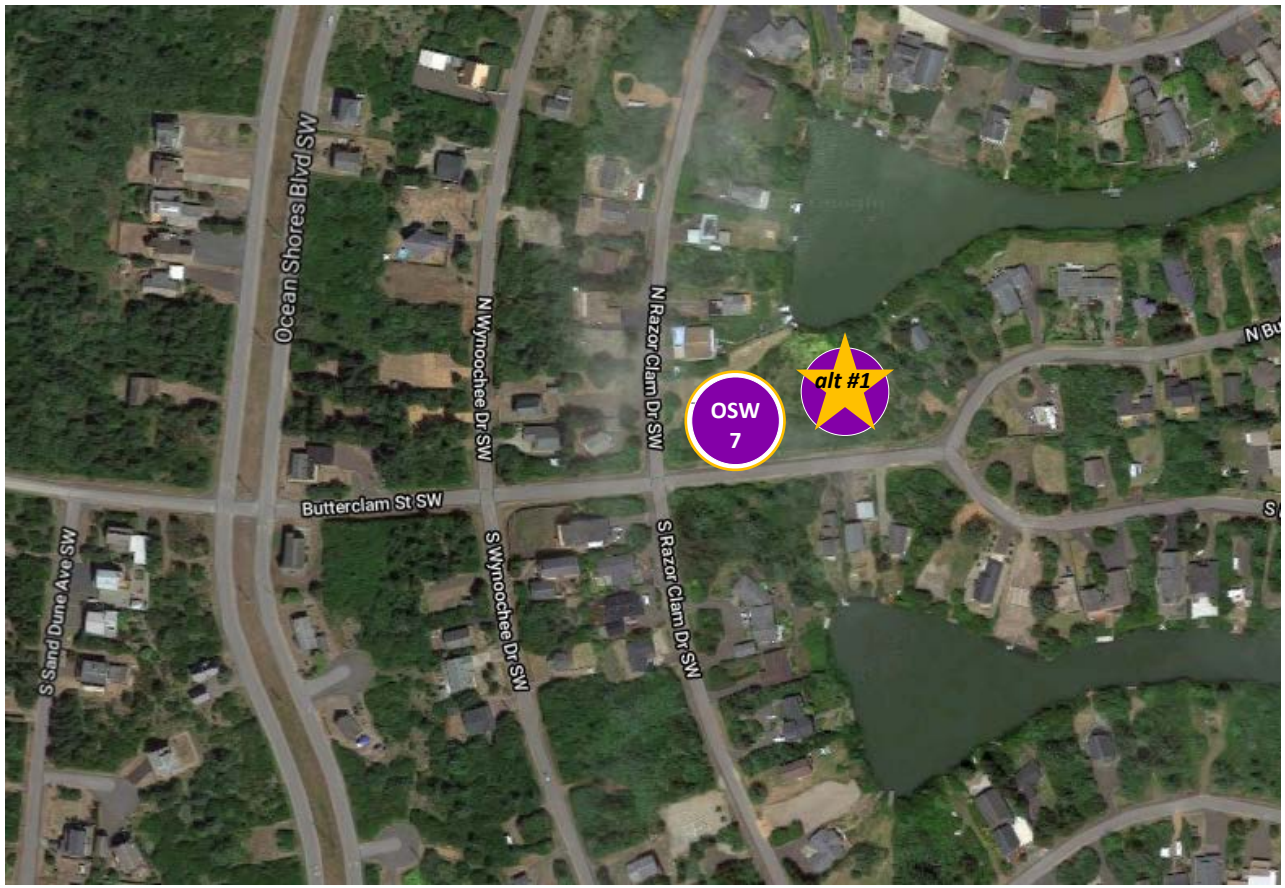
OSW 6 - potential VES site at Ocean Lake Way SW & North Port Lane NW. This site is very close to the OSCC-owned Ken Peterson Park.

Ocean Shores West: OSW 6 *alternative*

Photo Credit: *Jeana Gómez*

OSW 6 - *Alternative #1*: City of Ocean Shores-owned parcel, just north of OSW 6, on North Port Loop.

Ocean Shores West: OSW 7 + *alternative*



Source: *Google Maps*

OSW 7	
Address	398 N Butter Clam Street SW
Intersection	North Razor Clam Drive & Butterclam Street SW
Options	2
Notes	currently located on private land, but city-owned land is directly east: #092100047400

OSW 7- alt #1	
Address	N/a
Intersection	Butterclam Street SW, east of North Razor Clam
Notes	city-owned land, east of OSW 7

Ocean Shores West: OSW 7

OSW 7 - Potential VES site currently developed and privately-owned.

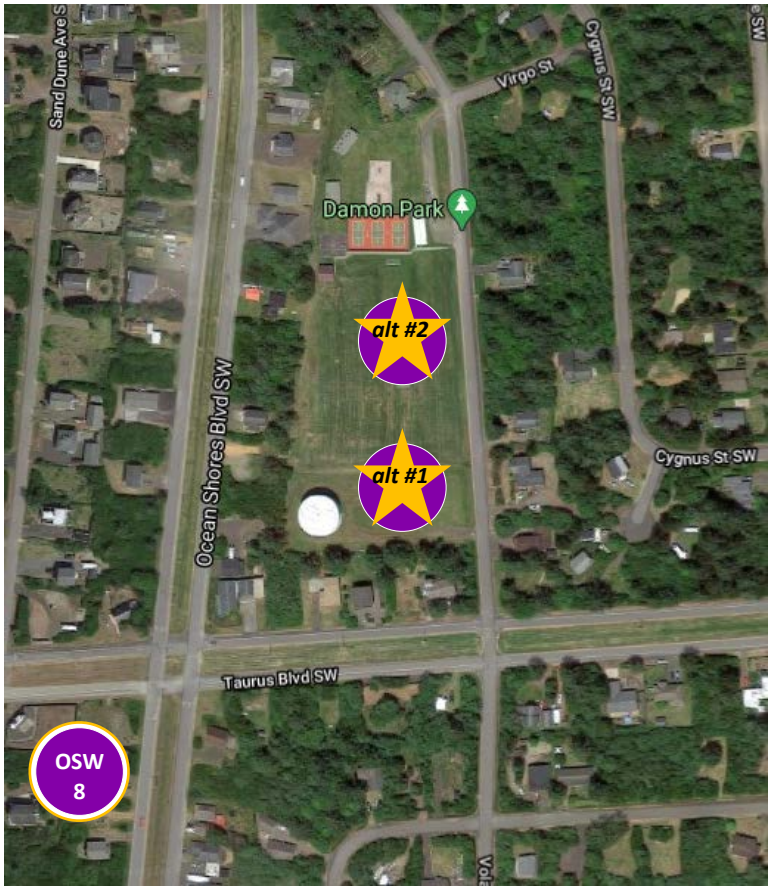
Photo Credit: *Jeana Gómez*

Ocean Shores West: OSW 7 *alternative*

Photo Credit: *Jeana Gómez*

OSW 7 - *Alternative* #1: Vacant City of Ocean Shores-owned land directly east of OSW 7

Ocean Shores West: OSW 8 + *alternatives*



Source: *Google Maps*

OSW 8	
Address	501 Ocean Shores Blvd SW
Intersection	Ocean Shores Boulevard SW & Taurus Boulevard
Options	2
Notes	Currently located on private land, but City-owned land available to the NE: #090700095202

OSW 8- alt #1	
Address	N/a
Intersection	Volans Avenue SW, just north of Taurus Blvd SW
Notes	City-owned parcel, vacant

OSW 8- alt #2	
Address	n/a
Intersection	Volans Avenue SW, just north of OSW 8 - alt #1
Notes	Damon Park, OSCC-owned/managed

Ocean Shores West: OSW 8

Photo Credit: *Jeana Gómez*

OSW 8 - Potential VES site at the SW corner of Ocean Shores Boulevard SW & Taurus Boulevard SW. Currently private, undeveloped land.

Ocean Shores West: OSW 8 *alternative #1*

OSW 8 - *Alternative #1*: City-owned land, with AHAB siren. Located just NE of OSW 8 site on Volans Avenue SW.

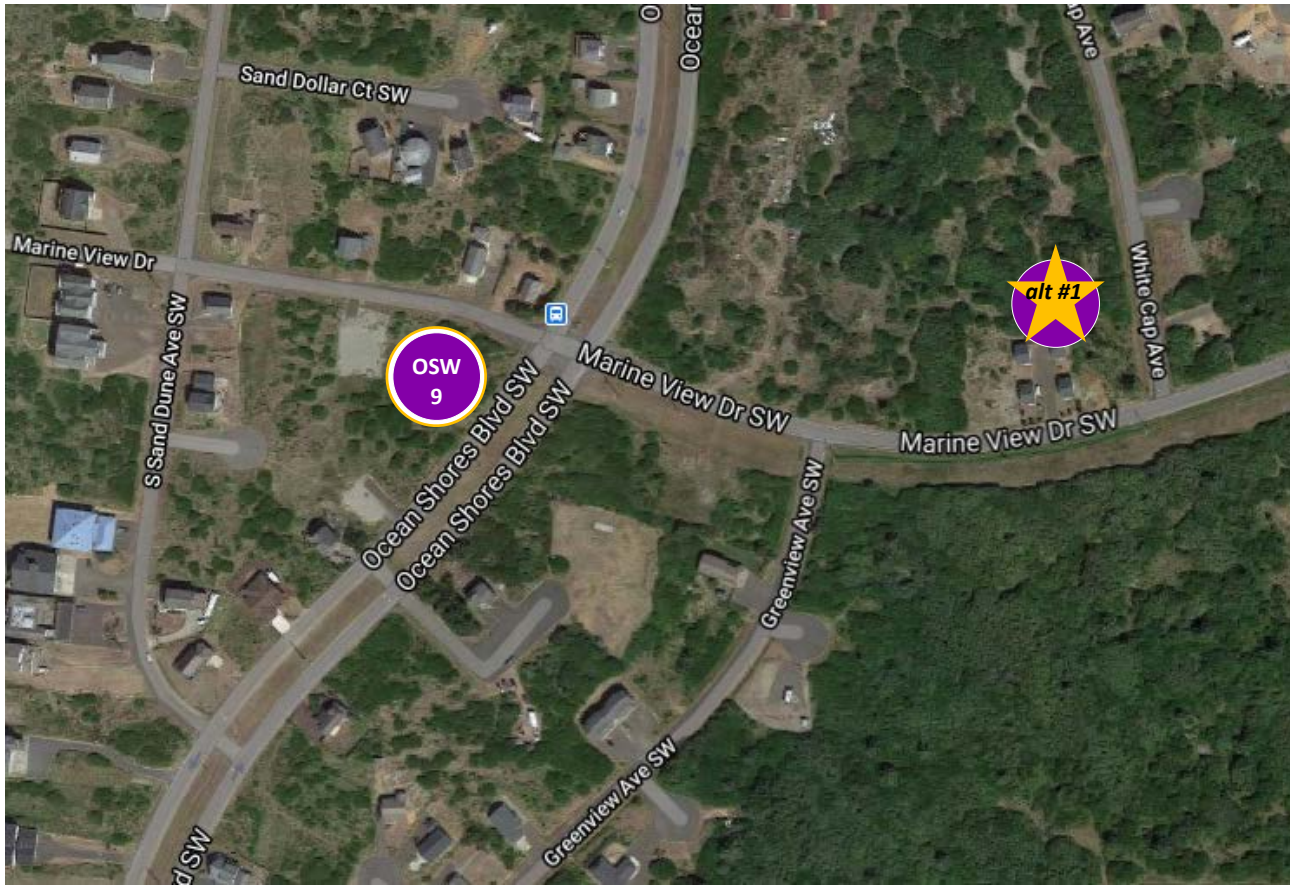
Photo Credit: *Jeana Gómez*

Ocean Shores West: OSW 8 *alternative #2*

OSW 8 - *Alternative #2*: Ocean Shores Community Club-owned land (Damon Park). Located just north of OSW 8 *Alternative #1* on Volans Avenue SW.

Photo Credit: *Jeana Gómez*

Ocean Shores West: OSW 9 + *alternative*



Source: *Google Maps*

OSW 9	
Address	1003 Ocean Shores Blvd SW
Intersection	Ocean Shores Boulevard SW & Marine View Drive
Options	2
Notes	currently located on private land, but city-owned land is located due east, 2 blocks: #093301006702

OSW 9 - alt #1	
Address	N/a
Intersection	White Cap Avenue & Marine View Drive SW
Notes	City-owned land

Ocean Shores West: OSW 9

OSW 9

Photo Credit: *Jeana Gómez*

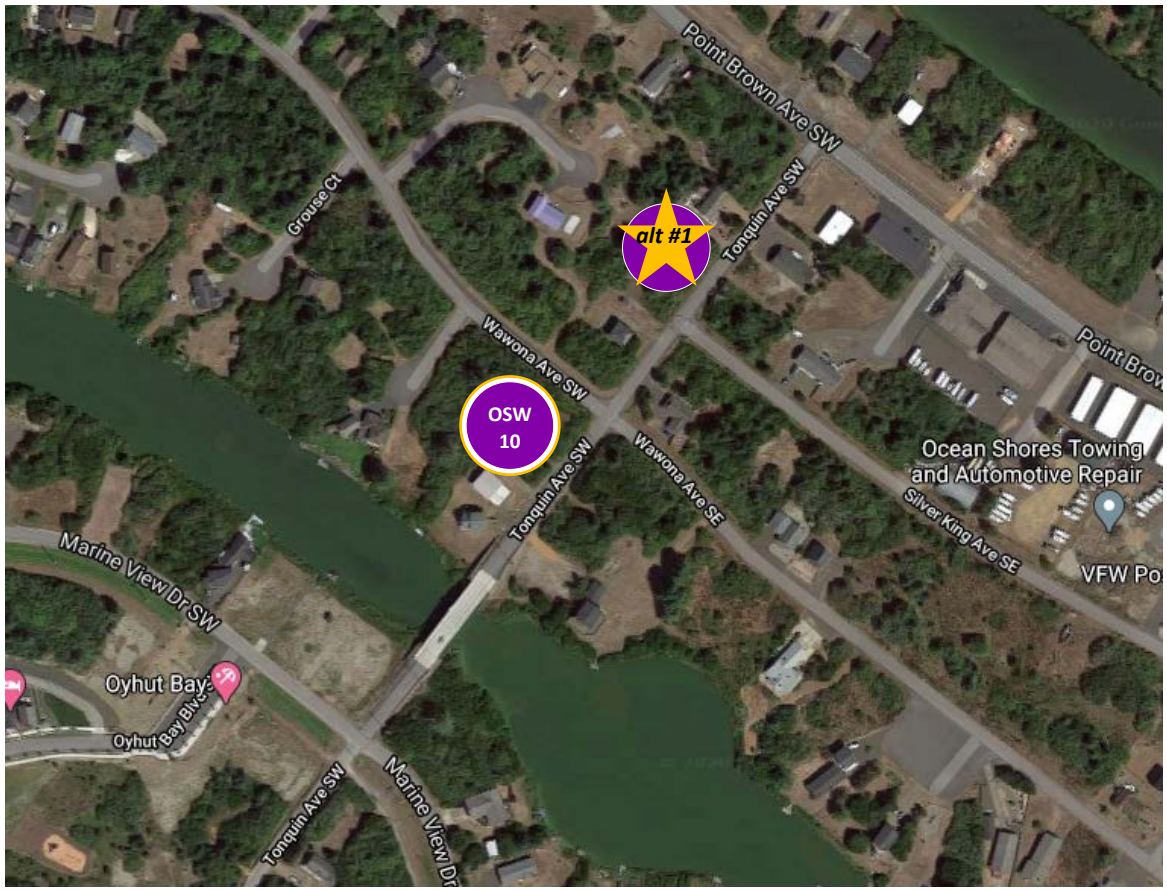
OSW 9 - Vacant, privately-owned land at the intersection of Ocean Shores Boulevard SW & Marine View Drive SW.

Ocean Shores West: OSW 9 *alternative*

Photo Credit: *Jeana Gómez*

OSW 9 - *Alternative #1*: Vacant, City-owned land just east of OSW 9, on White Cap Avenue SW, just north of Marine View Drive SW.

Ocean Shores West: OSW 10 + *alternative*



Source: *Google Maps*

OSW 10	
Address	921 Wawona Avenue SW
Intersection	Wowona Avenue SW & Tonquin Avenue SW
Options	2
Notes	currently located on private land, but city-owned land is located sparingly to the east, northeast: #093101704600

OSW 10 - alt #1	
Address	N/a
Intersection	Tonquin Avenue SW & Silver King Avenue SE
Notes	City-owned land, vacant

Ocean Shores West: OSW 10

OSW 10

OSW 10 - Semi-developed, privately-owned land at the intersection of Tonquin Avenue SE & Wawona Street SE

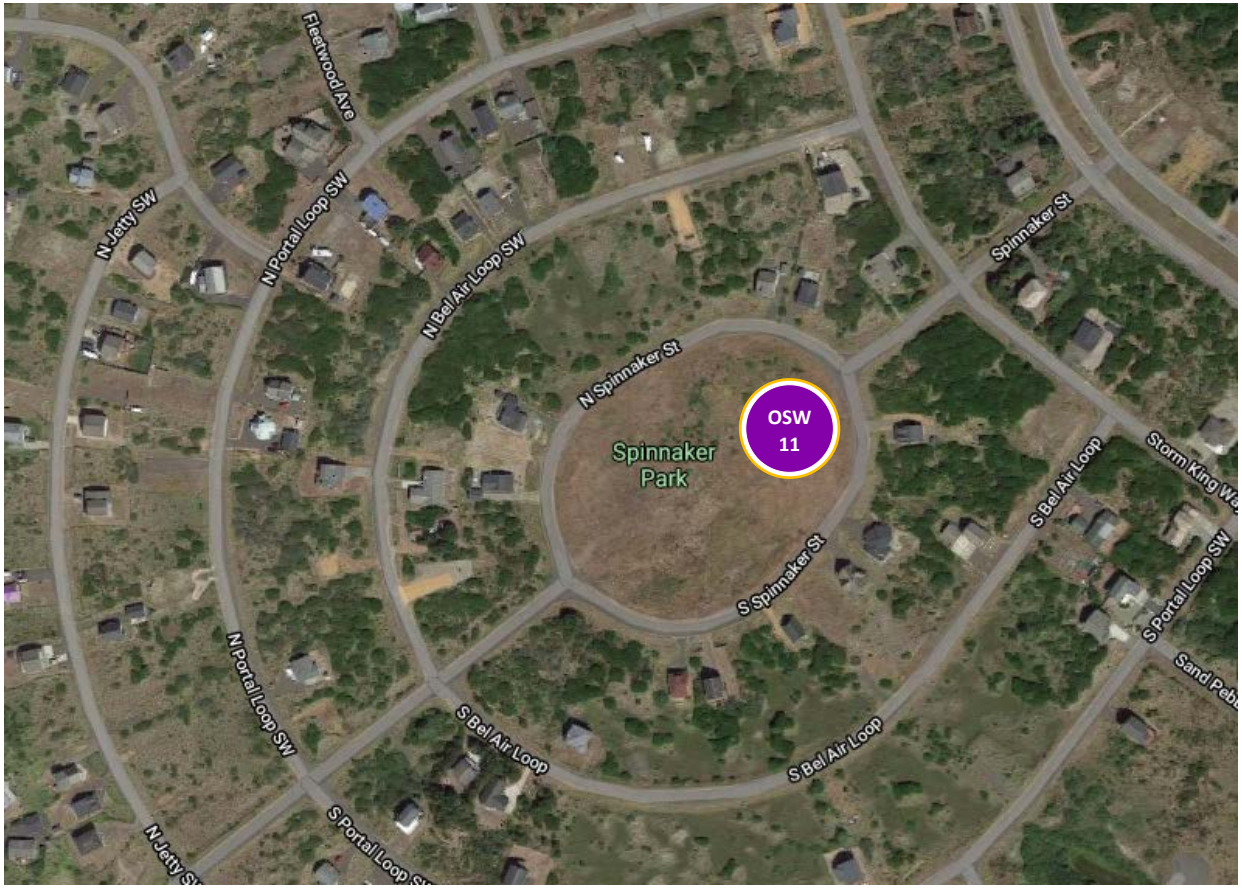
Photo Credit: *Jeana Gómez*

Ocean Shores West: OSW 10 *alternative*

Photo Credit: *Jeana Gómez*

OSW 10 - *Alternative #1*: Vacant, City of Ocean Shores-owned land just to the east/northeast.

Ocean Shores West: OSW 11



OSW 11	
Address	N/a
Intersection	South Spinnaker Street
Options	2
Notes	City-owned land, Spinnaker Park

Source: *Google Maps*

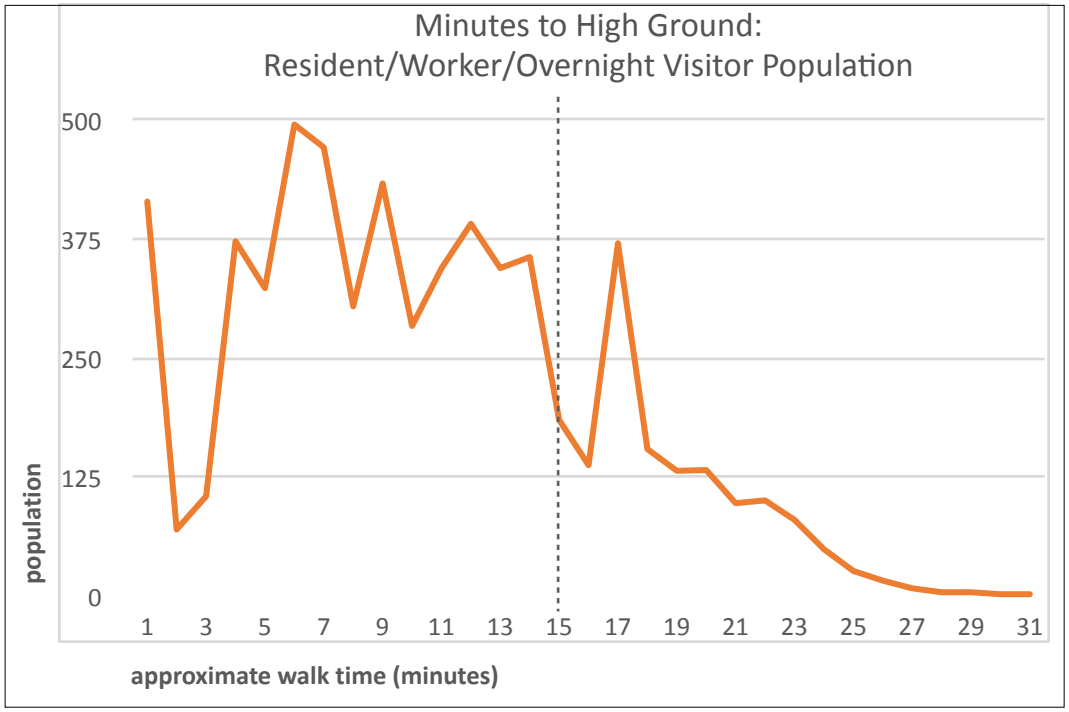
Ocean Shores West: OSW 11

OSW 11 - City-owned Spinnaker Park. Panorama and shots taken looking northwest and northeast. Note the AHAB siren.

Photo Credit: *Jeana Gómez*

OSW

Ocean Shores - West: VES Option #2 (Community-Derived)



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

<15 minutes	15-25 minutes	25+ minutes
5,159 people	1,515 people	37 people

Fire Station: Approximate 18 minute walk time to high ground or VES

Schools: Approximate 10 and 17 minute walk time to high ground or VES

Under **Option #2:**

- approximately **76.9%** of the total estimated Ocean Shores - West 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) = **4,633** people
- # of proposed VES = **11**

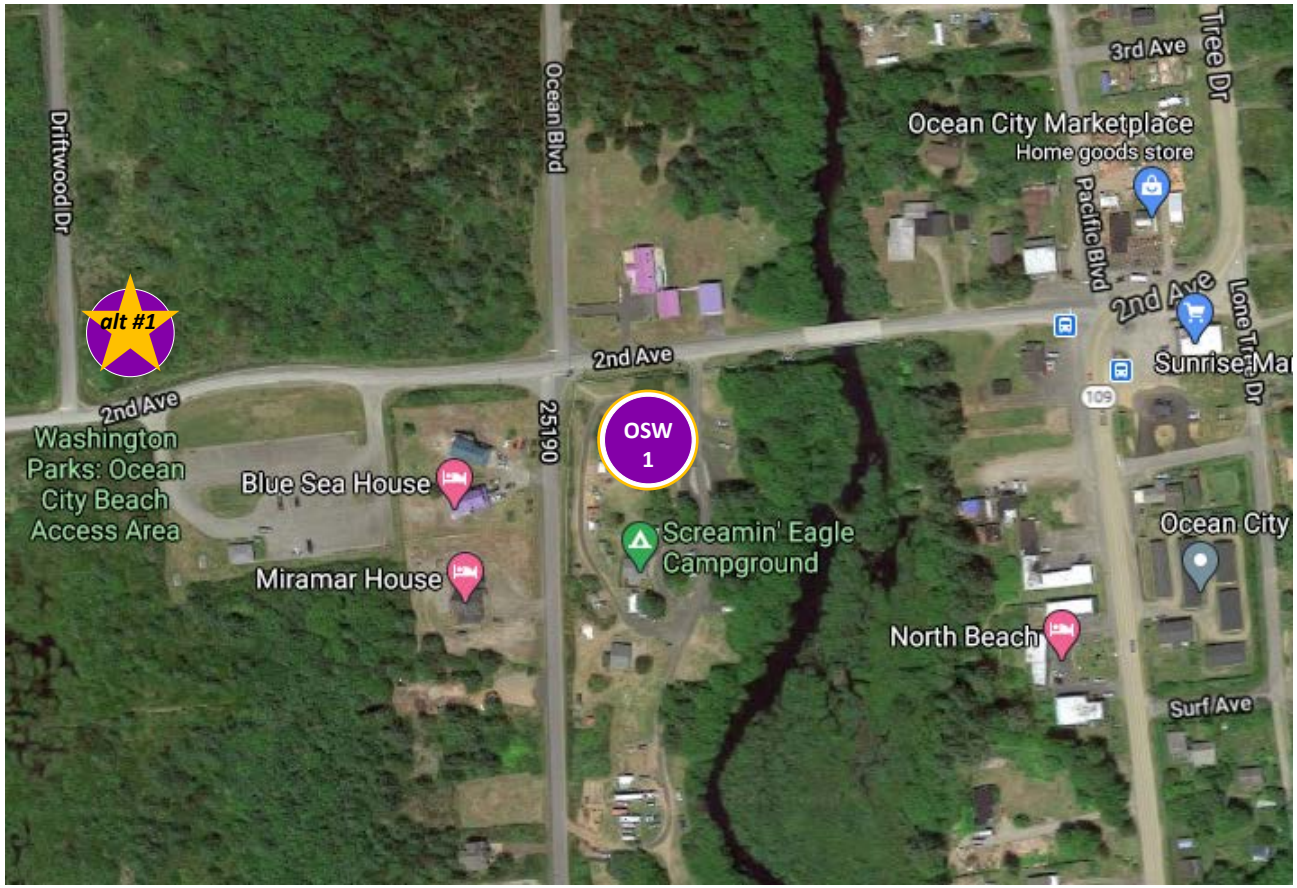
Ocean Shores - West: Option #3

- Community Study Area
- Fire Station
- School
- Tsunami Siren
- Natural High Ground
- Water/Wetland (Impassa
- Proposed VES Site

(Slow Walk) Walk Speed to High Ground

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

Ocean Shores West: OSW 1 + *alternative*



Source: *Google Maps*

OSW 1	
Address	17 Second Avenue
Intersection	2nd Avenue & Ocean Boulevard
Options	2
Notes	Ocean City Beach Access Area (currently Screamin' Eagle Campground) - State of WA-owned land

OSW 1 - alt #1	
Address	N/a
Intersection	Second Avenue & Driftwood Drive
Notes	Second Avenue, vacant land. Owned by State of Washington Parks & Recreation

Ocean Shores West: OSW 1

OSW 1 - Screamin' Eagle Campground. Looking at Campground entrance and NW corner.

Photo Credit: *Jeana Gómez*

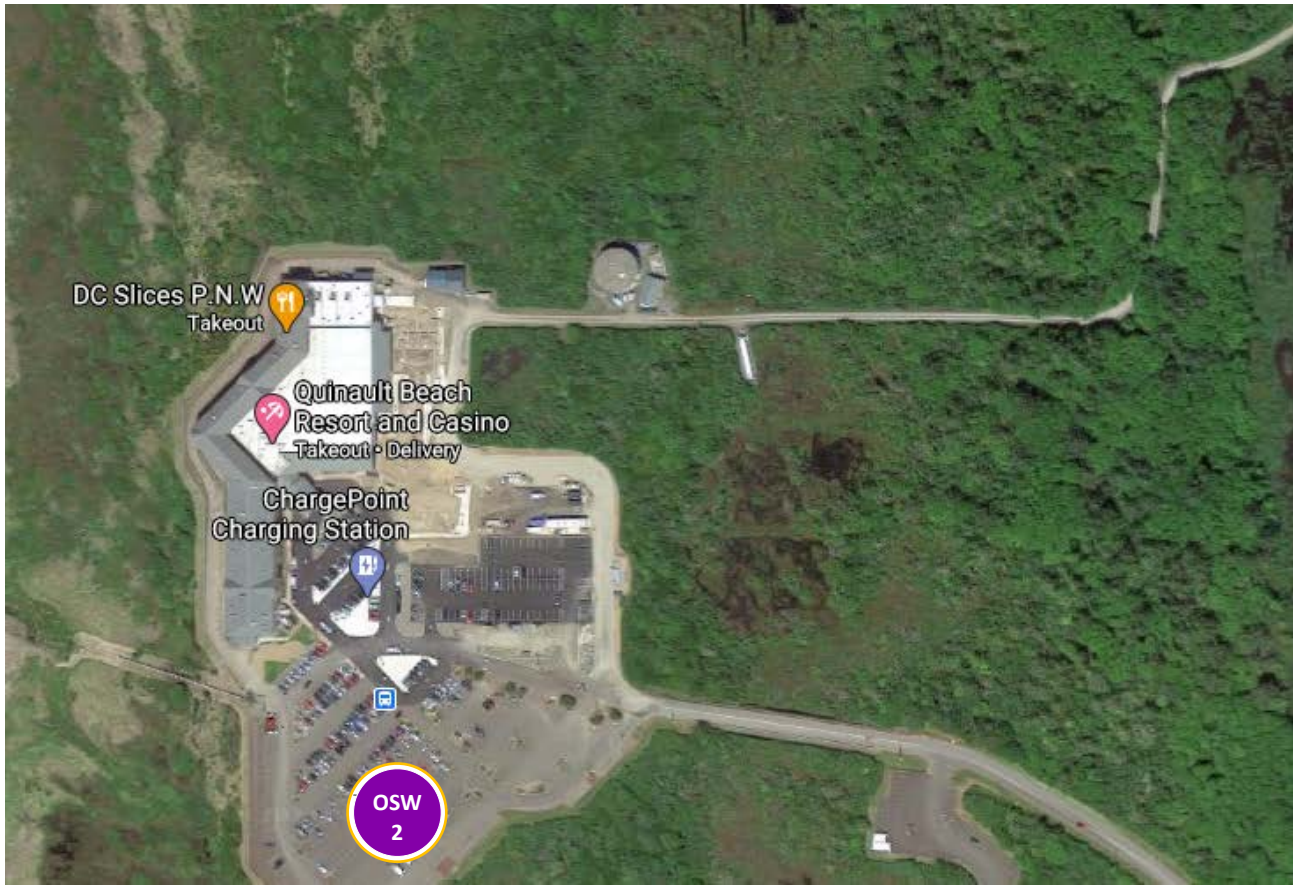
OSW 1 - Looking SE and W, Ocean Boulevard & Second Avenue intersection

Ocean Shores West: OSW 1 *alternative*

Photo Credit: *Jeana Gómez*

OSW 1 - *Alternative #1*: State of Washington-owned Parks & Recreation land. Same side of road as Campground (south).

Ocean Shores West: OSW 2



OSW 2	
Address	N/a
Intersection	78 State Route 115
Options	2
Notes	Quinault Beach Resort and Casino, tribal-owned land

Source: *Google Maps*

Ocean Shores West: OSW 2

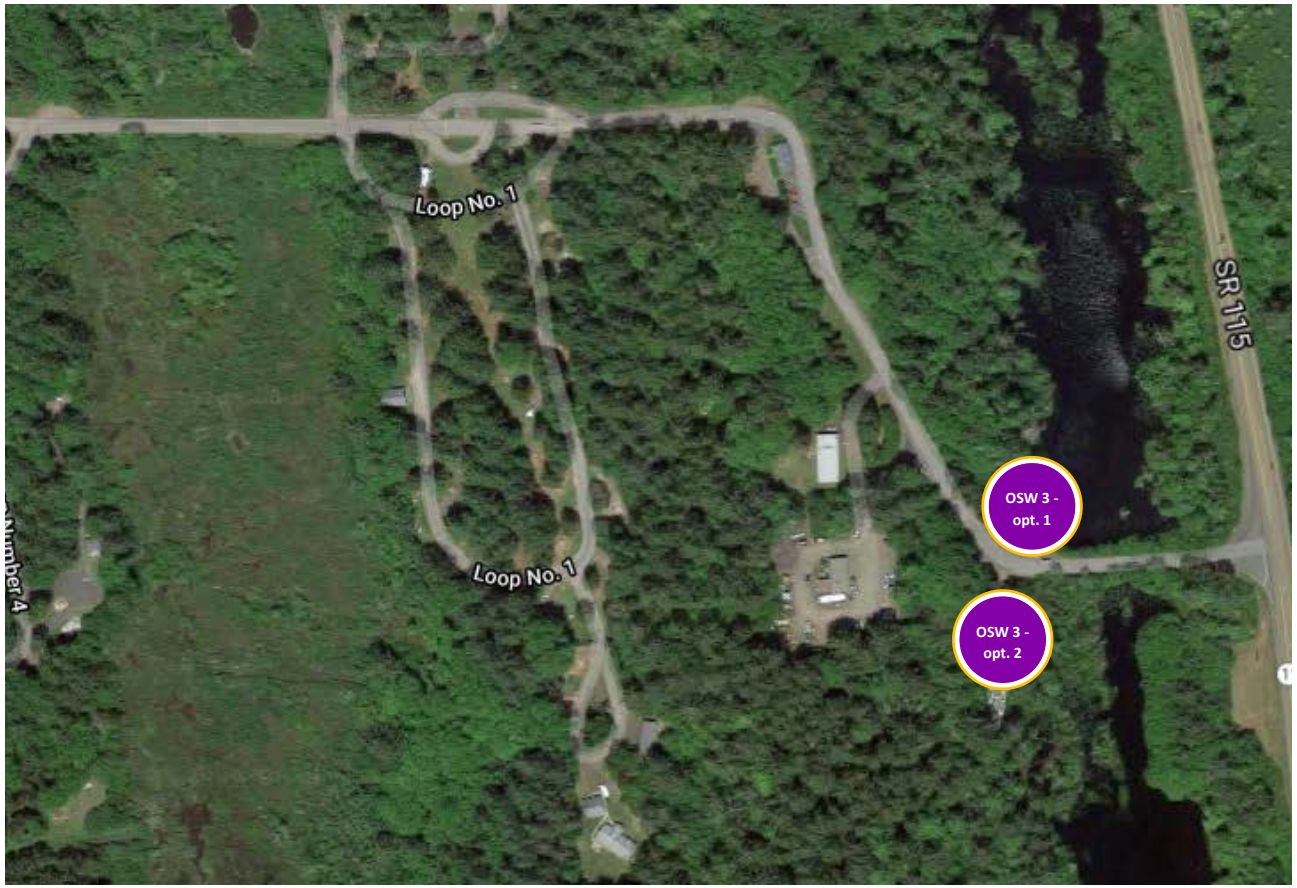


OSW 2 - Quinault Beach Resort & Casino complex, from parking lot

Photo Credit: *Jeana Gómez*

OSW 2 - Quinault Beach Resort & Casino complex, panoramic view looking west

Ocean Shores West: OSW 3



Source: *Google Maps*

OSW 3 - option 1	
Address	148 State Route 115
Intersection	Ocean City State Park Campground
Notes	State-owned land, Ocean City campground (south side of street)

OSW 3 - option 2	
Address	148 State Route 115
Intersection	Ocean City State Park Campground
Notes	State-owned land, Ocean City campground (north side of street)

Ocean Shores West: OSW 3

OSW 3 - opt. 1

Photo Credit: *Jeana Gómez*

OSW 3 - *option 1*: clearing or camp area near campground entrance

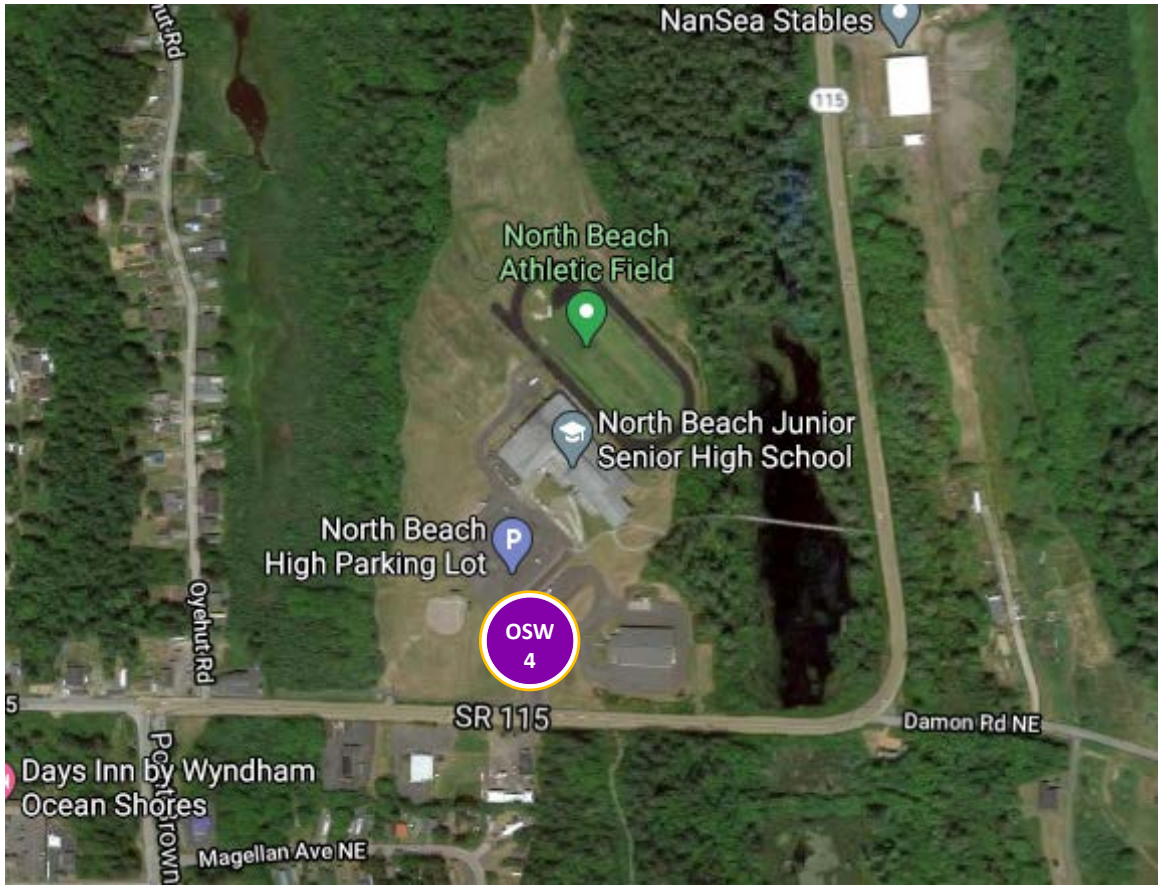
Ocean Shores West: OSW 3

OSW 3 - opt. 2

Photo Credit: *Jeana Gómez*

OSW 3 - *option 2*: Round-about near entrance to park.

Ocean Shores West: OSW 4



OSW 4	
Address	336 State Route 115
Intersection	SR 115 & Oyehut Road
Options	2
Notes	North Beach Junior/ Senior High School

Source: *Google Maps*

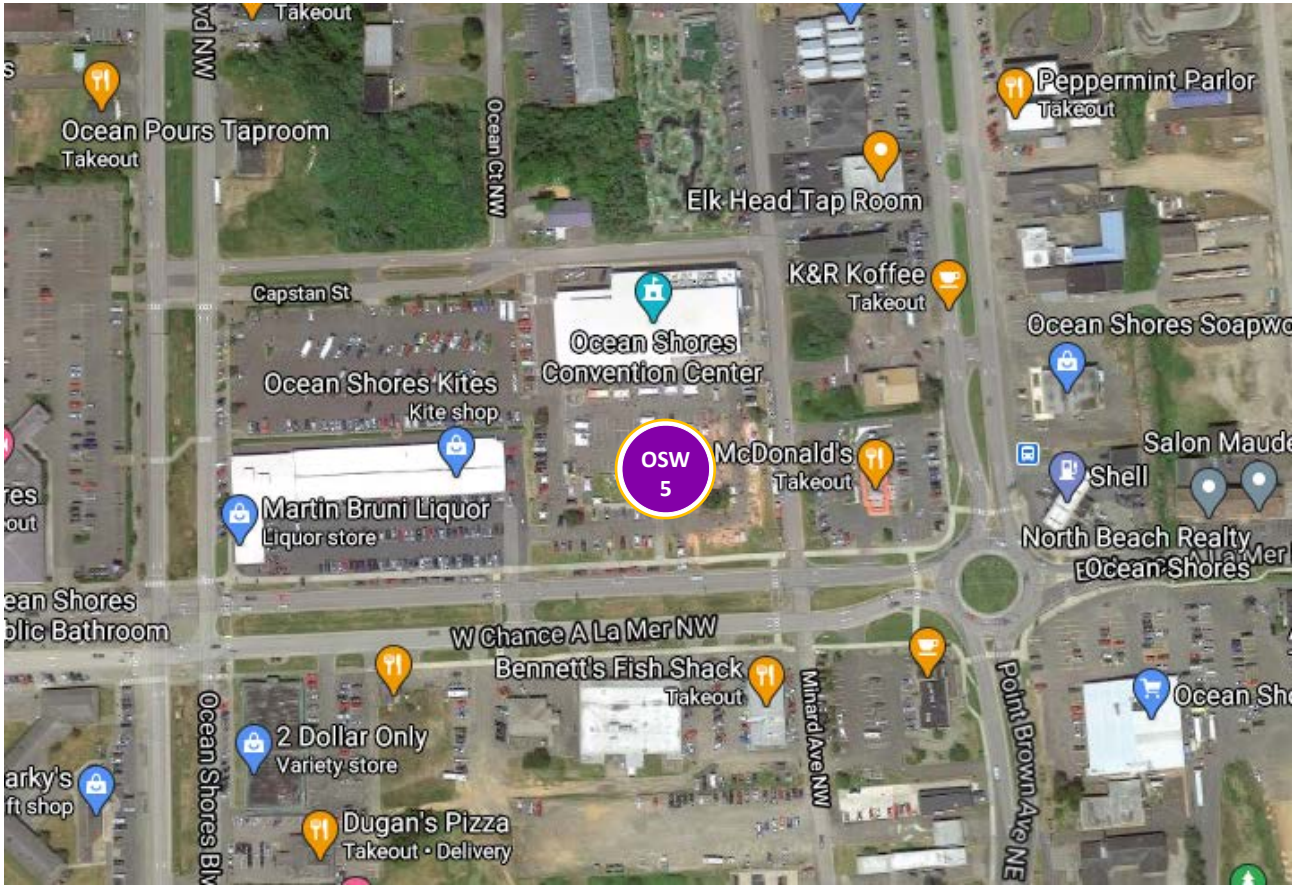
Ocean Shores West: OSW 4

OSW 4 - North Beach Junior/Senior High School (from left to right: admin building, school, sports field)

OSW 4 - North Beach Junior/Senior High School, panoramic view, looking west

Photo Credit: *Jeana Gómez*

Ocean Shores West: OSW 5



OSW 5	
Address	120 West Chance a La Mer NW
Intersection	West Chance a La Mer NW & Minard Avenue NW
Options	2
Notes	Ocean Shores Convention Center and parking lot. City-owned land.

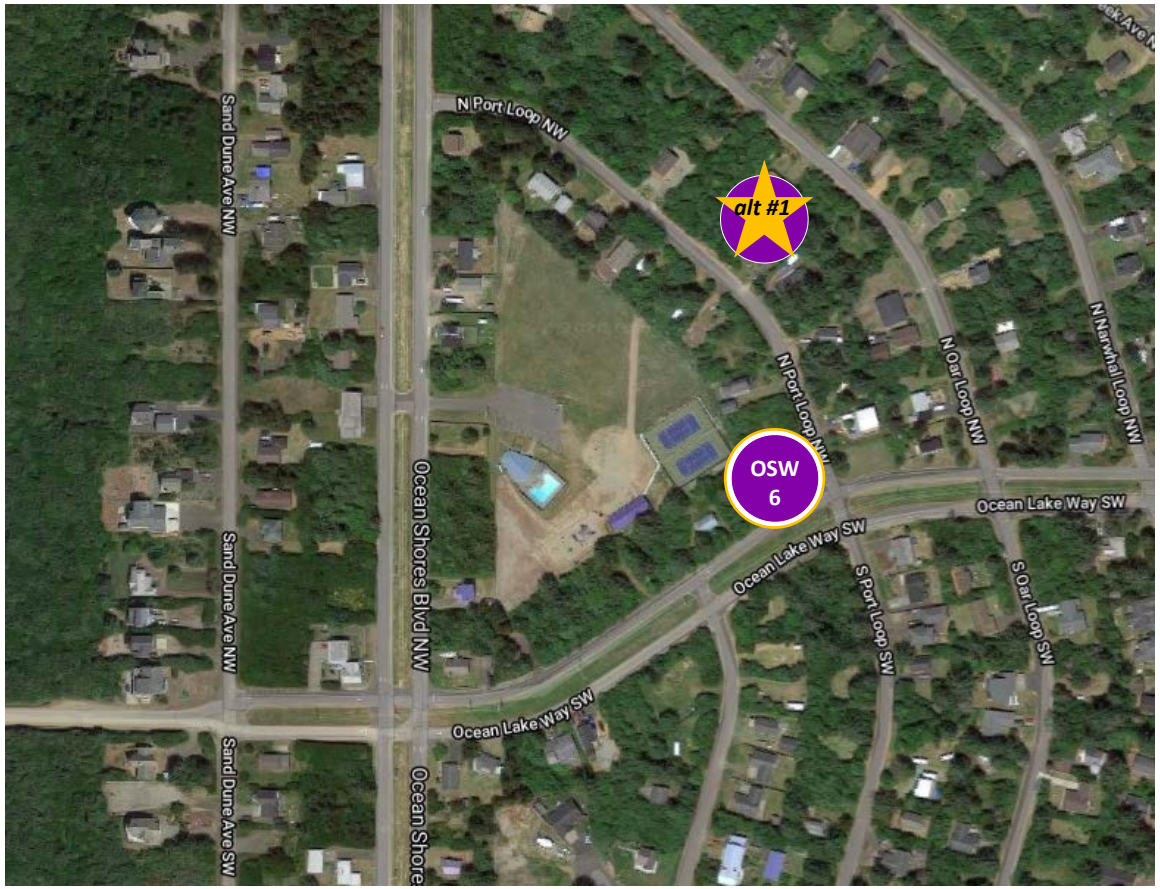
Source: *Google Maps*

Ocean Shores West: OSW 5

OSW 5 - Ocean Shores Convention Center. Looking northwest and north. Large parking lot located in front, to the south of the building.

Photo Credit: *Jeana Gómez*

Ocean Shores West: OSW 6 + *alternative*



Source: *Google Maps*

OSW 6	
Address	134 Ocean Lake Way SW
Intersection	Ocean Lake Way SW & North Port Loop NW
Options	2
Notes	Currently located on private land, but some City-owned land on North Port Loop NW, to the north: #090300018200

OSW 6- alt #1	
Address	146 N Port Loop NW
Intersection	North Port Loop NW
Notes	City-owned land

Ocean Shores West: OSW 6

Photo Credit: *Jeana Gómez*

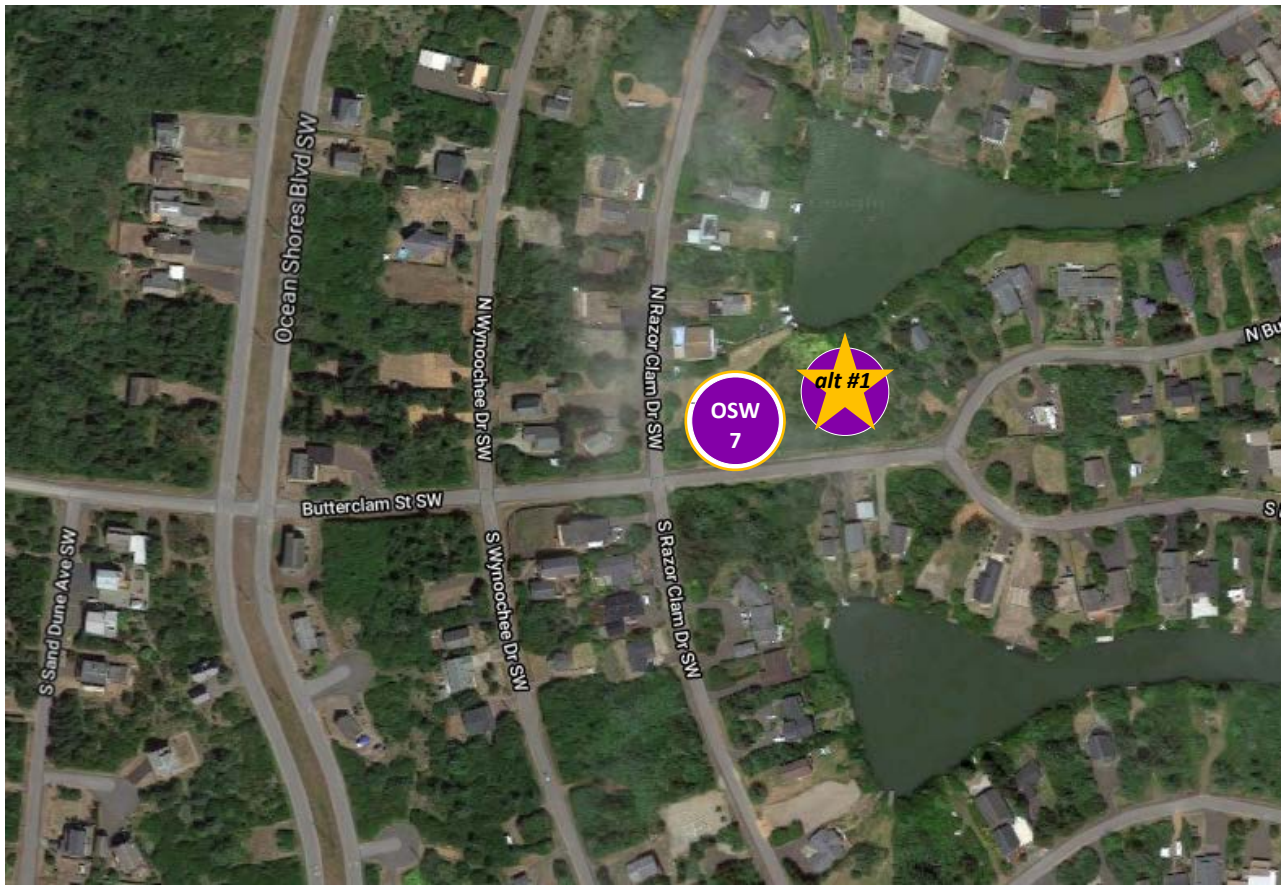
OSW 6 - potential VES site at Ocean Lake Way SW & North Port Lane NW. This site is very close to the OSCC-owned Ken Peterson Park.

