

INSIGHTS FROM MAPPING OF BURIED PLASTIC PIPES WITH 2D ELECTRICAL RESISTIVITY AND 2D/3D GROUND PENETRATING RADAR

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Buried utilities of different shapes and sizes are characteristics of built-up areas and carry different materials such as water, waste water, electrical signal, communication signals etc. The careful identification of these utilities in order not to constitute danger to life and property when further development is needed is pertinent. To this end, 2D Electrical Resistivity Tomography and 2D/3D Ground Penetrating Radar has been used in mapping buried plastic pipes at three locations within Mountain Top University, Southwestern Nigeria in order to provide information about the location, diameter and depth of buried plastic pipes. 2D and 3D GPR survey were conducted using monostatic antennas with frequencies of 450 and 750 MHz. One 6 m by 6 m and two 3 m by 3 m 3D GPR were carried out with lines pacing interval of 1 m and 0.5 m respectively. 2D Electrical Resistivity imaging was carried out with dipole-dipole array and electrode spacing of 0.1 m in order to ensure high subsurface resolution. On the 2D ERT, the pipeline is represented by relatively high electrical resistivity anomalies (700 to 100k Ωm). The high resistivity contrast is suggestive of air-filled plastic pipes. The pipes are also represented by hyperbolic signatures on the GPR. Interestingly, linear anomalies are observed on some 3D GPR time slices which are associated to the buried pipes thereby providing a robust visualization of the buried utility. Integration of the 2D ERT inverted sections and radargrams shows that depth to the top of the buried pipes ranges from 0.2 to 0.31 m while diameter of the buried pipes ranges from 0.2 to 0.22m. Ground truthing of the buried pipes shows that the diameter of the pipes are 8 inches (0.2032 m). The result of this study further corroborates that integration of 2D ERT and GPR surveys allows for a better identification of buried utilities.