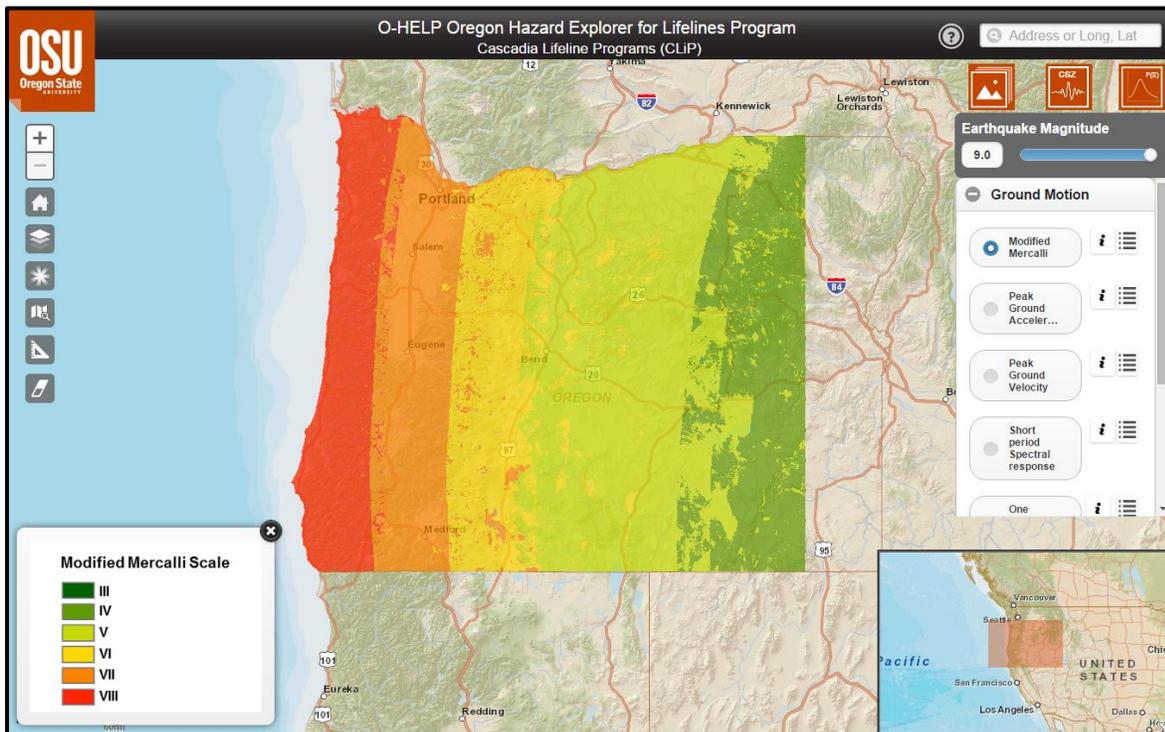




O-HELP USER MANUAL

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INTRODUCTION:

This is a user manual for the O-HELP (Oregon Hazard Explorer for Lifelines Program) website, which is a user-friendly, web-based geographic information system (GIS) tool to assess potential earthquake hazards in Oregon, developed with support from the Cascadia Lifelines Program (CLiP). The website contains previously mapped hazard information on severe ground shaking, landslides, liquefaction and lateral spreading, co-seismic subsidence, and potential tsunami inundation lines in a simple and powerful web-based interface which does not require the user to have extensive knowledge of GIS.

BACKGROUND:

Unfortunately, the Cascadia Subduction Zone (CSZ) is capable of generating a M9.0 earthquake that could greatly damage the built environment in Oregon. Such a powerful and long-lasting earthquake can generate severe ground shaking, landslides, liquefaction-induced ground deformations, fault rupture vertical displacement, tsunamis, etc. These seismic deformations will likely be considerably damaging to foundations, bridges, roadways, pipelines, and other lifelines.

Many of Oregon's lifeline providers, such as public and private entities responsible for transportation, electric and gas utilities, water and wastewater, fuel, airports, and harbors face an aging infrastructure that was built prior to a full understanding of this extreme seismic risk. Generally, available methods to assess and mitigate seismic risk to these vital lifelines have been developed for much shorter duration, crustal earthquakes, typical of those experienced in California. However, such methods may not be appropriate for mitigating subduction zone earthquakes which can last up to three- to five-minutes, as recently experienced in Chile and Japan, and expected in Oregon. As such, The purpose of the O-HELP website is to provide easy access to the latest and best available hazard information over the web, including work completed in the recent Oregon Resilience Plan (ORP) (OSSPAC, 2013) and other work completed by the Department of Geology and Mineral Industries (DOGAMI) and the United States Geological Survey (USGS).

INTENDED AUDIENCE:

This tool is designed for engineers, planners, geologists, and others who need this information to help make appropriate decisions. It is assumed that the users have enough knowledge about earthquake engineering and geologic hazards to understand what the data means and how to use it appropriately. Minimal knowledge of GIS will be needed to work with this web-GIS tool.

Participants in the Project:

Participating organizations in CLiP include: the Oregon Department of Transportation (ODOT), Portland General Electric (PGE), Northwest Natural Gas (NWN), Portland Water Bureau (PWB), Port of Portland (PDX), Eugene Water and Electric Board (EWEB), Bonneville Power Administration (BPA) and Tualatin Valley Water District (TVWD).

The Department of Oregon Geology and Mineral Industries (DOGAMI) developed several of the datasets that have been included in the website. They have also contributed ideas to the design of the website.

