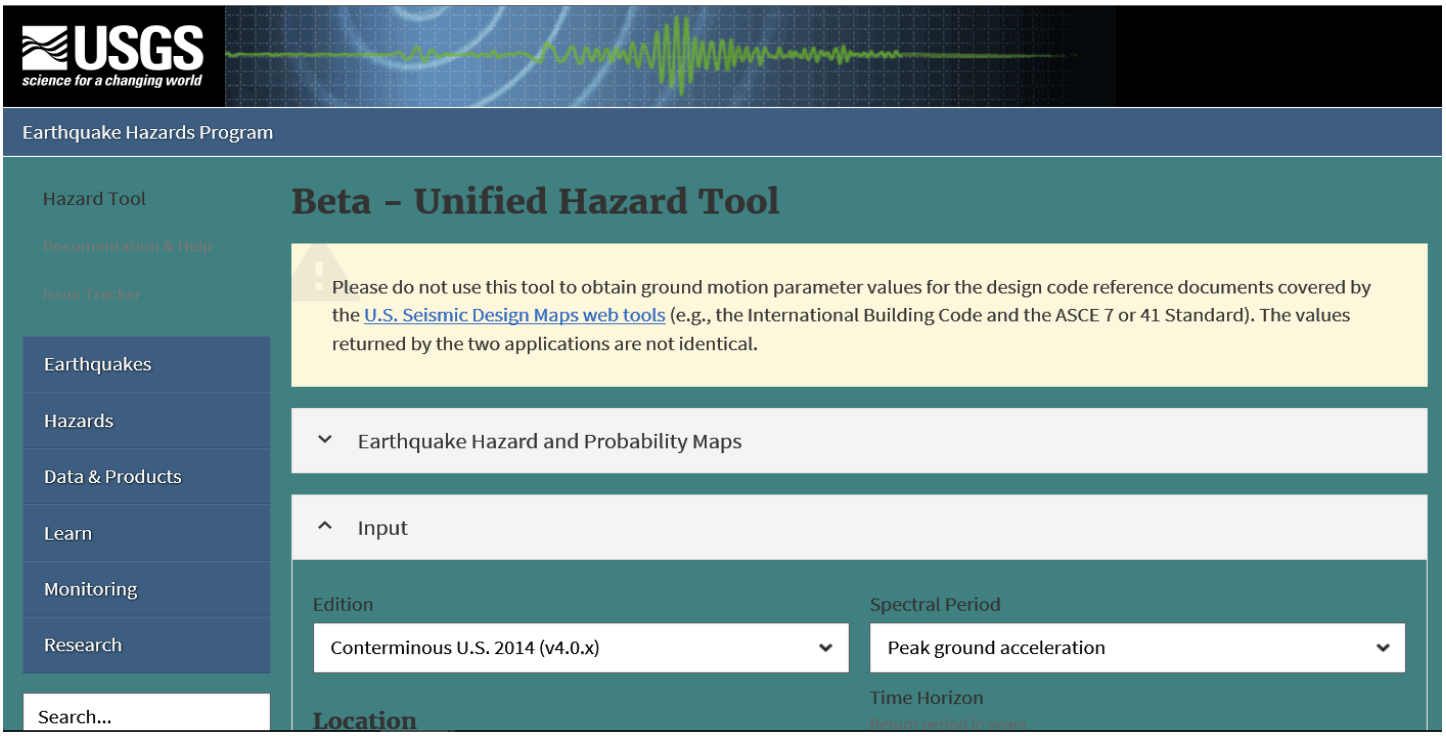
United States Geological Survey (USGS) Peak Ground Acceleration (PGA) Calculator Tutorial (Beta – Unified Hazard Tool)

Fannie Mae requires the Lender to assess the seismic risk for each Property that secures a Mortgage Loan being purchased by Fannie Mae. The Property Condition Assessment (PCA) Report provides the Lender with the information needed to evaluate whether a Property is located in an area or region that may have a propensity to be impacted by a seismic event. To assess the seismic risk, the PCA Report must identify the Peak Ground Acceleration ("PGA") for the Property. The PGA, which replaced the reporting of the Seismic Zone for the Property, is reported by the United States Geological Survey ("USGS"), and represents the shaking or ground motion from an earthquake, expressed as a percentage of g, with g being the acceleration of a falling object due to gravity. If the Property is located in a region with a high seismic risk (i.e., the Property is located in a region that has a 10% or greater probability of the maximum Peak Ground Acceleration equal to or greater than 0.15g at any point in a 50 year period), then the Lender must perform additional seismic risk analysis.

