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Utilising Electrical Resistivity Tomography for Peat Soil Stratigraphy Analysis at Parit Nipah

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Abstract: This research examined Electrical Resistivity Tomography (ERT) for analysing peat soil stratigraphy at Parit Nipah in Johor, Malaysia. Analyses were carried out with the Wenner and Schlumberger arrays along with two lines to assess their effectiveness for peat profiling. The electrode spacing was set at 2 metres for the longer configuration and 1 metre for the shorter one for Line 1, and 1 metre for the longer configuration and 0.5 metres for the shorter one for Line 2. This allowed for a thorough investigation of both lateral and vertical variations in resistivity. The maximum depth reached during the investigation was 16 metres on Line 1 and 7 metres on Line 2 by utilising an ABEM Terrameter SAS 4000, steel electrodes, and Lund imaging cables. The ZondRes2d software was used for data processing and inversion, creating two-dimensional resistivity models. The Schlumberger array emerged as the preferred method for peat profiling, showing minimal differences compared to results from traditional peat sampling methods. While the Wenner protocol was also effective, it exhibited a slightly greater margin of error. This study highlights the ability of ERT to analyse peat stratigraphy efficiently and non-invasively, underscoring its advantages for peatland conservation and sustainable management practices.

Keywords: : Electrical Resistivity Tomography, Schlumberger Array, Wenner Array, Peat Profiling, Non-invasive Method.

1. Introduction

The identification of soil profiles is crucial in geotechnical investigation. To develop geotechnical designs for construction projects, it is essential to gather sufficient data regarding the soil profile. Conventional methods, like drilling, have been effective for data collection. However, they are often expensive, time-consuming, and invasive. Large infrastructure projects, such as railway and road construction, often require numerous boreholes to obtain adequate data for comprehensive analysis, which subsequently increases project duration and costs.

Geophysical techniques, like Electrical Resistivity Tomography (ERT), are becoming increasingly popular as non-invasive methods that provide broader exploration capabilities and efficient data analysis.

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Advances in these geophysical methods have allowed for the mapping of the spatial distribution in electrical resistivity and induced polarisation within subsurface layers, thereby facilitating the assessment of subsurface variations (Slob, 2004).

The ERT technique measures the electrical resistivity of the ground surface, which is influenced by the resistivity variations of different material layers. This method involves injecting current into the ground using two current electrodes and measuring the resulting potential difference. A core aspect of Electrical Resistivity Tomography (ERT) is the computation of the resistivity pseudo-section, which entails comparing the observed apparent resistivity pseudo-section with a calculated pseudo-section (Everett, 2013).

ERT is considered superior to other electrical methods because it can yield quantitative results using a precisely controlled source of specific dimensions. The electrical properties measured by ERT are significantly affected by geological features such as mineral composition, fluid content, porosity, and water saturation levels. By mapping the distribution of electrical resistivity across the soil, it becomes possible to differentiate between various soil layers (Herman, 2001; Loke, 1999). As a result, these non-invasive geophysical techniques provide significant advantages across different fields, such as geology, geotechnical engineering, and environmental research (Miele et al., 1996).

Despite its many benefits, ERT has limitations, particularly in areas with complex subsurface characteristics, like peatlands, which exhibit heterogeneous properties and significant

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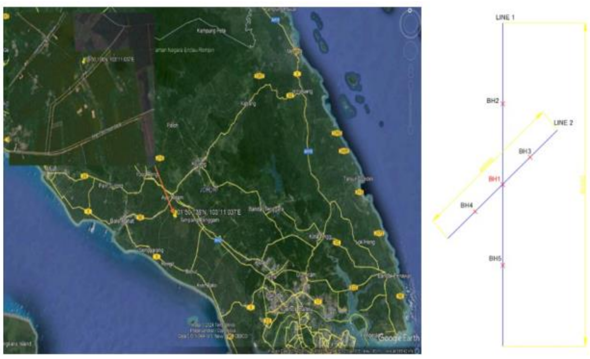
fluctuations in water tables. In regions with highly variable peat properties, resistivity variability can lead to ambiguous interpretations, as the method may not accurately distinguish between different peat layers or the presence of decomposed organic material. Furthermore, significant changes in the water table can complicate resistivity measurements by introducing temporal variations that impact data consistency (Binley et al., 2002). High moisture content, characteristic of peatlands, can further obscure the delineation of subsurface features due to water's dominant influence on electrical resistivity (Reynolds, 2011). Addressing these limitations typically requires integrating ERT data with supplementary methods, such as drilling or other geophysical techniques, to enhance accuracy and reliability in complex environments.

