



ISBN : 978-979-3793-73-3

ICoSET

INTERNATIONAL CONFERENCE ON SCIENCE, ENGINEERING AND TECHNOLOGY

Sustainable Development in Developing Country

UIR INTERNATIONAL CONFERENCE 2017

ICoSET

INTERNATIONAL CONFERENCE ON SCIENCE, ENGINEERING AND TECHNOLOGY

"Sustainable Development in Developing Country"

PEKANBARU, 8-10 NOVEMBER 2017



PROCEEDING



YAYASAN LEMBAGA PENDIDIKAN ISLAM (YLPI) RIAU
UNIVERSITAS ISLAM RIAU

2017

LPPM - UIR

LEMBAGA PENELITIAN DAN PENGABDIAN KEPADA MASYARAKAT UNIVERSITAS ISLAM RIAU
Jl. Kaharuddin Nasution No. 113, Marpoyan, Pekanbaru
Riau - Indonesia 28284

PROCEEDING

International Conference on Science Engineering and Technology (ICoSET) 08 - 10 November 2017 Pekanbaru, Indonesia

“Sustainable Development in Developing Country

Editor :

Evizal Abdul Kadir

Ku Ruhana Ku Mahamud

Tole Sutikno

Organizer :



Co-Organizers :



PUBLISHER BY UNIVERSITAS ISLAM RIAU (UIR) PRESS
2017

UIR Press

Art Design, Publishing & Printing

LPPM, Rectorat Building 3rd Floor, Jl. Kaharuddin Nasution No.113, Marpoyan 28284
Pekanbaru, Indonesia.

Telp : 0761-674674, Fax : 0761-674834

uirpress.uir.ac.id

@UIR Press 2017

Hak cipta dilindungi oleh undang-undang; dilarang memperbanyak, menyalin, merekan, sebagian atau seluruh bagian buku ini dalam bahasa atau bentuk apapun tanpa izin tertulis dari penerbit.

ISBN : 978-979-3793-73-3

Perpustakaan Nasional: Katalog Dalam Terbitan (KDT)

International Conference on Science Engineering and Technology (ICoSET)

08 - 10 November 2017, Pekanbaru, Indonesia.

Evizal Abdul Kadir, et al – Pekanbaru : UIR Press 2017

Xii, 261 p. ; illus.; 29 cm

Bibliografi

ISBN : 978-979-3793-73-3

ORGANIZING COMMITTEE

Conference Chair:

Dr. Evizal Abdul Kadir, ST., M.Eng

Conference Co-Chair Science:

Dr. Dedikarni, ST., M.Sc

Conference Co-Chair Social:

Dr. Sri Yuliani, M.Pd

Technical Program Chair:

Prof. Dr. Ku Ruhana Ku Mahamud

Assoc. Prof. Dr. Tole Sutikno

Technical Program Committees:

Prof. Dr. Detri Karya, SE., MA
(Islamic University of Riau, Indonesia)

Prof. Dr. Tengku Dahril, M.Sc
(Islamic University of Riau, Indonesia)

Prof. Dr. Sugeng Wiyono, MMT
(Islamic University of Riau, Indonesia)

Prof. Zainal A. Hasibuan, MLS., Ph.D
(University of Indonesia, Indonesia)

Prof. Dr. Usama Fauzi Juniansyah
(University of Tokyo, Japan)

Prof. Dr. Zailuddin Arifin
(Universiti Teknologi MARA, Malaysia)

Prof. Ahmed A. Al Absi
(Kyungdong University Korea)

Prof. Kazuhiko Nagatomo
(Dayeh University)

Assoc. Prof. Dr. Shahrul Kamal Abdul
Rahim
(Universiti Teknologi Malaysia)

Ahn, Young Mee, Ph.D
(Inha University, Korea)

Hitoshi Irie, Ph.D
(Chiba University, Japan)

Julie Yu-Chih Liu, Ph.D
(Yuan Ze University, Taiwan)

Prof. Dr. Hasan Basri Jumin, M.Sc
(Islamic University of Riau, Indonesia)

Prof. Dr. Syafrinaldi, SH., M.CL
(Islamic University of Riau, Indonesia)

Prof. Dr. Seno Himala Putra,
M.Pd (Islamic University of Riau,
Indonesia)

Prof. Josaphat Tetuko Sri Sumantyo,
Ph.D
(Chiba University, Japan)

Prof. Dr. Eko Supriyanto
(Universiti Teknologi Malaysia)

Prof. Jhon Lee, B.Sc, M.Sc., Ph.D
(Kyungdong University Korea)

Prof. Wisup Bae, Ph.D
(Sejong University, Korea)

Assoc. Prof. Dr. Azhan Hashim Ismail
(Universiti Teknologi MARA, Malaysia)

Dr. Inkyo Cheong
(Inha University, Korea)

Dr. Montira Leelakriangsak
(Prince of Songkla University, Thailand)

Kuen-Song Lin, Ph.D
(Yuan Ze University, Taiwan)

Liang Chih Yu, Ph. D
(Yuan Ze University, Taiwan)

Chia-Yu Hsu, Ph.D
(Yuan Ze University, Taiwan)

