Volumetric Surveys of Ash Storage Dams

Presented by Paul Stivano

aurecon

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OVERVIEW

- Background information
- Survey Techniques
- Final Detail Output

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Dam 1

VALES POINT

- Vales Point Power Station is situated in Mannering Park 1 hour North of Sydney on The Central Coast.
- Owned and operated by Delta Electricity.
- Vales Point Power Station was Built in 1960's and upgraded in 1978-1979 and again in 1989.
- Vales Point Ash Dam is filled with a combination of Fly Ash from Vales Point & Munmorah and Furnace Ash from Vales Point.

Vales Point

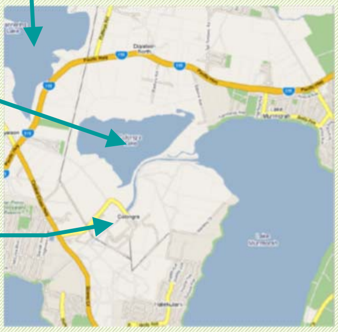
Area 1
70 ha of capped ash
Areas 2 & 3
200 ha exposed wet ash
Area 4
180 ha of inundated ash (water)

Ash dam perimeter approximately 13km

Dam 2

MUNMORAH

- Munmorah Power Station Built in 1967
- Munmorah ash dam contains only furnace ash from Munmorah PS



Munmorah

105 ha of inundated ash (water)

Ash Dam perimeter approximately 6km

Why survey ash dams?

- capacity surveys are required for the dam lifespan analysis and to assist in future ash management planning
- Lack of previous survey data
  - Vales Point Dam was previously Surveyed by in 1958,1965, and 1991 with a limited survey undertaken in 1995.
  - Munmorah is filled with Furnace Ash from Munmorah only and no recorded surveys since the construction of the Dam Wall were found on record

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Survey Techniques

- **STATIC GNSS CONTROL SURVEY**
- **AERIAL PHOTOGRAPHY**
  - Aerial Photography flown 1991
  - No significant change to the external features surrounding ash dam
- **CONVENTIONAL THEODILITE TOPOGRAPHICAL SURVEY**
  - Used to supplement GNSS survey where GNSS Survey was insufficient (Trees)
- **RTK GNSS TOPOGRAPHICAL SURVEY**
  - Used to Survey Ground Surfaces where OHS permitted. E.g. Waterline surrounding ash, Capped areas.

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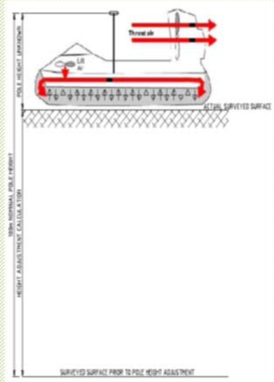
Survey Techniques

RTK GNSS

(Hovercraft on exposed ash)

- Survey required the modelling of the surface of the ash
- GNSS unit was attached to the Hovercraft
- This particular hovercraft was chosen for its capability to control the lift engine separately to the thrust engine. This ensured that the level of the hovercraft did not change significantly with forward motion



GNSS Survey utilising Hovercraft

Initial problems found

1. Electronic interference with RTK Radio signal
   – radio antennae moved to the front of craft
2. How do you measure the GNSS antennae height accurately?
   – Set the height of the GNSS unit to arbitrary height of 100

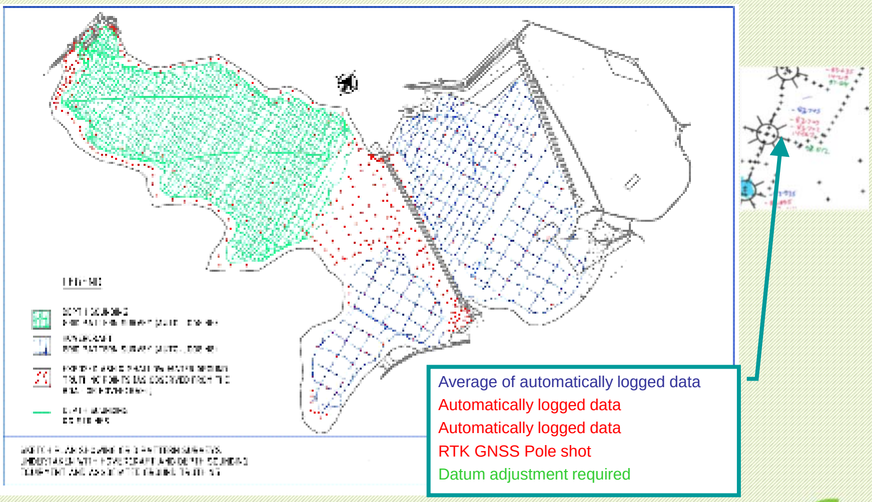
Data capture

– Automatic Log points every 10m
– Hovercraft data overlapped with the standard RTK GNSS data at the extremity of the ash
– Run a N/S & E/W grid every 100m
– Approximately 60 stationary pole shots were observed at regular crossing grids