2. Site Description

The research site was located in Parit Nipah, Johor, Malaysia. The area lies within a Quaternary region, characterised by the presence of marine and continental deposits such as peat, sand, silt, clay, and small amounts of gravel, as depicted in Figure 1. This region is a sparsely populated area and primarily used for palm tree cultivation. The analysis conducted with the peat sampler indicated that the uppermost 4 metres of soil at the research region consisted mainly of peat. Hence, the location selection was selected due to its substantial peat depth, which is among the deepest recorded in the area. The location also offered convenient access, making it suitable for conducting research activities.

3. Field Investigation



(a) (b)

Figure 1. (a) Study location with coordinate. (b) Illustration of 2 ERT line conducted at the field.

The field study entails geo-electrical studies using Electrical Resistivity Tomography (ERT) and a peat sampler for profiling. The study's objective was to ascertain peat depth by employing Non-Destructive Testing (NDT) and validating the findings through conventional invasive methods.

3.1 Peat Sampler

The peat sampler was used to collect the partially disturbed samples. The approaches conform to the requirements specified by Eijkelkamp Agrisearch Equipment (E.A., 2014). The peat sample tests were conducted to verify the accuracy of the soil stratigraphy collected from the ERT method. The peat sampler was used as a more affordable and straightforward alternative to the use of an expensive and complicated borehole. Five inquiry locations were designated, three of them located along each line of the ERT array, and one situated at the midpoint between Line 1 and Line 2. Profiling was made at regular intervals of 0.5 metres, reaching a maximum depth of 5 metres.

3.2 Electrical Resistivity Tomography

The Electrical Resistivity Tomography (ERT) was conducted using the Wenner and Schlumberger arrays for both Line 1 and Line 2. The experiments were conducted on a rainy day in May. The protocols selected for comparison aimed to determine the most appropriate protocol array configuration for peat profiling. The Schlumberger array is specifically designed to detect variations in lateral resistivity, while the Wenner array is used to recognise changes in vertical resistivity (Loke, 2004). Additionally, the gradient array in Electrical Resistivity Tomography (ERT) maps subsurface resistivity distributions to determine peat deposits' thickness and lateral changes (Yusa et al., 2019).

The equipment used in the test consists of the ABEM Terrameter SAS 4000, steel electrodes, electrode selector, jumper, Lund imaging cable, and steel electrodes. A total of 61 steel electrodes were used, which is the maximum number of electrodes that can be used for two Lund imaging cables. There are two sets of electrodes, one using 2-metre electrodes for the long setup and another using 1-metre electrodes for the short setup. The spacing for the long setup was 1 metre, while the spacing for the short setup was 0.5 metres. Reducing the distance between measurements can enhance the number of measurements collected, resulting in more detailed outcomes and decreasing the likelihood of noise that may introduce ambiguity into the results (Baines et al., 2002). The distance between electrodes directly affects the number of measurements, the scope of research, the vulnerability to interference, and the accuracy in both horizontal and vertical dimensions. The ZondRes2d software was used for data processing and inversion. The ZondRes2d inversion code facilitated the development of a two-dimensional inverse model of resistivity measurements in the subsurface using the measured apparent resistivity (Griffiths & Barker, 1993).