Dr. Wahyudi Sutopo
(Solo State University, Indonesia)

Dr. Anas Puri, ST., MT
(Islamic University of Riau)

Dr. Eng. Husnul Kausarian, B.Sc
(Hons)., M.Sc
(Islamic University of Riau)

Organizing Committee:

Faizan Dalilla, ST., M.Si
Augusta Adha, ST., MT

Treasurer:

Bismi Annisa, ST., MT

Dr. Tulyapong Tulyapitak
(Prince of Songkla University, Thailand)

Dr. Zulfatman
(University of Muhammadiyah Malang,
Indonesia)

Dr. Eng. Muslim, ST., MT
(Islamic University of Riau)

Dr. Shukor Sanim Mohd Fauzi
(Universiti Teknologi MARA, Malaysia)

Secretary:

Dr. Zetriuslita, S.Pd., M.Si
Heriyanto, SP., M.Si
Reni Anggraini Putri, SE

Information Technology (IT):

Abdul Syukur, S.Kom., M.Kom
Hendra Gunawan, ST., M.Eng

Learning (Gdl) Method Applied At Class Xi Sman Pekanbaru Academic Year 2016/2017 (Suryanti, Sepita Ferazona) -----	212
1025: Measurement of Electric Grid Transmission Lines as the Supporting of National Energy Program in West Sumatra Area, Indonesia through Geological Mapping and Assessment (Husnul Kausarian, Batara, Dewandra Bagus Eka Putra, Adi Suryadi, Evizal Abdul Kadir) -----	221
1026: Relationship Between Adolescent Characteristic and Bullying Incidents at Private Junior High School In Pekanbaru (Fathra Annis Nauli, Jumaini, Diva de Laura) -----	230
1027: Green Beans Plant Response (Vigna Radiata L) On Liquid Organic Fertilizer (Lof) Nasa and NPK Compound Fertilizer (Ernita, M. Noer, Sidik Arif Irawan) -----	238
1028: Analysis Of Human Resources Work In Production Activity Hydroponic Vegetables Commodity (Case Study: Technical Implementation Unit Of Agro Garden In Islamic University Of Riau) (Darus, Hajry Arief Wahyudy) -----	254

MEASUREMENT OF ELECTRIC GRID TRANSMISSION LINES AS THE SUPPORTING OF NATIONAL ENERGY PROGRAM IN WEST SUMATERA AREA, INDONESIA THROUGH GEOLOGICAL MAPPING AND ASSESSMENT

Husnul Kausarian¹, Batara¹, Dewandra Bagus Eka Putra¹, Adi Suryadi¹
Evizal Abdul Kadir²

¹Department of Geological Engineering, Faculty of Engineering, Universitas Islam Riau

¹Department of Information Technology, Faculty of Engineering, Universitas Islam Riau

Email : husnulkausarian@eng.uir.ac.id, evizal@eng.uir.ac.id

Abstract

The need for energy in Indonesia continues to increase and the Indonesian government is keen to realize the development of electricity transmission network in Alam Pauh Duo, Alam Pauh Duo Subdistrict, Solok Selatan District. The topography of this region consists of Geomorphology Units of the Hills and High Geomorphological Units with an altitude of about 900-500m (meters) with lithology composed of volcanic rock lithology and breakthroughs of granite and granodiorite. The method used in the review survey (reconnaissance) is road sweeping or tracking using a handheld GPS. The results of this mapping and assessment are the coordinate values of the markers or dividing marks that are already available and scattered in each location point. The final result is a map that has a description of the location of Land Power plant and Transmission Tower. There are 15 transmission towers planned for the builders as well as power plant (GI). The required land area of each transmission tower is about 15x15 m (meters) up to 20x20 m and the land area for 3ha (hectare) power plant (GI) development. Then the distance between each tower of transmission approximately 30 meters.

Keywords: *Power Plant, Transmission Line, Alam Pauh Duo, Geological Mapping, Geological Assessment*

1. INTRODUCTION

The need for energy in Indonesia increase continuously in line with the growth rate of the industry and the number of residents and the Indonesian government is currently keen to realize this infrastructure, one of which is to build electricity transmission network. One source of this electrical energy is geothermal. Regency of Solok Selatan is one of the areas in Indonesia that have the potential of natural resources that is geothermal energy because Solok Selatan region has a geological condition that supports the formation of hot springs, indirect utilization developed for

geothermal power generation (Dickson et al., 2013). So with the existence of geothermal sources that can generate electricity is very potential to be built electric transmission lines that are around this area (Knott, 2012).

Geothermal energy is a relatively environment-friendly energy source because it comes from the inner heat of the earth. Water that is pumped into the earth by humans or natural causes (rain) is collected to the surface of the earth in the form of steam, which can be used to drive turbines to produce electricity. The cost of exploration, as well as the capital cost of

geothermal power plants, is higher than other power plants that use fossil fuels. However, once it starts operating, its production costs are low compared to fossil fuel power plants. Power Transmission Is a process of distributing electricity (Ding et al., 2011, Gao et al., 2007, Huang et al., 2016) from power plant to power distribution lines (power plant distribution) so that it can be distributed up to consumer electric users (Sheng et al., 2013).

