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THE 6TH ANNUAL SCIENTIFIC MEETING ON DISASTER RESEARCH 2019 51 Identification of Earthquake Hazard Zones Through Deterministic Seismic Hazard Analysis (DSHA) Method at Bandar Lampung City Based SyamsurijalRasimeng1,2, Putri Amalia1, Desta Amanda Nuraini1, Masdar Helmi3, Tugiyono4, Suharno1 1Department of Geophysics Engineering, University of Lampung, Indonesia 2Doctoral Programme of Environmental Sciences, University of Lampung, Indonesia 3Department of Civil Engineering, University of Lampung, Indonesia 4Department of Environmental Sciences, University of Lampung, Indonesia Email: syamsurijal.rasimeng@eng.unila.ac.id Abstract Research on earthquake hazard zone analysis based on MASW data using deterministic methods in the Bandar Lampung which aims to determine the PGA (Peak Ground Acceleration) earthquake originating from the Srike-Slip Faults and the determination of soil classes based on Vs30 values.

The method used is (i) identifying the earthquake source that affects the study area (ii) calculating the closest distance of the earthquake source to the study area (iii) calculating the attenuation function with Vs30 from MASW data (iv) calculating PGA Bedrock and Soil. The results of Vs30 data analysis for the city of Bandar Lampung show soil classes B, C, D to E, maximum values of land acceleration (PGA) in thelayer bedrock ranging from 0.0607g to 0.0752g. Meanwhile, maximum ground acceleration (PGA) inlayers soil ranges from 0.0637g to 0.1894g. Keywords: Deterministic, Vs30, PGA, Semangko Fault, Site Class. 1. Introduction Tectonically, the territory of Indonesia is a very complex and very active region that produces earthquakes that cause disasters.

This area consists of three large tectonic plates namely Australian, Indian and Eurasian plates and nine small plates namely Burma plate, Maluku sea plate, Banda sea plate, Timor plate, Philippine plate, Caroline plate, Birdhead plate, Mauke THE 6TH ANNUAL SCIENTIFIC MEETING ON DISASTER RESEARCH 2019 52 plate and Woodlark plate (Bird , 2003). Plate with a variety of different types of movements that have shaped the earthquake zone subduction (the subduction zone) and zone transform fault (the transform fault zone) that is now a source of seismic active zone. The geological conditions of KBL which are still influenced by the Sumatra Fault System (SFS) and the tectonic activity subduction of the Indo-Australian plate towards Eurasia

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are also inseparable from the earthquake shocks caused by these two geological phenomena. So that the city of Bandar Lampung, which is the center of services, trade and economy in the province of Lampung, needs to anticipate all the impacts caused by the earthquake. One of them is by determining earthquake prone zones.

Based on the calculation of the effect of the fault zone on the area around the fault zone, the Semangko fault has Peak Ground Acceleration a fairly high (PGA) value. So that it can be expected to have a significant impact on the city of Bandar Lampung. Semangko Fault is a geological formation that stretches on the island of Sumatra from north to south, starting from Acehto Teluk Semangka in Lampung. This fault forms the Barisan Mountains, a series of highlands on the west side of the island. Semangko Fault is relatively young and most easily seen in the Sianok Canyon and Anai Valley areas near the City of Bukittinggi. 1. Methodology 2.1 Determination of coordinates The Determination of coordinates is carried out in the city of Bandar Lampung using Google Earth software.

After that calculations are carried out latitude and longitude at some points in Bandar Lampung city and 42 coordinates are obtained. 2.2 Calculation of VS30 Estimates of Vs30 are obtained from Multichannel Analysis of Surface Wave (MASW) data in Bandar Lampung city. The estimation of Vs30 is then used to determine the soil class based on The NEHRP site classes. 2.3 Deterministic Seismic Hazard Analysis (DSHA) In general, the DSHA approach method can be divided into 4 stages, namely: identifying earthquake sources that are likely to affect the observation location, determining the scenario of earthquake parameters by selecting the maximum magnitude and the closest location of the earthquake source which is expected to have an impact on the location of the observation, determine the parameters of ground motion at the observation location by using the attenuation THE 6TH ANNUAL SCIENTIFIC MEETING ON DISASTER RESEARCH 2019 53 function and determining the parameters of the largest soil movement planned to occur at the observation site.