3.3 Comparison between ERT and Peat Sampler

Compared with conventional peat samplers, Electrical Resistivity Tomography (ERT) offers several practical benefits. ERT is a non-invasive method that reduces environmental disruption and preserves the peatland's integrity, which is essential for conservation efforts and in areas where protecting natural ecosystems is crucial. Additionally, ERT is more efficient for large-scale studies, as it can gather extensive subsurface data across wide areas in a shorter time. In contrast, although reliable for acquiring direct physical samples, traditional peat samplers require significant labour, are time-consuming, and involve intrusive methods that may disturb the peatland.

From a financial standpoint, while ERT may require a larger initial investment in equipment than conventional peat samplers, its capability to survey extensive areas and deliver continuous

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data makes it more cost-effective over time. Moreover, ERT offers better spatial resolution, allowing for detailed insights into lateral and vertical variations in subsurface resistivity, which is vital for comprehending peat distribution and characteristics. On the other hand, conventional peat samplers yield localised data points that may not represent the broader variability of the peatland accurately.

However, ERT has its drawbacks, such as sensitivity to noise from environmental factors and the need for specialised software and expertise for data analysis. In contrast, conventional peat samplers provide direct physical samples for laboratory examinations, offering complementary insights, such as organic content, humification levels, and cation exchange capacity, which can enhance the interpretation of ERT results.

In conclusion, ERT offers notable advantages regarding non-invasiveness, efficiency, and extensive coverage, making it a valuable tool for studying peatlands. Nevertheless, traditional peat samplers are essential for validating and supplementing ERT data, ensuring a comprehensive understanding of peatland characteristics.

4. Results and discussion

Peat properties tests were also conducted to obtain information about the type of peatlands and the specific conditions under which the study was conducted. Table 1 summarises the peat properties in the study area.

Peat soil retains a significant amount of moisture due to its organic materials and the remains of plant cells, which have the ability to store water. A soil moisture test conducted on peat samples revealed changes in measurement due to the elevated water levels and the soil's high water-holding capacity. Its loose and porous texture allows the soil fibres to retain substantial water owing to their inherent high retention abilities (Huat et al., 2011). The results indicate a considerable amount of organic matter typical of peat soils, along with inorganic substances derived from various environmental and geological processes (Mesri & Ajlouni, 2007).

The peat soil in the examined area displays a high liquid limit of 178.22%, attributed to its large proportion of organic matter and moisture, significant humification, high fibre content, and the distinctive structural traits associated with peat (Huat et al., 2011). The classification of Parit Nipah peat soil as haemic peat, along with specific plant and organic materials, environmental conditions that preserve fibrous elements, and the soil's geotechnical features, contributes to the observed 58.68% fibre content. The elevated fibre content in the samples can be linked to these factors. Adnan (2008) identified that the specific gravity of peat ranges from 1.1 to 1.9, based on the BS 1377: Part 2: 1990, Clause 8.4 protocol. The high organic content, minimal mineral matter, and increased porosity contribute to a lower density when compared with mineral soils (Adnan, 2008). The acidity of peat soil results from the high production of organic acids during the decomposition of plant matter, the absence of neutralising minerals, anaerobic conditions during peat formation, and pyrite oxidation, with all these factors contributing to increased acidity in peat soils (Hikmatullah & Sukarman, 2014).

4.1 Soil Profile from Peat Sampler

The peat sampler was utilised at five specific coordinates to gather samples: (N 01°50.138', E 103° 11.037') for borehole 1, (N 01°50.150', E 103°11.034') for borehole 2, (N 01°50.144', E103°11.040') for borehole 3, (N 01°50.133', E 103°11.034') for borehole 4, and (N 01°50.129', E 103°11.042') for borehole 5.

The soil profiles obtained are presented in Figure 2 through Figure 6. The findings indicated that peats were identified at depths of 4 metres in boreholes 2, 3, and 5 and at a depth of 4.5 metres in boreholes 1 and 4. Subsequently, there was a transitional stratum comprising a mixture of peat and soft clay, followed by a soft clay layer. The table shows identifiable fibres, such as roots, which serve as indicators of various kinds of peat. The acquired sample exhibits subtle variations in peat colours, transitioning from a dark reddish-brown to a reddish-brown tone. This implies that the extent of peat decomposition varies depending on the depth. The extent of decomposition is directly influenced by factors such as moisture, organic composition, and fibre characteristics.