STUDY AREA

The Study site is located in Alam Pauh Duo, Kecamatan Alam Pauh Duo, District Solok Selatan, Geographically at $01^{\circ}36'17.635''$ - $01^{\circ}37'26.464''$ S dan $101^{\circ}8'37.704''$ - $101^{\circ}7'44.508''$ N. Landform at the study site is an area of hills and there are also local community plantations (Figure 1).

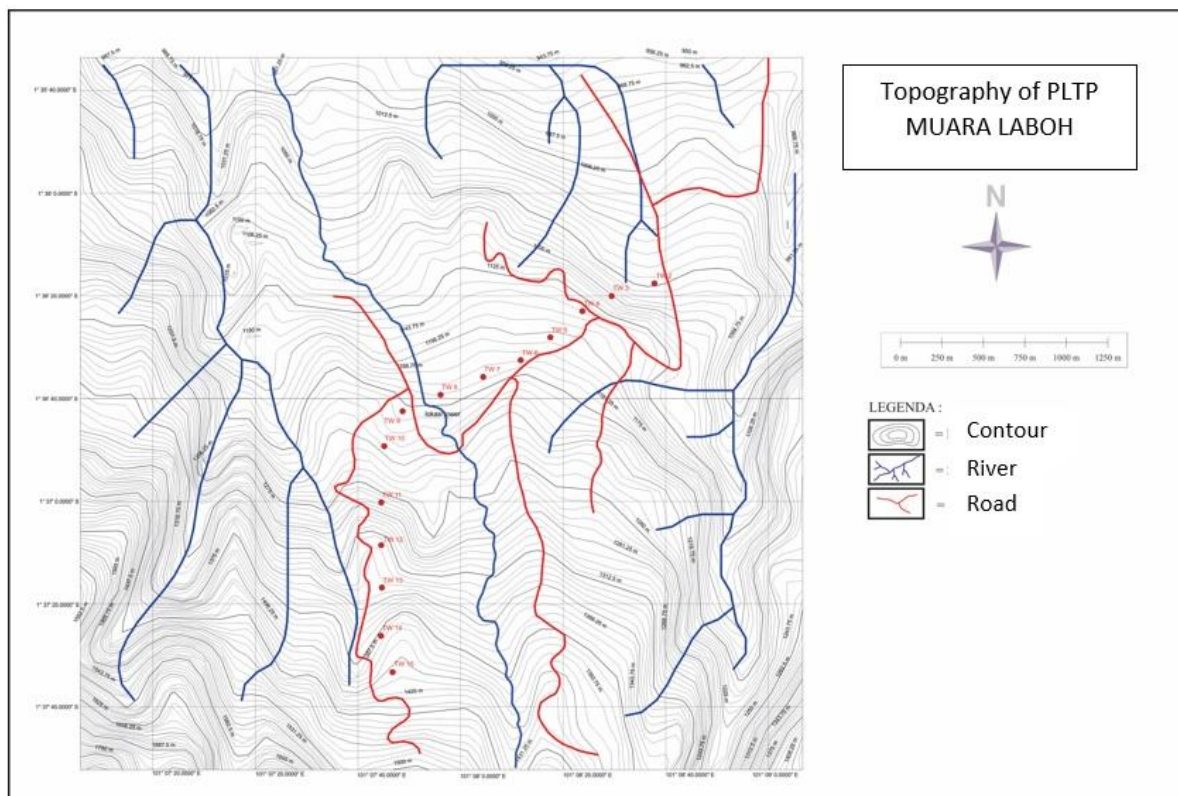


Figure 1. The map of survey line area.

Geothermal In the area of South Solok, or more precisely in the Muara Laboh, most of the hot springs associated with Muara Labuh located in a river valley Suliti, the basin tectonics (tectonic basin) along the 30 km and a width of 2-3 km at an altitude of 450 meters above the sea level. The tectonic basin in the North Muara Labuh. From the start of the southern end of the basin, topography continues to climb and the hot springs discovered at a distance of more than 3 km from the Mount Sikapa (656m) to Sapan Malulong (850m). Areas

to the south are called Sikapa Hill South Muara Labuh.

