Mine Design Through Visual Impact Analysis

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Visual Impact of Mining

An important part of mine design is to assess the visual impact of major mine features such as Waste Rock Dumps (WRD), Tailings Storage Facility (TSF) and Heap Leach Pads (HLP) have on the natural view.

Today we will look at two examples

• Mine Design using Viewshed and Line of Site Tools
• Animation of proposed Mine Facilities on surrounding environment
Problem

Client required a Visual Impact Analysis to make sure they had minimal impact on the surrounding natural views.

The analysis had to answer the following:
Post mining: From the major road, can you see the mountain ridgeline after the Tailings Storage Facility (TSF) & Waste Rock Dump (WRD) have been developed.
What is the maximum height that the TSF/WRD can be built to have zero impact on the ridgeline when viewed from main road?
Can you see the proposed pit from Eastern Road
Can you see the proposed campsite and airstrip from the surrounding main roads.
How?

To answer the questions, we performed a Visual Impact Study using the Viewshed and Line of Site Tools found in the 3D Analyst, Visibility toolset.

What is a Viewshed

A viewshed identifies areas that can be seen from one or more observation locations.

Image: ESRI

Highlights viewable areas (in green)
Line of Site

A line of sight is a line between two points on a surface that shows where along the line the view is obstructed.

Using both tools, we then identified areas that can (and can’t) be seen from set observation points.
Site Location

Proposed Mine Features
Detailed Topo (50cm) only existed within tenement boundary so topo had to be supplemented with Geoscience Australia 10m Topo Data.
The Line of Site and Viewshed Analysis tools work on raster datasets.

Topo data was converted into a raster grid surface with 2m pixel resolution in preparation for the Viewshed Analysis.
DXF drawings of the TSF, WRD and Pit were obtained from Engineering team and converted to 3D surface.
Results

Before Mine Infrastructure Placement

Areas in **Yellow** show visible areas as seen from the surrounding road.
Results

After Mine Infrastructure Placement

Areas in Red indicate areas of reduced visibility as seen from the surrounding road.
Results

Combined Before/After
Site line 1B shows TSF ~45m too high.
Site line 4a shows TSF ~15m too high.
Campsite Viewshed
Pit Viewshed
Conclusion

- Redesign of TSF and WRD.
- Pit no real visual impact
- Campsite visual impact acceptable.
Animated View of Proposed Mine Facilities

Visual Impact of Mining

- Landscape Changes
- Active Operations
Viewshed of Mine Features
View of Heap Leach Pad

- Southeast Vantage Point
- Elevation 540’ amsl (+2,110’ to Target)
- ~8-11 miles

Without Vegetation

With Vegetation
View of Heap Leach Pad

- Southwest Vantage Point
- Elevation 1,520’ amsl (+1,130’ to Target)
- ~12-13 miles

Without Vegetation

With Vegetation
View of Heap Leach Pad

- Northwest Vantage Point
- Elevation 2,550’ amsl (+100’ to Target)
- ~4-6 miles

Without Vegetation

With Vegetation
View of Heap Leach Pad

- Northwest Vantage Point
- Elevation 1,460' (+1,190' to Target)
- ~8-11 miles

Without Vegetation

With Vegetation
Thank You

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