After analysing the tables, boreholes 1, 2, 3, and 5 exhibit an absence of peat soil in the peat sampler when extracted at depths ranging from 0.5m to 1.0m. This is attributed to the fibrous nature of the peat. The soft roots could not be included within the peat sampler, resulting in the disappearance of a small amount of peat soil and water that was removed due to the fibrous nature of the peat.

Table 1: Peat Properties

Peat properties	Value	Previous study
Moisture content	689.84 %	250 – 985.40% (N. Wahab et al, 2019)
Ash content	16.47 %	0.8% to 32.8% (A.A.M. Addly et al., 2022)
Organic content	83.53 %	95.88-98.48% (Wahab A. et al., 2022)
Fiber content	58.68 %	40 – 63% (Zainorabidin A. et al., 2014)
Liquid limit	178.22 %	220 – 417 % (Prabir K. et al., 2017)
Specific gravity	1.28	1.1 – 1.9 (N. Wahab et al, 2019)
pH	3.88	3 – 4 (Razali et al., 2013)

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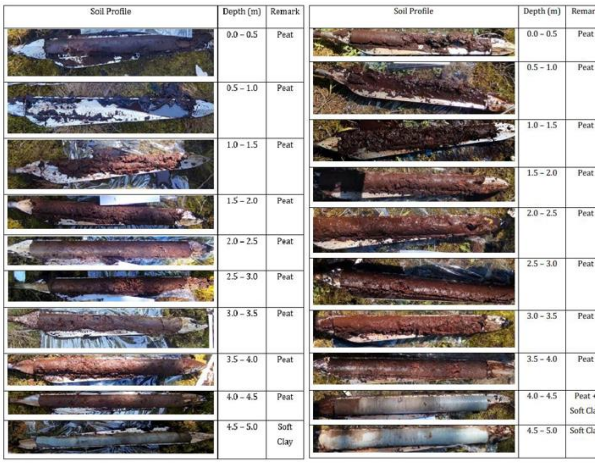
4.2 Soil Resistivity Profile

Geoelectrical technology, particularly Electrical Resistivity Tomography (ERT), was utilised to ascertain the soil strata in Parit Nipah. The primary objective of these experiments was to examine geophysical methodologies for determining the depth of peat in the designated study areas. Two surveys of Electrical Resistivity Tomography (ERT) were carried out in Parit Nipah. The resulting 2-D stratigraphic profiles are illustrated in Figure 7 and Figure 8. The obtained images display clear differentiation between soil layers, facilitating precise evaluation of the depth of peat. The initial line, with a total of 80 metres, consisted of a brief setup of 1 metre and an extended setup of 2 metre. The second line, with a total length of 40 metres, consisted of a 0.5 metre short configuration and a 1-metre-long setup.

5. Correlation Between Ert Method And Peat Sampler



(a) (b)

Figure 2. (a) Soil Profile obtained from peat sampler at borehole 1. (b) Soil Profile obtained from peat sampler at borehole 2.

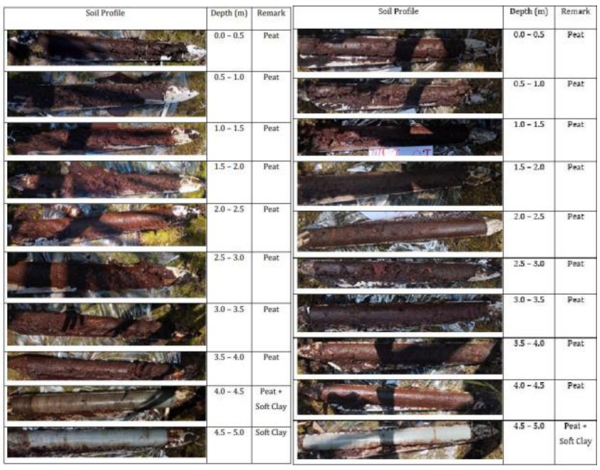


Figure 3. (a) Soil Profile obtained from peat sampler at borehole 3. (b) Soil Profile obtained from peat sampler at borehole 4.