The following people have contributed to the development and maintenance of the website: Daniel T. Gillins (PI), Michael J. Olsen (Co-PI), Rubini Narayanan, and Mahyar Sharifi-Mood. All of these individuals are part of the Geomatics research group in the School of Civil and Construction Engineering at Oregon State University.

DISCLAIMER:

The Geomatics research group in School of Civil and Construction Engineering at the Oregon State University works to ensure that the information provided on this website is accurate, timely, and useful. The information provided herein is for reference only and is **not suitable** for incorporation in engineering design or site-specific analysis; instead, it provides a starting point to identify and understand hazards of primary concern. For more generalized information regarding earthquake and other types of hazards in Oregon meant for the general public, please visit the web page of Oregon HazVu: Statewide Geohazards Viewer at: <http://www.oregongeology.org/hazvu/>.

The Geomatics research group is not responsible for errors or omissions in information provided on this website. Any use of this website or the information available at this website is at your own risk and we will not be responsible for the consequences of your decision to utilize the information.

Visitors are encouraged to confirm the information contained on this website with other reliable sources and agencies. Use and access to this website or any of the links contained within this website do not create an engineering consultant-client relationship. The linked websites are not under Geomatics research group's control and the research group does not assume any responsibility or liability for any communication or materials available at such linked websites.

Corrections and additions to this website will be made when necessary or as time permits.

DATA SOURCES

The web-GIS framework for O-HELP has been designed in ESRI's ArcGIS for Server (i.e., ArcServer) platform. ArcServer enables the use of several of ESRI's base layers, including aerial imagery, topographic maps, and road networks.

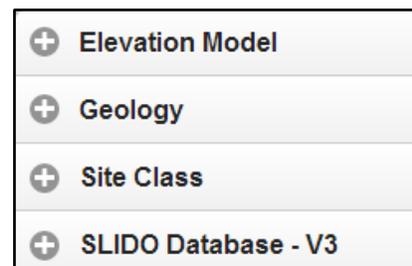
The tectonic activities of the Cascadia Subduction Zone are capable of triggering great seismic events, hence numerous layers of raster and vector data depicting such hazards associated with a M8.1, M8.4, M8.7, and M9.0 Cascadia Subduction Zone (CSZ) earthquake have been collected and uploaded to this platform. Many of these data layers were published in the Oregon Resilience Plan (OSSPAC, 2013; Madin and Burns, 2013).

LAYER CONTROL OPTION

Three icons which control the various data layers are presented in the upper right portion of the O-HELP website. Each selectable icon is discussed below.

General Site Info Tab

Selecting this icon creates a box of headers that allow the user to access several data layers of general site information. The headers are: Elevation Model, Geology, NEHRP site class, and data streamed from the SLIDO database (version 3.2). Selecting a header will then allow the user to select and view various data layers, as defined below, by clicking on a radio button.



Digital Elevation Model

- **30 meter resolution:** a raster hybrid digital elevation model (DEM) which combines 1 meter LIDAR data from the Oregon LIDAR Consortium where available with 10 meter resolution USGS National Elevation Dataset (NED) data elsewhere. The data were then resampled using bilinear interpolation to a 30 m cell size to balance file size with level of detail. The NED data was obtained from at the USGS at <http://ned.usgs.gov/>. More information about the LIDAR data can be found at: <http://www.oregongeology.org/sub/projects/olc/>.

Geology

- **Site Geology:** a vector polygon feature layer depicting general site geology in Oregon, compiled by DOGAMI and made available through the Oregon Geologic Data Compilation (OGDC) v5.0. This file was downloaded at <http://www.oregongeology.org/sub/ogdc/> on March 22, 2014.
- **Fault:** a vector polyline feature layer depicting mapped quaternary (i.e. active) faults of the last 1,600,000 years (USGS, 2006). This file was downloaded from the USGS at <http://earthquakes.usgs.gov/regional/qfaults/> on March 4, 2014.

Site Class

- **NEHRP:** a vector polygon feature depicting soil site class, as defined by the National Earthquake Hazard Reduction Program (NEHRP). These data were produced by DOGAMI and published as part of the Oregon Resilience Plan (OSSPAC, 2013). Table 1 gives the profile type for each soil site class according to the average shear wave velocity in the upper 30 meters of the site profile.

Table 1- NEHRP Site classification definitions (BSSC, 2001).

Site Class	Profile Type	Rock/Soil Shear wave Velocity (m/s)
A	Hard rock	>1500
B	Rock	760 - 1500
C	Very dense soil/soft rock	360 - 760
D	Stiff soil	180 - 360
E	Soft soil	<180
F	Special soils requiring site-specific evaluation	

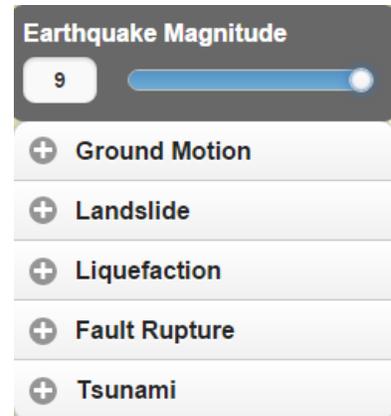
SLIDO Database - Version 3.2

DOGAMI provides the Statewide Landslide Information Database for Oregon (SLIDO), which contains a compilation of landslides that have been identified on published maps (Burns et al., 2011). O-HELP streams these data directly from the SLIDO database server (Version 3), accessed directly at <http://www.oregongeology.org/sub/slido/data.htm>. Since these data are streamed from DOGAMI's server, updates to SLIDO will be automatically updated in O-HELP.