DSHA is done by determining the parameters of ground motion at the observation location using attenuation functions (Irsyam, 2010). 2. Analysis and Discussion In this study, the location of the Lampung airport was located close to the stamps fault and the Sundanese fault. To determine the effect of the earthquake source, a PGA calculation was performed on each earthquake source for the study location. The following is the PGA value in the stamps fault and sunda fault: THE 6TH ANNUAL SCIENTIFIC MEETING ON DISASTER RESEARCH 2019 54 Area Magnitud e Location The epicenter to the research location (meters) G Kumering Strait 6.2 5.629S 105.322E 72.109.07

0.08509996 Southern Sumatra 7.6 5.226S 104.596E 30.404,56 0.09670295 3 Sunda Strait 7.1 6.389S 105.480E 117,690.03 0.08509996 From the table, it can be seen that the greatest PGA value is found in semangko faults, this indicates that the stamps fault was the source of the earthquake that affected the Bandar Lampung region. A. Determining the value of Vs30 After the earthquake source is obtained, then determine the value of Vs30. Vs30 values in the Bandar Lampung region were obtained through the Multichannel Analysis of Surface Wave (MASW) data in Bandar Lampung city. The value of vs30 is used to determine the classification of rocks based on the strength of earthquake vibrations due to local effects and is used for purposes in the design of earthquake resistant buildings.

Class Land General Description Vs30 (m / s) A Rock hard>1,500 B Rock 750-1500 C Land hard, very dense and soft rocks 350-750 D Land Average 175-350 E Land Software <175 Table 3.1 Classification of Site Class based NEHRP (FEMA 302, 1997). In the city of Bandar Lampung the value of Vs30 ranged from 47.3 m / s to 800 m / s, this indicates that the city of Bandar Lampung has a class of land class B, C, D and E where the soil class cannot continue seismic waves due to the type of soil in this rock is soft rock. B. Analysis of the DSHA Method Analysis of the potential earthquake risk in the Bandar Lampung region is done using the Deterministic Seismic Hazard Analysis (DSHA) method where the results obtained are in the form of Peak Ground Acceleration in the bedrock layer and soil layer. This PGA value is obtained from the calculation of the attenuation function.

THE 6TH ANNUAL SCIENTIFIC MEETING ON DISASTER RESEARCH 2019 55 Based on attenuation calculations using the Boore-Atkinson equation (2008) the PGA values in the bedrock layer ranged from 0.0605g-0.0755g and the PGA values for soil layers ranged from 0.06g-0.18g. From the PGA calculation by entering the value of Vs30 it can be concluded that if Vs30 is large, the resulting PGA value will be smaller and vice versa. On the zoning map of the bedrock layer, it can be seen that the PGA value of 0.073g is a very vulnerable zone located in the upper west direction. While on the zoning map in the soil layer, it can be seen that the PGA value of 0.19g is a very vulnerable zone. 4. Conclution In Bandar Lampung City the Vs30 value produced ranges from 180 m/s to 760 m/s, this indicates that Bandar Lampung City has class C, D and E soil classifications which describe medium and hard land. The bedrock PGA values ranged from 0.060700g-0.075259g THE 6TH ANNUAL SCIENTIFIC MEETING ON DISASTER RESEARCH 2019 56 while the PGA values in soil ranged from 0.063771g-0.189448g.

The deterministic method gives a picture of the relationship between the strength of the earthquake and the distance of the earthquake source. Areas that are closer to the rupture area will have a PGA value greater than the area farther away from the rupture area and the PGA value can also be affected by the type of soil. References 1. Bird, P. 2003. An updated digital model of plate boundaries: Geochemistry, Geophysics, Geosystems, 4, no.3, 1027, doi:10.1029/ 2001GC000252. 2. Boore, D.M. dan Atkinson, G.M., 2008. Ground-motion prediction equations for the average horizontal component of PGA, PGV, and 5%-damped PSA at spectral periods between 0.01 s and 10.0 s. Earthquake Spectra. Volume 24, nomor 1. 3. FEMA 302., 1997.

NEHRP Recomended Provicions for Seismic Regulation for New Building and Other Structure. Federal Emergency Management Agency. Washington, D.C. 4. Irsyam, M.D., Sengara, W., Aldiamar, F., Widiyantoro, S., Triyoso, W., Natawidjaja, D.H., Kertapati, E., Meilano, I., Suhardjono., Asrurifak, M. dan Ridwan, M., 2010. Ringkasan Hasil Studi Tim Revisi Peta Gempabumi Indonsia 2010. Kementrian Pekerjaan Umum.