The peat soil profile acquired from the peat sampler was overlaid for comparison purposes. A comparative analysis was carried out between the soil stratigraphy attained using the electrical resistivity approach and that obtained using the peat sampler. The percentage error was calculated using the conventional formula [(observed value – exact value)/exact value x 100]. Tables 2 and 3 summarise the comparison between the soil profiles obtained using the Electrical Resistivity Tomography (ERT) technology and the peat sampler. The layer was constructed with data obtained from a prior study in Parit Nipah. The study determined that the resistivity of peat in Parit Nipah ranges from 100.8 to 139.5 ohm.m, whereas clay resistivity ranges from 5.4 to 22.3 ohm.m (1).

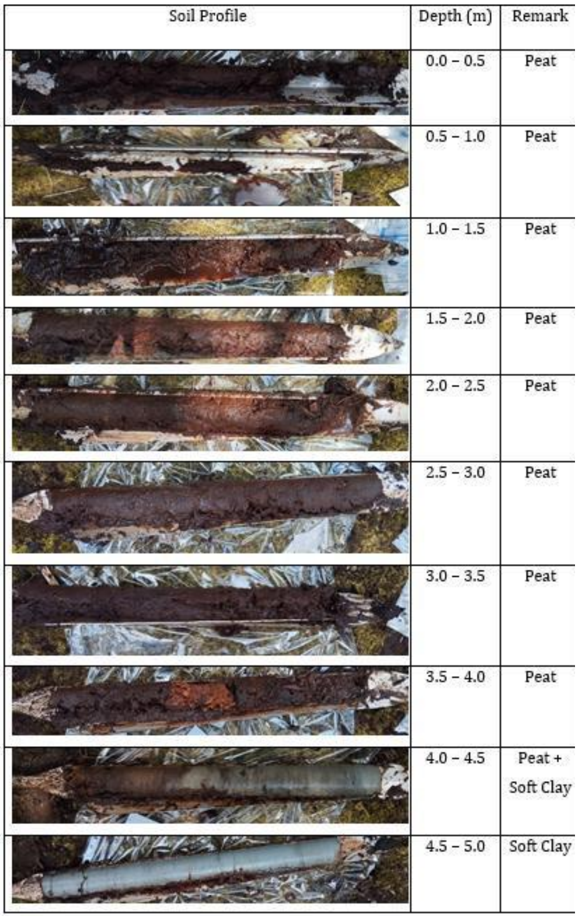


Figure 4. Soil Profile obtained from peat sampler at borehole 5.

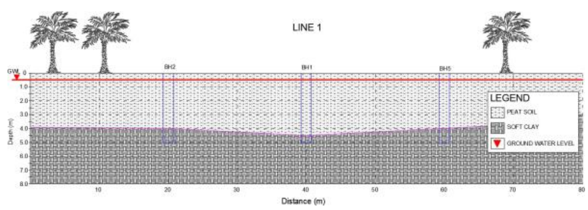


Figure 5. Soil stratigraphy at Parit Nipah, Johor (Line 1)

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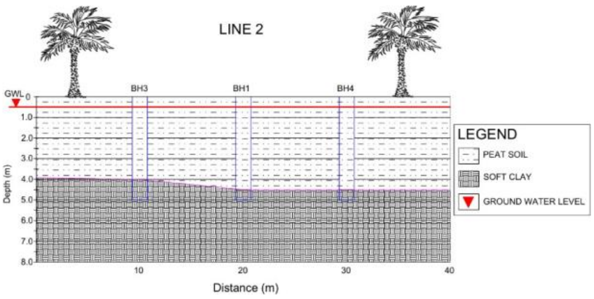
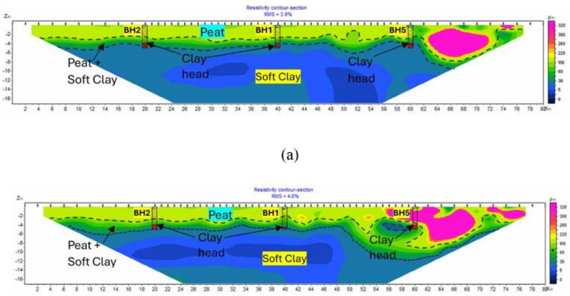


