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GEOVIA
User Conference
Google Earth
Image Landsat / Copernicus
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Surpac & **Google Earth** – Why, What, How & When?

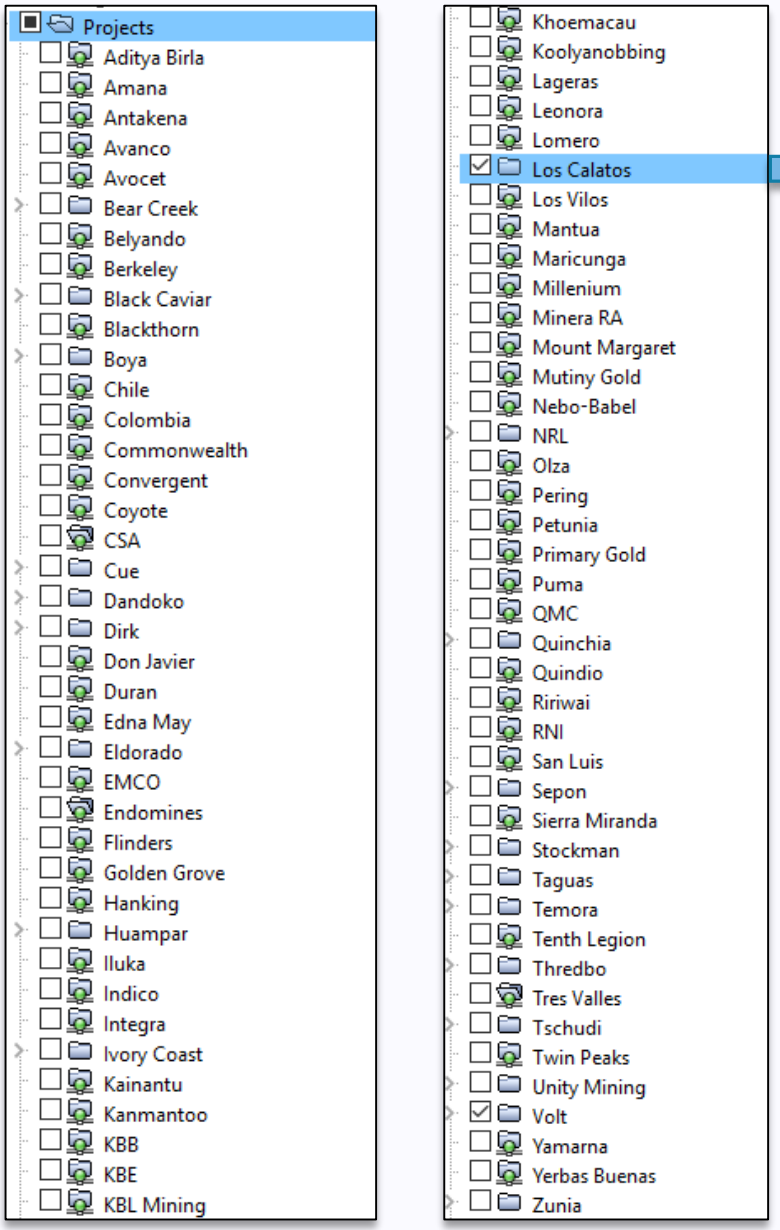
Presentation Outline

- Why interface **Surpac** with **Google Earth?**
- What data can be taken from **Surpac** into **Google Earth?**
- What data can be taken from **Google Earth** back into **Surpac?**
- Case studies using **Surpac** and **Google Earth**
- Plotting **Google Earth** images to scale in **Surpac**
- **Google Earth** on your mobile phone