Ocean Shores West: OSW 6 *alternative*

Photo Credit: *Jeana Gómez*

OSW 6 - *Alternative #1*: City of Ocean Shores-owned parcel, just north of OSW 6, on North Port Loop.

Ocean Shores West: OSW 7 + *alternative*



Source: *Google Maps*

OSW 7	
Address	398 N Butter Clam Street SW
Intersection	North Razor Clam Drive & Butterclam Street SW
Options	2
Notes	currently located on private land, but city-owned land is directly east: #092100047400

OSW 7- alt #1	
Address	N/a
Intersection	Butterclam Street SW, east of North Razor Clam
Notes	city-owned land, east of OSW 7

Ocean Shores West: OSW 7

OSW 7 - Potential VES site currently developed and privately-owned.

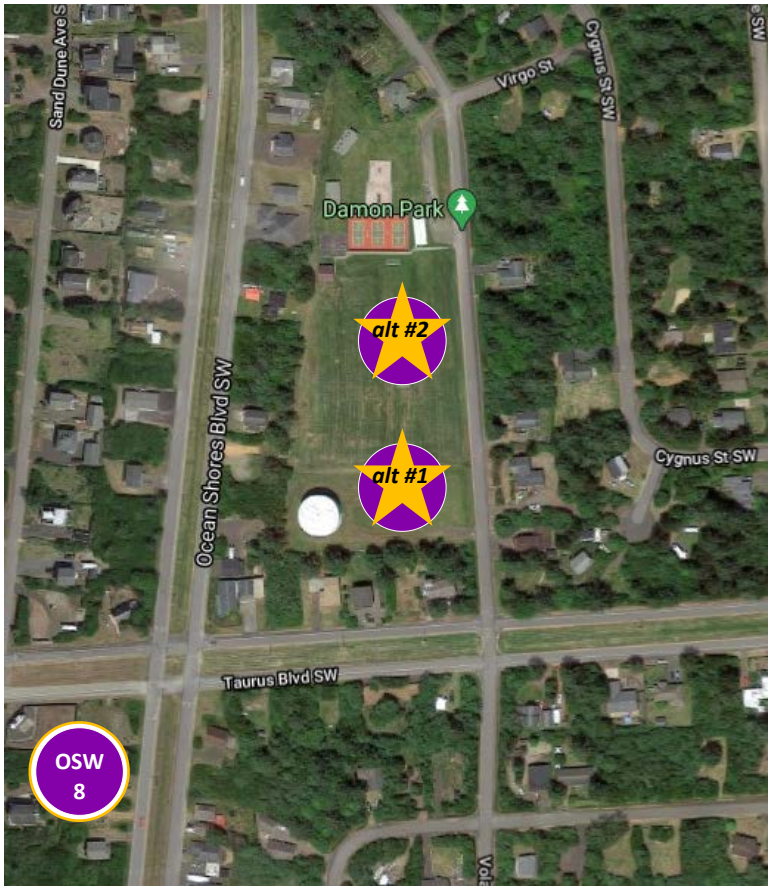
Photo Credit: *Jeana Gómez*

Ocean Shores West: OSW 7 *alternative*

Photo Credit: *Jeana Gómez*

OSW 7 - *Alternative* #1: Vacant City of Ocean Shores-owned land directly east of OSW 7

Ocean Shores West: OSW 8 + *alternatives*



Source: *Google Maps*

OSW 8	
Address	501 Ocean Shores Blvd SW
Intersection	Ocean Shores Boulevard SW & Taurus Boulevard
Options	2
Notes	Currently located on private land, but City-owned land available to the NE: #090700095202

OSW 8- alt #1	
Address	N/a
Intersection	Volans Avenue SW, just north of Taurus Blvd SW
Notes	City-owned parcel, vacant

OSW 8- alt #2	
Address	n/a
Intersection	Volans Avenue SW, just north of OSW 8 - alt #1
Notes	Damon Park, OSCC-owned/managed

Ocean Shores West: OSW 8

Photo Credit: *Jeana Gómez*

OSW 8 - Potential VES site at the SW corner of Ocean Shores Boulevard SW & Taurus Boulevard SW. Currently private, undeveloped land.

Ocean Shores West: OSW 8 *alternative #1*

OSW 8 - *Alternative #1*: City-owned land, with AHAB siren. Located just NE of OSW 8 site on Volans Avenue SW.

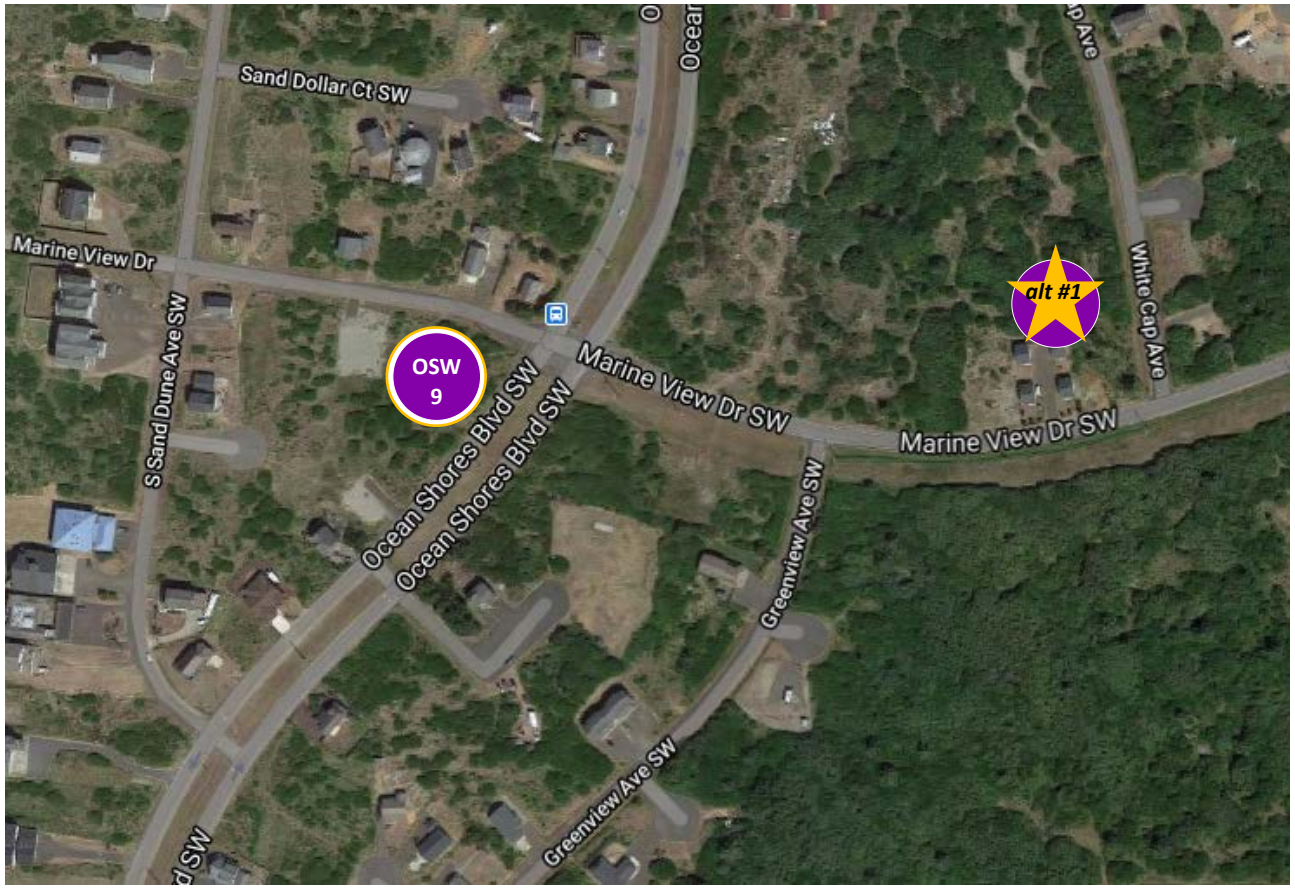
Photo Credit: *Jeana Gómez*

Ocean Shores West: OSW 8 *alternative #2*

OSW 8 - *Alternative #2*: Ocean Shores Community Club-owned land (Damon Park). Located just north of OSW 8 *Alternative #1* on Volans Avenue SW.

Photo Credit: *Jeana Gómez*

Ocean Shores West: OSW 9 + *alternative*



Source: *Google Maps*

OSW 9	
Address	1003 Ocean Shores Blvd SW
Intersection	Ocean Shores Boulevard SW & Marine View Drive
Options	2
Notes	currently located on private land, but city-owned land is located due east, 2 blocks: #093301006702

OSW 9 - alt #1	
Address	N/a
Intersection	White Cap Avenue & Marine View Drive SW
Notes	City-owned land

Ocean Shores West: OSW 9

OSW 9

Photo Credit: *Jeana Gómez*

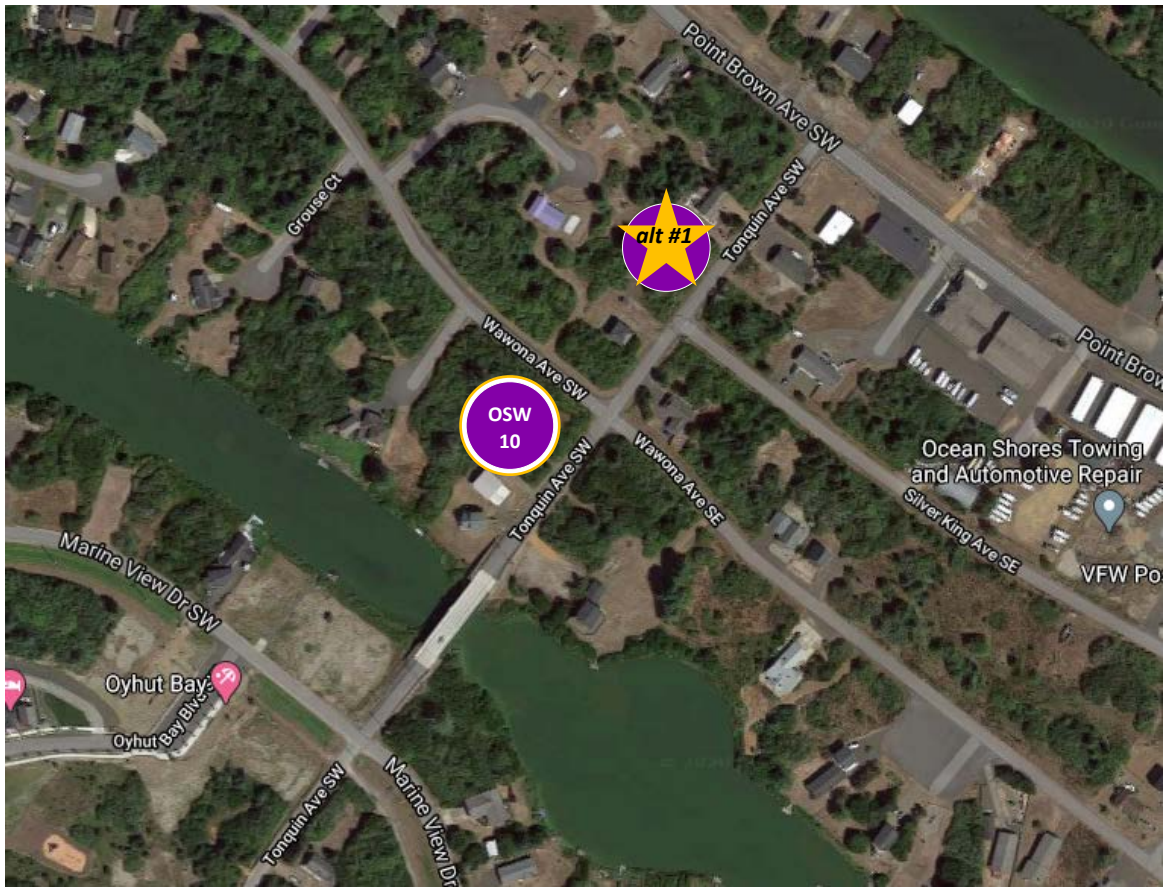
OSW 9 - Vacant, privately-owned land at the intersection of Ocean Shores Boulevard SW & Marine View Drive SW.

Ocean Shores West: OSW 9 *alternative*

Photo Credit: *Jeana Gómez*

OSW 9 - *Alternative #1*: Vacant, City-owned land just east of OSW 9, on White Cap Avenue SW, just north of Marine View Drive SW.

Ocean Shores West: OSW 10 + *alternative*



Source: *Google Maps*

OSW 10	
Address	921 Wawona Avenue SW
Intersection	Wowona Avenue SW & Tonquin Avenue SW
Options	2
Notes	currently located on private land, but city-owned land is located sparingly to the east, northeast: #093101704600

OSW 10 - alt #1	
Address	N/a
Intersection	Tonquin Avenue SW & Silver King Avenue SE
Notes	City-owned land, vacant

Ocean Shores West: OSW 10

OSW 10 - Semi-developed, privately-owned land at the intersection of Tonquin Avenue SE & Wawona Street SE

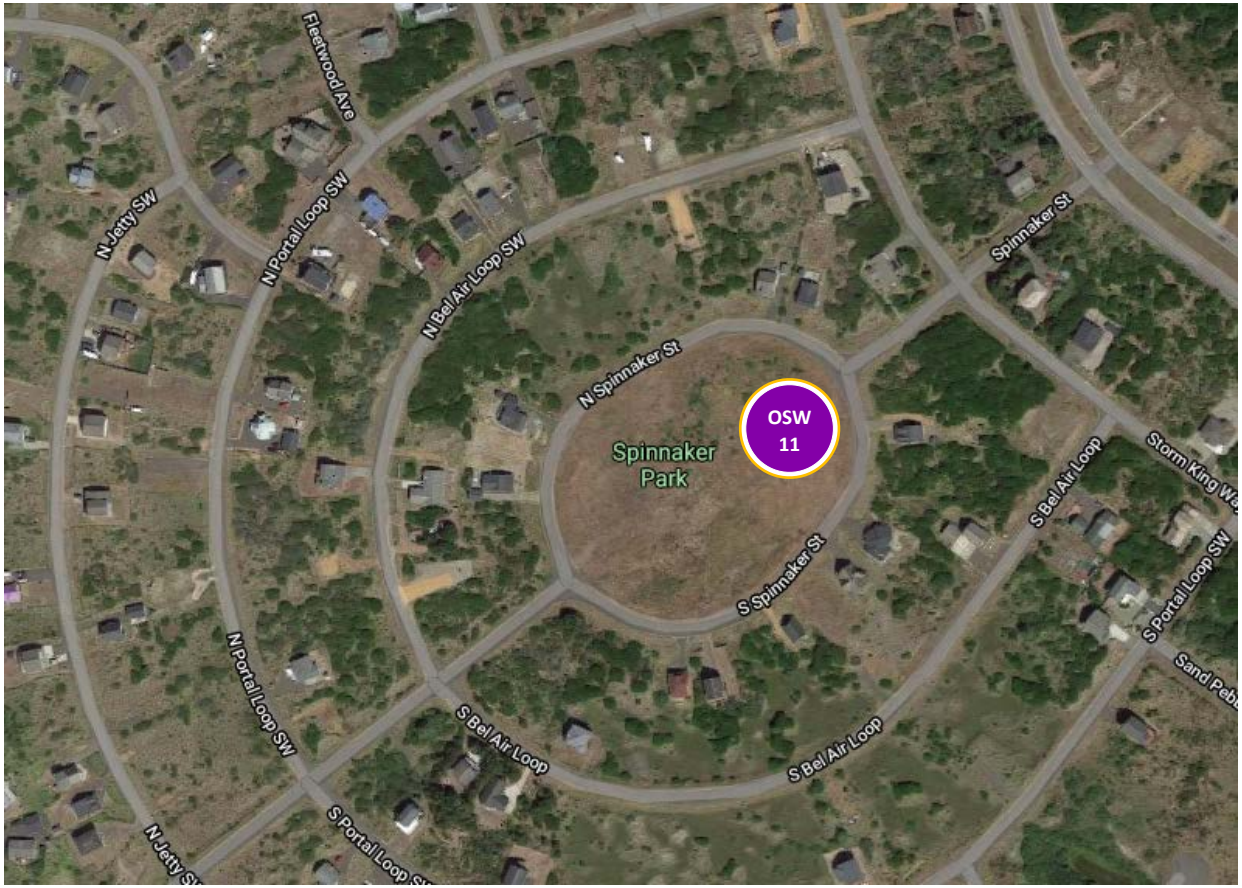
Photo Credit: *Jeana Gómez*

Ocean Shores West: OSW 10 *alternative*

Photo Credit: *Jeana Gómez*

OSW 10 - *Alternative #1*: Vacant, City of Ocean Shores-owned land just to the east/northeast.

Ocean Shores West: OSW 11



OSW 11	
Address	N/a
Intersection	South Spinnaker Street
Options	2
Notes	City-owned land, Spinnaker Park

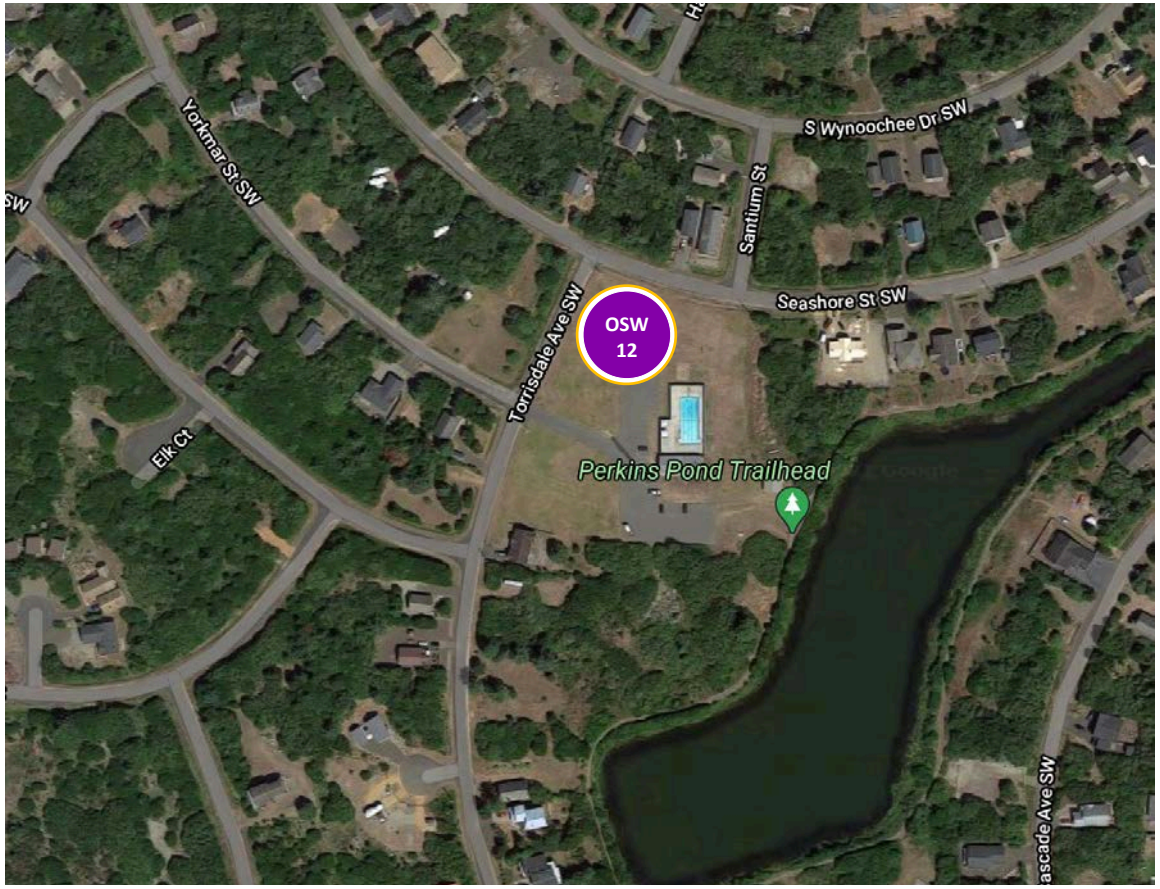
Source: *Google Maps*

Ocean Shores West: OSW 11

OSW 11 - City-owned Spinnaker Park. Panorama and shots taken looking northwest and northeast. Note the AHAB siren.

Photo Credit: *Jeana Gómez*

Ocean Shores West: OSW 12



Source: *Google Maps*

OSW 12	
Address	Torrisdale Avenue
Intersection	Torrisdale Avenue SW & Seashore Street SW
Options	3
Notes	Cabana Pool, owned by the Ocean Shores Community Club. Parcel #093100705500

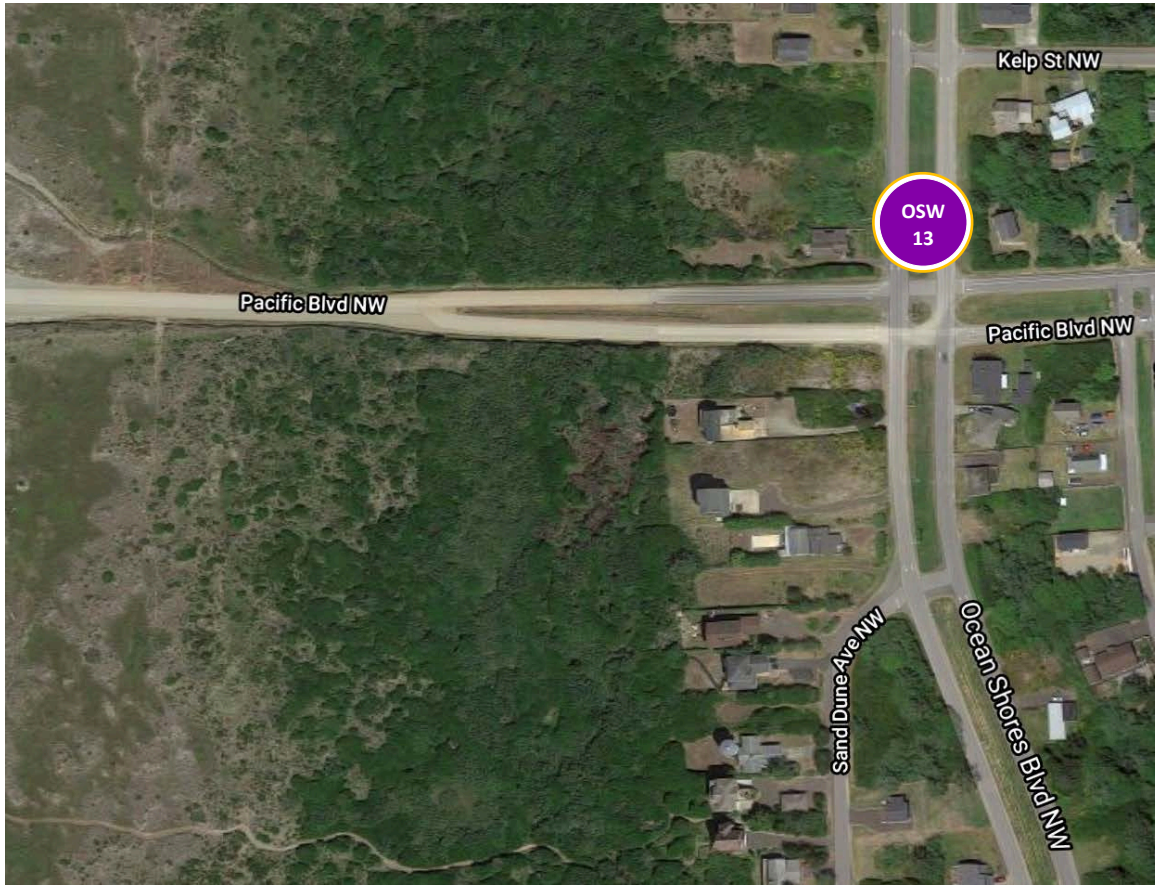
Ocean Shores West: OSW 12

OSW 12

Photo Credit: *Google Maps Street View*

OSW 12 - potential VES site near the OSCC-owned Cabana Pool. Large open area at the intersection of Torrisdale Avenue SW & Seashore Street SW.

Ocean Shores West: OSW 13



Source: *Google Maps*

OSW 13	
Address	Ocean Shores Blvd NW
Intersection	Ocean Shores Blvd NW & Pacific Blvd NW
Options	2, 3, 4
Notes	Major beach approach potential VES location. Potential site is in the "neutral area" skinny strip of land owned by the City. Parcel #61822758170

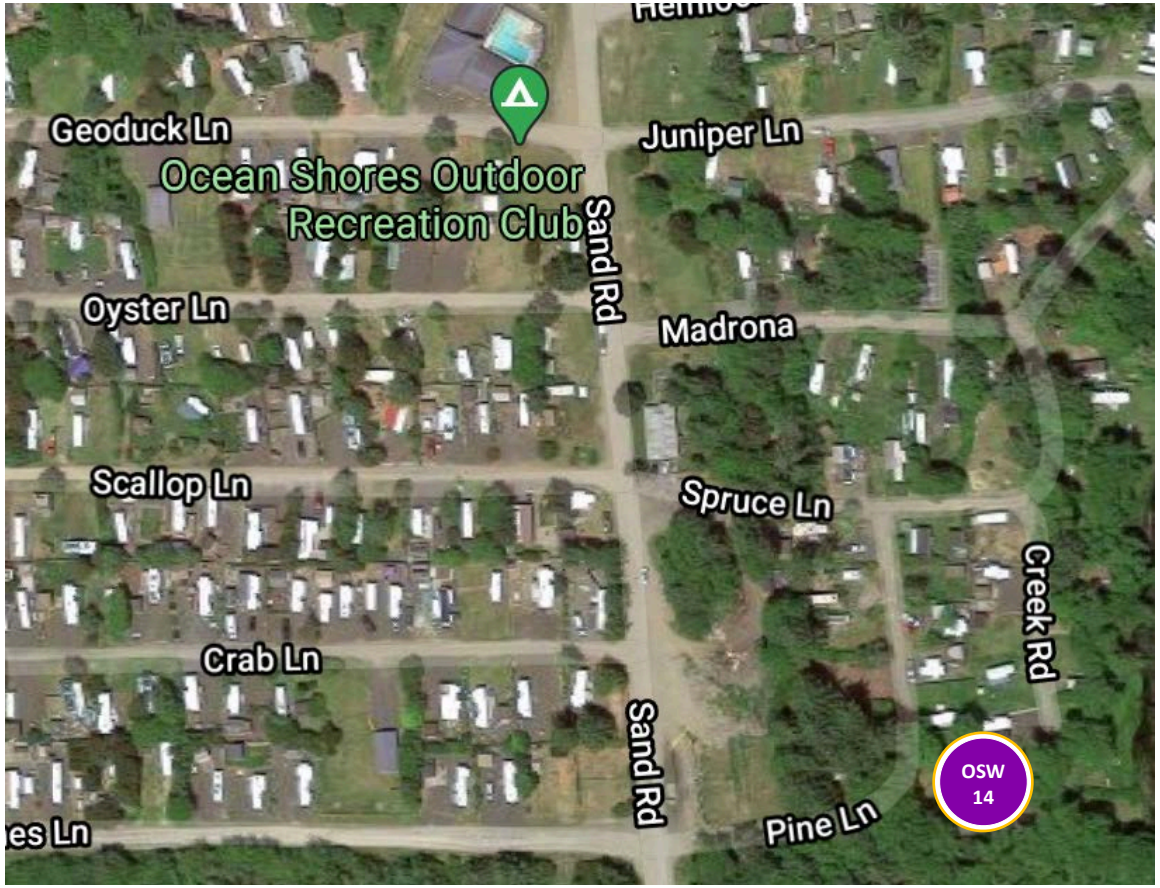
Ocean Shores West: OSW 13

OSW 13

Photo Credit: *Google Maps Street View*

OSW 13 - potential VES location adjacent to a major beach approach (Pacific Blvd/Pacific Beach) on City-owned land.

Ocean Shores West: OSW 14



Source: *Google Maps*

OSW 14	
Address	58 Dunes Lane (SE corner)
Intersection	Dunes Lane & Pine Lane
Options	2, 3, 4
Notes	Currently located on vacant, Ocean Shores Outdoor Rec-owned land. Parcel #181210330010

Ocean Shores West: OSW 14

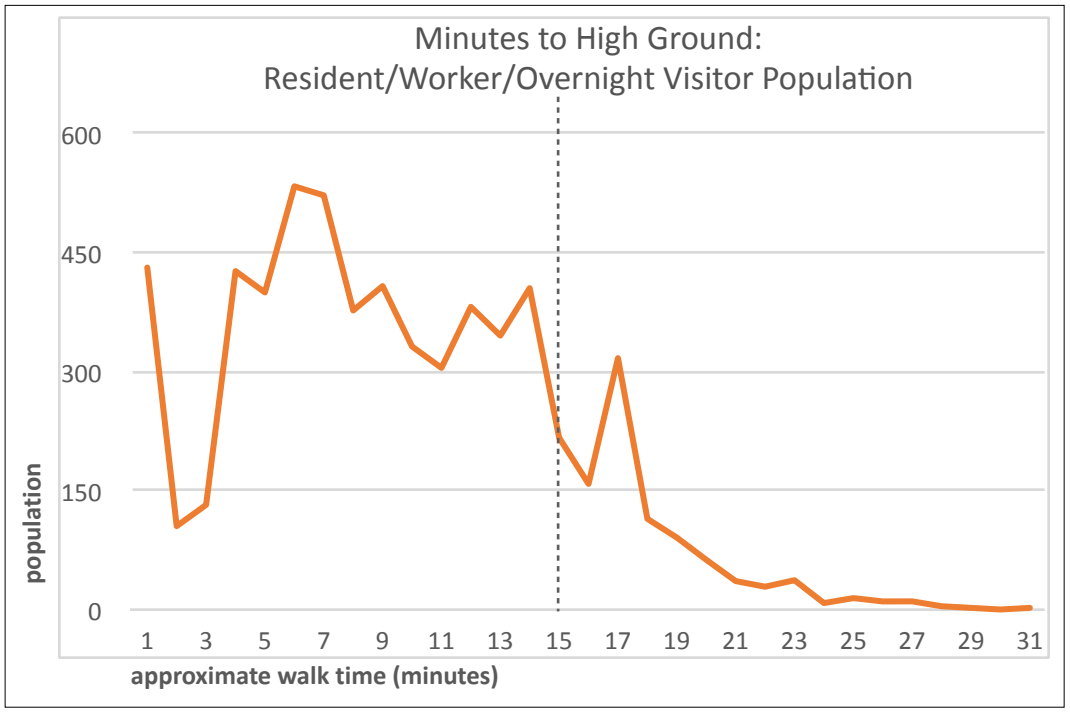
OSW 14

Photo Credit: *Google Maps Street View*

OSW 14 - (no street view available) Currently located on vacant land near (and owned by) the Ocean Shores Outdoor Recreation club vacation/seasonal lots.

OSW

Ocean Shores - West: VES Option #3 (Broad Spatial Coverage)



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

<15 minutes	15-25 minutes	25+ minutes
5,550 people	1,132 people	29 people

■ *Fire Station: Approximate 18 minute walk time to high ground or VES*

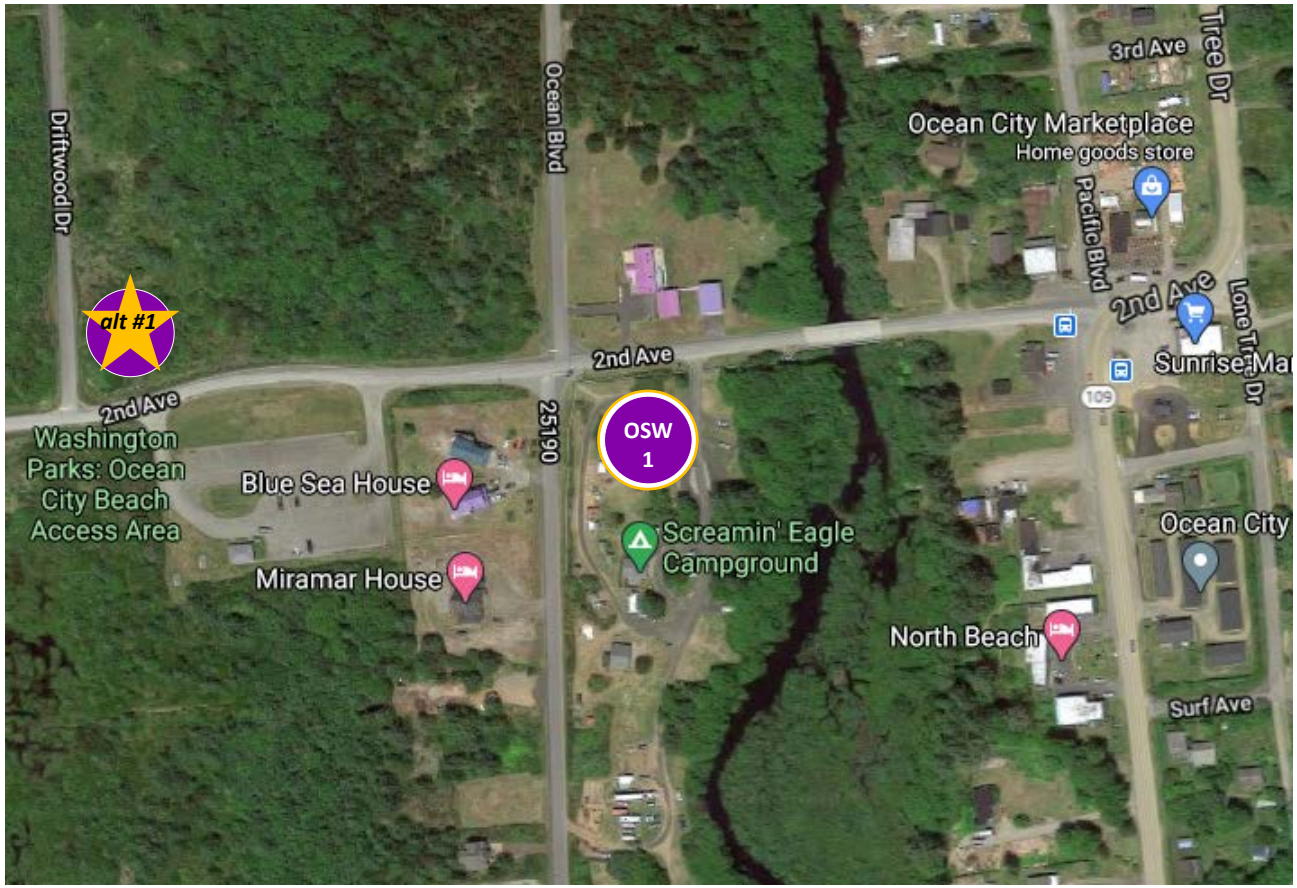
▲ *Schools: Approximate 10 and 17 minute walk time to high ground or VES*

Under **Option #3:**

- approximately **82.7%** of the total estimated Ocean Shores - West 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) = **5,027** people
- # of proposed VES = **14**


Ocean Shores - West: Option #4
Community Study Area
Fire Station
School
Tsunami Siren
Natural High Ground
Water/Wetland (Impassa
Proposed VES Site
(Slow Walk) Walk Speed to High Ground
<15 Minutes
15-25 Minutes
25+ Minutes
OSW 1
OSW 2
OSW 4
OSW 5
OSW 13
OSW 6
OSW 8
OSW 7
OSW 9
OSW 10
OSW 11
0.75 0.375 0 0.75 1.5 Miles

Ocean Shores West: OSW 1 + *alternative*



Source: *Google Maps*

OSW 1	
Address	17 Second Avenue
Intersection	2nd Avenue & Ocean Boulevard
Options	2
Notes	Ocean City Beach Access Area (currently Screamin' Eagle Campground) - State of WA-owned land

OSW 1 - alt #1	
Address	N/a
Intersection	Second Avenue & Driftwood Drive
Notes	Second Avenue, vacant land. Owned by State of Washington Parks & Recreation

Ocean Shores West: OSW 1

OSW 1

OSW 1 - Screamin' Eagle Campground. Looking at Campground entrance and NW corner.

Photo Credit: *Jeana Gómez*

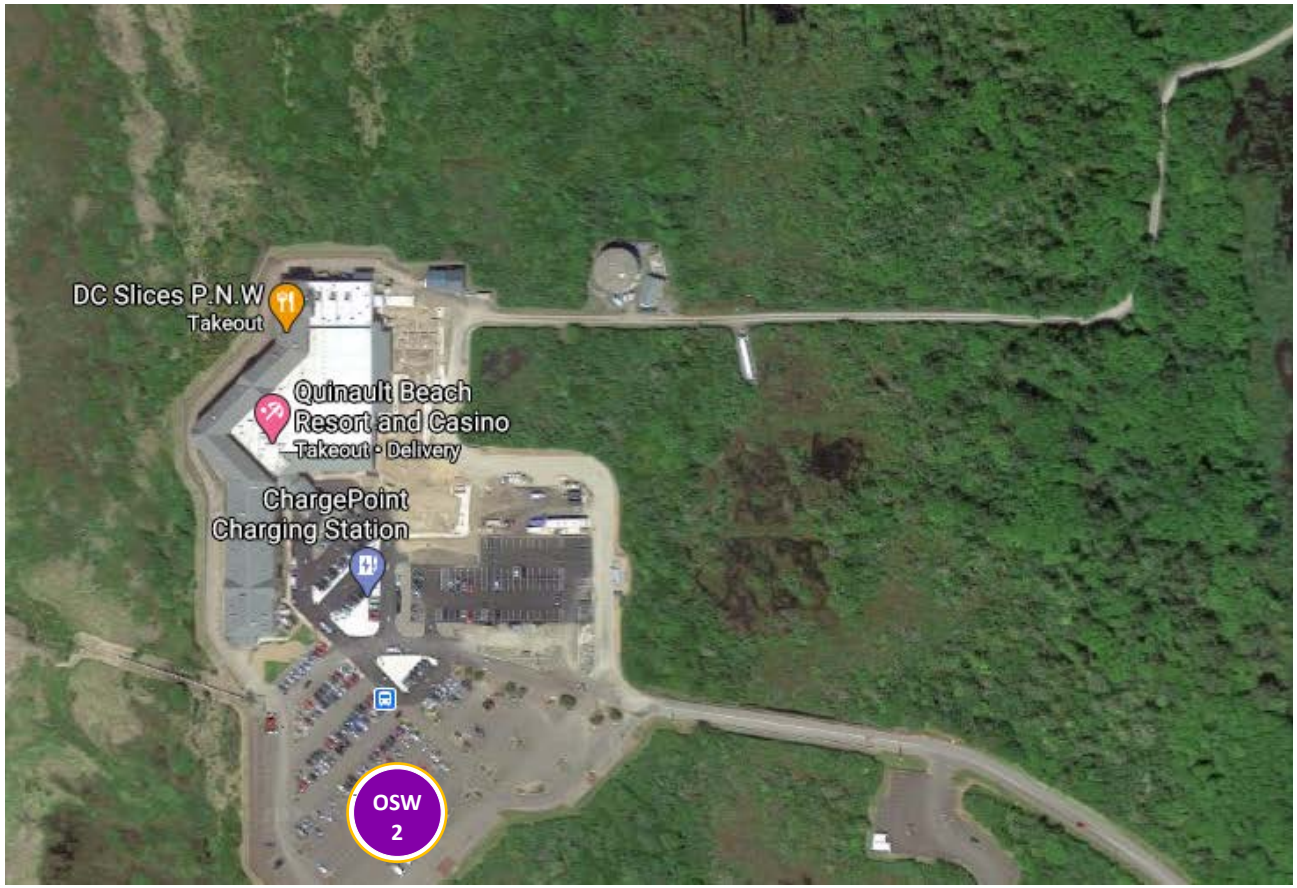
OSW 1 - Looking SE and W, Ocean Boulevard & Second Avenue intersection

Ocean Shores West: OSW 1 *alternative*

Photo Credit: *Jeana Gómez*

OSW 1 - *Alternative #1*: State of Washington-owned Parks & Recreation land. Same side of road as Campground (south).

Ocean Shores West: OSW 2



OSW 2	
Address	N/a
Intersection	78 State Route 115
Options	2
Notes	Quinault Beach Resort and Casino, tribal-owned land

Source: *Google Maps*

Ocean Shores West: OSW 2

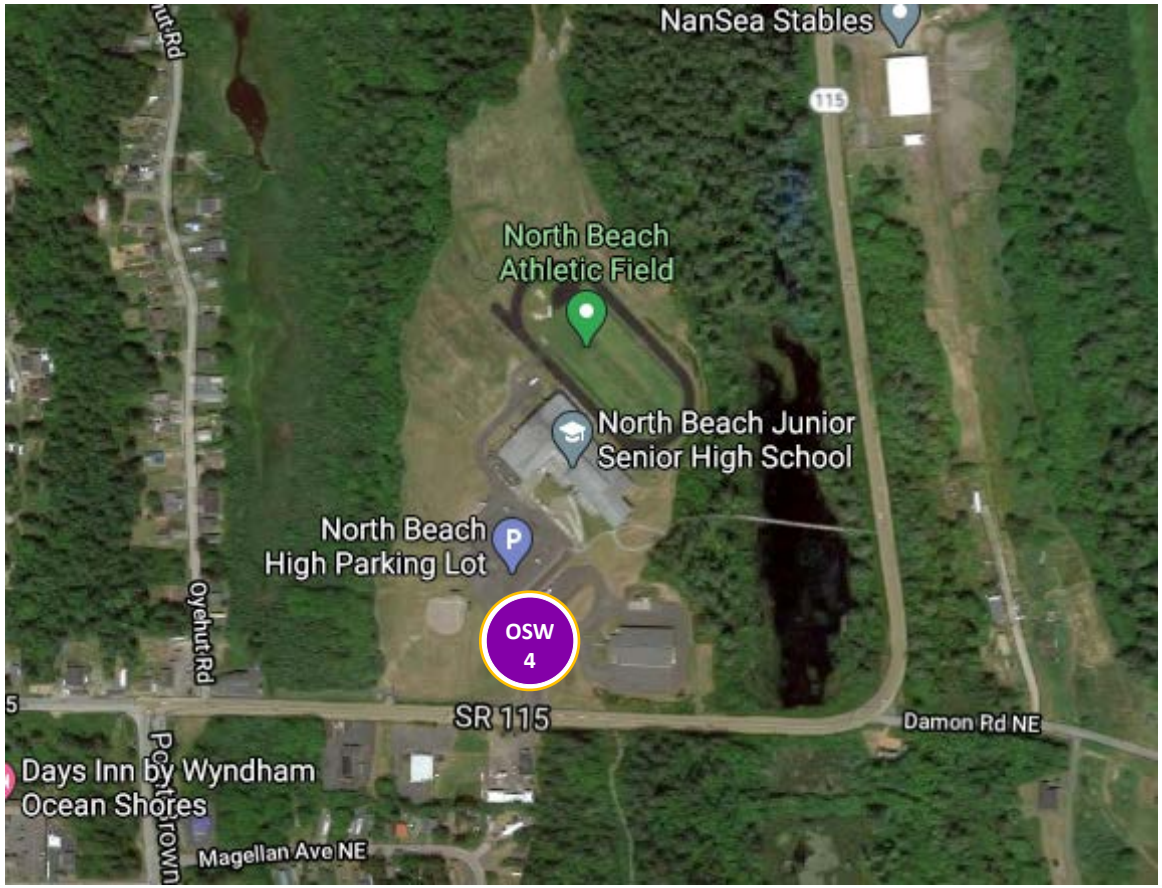


OSW 2 - Quinault Beach Resort & Casino complex, from parking lot

Photo Credit: *Jeana Gómez*

OSW 2 - Quinault Beach Resort & Casino complex, panoramic view looking west

Ocean Shores West: OSW 4



OSW 4	
Address	336 State Route 115
Intersection	SR 115 & Oyehut Road
Options	2
Notes	North Beach Junior/ Senior High School

Source: *Google Maps*

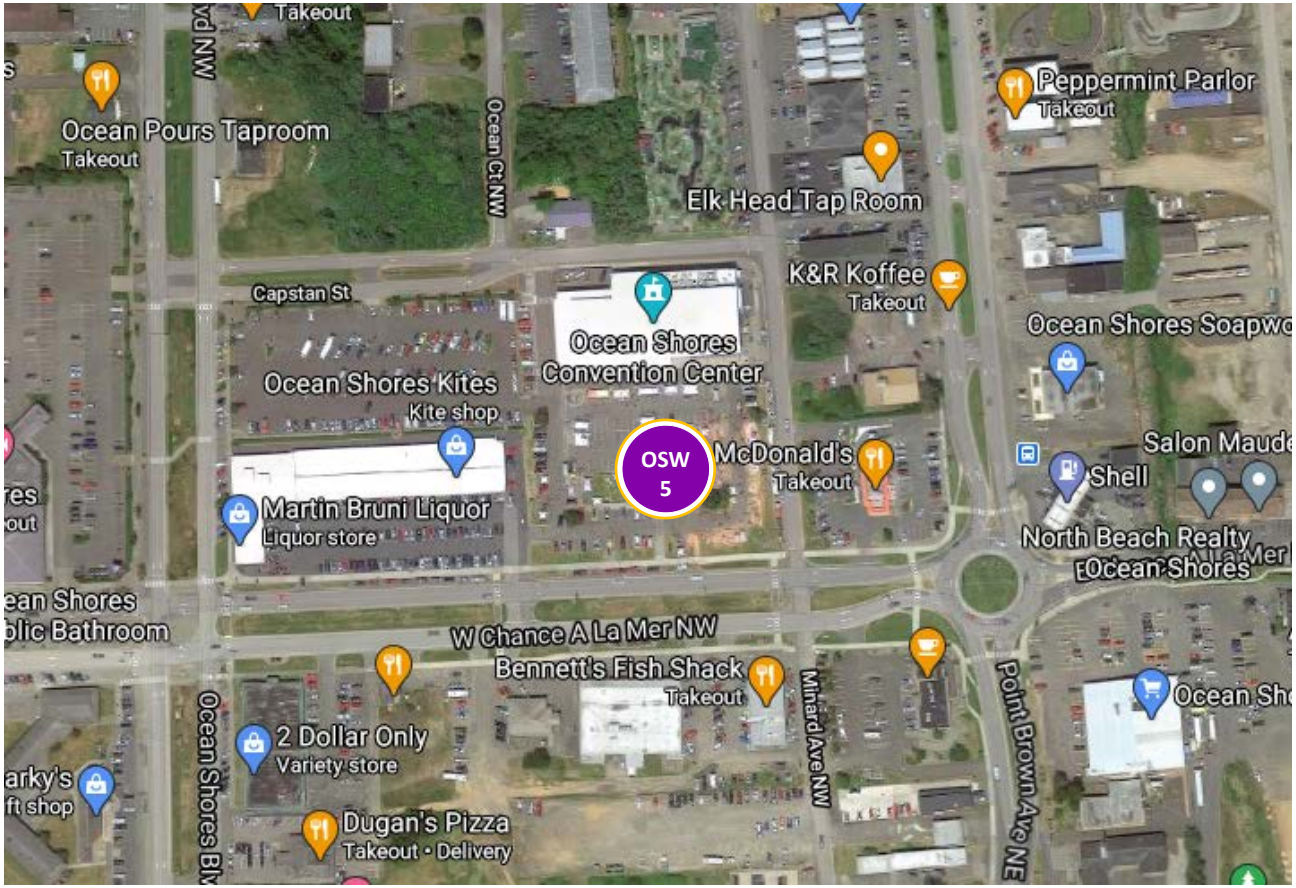
Ocean Shores West: OSW 4

OSW 4 - North Beach Junior/Senior High School (from left to right: admin building, school, sports field)

OSW 4 - North Beach Junior/Senior High School, panoramic view, looking west

Photo Credit: *Jeana Gómez*

Ocean Shores West: OSW 5



OSW 5	
Address	120 West Chance a La Mer NW
Intersection	West Chance a La Mer NW & Minard Avenue NW
Options	2
Notes	Ocean Shores Convention Center and parking lot. City-owned land.

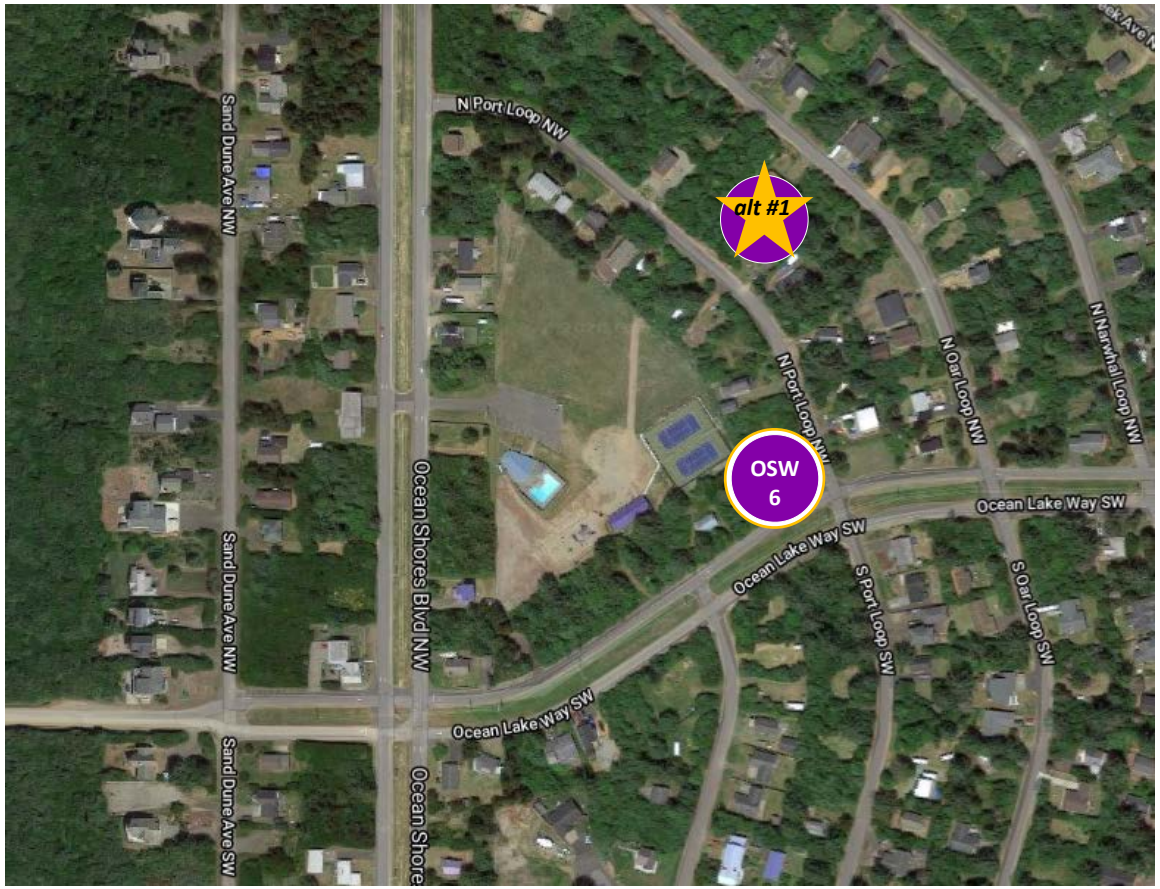
Source: *Google Maps*

Ocean Shores West: OSW 5

OSW 5 - Ocean Shores Convention Center. Looking northwest and north. Large parking lot located in front, to the south of the building.