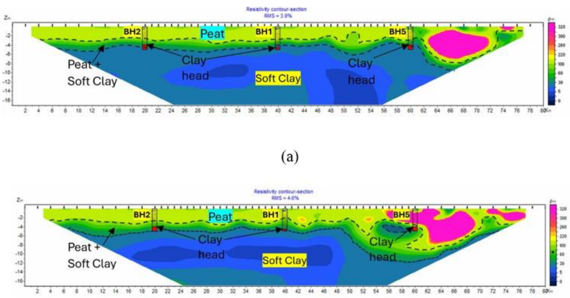
Figure 6. Soil stratigraphy at Parit Nipah, Johor (Line 2)



(a)

(b)

Figure 7. (a) Schlumberger array for line 1 (80m). (b) Wenner array for line 1 (80m).



(a)

(b)

Figure 8. (a) Schlumberger array for line 1 (80m). (b) Wenner array for line 1 (80m).

The error percentages for the peat layer on Line 1, as determined using the Schlumberger array and Wenner array, were 23% and 30%, respectively, compared to the data acquired from the peat sampler. In Line 1, the transition layer between peat and soft clay showed percentage inaccuracy of 6% and 7% for the Schlumberger array and Wenner array, respectively. The summarised data is presented in Table 2.

The error percentages for the peat layer on Line 2, as determined by the Schlumberger array and Wenner array, were 21% and 25%, respectively, compared to the data obtained from the peat sampler. The Schlumberger array and Wenner array methods had percentage errors of 5% and 17%, respectively, in the transition layer between the peat and soft clay layer at Line 2. The summarised data is displayed in Table 3.

To summarise, the results indicate that decreasing the space between electrodes in the Schlumberger array results in enhanced accuracy and heightened sensitivity, in contrast with using wider electrode spacing. Okpoli (2013) noted that reducing the distance between electrodes results in a shorter penetration depth, hence enhancing sensitivity to changes in the electrical resistivity of the subsurface. However, using the Wenner array in the peat region, Line 2 had a smaller margin of error than Line 1, supported by Okpoli's findings. However, in the transition zone, Line 2 showed a larger disparity than Line 1, mainly due to discrepancies between the extrapolated software data and the actual data collected in the field. This may clarify why the accuracy differences are more noticeable for electrodes with shorter intervals on Line 2 than on Line 1. The results also showed that the electrical resistivity method effectively identifies differences in soil layers, and the most favourable technique for peat profiling is the Schlumberger array, as it demonstrates little inaccuracy.

6. Conclusion

Electrical Resistivity Tomography (ERT) technology for evaluating soil profiles has shown promising results. The soil profile obtained through the ERT method closely aligns with data gathered from the peat sampler, indicating that ERT effectively and efficiently characterises soil profiles, making it a suitable option for peatland research.

Among the various methods tested, the Schlumberger technique was particularly effective for profiling peat, as it had minimal discrepancies compared with the peat sampler data. Additionally, the ERT method improves investigative capabilities and avoids invasive techniques, making it an appealing choice for non-invasive subsurface exploration in peatlands.

To further enhance the efficacy of ERT in analysing peatlands, the study recommends focusing on essential peat characteristics, including organic content, moisture content, and the degree of humification. Incorporating these factors into the analysis will improve the understanding of the diverse peat resistivity values, thereby improving the accuracy and reliability of ERT findings.

In summary, this study underscores the promise of ERT as a valuable non-invasive tool for characterising peatlands. The strong correlation between ERT-derived soil profiles and peat sampler data highlights its relevance for geotechnical and environmental research. Its cost efficiency and ability to reduce intrusive methods further reinforce its importance for extensive peatland studies. The broader implications suggest that ERT could significantly assist land managers and conservationists in the sustainable management of peatlands. Practical applications include mapping peat thickness for carbon stock evaluations, monitoring subsurface water flow, and pinpointing areas at risk of degradation. Future developments in ERT techniques may further transform peatland research and conservation efforts by addressing the challenges associated with complex peat characteristics.