The Lender may wish to determine a Property's seismic risk earlier in the underwriting process, before the PCA is ordered, to assess whether to proceed with full underwriting for a Property that may require additional seismic risk analysis. This tutorial will assist the Lender in using the USGS Earthquake Hazards website, with a focus on the Beta – Unified Hazard Tool website (see link below). There are other publicly available sources for determining a Property's PGA, as well as numerous seismic hazardous determination tools made available by USGS.

By clicking on the following link, the user should be taken to the following screen:

https://earthquake.usgs.gov/hazards/interactive/.



To determine a Property's PGA using the tool, the user will need to input the following information:

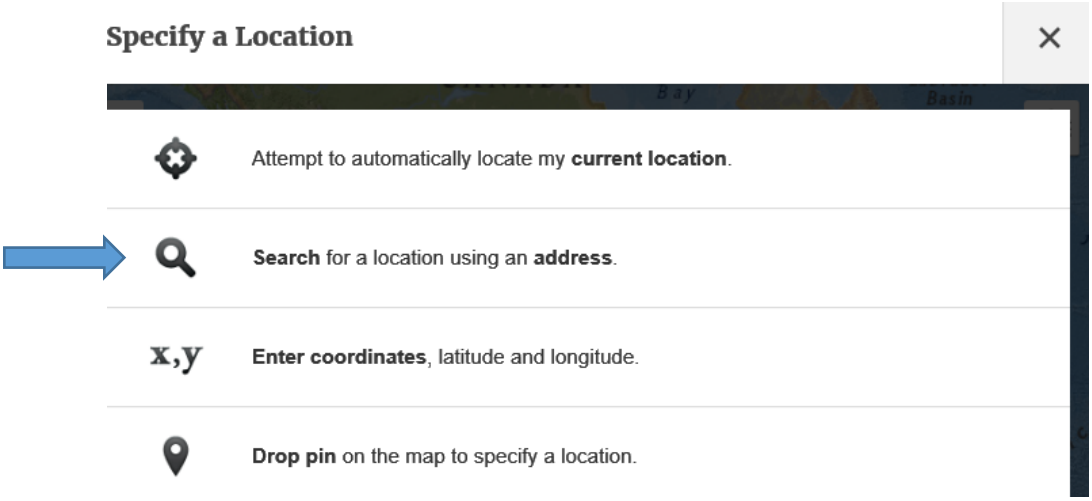
Item Description	Input	Input Type
Edition	Dynamic: Coterminous US 2014	Drop Down Menu
Location	Latitude & Longitude via Property Address	Text
Site Class	259 m/s (Site class D) – CA, OR, NV, WA 760 m/s (B/C Boundary) – all other states	Drop Down Menu
Spectral Period	Peak Ground Acceleration	Drop Down Menu
Time Horizon	475 years (10% in 50 years)	Drop Down Menu