Photo Credit: *Jeana Gómez*

Ocean Shores West: OSW 6 + *alternative*



Source: *Google Maps*

OSW 6	
Address	134 Ocean Lake Way SW
Intersection	Ocean Lake Way SW & North Port Loop NW
Options	2
Notes	Currently located on private land, but some City-owned land on North Port Loop NW, to the north: #090300018200

OSW 6- alt #1	
Address	146 N Port Loop NW
Intersection	North Port Loop NW
Notes	City-owned land

Ocean Shores West: OSW 6

Photo Credit: *Jeana Gómez*

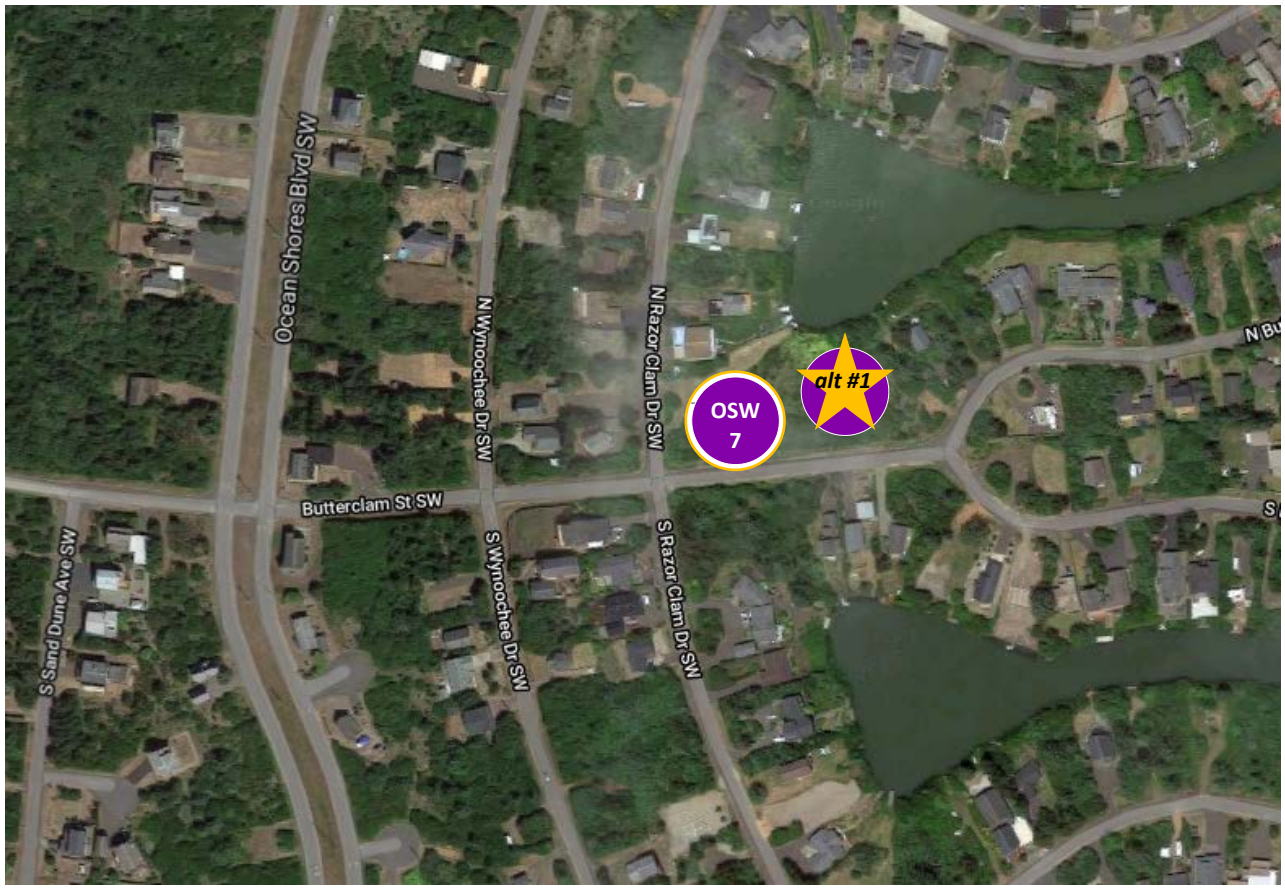
OSW 6 - potential VES site at Ocean Lake Way SW & North Port Lane NW. This site is very close to the OSCC-owned Ken Peterson Park.

Ocean Shores West: OSW 6 *alternative*

Photo Credit: *Jeana Gómez*

OSW 6 - *Alternative #1*: City of Ocean Shores-owned parcel, just north of OSW 6, on North Port Loop.

Ocean Shores West: OSW 7 + *alternative*



Source: *Google Maps*

OSW 7	
Address	398 N Butter Clam Street SW
Intersection	North Razor Clam Drive & Butterclam Street SW
Options	2
Notes	currently located on private land, but city-owned land is directly east: #092100047400

OSW 7- alt #1	
Address	N/a
Intersection	Butterclam Street SW, east of North Razor Clam
Notes	city-owned land, east of OSW 7

Ocean Shores West: OSW 7

OSW 7 - Potential VES site currently developed and privately-owned.

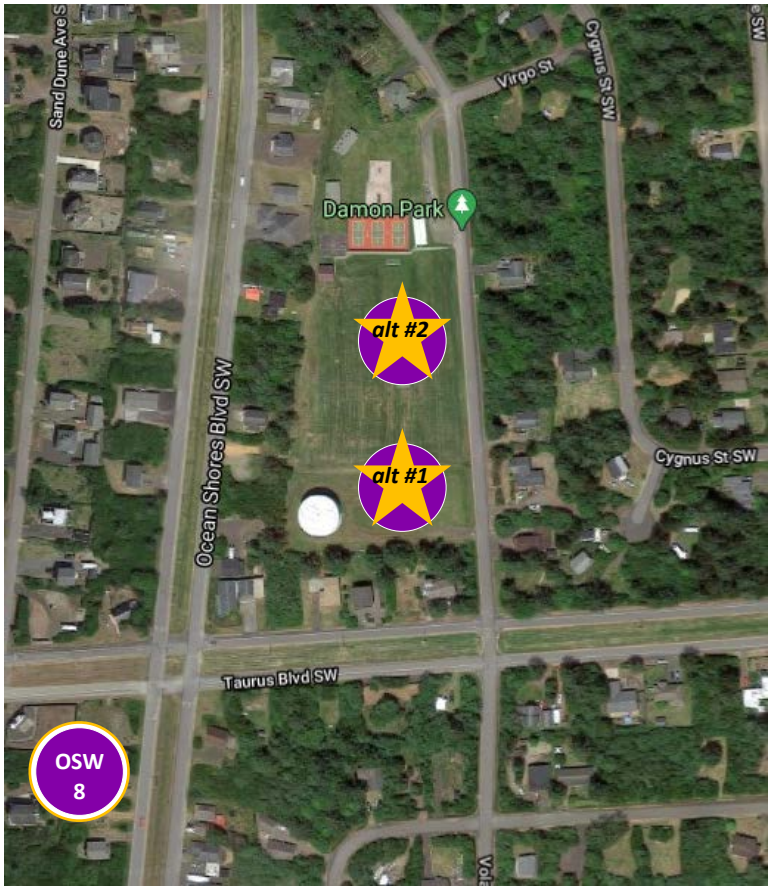
Photo Credit: *Jeana Gómez*

Ocean Shores West: OSW 7 *alternative*

Photo Credit: *Jeana Gómez*

OSW 7 - *Alternative* #1: Vacant City of Ocean Shores-owned land directly east of OSW 7

Ocean Shores West: OSW 8 + *alternatives*



Source: *Google Maps*

OSW 8	
Address	501 Ocean Shores Blvd SW
Intersection	Ocean Shores Boulevard SW & Taurus Boulevard
Options	2
Notes	Currently located on private land, but City-owned land available to the NE: #090700095202

OSW 8- alt #1	
Address	N/a
Intersection	Volans Avenue SW, just north of Taurus Blvd SW
Notes	City-owned parcel, vacant

OSW 8- alt #2	
Address	n/a
Intersection	Volans Avenue SW, just north of OSW 8 - alt #1
Notes	Damon Park, OSCC-owned/managed

Ocean Shores West: OSW 8

OSW 8

Photo Credit: *Jeana Gómez*

OSW 8 - Potential VES site at the SW corner of Ocean Shores Boulevard SW & Taurus Boulevard SW. Currently private, undeveloped land.

Ocean Shores West: OSW 8 *alternative #1*

OSW 8 - *Alternative #1*: City-owned land, with AHAB siren. Located just NE of OSW 8 site on Volans Avenue SW.

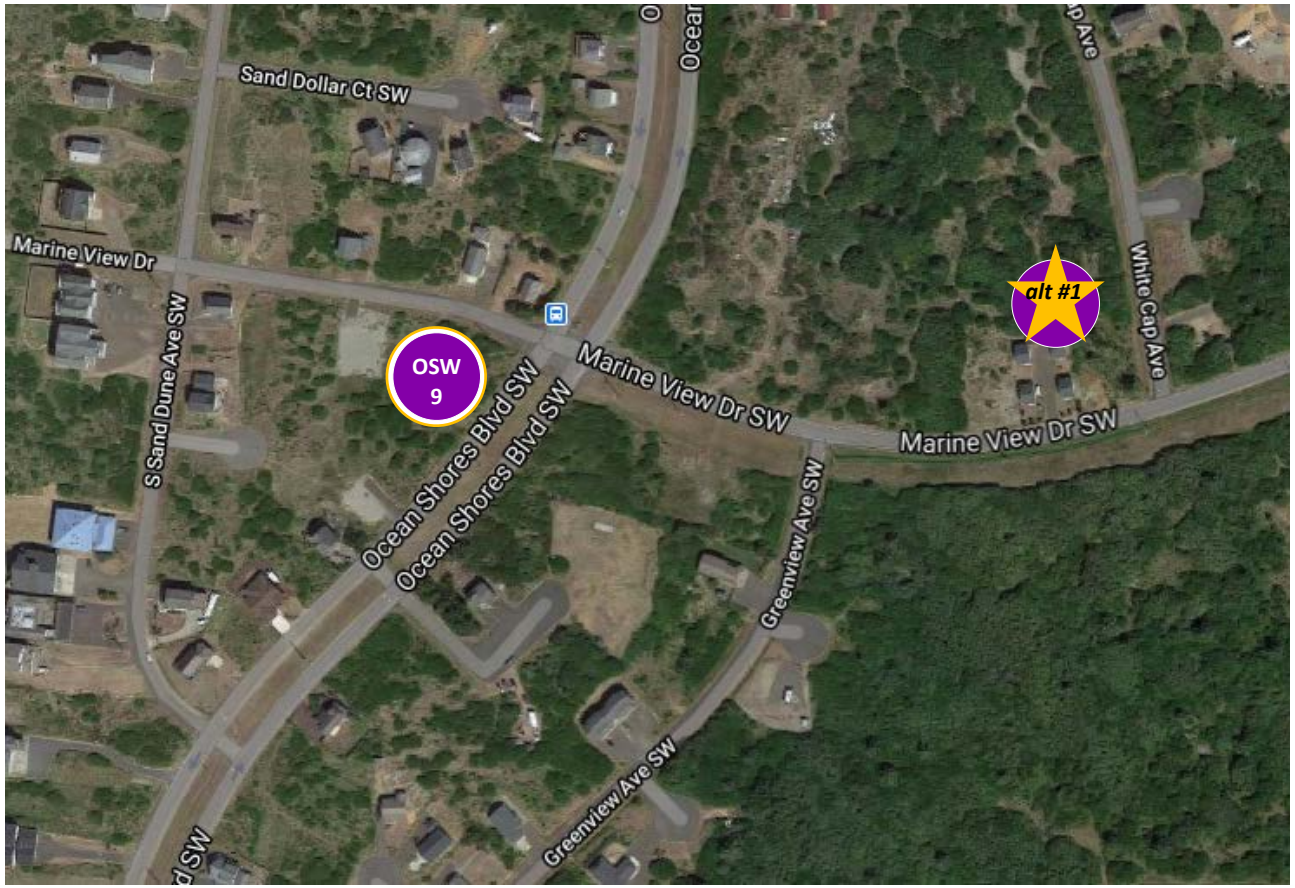
Photo Credit: *Jeana Gómez*

Ocean Shores West: OSW 8 *alternative #2*

OSW 8 - *Alternative #2*: Ocean Shores Community Club-owned land (Damon Park). Located just north of OSW 8 *Alternative #1* on Volans Avenue SW.

Photo Credit: *Jeana Gómez*

Ocean Shores West: OSW 9 + *alternative*



Source: *Google Maps*

OSW 9	
Address	1003 Ocean Shores Blvd SW
Intersection	Ocean Shores Boulevard SW & Marine View Drive
Options	2
Notes	currently located on private land, but city-owned land is located due east, 2 blocks: #093301006702

OSW 9 - alt #1	
Address	N/a
Intersection	White Cap Avenue & Marine View Drive SW
Notes	City-owned land

Ocean Shores West: OSW 9

OSW 9

Photo Credit: *Jeana Gómez*

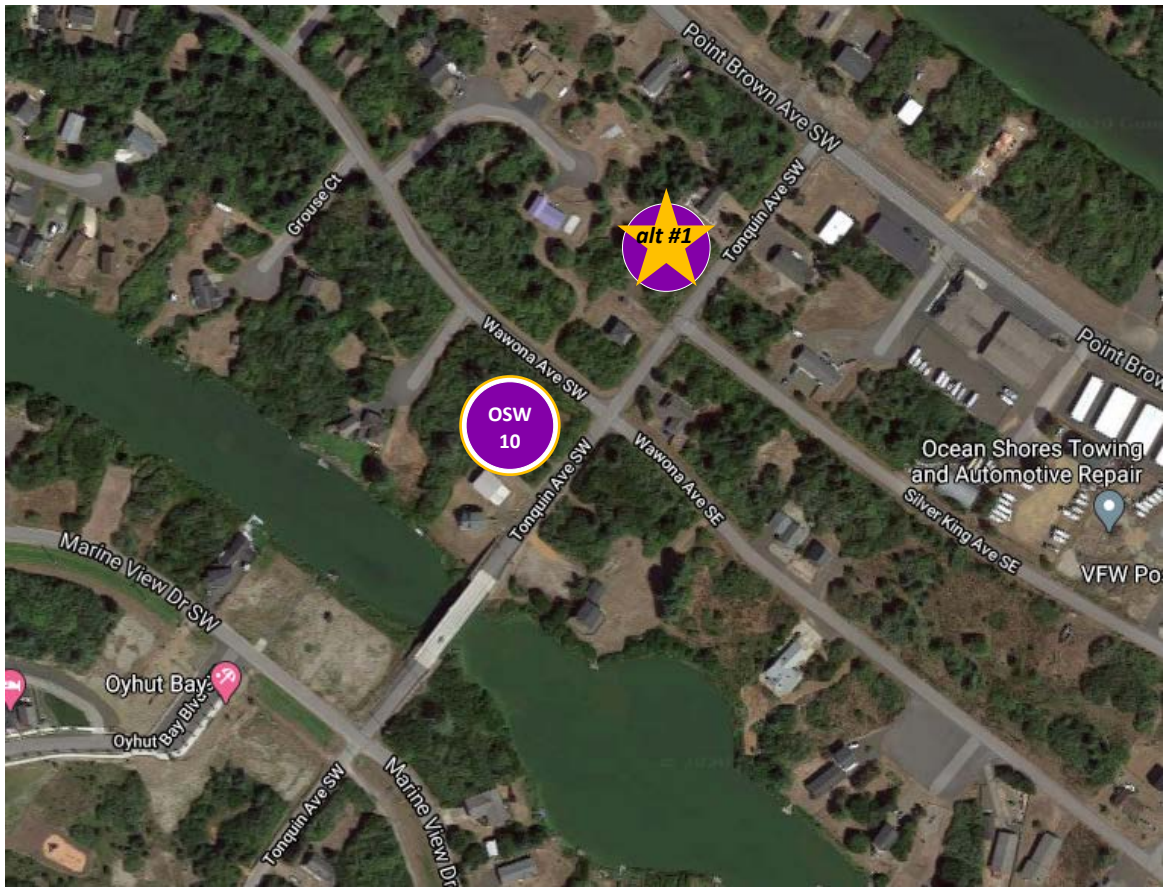
OSW 9 - Vacant, privately-owned land at the intersection of Ocean Shores Boulevard SW & Marine View Drive SW.

Ocean Shores West: OSW 9 *alternative*

Photo Credit: *Jeana Gómez*

OSW 9 - *Alternative #1*: Vacant, City-owned land just east of OSW 9, on White Cap Avenue SW, just north of Marine View Drive SW.

Ocean Shores West: OSW 10 + *alternative*



Source: *Google Maps*

OSW 10	
Address	921 Wawona Avenue SW
Intersection	Wowona Avenue SW & Tonquin Avenue SW
Options	2
Notes	currently located on private land, but city-owned land is located sparingly to the east, northeast: #093101704600

OSW 10 - alt #1	
Address	N/a
Intersection	Tonquin Avenue SW & Silver King Avenue SE
Notes	City-owned land, vacant

Ocean Shores West: OSW 10

OSW 10 - Semi-developed, privately-owned land at the intersection of Tonquin Avenue SE & Wawona Street SE

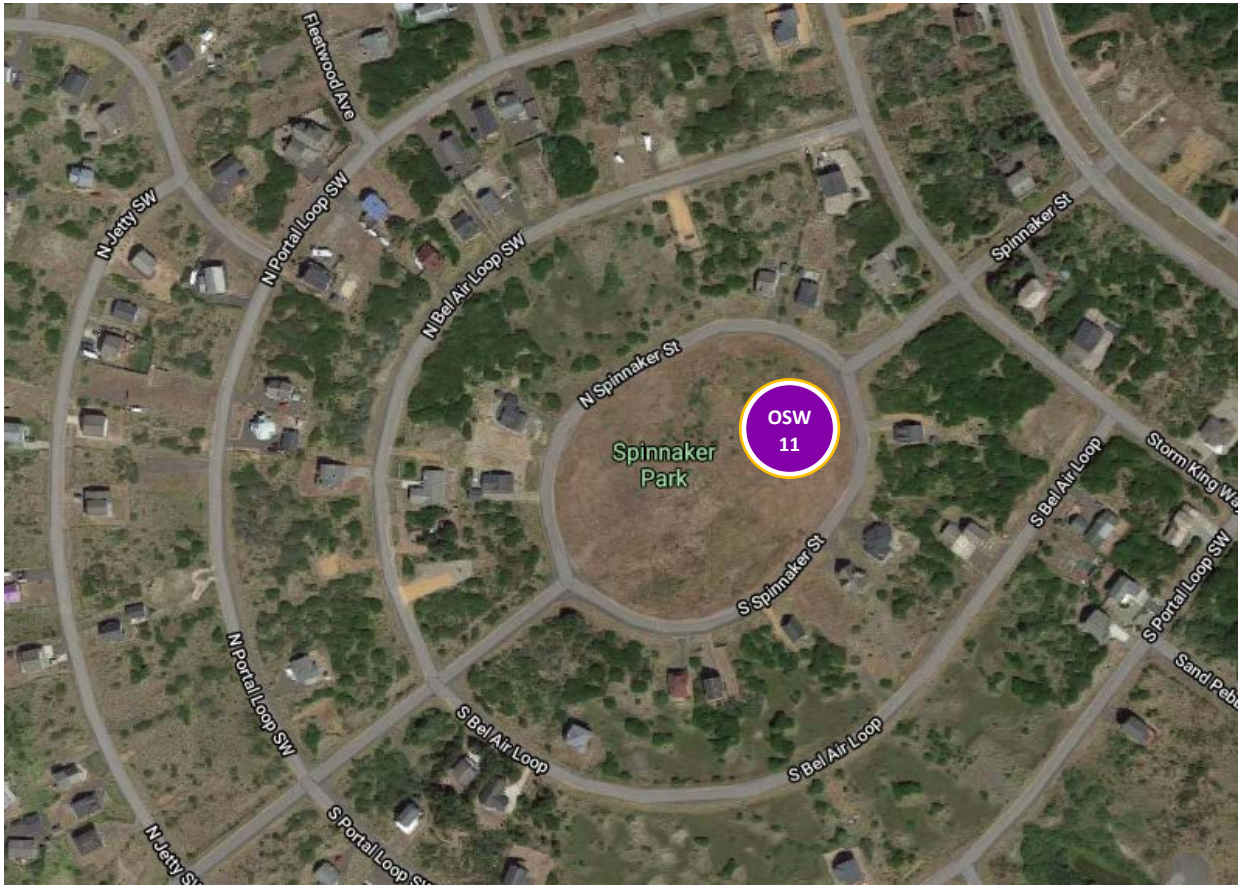
Photo Credit: *Jeana Gómez*

Ocean Shores West: OSW 10 *alternative*

Photo Credit: *Jeana Gómez*

OSW 10 - *Alternative #1*: Vacant, City of Ocean Shores-owned land just to the east/northeast.

Ocean Shores West: OSW 11



OSW 11	
Address	N/a
Intersection	South Spinnaker Street
Options	2
Notes	City-owned land, Spinnaker Park

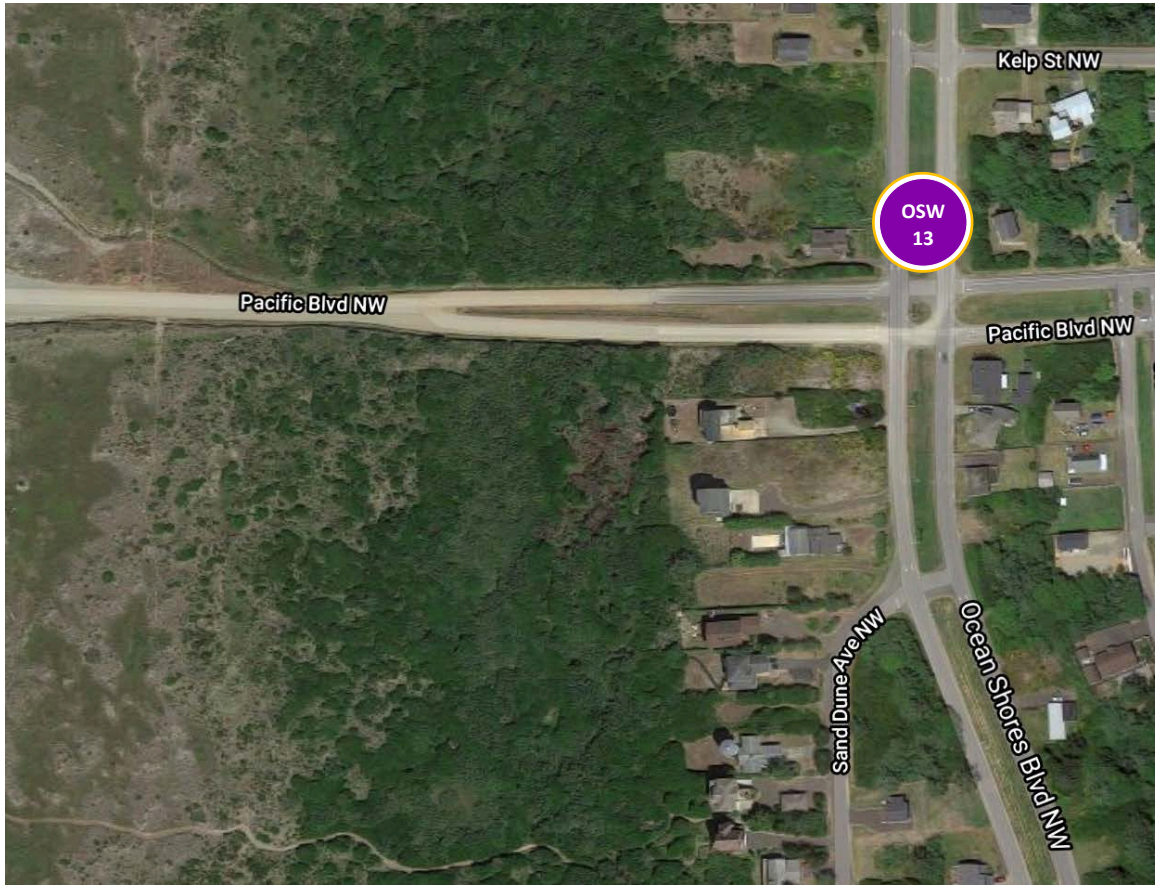
Source: *Google Maps*

Ocean Shores West: OSW 11

OSW 11 - City-owned Spinnaker Park. Panorama and shots taken looking northwest and northeast. Note the AHAB siren.

Photo Credit: *Jeana Gómez*

Ocean Shores West: OSW 13



Source: *Google Maps*

OSW 13	
Address	Ocean Shores Blvd NW
Intersection	Ocean Shores Blvd NW & Pacific Blvd NW
Options	2, 3, 4
Notes	Major beach approach potential VES location. Potential site is in the "neutral area" skinny strip of land owned by the City. Parcel #61822758170

Ocean Shores West: OSW 13

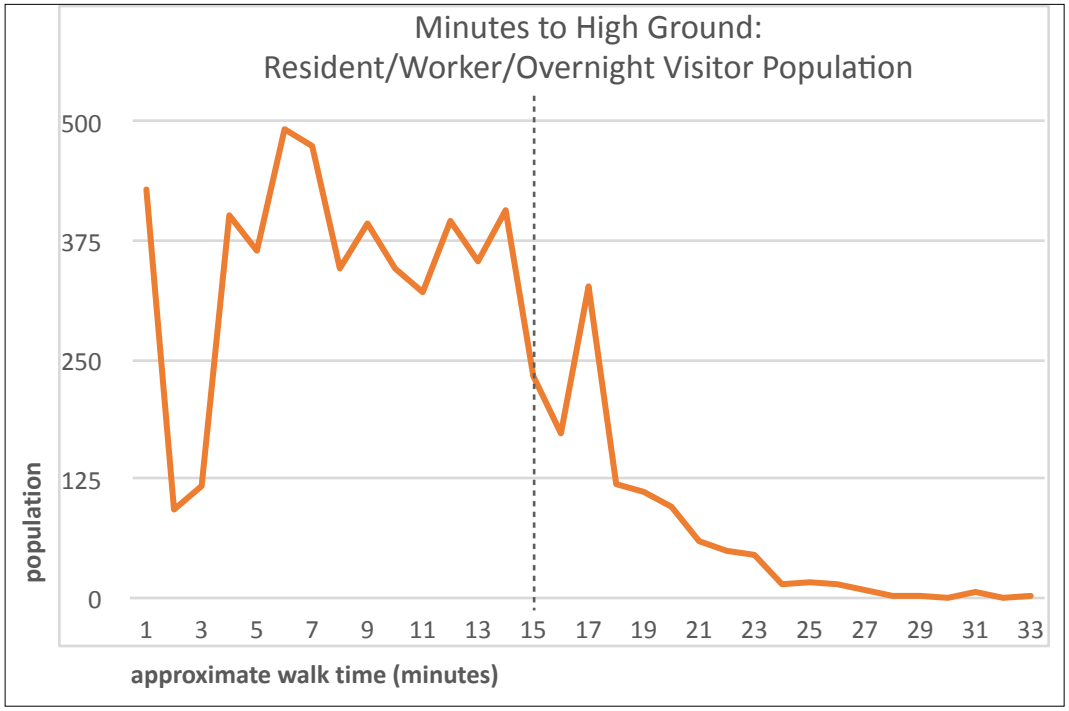
OSW 13

Photo Credit: *Google Maps Street View*

OSW 13 - potential VES location adjacent to a major beach approach (Pacific Blvd/Pacific Beach) on City-owned land.

OSW

Ocean Shores - West: VES Option #4 (Efficient/Lean)



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

<15 minutes	15-25 minutes	25+ minutes
5,384 people	1,293 people	35 people

■ *Fire Station: Approximate 18 minute walk time to high ground or VES*

▲ *Schools: Approximate 10 and 17 minute walk time to high ground or VES*

Under **Option #4:**

- approximately **80.2%** of the total estimated Ocean Shores - West 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 = **33** minutes
- approximate *minimum* VES capacity need (15 minute walk time) = **4,860** people
- # of proposed VES = **11**

OSW

Potential Ocean Shores West VES Locations: All Options (1-4)

VES ID	Intersection	Parcel ID	Parcel Owner	Lat | Long	Options	Notes
OSW 1	2nd Avenue & Ocean Boulevard	786501000500	Screamin' Eagle Campground	47.070668, -124.168939	2, 3, 4	Ocean City Beach Access Area (currently Screamin' Eagle Campground) - State of WA-owned land due west
OSW 2	78 SR 115	181222120010	Quinault Land & Timber	47.042118, -124.170174	2, 3, 4	Quinault Beach Resort and Casino, tribal-owned land
OSW 3	Ocean City State Park Campground	181222420000	State of Washington	47.032457, -124.165071	2, 3	State-owned land, Ocean City campground
OSW 4	336 SR 115	181227110010	North Beach School District #64	47.018080, -124.159587	2, 3, 4	North Beach Junior/Senior High School
OSW 5	120 West Chance a La Mer NW	90100700004	City of Ocean Shores	47.008412, -124.163416	2, 3, 4	Ocean Shores Convention Center and parking lot. City-owned land.
OSW 6	Ocean Lake Way SW & North Port Loop NW	90300014900	Richard T Duffy	46.984810, -124.162445	2, 3, 4	Currently located on private land, but some City-owned land on North Port Loop NW, to the north: #090300018200
OSW 7	North Razor Clam Drive & Butterclam Street SW	92100028800	Pamala J & Michael A Cobb	46.962666, -124.164543	2, 3, 4	currently located on private land, but city-owned land is directly east: #092100047400
OSW 8	Ocean Shores Boulevard SW & Taurus Boulevard SW	91700005800	Lisa & Randy Seal	46.971723, -124.166264	2, 3, 4	Currently located on private land, but City-owned land available to the NE: #090700095202
OSW 9	Ocean Shores Boulevard SW & Marine View Drive SW	93300300700	Amy J Wolner	46.952215, -124.168749	2, 3, 4	currently located on private land, but city-owned land is located due east, 2 blocks: #093301006702
OSW 10	Wowona Avenue SW & Tonquin Avenue SW	93101209000	Christopher B Miller	46.952514, -124.145951	2, 3, 4	currently located on private land, but city-owned land is located sparingly to the east, northeast: #093101704600
OSW 11	South Spinnaker Street	93900102100	City of Ocean Shores	46.934499, -124.166225	2, 3, 4	city-owned land, Spinnaker Park
OSW 12	Torrisdale Avenue SW & Seashore Street SW	93100705500	Ocean Shores Community Club	46.955773, -124.162348	3	OSCC-owned land, large open parcel at a highly visible intersection.
OSW 13	Ocean Shores Blvd NW & Pacific Blvd NW	618122758170	City of Ocean Shores	46.993884, -124.166182	3, 4	City-owned land, located adjacent to a major beach approach
OSW 14	Dunes Lane & Pine Lane	181210330010	Ocean Shores Outdoor Rec Club	47.056828, -124.167127	3	Vacant land owned by the Ocean Shores Outdoor Rec Club (seasonal vacation campground, rv, etc.)

OSW

Potential Ocean Shores West VES Locations: All Options (1-4)

Notes

OSW 1 - OSW 1 Ocean City Beach Access Area (currently Screamin' Eagle Campground) - State of Washington-owned land due west along Second Avenue.).

OSW 2 - OSW 2 site is Quinault Beach Resort and Casino, tribal-owned land. Long, private road to gain access to the Resort. Wetlands and other water elements may cut Resort off from in and out traffic (both on-foot and in cars). VES tower would serve Resort guests and employees and nearby visitors and residents.

OSW 4 -The OSW 4 site is the Junior/Senior High School property has ample space to accommodate a VES tower. AHAB siren already on-site, near play field at the road: *see panorama photo*.

OSW 6 - The OSW 6 site is currently located on private land, but some City-owned land on North Port Loop NW, to the north.

OSW 7 - The OSW 7 is currently located on private land, but city-owned land is directly east on Butterclam Street SW.

OSW 8 - OSW 8 is currently located on private land, but City-owned land and OSCC park, Damon Park, available to the NE on Volans Avenue SW.

OSW 9 - OSW 9 is currently located on private land, but city-owned land is located due east, 2 blocks.

OSW 10 - OSW 10 is currently located on private land, but City-owned land is located sparingly to the east/northeast.

OSW

Considerations

Ocean Shores Community Club-Owned Properties

- Cabana Park (900 Torrisdale Avenue SW)
    A. Located just northeast of **OSW 9**
        - Could be *Alternative #2* for OSW 9

- Damon Park (Volans Avenue Southwest)
    B. Located north, adjacent to **OSW 8**
        - Existing *Alternative #2* for OSW 8

- Ken Peterson Park (Ocean Lake Way)
    C. Located just west of **OSW 6**
        - Could be *Alternative #2* for OSW 6

Other City-Owned Properties

- Ocean Shores Fire Department (585 Point Brown Avenue NE)
    A. Located just south of **OSW 5**
        - Could be *Alternative #1* for OSW 5

- Ocean Shores Library (573 Point Brown Avenue NE)
    B. Located just south of **OSW 5**
        - Could be *Alternative #1* for OSW 5

- Ocean Shores Police Department (577 Point Brown Avenue NE)
    C. Located just south of **OSW 5**
        - Could be *Alternative #1* for OSW 5

Ocean Shores - West: Comparison of All Options (1-4)

OSW

Option #1

# of proposed VES = 0

N/A

*Minimum VES Capacity (# of People)

7.8%

% of people within **15 minutes** of high ground

8.8%

% of people within **25 minutes** of high ground

Option #2

# of proposed VES = 11

4,633

*Minimum VES Capacity (# of People)

76.9%

% of people within **15 minutes** of high ground or vertical evacuation

99.4%

% of people within **25 minutes** of high ground or vertical evacuation

Option #3

# of proposed VES = 14

5,027

*Minimum VES Capacity (# of People)

82.7%

% of people within **15 minutes** of high ground or vertical evacuation

99.6%

% of people within **25 minutes** of high ground or vertical evacuation

Option #4

# of proposed VES = 11

4,860

*Minimum VES Capacity (# of People)

80.2%

% of people within **15 minutes** of high ground or vertical evacuation

99.5%

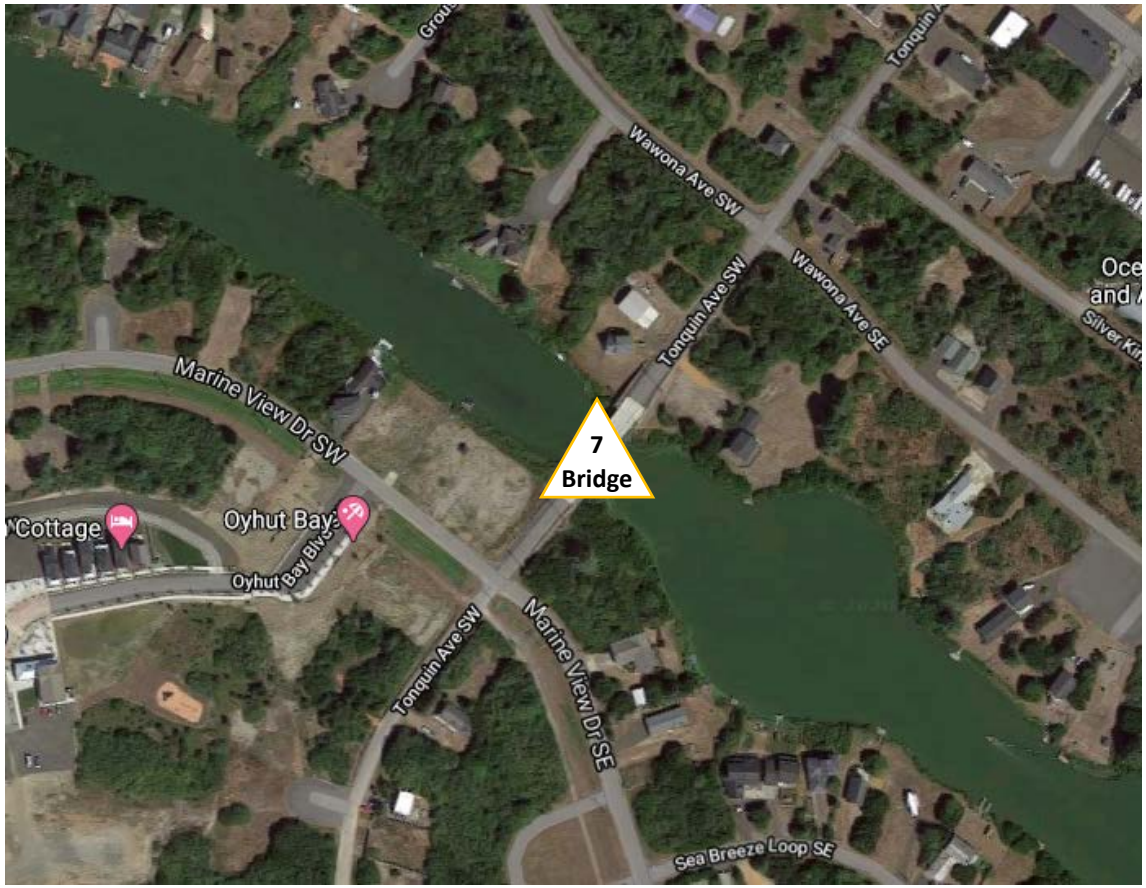
% of people within **25 minutes** of high ground or vertical evacuation

OSW

Ocean Shores - West: 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.

Bridge 7: Tonquin Avenue SW



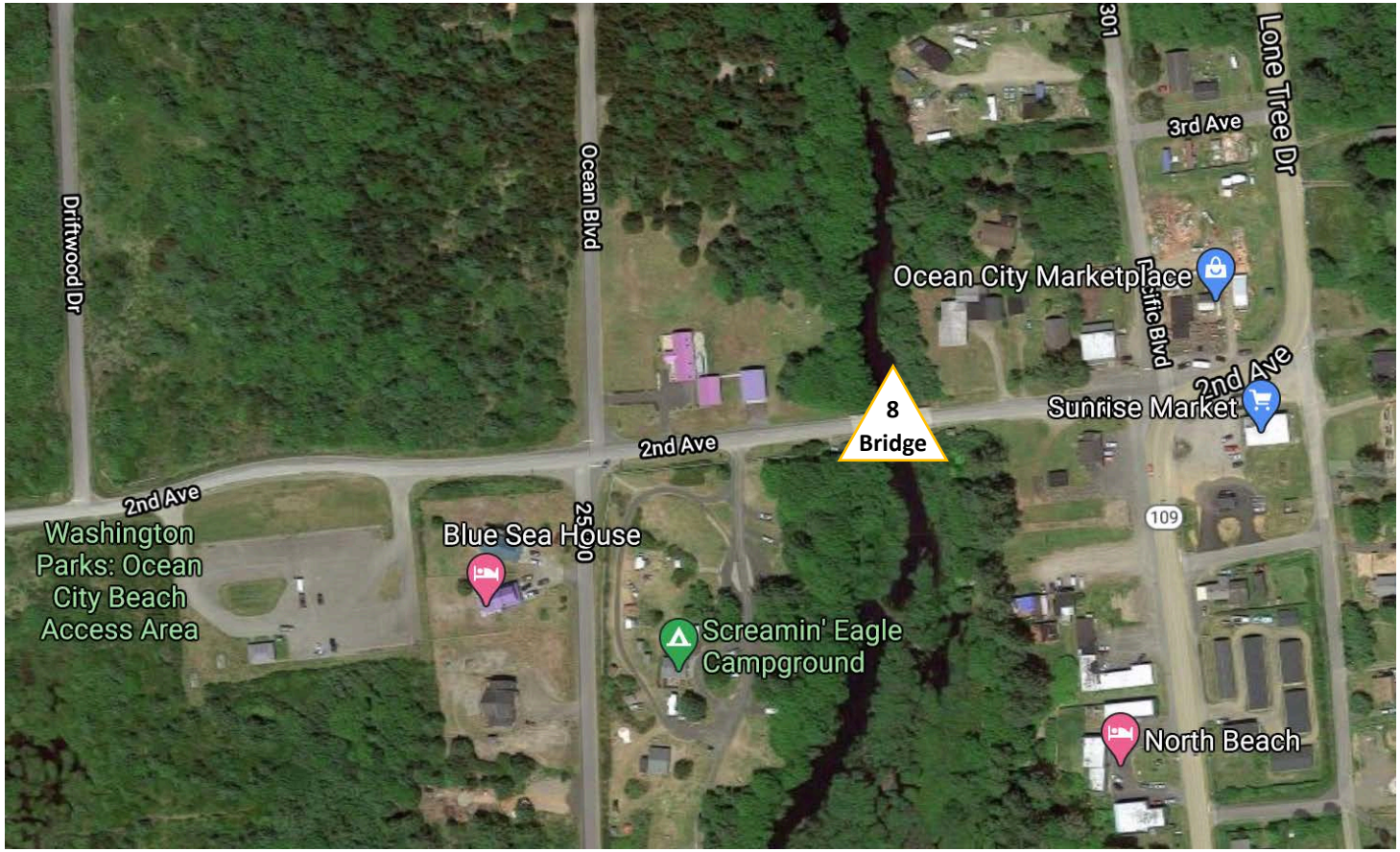
Source: *Google Maps*

Bridge 7: Tonquin Avenue SW

Tonquin Avenue Southwest (looking southwest)

Photo Credit: *Jeana Gómez*

Bridge 8: Second Avenue



Source: *Google Maps*

Bridge 8: Second Avenue

Photo Credit: *Jeana Gómez*

Second Avenue bridge near Ocean City, OSW 1. Looking south.

Ocean Shores - East

Ocean Shores - East community study area population <u>in the tsunami hazard area</u> = ~5,558 people

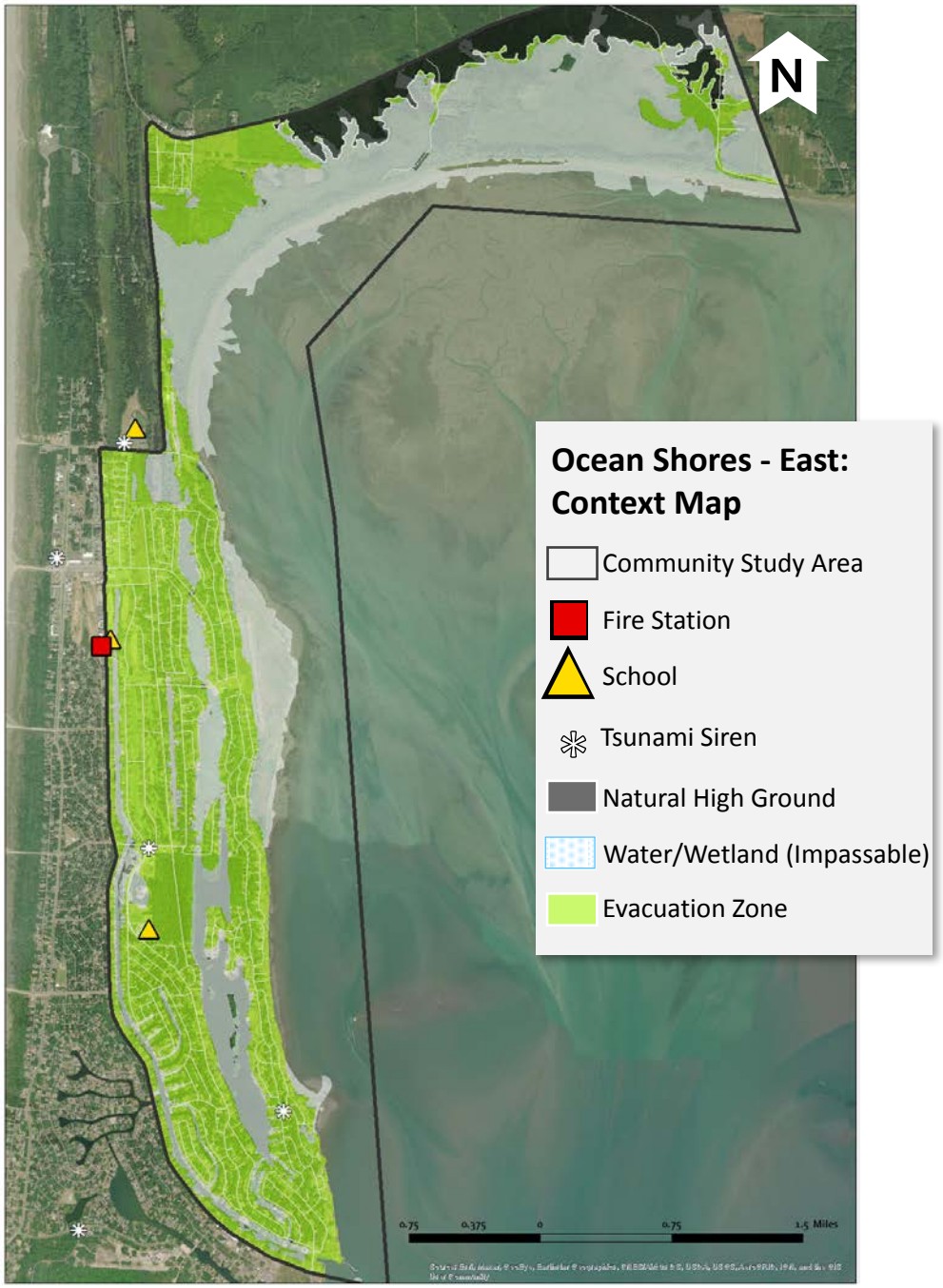
Resident/Worker/Overnight Visitor population = ~5,222 people

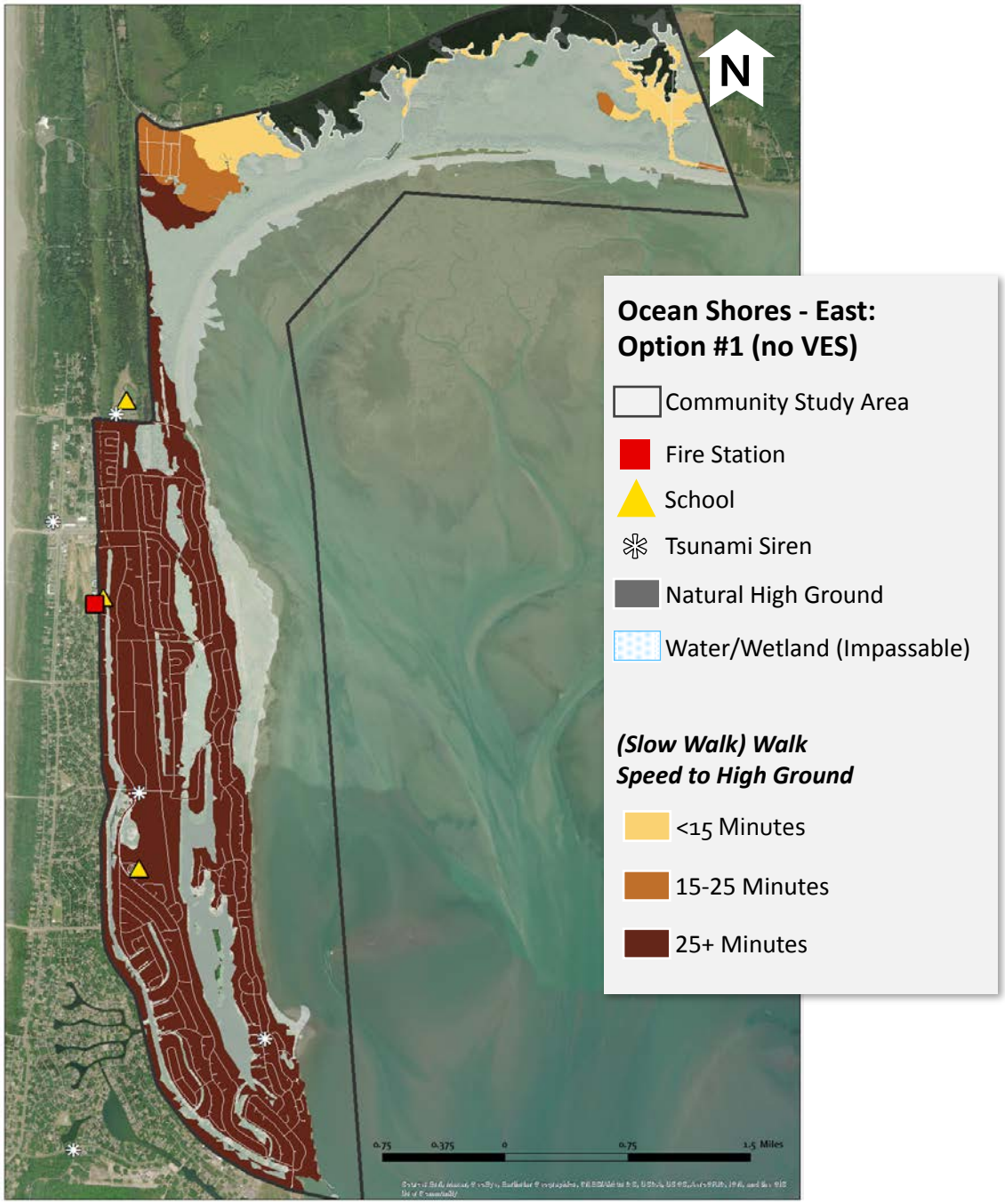
Fire Department occupancy = N/A

Schools occupancy = ~336 people

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

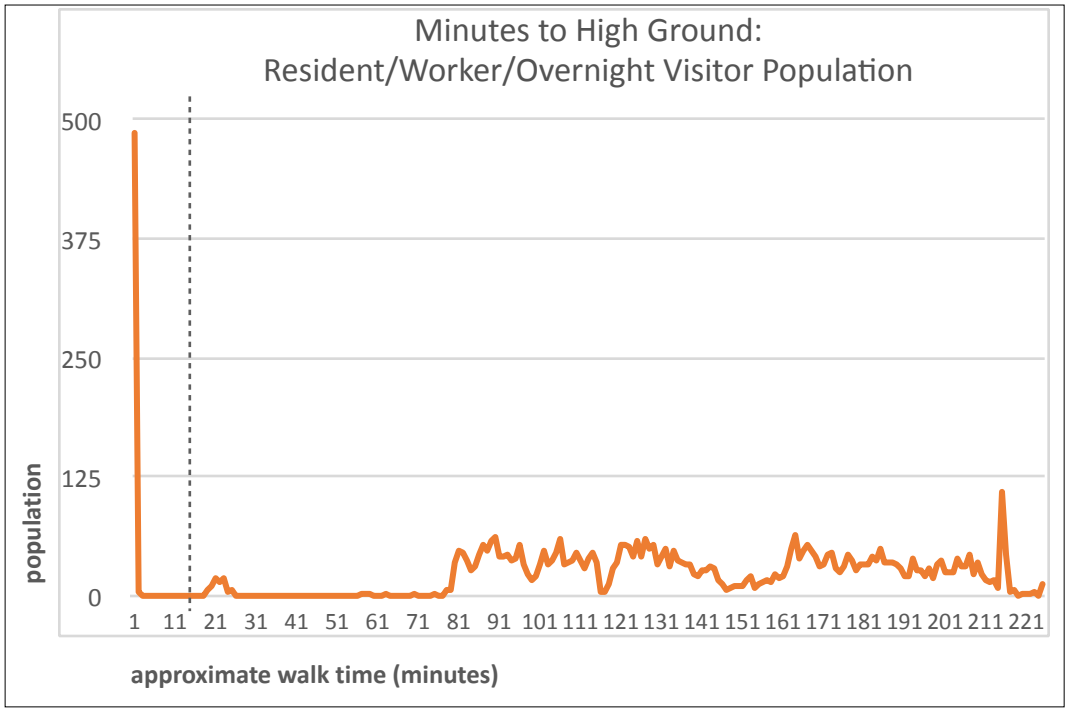
OSE


N
Ocean Shores - East:
Context Map
Community Study Area
Fire Station
School
Tsunami Siren
Natural High Ground
Water/Wetland (Impassable)
Evacuation Zone
0.75
0.375
0
0.75
1.5 Miles