Hovercraft data verification

– Crossing points were analysed and compared between grids
– Crossing points were then compared with stationary pole shots to calculate the required height adjustment

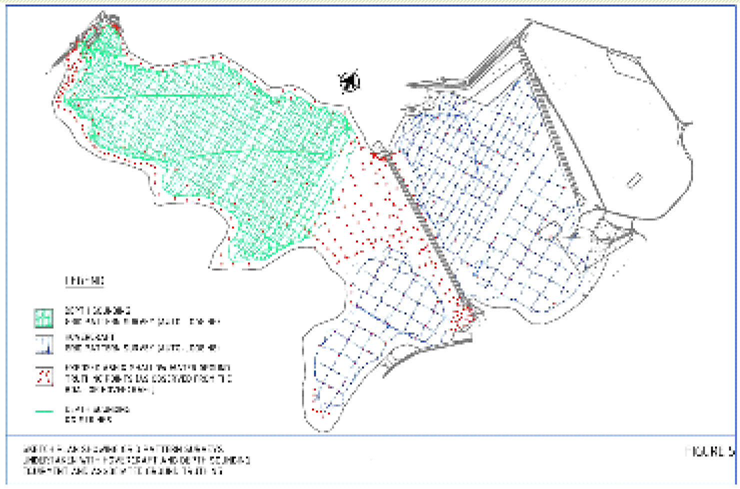
Captured data strings



RTK GNSS and depth sounding

- The GNSS unit was connected to a CEEDUCER PRO Dual frequency Depth Sounder.
- The Depth sounder records the depth of the water approximately six times per second.
- The GNSS Unit was located vertically opposed to the Depth Sounder giving depth data horizontal position regardless of the direction of motion
- RTK GNSS was used to output the position of the depth sounder transducer attached to the boat every second.
- A pole height of GNSS unit above water level and transducer draft was set in each instrument
- The depth sounder/GNSS combination was operated in a N/S direction at 20m intervals
- Survey data was initially checked in CAD for hole and omissions.
- The E/W was operated at 50m intervals to infill the data and provide crossing line checks
- 2 QQ lines were runs at 45° to the main runs

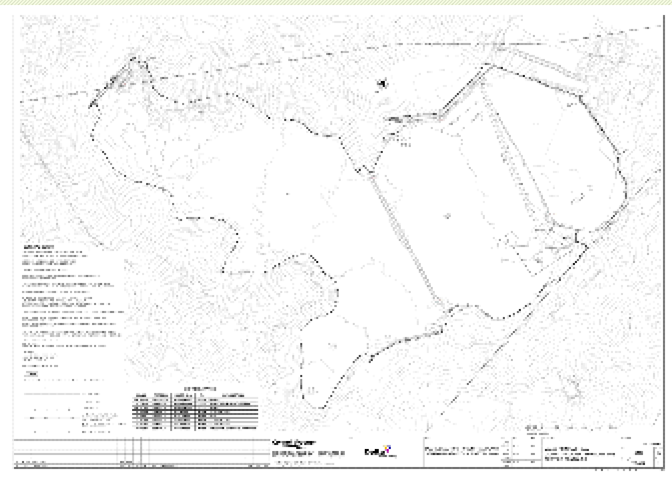
Captured data strings



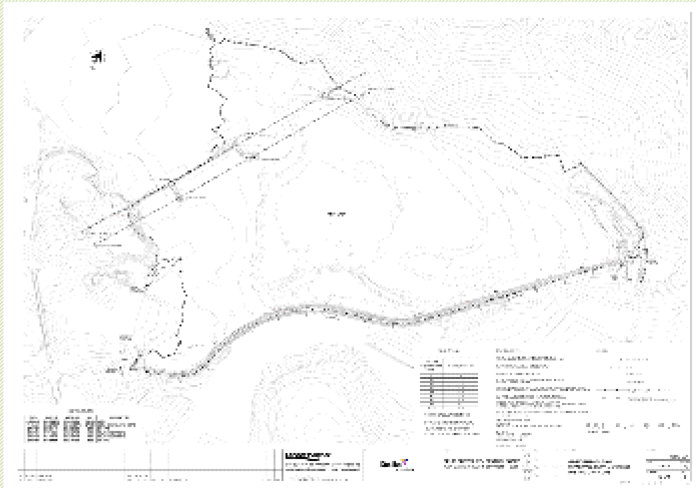
Reduction of Depth Sounder Data

- Data was downloaded into CEESTAR program and reduced to X,Y,Z positions
- Approximately 45,000 points were observed in both High and Low Frequency
- Data was filtered in the following ways
  - Any data with zero's in either the Hf or the Lf were removed.
  - Any data where the difference between the Hf and Lf frequency was greater than 0.2m was also removed.
  - The full data set was filtered by half to reduce the depth sounded points to approximately 20,000 points
- Data was imported into 12D and initial DTM produced
- Break lines were added to enhance the banks that could be identified from the data
- The data was then merged together with all other forms of captured data into the final 12D project to create the final DTM.

Final output plan – Vales Point



Final output plan – Munmorah




Thankyou for your attendance and attention
Questions?
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