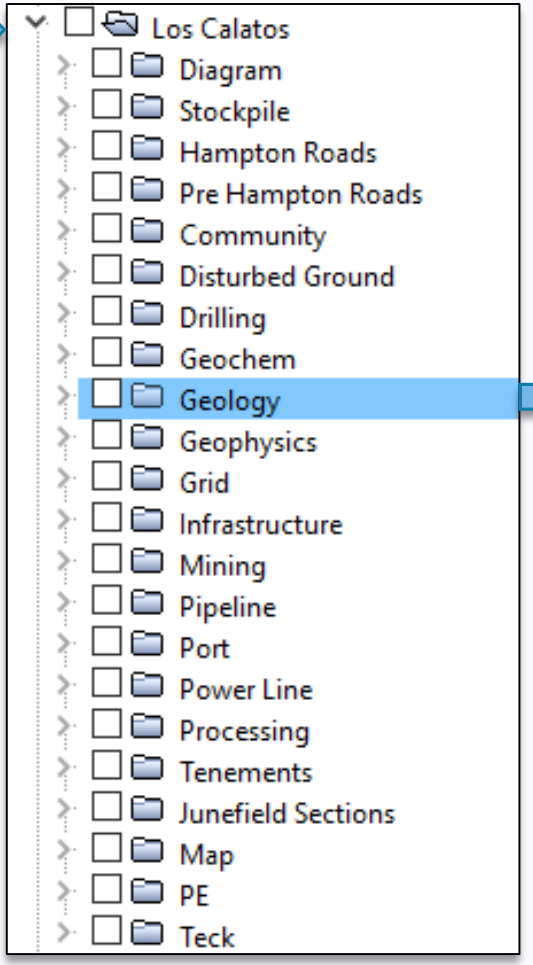
Why Interface **Surpac** with **Google Earth**?

- **Google Earth** is free and very easy to use….even CEO's have it on their laptops
- Very high resolution images can be saved for presentations and reports
- You can print directly to PDF's – and add company logos, title blocks, legends etc.
- Directly import GIS data and edit the data eg. shape files, TAB files, CSV files
- You can easily import large image files eg. Airborne magnetic as GEOTIFF's
- Create premium high resolution fly overs for export
- Digitizing, Editing and Measurement tools
- Elevation profile and statistics from GPS tracks
- You can go back in time and look at historical images
- Save and then send your data in a single kmz file which can be opened directly in **Google Earth** from emails on your computer or mobile device
- Store all of your project data in folders which are automatically saved on exit