N
Ocean Shores - East:
Option #1 (no VES)
Community Study Area
Fire Station
School
Tsunami Siren
Natural High Ground
Water/Wetland (Impassable)
(Slow Walk) Walk
Speed to High Ground
<15 Minutes
15-25 Minutes
25+ Minutes
0.75
0.375
0
0.75
1.5 Miles

OSE

Ocean Shores - East: 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

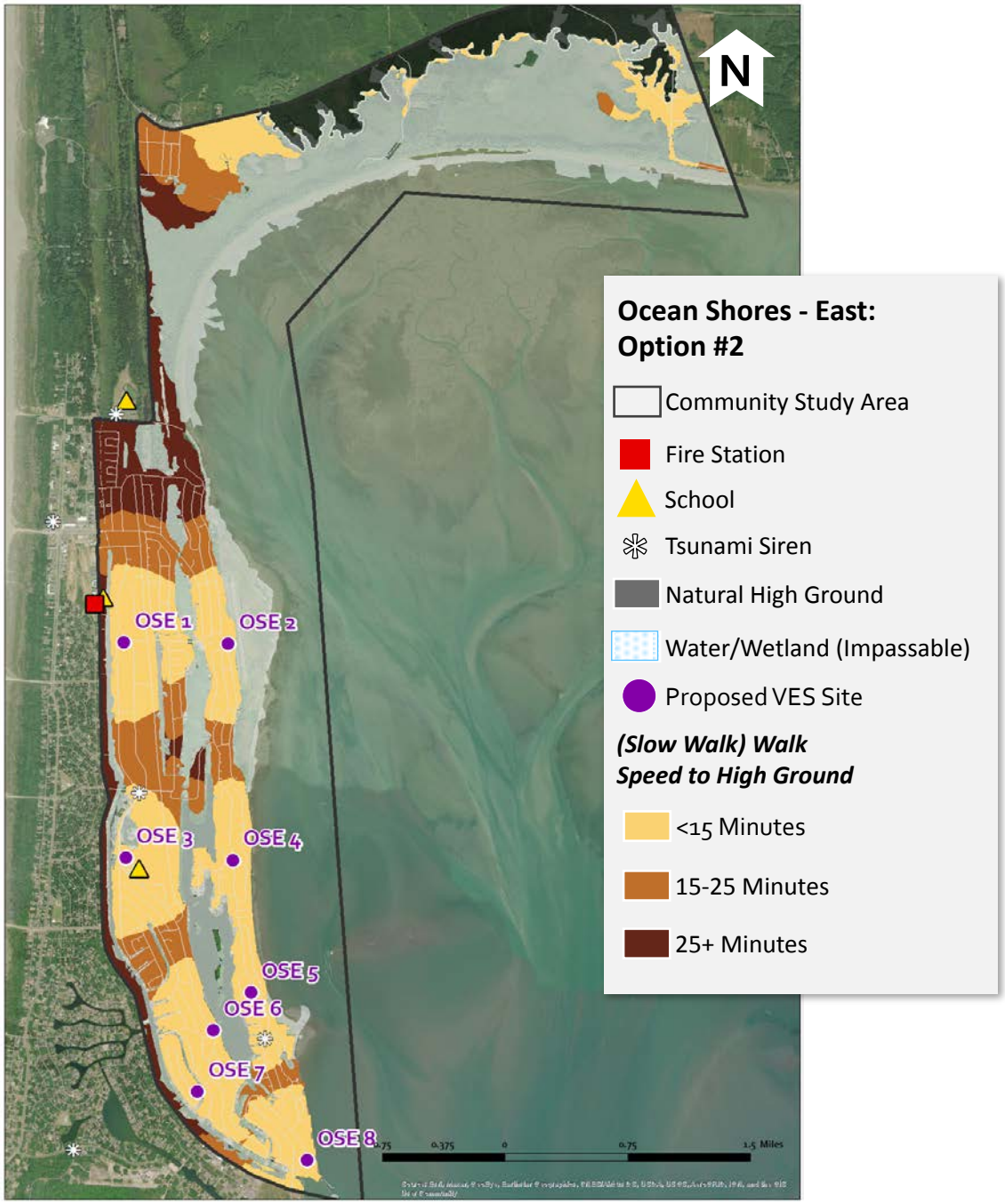
<15 minutes	15-25 minutes	25+ minutes
490 people	78 people	4,990 people

Fire Station: N/A

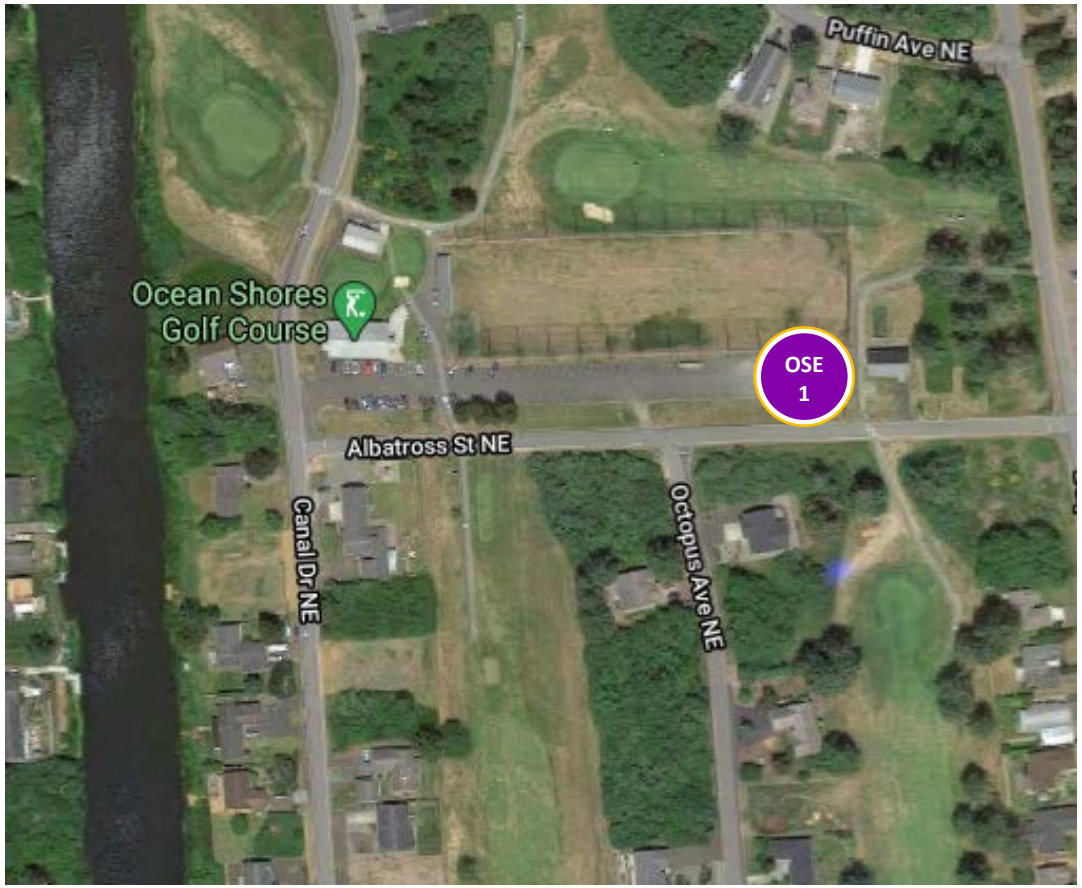
Schools: Approximate 110 and 160 minute walk time to high ground

Under **Option #1:**

- approximately **8.8%** of the total estimated Ocean Shores - East population are within 15 minutes to natural high ground
- approximate **maximum* walk time to natural high ground for identified population = **225** minutes


N
OSE 1
OSE 2
OSE 3
OSE 4
OSE 5
OSE 6
OSE 7
OSE 8
0.75 0.375 0 0.75 1.5 Miles
Ocean Shores - East: Option #2
Community Study Area
Fire Station
School
Tsunami Siren
Natural High Ground
Water/Wetland (Impassable)
Proposed VES Site
(Slow Walk) Walk Speed to High Ground
<15 Minutes
15-25 Minutes
25+ Minutes

Ocean Shores East: OSE 1



OSE 1	
Address	N/a
Intersection	Octopus Avenue NE & Albatross Street NE
Options	2
Notes	City of Ocean Shores recreational land (Ocean Shores Golf Course)

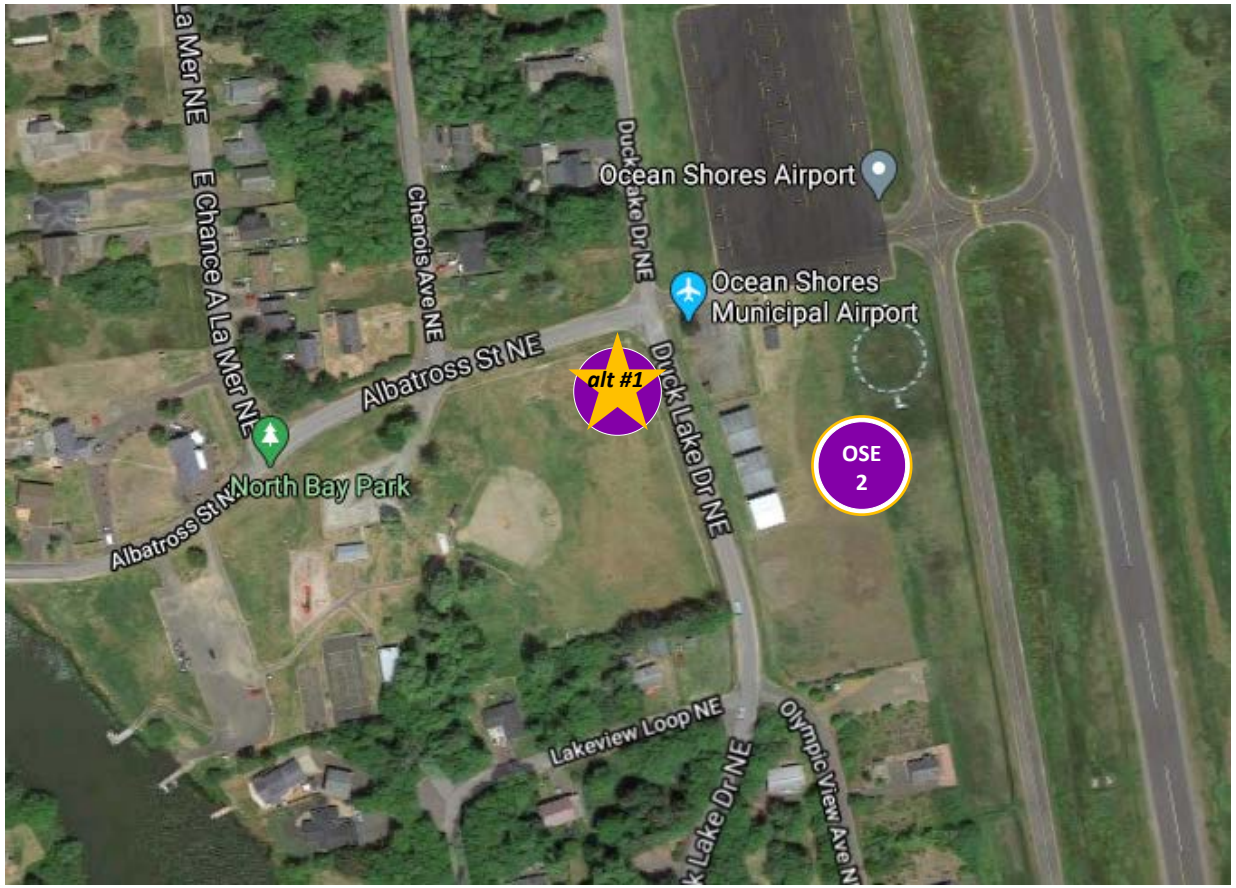
Source: *Google Maps*

Ocean Shores East: OSE 1

OSE 1 - Potential VES could be located in the parking lot

OSE 1 - AHAB siren site Photo Credit: *Jeana Gómez*

Ocean Shores East: OSE 2 + *alternative*



OSE 2	
Address	498 Duck Lake Drive NE
Intersection	Duck Lake Drive NE & Albatross Street NE
Options	2
Notes	Ocean Shores Municipal Airport

OSE 2 - alt #1	
Address	N/a
Intersection	Albatross Street NE & Duck Lake Drive NE
Notes	City-owned land, North Bay Park

Source: *Google Maps*

Ocean Shores East: OSE 2

OSE 2

Photo Credit: *Jeana Gómez*

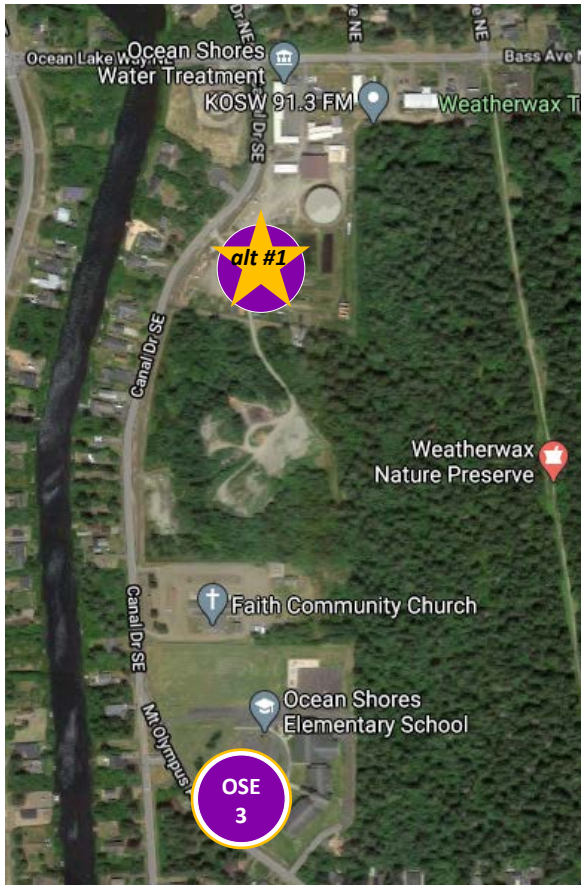
OSE 2 - looking east towards airport

Ocean Shores East: OSE 2 *alternative*

OSE 2 - *Alternative #1*: North Bay Park, adjacent to the Municipal Airport, to the west.

Photo Credit: *Jeana Gómez*

Ocean Shores East: OSE 3 + *alternative*



OSE 3	
Address	300 Mt Olympus Avenue SE
Intersection	SE of Canal Drive SE & Mt Olympus Avenue SE
Options	2
Notes	Ocean Shores Elementary

OSE 3 - alt #1	
Address	165 Ocean Lake Way
Intersection	Ocean Lake Way & Canal Drive SE
Notes	City-owned land, with other city services and storage, office, etc.

Source: *Google Maps*

Ocean Shores East: OSE 3

OSE 3

OSE 3 - Potential VES site at Ocean Shores Elementary (parking lot, most likely)

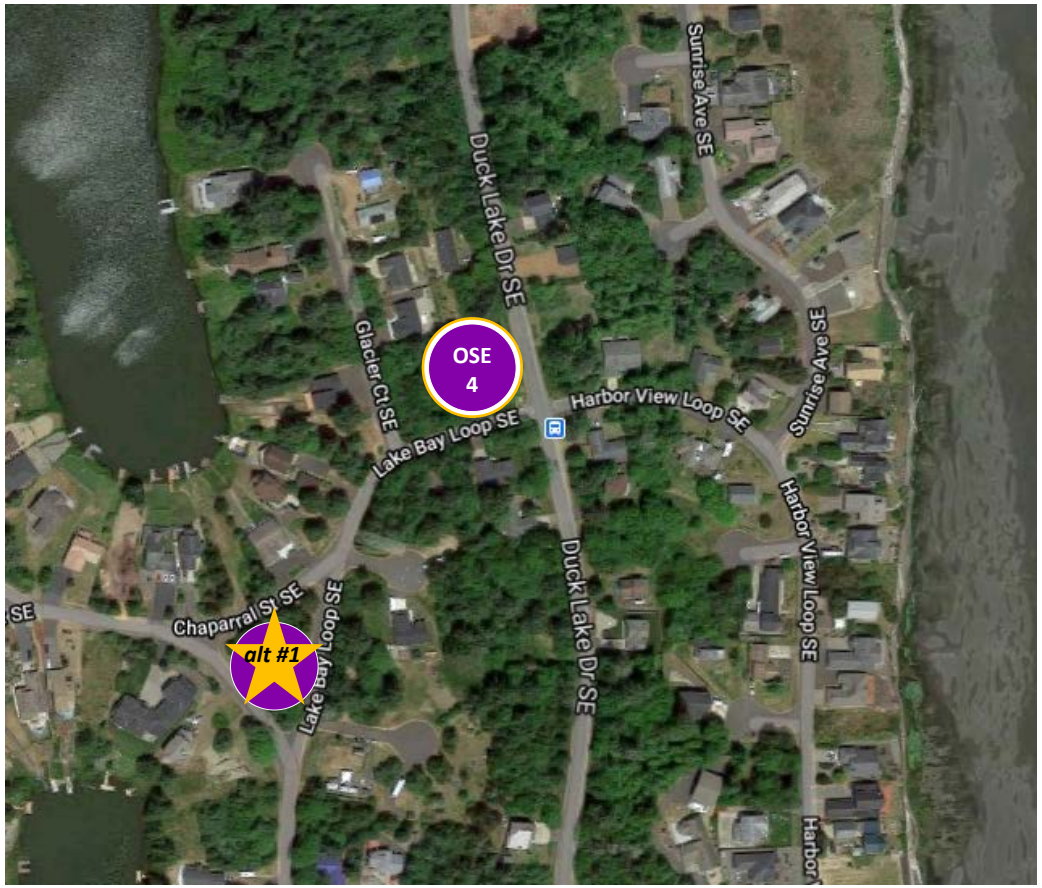
Photo Credit: *Jeana Gómez*

Ocean Shores East: OSE 3 *alternative*

OSE 3 - *Alternative #1*: City-owned properties north of Ocean Shores Elementary, at the intersection of Ocean Lake Way & Mount Olympus Avenue SE. Also, site of AHAB siren.

Photo Credit: *Jeana Gómez*

Ocean Shores East: OSE 4 + *alternative*



OSE 4	
Address	299 Duck Lake Drive SE
Intersection	Duck Lake Drive SE & Lake Bay Loop SE
Options	2
Notes	City-owned vacant land SW of intersection: #094701500000

OSE 4 - alt #1	
Address	N/a
Intersection	Chaparral Street SE & Lake Bay Loop SE
Notes	city-owned vacant lot

Source: *Google Maps*

Ocean Shores East: OSE 4

OSE 4

Photo Credit: *Jeana Gómez*

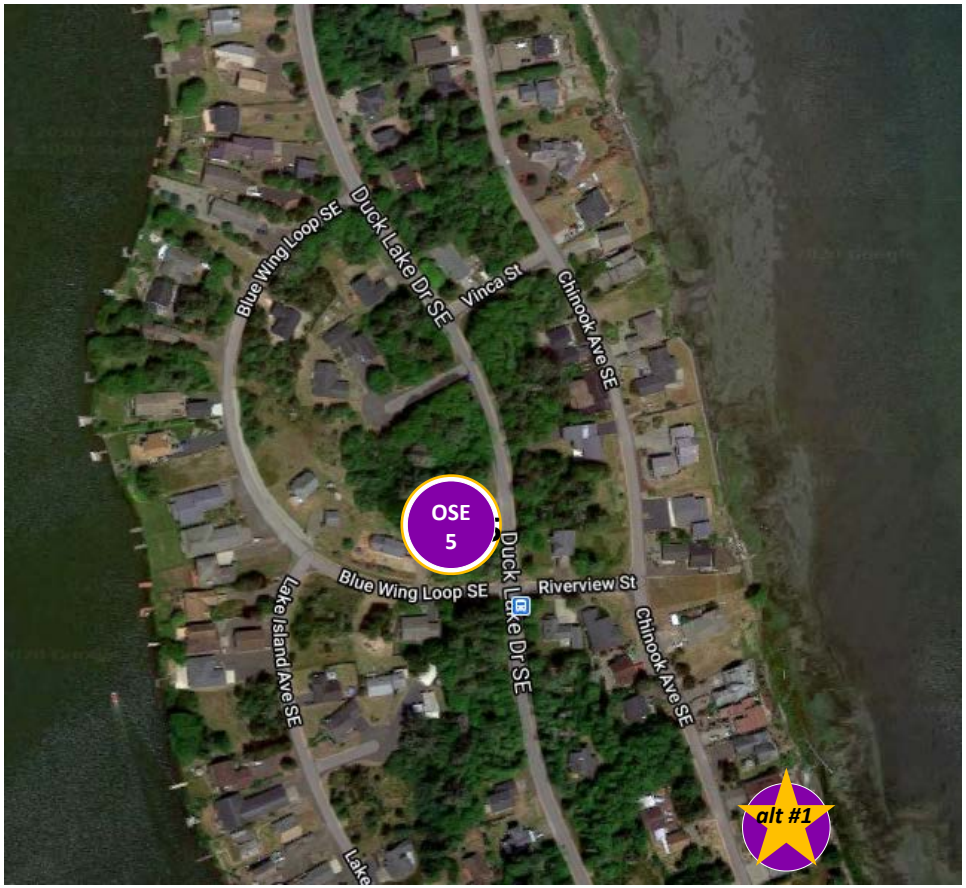
OSE 4 - Potential VES site located at the intersection of Duck Lake Drive SE & Chaparral Street SE (NW corner), photo looking NW

Ocean Shores East: OSE 4 *alternative*

Photo Credit: *Jeana Gómez*

OSE 4 - *Alternative #1*: Located just west of OSE 4 on a round parcel of land, publicly-owned by the City of Ocean Shores

Ocean Shores East: OSE 5 + *alternative*



Source: *Google Maps*

OSE 5	
Address	614 Blue Wing Loop SE
Intersection	Blue Wing Loop SE & Duck Lake Drive SE
Options	2
Notes	Currently located on private land, look for nearby vacant land -- possibly exempt available?

OSE 5 - alt #1	
Address	N/a
Intersection	Chinook Avenue SE, south of Riverview Street
Notes	city-owned ROW parcel, very small but could be adapted. Confirm?

Ocean Shores East: OSE 5

OSE 5

Photo Credit: *Jeana Gómez*

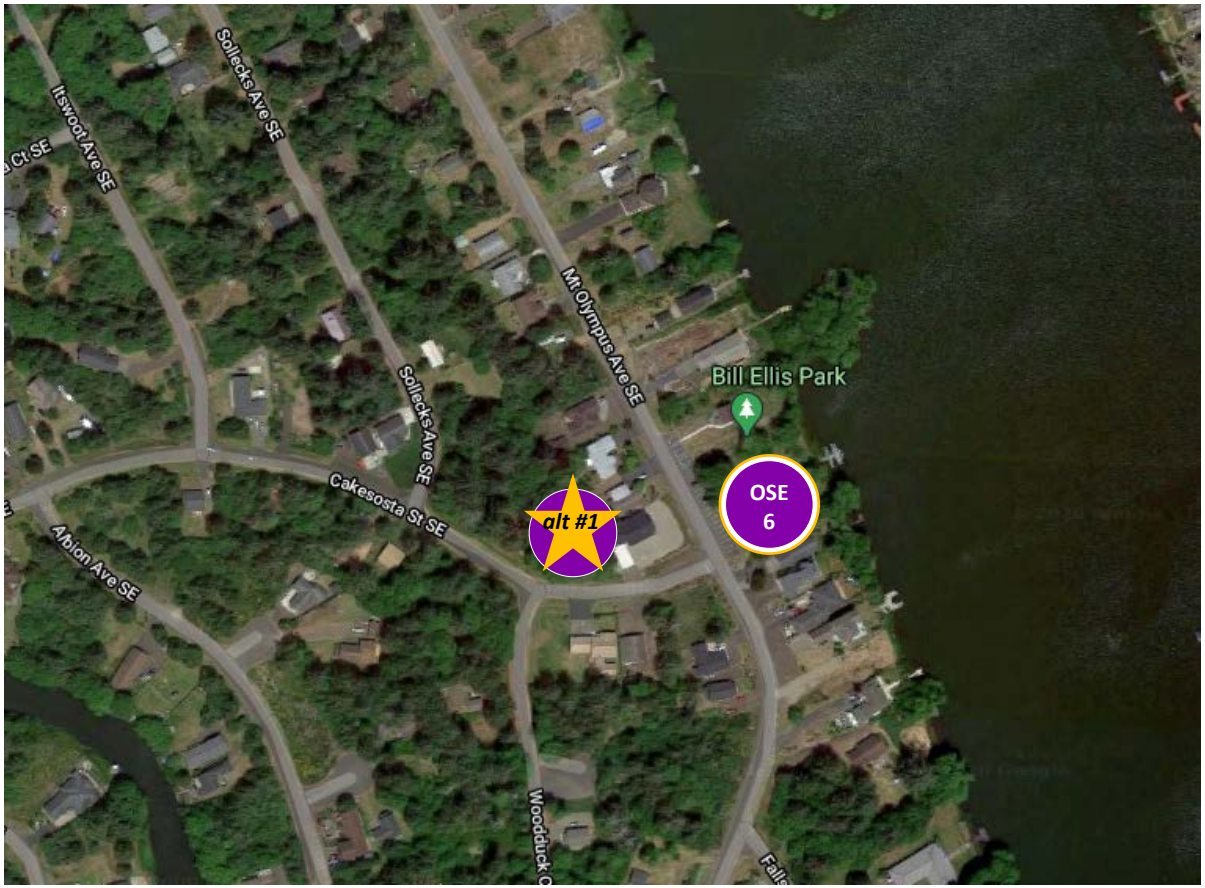
OSE 5 - This potential site is currently privately-owned, but located at a high visibility intersection.

Ocean Shores East: OSE 5 *alternative*

Photo Credit: *Jeana Gómez*

OSE 5 - *Alternative #1*: Small, narrow lot owned by the City of Ocean Shores (SE of OSE 5)

Ocean Shores East: OSE 6 + *alternative*



Source: *Google Maps*

OSE 6	
Address	698 Mt Olympus Avenue SE
Intersection	Mt Olympus Avenue SE & Cakesosta Street SE
Options	2
Notes	Currently located on private land (Bill Ellis Park, private?), but there is a city-owned ROW across the street, to the

OSE 6 - alt #1	
Address	N/a
Intersection	Mt Olympus Avenue SE & Cakesosta Street SE
Notes	City-owned ROW, across the street from Bill Ellis Park

Ocean Shores East: OSE 6

OSE 6 - This parcel is a community park owned and managed by the Ocean Shores Community Club: Bill Ellis Park.

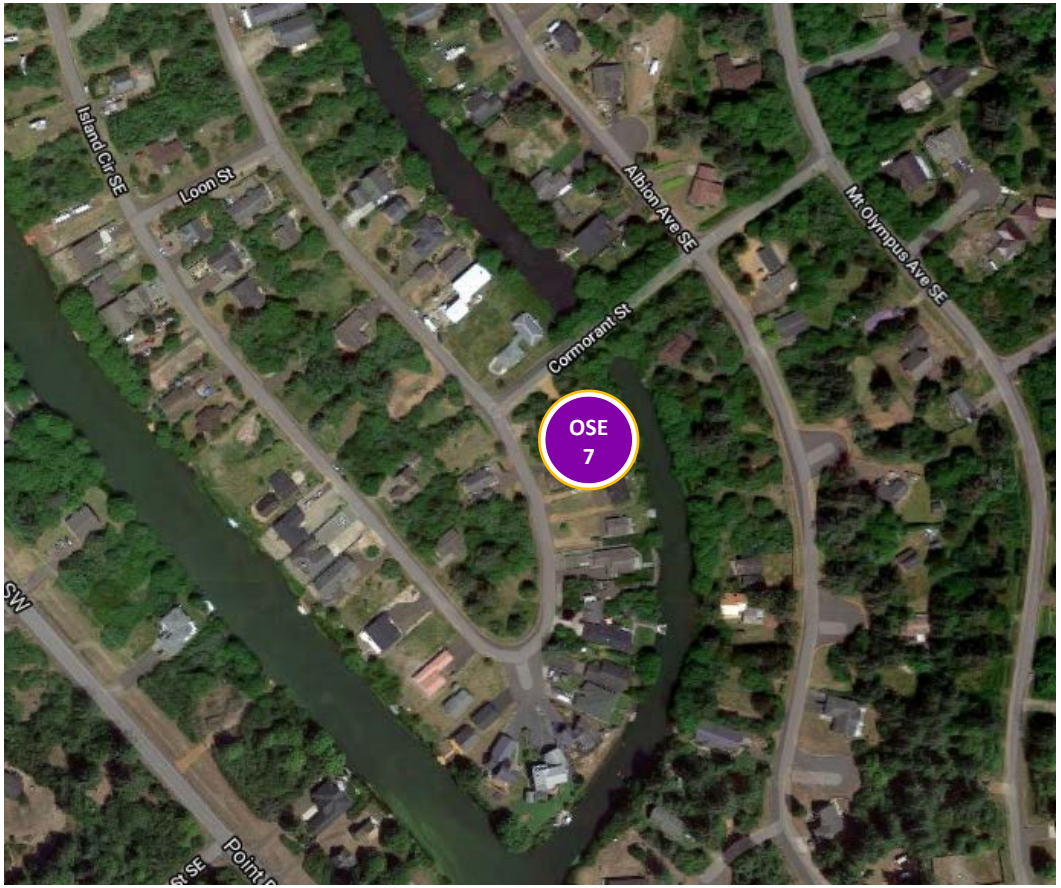
Photo Credit: *Jeana Gómez*

Ocean Shores East: OSE 6 *alternative*

Photo Credit: *Jeana Gómez*

OSE 6 - *Alternative #1*: City-owned ROW, just to the west from OSE 6, on Cakesosta Street

Ocean Shores East: OSE 7



OSE 7	
Address	165 Cormorant Street SE
Intersection	Cormorant Street & Island Circle SE
Options	2
Notes	Currently located on private land -- look for nearby vacant private land

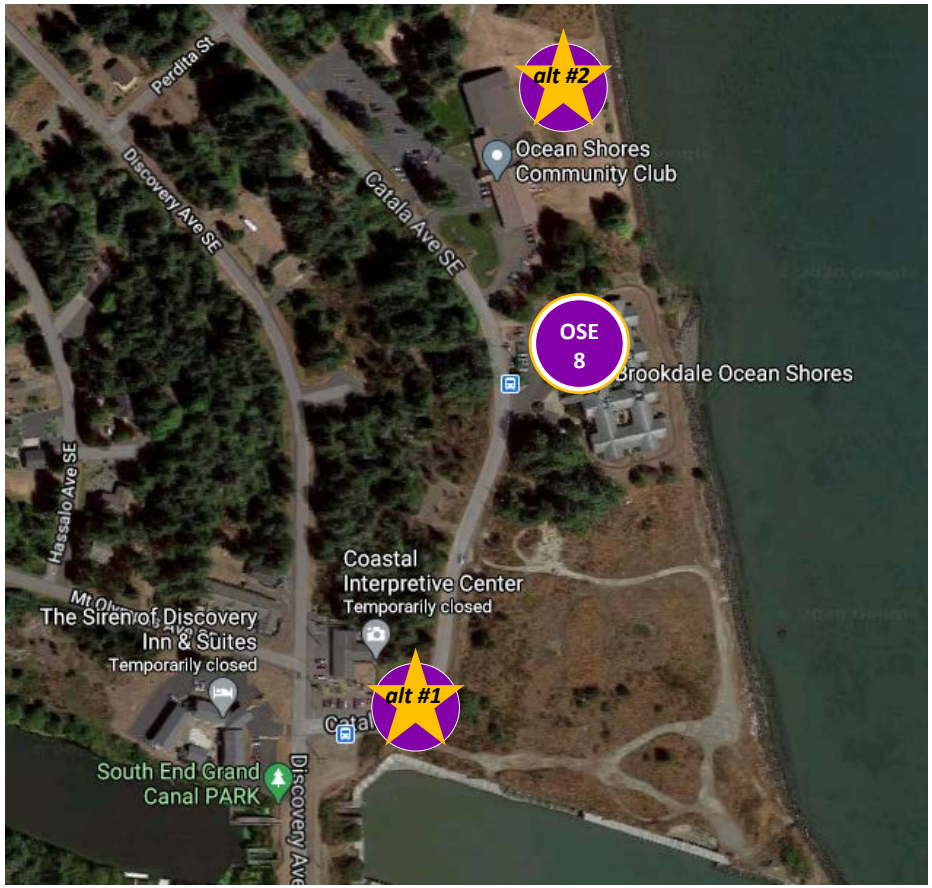
Source: *Google Maps*

Ocean Shores East: OSE 7

Photo Credit: *Jeana Gómez*

OSE 7 - This potential site is currently privately-owned, but undeveloped.

Ocean Shores East: OSE 8 + *alternatives*



Source: *Google Maps*

OSE 8	
Address	N/a
Intersection	1020 Catala Avenue SE
Options	2
Notes	Brookdale Senior Assisted Living. Locate tower here or on nearby City-owned land, to the SW (Coastal Interpretive Center): #092900059300

OSE 8 - alt #1	
Address	1033 Catala Avenue SE
Intersection	Catala Avenue SE & Discovery Avenue SE
Notes	Coastal Interpretive Center

OSE 8 - alt #2	
Address	1015 Catala Avenue SE
Intersection	Catala Avenue SE, south of Perdita Street
Notes	Ocean Shores Community Club

Ocean Shores East: OSE 8

OSE 8



OSE 8 - This potential site is located at the Brookdale Senior Assisted Living facility. There is potentially space in the parking lot or adjacent open space for a VES tower.

Photo Credit: *Jeana Gómez*

Ocean Shores East: OSE 8 *alternative #1*



OSE 8 - *Alternative #1*: City-owned property, Coastal Interpretive Center, with vacant land to the NE of the parcel along Catala Avenue SE

Photo Credit: *Jeana Gómez*

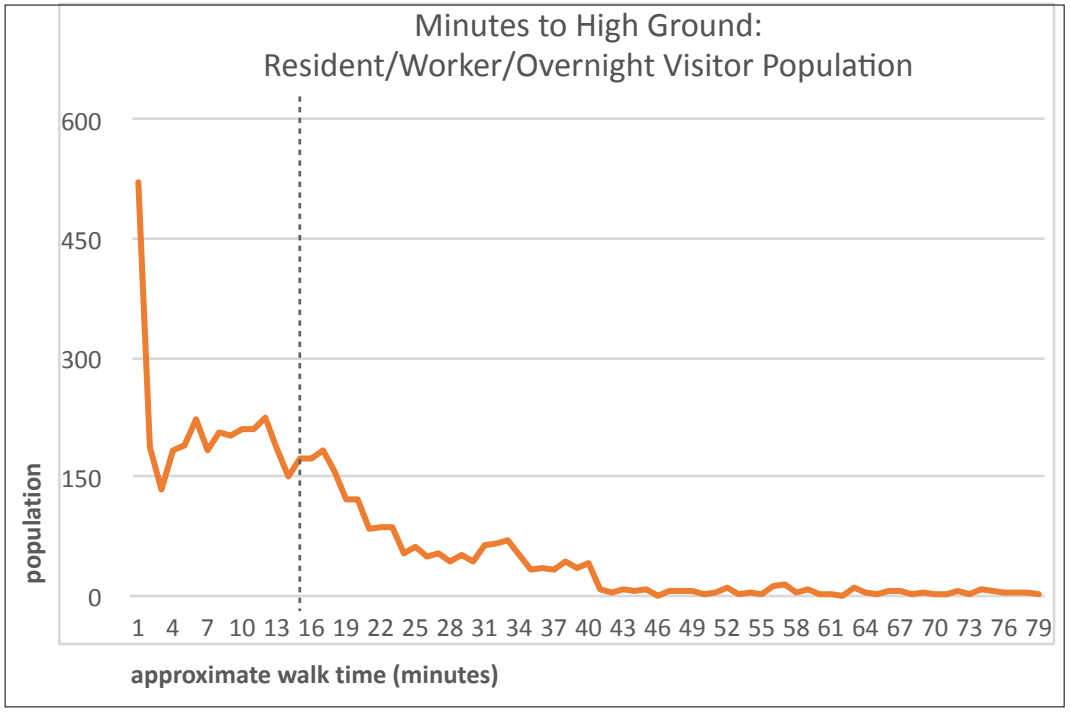
Ocean Shores East: OSE 8 *alternative #2*

OSE 8 - *Alternative #2*: Ocean Shores Community Club-owned property just north of OSE 8. Lots of open space that could potentially accommodate a VES tower.

Photo Credit: *Google Maps Street View*

Ocean Shores - East: VES Option #2 (Community-Derived)

OSE 1 OSE 2 OSE 3 OSE 4 OSE 5 OSE 6 OSE 7 OSE 8



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

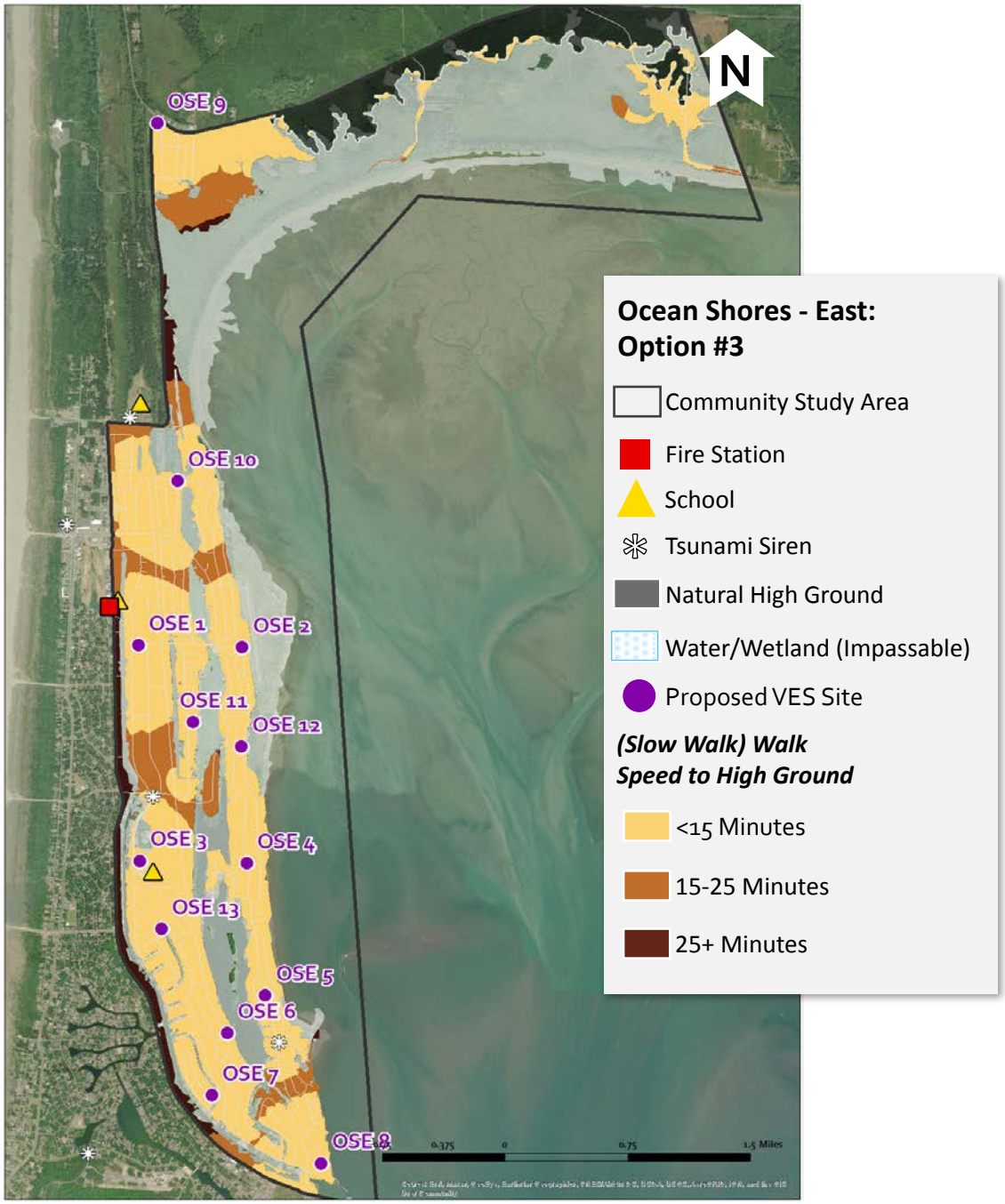
<15 minutes	15-25 minutes	25+ minutes
3,310 people	1,302 people	947 people

Fire Station: N/A

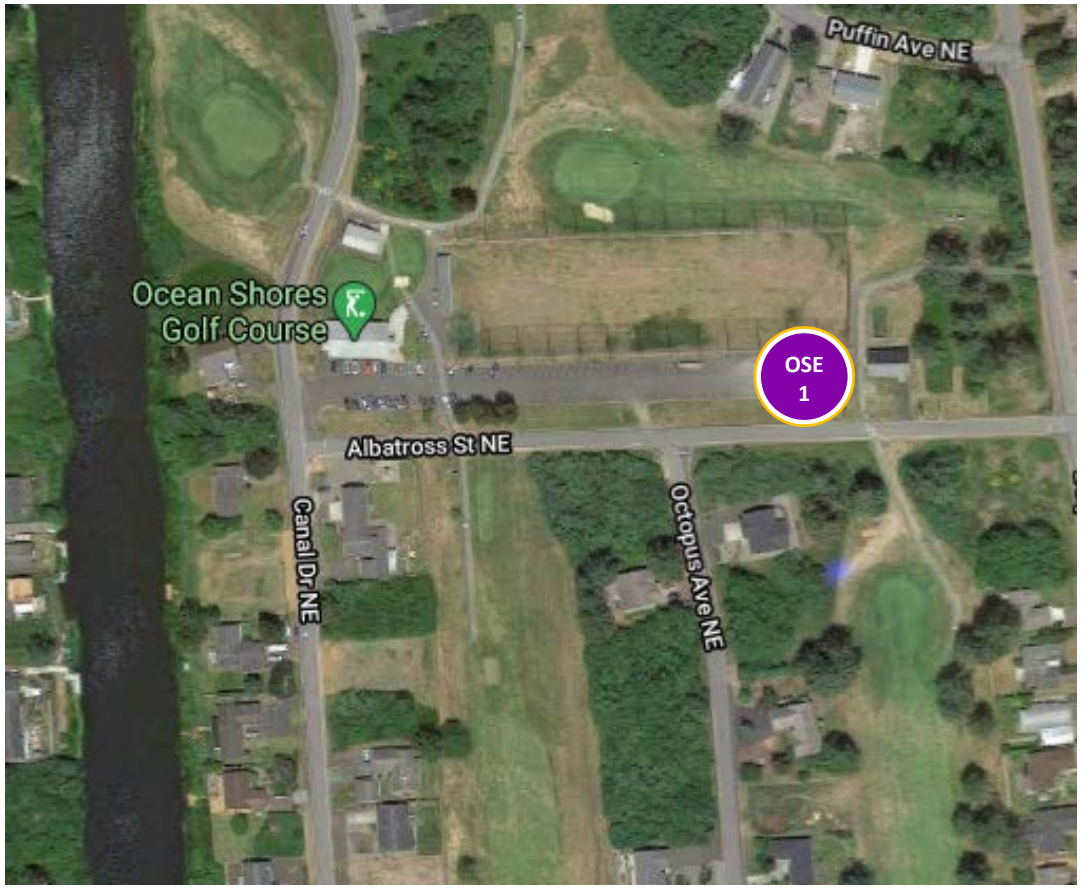
Schools: Approximate 2 and 30 minute walk time to high ground or VES

Under **Option #2:**

- approximately **59.5%** of the total estimated Ocean Shores - East 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 = **79** minutes
- approximate *minimum* VES capacity need (15 minute walk time) = **2,819** people
- # of proposed VES = **8**


N
OSE 9
OSE 10
OSE 1
OSE 2
OSE 11
OSE 12
OSE 3
OSE 4
OSE 13
OSE 5
OSE 6
OSE 7
OSE 8
0.375
0
0.75
1.5 Miles
Ocean Shores - East: Option #3
Community Study Area
Fire Station
School
Tsunami Siren
Natural High Ground
Water/Wetland (Impassable)
Proposed VES Site
(Slow Walk) Walk Speed to High Ground
<15 Minutes
15-25 Minutes
25+ Minutes

Ocean Shores East: OSE 1



OSE 1	
Address	N/a
Intersection	Octopus Avenue NE & Albatross Street NE
Options	2
Notes	City of Ocean Shores recreational land (Ocean Shores Golf Course)

Source: *Google Maps*

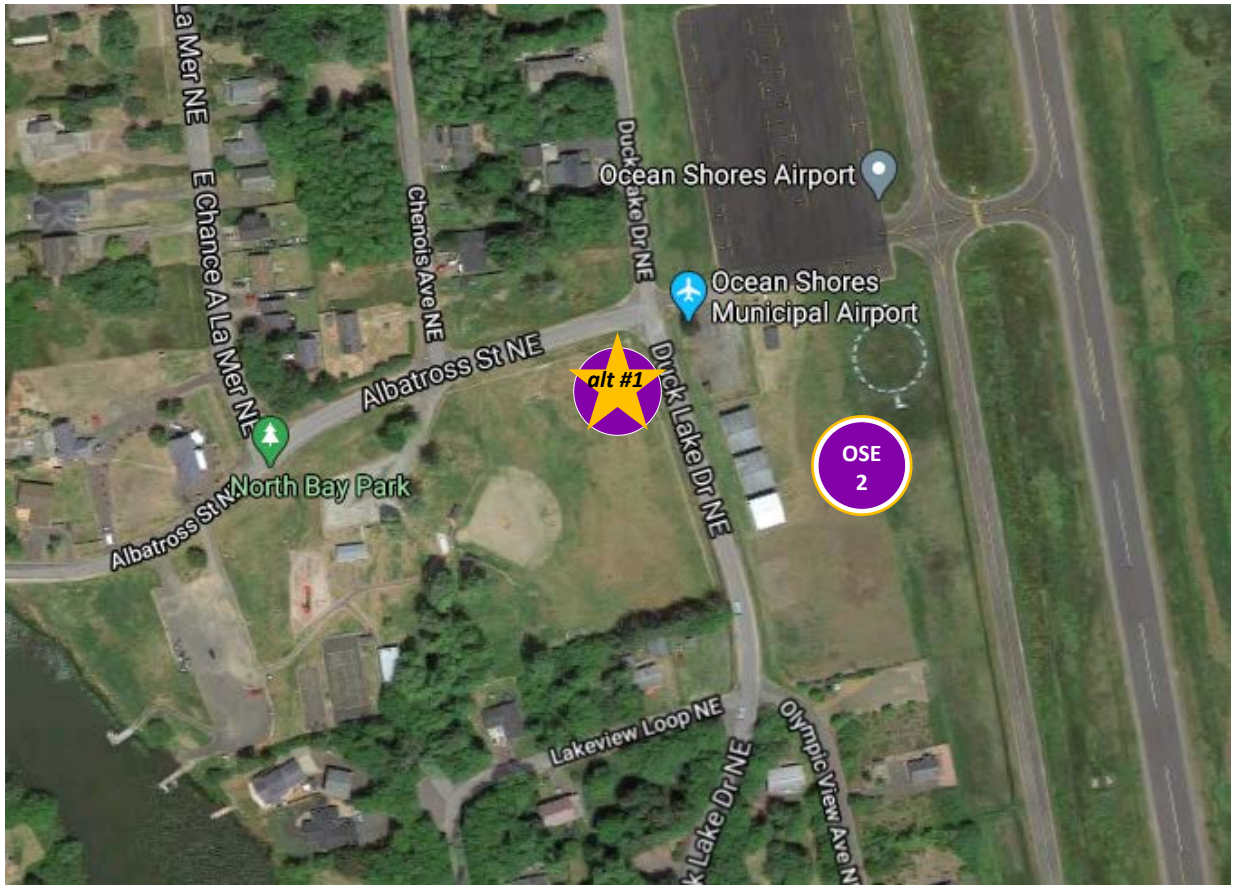
Ocean Shores East: OSE 1

OSE 1

OSE 1 - Potential VES could be located in the parking lot

OSE 1 - AHAB siren site Photo Credit: *Jeana Gómez*

Ocean Shores East: OSE 2 + *alternative*



OSE 2	
Address	498 Duck Lake Drive NE
Intersection	Duck Lake Drive NE & Albatross Street NE
Options	2
Notes	Ocean Shores Municipal Airport

OSE 2 - alt #1	
Address	N/a
Intersection	Albatross Street NE & Duck Lake Drive NE
Notes	City-owned land, North Bay Park

Source: *Google Maps*

Ocean Shores East: OSE 2

OSE 2

Photo Credit: *Jeana Gómez*

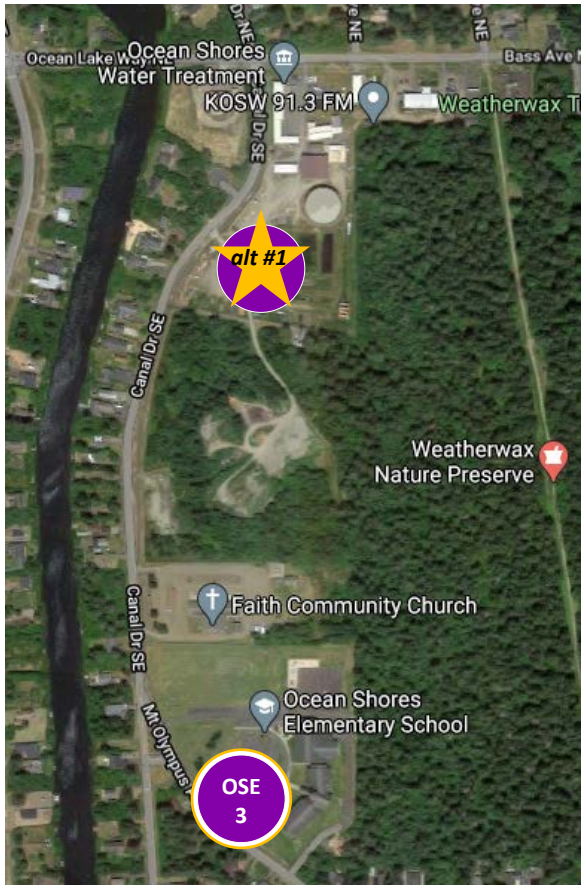
OSE 2 - looking east towards airport

Ocean Shores East: OSE 2 *alternative*

OSE 2 - *Alternative #1*: North Bay Park, adjacent to the Municipal Airport, to the west.