- **Landslide Polygons:** a vector polygon feature representing the landslide deposits and scarps along with scarp flanks.
- **Landslide Points:** the location of historic landslides which occurred in Oregon, compiled as a point feature dataset.

CSZ Hazards Tab

Selecting this icon creates a box of headers that allow the user to access several hazard layers associated with scenarios M9.0, M8.7, M8.4, and M8.1 CSZ earthquake. The headers area: Ground Motion, Landslide, Liquefaction, Fault Rupture, and Tsunami. Selecting a header will then allow the user to select and view various data layers, as defined below, by clicking on a radio button.



Earthquake Scenario Slider

User can select between four Cascadia Subduction Zone (CSZ) earthquake scenarios of M8.1, M8.4, M8.7, and M9.0. The default values is magnitude 9.0 scenario, which changing the slider to any of the earthquake magnitude scenarios will make earthquake hazard map of that scenario available for user in the data layers of CSZ hazard tab.

Ground Motion

- **Modified Mercalli scale:** a raster showing the intensity of the earthquake at the surface according to the Modified Mercalli Intensity Scale. The raster was computed using mapped PGA values from the Oregon Resilience Plan (OSSPAC, 2013; Madin and Burns, 2013), and a regression relationship developed in Wald et al. (1999). The Modified Mercalli Intensity Scale refers to the expected effects experienced at a place during the earthquake. Lower numbers of the scale generally deal with how the earthquake is felt by people; higher numbers are based on observations of structural damage (see Table 2).
- **Peak ground acceleration (PGA):** a raster of PGA values at the ground surface during any of the CSZ earthquake scenarios. This raster was published in the Oregon Resilience Plan (OSSPAC, 2013). DOGAMI described the method and data used to develop this raster in Madin and Burns (2013). Briefly, the raster was computed using bedrock PGA values from a USGS Shakemap for a scenario M9.0 CSZ earthquake, a polygon feature of NEHRP site classes described above, and soil amplification relationships in Boore and Atkinson (2008). The Shakemap is available at: http://earthquake.usgs.gov/earthquakes/shakemap/global/shake/Casc9.0_expanded_se/#download
- **Peak ground Velocity:** a raster of PGV values at the ground surface during the CSZ earthquake scenarios. This raster was published in the Oregon Resilience Plan (OSSPAC, 2013). DOGAMI described the method and data used to develop this raster in Madin and Burns (2013). Briefly, the raster was computed using bedrock one-second spectral acceleration (SA01) values from the same USGS Shakemap as the one used for computing the PGA raster. Then, based on the

polygon feature of NEHRP site classes described above, SA01 values at the ground surface were computed using soil amplification relationships in Boore and Atkinson (2008). Finally, the SA01 values were converted into PGV values by using the relationship described in Newmark and Hall (1982).

- **Short period spectral response:** This layer provide raster of surficial 0.3-second spectral acceleration values for the selected CSZ earthquake scenario from the scenario slider.

Table 2- Abbreviated description of the 12 levels of Modified Mercalli Intensity (from <http://earthquake.usgs.gov/learn/topics/mercalli.php>, accessed July 2014).

No.	Description
I	Not felt except by a very few under especially favorable conditions.
II	Felt only by a few persons at rest, especially on upper floors of buildings.
III	Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibrations similar to the passing of a truck. Duration estimated.
IV	Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.
V	Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
VI	Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.
VII	Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.
VIII	Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned.
IX	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
X	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.
XI	Few, if any (masonry) structures remain standing. Bridges destroyed. Rails bent greatly.
XII	Damage total. Lines of sight and level are distorted. Objects thrown into the air.

- **One second spectral response:** a raster of one-second spectral acceleration values at the ground surface during the CSZ earthquake scenarios. This raster was published in the Oregon Resilience Plan (OSSPAC, 2013). DOGAMI described the method and data used to develop this raster in Madin and Burns (2013). Briefly, this raster was computed using bedrock one-second spectral acceleration (SA01) values from the same USGS Shakemap as the one used for computing the PGA raster depicted in O-HELP. Then, based on the polygon feature of NEHRP site classes

described above, SA01 values at the ground surface were computed using soil amplification relationships in Boore and Atkinson (2008).

Seismically induced Landslides

- **Landslide triggering probability:** a raster depicting landslide triggering probabilities given a CSZ earthquake scenario of M8.1, M8.4, M8.7 and M9.0. This raster was published in the Oregon Resilience Plan (OSSPAC, 2013). DOGAMI described the method and data used to develop this raster in Madin and Burns (2013). Briefly, the raster was computed using the model described in section 4.2.2.2 of HAZUS-MH MR4 software (FEMA, 2011). DOGAMI input a new landslide susceptibility map and the PGA raster depicted in O-HELP in this model. Then, following HAZUS (FEMA, 2011) recommendations, the probabilities of landslide triggering were scaled to a maximum of 30%.
- **Landslide displacement:** a raster depicting landslide displacement given a CSZ earthquake scenario of M8.1, M8.4, M8.7 and M9.0. This raster was published in the Oregon Resilience Plan (OSSPAC, 2013). DOGAMI described the method and data used to develop this raster in Madin and Burns (2013). Briefly, the raster was computed using the model described in section 4.2.2.2 of HAZUS-MH MR4 software (FEMA, 2011). DOGAMI input a new landslide susceptibility map and the PGA raster depicted in O-HELP in this model. Then, following HAZUS (FEMA, 2011) equation 4-25, the permanent ground displacement of peak ground displacement was computed.

