

# Aerial Topography Survey of Solar PV Site



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HUVIAiR was asked to conduct an aerial survey of a 100 acre site on which a 20 MW solar PV plant was being planned. The site is located in Yadgir district of Karnataka. The outputs needed were:

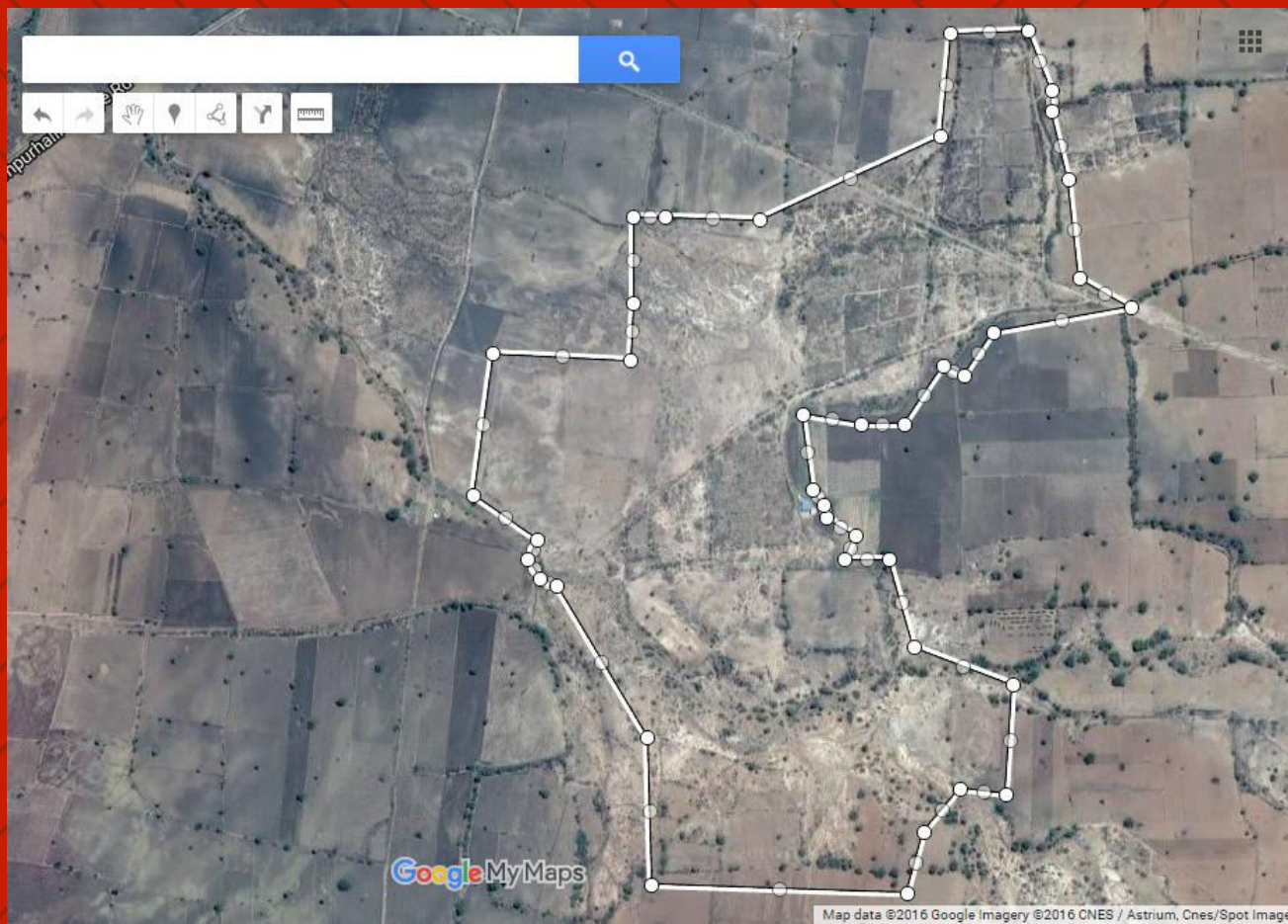
- **2D top view image** (Orthomosaic) with boundary demarcated
- **Contours**
- **Digital 3D model**

# Survey Process

## Before going to site:

- The client assisted us in identifying approximate boundary points of the site with the help of satellite imagery of Google Earth.
- Approximate flight path and image overlap intervals were determined by HUVIAIR based on this input.





Approximate boundary extents sent by client using Google Maps/Google Earth Polygon marking feature



Drone Flight Plan was designed using the boundary polygon  
Altitude of flight – 120 meters above ground level; Image Overlap – 70%



# Survey Process

## At Site:

- Visible markers were placed at the boundary milestones.
- After refining the flight path and image overlap interval settings at site, the UAV was flown across the site and several hundreds of geo referenced images were captured.
- The team of two from HUVIAiR spent 7 hours at site.