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Table 2: Summarized data for line 1

	Line 1					
Protocols		**Schlumberger**			**Wenner**	
Peat Area (PS) (m)	0 – 4.0	0 – 4.5	0 – 4.0	0 – 4.0	0 – 4.5	0 – 4.0
Peat Area (ERT) (m)	0 – 3.0	0 – 3.0	0 – 3.8	0 – 2.5	0 – 2.1	0 – 4.0
Error (%)	25	33	5	37	53	0
Average Error (%)		23			30	
Transition Area (PS) (m)	4.0 – 4.5	4.5 – 5.0	4.0 – 4.5	4.0 – 4.5	4.5 – 5.0	4.0 – 4.5
Transition Area (ERT) (m)	3.0 – 4.3	3.0 – 4.5	3.0 – 4.3	2.5 – 5.0	2.1 – 4.9	4.0 – 4.9
Error (%)	4	10	4	11	2	8
Average Error (%)		6			7	

Table 3: Summarized data for line 2.

	Line 2					
Protocols		**Schlumberger**			**Wenner**	
Peat Area (PS) (m)	0 – 4.0	0 – 4.5	0 – 4.5	0 – 4.0	0 – 4.5	0 – 4.5
Peat Area (ERT) (m)	0 – 3.0	0 – 3.2	0 – 3.0	0 – 2.5	0 – 3.0	0 – 4.2
Error (%)	25	28	33	37	33	6
Average Error (%)		21			25	
Transition Area (PS) (m)	4.0 – 4.5	4.5 – 5.0	4.5 – 5.0	4.0 – 4.5	4.5 – 5.0	4.5 – 5.0
Transition Area (ERT) (m)	3.0 – 5.0	3.2 – 5.0	3.0 – 5.2	2.5 – 5.2	3.0 – 4.6	4.2 – 6.5
Error (%)	11	0	4	15	8	30
Average Error (%)		5			17	

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8. References

A.A.M. Addly et al. IS THE RESIDUAL ASH METHOD APPLICABLE TO TROPICAL PEATLANDS? Mires and Peat, Volume 28 (2022), Article 08, 16 pp., http://www.mires- and-peat.net/, ISSN 1819-754X International Mire Conservation Group and International Peatland Society, DOI: 10.19189/MaP.2020.GDC.StA.2147

Adnan, A. (2008). Geotechnical Characteristics of Peat. ResearchGate.

Basri, K., Wahab, N., Talib, M. K. A., & Zainorabidin, A. (2019). Sub-surface profiling using electrical resistivity tomography (ERT) with complement from peat sampler. Civil Engineering and Architecture, 7(6).

Baines, D., et al., Electrical resistivity ground imaging (ERGI): a new tool for mapping the lithology and geometry of channel-belts and valley-fills. Sedimentology, 2002. 49(3): p. 441-449.

Binley, A., Hubbard, S. S., Huisman, J. A., & Revil, A. (2002). Geophysical characterization of subsurface properties. Springer.

Everett, M.E., Near-surface applied geophysics. 2013: Cambridge University Press.

Equipment, E.A., Peat Sampler Operating Instruction. Netherlands: Eijkelkamp Agrisearch Equipment, 2014.

Griffiths, D. and R. Barker, Two-dimensional resistivity imaging and modelling in areas of complex geology. Journal of applied Geophysics, 1993. 29(3-4): p. 211-226.

HabibM.Mohamad, B.Kasbi. (2021) Inventigating Peat Soil Stratigraphy and Marine Clay Formation Using the Geophysical Method in Padas Valley, Northen Borneo.

Herman, R., An introduction to electrical resistivity in geophysics. American Journal of Physics, 2001. 69(9): p. 943-952.