Photo Credit: *Jeana Gómez*

Ocean Shores East: OSE 3 + *alternative*



OSE 3	
Address	300 Mt Olympus Avenue SE
Intersection	SE of Canal Drive SE & Mt Olympus Avenue SE
Options	2
Notes	Ocean Shores Elementary

OSE 3 - alt #1	
Address	165 Ocean Lake Way
Intersection	Ocean Lake Way & Canal Drive SE
Notes	City-owned land, with other city services and storage, office, etc.

Source: *Google Maps*

Ocean Shores East: OSE 3

OSE 3

OSE 3 - Potential VES site at Ocean Shores Elementary (parking lot, most likely)

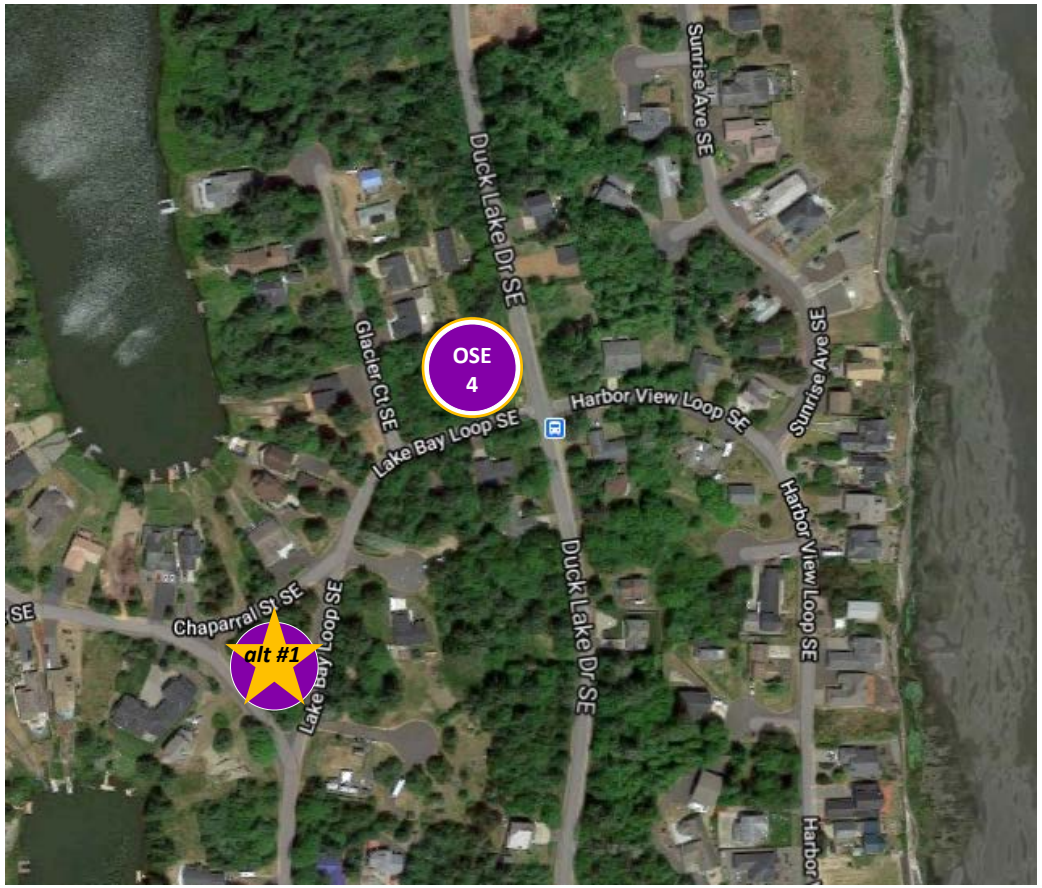
Photo Credit: *Jeana Gómez*

Ocean Shores East: OSE 3 *alternative*

OSE 3 - *Alternative #1*: City-owned properties north of Ocean Shores Elementary, at the intersection of Ocean Lake Way & Mount Olympus Avenue SE. Also, site of AHAB siren.

Photo Credit: *Jeana Gómez*

Ocean Shores East: OSE 4 + *alternative*



OSE 4	
Address	299 Duck Lake Drive SE
Intersection	Duck Lake Drive SE & Lake Bay Loop SE
Options	2
Notes	City-owned vacant land SW of intersection: #094701500000

OSE 4 - alt #1	
Address	N/a
Intersection	Chaparral Street SE & Lake Bay Loop SE
Notes	city-owned vacant lot

Source: *Google Maps*

Ocean Shores East: OSE 4

OSE 4

Photo Credit: *Jeana Gómez*

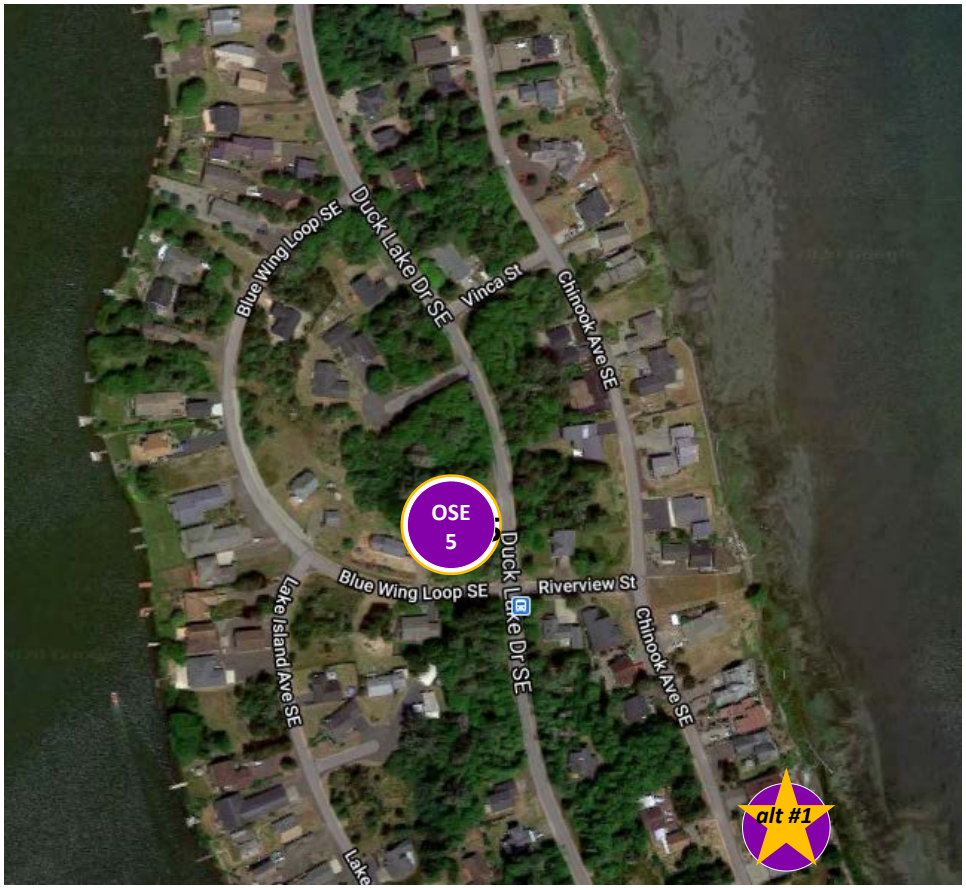
OSE 4 - Potential VES site located at the intersection of Duck Lake Drive SE & Chaparral Street SE (NW corner), photo looking NW

Ocean Shores East: OSE 4 *alternative*

Photo Credit: *Jeana Gómez*

OSE 4 - *Alternative #1*: Located just west of OSE 4 on a round parcel of land, publicly-owned by the City of Ocean Shores

Ocean Shores East: OSE 5 + *alternative*



Source: *Google Maps*

OSE 5	
Address	614 Blue Wing Loop SE
Intersection	Blue Wing Loop SE & Duck Lake Drive SE
Options	2
Notes	Currently located on private land, look for nearby vacant land -- possibly exempt available?

OSE 5 - alt #1	
Address	N/a
Intersection	Chinook Avenue SE, south of Riverview Street
Notes	city-owned ROW parcel, very small but could be adapted. Confirm?

Ocean Shores East: OSE 5

OSE 5

Photo Credit: *Jeana Gómez*

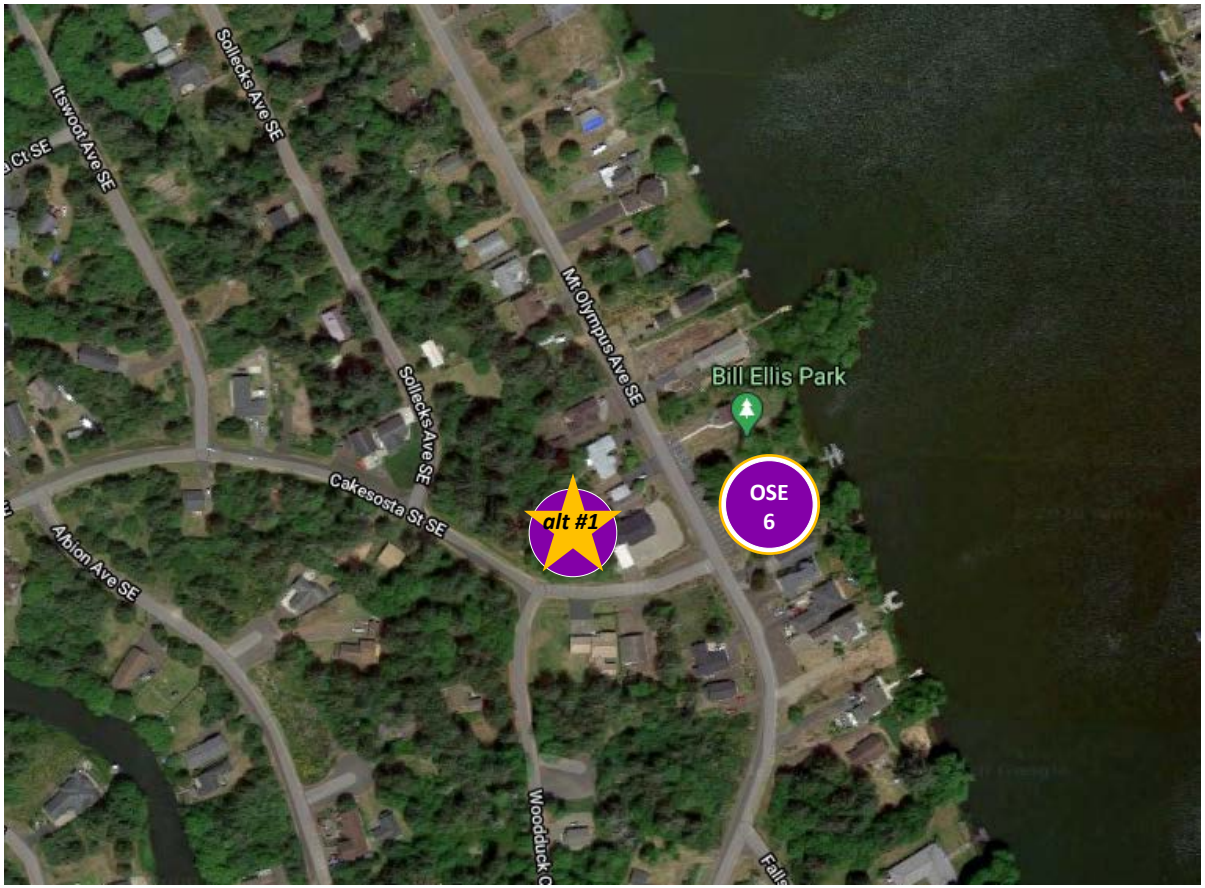
OSE 5 - This potential site is currently privately-owned, but located at a high visibility intersection.

Ocean Shores East: OSE 5 *alternative*

Photo Credit: *Jeana Gómez*

OSE 5 - *Alternative #1*: Small, narrow lot owned by the City of Ocean Shores (SE of OSE 5)

Ocean Shores East: OSE 6 + *alternative*



Source: *Google Maps*

OSE 6	
Address	698 Mt Olympus Avenue SE
Intersection	Mt Olympus Avenue SE & Cakesosta Street SE
Options	2
Notes	Currently located on private land (Bill Ellis Park, private?), but there is a city-owned ROW across the street, to the

OSE 6 - alt #1	
Address	N/a
Intersection	Mt Olympus Avenue SE & Cakesosta Street SE
Notes	City-owned ROW, across the street from Bill Ellis Park

Ocean Shores East: OSE 6

OSE 6

OSE 6 - This parcel is a community park owned and managed by the Ocean Shores Community Club: Bill Ellis Park.

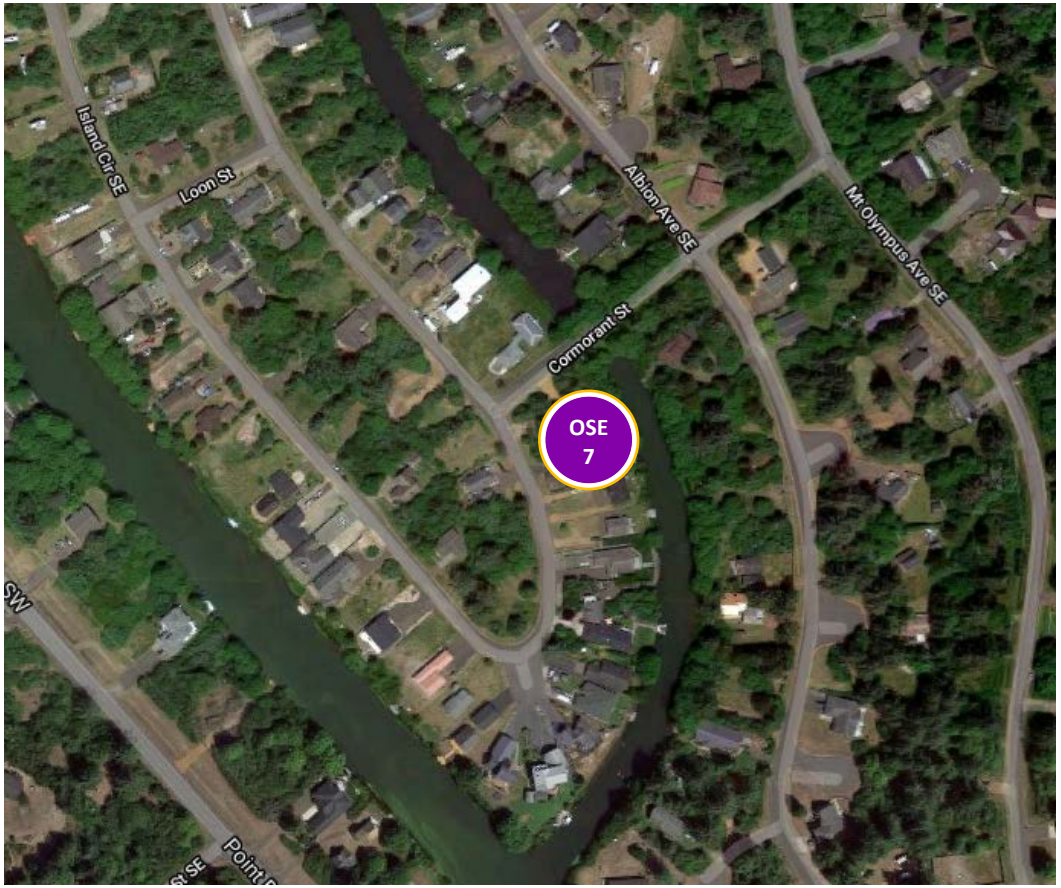
Photo Credit: *Jeana Gómez*

Ocean Shores East: OSE 6 *alternative*

Photo Credit: *Jeana Gómez*

OSE 6 - *Alternative #1*: City-owned ROW, just to the west from OSE 6, on Cakesosta Street

Ocean Shores East: OSE 7



OSE 7	
Address	165 Cormorant Street SE
Intersection	Cormorant Street & Island Circle SE
Options	2
Notes	Currently located on private land -- look for nearby vacant private land

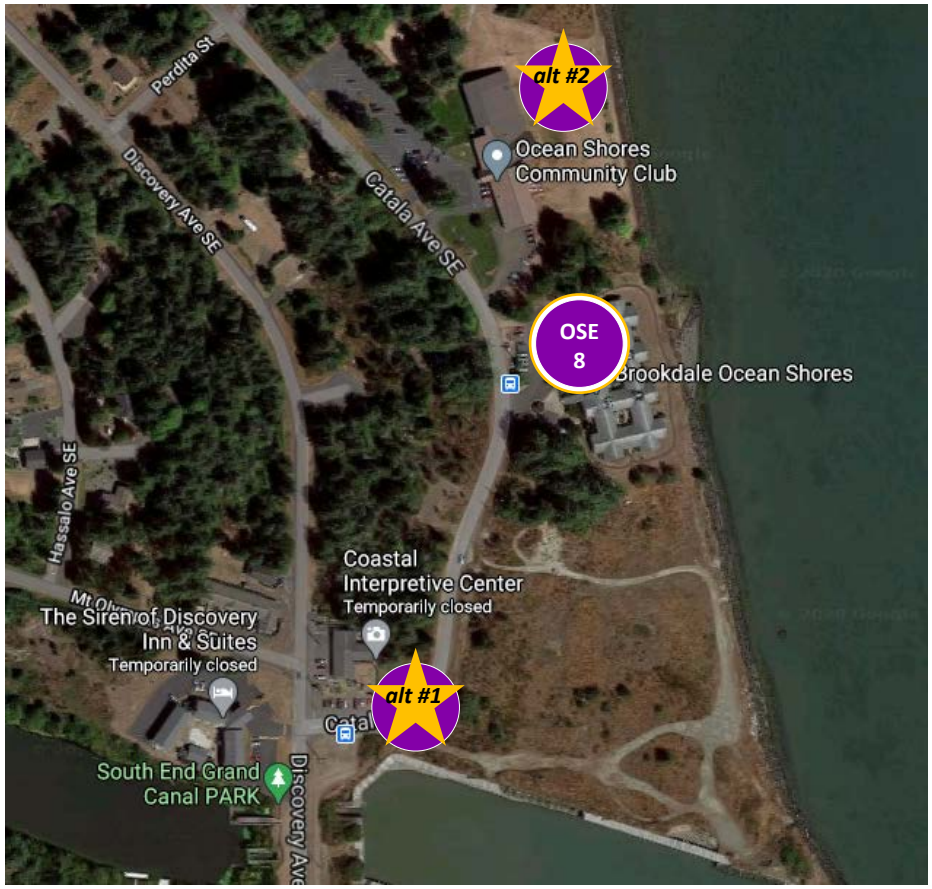
Source: *Google Maps*

Ocean Shores East: OSE 7

Photo Credit: *Jeana Gómez*

OSE 7 - This potential site is currently privately-owned, but undeveloped.

Ocean Shores East: OSE 8 + *alternatives*



Source: *Google Maps*

OSE 8	
Address	N/a
Intersection	1020 Catala Avenue SE
Options	2
Notes	Brookdale Senior Assisted Living. Locate tower here or on nearby City-owned land, to the SW (Coastal Interpretive Center): #092900059300

OSE 8 - alt #1	
Address	1033 Catala Avenue SE
Intersection	Catala Avenue SE & Discovery Avenue SE
Notes	Coastal Interpretive Center

OSE 8 - alt #2	
Address	1015 Catala Avenue SE
Intersection	Catala Avenue SE, south of Perdita Street
Notes	Ocean Shores Community Club

Ocean Shores East: OSE 8

OSE 8



OSE 8 - This potential site is located at the Brookdale Senior Assisted Living facility. There is potentially space in the parking lot or adjacent open space for a VES tower.

Photo Credit: *Jeana Gómez*

Ocean Shores East: OSE 8 *alternative #1*

OSE 8 - *Alternative #1*: City-owned property, Coastal Interpretive Center, with vacant land to the NE of the parcel along Catala Avenue SE

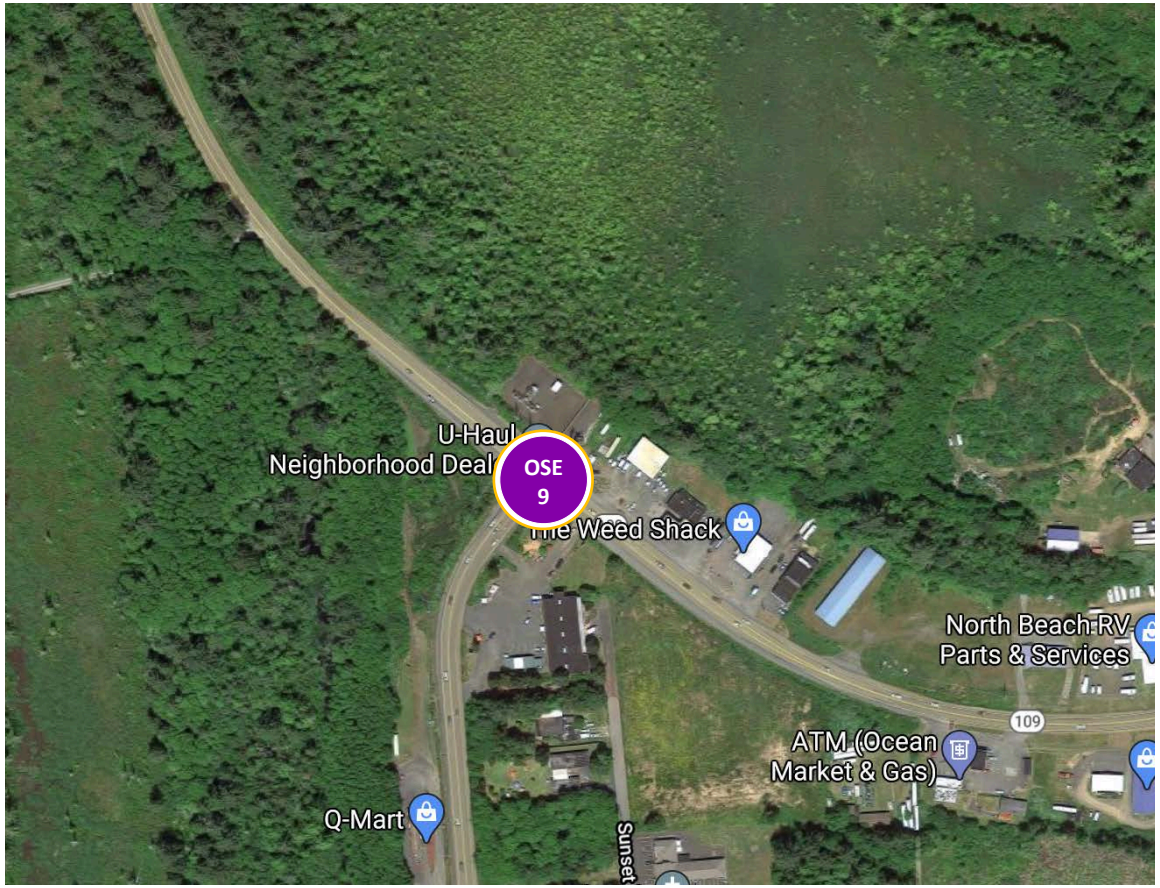
Photo Credit: *Jeana Gómez*

Ocean Shores East: OSE 8 *alternative #2*

OSE 8 - *Alternative #2*: Ocean Shores Community Club-owned property just north of OSE 8. Lots of open space that could potentially accommodate a VES tower.

Photo Credit: *Google Maps Street View*

Ocean Shores East: OSE 9



Source: *Google Maps*

OSE 9	
Address	2308 State Route 109
Intersection	State Route 109 & State Route 115
Options	3, 4
Notes	Public Utility District #1-owned land, just outside the study area (northeast corner of the intersection). Parcel #181215440030

Ocean Shores East: OSE 9

OSE 9

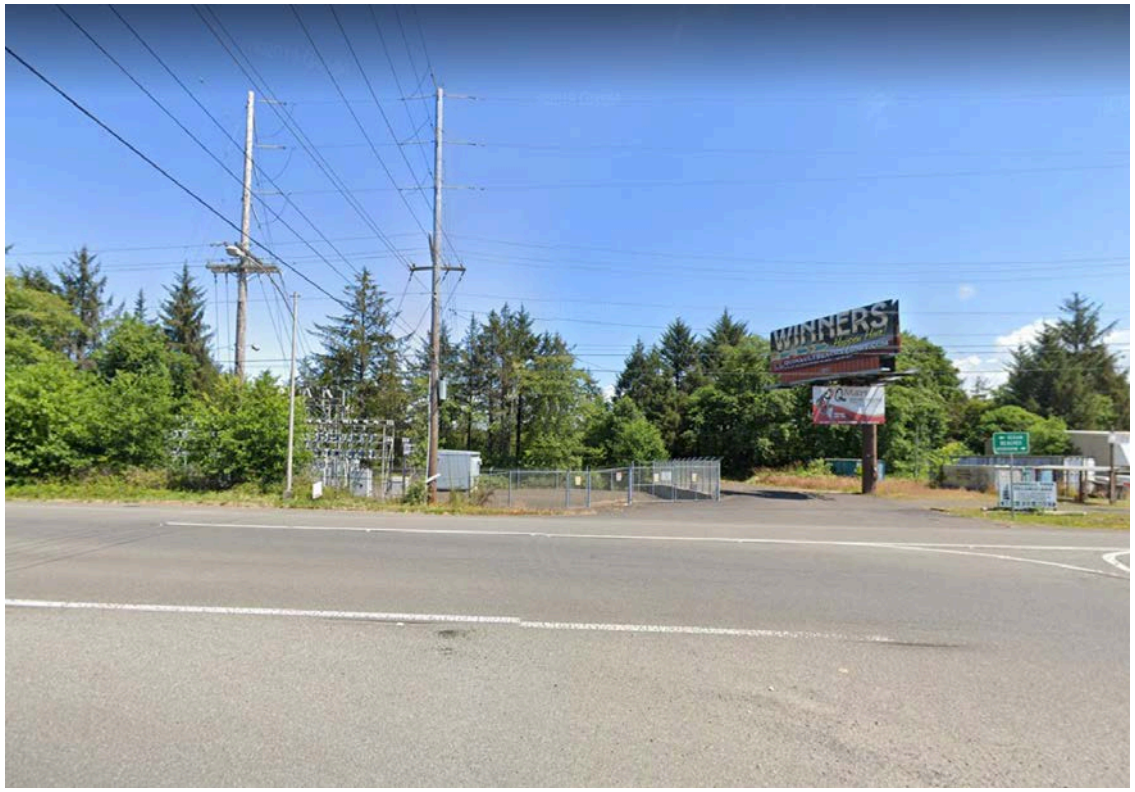


Photo Credit: *Google Maps Street View*

OSE 9 - Public Utility District #1-owned land located at prominent intersection, including highway “turnoff” to Ocean Shores.

Ocean Shores East: OSE 10

Source: *Google Maps*

OSE 10	
Address	E Rain Street NE
Intersection	E Rain Street NE & Cardinal Avenue NE
Options	3, 4
Notes	City-owned vacant parcel at key residential intersection, near canal. Parcel #095101300000.

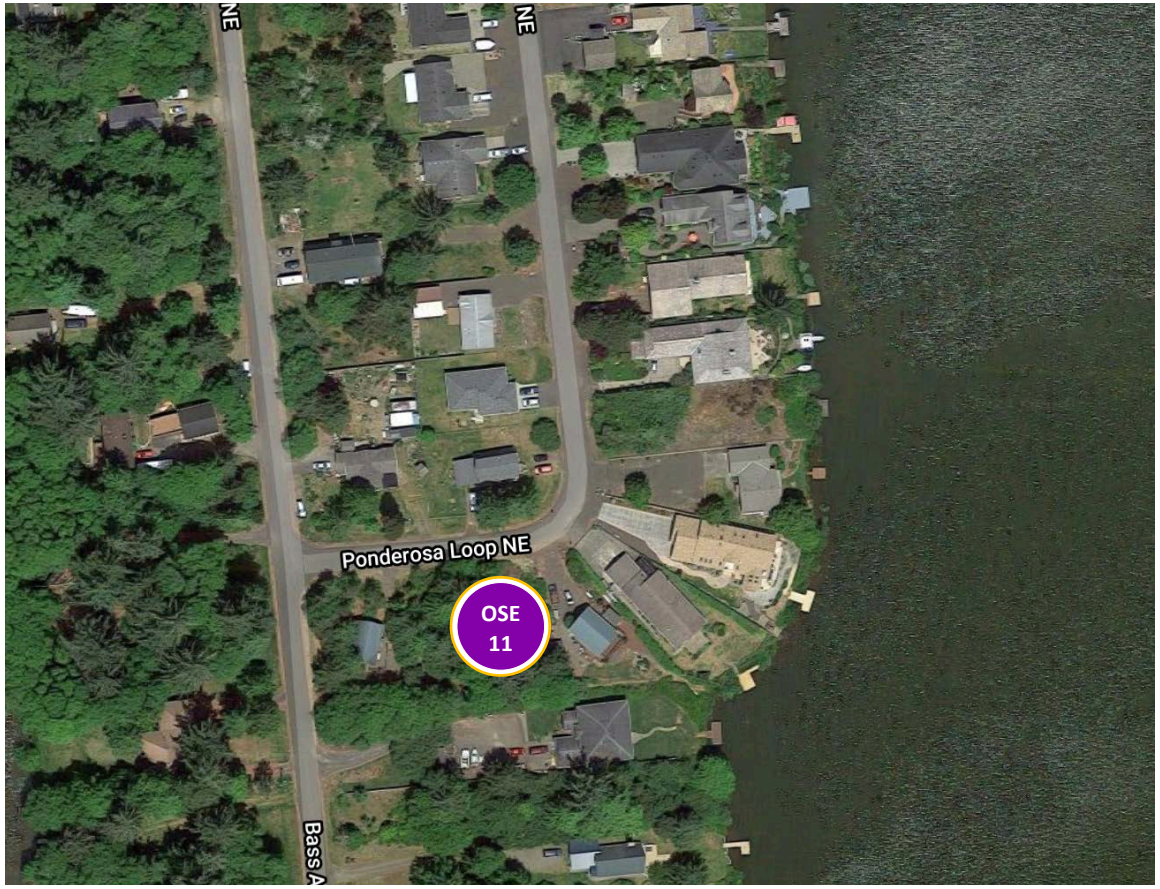
Ocean Shores East: OSE 10

OSE 10

Photo Credit: *Google Maps Street View*

OSE 10 - Vacant city-owned land at an intersection in a residential neighborhood in north Ocean Shores.

Ocean Shores East: OSE 11



Source: *Google Maps*

OSE 11	
Address	308 Ponderosa Loop NE
Intersection	Ponderosa Loop NE & Bass Avenue NE
Options	3, 4
Notes	Privately-owned vacant lot. Parcel #094901206100

Ocean Shores East: OSE 11

OSE 11

Photo Credit: *Google Maps Street View*

OSE 11 - Privately-owned vacant lot.

Ocean Shores East: OSE 12

Source: *Google Maps*

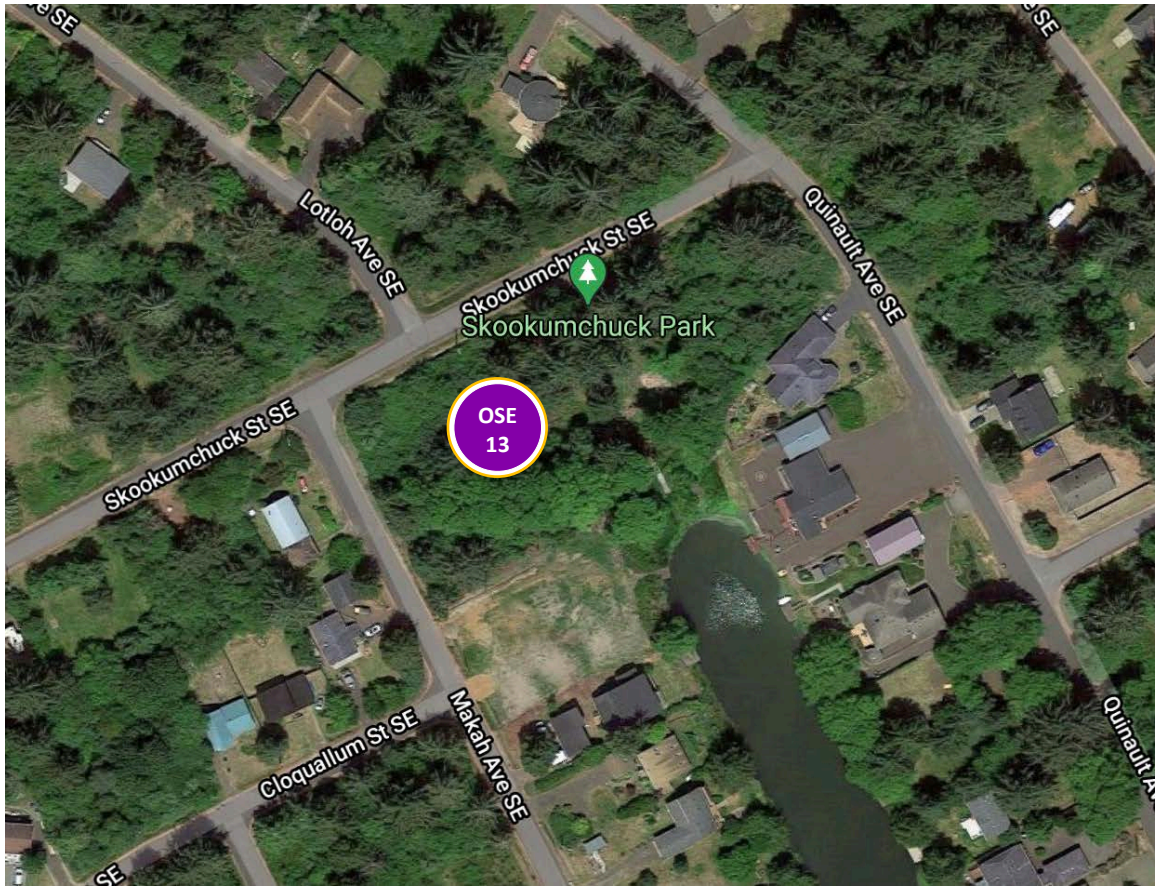
OSE 12	
Address	201 Olympic View Avenue NE
Intersection	Olympic View Avenue & Hutton Street NE
Options	3, 4
Notes	Privately-owned vacant lot on corner. Parcel #94900601400

Ocean Shores East: OSE 12

Photo Credit: *Google Maps Street View*

OSE 12 - Privately-owned, vacant lot.

Ocean Shores East: OSE 13



Source: *Google Maps*

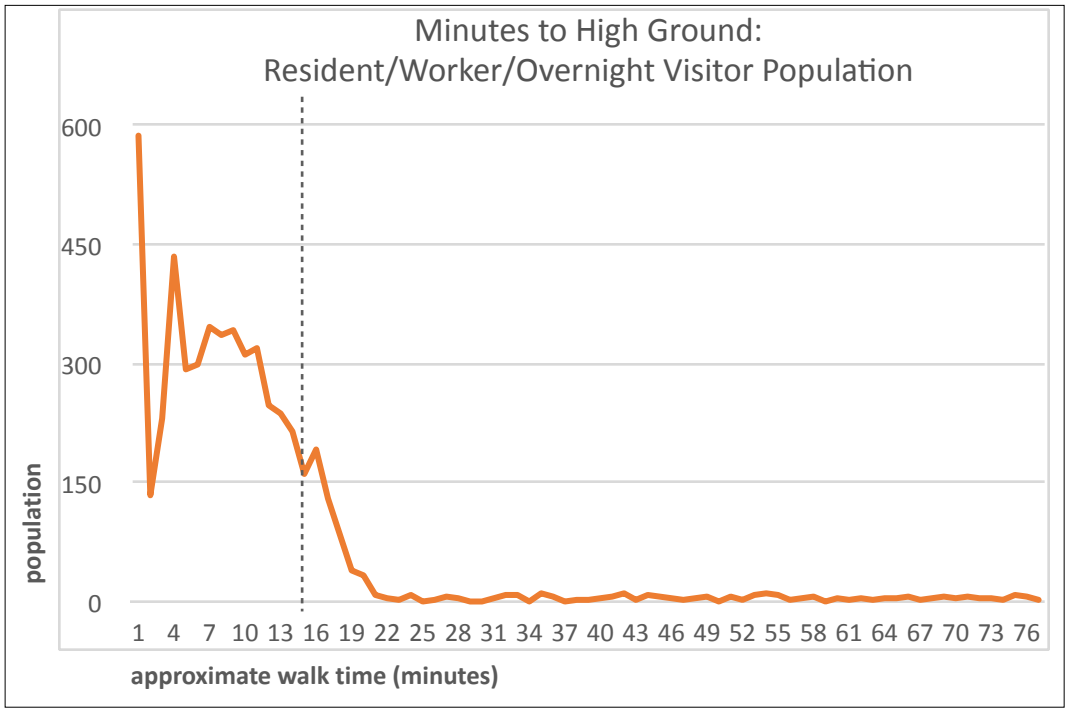
OSE 13	
Address	Skookumchuck Street SE
Intersection	Skookumchuck Street SE & Makah Avenue SE
Options	3, 4
Notes	Skookumchuck Park. Owned by the Ocean Shores Community Club. Parcel #91900061500

Ocean Shores East: OSE 13

Photo Credit: *Google Maps Street View*

OSE 13 - OSCC-owned park (Skookumchuck Park).

Ocean Shores - East: VES Option #3 (Broad Spatial Coverage)



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

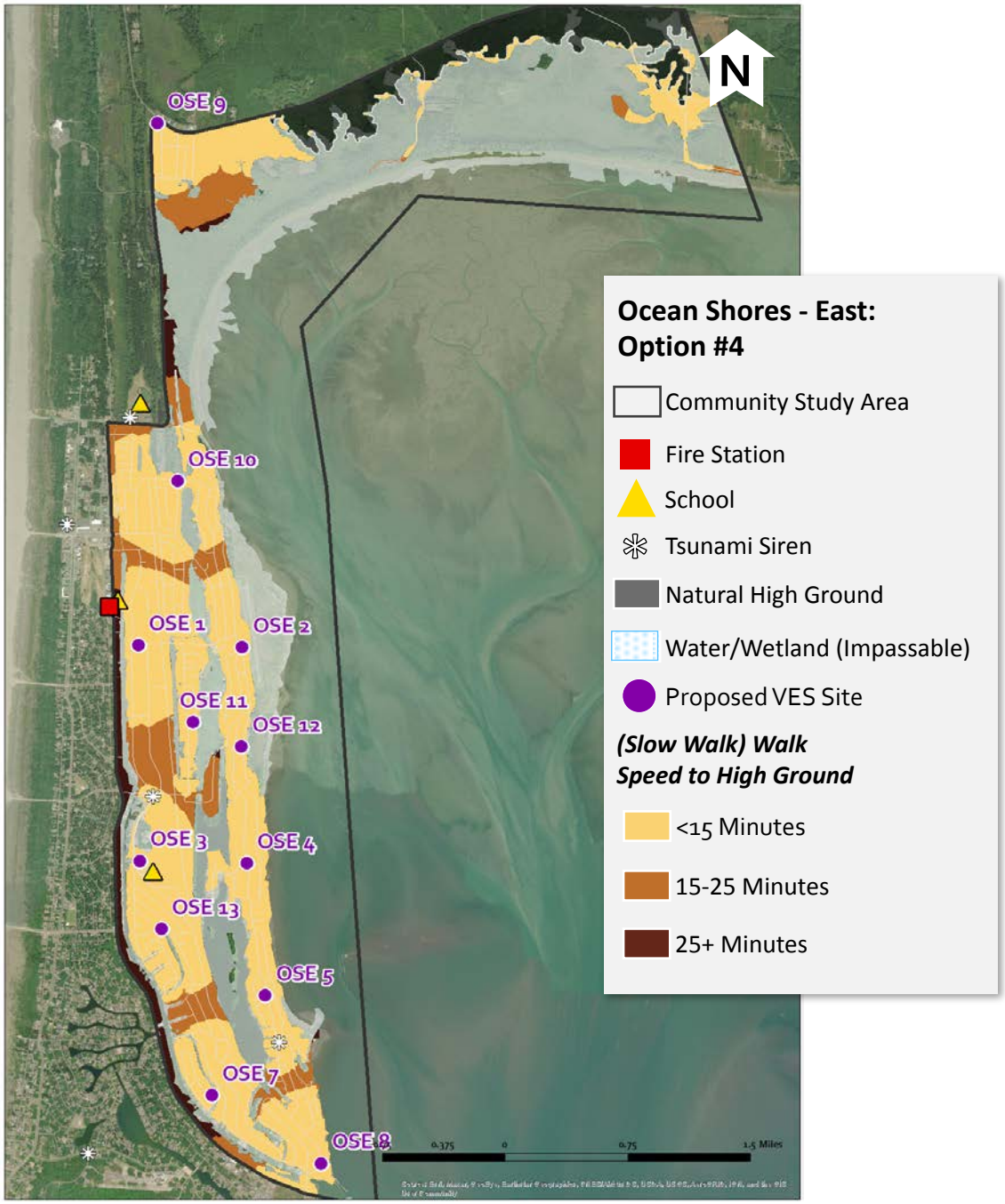
<15 minutes	15-25 minutes	25+ minutes
4,630 people	661 people	267 people

■ *Fire Station: N/A*

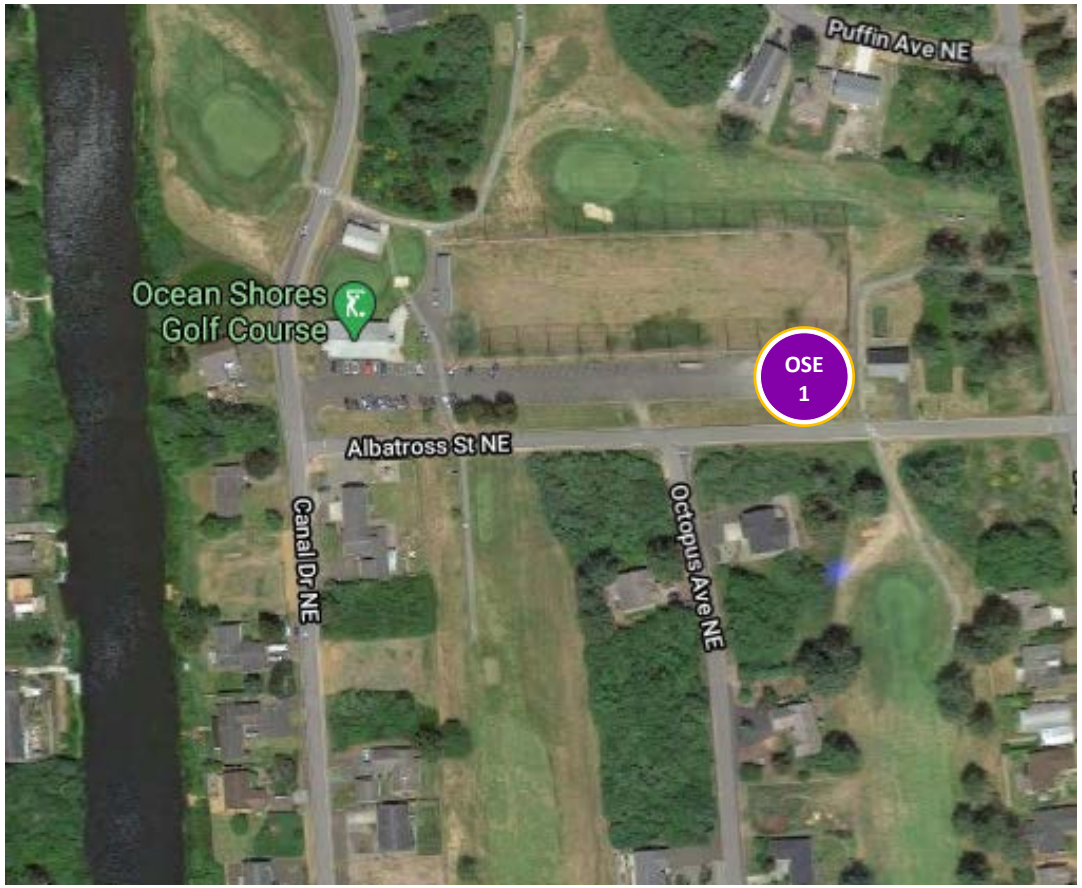
▲ *Schools: Approximate 2 and 27 minute walk time to high ground or VES*

Under **Option #3:**

- approximately **83.3%** of the total estimated Ocean Shores - East 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 = **77** minutes
- approximate *minimum* VES capacity need (15 minute walk time) = **4,140** people
- # of proposed VES = **13**


N
OSE 9
OSE 10
OSE 1
OSE 2
OSE 11
OSE 12
OSE 3
OSE 4
OSE 13
OSE 5
OSE 7
OSE 8
0.375
0
0.75
1.5 Miles
Ocean Shores - East:
Option #4
Community Study Area
Fire Station
School
Tsunami Siren
Natural High Ground
Water/Wetland (Impassable)
Proposed VES Site
(Slow Walk) Walk
Speed to High Ground
<15 Minutes
15-25 Minutes
25+ Minutes

Ocean Shores East: OSE 1



OSE 1	
Address	N/a
Intersection	Octopus Avenue NE & Albatross Street NE
Options	2
Notes	City of Ocean Shores recreational land (Ocean Shores Golf Course)

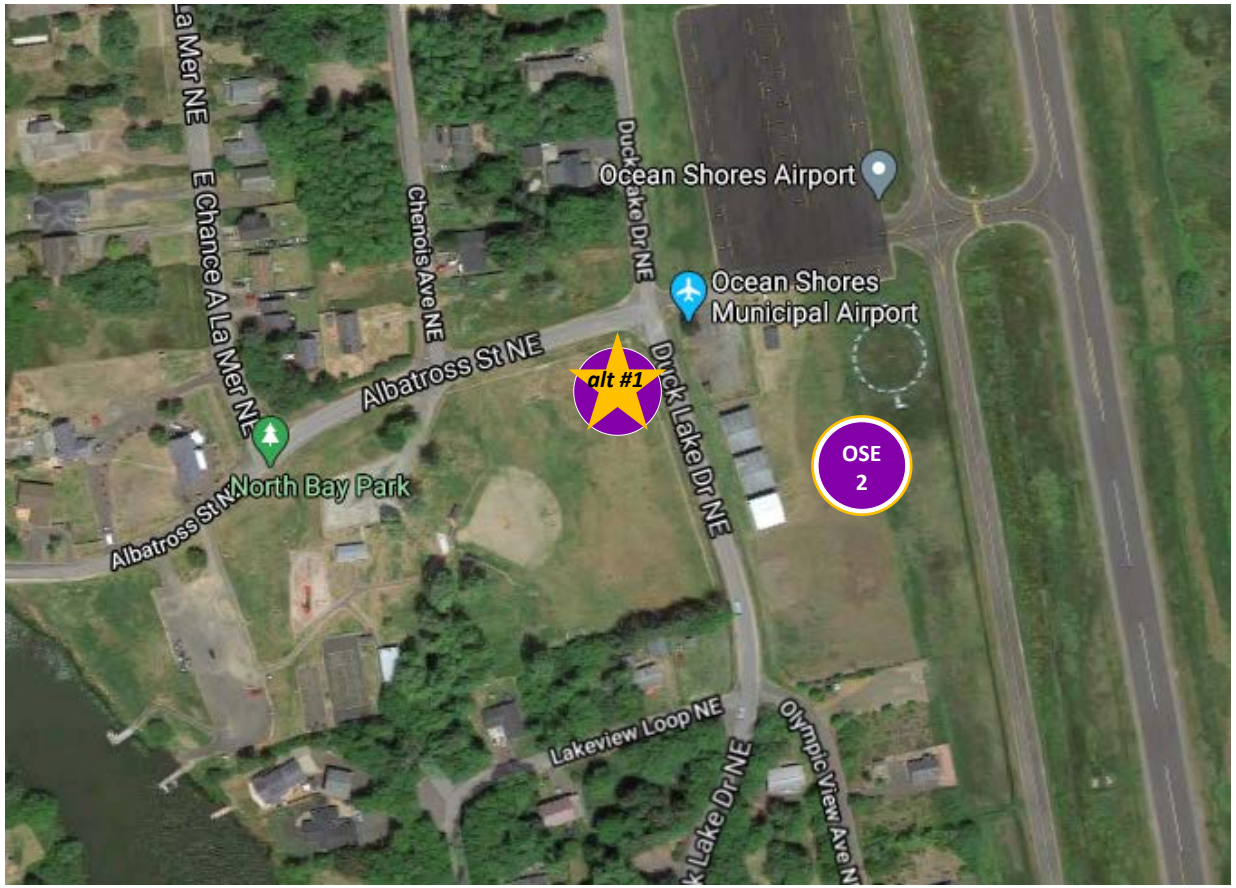
Source: *Google Maps*

Ocean Shores East: OSE 1

OSE 1 - Potential VES could be located in the parking lot

OSE 1 - AHAB siren site Photo Credit: *Jeana Gómez*

Ocean Shores East: OSE 2 + *alternative*



OSE 2	
Address	498 Duck Lake Drive NE
Intersection	Duck Lake Drive NE & Albatross Street NE
Options	2
Notes	Ocean Shores Municipal Airport

OSE 2 - alt #1	
Address	N/a
Intersection	Albatross Street NE & Duck Lake Drive NE
Notes	City-owned land, North Bay Park

Source: *Google Maps*

Ocean Shores East: OSE 2

OSE 2

Photo Credit: *Jeana Gómez*

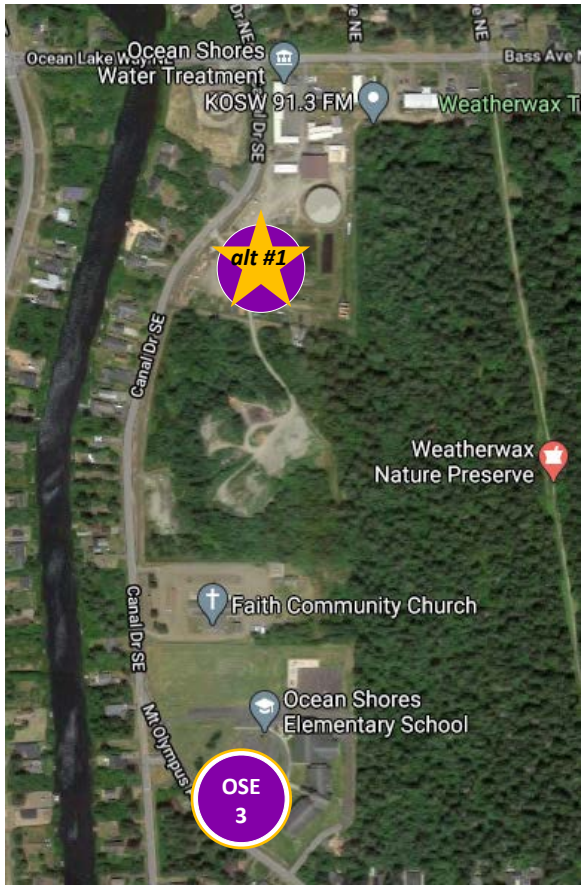
OSE 2 - looking east towards airport

Ocean Shores East: OSE 2 *alternative*

OSE 2 - *Alternative #1*: North Bay Park, adjacent to the Municipal Airport, to the west.