1. Edition: From the drop-down menu, select "Dynamic: Coterminous US 2014".

2. Location: The Latitude and Longitude may be obtained from the property address.

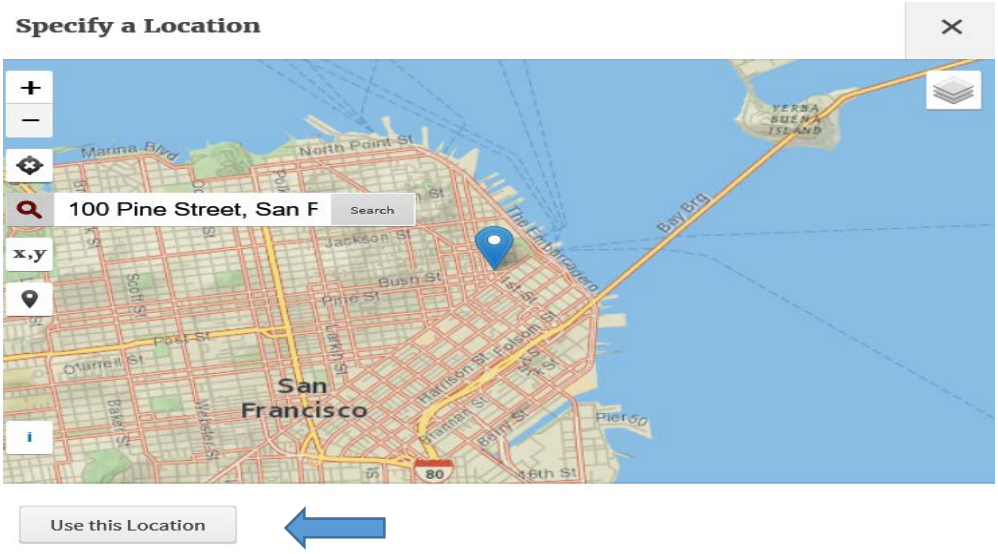
   (a) Click "Choose location using a map."

(b) Next click "Search for a location using an address."

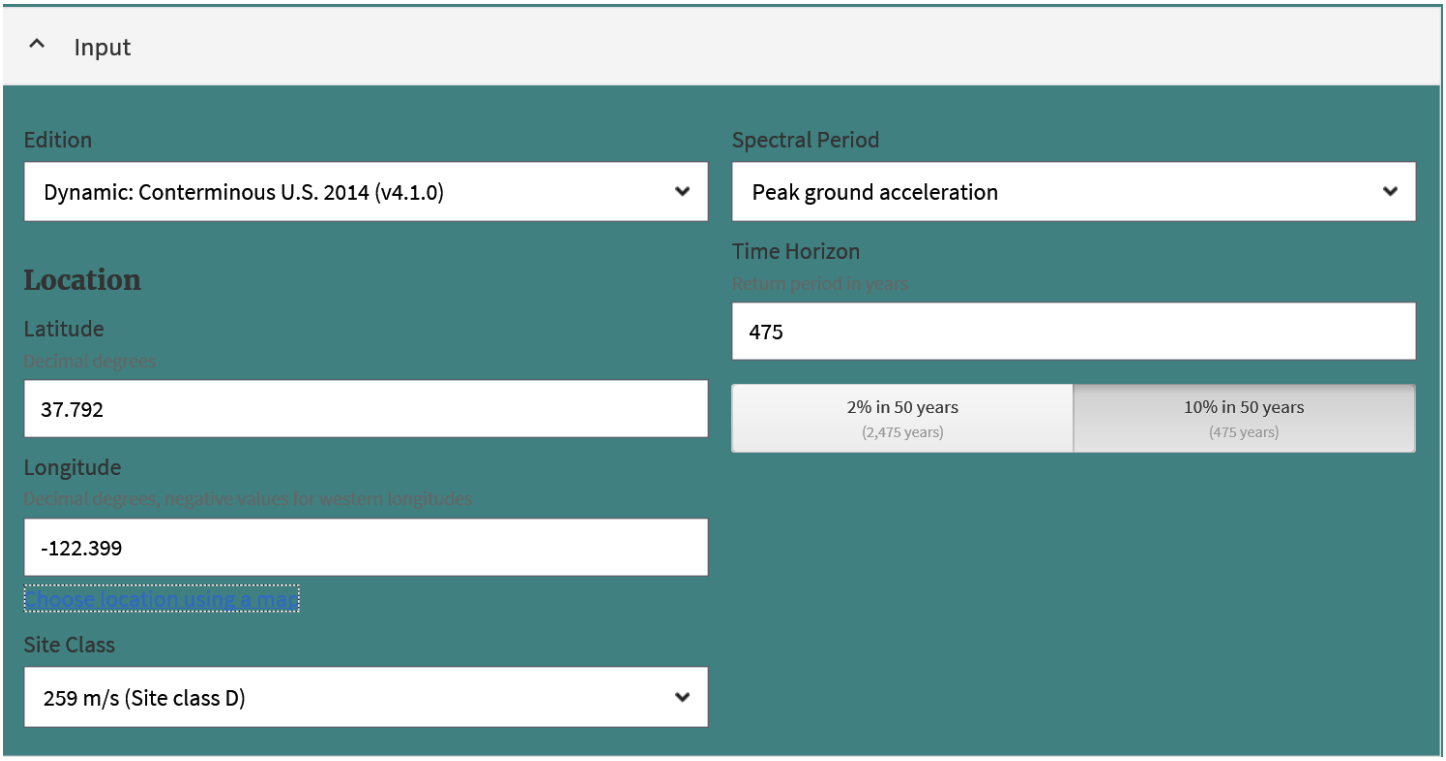


(c) Type in the Property address and click "Search."