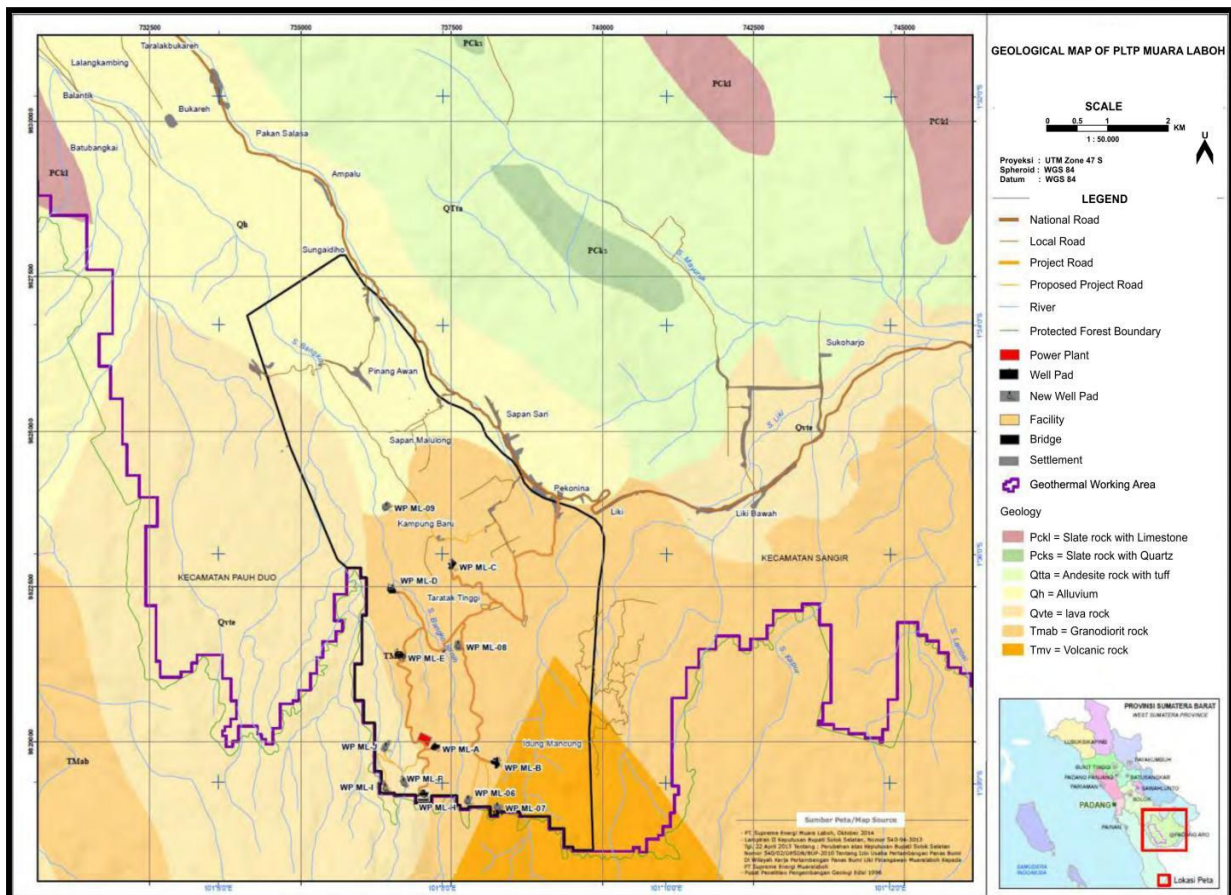
The survey area has a landscape classified into Geomorphology Hills unit and Geomorphology High Hills Unit with a height of about 900-500m (meters). Lithology contained in the research area is volcanic rock and breakthroughs of granite and granodiorite. Potential energy in this area is geothermal energy because that area has many hot springs.

In general, the survey area included in stratigraphic from young to old is

composed of: Paleozoic metamorphic rocks (bedrock) (Perm-Carbon): composed by metamorphic rocks, metasediment and Pre-Tertiary volcanic rocks; Mesozoikum metasediment- rocks (Triassic-Jurassic): Members Batusabak and Shale (Formation Tuhur), Member of limestone's Kuantan Formation and sedimentary and volcanic rocks (Formation Sigunyor); Tertiary rocks consisting of: a group of sedimentary rocks and volcanic rocks group. Group volcanic rocks are divided into two age groups, namely groups of Eocene volcanic rocks (Formation Bandan) and Oligo-Miocene volcanic rocks (Formation Painan). Pre-Mesozoic rocks in the Mesozoic-break through the granite-diorite (Jura-Cretaceous). Tertiary rocks intruded by granodiorite and diabase rocks (Miocene). Quaternary volcanic precipitate mainly covered the top rock of the groups.

Surface sediment consists of alluvium, lacustrine and swamp sediment (Resen)

Structures that affect this area is the Sumatra Fault: Dextral strike-slip fault and the normal fault has direction northwest-eastwest. Fault growing in this area: a normal fault and strike-slip fault. Normal faults generally the northwest-southeast direction of the Fault Semangko. While fault that has direction east-west allegedly closely associated with diabase intrusive rocks. Faults developed in the rock group Painan Oligo-Miocene formations. Fault limit there lithological contact between intrusive rocks diabase (Tdb) and integral volcanic rocks (Qou). Strike-slip Fault relative has north-south direction cut in several places on normal faults. In some locations, this fault is estimated as controlling the course of the hydrothermal solution and lithological contacts (figure 2).



METHODOLOGY

The survey (reconnaissance) used in Alam Pauh Duo, District Alam Pauh Duo, South Solok. The method used in reviewing survey (reconnaissance) is sweeping the street or track using GPS handheld (Kausarian et al., 2014, 2016, 2017, O'Rourke, 1996).

The goal in reviewing survey (reconnaissance) is looking for a peg or re-check the presence of the power plant and the transmission tower (Li et al., 2012, Mei et al., 2012) that based on reports from the initial survey. And to investigate the geological conditions in the field include lithological characteristics and access path between each power plant and the tower destination point (Svacina, 1992, Wheeler, 1964).