Liquefaction

- **Liquefaction triggering probability:** a raster depicting liquefaction triggering probabilities given a CSZ earthquake scenario of M8.1, M8.4, M8.7 and M9.0. This raster was published in the Oregon Resilience Plan (OSSPAC, 2013). DOGAMI described the method and data used to develop this raster in Madin and Burns (2013). Briefly, the raster was computed using the model described in section 4.2.2.1 of HAZUS-MH MR4 software (FEMA, 2011). DOGAMI input a new liquefaction susceptibility map and the PGA raster depicted in O-HELP in this model. Then, following HAZUS (FEMA, 2011) recommendations, the probabilities of liquefaction triggering were scaled to a maximum of 30%.
- **Lateral spreading:** a raster depicting lateral spreading given a CSZ earthquake scenario of M8.1, M8.4, M8.7 and M9.0. This raster was published in the Oregon Resilience Plan (OSSPAC, 2013). DOGAMI described the method and data used to develop this raster in Madin and Burns (2013). Briefly, the raster was computed using the model described in section 4.2.2.1 of HAZUS-MH MR4 software (FEMA, 2011). DOGAMI input a new liquefaction susceptibility map and the PGA raster depicted in O-HELP in this model. Then, following HAZUS (FEMA, 2011) equation 4-23, the liquefaction-induced lateral spreading was computed.

Fault Rupture

- **Coastal co-seismic subsidence:** This layer is only available for M9.0 CSZ earthquake. The layer is a raster depicting subsidence given a M9.0 CSZ earthquake. This is a parameter which depicts the land level change in a Cascadia subduction earthquake event along the coast. DOGAMI input the elastic dislocation models by Witter et al (2011) in order to compute this map.

Tsunami

- **Anticipated inundation area:** This layer is only available for M9.0 CSZ earthquake. The dataset is shapefile representing the areas which will be inundated in a Large (L1) tsunami scenario for Oregon coast. The methods and data used to make this map are described in detail in Priest et al (2013).

Probabilistic Hazards Tab



This button is under development button and will eventually provide a collapsible set of layers corresponding to a probabilistic version of hazards rather than a scenario based maps.

TOOL FEATURES

Several features and tools in O-HELP (numbered in Figure 1) are defined individually below.

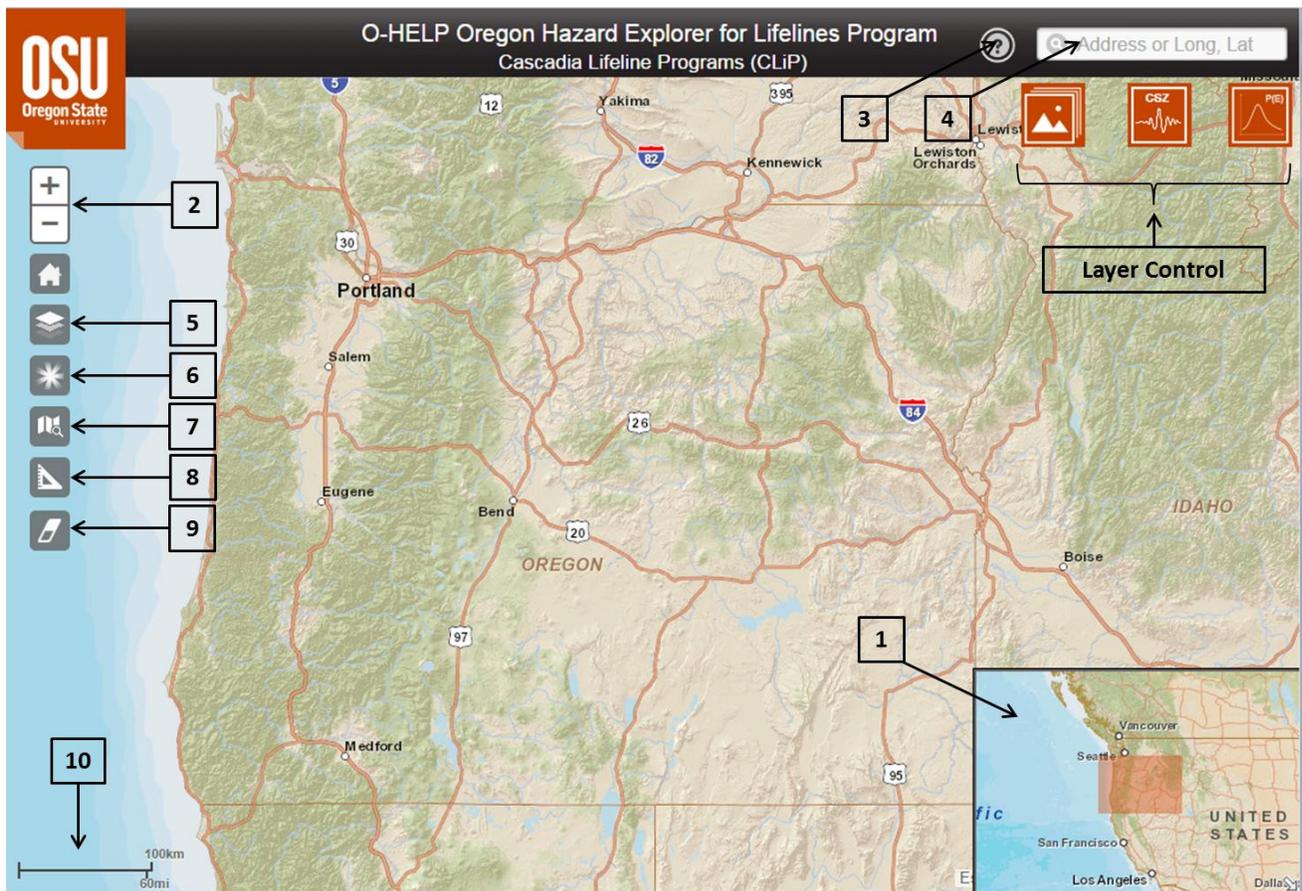


Figure 1. Outline view of the O-HELP website with various feature tools and their screen location.