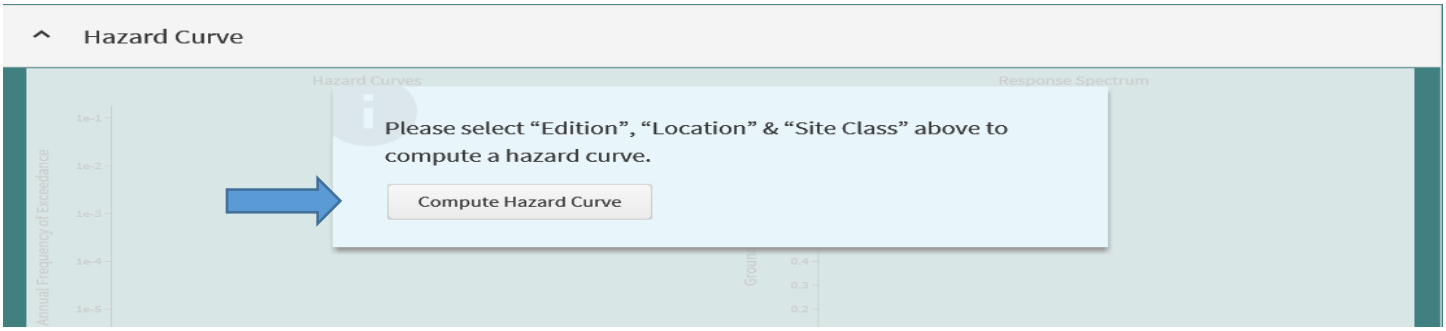
(d) Click "Use this location".



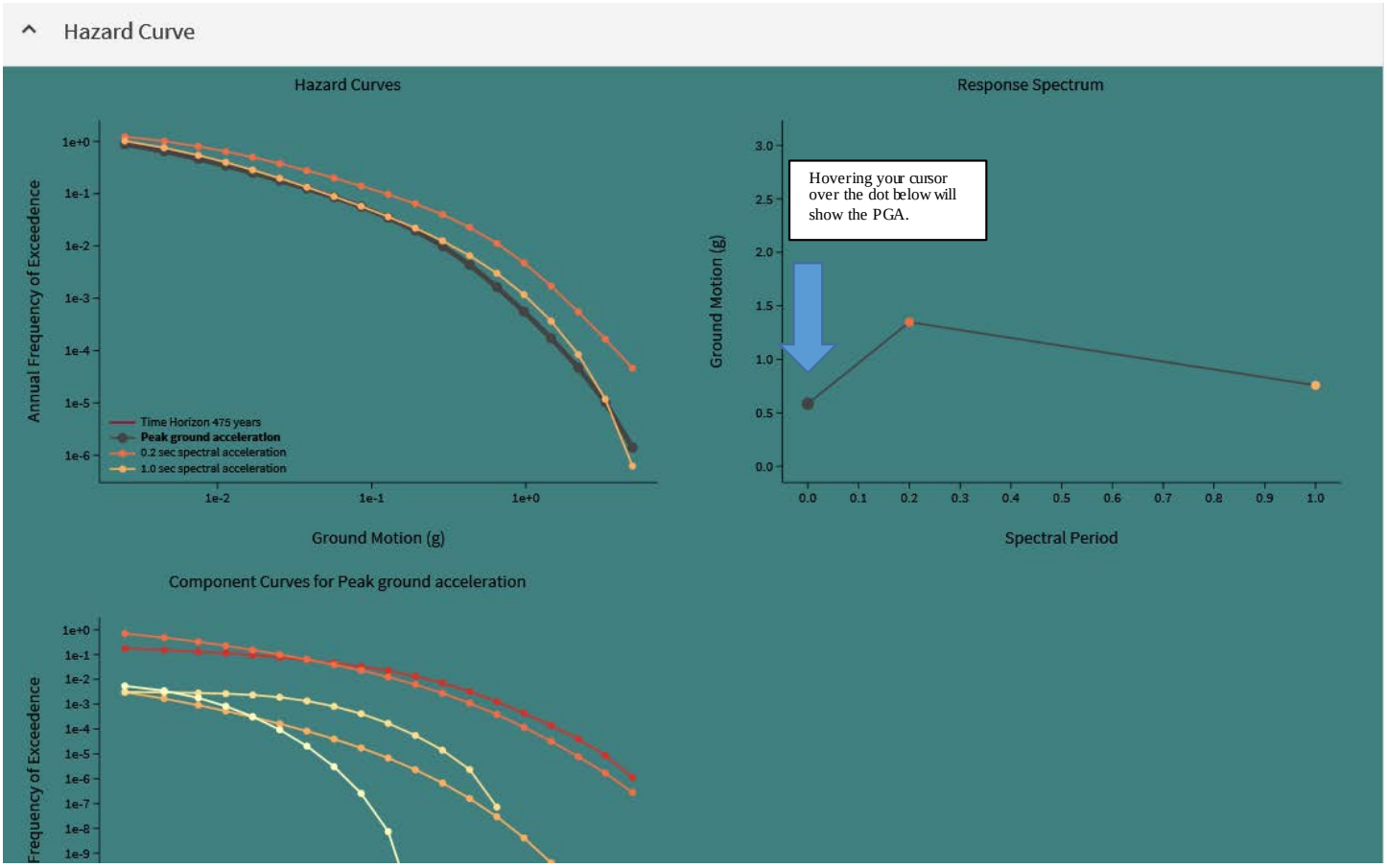
3. Input the Site Class (259 m/s or 760 m/s), Spectral Period (Peak ground acceleration) and Time Horizon (475) per the chart above.