The transmission can be airways and underground conduits, but generally in the form of the airways. Electrical energy is channeled through aerial transmission line

generally use bare wire that relies on air as the insulating medium between the wires. And to refute / stretching wires with the height and distance are safe for humans and the surrounding environment, the conductor wires mounted on a sturdy building construction, commonly called the tower. Inter/ electric tower and wires insulated by an insulator.

RESULT AND DISCUSSION

The form of the survey data taken in the form of the coordinate value of stakes or pins barrier already available and distributed at each site listed in Figure 1 are indicated by red dots. The existence of a limiting peg or mark to be close to the peak location of injection wells drilling geothermal power plant in Muara Laboh, up toward the power plant (GI) under adjacent to the Main Office PT. Supreme Energy (Figure 3).

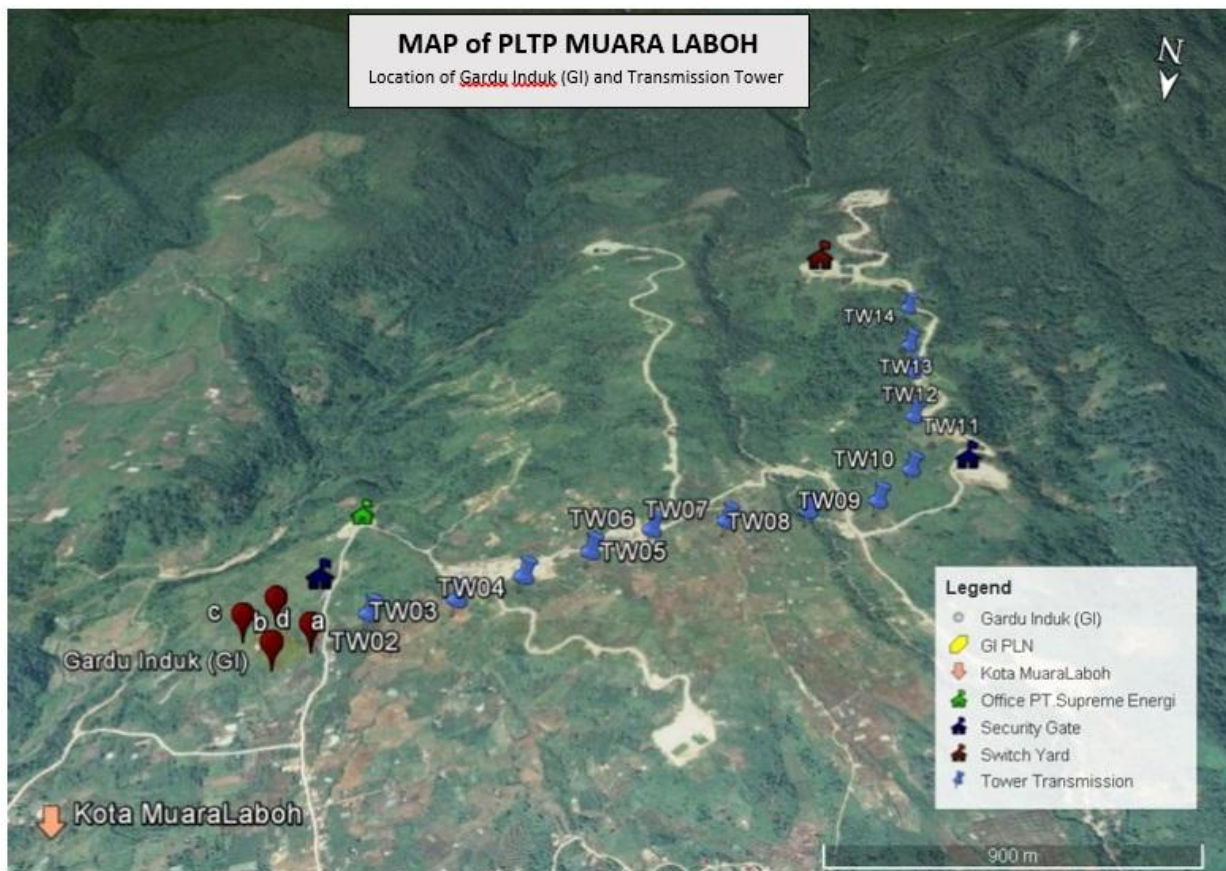


Figure 3. Locations of the power plant and the transmission tower (modified from googleearth).

Based on survey data that has been obtained then produced a map that has a description field site power plant and transmission tower. There are 15 planned develop transmission tower and Power plant (GI). The land area required for each transmission tower around 15x15 m (meters) up to 20x20 m and the area of land for the construction of the Power plant (GI) 3HA (hectares). Then the distance between each transmission towers approximately 230 meters.

Electrical energy is stream through aerial transmission lines rely on air as the

insulating medium between the wire conductor with the surrounding objects. To refute / span wires with the height and distance are safe for humans and the surrounding environment, the conductor wires mounted on a sturdy building construction, commonly called the tower. There is a 15 point locations potential to build a transmission tower (Figure 3), marking the point of this site in the form of stakes barrier. Here are images of locations around the pegs of the transmission tower (Figure 4).

