

# 3D Mapping In Construction Projects for Soil Characterizations And EIA Enhancement

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## -----ABSTRACT-----

*With the advancement on automation systems in our life and construction projects the development of automated Environmental Impact assessment EIA system is desirable. This could be achieved by set of integrated technologies, software, and hardware to perform a task which is in this research paper is Quality EIA. The environmental impact assessment must be improved, assessed, and quality checked for the human and the environment health and safety benefit first, and the advancement of human activities and needs towards the future. If we consider the development and construction projects is one of the markers and the signature of how far is countries and human civilized or advanced, the EIA quality review and development of this document in any project should be improved and advanced.*

*Ideally EIA system, document, will lead to quickly and easily obtain information, improve project value, and return of investment, improving facilities and reach the optimum clients and government requirements. This often necessitates to build a tailored applications sometime combine or develop innovative, and integrate, new, existing hardware, software, methods, and technologies to reach that aim. Which is the research methodology of this research paper*

*This research paper concluded that 3D mapping for soil characterizations a technology where spatial interpolation methods play a significant part as a backbone of its core in relation to the accuracy of the data which will provides essential elements towards site characterization information, that need to be informed in to the EIA in structure and elegant way to improve decision making, planning strategies, environmental management, risk assessment, more than those projects estimations.*

*This research paper adopts a multi-method approach involving reviewing the literature, case studies, and computer simulation.*

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## I. Introduction

Improving the information provided in developing the Environmental Impact Assessment EIA related to specific site by the use of innovative 3D soil characterizations technology, will reveal the unknown information such as the type, extent and volume of soil in specific locations which will enhance soil characterization information in general and will be reflected in improving the information required in EIA document which will add value and insight information as quality soil characterization will provide quality EIA, and quality projects.

The accurateness of the distribution of soil parameters in 3D relying on the consistency and accuracy of soil data received from soil sampling process. To obtain dependable datasets, soil sampling procedure needs to be improved and enhanced. One of the advantages of this examination is the consideration of the vertical soil data and the vertical soil profile, which has shown to be significant component to forecast and evaluate the soil volume. sampling depths can be condensed and number of sampling locations can be reduces while the accurateness of prediction for various distribution of soil parameters can be confirmed.

This research paper adopts a several method involving case studies, reviewing literature related. We will investigate a hydrocarbon contaminated site and apply 3D mapping technology to investigate the soil characteristics and the use of 3D mapping technology in contaminated site as case study. With this concern will review the literatures towards the behaviour of Petroleum Hydrocarbon when its contact soil.

## II. (TPH) Petroleum Hydrocarbon in soil samples

For the total amount of PHCs contained in an environmental sample total petroleum hydrocarbon is the stricture used. for estimation of TPH in soil samples the total recoverable petroleum hydrocarbons (TRPH) frequently used (USEPA, 1979a). Petroleum hydrocarbon (PHC) Environmental pollution caused by releases of petroleum to surface water, or land is of apprehension because chemicals in PHCs can present a risk to plants, animals, environmental and human.

## **2.1 soil and the environment in contact with petroleum hydrocarbon**

The present of petroleum hydrocarbon (PHC) could affect growth of soil microbes and plants (Bundy et al., 2002) the (PHC) in soils, or water may cause health problems to animals, environment, and human being (Aguilera et al., 2010). The downward movement of the oil is affected by many factors such as soil characterization information, such as soil porosity, texture, size, silt content, moisture, and others.

### **III. Spatial Interpolation and Soil Mapping**

For soil pH the performance of three commonly used interpolation methods, radial basis functions (**RBF**), inverse distance weighted (IDW), and ordinary kriging (OK) were used to interpolating between sampled points and characterize the spatial variability in a study presented by (Ghobakhlou et al., 2011).