1. Overview Map

Located in the lower right corner of the website, an overview map shows the user where the main display is concentrated. As shown in Figure 2, the user can click and move the red box (1A) inside the overview map to change the current view extent. By clicking the small arrow in lower right corner (1B), the user can hide the overview map from displaying on the web page, if desired.



Figure 2. The overview map, which is located at the bottom right corner of the website.

2. Zooming and Panning



To navigate the map, the user can pan with a mouse. They can also zoom in and out with the  buttons or by using the mouse wheel. The initial default view is the entire State of Oregon.

3. User Help



Clicking on this icon provides a link to the OHELP user manual document.

4. Address Locator



This tool enables the user to search for a specific location by entering either geographic coordinates in longitude, latitude format, or by entering the address for a location of interest. Once the user inputs the search information, the locator will show the place by dropping a black pin on the map. A window will then pop up in the map with the latitude and longitude information for that site (see Figure 3). Within the same pop-up window, there is a link that can be selected for generating a report for that location. Similar report can be generated using single point report (See “Single Point Report” in section “7. Report Tools” for more details).



Figure 3: Pop up window representing spatial information of the selected address or latitude, longitude on the interactive map.

5. Base Layer Selection

After selecting this icon, a new box will open which gives the user three options for a base map layer (Figure 4). Current available base map layers are ESRI Streets, ESRI Imagery and ESRI Topography. Once the selection is done, the user can click on the same icon to have the box removed from the window.



Figure 4: ESRI street, imagery and topography basemaps in O-Help (Left to Right).

6. Transparency Tool

The transparency tool enables the user to change the opacity of the current selected layer. Note that only one layer can be visible and selected at a time. The default initialized value for transparency is 30%. By clicking on the icon, a box will pop up (Figure 5) wherein the user can adjust the transparency value by moving a slider. By increasing the transparency value, the layer will become less opaque and more visible. By increasing the value, the layer will become more transparent and the underlying base map will become more visible.



Figure 5: Window with a slider for adjusting the transparency value of the current selected layer.

7. Reports Tool

By clicking on the measurement tool button, a box will be shown (see Figure 6) which gives the user ability to select a pin, line, or polygon for measurement and information.



Figure 6: Window with a slider for adjusting the transparency value of the current selected layer.

Single Point Report

After clicking on the single point report button, the user can click on a desired point on the map and a pop-up window will appear like the one shown in Figure 3. This will allow the user to view the latitude/longitude of the point as well as a screenshot of the final report linked to a detail report on the pinned point. Similar report can be obtained by using any of the following options:

- Using the address locator in the search box (see “4. Address Locator”)
- Using the single point report button

Both of above methods will add a pin to the map at the desired location and a pop up window will be shown (Figure 3). Inside the window, the report thumbnail will link to an O-HELP hazard report in a new window for that specified location. An example O-HELP hazard report is shown in Figure 7.

O-HELP HAZARD REPORT																																											
Section I																																											
Site Name: <input type="text" value="My site"/> Latitude: 45.5206 Longitude: -122.6721 Date: 3/18/2016 Comments <div style="border: 1px solid gray; padding: 5px; min-height: 40px;"> This is a building of interest. </div>	Vicinity Map Under Development																																										
Section II: General site Information																																											
Elevation (Meter): 9.9 Slope (Degree): 0.6 NEHRP Site Class: E Site Geologic Unit: sediments Site Geology Description: Alluvium Site Geology Symbol: Qs Age of Site Geologic unit: Quaternary Distance to nearest mapped active faults (Km): 1																																											
Section III: Seismic parameters - M9.0 CSZ Earthquake																																											
Modified Mercalli Scale: VII Peak Ground Acceleration (g): 0.19 Peak Ground Velocity (cm/sec): 29.1 Short Period Spectral Response (g): 0.42 One Second Spectral Response (g): 0.31																																											
Section IV: Hazard Rating - M9.0 CSZ Earthquake																																											
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 15%;"></th> <th style="width: 15%;">Unit</th> <th style="width: 15%;">Very Low</th> <th style="width: 15%;">Low</th> <th style="width: 15%;">Medium</th> <th style="width: 15%;">High</th> <th style="width: 15%;">Very High</th> </tr> </thead> <tbody> <tr> <td>Deterministic Hazard</td> <td></td> <td style="background-color: #90EE90;">0</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Landslide Probability:</td> <td>%</td> <td colspan="2" style="background-color: #90EE90;">0</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Landslide Displacement:</td> <td>cm</td> <td colspan="2" style="background-color: #90EE90;">0</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Liquefaction Probability:</td> <td>%</td> <td></td> <td></td> <td style="background-color: #FFFF99;">13</td> <td></td> <td></td> </tr> <tr> <td>Lateral Spreading:</td> <td>cm</td> <td></td> <td></td> <td></td> <td style="background-color: #FF8C00;">40</td> <td></td> </tr> </tbody> </table>		Unit	Very Low	Low	Medium	High	Very High	Deterministic Hazard		0					Landslide Probability:	%	0					Landslide Displacement:	cm	0					Liquefaction Probability:	%			13			Lateral Spreading:	cm				40	
	Unit	Very Low	Low	Medium	High	Very High																																					
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Liquefaction Probability:	%			13																																							
Lateral Spreading:	cm				40																																						

Figure 7: Example O-HELP hazard report, generated by clicking on the “Print Report Tool”.