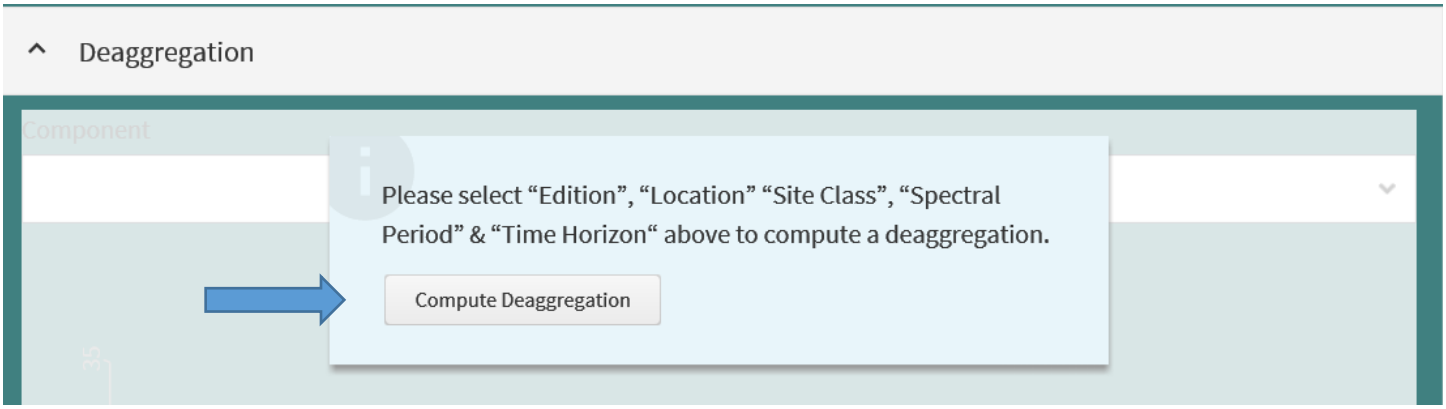


4. Click "Compute Hazard Curve".