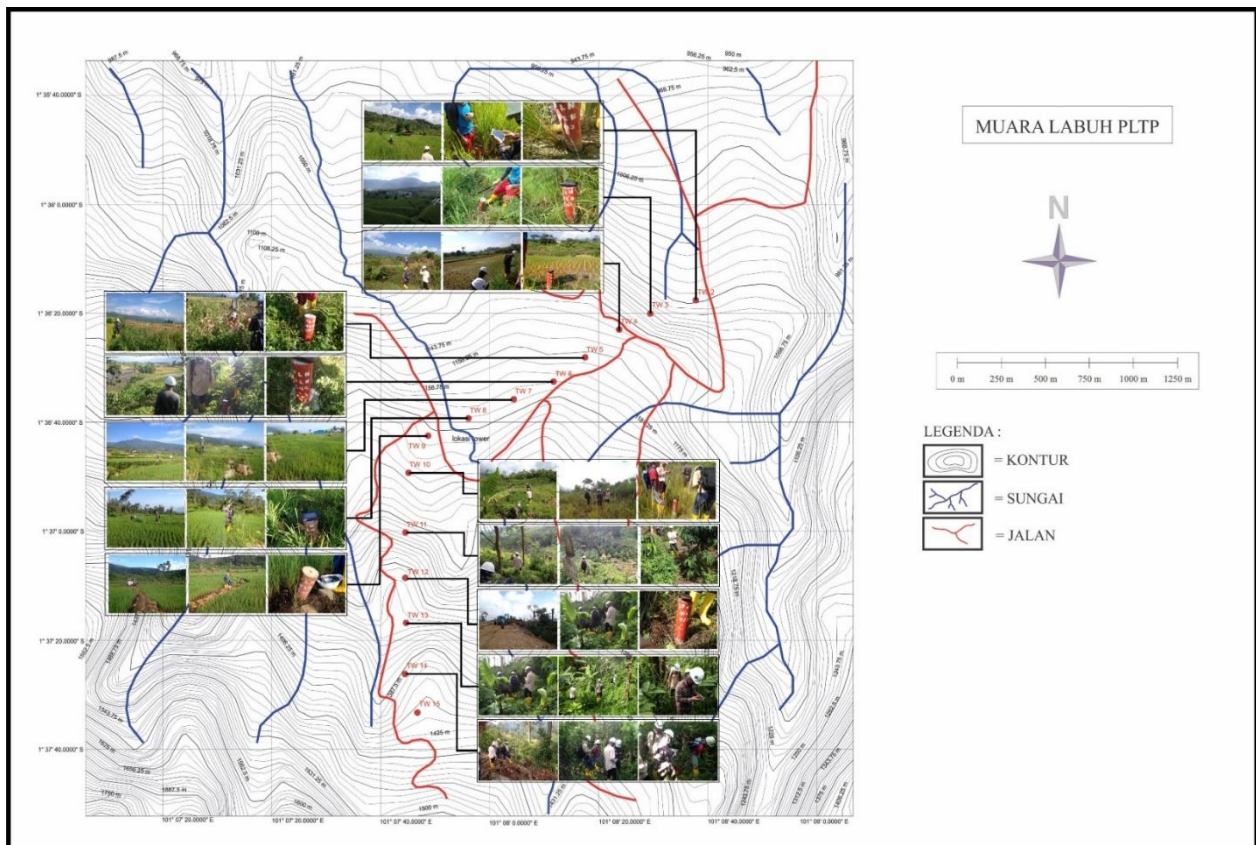


Figure 4. The Distribution Map Field Conditions in Every Transmission tower.

The results of field observations, field conditions are growing areas of local residents, the stakes are also several locations in the valley or the outskirts of the hill (see figure 3). Trails road is the only main access. For the location of transmission towers, peg 1 and 15 will be determined once the location of the power

plant and Switchyard has been determined. Some points of the tower mounting location as a representation of the overall location shows this region in accordance become transmission lines.

There are 13 spots locations, including transmission 2 tower's locations is in the villagers' rice fields and access roads to get

there a path that is usually passed by the farmers. Access from the main road leading to the location about 100 meters. Transmission 3 tower's locations are in villagers' rice fields and access roads to get there a path that is usually passed by the farmers. Access from peg 2 to the location of the tower is about 200 meters. Condition transmission 4 tower's locations are in the villagers' rice fields and access roads to get there a path that is usually passed by the farmers. Access from peg 3 to the location of the tower about 220 meters. transmission 5 tower's locations as well as in the villagers' rice fields there are shrubs and the access road to get there is a path that is usually passed by the farmers. Access tower peg 4 to a location about 210 meters. Transmission 6 tower's locations as well as in the villagers' rice fields there are shrubs and the access road to get there is a path that is usually passed by farmers and residents. Access peg 5 to the location of the tower about 210 meters.

transmission 7 tower's locations as well as in the villagers' rice fields and there are shrubs and the access road to get there is a path that is usually passed by farmers and residents. There was no stakes marker. Access tower peg 7 to a location approximately 180 meters. Transmission 8 tower's locations as well as in the villagers' rice fields and there are shrubs and the access road to get there is a path that is usually passed by farmers and residents. Access tower peg 7 to a location

approximately 200 meters. Transmission 9 tower's locations are in the villagers' rice fields, there are shrubs and the access road to get there is a path that is usually passed by farmers and residents. The Access for peg 8 tower to a location approximately 200 meters. Transmission 10 tower's locations are in the villagers' rice fields, there are shrubs and the access road to get there is a path that is usually passed by farmers and residents. Access tower peg 9 to a location approximately 200 meters.