Photo Credit: *Jeana Gómez*

Ocean Shores East: OSE 3 + *alternative*



OSE 3	
Address	300 Mt Olympus Avenue SE
Intersection	SE of Canal Drive SE & Mt Olympus Avenue SE
Options	2
Notes	Ocean Shores Elementary

OSE 3 - alt #1	
Address	165 Ocean Lake Way
Intersection	Ocean Lake Way & Canal Drive SE
Notes	City-owned land, with other city services and storage, office, etc.

Source: *Google Maps*

Ocean Shores East: OSE 3

OSE 3

OSE 3 - Potential VES site at Ocean Shores Elementary (parking lot, most likely)

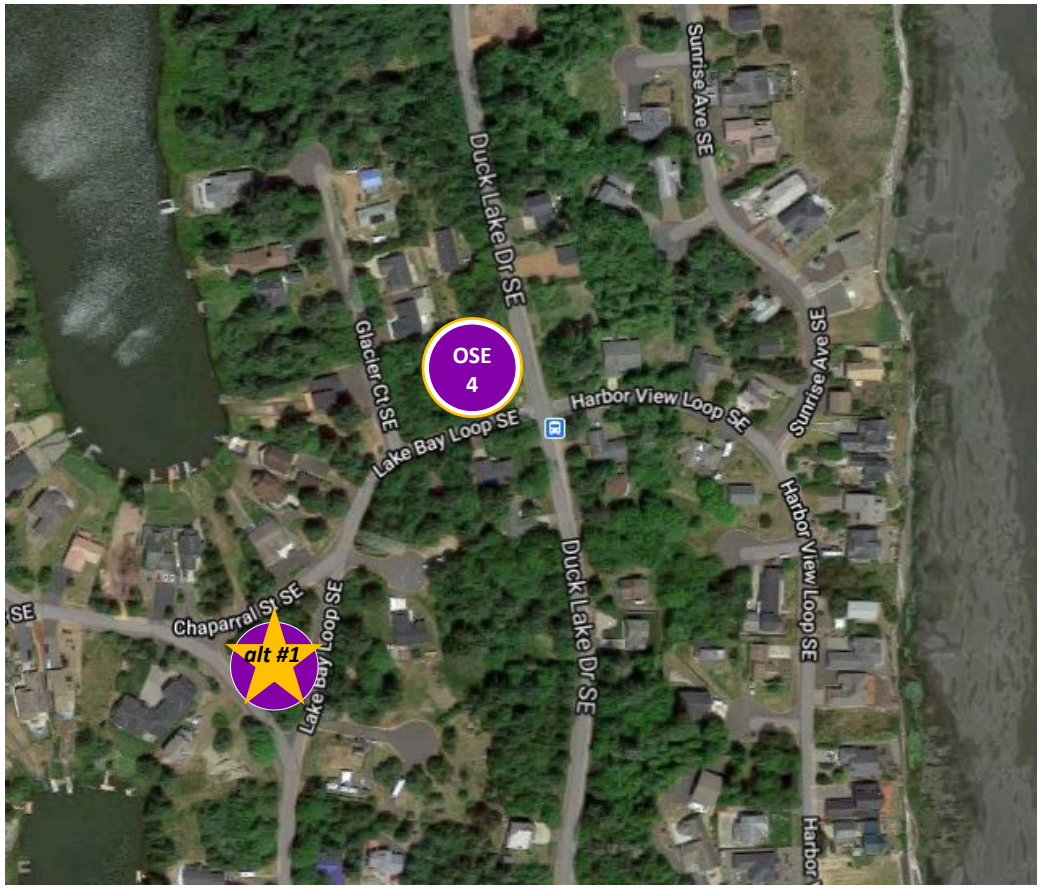
Photo Credit: *Jeana Gómez*

Ocean Shores East: OSE 3 *alternative*

OSE 3 - *Alternative #1*: City-owned properties north of Ocean Shores Elementary, at the intersection of Ocean Lake Way & Mount Olympus Avenue SE. Also, site of AHAB siren.

Photo Credit: *Jeana Gómez*

Ocean Shores East: OSE 4 + *alternative*



OSE 4	
Address	299 Duck Lake Drive SE
Intersection	Duck Lake Drive SE & Lake Bay Loop SE
Options	2
Notes	City-owned vacant land SW of intersection: #094701500000

OSE 4 - alt #1	
Address	N/a
Intersection	Chaparral Street SE & Lake Bay Loop SE
Notes	city-owned vacant lot

Source: *Google Maps*

Ocean Shores East: OSE 4

OSE 4

Photo Credit: *Jeana Gómez*

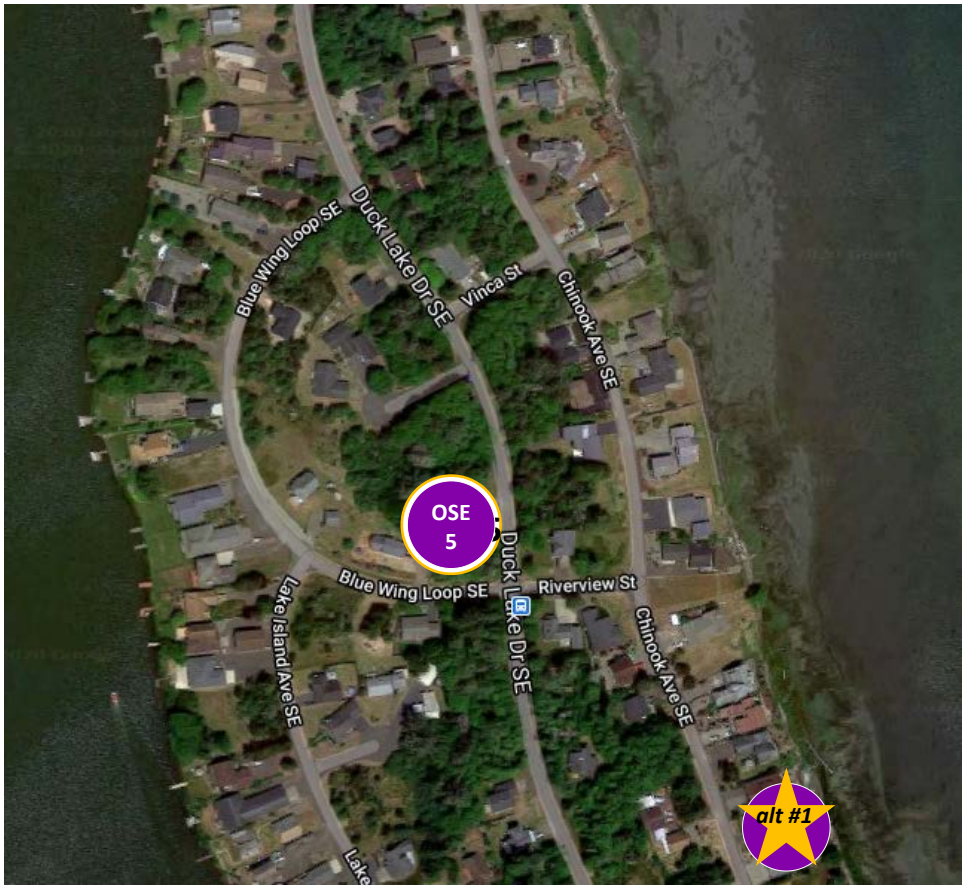
OSE 4 - Potential VES site located at the intersection of Duck Lake Drive SE & Chaparral Street SE (NW corner), photo looking NW

Ocean Shores East: OSE 4 *alternative*

Photo Credit: *Jeana Gómez*

OSE 4 - *Alternative #1*: Located just west of OSE 4 on a round parcel of land, publicly-owned by the City of Ocean Shores

Ocean Shores East: OSE 5 + *alternative*



Source: *Google Maps*

OSE 5	
Address	614 Blue Wing Loop SE
Intersection	Blue Wing Loop SE & Duck Lake Drive SE
Options	2
Notes	Currently located on private land, look for nearby vacant land -- possibly exempt available?

OSE 5 - alt #1	
Address	N/a
Intersection	Chinook Avenue SE, south of Riverview Street
Notes	city-owned ROW parcel, very small but could be adapted. Confirm?

Ocean Shores East: OSE 5

OSE 5

Photo Credit: *Jeana Gómez*

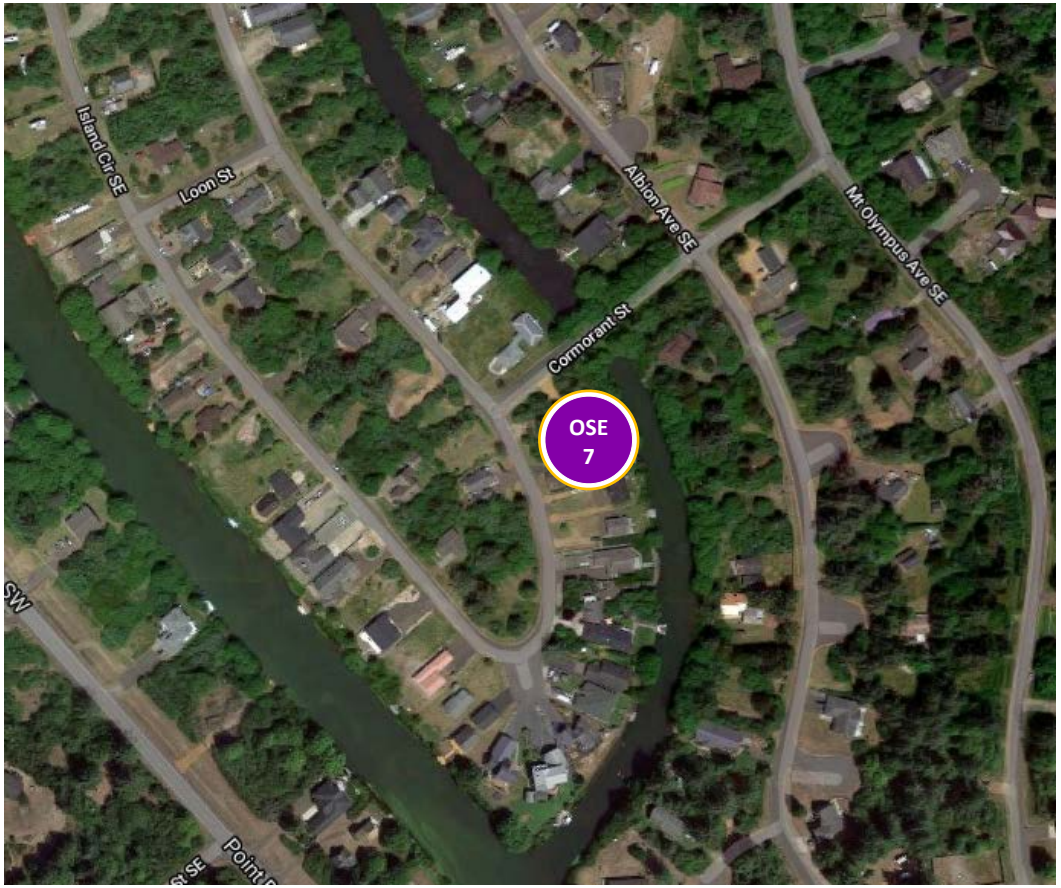
OSE 5 - This potential site is currently privately-owned, but located at a high visibility intersection.

Ocean Shores East: OSE 5 *alternative*

Photo Credit: *Jeana Gómez*

OSE 5 - *Alternative #1*: Small, narrow lot owned by the City of Ocean Shores (SE of OSE 5)

Ocean Shores East: OSE 7



OSE 7	
Address	165 Cormorant Street SE
Intersection	Cormorant Street & Island Circle SE
Options	2
Notes	Currently located on private land -- look for nearby vacant private land

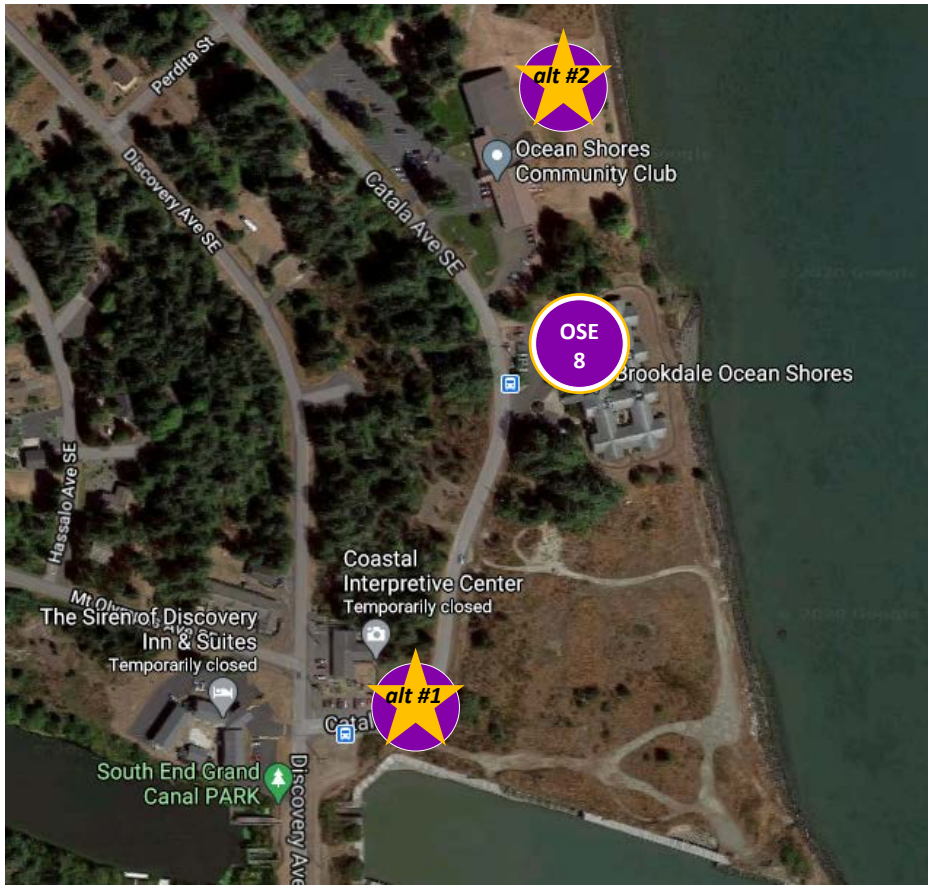
Source: *Google Maps*

Ocean Shores East: OSE 7

Photo Credit: *Jeana Gómez*

OSE 7 - This potential site is currently privately-owned, but undeveloped.

Ocean Shores East: OSE 8 + *alternatives*



Source: *Google Maps*

OSE 8	
Address	N/a
Intersection	1020 Catala Avenue SE
Options	2
Notes	Brookdale Senior Assisted Living. Locate tower here or on nearby City-owned land, to the SW (Coastal Interpretive Center): #092900059300

OSE 8 - alt #1	
Address	1033 Catala Avenue SE
Intersection	Catala Avenue SE & Discovery Avenue SE
Notes	Coastal Interpretive Center

OSE 8 - alt #2	
Address	1015 Catala Avenue SE
Intersection	Catala Avenue SE, south of Perdita Street
Notes	Ocean Shores Community Club

Ocean Shores East: OSE 8

OSE 8



OSE 8 - This potential site is located at the Brookdale Senior Assisted Living facility. There is potentially space in the parking lot or adjacent open space for a VES tower.

Photo Credit: *Jeana Gómez*

Ocean Shores East: OSE 8 *alternative #1*



OSE 8 - *Alternative #1*: City-owned property, Coastal Interpretive Center, with vacant land to the NE of the parcel along Catala Avenue SE

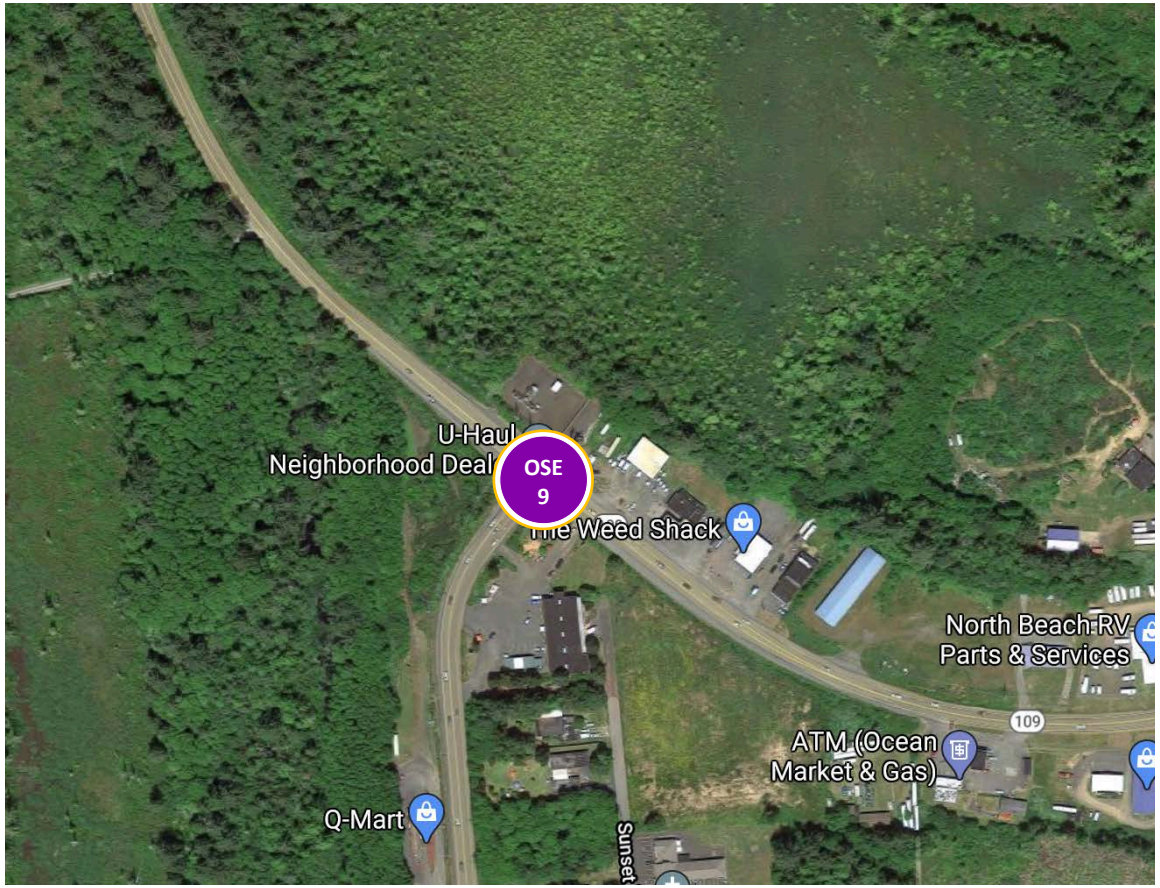
Photo Credit: *Jeana Gómez*

Ocean Shores East: OSE 8 *alternative #2*

OSE 8 - *Alternative #2*: Ocean Shores Community Club-owned property just north of OSE 8. Lots of open space that could potentially accommodate a VES tower.

Photo Credit: *Google Maps Street View*

Ocean Shores East: OSE 9



Source: *Google Maps*

OSE 9	
Address	2308 State Route 109
Intersection	State Route 109 & State Route 115
Options	3, 4
Notes	Public Utility District #1-owned land, just outside the study area (northeast corner of the intersection). Parcel #181215440030

Ocean Shores East: OSE 9

OSE 9

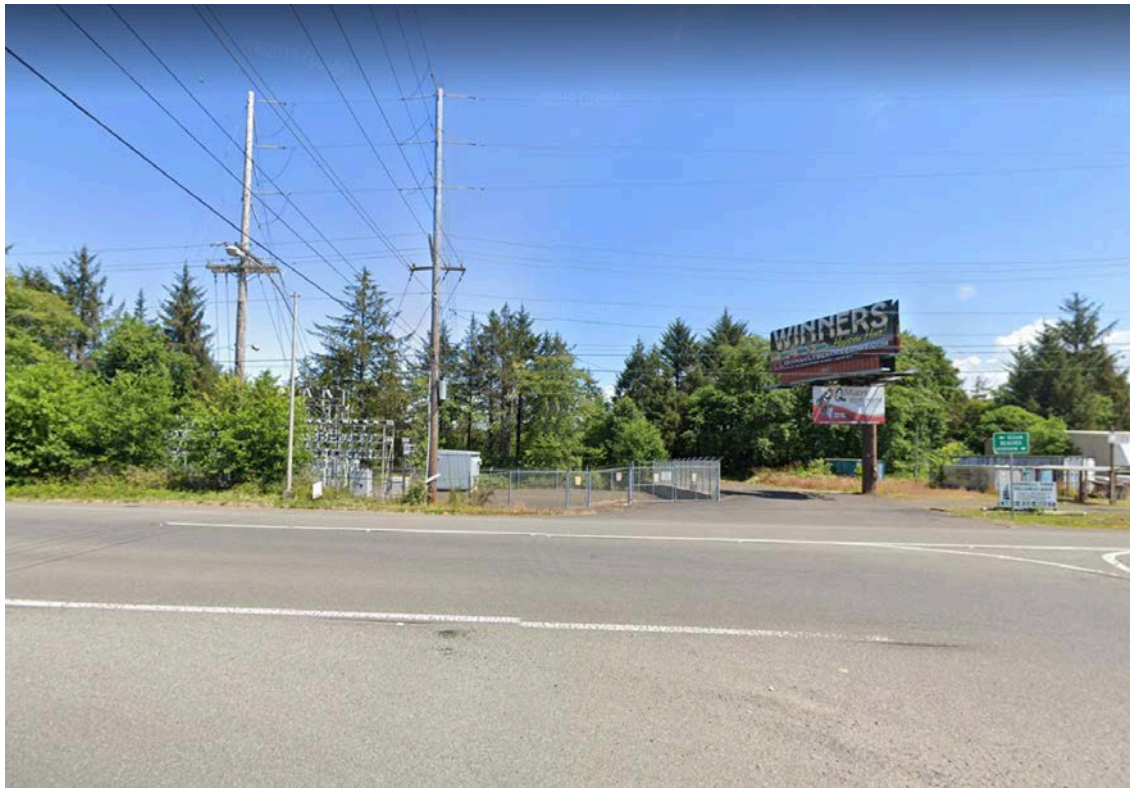


Photo Credit: *Google Maps Street View*

OSE 9 - Public Utility District #1-owned land located at prominent intersection, including highway “turnoff” to Ocean Shores.

Ocean Shores East: OSE 10

Source: *Google Maps*

OSE 10	
Address	E Rain Street NE
Intersection	E Rain Street NE & Cardinal Avenue NE
Options	3, 4
Notes	City-owned vacant parcel at key residential intersection, near canal. Parcel #095101300000.

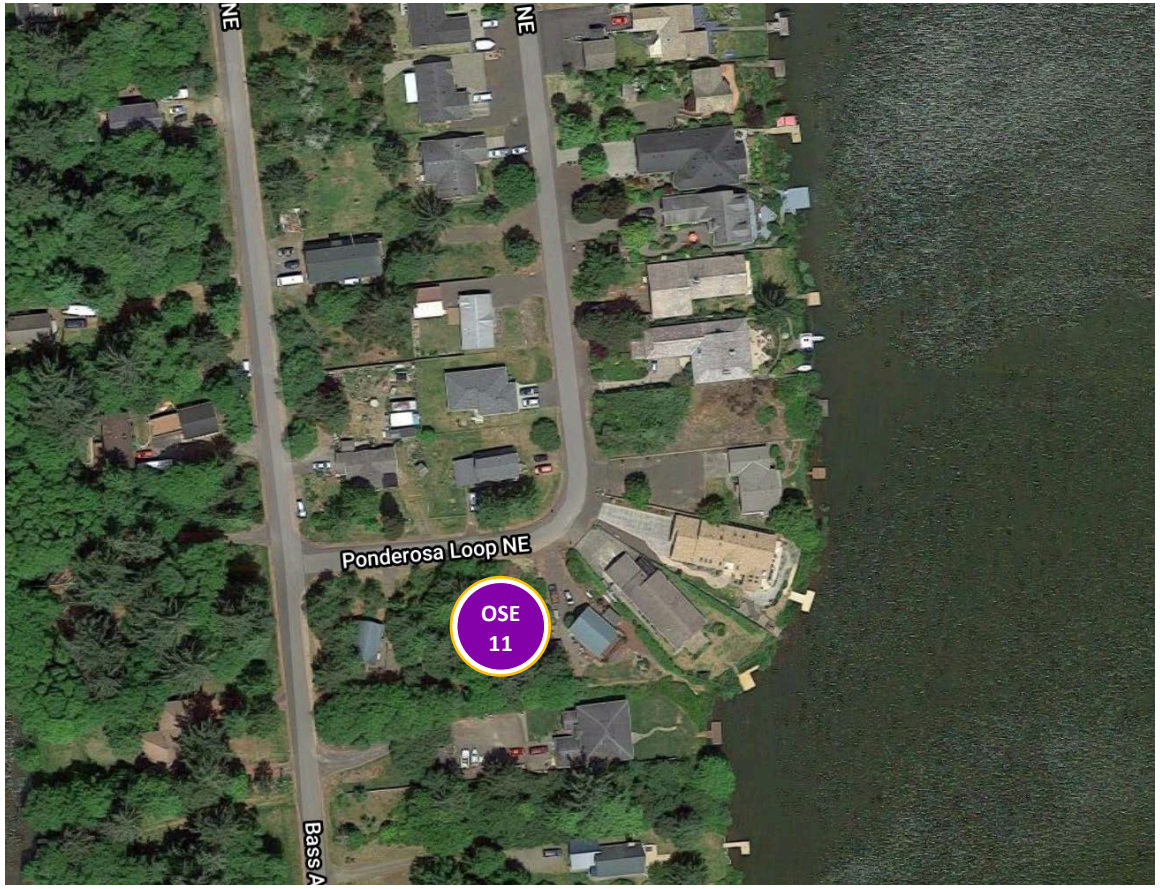
Ocean Shores East: OSE 10

OSE 10

Photo Credit: *Google Maps Street View*

OSE 10 - Vacant city-owned land at an intersection in a residential neighborhood in north Ocean Shores.

Ocean Shores East: OSE 11



Source: *Google Maps*

OSE 11	
Address	308 Ponderosa Loop NE
Intersection	Ponderosa Loop NE & Bass Avenue NE
Options	3, 4
Notes	Privately-owned vacant lot. Parcel #094901206100

Ocean Shores East: OSE 11

OSE 11

Photo Credit: *Google Maps Street View*

OSE 11 - Privately-owned vacant lot.

Ocean Shores East: OSE 12

Source: *Google Maps*

OSE 12	
Address	201 Olympic View Avenue NE
Intersection	Olympic View Avenue & Hutton Street NE
Options	3, 4
Notes	Privately-owned vacant lot on corner. Parcel #94900601400

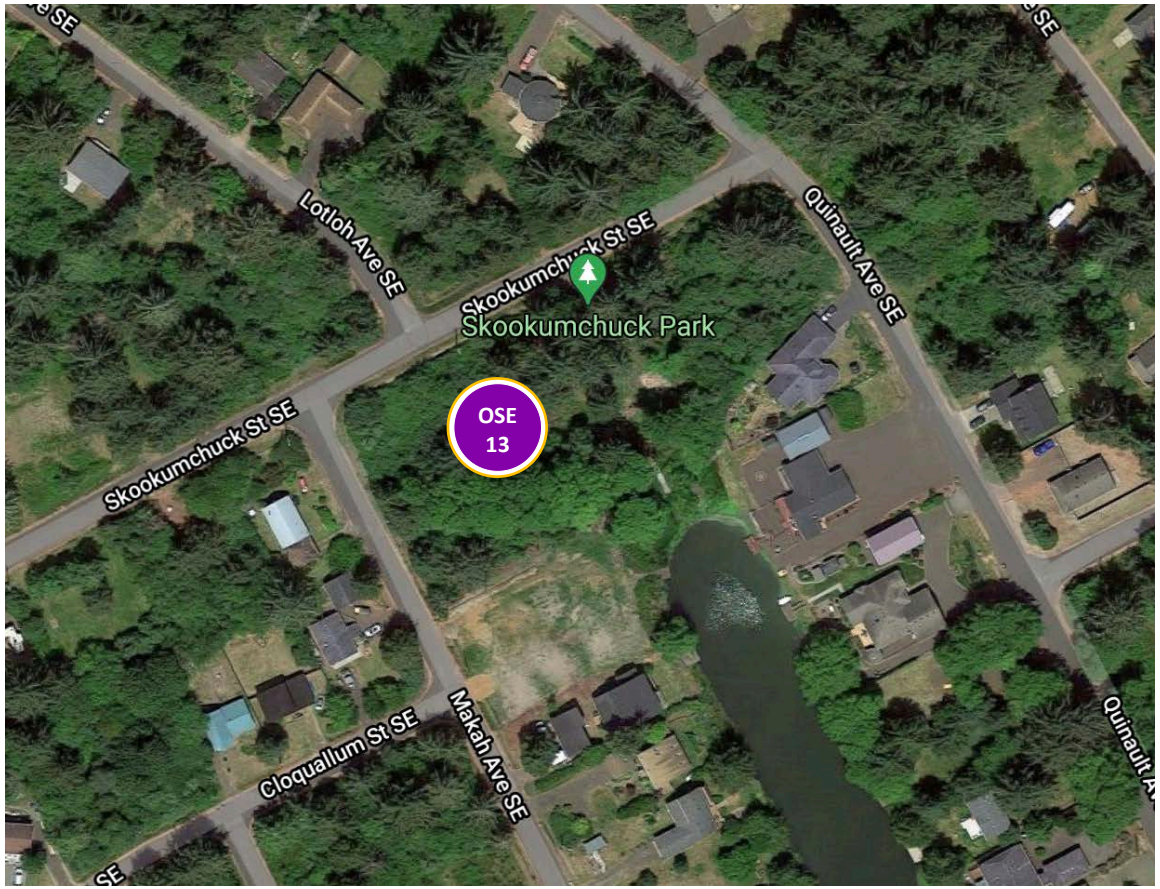
Ocean Shores East: OSE 12

OSE 12

Photo Credit: *Google Maps Street View*

OSE 12 - Privately-owned, vacant lot.

Ocean Shores East: OSE 13



Source: *Google Maps*

OSE 13	
Address	Skookumchuck Street SE
Intersection	Skookumchuck Street SE & Makah Avenue SE
Options	3, 4
Notes	Skookumchuck Park. Owned by the Ocean Shores Community Club. Parcel #91900061500

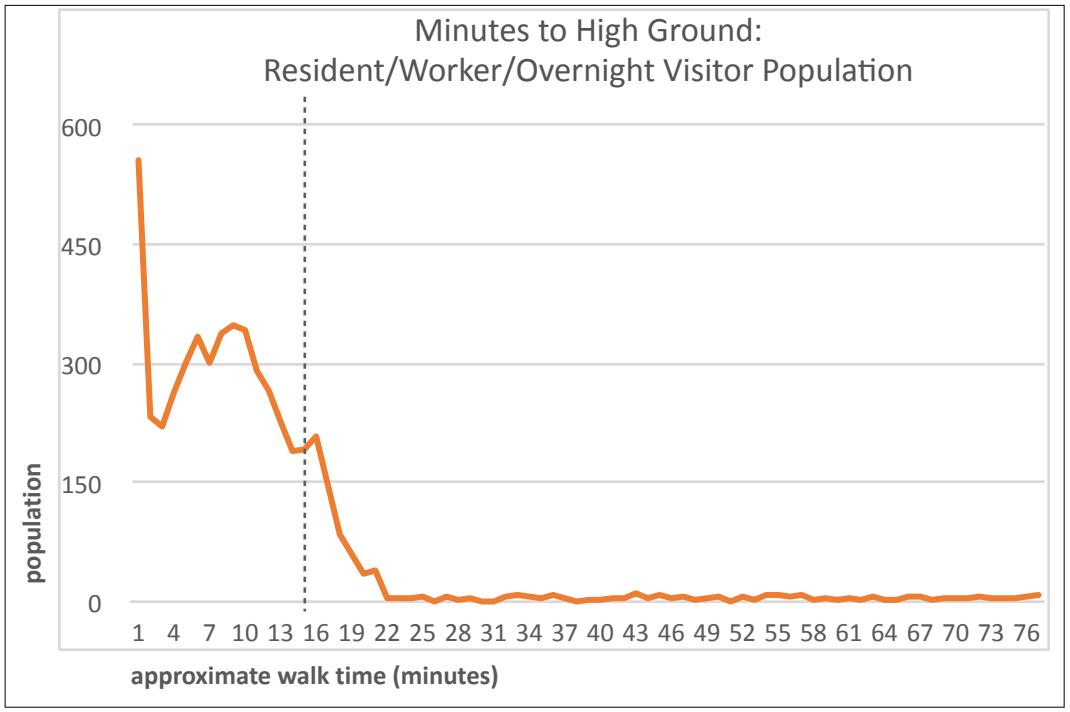
Ocean Shores East: OSE 13

Photo Credit: *Google Maps Street View*

OSE 13 - OSCC-owned park (Skookumchuck Park).

OSW

Ocean Shores - East: VES Option #4 (Efficient/Lean)



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

<15 minutes	15-25 minutes	25+ minutes
4,508 people	783 people	267 people

Fire Station: N/A

Schools: Approximate 2 and 28 minute walk time to high ground or VES

Under **Option #4:**

- approximately **81.1%** of the total estimated Ocean Shores - East 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 = **77** minutes
- approximate *minimum* VES capacity need (15 minute walk time) = **4,018** people
- # of proposed VES = **12**

OSE

Potential Ocean Shores East VES Locations: All Options (1-4)

VES ID	Intersection	Parcel ID	Parcel Owner	Lat | Long	Options	Notes
OSE 1	Octopus Avenue NE & Albatross Street NE	90500079700	City of Ocean Shores	46.997690, -124.157170	2, 3, 4	City of Ocean Shores recreational land (Ocean Shores Golf Course)
OSE 2	Duck Lake Drive NE & Albatross Street NE	94900900100	City of Ocean Shores	46.998326, -124.143688	2, 3, 4	Ocean Shores Municipal Airport
OSE 3	300 Mt Olympus Avenue SE	617121014001	North Beach School District #64	46.978038, -124.155899	2, 3, 4	Ocean Shores Elementary
OSE 4	Duck Lake Drive SE & Lake Bay Loop SE	94700118200	Darlene J & Roland J Bahr Trust	46.978869, -124.141928	2, 3, 4	City-owned vacant land SW of intersection: #094701500000
OSE 5	Blue Wing Loop SE & Duck Lake Drive SE	94700500100	Diane Siebert & Chris Blackwell	46.967208, -124.138620	2, 3, 4	Currently located on private land, look for nearby vacant land -- possibly exempt available? #094701200000 is nearby, just SE
OSE 6	Mt Olympus Avenue SE & Cakesosta Street SE	91900061601	Ocean Shores Community Club	46.963596, -124.143383	2, 3	Currently located on private land (Bill Ellis Park, private?), but there is a city-owned ROW across the street, to the west: #091900061700
OSE 7	Cormorant Street & Island Circle SE	92700016600	Lori & Brent Gambriell	46.958165, -124.145076	2, 3, 4	Currently located on private land -- look for nearby vacant private land
OSE 8	1020 Catala Avenue SE	92900060102	Quinault Land & Timber Enterprises	46.952658, -124.130549	2, 3, 4	Brookdale Senior Assisted Living. Either locate tower here or on nearby City-owned land, to the SW (Coastal Interpretive Center): #092900059300
OSE 9	State Route 109 & State Route 115	181215440030	Public Utility District #1	47.044871, -124.158170	3, 4	Utility District-owned land at major intersection
OSE 10	E Rain Street NE & Cardinal Avenue NE	95101300000	City of Ocean Shores	47.012392, -124.153125	3, 4	City-owned property
OSE 11	Ponderosa Loop NE & Bass Avenue NE	94901206100	Shelly & Derek Kane	46.991065, -124.149693	3, 4	Privately-owned, vacant property
OSE 12	Olympic View Avenue & Hutton Street NE	94900601400	Harold Wiebenga Jr. Et Al	46.989265, -124.143273	3, 4	Privately-owned, vacant property. Corner lot.
OSE 13	Skookumchuck Street SE & Makah Avenue SE	91900061500	Ocean Shores Community Club	46.972591, -124.152807	3, 4	OSCC park (Skookumchuck)

OSE

Potential Ocean Shores East VES Locations: All Options (1-4)

Notes

OSE 1 - OSE 1 is the golf course and has potential open space in and around the parking lot and driving range (*see photos*). AHAB siren on site, too. Existing tsunami awareness here.

OSE 2 - The OSE 2 site is the airport and is adjacent to a city-owned and managed park (North Bay Park). The open area of the park across the street (*see photos*) from the airport could be a good alternative VES location.

OSE 3 -OSE 3 is the school, and a natural choice, although there is also ample space at the nearby City-owned property with existing City water treatment and public works facilities (165 Ocean Lake Way).

OSE 4 - OSE 4 is a city-owned vacant land SW of Duck Lake & Lake Bay intersection.

OSE 5 - OSE 5 is proposed on private land. A small City-owned ROW parcel is nearby, just SE. Small, but may provide enough space for small tower.

OSE 6 - OSE 6 is proposed on land owned by the OSCC, but there is a city-owned ROW across the street, to the west.

OSE 7 - OSE 7 is currently proposed to be located on private land -- look for nearby vacant private land as an alternative.

OSE 8 - OSE 8 is at the Brookdale Senior Assisted Living. Either locate tower here or on nearby City-owned land, to the SW (Coastal Interpretive Center) or nearby OSCC-owned land to the N (Ocean Shores Community Club).

Considerations

Ocean Shores Community Club-Owned Properties (OSCC)

- Bayshore Clubhouse (1016 Catala Avenue SE)
    A. Located just north of **OSE 8**
    B. Currently Alternative #2 for OSE 8

- Bill Ellis Park (698 Mt Olympus Avenue SE)
    C. Current location for **OSE 6**

OSE

Ocean Shores - East: Comparison of All Options (1-4)

Option #1

# of proposed VES = 0

N/A

*Minimum VES Capacity (# of People)

8.8%

% of people within **15 minutes** of high ground

10.2%

% of people within **25 minutes** of high ground

Option #2

# of proposed VES = 8

2,819

*Minimum VES Capacity (# of People)

59.5%

% of people within **15 minutes** of high ground or vertical evacuation

83.0%

% of people within **25 minutes** of high ground or vertical evacuation

Option #3

# of proposed VES = 13

4,140

*Minimum VES Capacity (# of People)

83.3%

% of people within **15 minutes** of high ground or vertical evacuation

95.2%

% of people within **25 minutes** of high ground or vertical evacuation

Option #4

# of proposed VES = 12

4,018

*Minimum VES Capacity (# of People)

81.1%

% of people within **15 minutes** of high ground or vertical evacuation

95.2%

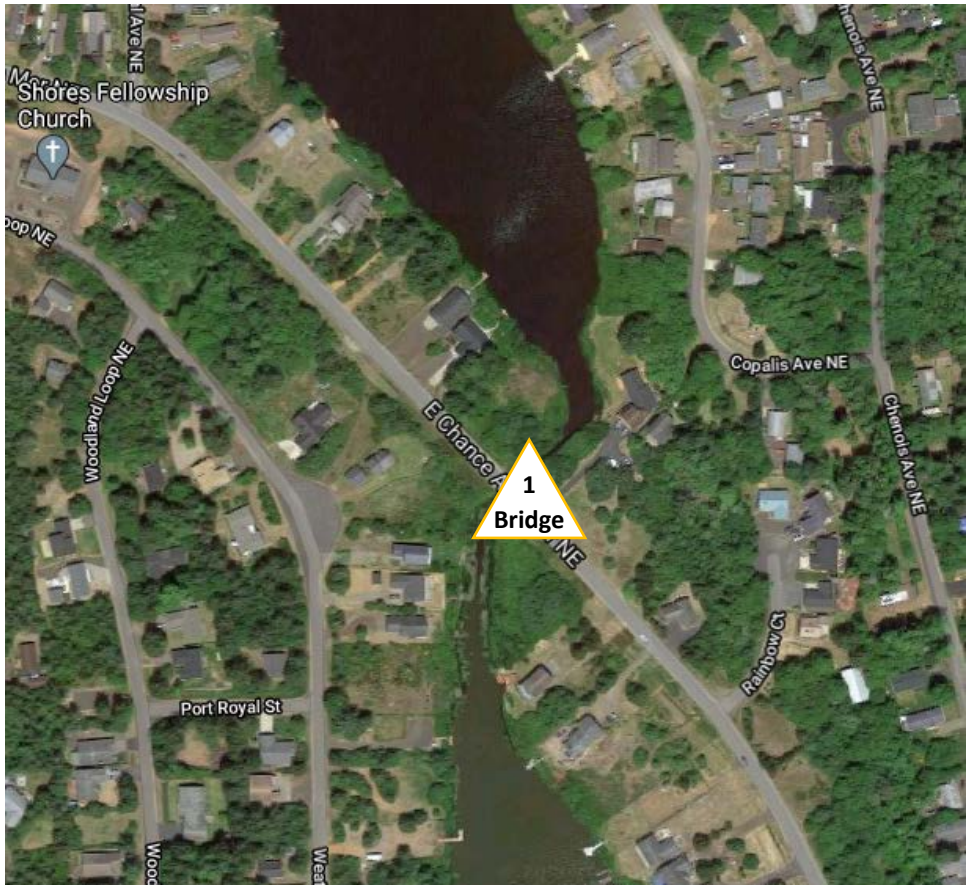
% of people within **25 minutes** of high ground or vertical evacuation

OSE

Ocean Shores - East: 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.

Bridge 1: E Chance a La Mer



Source: *Google Maps*

Bridge 1: E Chance a La Mer

East Chance a La Mer Northeast (looking east)

Photo Credit: *Jeana Gómez*

Bridge 2: Albatross Street NE

Source: *Google Maps*

Bridge 2: Albatross Street NE

Photo Credit: *Jeana Gómez*

Albatross Street Northeast (looking west)

Bridge 3: Overlake Street NE

Source: *Google Maps*

Bridge 3: Overlake Street NE

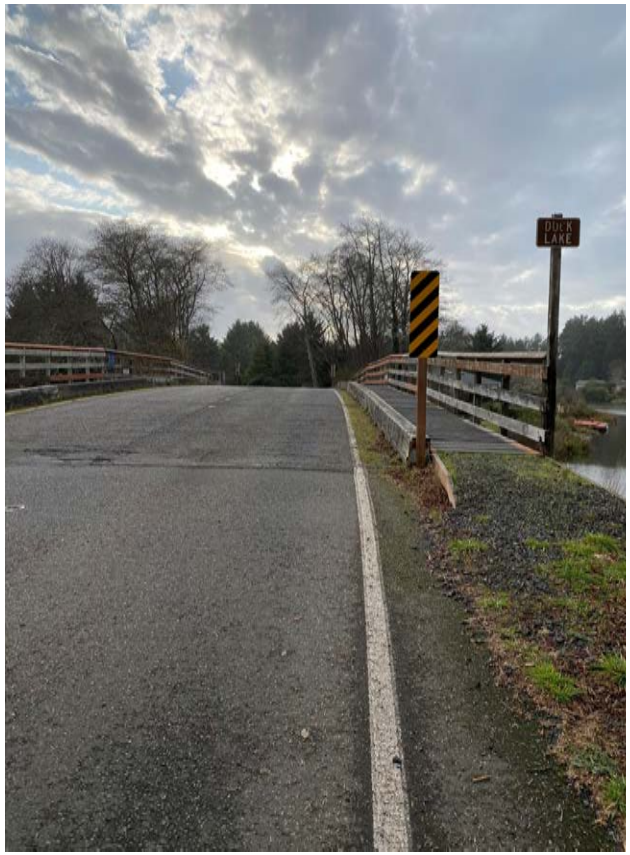


Photo Credit: *Jeana Gómez*

Overlake Street Northeast (looking west)

Bridge 4: Ocean Lake Way NE

Source: *Google Maps*

Bridge 4: Ocean Lake Way NE

Photo Credit: *Jeana Gómez*

Ocean Lake Way Northeast (looking west)

Bridge 5: Point Brown Avenue SW

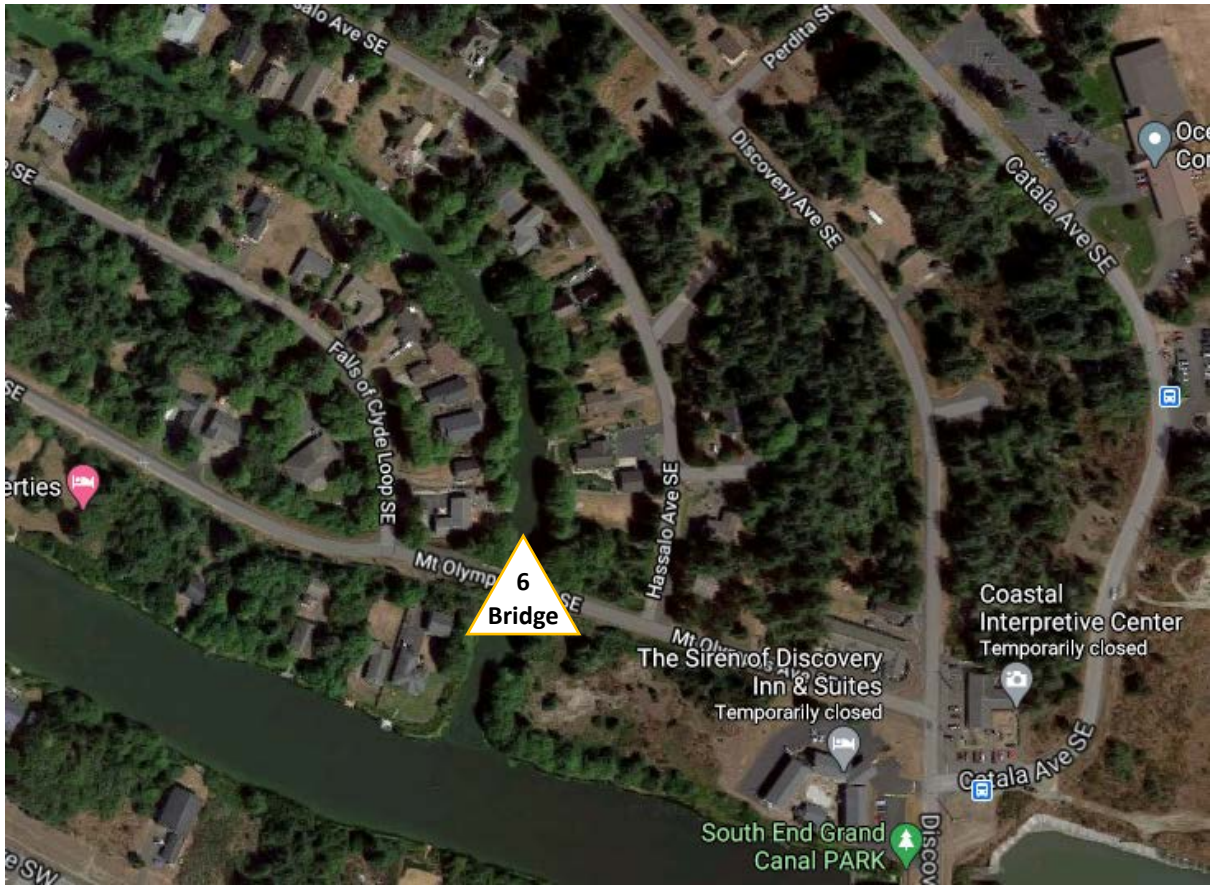
Source: *Google Maps*

Bridge 5: Point Brown Avenue SW

Photo Credit: *Jeana Gómez*

Point Browne Avenue Southwest (looking SE)

Bridge 6: Mount Olympus Avenue SE



Source: *Google Maps*

Bridge 6: Mount Olympus Avenue SE

Mount Olympus Avenue Southeast (looking SE)