Each generated report for a specific location has 4 sections. Data shown in this report are taken from the data layers previously referenced in this manual. In the first section of the report, a user can type a site name and any relevant comments. This section also includes the latitude and longitude of the site, and the date. The second section gives the user the details of general site information, including elevation, slope, NEHRP site class, general and detailed site geology information, the corresponding geologic symbol, geologic age, and distance to nearest mapped active fault.

The third section summarizes details about estimated seismic parameters in that location given a CSZ earthquake scenario of M8.1, M8.4, M8.7, and M9.0. Such parameters are the modified Mercalli scale

earthquake intensity, peak ground acceleration (PGA), peak ground velocity (PGV), coastal coseismic subsidence (only available for M9.0), and one-second spectral response.

Within the fourth section of the report, various hazards associated with a Cascadia Subduction Zone earthquake scenarios are given in a graphical representation. The landslide probability, estimated landslide displacement, liquefaction triggering probability, and estimated lateral spreading displacement values are categorized into 5 different hazard classes: very low, low, medium, high and very high. Note that these are generalized categorizations and would vary depending on the structure or object of interest.

Table 2 defines the thresholds used to categorize these hazards.

Table 2: Various classes of hazards and their corresponding thresholds.

Layer	Units	Very Low	Low	Medium	High	Very High
Landslide Probability	%	0-5	5-10	10-15	15-20	>20
Landslide Displacement	cm	0-3	3-10	10-30	30-100	>100
Liquefaction Probability	%	0-5	5-10	10-15	15-20	>20
Lateral Spreading	cm	0-3	3-10	10-30	30-100	>100

MultiPoint Report 

The MultiPoint Report allows the user to iterate report generation on more than one point. Performing the MultiPoint tool, user can click on desired multiple points on the map to extract hazard related information and generate a final report. The final report can be downloaded as a CSV file from a pop-up window, or the Reports Tool collapsible window. The CSV download link appears after completion of the report generation (Figure 8). The report includes the following fields on each pinned point: PID, Latitude, Longitude, Elevation(m), Slope(deg), NEHRP Site Class, Geologic Unit, Geology Description, Geology Symbol, Age of Geologic Unit, Modified Mercalli Scale, PGA(g), PGV(cm/s), Short Period Spectral Response(g), One Second Spectral Response(g), Landslide Probability(%), Landslide Displacement(cm), Liquefaction Probability(%), Lateral Spreading(cm).

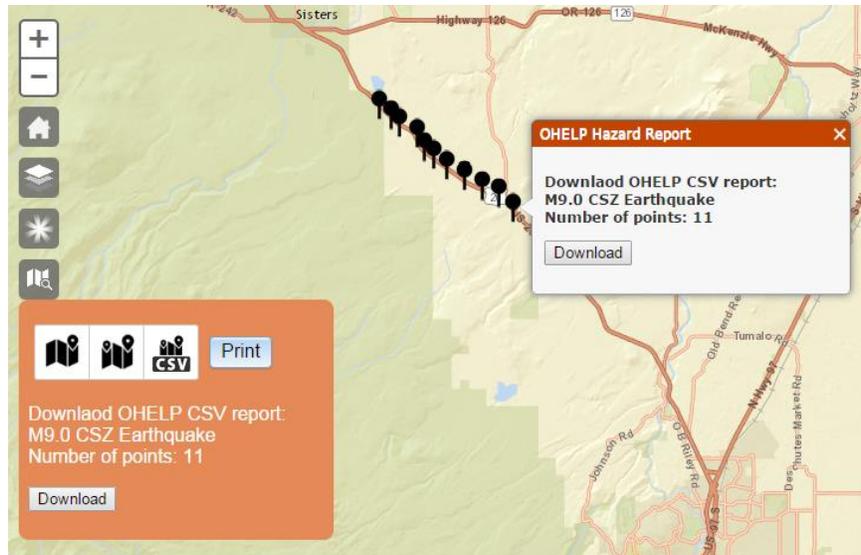


Figure 8: Example of OHELP MultiPoint report and final CSV download links

CSV MultiPoint Report

User can also get MultiPoint Report by submitting a CSV file (Figure 9) of point information that lists the PID, latitude, and longitude of the points. The acceptable file is a comma-delaminated format with the required fields is aforementioned order. After receiving the CSV file, OHELP will sparse the coordinate values and will extract hazard parameters for each of point and return a new CSV file with hazard information. Similar to MultiPoint Tool, the final report can be downloaded as a CSV file from a pop-up window, or the Reports Tool collapsible window. The CSV download link appears after completion of the report generation. The report generation time varies based on the number points that report is requested for. However, the report generation is a time consuming process.