Transmission 11 tower's locations are in community garden and there's shrubs and the access road to get there is a path, and located alongside a hill. Access tower peg 10 to a location about 200 meters. transmission 12 tower's locations are in shrubs and the access road to get there is a path, and located alongside a road project. Access tower peg 11 to a location approximately 200 meters. transmission 13 tower's locations are in shrubs and the access road to get there is a path, and located alongside a road project. Access tower peg 12 to a location approximately 200 meters. transmission 14 tower's locations are shrubs and the access road to get there is a path, and located alongside a road project. Access tower peg 12 to a location approximately 200 meters.

In general, it can be described the appropriate location to build power transmission lines using the tower as in Figure 5.

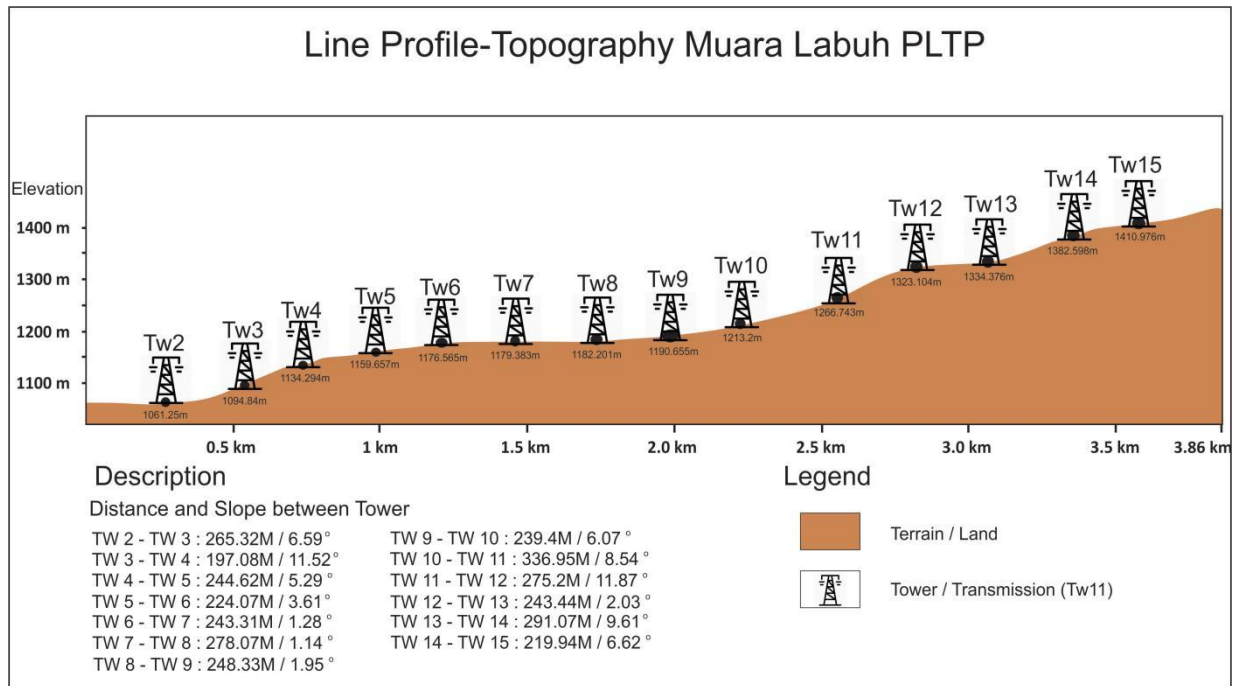


Figure 5. Final Result of the Profile of Topography Survey Location for the Transmission Tower Recommendation.

CONCLUSION

The development of Power Plant located on Alam Pauh Duo, Kecamatan Alam Pauh Duo, Solok Selatan is a potential area to build. This area has Geothermal In the area of South Solok, or more precisely in the Muara Labuh, most of the hot springs associated with Muara Labuh located in a river valley Suliti, the basin tectonics (tectonic basin) along the 30 km and a width of 2-3 km at an altitude of 450 meters above the sea level. The survey area has a landscape classified into Geomorphology Hills unit and Geomorphology High Hills Unit with a height of about 900-500m (meters). Based on survey data that has been obtained then produced a map that has a description field site power plant and transmission tower, this area has a potential to build 15 towers as the transmission line to distribute the electricity.