Photo Credit: *Jeana Gómez*

Taholah

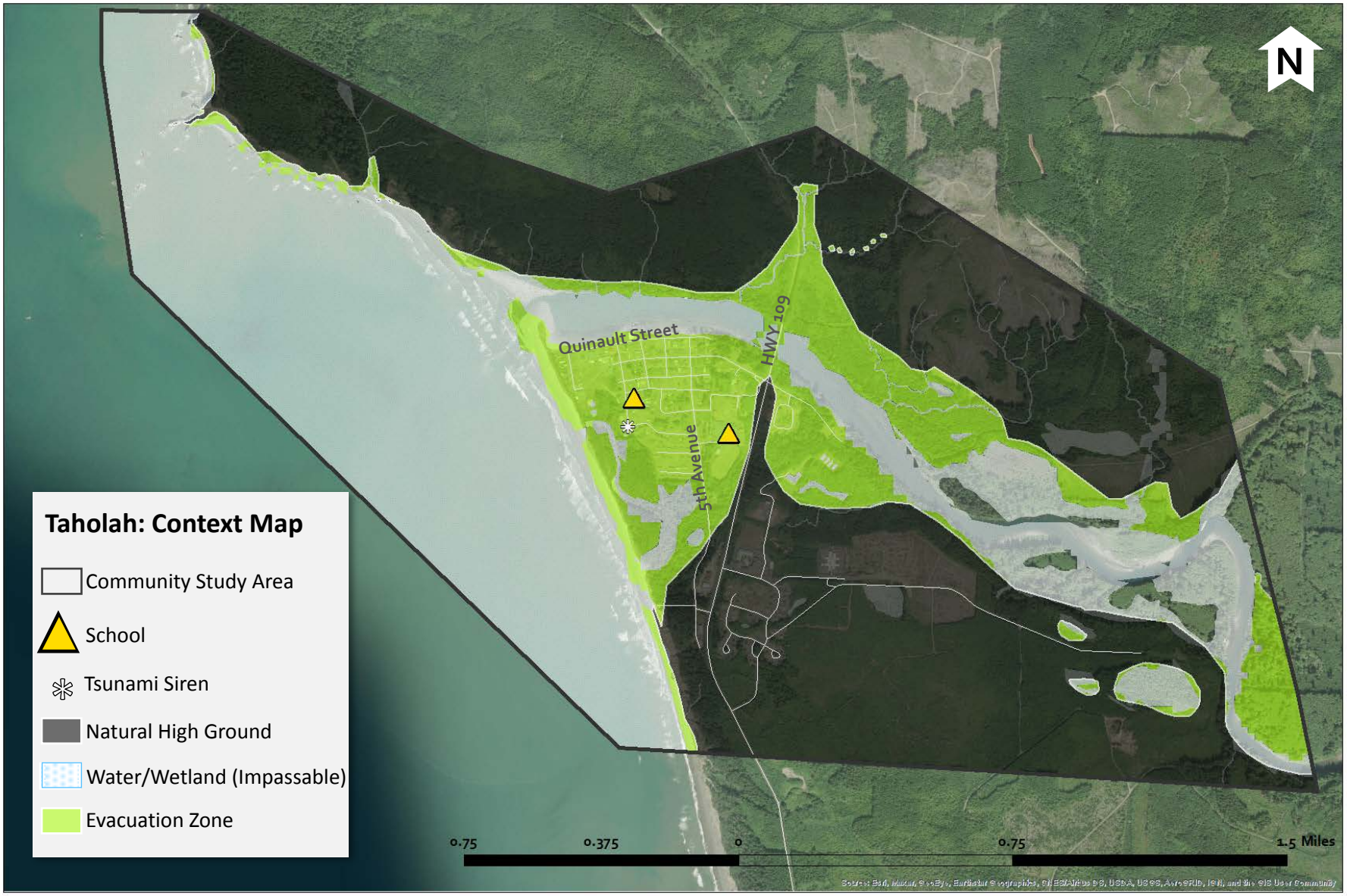
Taholah community study area population <u>in the tsunami hazard area</u> = ~579 people

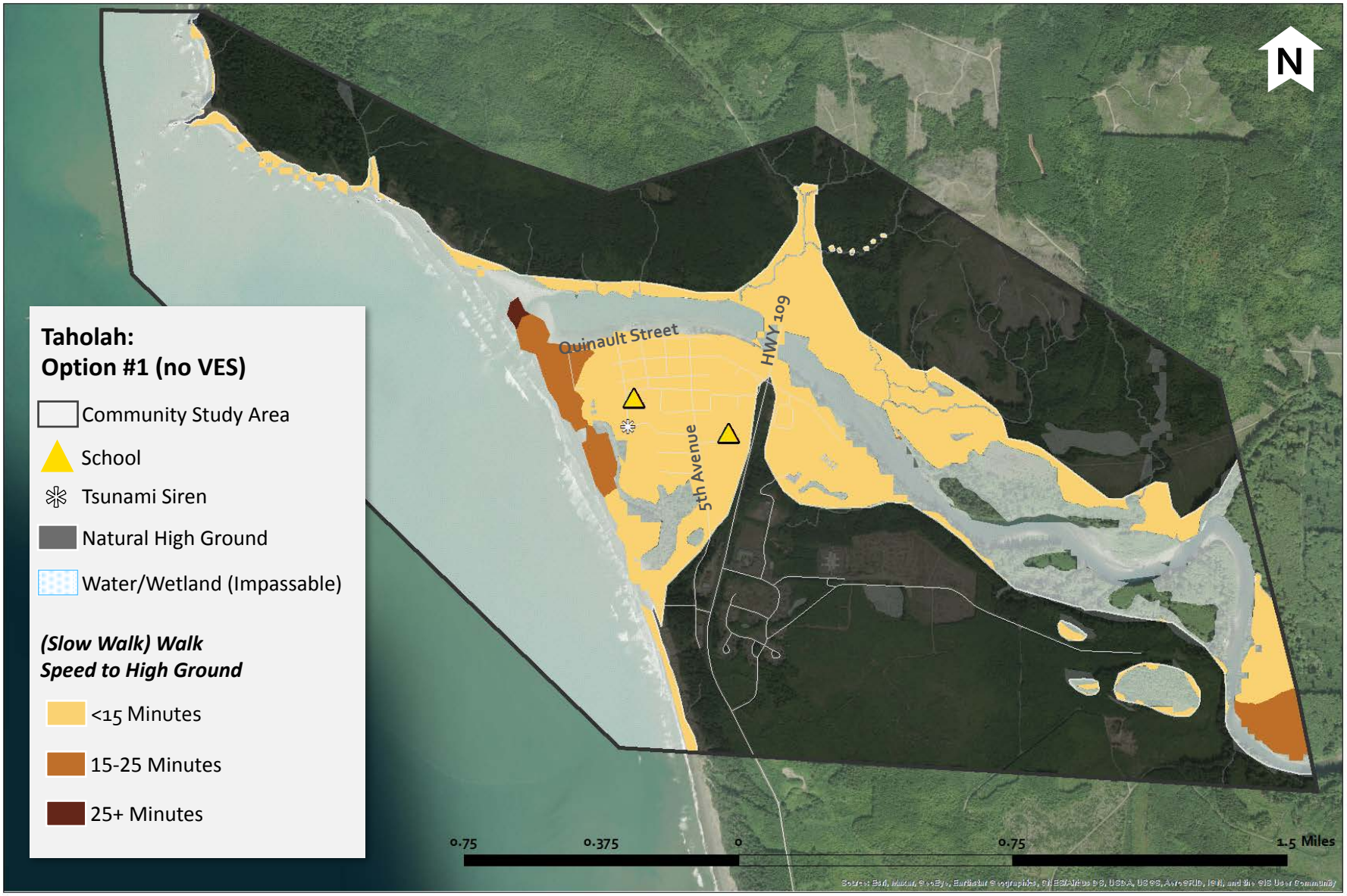
Resident/Worker/Overnight Visitor population = ~399 people

Fire Department occupancy = N/A

Schools occupancy = ~180 people

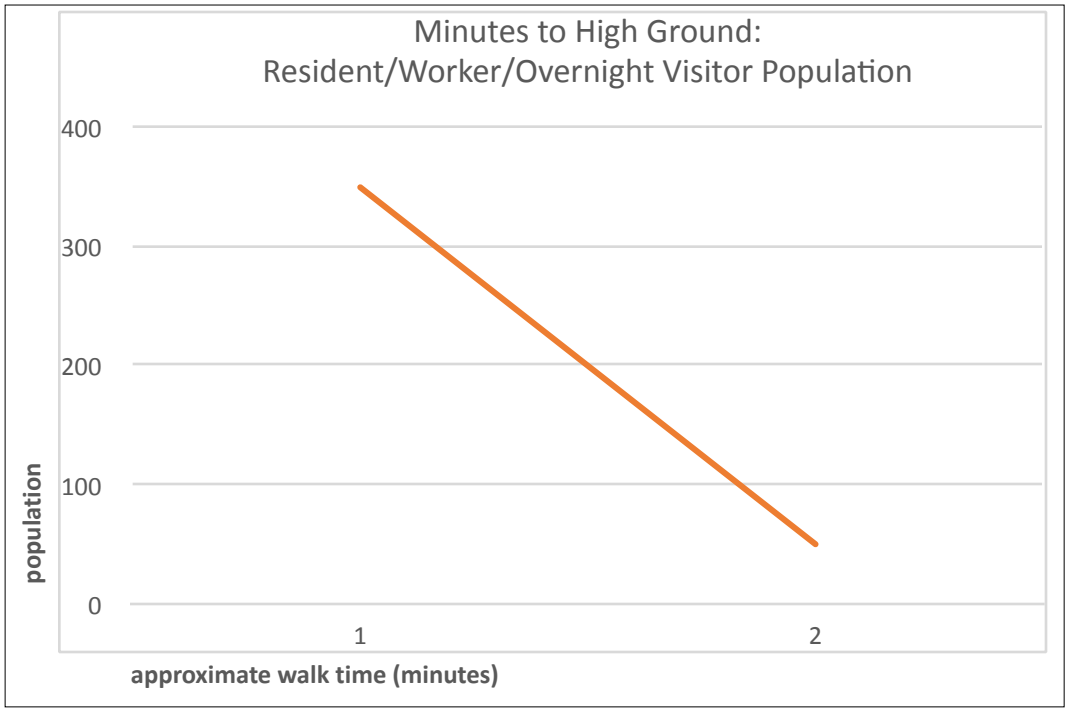
Source: 2010 Census (average household size); Grays Harbor County Residential Land Use


N
Quinault Street
HWY 109
5th Avenue
Taholah: Context Map
Community Study Area
School
Tsunami Siren
Natural High Ground
Water/Wetland (Impassable)
Evacuation Zone
0.75
0.375
0
0.75
1.5 Miles


Taholah:
Option #1 (no VES)
Community Study Area
School
Tsunami Siren
Natural High Ground
Water/Wetland (Impassable)
(Slow Walk) Walk Speed to High Ground
<15 Minutes
15-25 Minutes
25+ Minutes
Quinault Street
HWY 109
5th Avenue
N
0.75
0.375
0
0.75
1.5 Miles

Taholah: VES Option #1 (No VES)

TA



*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.

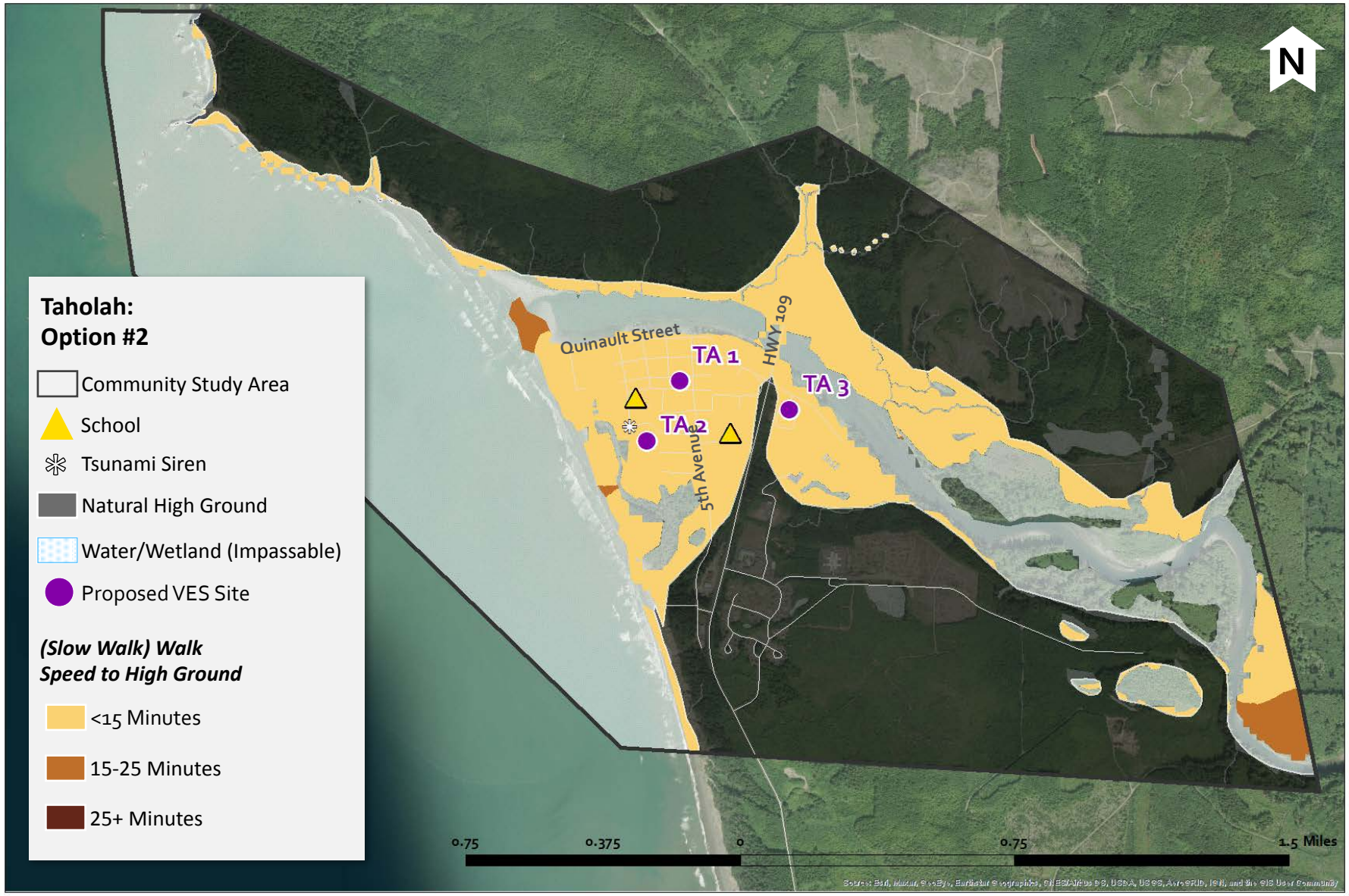
Approximate # of People, by Walking Time Bands, to High Ground

<15 minutes	15-25 minutes	25+ minutes
579 people	n/a	n/a

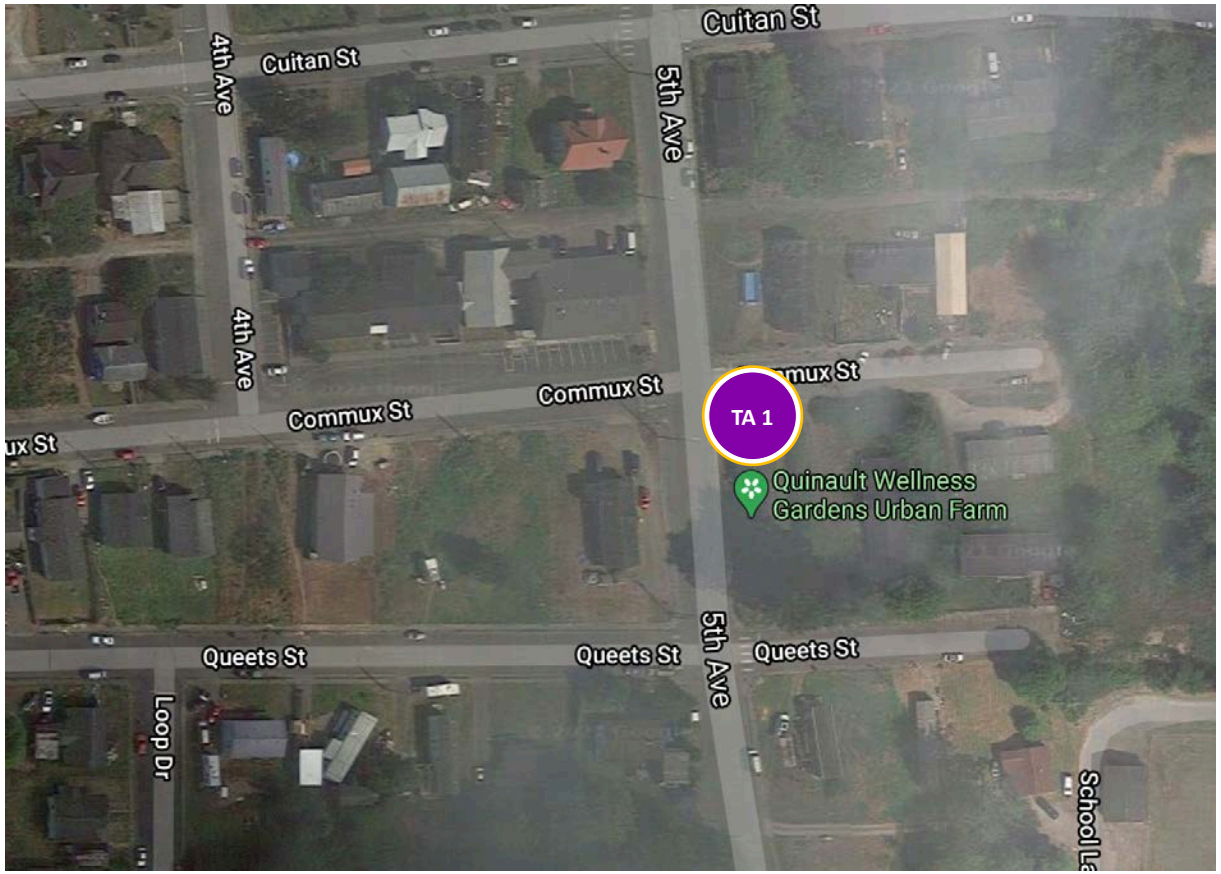
Fire Station: N/A

Schools: Approximate 2 and 11 minute walk time to high ground

Under **Option #1:**
- approximately **100%** of the total estimated Taholah population are within 15 minutes to natural high ground
- approximate **maximum* walk time to natural high ground for identified population = **11** minutes


Taholah:
Option #2
Community Study Area
School
Tsunami Siren
Natural High Ground
Water/Wetland (Impassable)
Proposed VES Site
(Slow Walk) Walk Speed to High Ground
<15 Minutes
15-25 Minutes
25+ Minutes
Quinault Street
HWY 109
5th Avenue
TA 1
TA 2
TA 3
N
0.75
0.375
0
0.75
1.5 Miles

Taholah: TA 1



TA 1	
Address	501 Commux Street
Intersection	Commux Street & 5th Avenue
Options	2
Notes	Located adjacent to the Quinault Indian Nation Senior Program, potentially vacant land near the Quinault Wellness Gardens Urban Farm

Source: *Google Maps*

Taholah: TA 1

TA 1

TA 1 - Potential vacant land near the Quinault Wellness Gardens Urban Farm (on the right), looking north — senior program building on the left, at intersection

Photo Credit: *Google Maps Street View*

Taholah: TA 2

TA 2	
Address	2nd Avenue
Intersection	2nd Avenue & Spruce Street
Options	2
Notes	Located near tribal head start (confirm)

Source: *Google Maps*

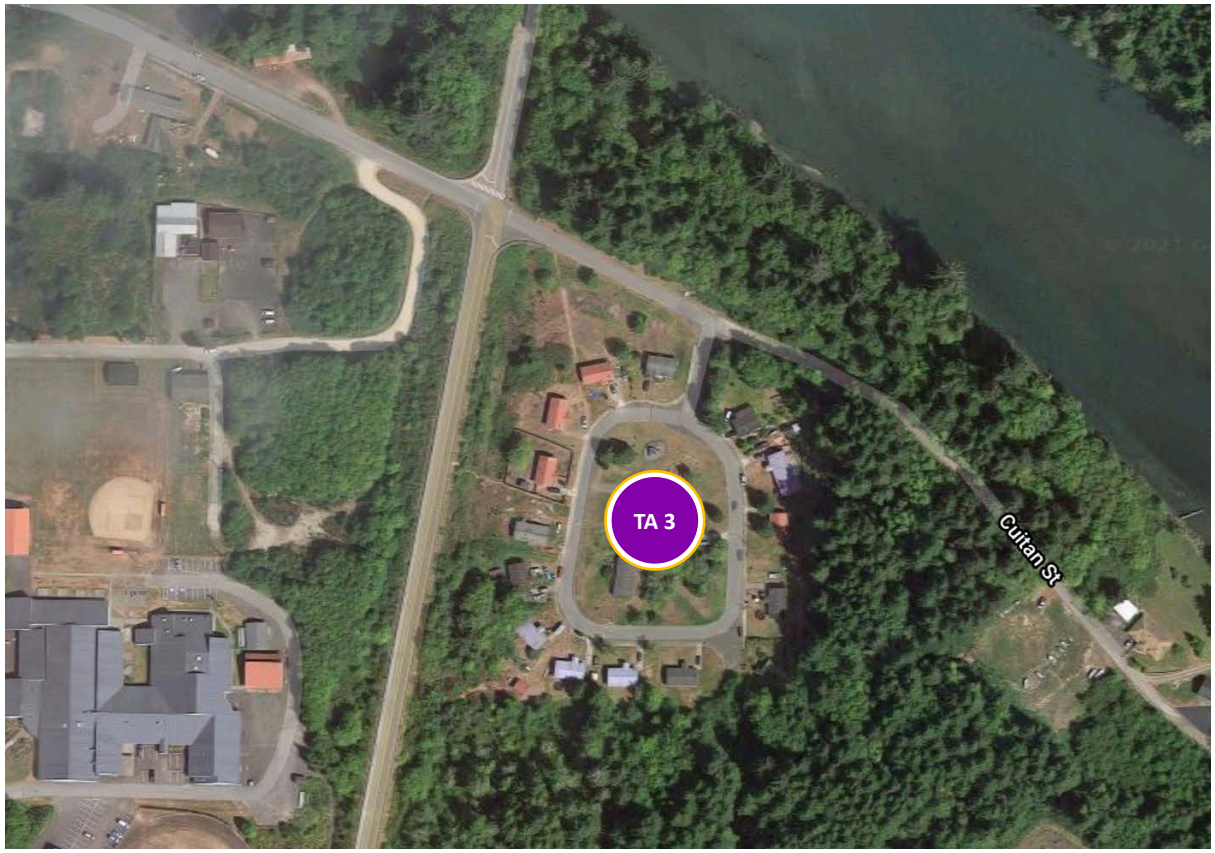
Taholah: TA 2

TA 2

TA 2 - Located near tribal head start (confirm). Some vacant land nearby, adjacent. Tsunami siren in the background.

Photo Credit: *Google Maps Street View*

Taholah: TA 3



TA 3	
Address	Park Place
Intersection	Park Place & Cuitan Street
Options	2
Notes	Residential neighborhood loop.

Source: *Google Maps*

Taholah: TA 3

TA 3

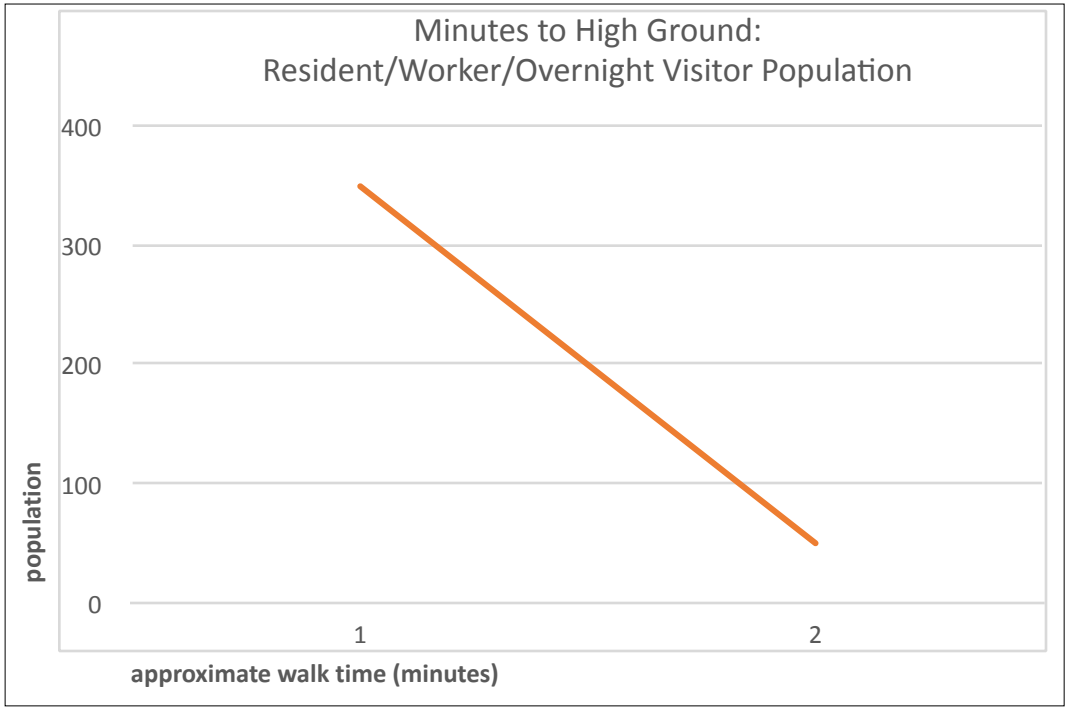
TA 3 - Residential loop, Park Place

Photo Credit: *Google Maps Street View*

Taholah: VES Option #2 (community-derived)

TA

TA 1 TA 2 TA 3



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

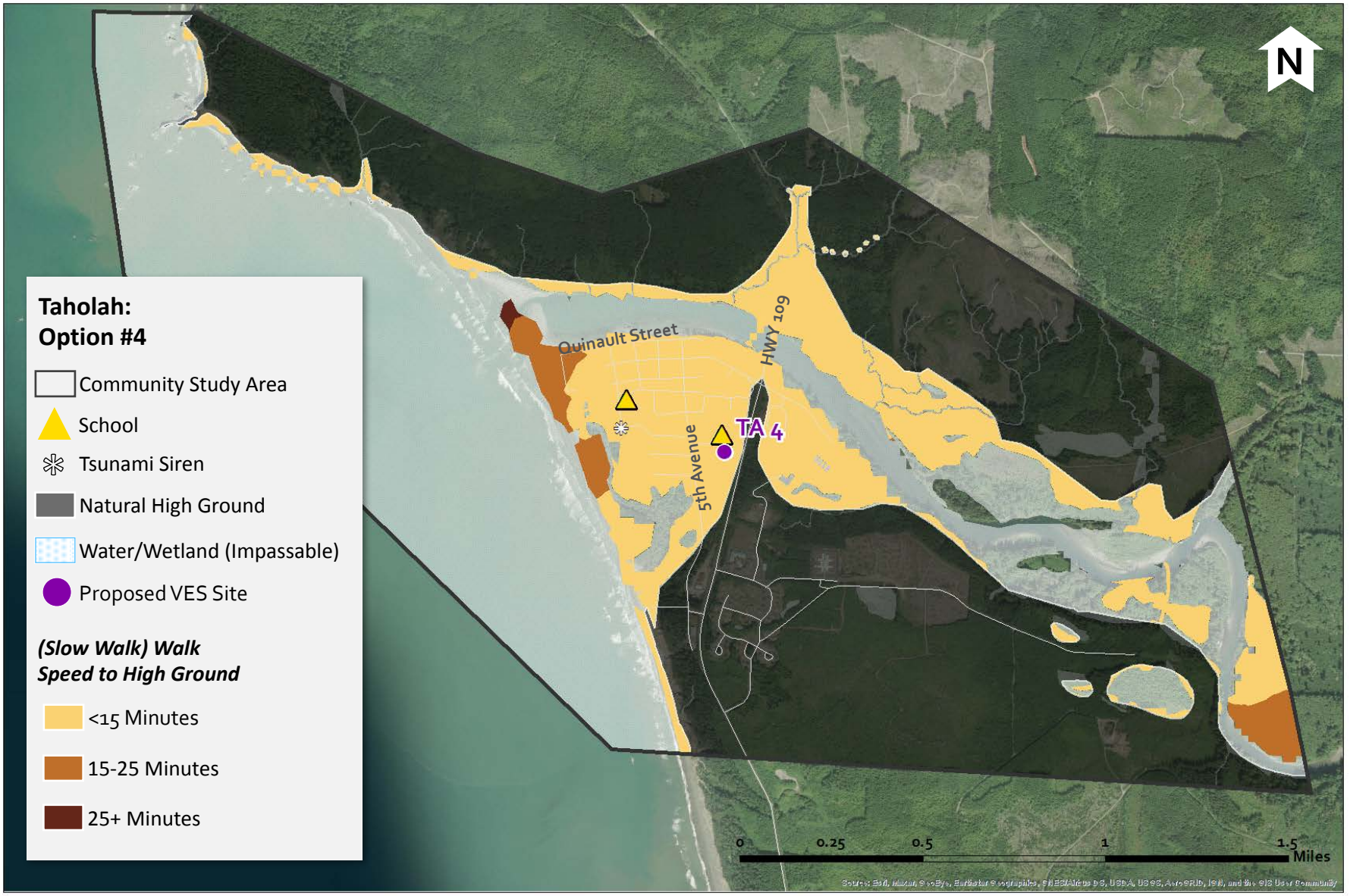
<15 minutes	15-25 minutes	25+ minutes
579 people	n/a	n/a

Fire Station: N/A

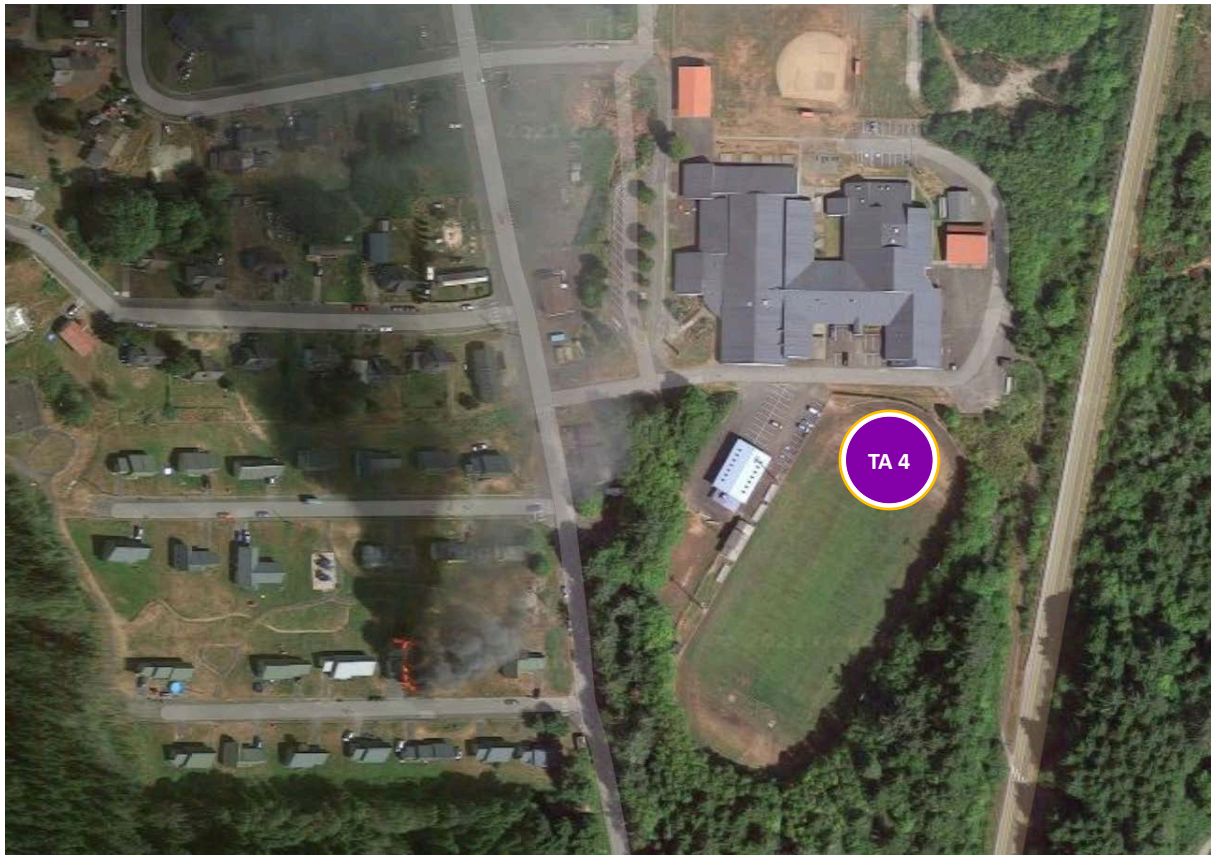
Schools: Approximate 2 and 4 minute walk time to high ground or VES

Under **Option #2:**

- approximately **100%** of the total estimated Taholah 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 = **4** minutes
- approximate *minimum* VES capacity need (15 minute walk time) = **0** people
- # of proposed VES = **3**


Taholah:
Option #4
Community Study Area
School
Tsunami Siren
Natural High Ground
Water/Wetland (Impassable)
Proposed VES Site
(Slow Walk) Walk Speed to High Ground
<15 Minutes
15-25 Minutes
25+ Minutes
Quinault Street
HWY 109
5th Avenue
TA 4
N
0
0.25
0.5
1
1.5
Miles

Taholah: TA 4



TA 4	
Address	600 Chitwhin Drive
Intersection	Chitwhin Drive & 5th Avenue
Options	4
Notes	Taholah School District, school building

Source: *Google Maps*

Taholah: TA 4

TA 4

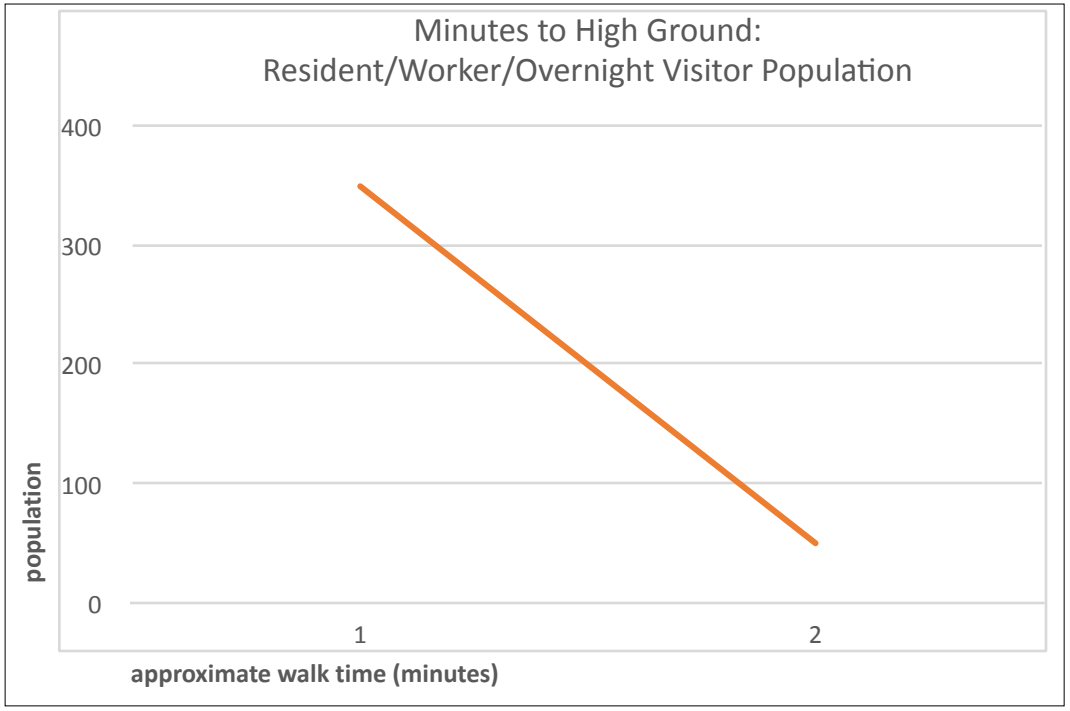
TA 4 - Taholah School and Taholah School District.
Entrance to school off 5th Avenue.

Photo Credit: *Google Maps Street View*

Taholah: VES Option #4 (lean/efficient)

TA

TA 4



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

<15 minutes	15-25 minutes	25+ minutes
579 people	n/a	n/a

Fire Station: N/A

Schools: Approximate 2 and 10 minute walk time to high ground or VES

Under **Option #4:**

- approximately **100%** of the total estimated Taholah 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 = **10** minutes
- approximate *minimum* VES capacity need (15 minute walk time) = **0** people
- # of proposed VES = **1**

TA

Potential Taholah VES Locations: All Options (1, 2, 4)

VES ID	Intersection	Parcel ID	Parcel Owner	Lat | Long	Options	Notes
TA 1	5th Avenue & Commux Street	unknown	unknown	47.346217, -124.289532	2	Near Quinault Wellness Gardens urban farm
TA 2	2nd Avenue & Spruce Street	unknown	unknown	47.344442, -124.293106	2	Near Head Start and tsunami siren
TA 3	Park Place & Cuitan Street	unknown	unknown	47.345159, -124.284176	2	Residential community
TA 4	Chitwhin Drive & 5th Avenue	unknown	unknown	47.344056, -124.287681	4	Taholah School District building, school

Taholah: Comparison of All Options (1, 2, 4)

TA

Option #1

# of proposed VES = 0

N/A

*Minimum VES Capacity (# of People)

100%

% of people within **15 minutes** of high ground

100%

% of people within **25 minutes** of high ground

Option #2

# of proposed VES = 3

0

*Minimum VES Capacity (# of People)

100%

% of people within **15 minutes** of high ground or vertical evacuation

100%

% of people within **25 minutes** of high ground or vertical evacuation

Option #3

NOT COMPLETED

Option #4

# of proposed VES = 1

0

*Minimum VES Capacity (# of People)

100%

% of people within **15 minutes** of high ground or vertical evacuation

100%

% of people within **25 minutes** of high ground or vertical evacuation

TA

Taholah: Comparison of All Options (1, 2, 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.

AHC

Aberdeen, Hoquiam, & Cosmopolis (AHC)

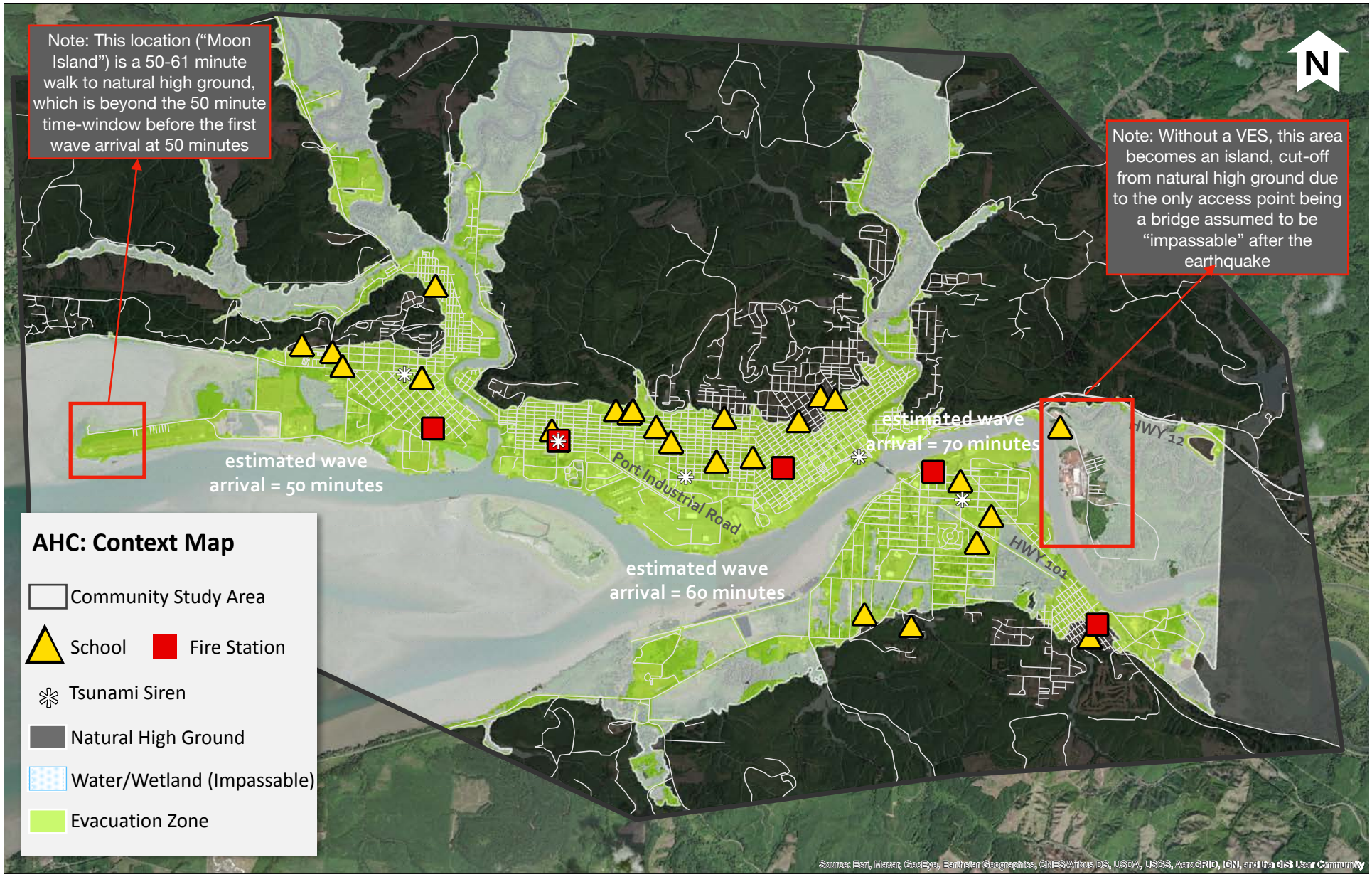
Aberdeen, Hoquiam, & Cosmopolis community study area population <u>in the tsunami hazard area</u> = ~25,205 people

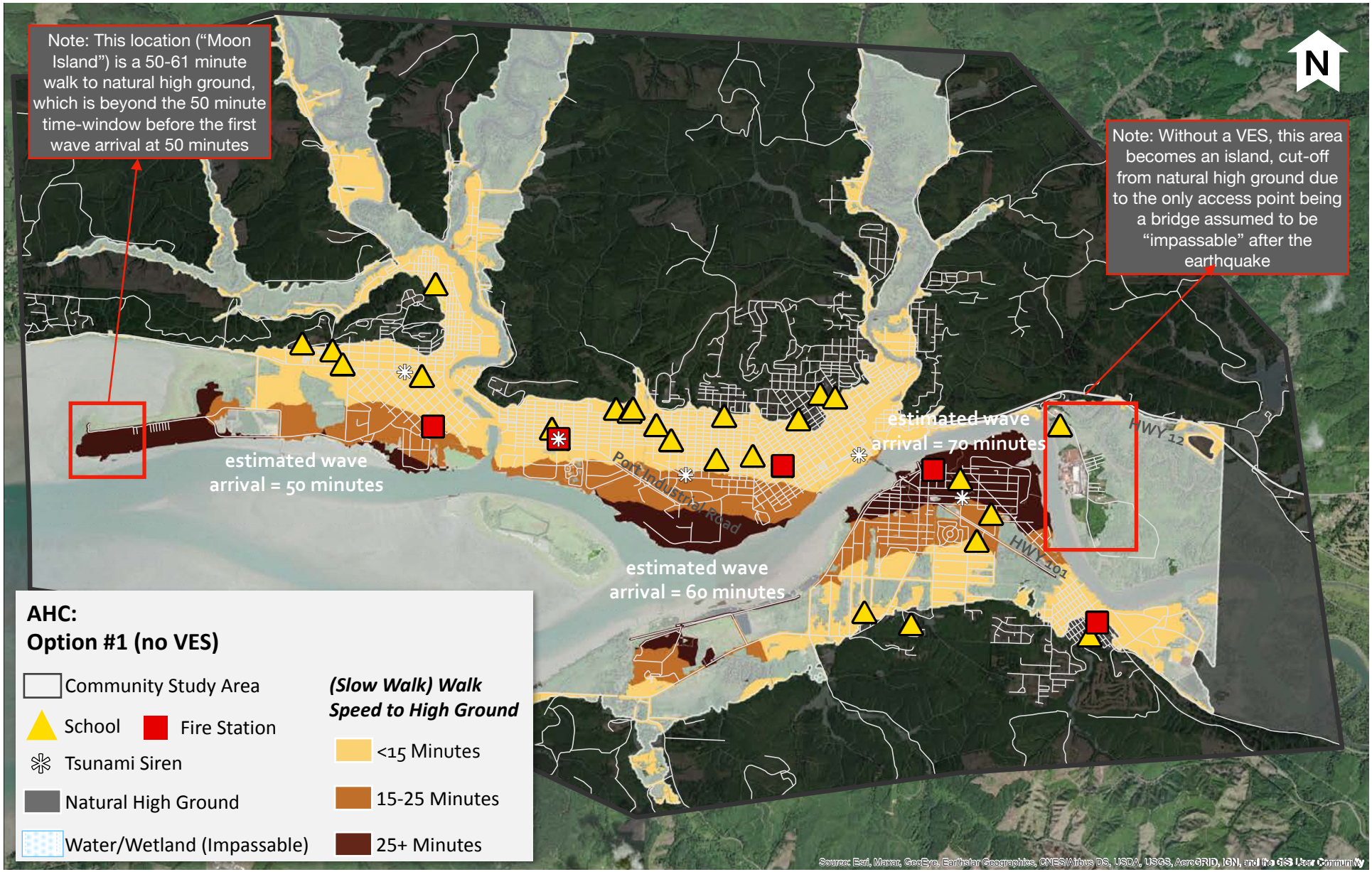
Resident/Worker/Overnight Visitor population = ~19,375 people

Fire Department occupancy = ~150 people

Schools occupancy = ~5,680 people

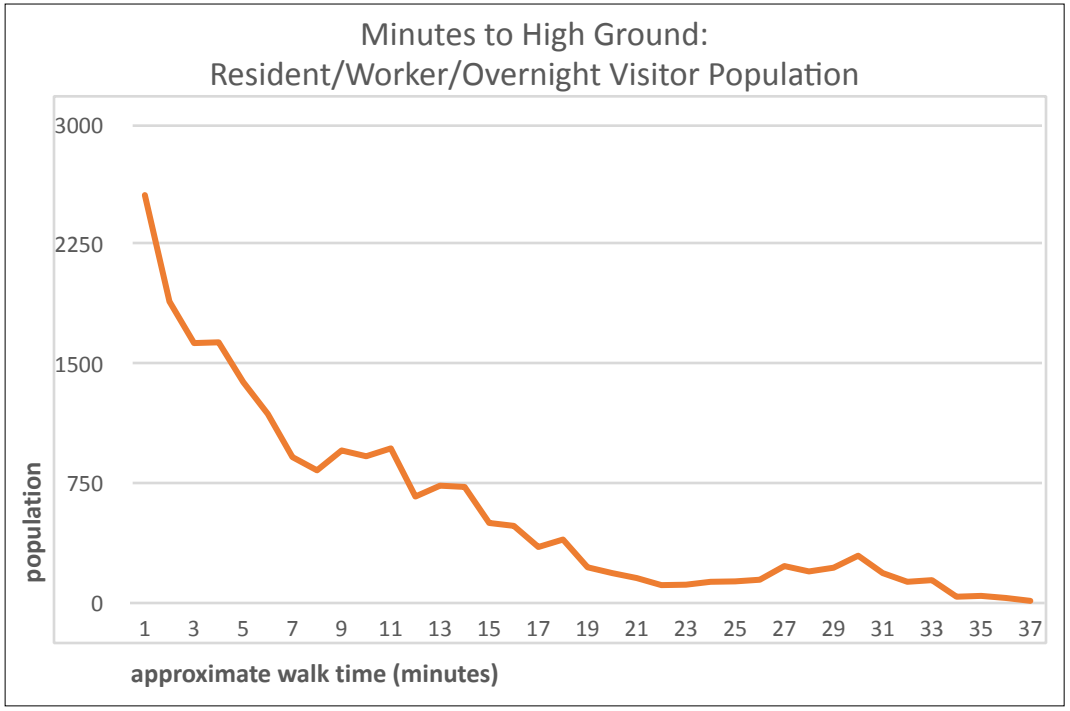
Source: 2010 Census (average household size); Grays Harbor County Residential Land Use


Note: This location ("Moon Island") is a 50-61 minute walk to natural high ground, which is beyond the 50 minute time-window before the first wave arrival at 50 minutes
Note: Without a VES, this area becomes an island, cut-off from natural high ground due to the only access point being a bridge assumed to be "impassable" after the earthquake
N
estimated wave arrival = 50 minutes
estimated wave arrival = 60 minutes
estimated wave arrival = 70 minutes
Port Industrial Road
HWY 12
HWY 101
AHC: Context Map
Community Study Area
School
Fire Station
Tsunami Siren
Natural High Ground
Water/Wetland (Impassable)
Evacuation Zone
Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community


Note: This location ("Moon Island") is a 50-61 minute walk to natural high ground, which is beyond the 50 minute time-window before the first wave arrival at 50 minutes
N
Note: Without a VES, this area becomes an island, cut-off from natural high ground due to the only access point being a bridge assumed to be "impassable" after the earthquake
estimated wave arrival = 50 minutes
estimated wave arrival = 60 minutes
estimated wave arrival = 70 minutes
Port Industrial Road
HWY 12
HWY 101
AHC:
Option #1 (no VES)
Community Study Area
School
Fire Station
Tsunami Siren
Natural High Ground
Water/Wetland (Impassable)
(Slow Walk) Walk Speed to High Ground
<15 Minutes
15-25 Minutes
25+ Minutes
Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Aberdeen, Hoquiam, & Cosmopolis: VES Option #1 (No VES)

AHC



*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
19,726 people	3,831 people	1,648 people

■ *Fire Station: Approximate 10, 12, 15, and 34 minute walk time to high ground*

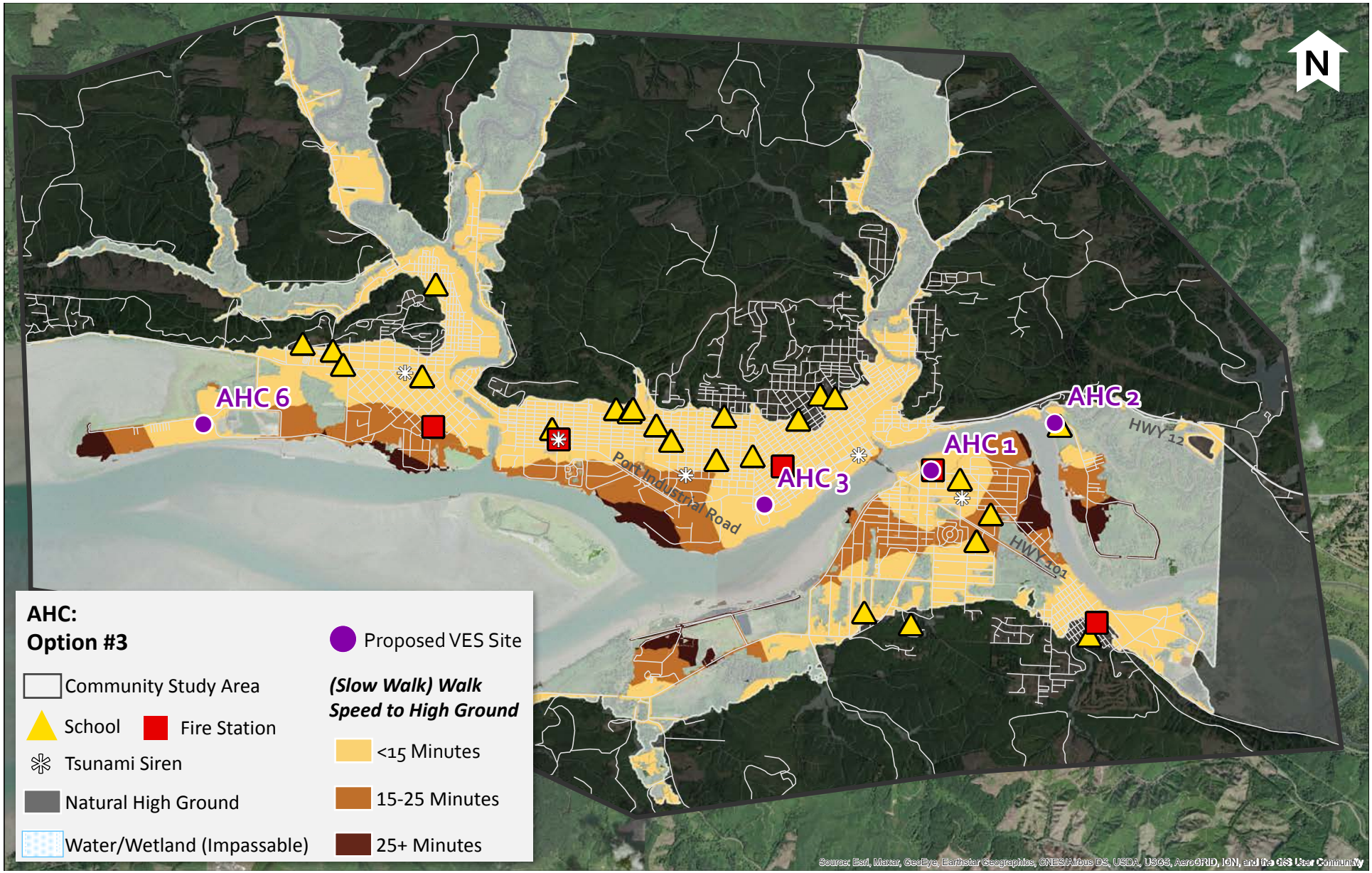
▲ *Schools: Approximate 1, 2, 3, 5, 6, 8, 10, 13, 17, 24, and 31 minute walk time to high ground*

Under **Option #1:**

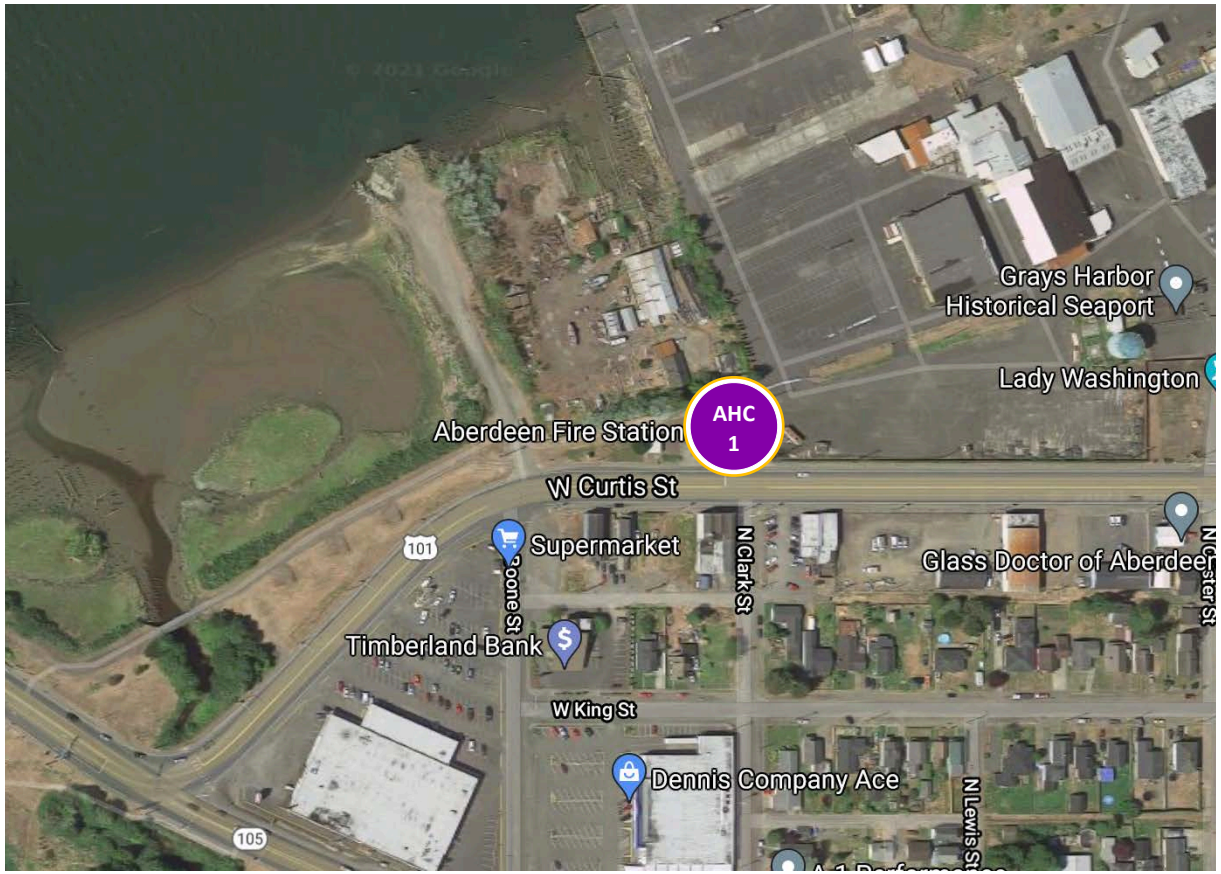
- approximately **93.5%** of the total estimated AHC population are within 25 minutes to natural high ground
- approximate **maximum* walk time to natural high ground for identified population = **37** minutes

Note: "Moon Island" is a 50-61 minute walk to natural high ground, which is beyond the 50 minute time-window before the first wave arrival at 50 minutes. Without VES, this area would be out of walking time/ distance to natural high ground within the window of evacuation time before the first expected wave.