# Survey Outputs

- **Top view image** (2D Orthomosaic) with boundary demarcated
- **Contours**
- **3D model**

# Top view image (2D Orthomosaic) with boundary demarcated

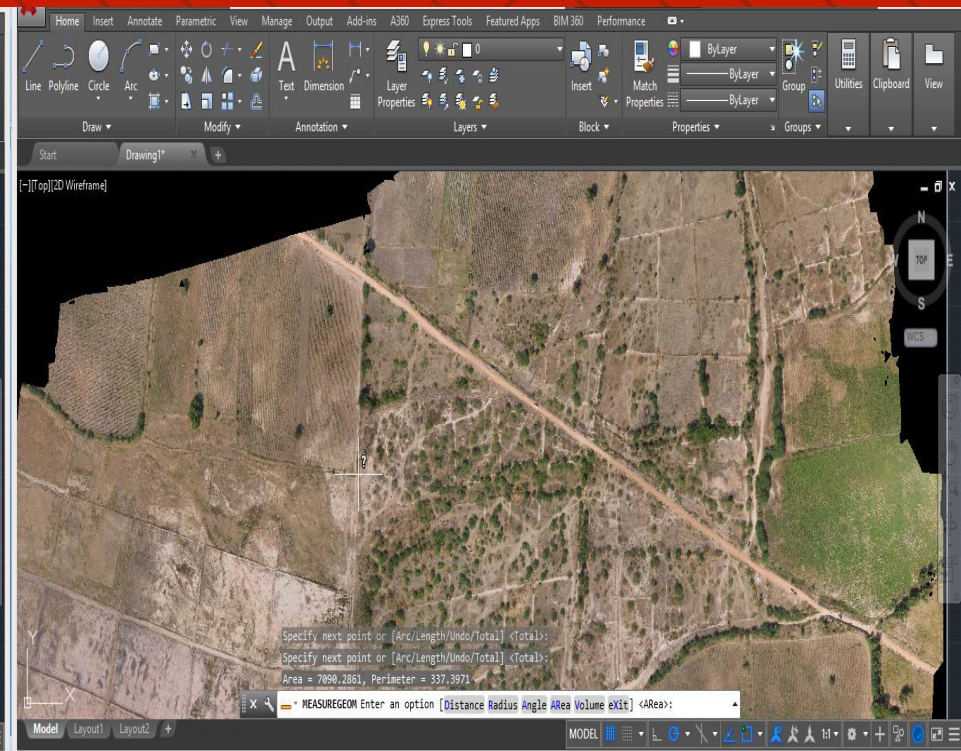
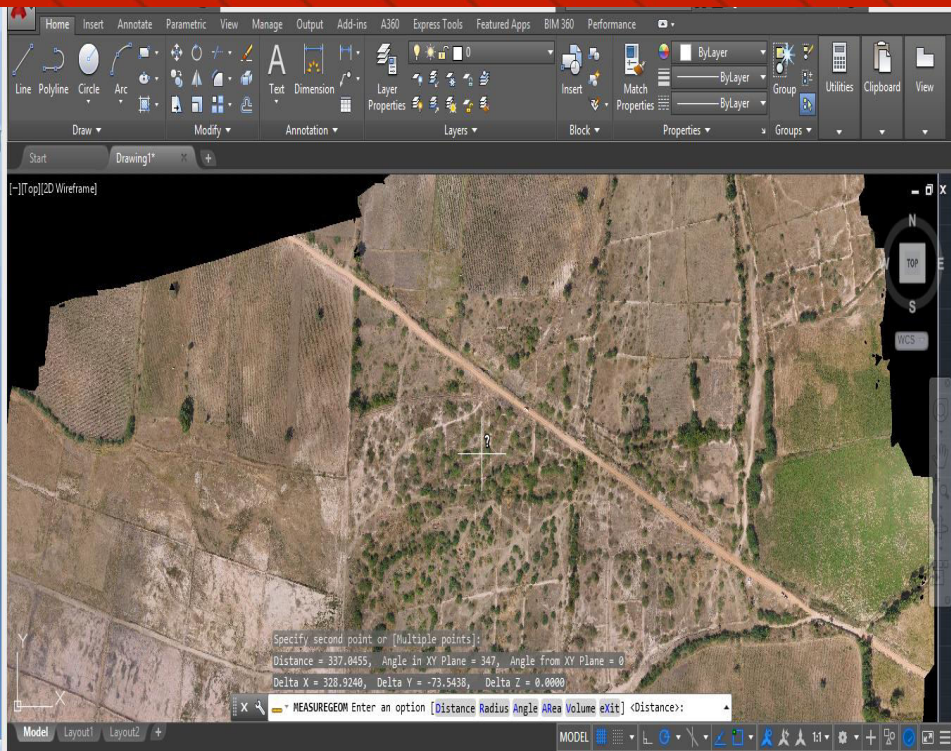
- Various images of the site are stitched together to form **one single 2D top view scaled image of the site**. The image resolution is up to **5 cm/pixel**.
- The boundary was identified using the visual markers that were visible on the final image.
- This image is created in the projection system of the customer's choice. It can be opened as a **geotiff file with CAD and GIS tools for further 2D analysis** and feature digitization.
- In this case, the customer used this image as the base layer for planning the layout of the panels and other components to be installed.
- This image can also be opened on Google Earth (it will overlay on top of the satellite imagery).
- Highly accurate (up to 3 cm accuracy) distance and area measurements can be performed on all the above mentioned tools.