The comparison between 12 different interpolation methods by using 5-meter DTM (digital terrain model), for each method, applicability, algorithm, efficiency and advantage been analysed by Chin, et al. (2004). this study concluded that there is no unconditionally unsurpassed method but only the best choice. both radial basis functions (**RBF**), and inverse distance weighted (IDW), interpolation method needed to adjust the power parameter and the examined radius to improve accuracy, these spatial interpolation methods had various decision parameters. (Chin, et al., 2004) specified that we should first assess the characteristic and formula of each method as well as the characteristics and spatial analysis of data previously to successfully chose a spatial interpolation method which is comparatively and suitable for certain study or project. These outcomes will give hand to the GIS consultants in selecting the finest method for the soil characterization, a technique should be implemented for its performance on a specific soil type and data density, and for its applicability to a inclusive choice of spatial scales as well.

### **3.1 Contaminated soil spatial variation models for predicting vertical soil profile**

From the literature review, and several pilot projects we can concluded that the Kriging produces much better spatial interpolation outcomes than inverse distance weighted (IDW).

### **IV. The EIA document components for construction, and environmental projects are;**

The most significant components required to be existing in any EIA document to ensure quality, accuracy and to meet the quality objectives are;

- 1- Summarized, and comprehensive towards the purposes.
- 2- Table of contents.
- 3- Related referencing presented.
- 4- Includes description of the project and proposals.
- 5- Includes effective and photographs, graphics to sustenance and support the document aim and the project.
- 6- Covers a decent explanation of the methods used of each topic related to the project specifically the environmental aspects and concerns.
- 7- Delivers evidence of good research and consultancy.
- 8- Responsibility towards justification and to monitoring.
- 9- Supported by the use of technology and the automation systems
- 10- Non-Technical Summary

3D mapping technology for soil characterizations in construction projects will enhance all the above significant components and add quality and value.

### **V. Environmental Impact Assessment document quality review**

For a reviewing the quality of any Environmental Impact Assessment document there are several factors must be included;

- 1- Project Description
- 2- Environment by the projects.
- 3- The important of the project.
- 4- Summary Non-Technical.
- 5- Regulatory compliance.
- 6- The use of figures, graphs, and tables.
- 7- The use of technology and the automation systems.

3D mapping technology for soil characterizations in construction projects will enhance all the above significant components and add quality and value.

## **VI. Soil characterizations and 3D mapping technology**

This 3D mapping and modeling technology will cover larger areas of soil which will be characterized and investigated in quality, cost effective and time efficient and assured QA/QC of the construction project with optimum risk assessment measure to support EIA compulsory components in the reports and statements. 3D mapping modeling extremely effectual and actual in assessing the spatial distribution of various soil characterization and fractions its makes field sampling cost effective and less labor required which decrease project risk assassinated. The 3-D modeling technologies results significant decrease in the number of sampling points required in the normal technics of sampling, while the quality of soil characterization can be guaranteed and much better than the old way of sampling which is not 3D mapping technology for soil characterization. Prediction of the environmental impacts can be obtained by the models of 3D mapping for soil characterization and guide the sampling outcomes before and subsequent to construction project started.

## **VII. 3D Soil Characterization Technology**

soil characterization could be achieved with quality and cost effective through 3D mapping technology and describe specific soil property and profile. Soil Characteristics is a very important component in the environmental impact assessment document EIA which is important element in any construction project and support the decision of risk based approach in general and enhance the quality of EIA statement

## **VIII. Conclusions**

This document and this approach will benefit the environment by identifying the required information for the EIA and the EIA electronic generation and give hands in technologies selection process for remediating the contamination on soil surface and vertical extent of this contamination under the ground. The predictive models for the investigated soil characterization sites by using interpolation techniques is appropriate for 3-D mapping of soil characterization.

This research paper provides innovative process to ensure quality of the environmental Impact Statement (EIS) achieved, support and enhance the new EIA electronic and electrical generation for environmental projects, using new and advanced technology of the 3D soil mapping and soil characterizations technics. The 3D mapping technology will support the effort in revealing the unknown information in specific soil characterization in general. By applying the 3D soil mapping technology, the EIA document will determine the alternatives that's needs to be examine, identifying the soil characterization and environmental impacts associated in soil surface and under the ground, assist as a term of reference (TOR), cost effective and quality assurance, and ensure the information delivered is satisfactory and the most important is to improve the quality of the EIA reports in the new electronic generation.

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