3D sub-surface data visualization: Integration with InfraWorks and BIM360

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I lead sub-surface data visualization group in environmental team. I have been responsible for developing this practice within the environment business line in India and building a team to work with different regions across globe. I have been working on identifying different platforms to better visualize the sub-surface data such as soil and groundwater to understand the extent of the contamination below the ground surface. Outside of work, I'm a travel enthusiast and a motorcyclist.
Learning Objectives

• Discover a 3D subsurface contaminant data visualization in Autodesk environment
• Discover a conceptual site model and integration with InfraWorks
• Learn about selection and optimization of remediation strategy for a contaminated site with the aid of an integrated 3D model
Need for sub-surface data visualization in 3D

“If a picture is worth a thousand words, then a 3D model is worth a million.”
Need for sub-surface data visualization in 3D and Integration with Autodesk

- Complexity of data types – geology, soil, groundwater
- To understand sub-surface contamination extents in correlation with aboveground features
- To arrive at better remedial strategy

Approach

- A 3D sub-surface model was created in Earth Volumetric Studio (EVS) and was brought to Autodesk environment to integrate with above ground features.
- The integrated model was later published in BIM360 for a greater client experience.
Stages of the project
Conceptual Site Model – Integration of sub-surface model with InfraWorks

STAGE A

3D SUB-SURFACE MODEL
Developed in Earth Volumetric Studio (EVS) using analytical results from lab and brought to Autodesk Environment.

STAGE B

GEOREFERENCING
Historical footprints of above ground features were georeferenced using Civil3D

3D Sub-surface model extracted from EVS was georeferenced using Civil3D

STAGE C

INTEGRATION
Georeferenced 3D sub-surface models were brought to InfraWorks to integrate them within a real-world context of built and natural assets

STAGE D

PUBLISHING AND ANIMATION
Integrated model was published in BIM360 for an easy access to clients.

A 360° fly-through animation was created by InfraWorks for a better user experience

“POWER OF AUTODESK FOR ENVIRONMENTAL INDUSTRY”
As the site was identified to be contaminated due to historical events, it was important to bring historical footprints to the integrated model along with existing scenario. This was achieved by Civil3D through digitizing historical footprints such as buildings and storage tanks, and later it was brought to InfraWorks.
A 3D contaminant model of Total Petroleum Hydrocarbons (TPH) was extracted out of EVS and georeferenced using Civil3D and later it was brought to InfraWorks.
Bore holes with TPH concentration was extracted out of EVS and georeferenced using Civil3D and later it was brought to InfraWorks.
Interpreted and georeferenced sub-surface objects were imported and integrated within InfraWorks software.

It enabled environmental professionals and clients to conceptually analyze and visualize TPH concentration below ground surface when correlated with real-world context of built and natural assets.

It enabled quick decision making for optimizing and designing the site clean-up strategies.
To have an integrated model published in a centralized location, 3D conceptual model from InfraWorks was published in BIM360 which enabled better user-experience for the client.
A 360° fly-through animation by Infraworks
What are the next steps?

BIM for Environment?

• Further update the model with integrating geology.
• Published model to be embedded with data; contaminant concentration, mass, and volume.
• Calculate the cost of remediation.
Conclusion

- A better understanding of sub-surface condition in correlation with real-world context of built and natural assets.
- Centralized visualization platform for conceptual site models – A comprehensive visualization.
- Cost reduction and risk mitigation for environmental site investigation and restoration.