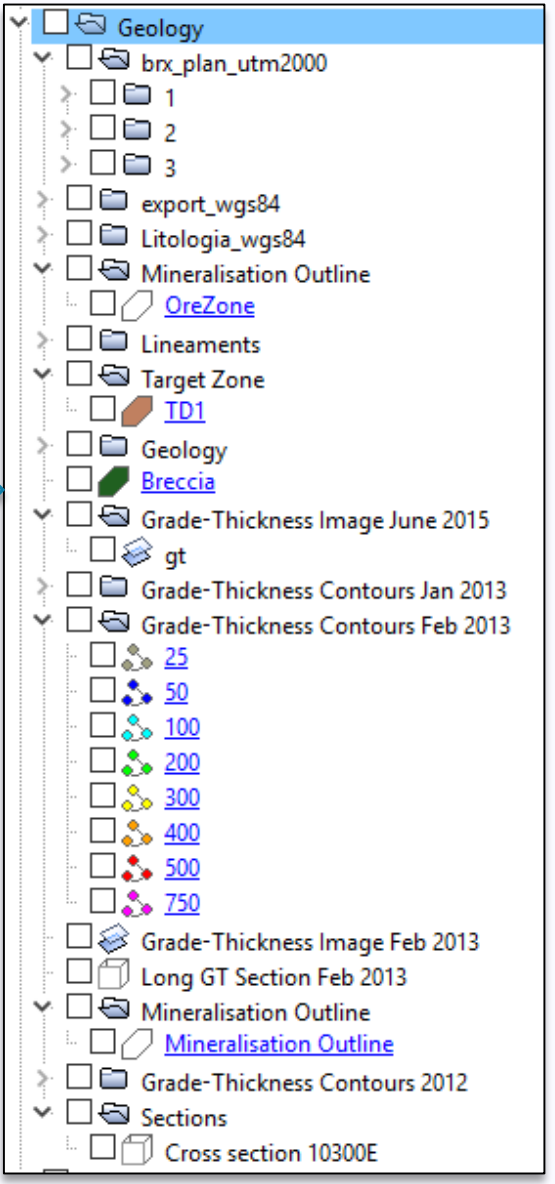
Over 80 project folders



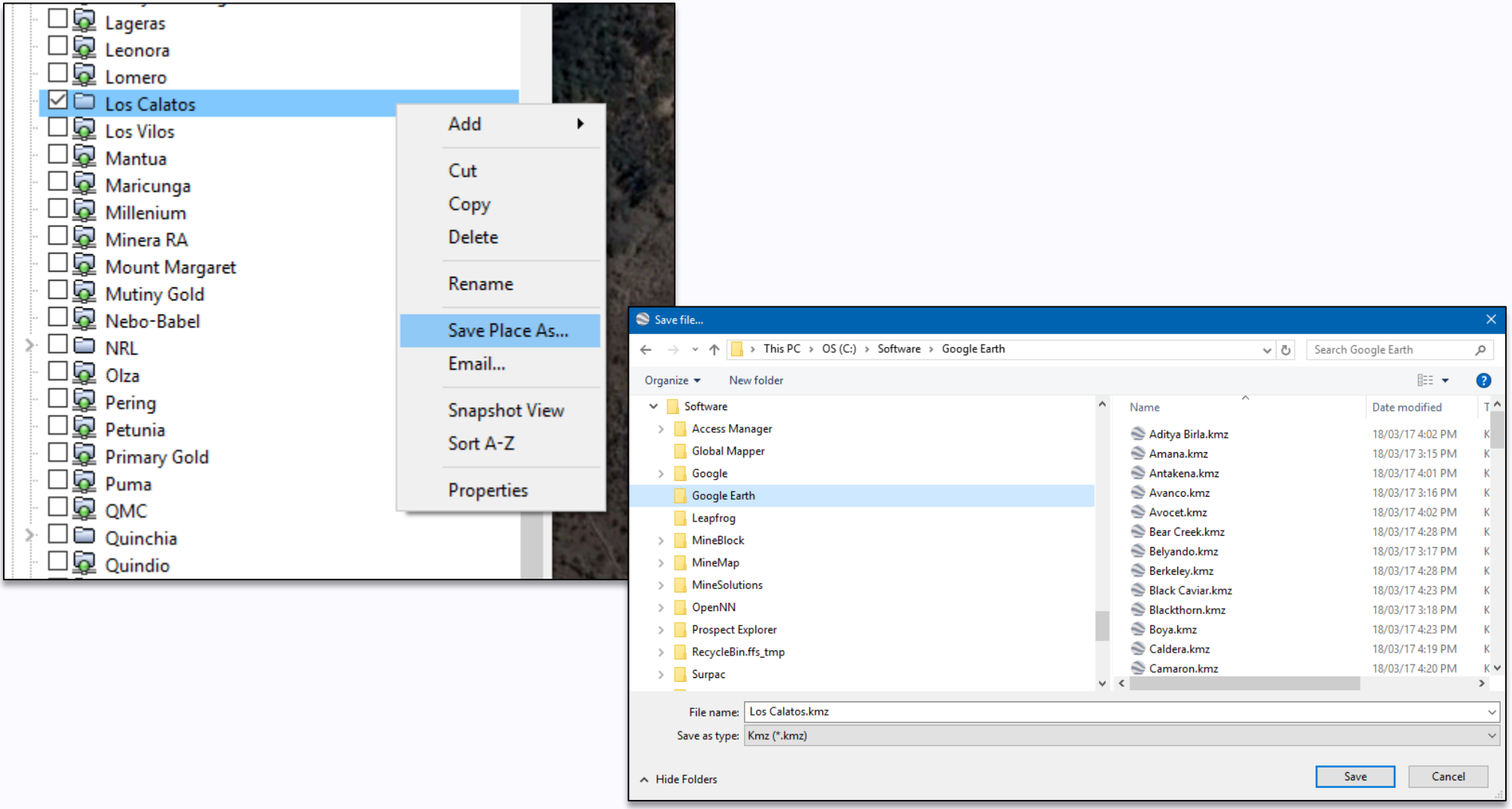
Example of project folder sub folders



Example of Geology sub files and folders



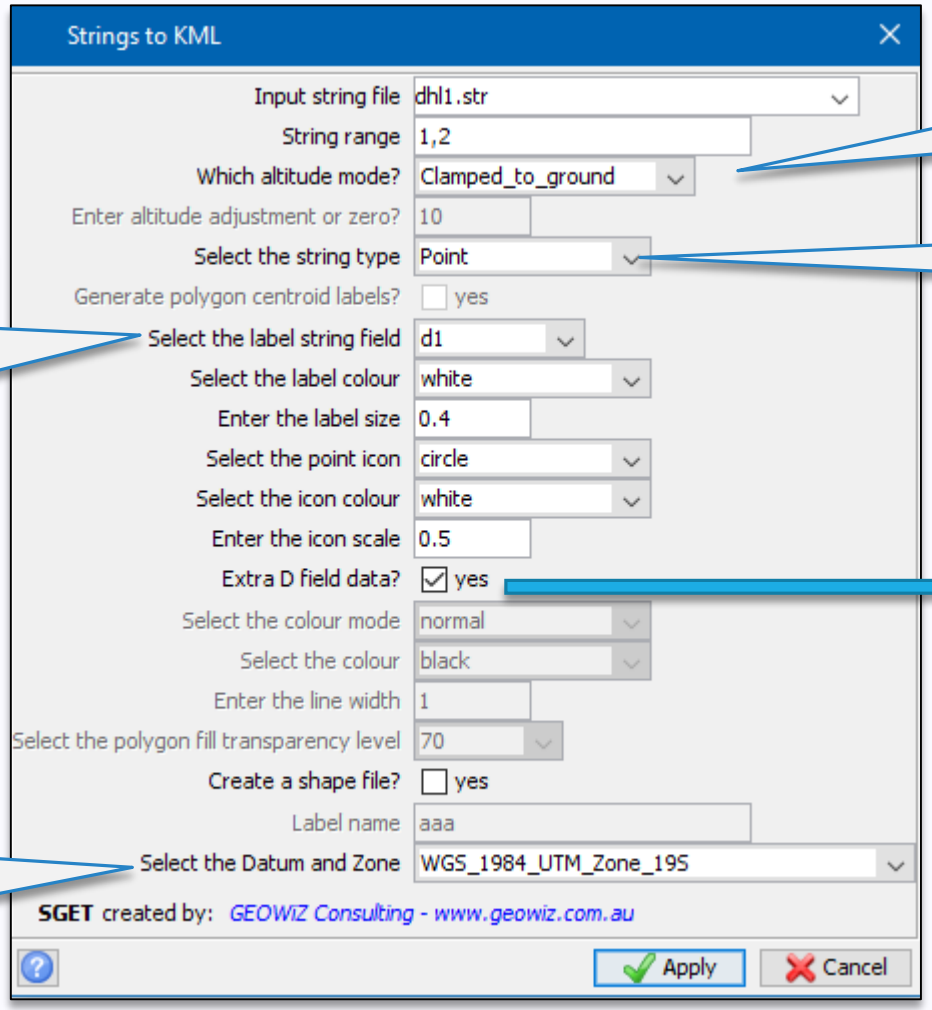
Save data at any folder level into a single kml/kmz file that can be emailed and directly opened in **Google Earth** with the same folder and file structure



What **Surpac** data can be exported to **Google Earth**?

- String spot heights – drill collars, geochem soil samples
- Open strings – drill traces, grid lines, geochem contours
- Closed strings – geology, mining tenements
- DTM's and 3DM's – waste dumps, infrastructure
- Images – anything displayed in **Surpac** Graphics
- Sections – images and strings