Figure 9: CSV file submission for generating OHELP MultiPoint report

Print Map

The Print button generates a printable version of the current extent view. After clicking this button, a new grey icon will be shown as “printing”, followed by a link to the printout. The user can click on the link to have the custom, printable map pop up in a new window like the one shown in Figure 10. Another option for printing a map from this website is to simply use the print screen key, or snipping tool, depending on the user’s operating system.

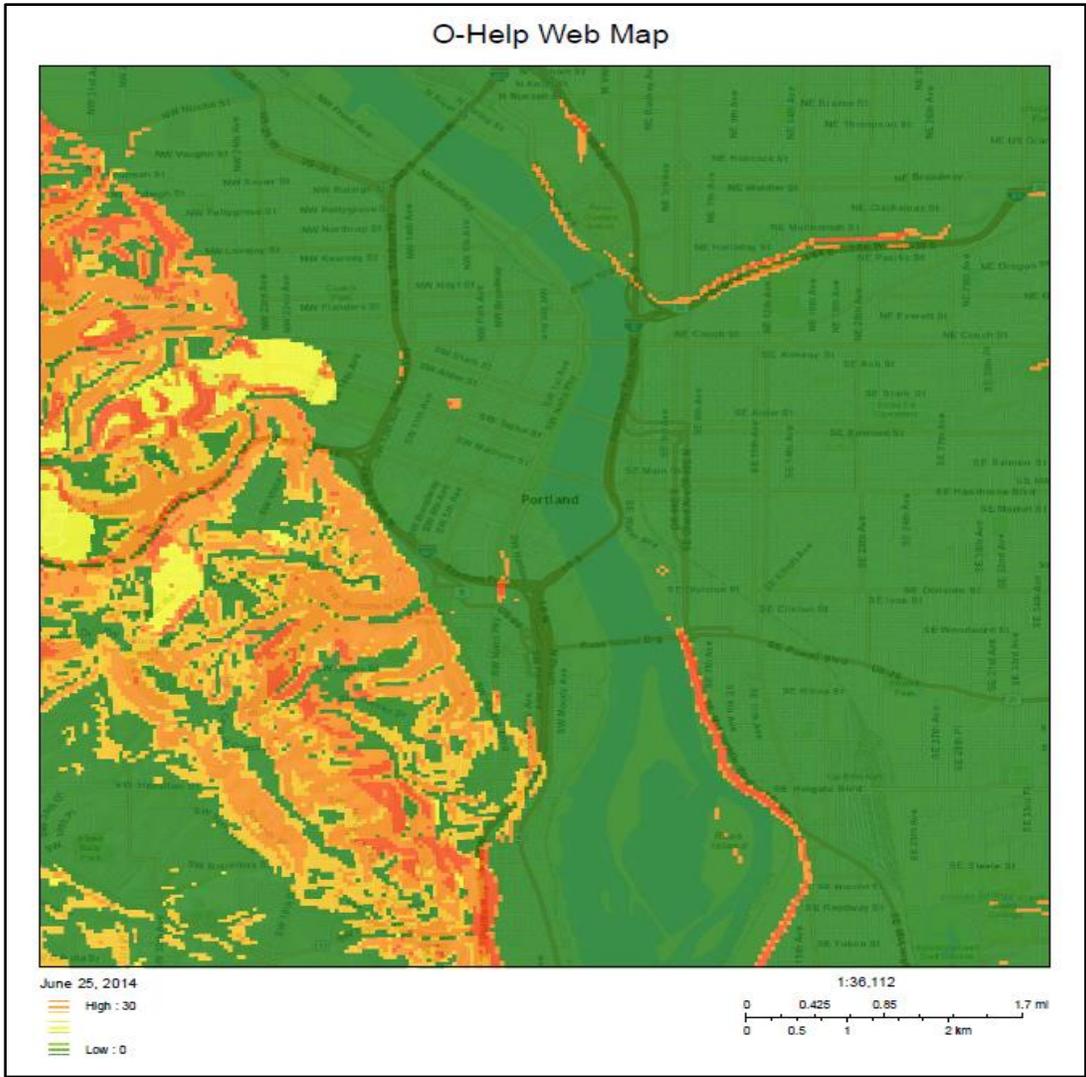


Figure 10: Example custom map generated by clicking on the print button.

8. Measure Tool

By clicking on the measurement tool button, a box will be shown (see Figure 11) which gives the user ability to select a pin, line, or polygon for measurement and information.



Figure 11: Measurement tool box and dimensions of the current selection.

Line Segment 

The second option inside the measure tool is the line segment button. By clicking on this button, the user has the ability to left click on various points on the map and draw a series of line segments. A double left click will stop drawing the lines. The cumulative length of the line segments is shown beneath the button in various desired units (e.g., feet, meters, and miles).

Polygon 

Similar to the line segment, the polygon button will calculate the area inside a defined polygon which is drawn by the user by clicking on various points on the map. The same procedure is applied to select the points on the map (left click for choosing corner points and double left click for closing the polygon). The area of the polygon is shown beneath the button.

Clear button 

This button will clear the pins, lines, or polygons which were previously drawn on the map.

9. Eraser Tool 

This button will clear all added layers, the pins, lines, or polygons previously loaded or drawn on the map.

10. Scalebar

It is an interactive scalebar than provides map scale both in metric and imperial units.

FUTURE WORK

As previously discussed, a placeholder is set for probabilistic maps, which are very useful for engineering analysis and risk management. Currently, building codes generally require engineers to use probabilistic seismic hazard analyses for their designs. Unfortunately, probabilistic maps are not yet available for many of the earthquake hazards in Oregon. Hence, future plans are to create such maps and then add them to O-HELP as they become available.