Note: Junction City Road will become an island, cut-off from natural high ground, due to the only access point to natural high ground is a bridge assumed to be "out" after the earthquake.


N
AHC 6
AHC 2
AHC 1
AHC 3
Port Industrial Road
HWY 12
HWY 101
AHC:
Option #3
Community Study Area
School
Fire Station
Tsunami Siren
Natural High Ground
Water/Wetland (Impassable)
Proposed VES Site
(Slow Walk) Walk Speed to High Ground
<15 Minutes
15-25 Minutes
25+ Minutes
Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Aberdeen, Hoquiam, & Cosmopolis: AHC 1



AHC 1	
Address	700 US-101
Intersection	West Curtis Street & North Clark Street
Options	3
Notes	Aberdeen Fire Station #2

Source: *Google Maps*

Aberdeen, Hoquiam, & Cosmopolis: AHC 1

AHC 1

Photo Credit: *Google Maps Street View*

AHC 1 - Aberdeen Fire Department #2. Potential VES space on empty lot located to the west of the building (or, east of the building in the parking lot).

Aberdeen, Hoquiam, & Cosmopolis: AHC 2

AHC 2	
Address	103 Junction City Road
Intersection	Junction City Road/ Sargent Boulevard
Options	3, 4
Notes	Grays Harbor County Juvenile + Harbor High

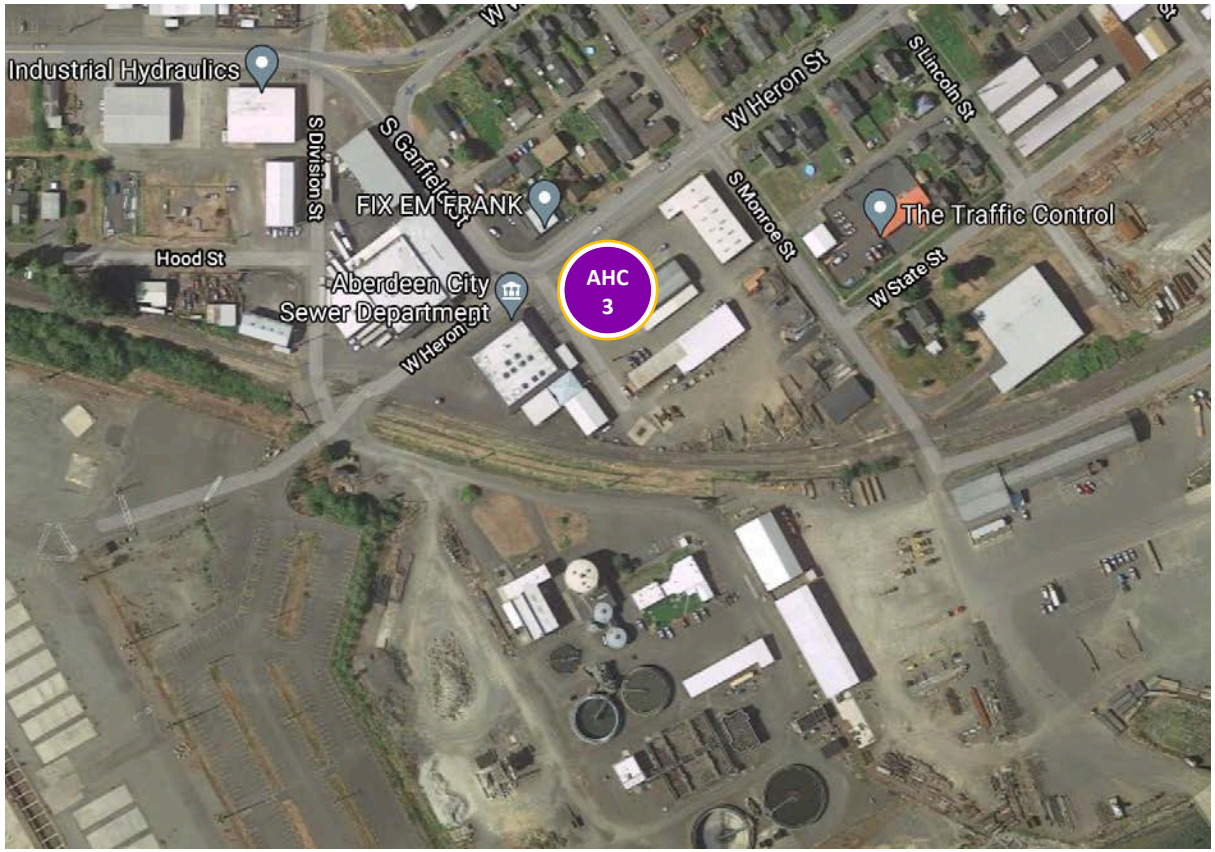
Source: *Google Maps*

Aberdeen, Hoquiam, & Cosmopolis: AHC 2

AHC 2 - Looking north from the Youth Detention Facility parking lot. Harbor High is located directly south/adjacent.

Photo Credit: *Bob Freitag*

Aberdeen, Hoquiam, & Cosmopolis: AHC 3



AHC 3	
Address	1205 West State Street
Intersection	South Garfield Street & West State Street
Options	3
Notes	City of Aberdeen Water Department

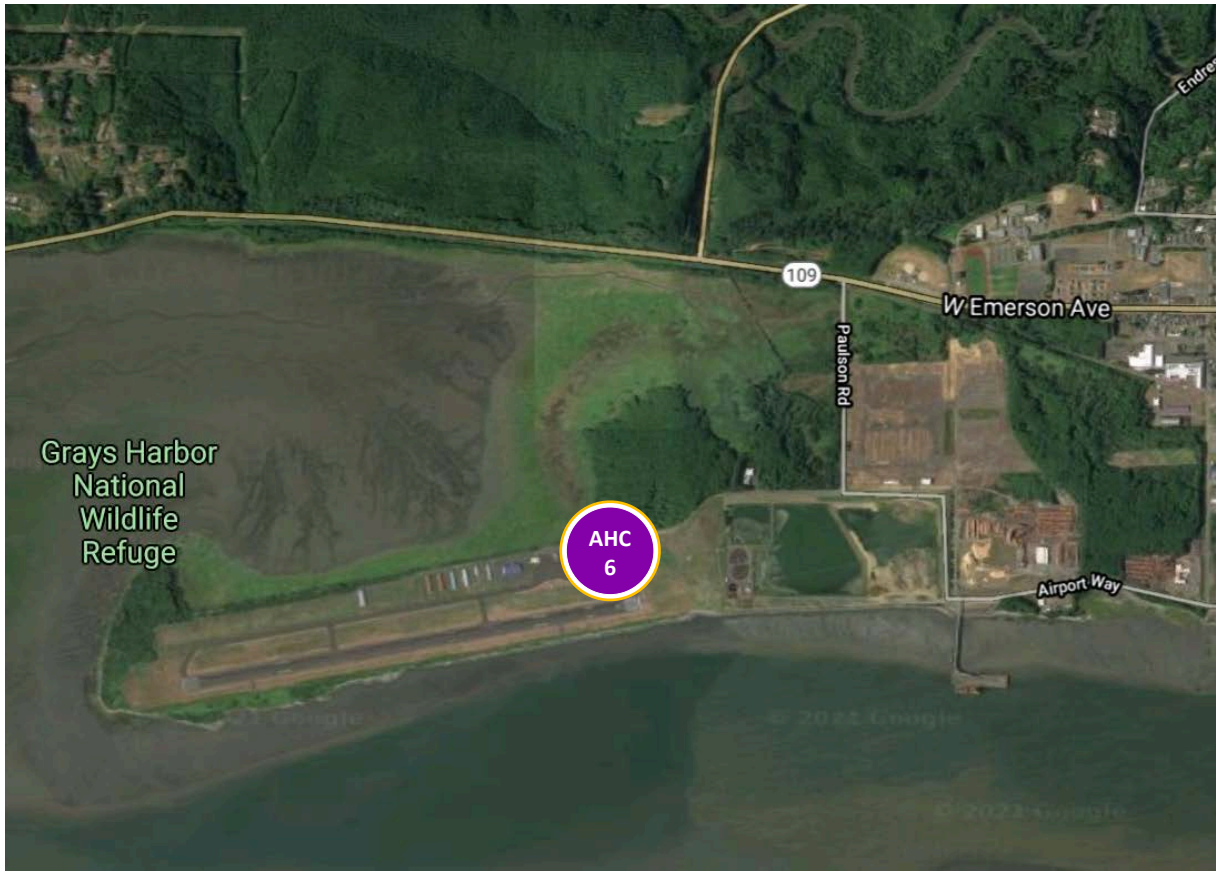
Source: *Google Maps*

Aberdeen, Hoquiam, & Cosmopolis: AHC 3

AHC 3 - City of Aberdeen-owned utility land located close to the river in south Aberdeen. Ample open space to accommodate VES. Would need to consider public access points.

Photo Credit: *Bob Freitag*

Aberdeen, Hoquiam, & Cosmopolis: AHC 6



AHC 6	
Address	Airport Way
Intersection	Airport Way near Bowerman Airport
Options	3
Notes	This is the "Moon Island" VES location. This is the only location in AHC that is beyond the 50 minute walk time (prior to the first wave arrival). There is a wildlife viewing trail located in the farthest western edge: Grays Harbor National Wildlife Refuge.

Source: *Google Maps*

Aberdeen, Hoquiam, & Cosmopolis: AHC 6

AHC 6

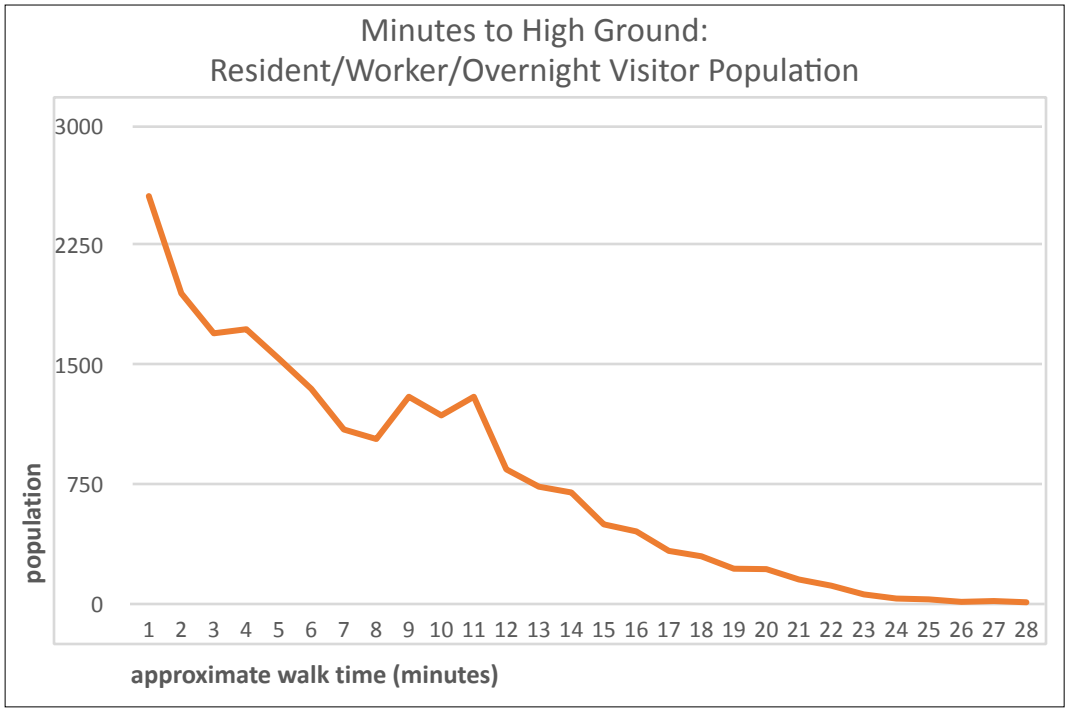
AHC 6 - Bowerman Airport / Grays Harbor National Wildlife Refuge potential VES location. (Looking west towards airport location. Refuge further west from airport).

Photo Credit: *Google Maps Street View*

Aberdeen, Hoquiam, & Cosmopolis: VES Option #3 (Broad Spatial Coverage)

AHC

AHC 1 AHC 2 AHC 3 AHC 4



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

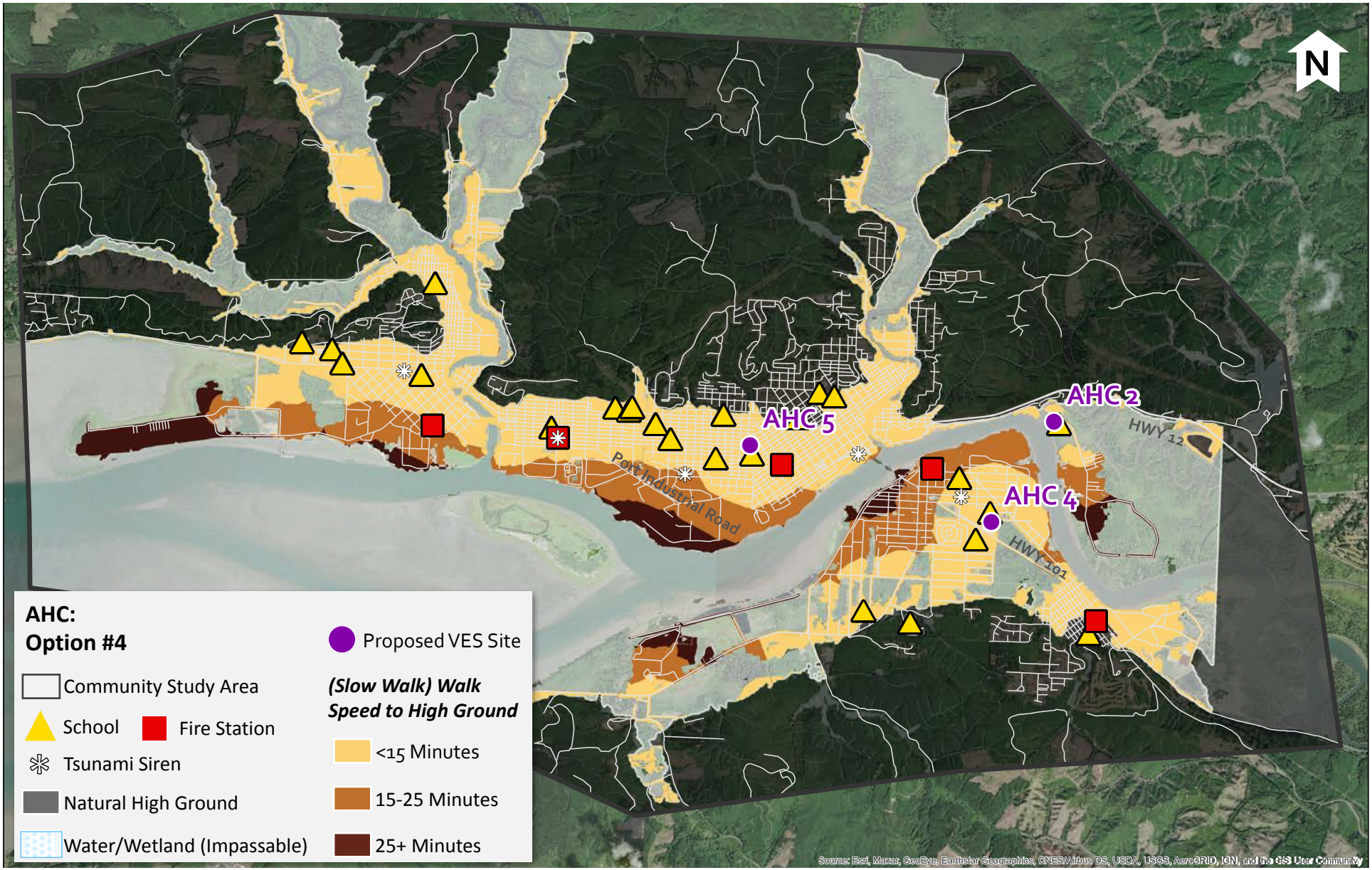
<15 minutes	15-25 minutes	25+ minutes
21,738 people	3,436 people	31 people

Fire Station: Approximate 1, 10, 11, and 15 minute walk time to high ground or VES

Schools: Approximate 1, 2, 3, 5, 6, 8, 10, 13, 17, and 20 minute walk time to high ground or VES

Under **Option #3:**

- approximately **99.9%** of the total estimated AHC population are within 25 minutes to natural high ground OR vertical evacuation
- approximate *maximum* walk time to natural high ground or vertical evacuation for identified population = **28** minutes
- approximate *minimum* VES capacity need (15 minute walk time) = **1,953** people
- # of proposed VES = **4**


N
AHC 2
AHC 5
AHC 4
HWY 12
Port Industrial Road
HWY 101
AHC:
Option #4
Community Study Area
School
Fire Station
Tsunami Siren
Natural High Ground
Water/Wetland (Impassable)
Proposed VES Site
(Slow Walk) Walk Speed to High Ground
<15 Minutes
15-25 Minutes
25+ Minutes
Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Aberdeen, Hoquiam, & Cosmopolis: AHC 2

AHC 2	
Address	103 Junction City Road
Intersection	Junction City Road/ Sargent Boulevard
Options	3, 4
Notes	Grays Harbor County Juvenile + Harbor High

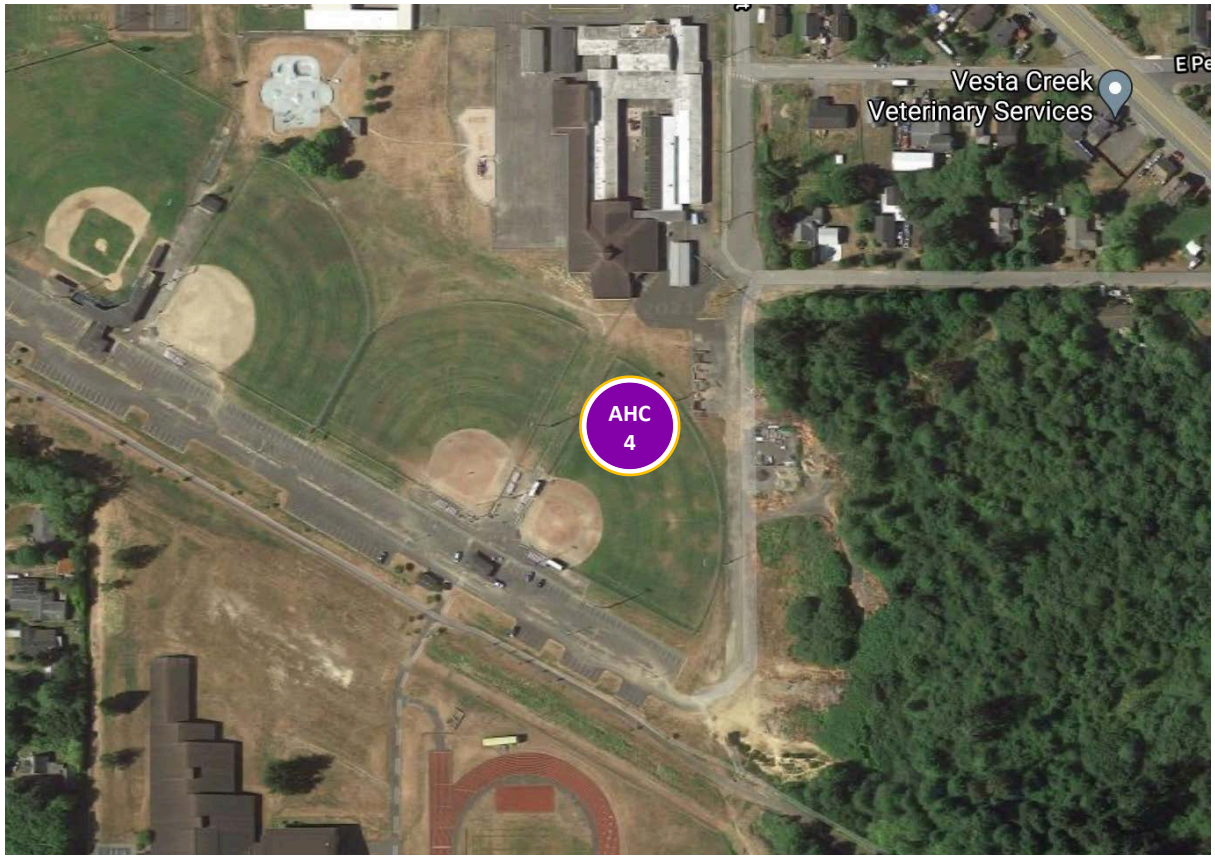
Source: *Google Maps*

Aberdeen, Hoquiam, & Cosmopolis: AHC 2

AHC 2 - Looking north from the Youth Detention Facility parking lot. Harbor High is located directly south/adjacent.

Photo Credit: *Bob Freitag*

Aberdeen, Hoquiam, & Cosmopolis: AHC 4



AHC 4	
Address	214 South Tilden Street
Intersection	South Farragut Street & East Perry Street
Options	4
Notes	Stevens Elementary School/Pioneer Park

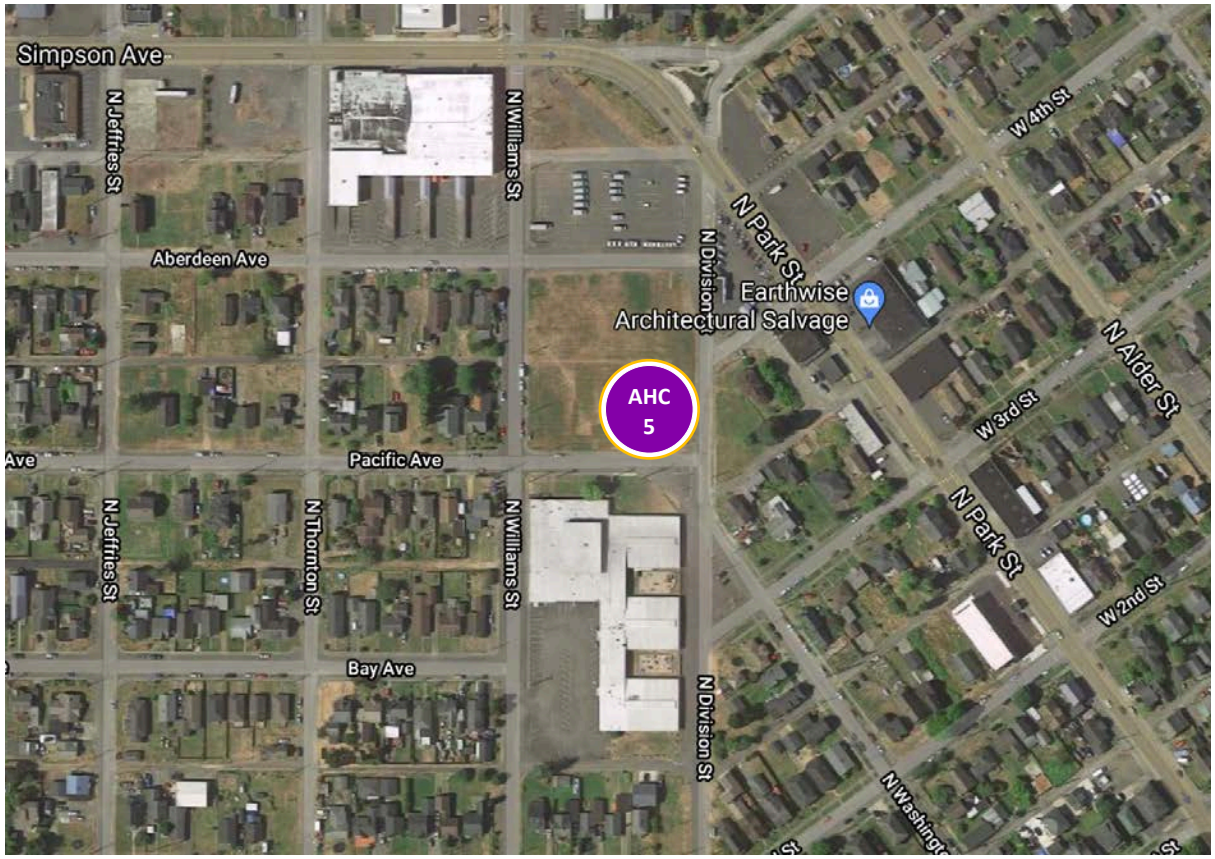
Source: *Google Maps*

Aberdeen, Hoquiam, & Cosmopolis: AHC 4

AHC 4 - Stevens Elementary parking area or play fields could be a good fit for potential VES. Adjacent tsunami siren. Alternative location could be Pioneer Park located to the south of the school.

Photo Credit: *Bob Freitag*

Aberdeen, Hoquiam, & Cosmopolis: AHC 5



AHC 5	
Address	1313 Pacific Avenue
Intersection	Pacific Avenue & North Division Street
Options	4
Notes	Aberdeen School District Hopkins Building -OR- empty land directly located to the north of Hopkins

Source: *Google Maps*

Aberdeen, Hoquiam, & Cosmopolis: AHC 5

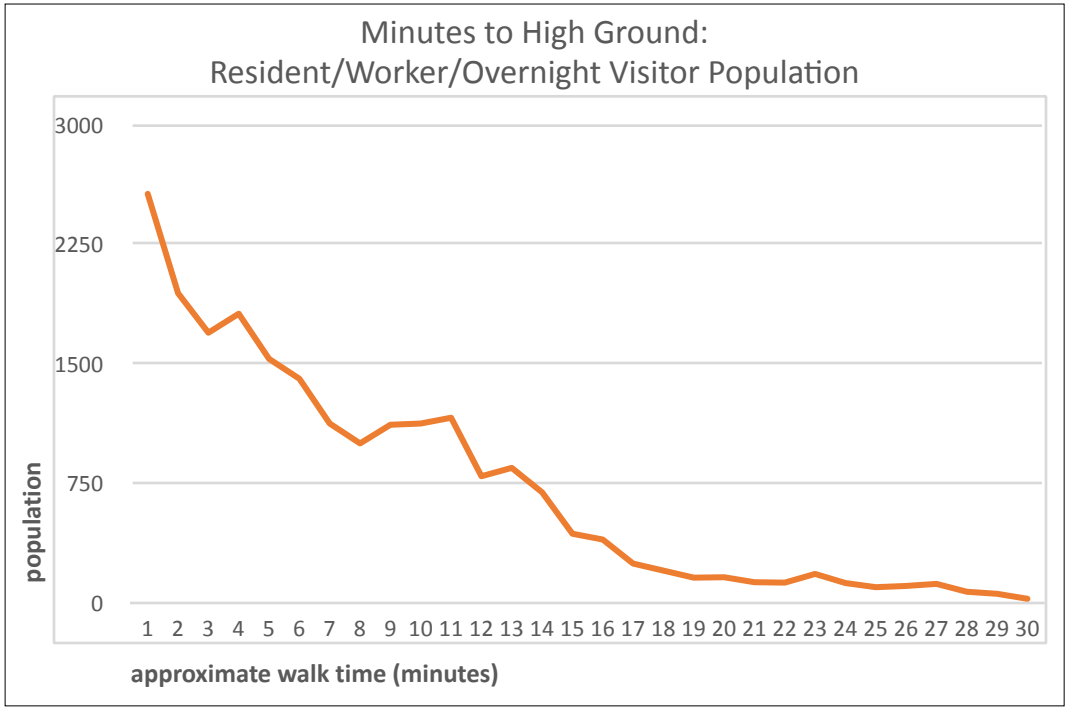
AHC 5 - Empty lot located to the north of the Hopkins Building.

Photo Credit: *Bob Freitag*

Aberdeen, Hoquiam, & Cosmopolis: VES Option #4 (lean/efficient)

AHC

AHC 2 AHC 4 AHC 5



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

<15 minutes	15-25 minutes	25+ minutes
22,633 people	2,243 people	330 people

■ *Fire Station: Approximate 9, 10, 15 and 20 minute walk time to high ground or VES*

▲ *Schools: Approximate 1, 2, 3, 5, 6, 8, 11, and 15 minute walk time to high ground or VES*

Under **Option #4:**

- approximately **98.7%** of the total estimated AHC population are within 25 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) = **1,734** people
- # of proposed VES = **3**

AHC

Potential Aberdeen, Hoquiam, & Cosmopolis VES Locations: All Options (1, 3, 4)

VES ID	Intersection	Parcel ID	Parcel Owner	Lat | Long	Options	Notes
AHC 1	West Curtis Street & North Clark Street	027400400000	G H Historical Seaport Authority	46.97174, -123.80099	3	Aberdeen Fire Station #2: 700 US-101
AHC 2	Junction City Road	317091011006	G H County	46.97789, -123.77931	3, 4	Grays Harbor County Juvenile + Harbor High: 103 Junction City Road
AHC 3	South Garfield Street & West State Street	029407400000	City of Aberdeen	46.96688, -123.82948	3	City of Aberdeen Water Department: 1205 West State Street
AHC 4	South Farragut Street & East Perry Street	317091521001	Aberdeen School District #5	46.96561, -123.78971	4	Stevens Elementary School/Pioneer Park: 214 South Tilden Street
AHC 5	Pacific Avenue & North Division Street	010400100100	Aberdeen School District #5	46.97346, -123.83141	4	Aberdeen School District Hopkins Building: empty land directly located to the north of the building
AHC 6	Airport Way (near Bowerman Airport)	056401200100	Port of Grays Harbor	46.97461, -123.92440	3	This is the “Moon Island” VES location. This is the only location in AHC that is beyond the 50 minute walk time (prior to the first wave arrival). There is a wildlife viewing trail located in the farthest western edge: Grays Harbor National Wildlife Refuge.

Aberdeen, Hoquiam, & Cosmopolis: Comparison of All Options (1, 3, 4)

AHC

Option #1

# of proposed VES = 0

N/A

*Minimum VES Capacity (# of People)

78.3%

% of people within **15 minutes** of high ground

93.5%

% of people within **25 minutes** of high ground

Option #2

NOT COMPLETED

Option #3

# of proposed VES = 4

1,953

*Minimum VES Capacity (# of People)

86.2%

% of people within **15 minutes** of high ground or vertical evacuation

99.9%

% of people within **25 minutes** of high ground or vertical evacuation

Option #4

# of proposed VES = 3

1,734

*Minimum VES Capacity (# of People)

89.8%

% of people within **15 minutes** of high ground or vertical evacuation

98.7%

% of people within **25 minutes** of high ground or vertical evacuation

AHC

Aberdeen, Hoquiam, & Cosmopolis: Comparison of All Options (1, 2, 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.

Bridge 1: Junction City Road/Sargent Boulevard

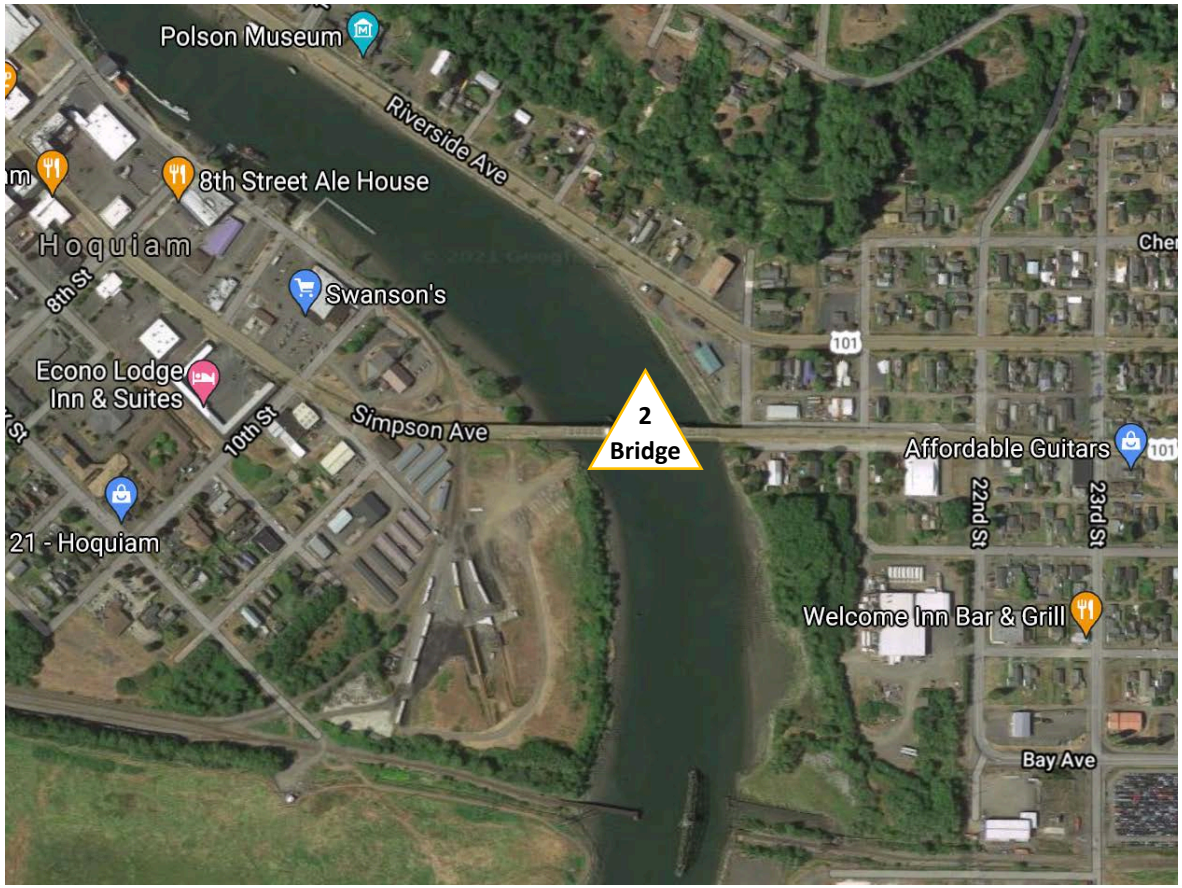
Source: *Google Maps*

Bridge 1: Junction City Road/Sargent Boulevard

South-facing entrance to bridge (looking south) and viewpoint of bridge profile

Photo Credit: *Bob Freitag*

Bridge 2: Aberdeen/Hoquiam Access Bridge (HWY 101)



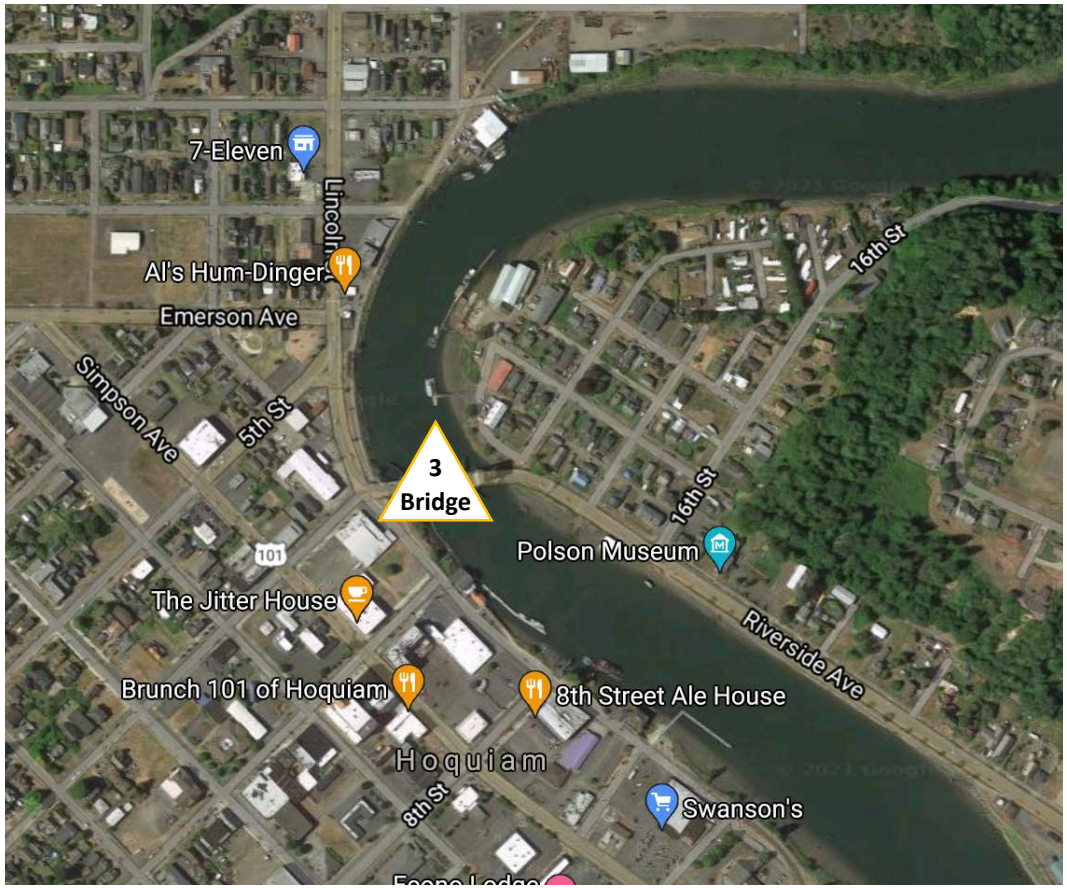
Source: *Google Maps*

Bridge 2: Aberdeen/Hoquiam Access Bridge (HWY 101)

HWY 101 Aberdeen/Hoquiam access bridge, from Hoquiam side of river (looking east)

Photo Credit: *Bob Freitag*

Bridge 3: Aberdeen/Hoquiam Access Bridge (Riverside Ave)



Source: *Google Maps*

Bridge 3: Aberdeen/Hoquiam Access Bridge (Riverside Ave)

Small access/lift bridge connecting north Aberdeen and north Hoquiam (looking southeast)

Photo Credit: *Bob Freitag*

Grays Harbor County: Comparison of Community Study Area Options

GHC

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
Grayland	1	0	**N/A**	1.9%	18.6%
Grayland	2	3	**770**	46.6%	98.0%
Grayland	3	5	**1,184**	70.6%	100.0%
Grayland	4	3	**900**	54.1%	95.2%
Westport	1	0	**N/A**	74.8%	88.3%
Westport	2	5	**888**	95.7%	99.9%
Westport	3	6	**888**	95.7%	99.9%
Westport	4	3	**867**	95.2%	99.9%
Ocean Shores - West	1	0	**N/A**	7.8%	8.8%
Ocean Shores - West	2	11	**4,633**	76.9%	99.4%
Ocean Shores - West	3	14	**5,027**	82.7%	99.6%
Ocean Shores - West	4	11	**4,860**	80.2%	99.5%
Ocean Shores - East	1	0	**N/A**	8.8%	10.2%
Ocean Shores - East	2	8	**2,819**	59.5%	83.0%
Ocean Shores - East	3	13	**4,140**	83.3%	95.2%
Ocean Shores - East	4	12	**4,018**	81.1%	95.2%
Taholah	1	0	**N/A**	100%	100.0%
Taholah	2	3	**0**	100%	100.0%
Taholah	4	1	**0**	100%	100.0%
Aberdeen, Hoquiam, Cosmopolis	1	0	**N/A**	78.3%	93.5%
Aberdeen, Hoquiam, Cosmopolis	3	4	**1,953**	86.2%	99.9%
Aberdeen, Hoquiam, Cosmopolis	4	3	**1,734**	89.8%	98.7%

Summary Tables

SA

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 Not Within 15 Minutes to High Ground or VES	# of People Not 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 Not Within 15 Minutes to High Ground or VES	# of People Not 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 Not Within 15 Minutes to High Ground or VES	# of People Not 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 Not Within 15 Minutes to High Ground or VES	# of People Not 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

SA

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:

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

PC

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 Not Within 15 Minutes to High Ground or VES	# of People Not 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 Not Within 15 Minutes to High Ground or VES	# of People Not 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 Not Within 15 Minutes to High Ground or VES	# of People Not 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 Not Within 15 Minutes to High Ground or VES	# of People Not 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

PC

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** (*based on FEMA's requirement of 10 SF per person*)
#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:

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

GHC

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

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

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 Not Within 15 Minutes to High Ground or VES	# of People Not 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

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 Not Within 15 Minutes to High Ground or VES	# of People Not 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

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 Not Within 15 Minutes to High Ground or VES	# of People Not 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

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 Not Within 15 Minutes to High Ground or VES	# of People Not 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

GHC

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	**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:

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

CC

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 Not Within 15 Minutes to High Ground or VES	# of People Not 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 Not Within 15 Minutes to High Ground or VES	# of People Not 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 Not Within 15 Minutes to High Ground or VES	# of People Not 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 Not Within 15 Minutes to High Ground or VES	# of People Not 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

CC

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**

**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*

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:

(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 Not Within 15 Minutes to High Ground or VES	# of People Not 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 Not Within 15 Minutes to High Ground or VES	# of People Not 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 Not Within 15 Minutes to High Ground or VES	# of People Not 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 Not Within 15 Minutes to High Ground or VES	# of People Not 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

S

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 Not Within 15 Minutes to High Ground or VES	# of People Not 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 Not Within 15 Minutes to High Ground or VES	# of People Not 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 Not Within 15 Minutes to High Ground or VES	# of People Not 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 Not Within 15 Minutes to High Ground or VES	# of People Not 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

LBS

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 Not Within 15 Minutes to High Ground or VES	# of People Not 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 Not Within 15 Minutes to High Ground or VES	# of People Not 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 Not Within 15 Minutes to High Ground or VES	# of People Not 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 Not Within 15 Minutes to High Ground or VES	# of People Not 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

LBN

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 Not Within 15 Minutes to High Ground or VES	# of People Not 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 Not Within 15 Minutes to High Ground or VES	# of People Not 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 Not Within 15 Minutes to High Ground or VES	# of People Not 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 Not Within 15 Minutes to High Ground or VES	# of People Not 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

OP

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 Not Within 15 Minutes to High Ground or VES	# of People Not 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 Not Within 15 Minutes to High Ground or VES	# of People Not 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 Not Within 15 Minutes to High Ground or VES	# of People Not 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 Not Within 15 Minutes to High Ground or VES	# of People Not 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 Not Within 15 Minutes to High Ground or VES	# of People Not 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 Not Within 15 Minutes to High Ground or VES	# of People Not 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 Not Within 15 Minutes to High Ground or VES	# of People Not 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 Not Within 15 Minutes to High Ground or VES	# of People Not 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

L

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 Not Within 15 Minutes to High Ground or VES	# of People Not 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 Not Within 15 Minutes to High Ground or VES	# of People Not 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 Not Within 15 Minutes to High Ground or VES	# of People Not 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 Not Within 15 Minutes to High Ground or VES	# of People Not 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

TO

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 Not Within 15 Minutes to High Ground or VES	# of People Not 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 Not Within 15 Minutes to High Ground or VES	# of People Not 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 Not Within 15 Minutes to High Ground or VES	# of People Not 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 Not Within 15 Minutes to High Ground or VES	# of People Not 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

N

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 Not Within 15 Minutes to High Ground or VES	# of People Not 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 Not Within 15 Minutes to High Ground or VES	# of People Not 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 Not Within 15 Minutes to High Ground or VES	# of People Not 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 Not Within 15 Minutes to High Ground or VES	# of People Not 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

G

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 Not Within 15 Minutes to High Ground or VES	# of People Not 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 Not Within 15 Minutes to High Ground or VES	# of People Not 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 Not Within 15 Minutes to High Ground or VES	# of People Not 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 Not Within 15 Minutes to High Ground or VES	# of People Not 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 Not Within 15 Minutes to High Ground or VES	# of People Not 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 Not Within 15 Minutes to High Ground or VES	# of People Not 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 Not Within 15 Minutes to High Ground or VES	# of People Not 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 Not Within 15 Minutes to High Ground or VES	# of People Not 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

OSW

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

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

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 Not Within 15 Minutes to High Ground or VES	# of People Not 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

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 Not Within 15 Minutes to High Ground or VES	# of People Not 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

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 Not Within 15 Minutes to High Ground or VES	# of People Not 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

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 Not Within 15 Minutes to High Ground or VES	# of People Not 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

OSE

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 Not Within 15 Minutes to High Ground or VES	# of People Not 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 Not Within 15 Minutes to High Ground or VES	# of People Not 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 Not Within 15 Minutes to High Ground or VES	# of People Not 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 Not Within 15 Minutes to High Ground or VES	# of People Not 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

TA

Taholah Summary Tables, by Option: 1-4

[*total estimated population in tsunami zone = ~579*]

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 Not Within 15 Minutes to High Ground or VES	# of People Not 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

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 Not Within 15 Minutes to High Ground or VES	# of People Not 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

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 Not Within 15 Minutes to High Ground or VES	# of People Not 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 Not Within 15 Minutes to High Ground or VES	# of People Not 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

AHC

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 Not Within 15 Minutes to High Ground or VES	# of People Not 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 Not Within 15 Minutes to High Ground or VES	# of People Not 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 Not Within 15 Minutes to High Ground or VES	# of People Not 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 Not Within 15 Minutes to High Ground or VES	# of People Not 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

LP

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 Not Within 15 Minutes to High Ground or VES	# of People Not 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 Not Within 15 Minutes to High Ground or VES	# of People Not 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 Not Within 15 Minutes to High Ground or VES	# of People Not 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 Not Within 15 Minutes to High Ground or VES	# of People Not 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

NB

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 Not Within 15 Minutes to High Ground or VES	# of People Not 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 Not Within 15 Minutes to High Ground or VES	# of People Not 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 Not Within 15 Minutes to High Ground or VES	# of People Not 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 Not Within 15 Minutes to High Ground or VES	# of People Not 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

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

Pacific County VES Locations: all Options

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

Grays Harbor County VES Locations: all Options

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

Grays Harbor County VES Locations: all Options

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

Clallam County VES Locations: all Options

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

Appendix B: Ocean Shores Bridges

Ocean Shores: Bridge Inventory + Locations

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

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

Population Comparisons: 2010 Census vs. 2019 ACS

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