Hikmatullah and Sukarman (2014): Cultivated Peat Soils in Trial of ICCTF.

Huat, B. B., Kazemian, S., Prasad, A., & Barghchi, M. (2011). State of an art review of peat: General perspective. International Journal of the Physical Sciences, 6(8), 1988-1996.

Loke, M., Electrical imaging surveys for environmental and engineering studies. A practical guide to, 1999. 2.

Loke, M., Tutorial: 2-D and 3-D electrical imaging surveys. 2004.

Mesri, G., & Ajlouni, M. (2007). Engineering properties of fibrous peats. Journal of Geotechnical and Geoenvironmental Engineering, 133(7), 850-866.

Miele, M., et al. Rectangular Schlumberger resistivity arrays for delineating vadose zone clay- lined fractures in shallow tuff. in Symposium on the Application of Geophysics to Engineering and Environmental Problems 1996. 1996. Society of Exploration Geophysicists.

Mohd et al., Study of Various Soil Stabilization Techniques That Suitable for Parit Nipah Peat Soil. Recent Trends in Civil Engineering and Built Environment Vol. 3 No. 1 (2022) p. 1884-1892

Muhammad Yusa, Ari Sandyavitri, Sigit Sutikno. Application of electrical resistivity test to estimate carbon storage of tropical peat deposit (Case study of Bengkalis island) MATEC Web Conf. 276 05004 (2019) DOI: 10.1051/matecconf/201927605004

N. Wahab, M. K. A. T, K. Basri, and M. M. Rohani, "Segregation peat fiber and pre-consolidation pressure effect on the physical properties of reconstituted peat soil," Interna tional Journal of Engineering and Advanced Technology (IJEAT), vol. 8, no. 6S3, pp. 640–647, 2019.

Norhaliza Wahab, Mohd Khaidir Abu Talib, Ahmad Khairul Abd Malik, Aziman Madun (2023) Effect Of Cement Stabilized Peat On Strength, Microstructure, And Chemical Analysis,Physics And Chemistry Of The Earth,ELSEVIER,129,1,ELSEVIER,1-8,ISSN:14747065

Norhaliza Wahab, Mohd Khaidir Abu Talib, Nurlatifah Jumien, Aziman Madun, Faizal Pakir (2023) Comparative Study Of Peat Properties In Johore Malaysia,Asia-Pacific Journal Of Science And Technology,KHON KAEN UNIVERSITY, THAILAND,28,4,KHON KAEN UNIVERSITY, THAILAND,1-8,ISSN:25396293

Okpoli, C.C., Sensitivity and resolution capacity of electrode configurations. Geophysics, 2013.

Prabir K. Kolay and Siti Noor Linda Taib (2017). Physical and Geotechnical Properties of Tropical Peat and Its Stabilization. DOI: 10.5772/intechopen.

Razali, Siti & Hj. Bakar, Ismail & Zainorabidin, Adnan. (2013). Behaviour of Peat Soil in Instrumented Physical Model Studies. Procedia Engineering. 53. 145–155. 10.1016/j.proeng.2013.02.020.

Reynolds, J. M. (2011). An introduction to applied and environmental geophysics. John Wiley & Sons.

Slob, E., Optimal acquisition and synthetic electrode arrays, in SEG Technical Program Expanded Abstracts 2004. 2004, Society of Exploration Geophysicists. p. 1389-1392.

Wahab, A., Hasan, M., Mohd Kusin, F., Embong, Z., Zaman, Q. U., Babar, Z. U., & Imran, M.

S. (2022). Physical Properties of Undisturbed Tropical Peat Soil at Pekan District, Pahang, West Malaysia. International Journal of Integrated Engineering, 14(4), 403 414. https://penerbit.uthm.edu.my/ojs/index.php/ijie/article/view/8667

Zainorabidin, A., & Zolkefle, S. N. A. (2014). Dynamic behavior of Western Johore Peat, Malaysia. Published by Asia Pacific Chemical Biological and Environmental Engineering Society (APCBEES)

DOI: https://doi.org/10.22452/mjs.vol45sp1.11
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