REFERENCES

- Dickson, M. H., & Fanelli, M. (2013). *Geothermal energy: utilization and technology*. Routledge.
- DING, Y., LIU, H., WAN, M., & XIAO, S. (2011). Three-Dimensional Digitalization Transfer of Ningdong-Shandong±660kV DC Power Transmission Pilot Project [J]. *Electric Power Construction*, 2, 010.
- GAO, Y., YUAN, J. Z., MA, Z. W., & WAN, M. Z. (2007). Development and Application of Helava Technique Based 3D Digital Simulative System for Construction Management of Transmission Lines [J]. *Power System Technology*, 21, 016.
- Huang, P., Liu, R., Mo, J., & Fang, Z. (2016). Design of digital information share system in power distribution network. In *Information Science and Control Engineering (ICISCE)*, 2016

-
- 3rd International Conference on (pp. 938-942). IEEE.
- Kausarian, H. Abdul Rahim Shamsudin, Yuniarti Yuskar. 2014. Geotechnical and Rock Mass Characterization Using Seismic Refraction Method At Kajang Rock Quarry, Semenyih, Selangor Darul Ehsan. *Journal of Ocean, Mechanical and Aerospace-Science and Engineering*, 13.
- Kausarian, H., Sumantyo, J. T. S., Kuze, H., Karya, D., & Panggabean, G. F. (2016). Silica Sand Identification using ALOS PALSAR Full Polarimetry on The Northern Coastline of Rupert Island, Indonesia. *International Journal on Advanced Science, Engineering and Information Technology*, 6(5), 568-573.
- Kausarian, H., Sri Sumantyo, J. T., Kuze, H., Aminuddin, J., & Waqar, M. M. (2017). Analysis of Polarimetric Decomposition, Backscattering Coefficient, and Sample Properties for Identification and Layer Thickness Estimation of Silica Sand Distribution Using L-Band Synthetic Aperture Radar. *Canadian Journal of Remote Sensing*, 43(2), 95-108.
- Knott, E. F. (2012). *Radar cross section measurements*. Springer Science & Business Media.
- LI, Y. J., LI, B., & LI, S. S. (2012). Discussion on Application of the Power plant Three Dimensional Design. *China Electric Power (Technology Edition)*, 4, 012.
- MEI, N., CHEN, D., DU, X., YANG, Y., WANG, Z., & CHENG, W. (2012). Three-Dimensional Digitalization Transfer of Qinghai-Tibet±400 kV DC Interconnection Project [J]. *Electric Power Construction*, 5, 008.
- O'Rourke, T. D., & Palmer, M. C. (1996). Earthquake performance of gas transmission pipelines. *Earthquake Spectra*, 12(3), 493-527.
- SHENG, D., QIE, X., HU, J., WU, Z., & QI, L. (2013). Conducting Research and Development of Grid Information Model (GIM) Technology and Constructing the Sharing Platform of Smart Grid Technology Information. *Electric Power Construction*, 8, 004.
- Svacina, J. (1992). Analysis of multilayer microstrip lines by a conformal mapping method. *IEEE transactions on microwave theory and techniques*, 40(4), 769-772.
- Wheeler, H. A. (1964). Transmission-line properties of parallel wide strips by a conformal-mapping approximation. *IEEE Transactions on Microwave Theory and Techniques*, 12(3), 280-289.
-



YAYASAN LEMBAGA PENDIDIKAN ISLAM (YLPI) RIAU
UNIVERSITAS ISLAM RIAU

UIR INTERNATIONAL CONFERENCE 2017

ICoSET

INTERNATIONAL CONFERENCE ON SCIENCE, ENGINEERING AND TECHNOLOGY

CERTIFICATE

This is to certify that

EVIZAL ABDUL KADIR

has participated in International Conference on Science, Engineering and Technology (ICoSET)
"Sustainable Development in Developing Country" as

PRESENTER

held by Lembaga Penelitian dan Pengabdian Masyarakat (LPPM) Universitas Islam Riau, Indonesia

Pekanbaru, 8-10 November 2017

University Partners:



Prof. Dr. H. Syafrinaldi, SH., M.C.L
Rector of Universitas Islam Riau



Dr. Evizal Abdul Kadir, M. Eng
Conference Chair

Certificate Number: 043/Certificate/ICoSET/2017



YAYASAN LEMBAGA PENDIDIKAN ISLAM (YLPI) RIAU
UNIVERSITAS ISLAM RIAU

UIR INTERNATIONAL CONFERENCE 2017

ICoSET

INTERNATIONAL CONFERENCE ON SCIENCE, ENGINEERING AND TECHNOLOGY

CERTIFICATE

This is to certify that

EVIZAL ABDUL KADIR

has participated in International Conference on Science, Engineering and Technology (ICoSET)
"Sustainable Development in Developing Country" as

CHAIR

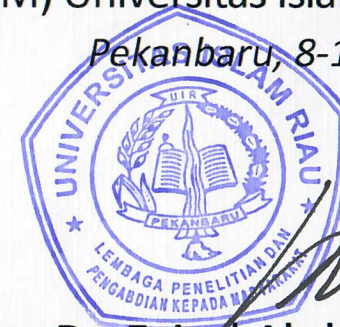
held by Lembaga Penelitian dan Pengabdian Masyarakat (LPPM) Universitas Islam Riau, Indonesia

Pekanbaru, 8-10 November 2017

University Partners:



Prof. Dr. H. Syafrinaldi, SH., M.C.L
Rector of Universitas Islam Riau



Dr. Evizal Abdul Kadir, M. Eng
Conference Chair