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APPENDIX:

Access to the data:

The data in O-HELP is available for research purposes through the College of Engineering at Oregon State University's ArcGIS web server. To access the mapping data in ESRI's ArcGIS products, follow the steps below to setup the server and to connect to the data:

1. Go to "Arc Catalog".
2. Double-click on "Add ArcGIS Server".
3. In the check box choose "Use GIS services" (Figure 12).

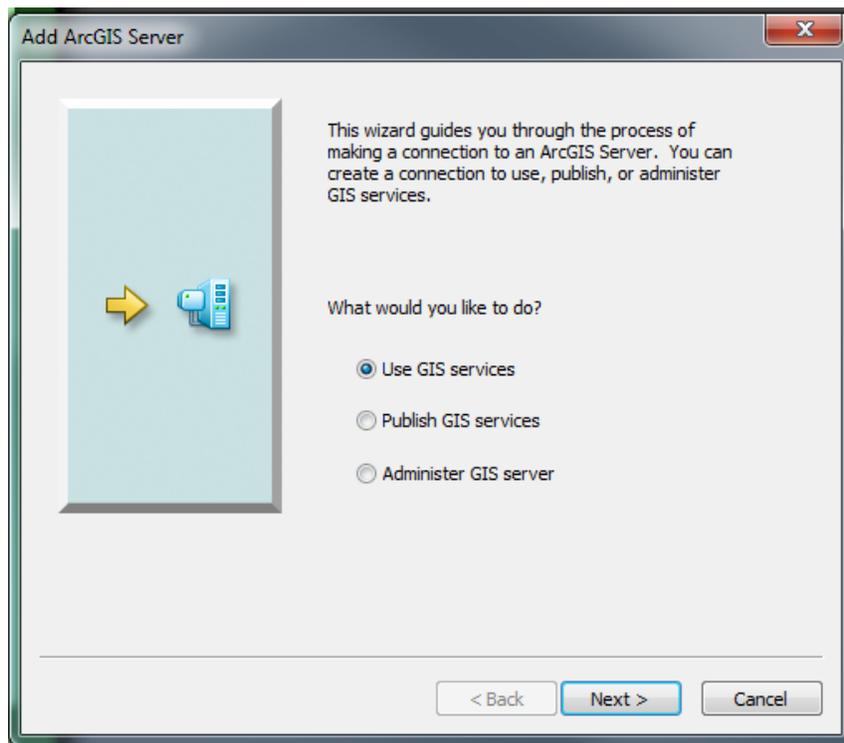


Figure 12: setting up of server step 3

4. Enter the following URL in the server URL box (Figure 13):
(<http://arcweld.engr.oregonstate.edu:6080/arcgis/services>)

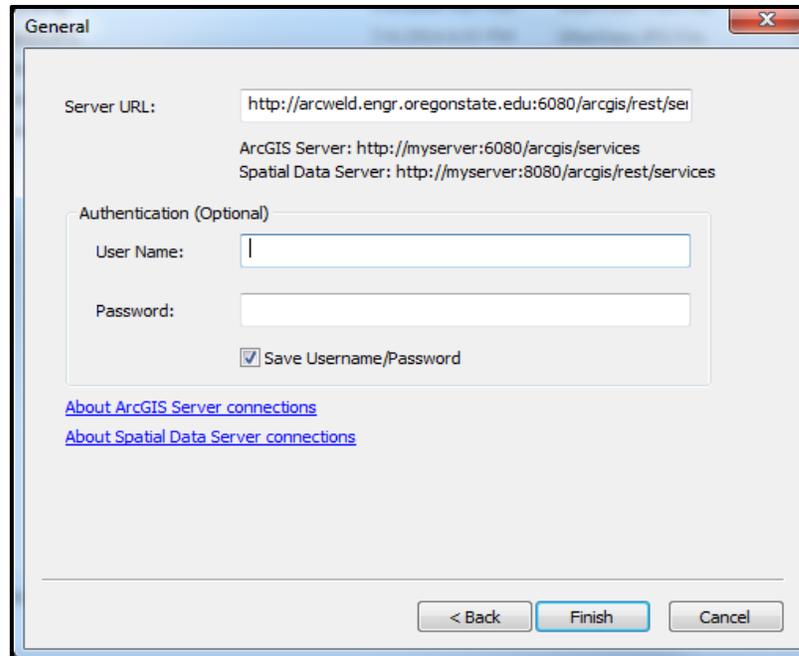


Figure 13: Setting up of server Step 4

5. Enter the authentication credentials as “*user*” for User Name, and “*ohelpme*” for password.
6. Once the server setup is completed, the data becomes visible on the catalog window. Data can be added to ArcMap from Arc Catalog by dragging and dropping the files to the table of contents.

Troubleshooting and FAQs:

Please make sure that once you have selected the pin tool on the location of interest, wait for the pop-up window to come up.

Q: The Print Report Tool is not working. What should I do?

A: The preferred browser for O-HELP is GOOGLE CHROME. Try opening the website with the chrome browser and refresh the page. Also, let the page allow pop-ups.

Q: Feature layers like NEHRP and Site Geology are not rendering on the website. Why is that?

A: Usually, it takes more time to read feature class files from the server in comparison to rasters. Please wait for the server to bring the data on the screen.

Q: The home button on the left side of the screen is vanished and features are not working properly. What should I do?

A: Go to the Settings for the CHROME browser and try clearing your “Cookies and Cached images and files”.