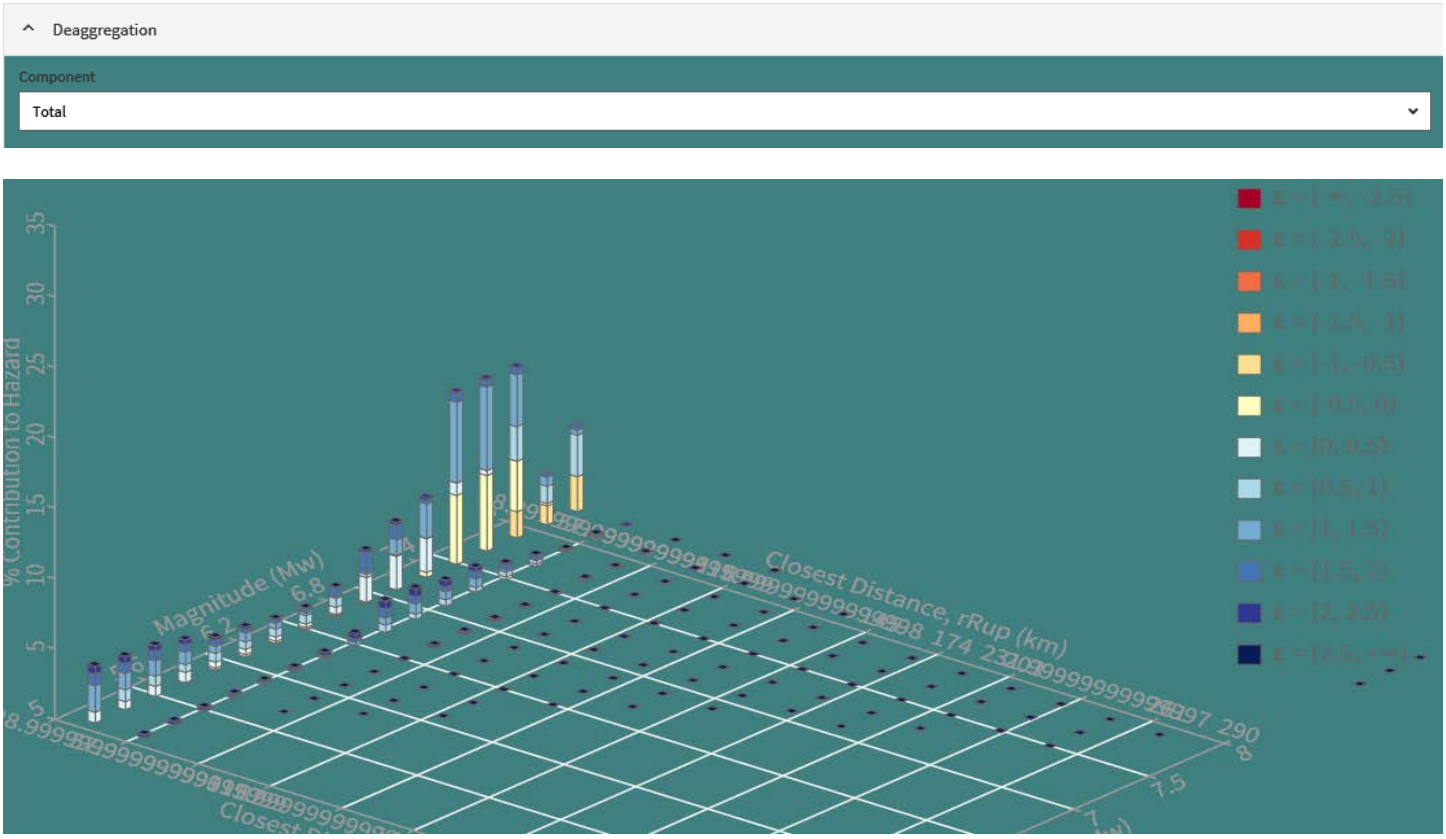
5. Click “Compute Deaggregation”.