2D top view image with boundary demarcated

(Representational image, resolution of original image is 5cm / pixel)



Examples of measurements done on Autocad (in EPSG3857 projection)



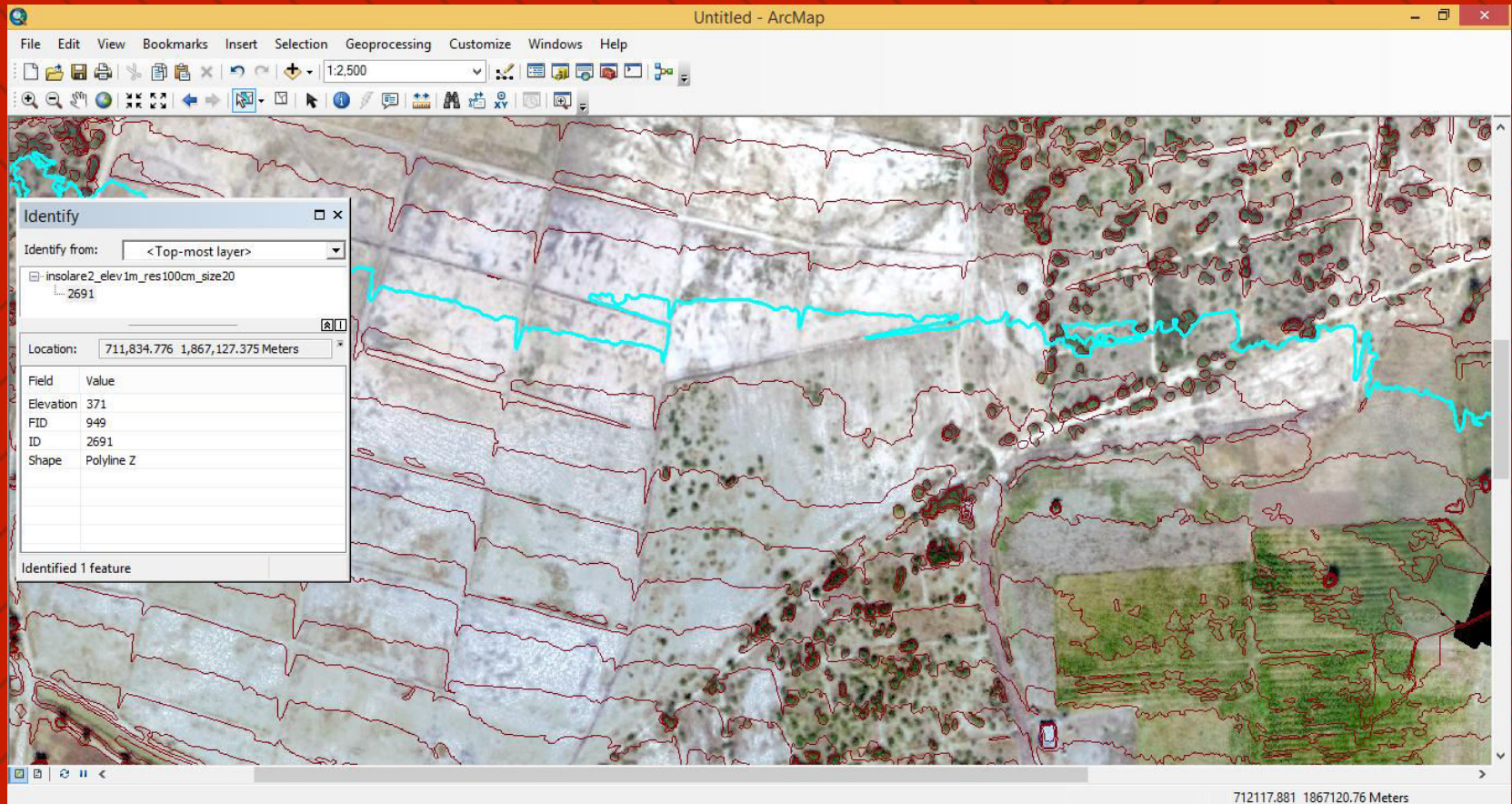
# Contours

- The images were converted into a dense 3D point cloud of the surface, with each point having a unique x,y,z coordinate.
- The 3D points were converted into a contour map.
- Contour map of the surface were generated with the required intervals. This can be opened as a .dwg/.dxf on CAD and GIS applications for further analysis.





1 meter interval contour map



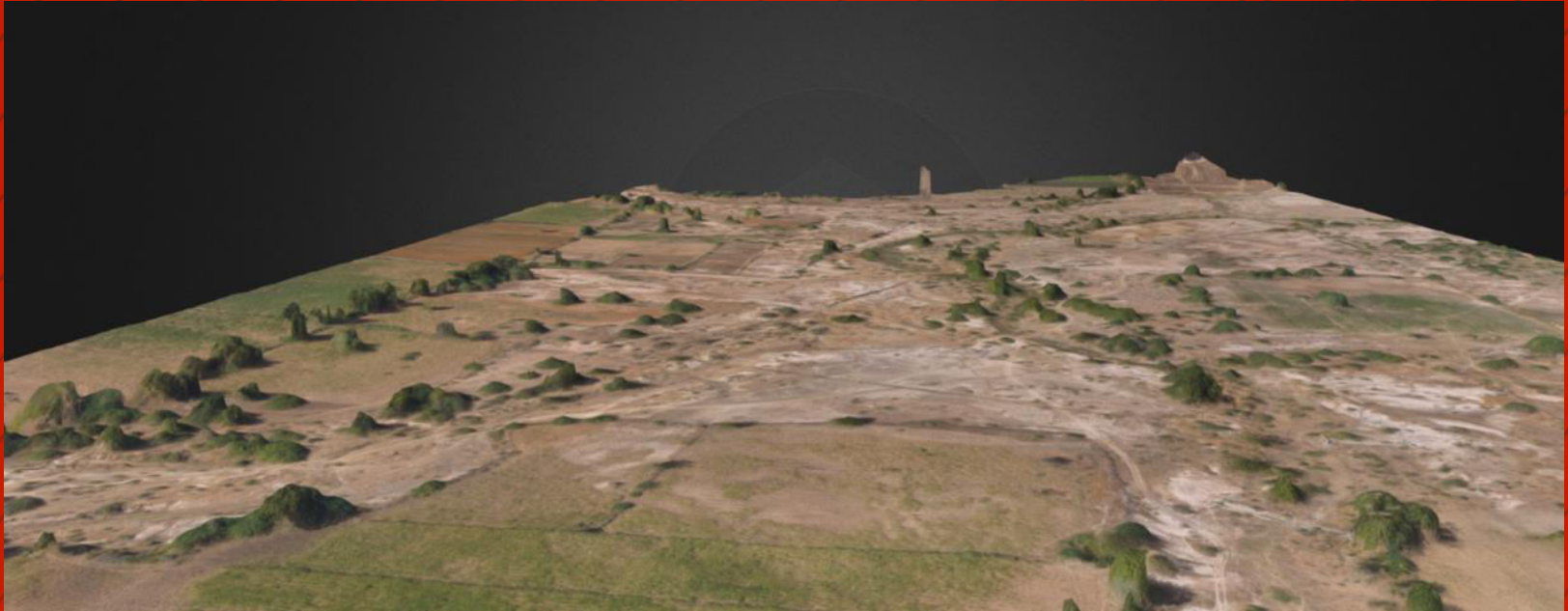
Contours accurately overlaid on the image viewed in GIS software



# 3-D Model

- A 3-D model of the site was generated. This model was used by the client to fly/orbit through the site to visualize the details in 3D and plan the work at hand.

<http://drdp.ly/xAyg0E>





# Summary

- The project was **completed in 4 days** – 1 day of pre site visit work + 1 day survey at site + 2 days for processing and delivering outputs.
- Traditional contour + boundary surveying would take at least 10 days time to complete.
- The **high resolution 2D top view image** (orthomosaic) and **3D model** are **additional outputs that traditional surveying cannot generate. These outputs add tremendous value to the site development planning process.**
- **Accuracy** of elevations, distances, areas and volume measurements are within **2-4 cm.**
- Despite these additional outputs, the **cost** of aerial surveying is significantly **less** than the cost of traditional surveying.