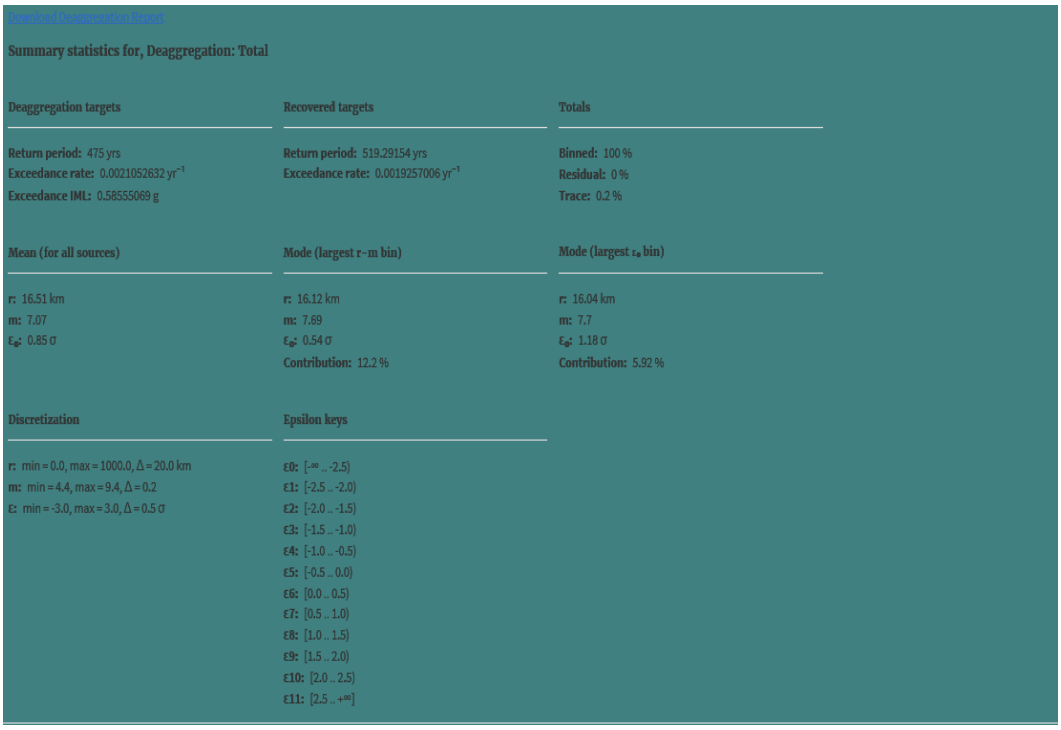




RESULTS

The calculated PGA is located by the arrow in the chart below under “Deaggregation targets”. The Exceedance IML is the calculated PGA. In this example, the PGA is 0.58555069 g or 0.59g rounded.





Download Deaggregation Report

Summary statistics for, Deaggregation: Total

Deaggregation targets	Recovered targets	Totals
Return period: 475 yrs	**Return period:** 519.29154 yrs	**Binned:** 100 %
Exceedance rate: 0.0021052632 yr^{-1}	**Exceedance rate:** 0.0019257006 yr^{-1}	**Residual:** 0 %
Exceedance IML: 0.58555069 g		**Trace:** 0.2 %

Mean (for all sources)	Mode (largest r-m bin)	Mode (largest ε_0 bin)
r: 16.51 km	**r:** 16.12 km	**r:** 16.04 km
m: 7.07	**m:** 7.69	**m:** 7.7
ε_0: 0.85 σ	**ε_0:** 0.54 σ	**ε_0:** 1.18 σ
	Contribution: 12.2 %	**Contribution:** 5.92 %

Discretization	Epsilon keys
r: min = 0.0, max = 1000.0, Δ = 20.0 km	**ε0:** [-∞ .. -2.5)
m: min = 4.4, max = 9.4, Δ = 0.2	**ε1:** [-2.5 .. -2.0)
ε: min = -3.0, max = 3.0, Δ = 0.5 σ	**ε2:** [-2.0 .. -1.5)
	ε3: [-1.5 .. -1.0)
	ε4: [-1.0 .. -0.5)
	ε5: [-0.5 .. 0.0)
	ε6: [0.0 .. 0.5)
	ε7: [0.5 .. 1.0)
	ε8: [1.0 .. 1.5)
	ε9: [1.5 .. 2.0)
	ε10: [2.0 .. 2.5)
	ε11: [2.5 .. +∞]

Because this Property has a PGA equal to or greater than 0.15g, additional seismic analysis would be required by the Lender.

Please refer to Part IIIA, Section 321 of the Fannie Mae Guide for further instructions regarding Property eligibility and underwriting requirements regarding a Property with high seismic risk.

For additional questions regarding the calculation of a Property's PGA using the USGS Earthquake Hazards website, please contact drawer_insurance@fanniemae.com.