Exporting **Surpac** String Data to **Google Earth**

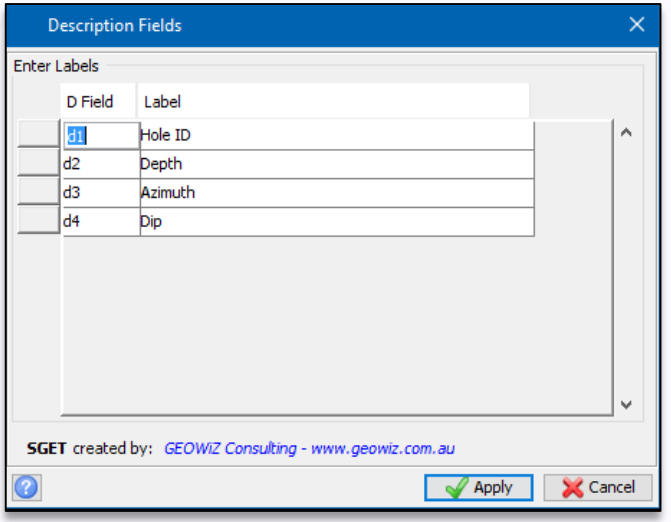


- *Absolute*
- *Clamped to the ground*
- *Relative to the ground*

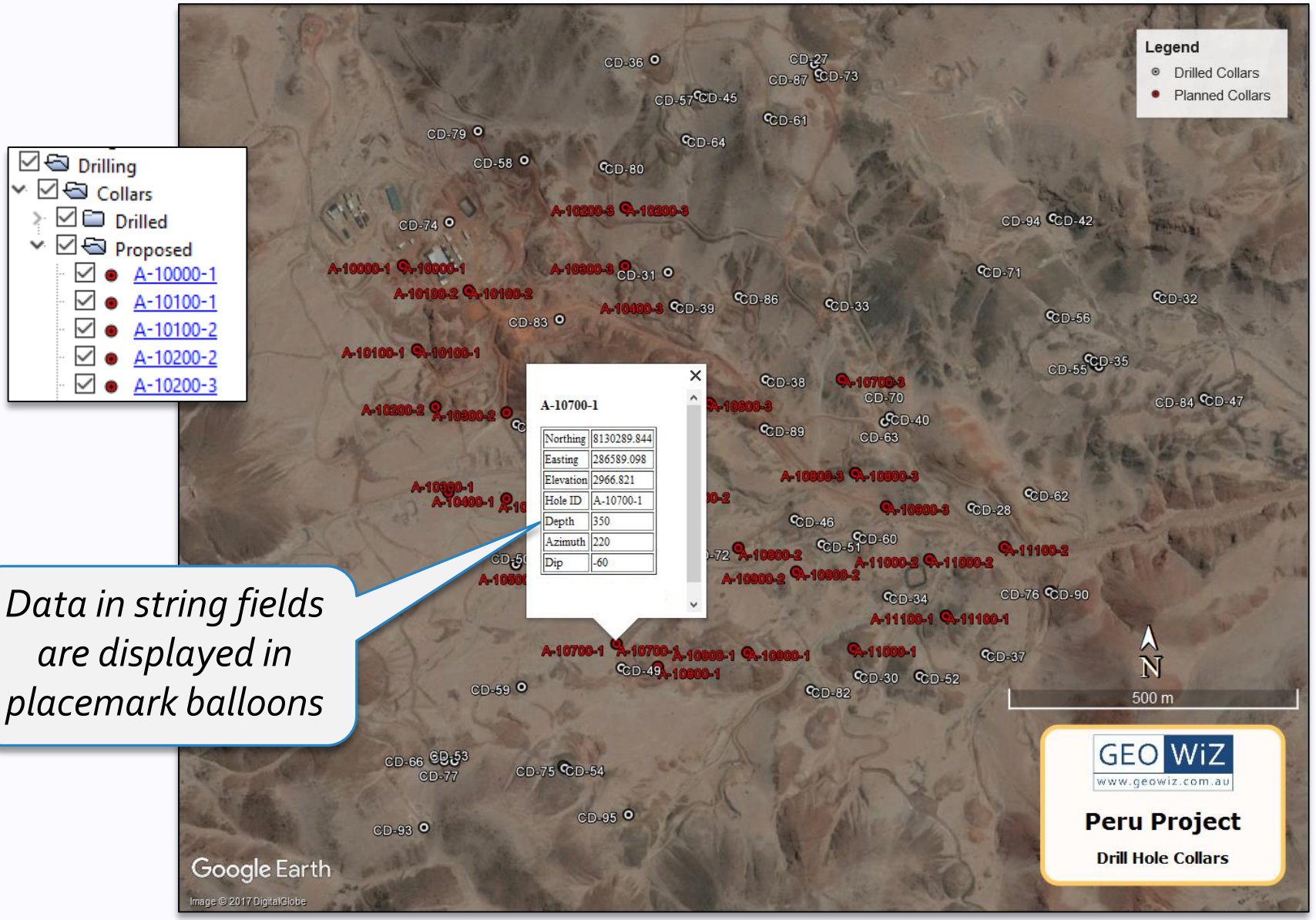
- *Point*
- *Line*
- *Polygon*

Select the string field to use as the label

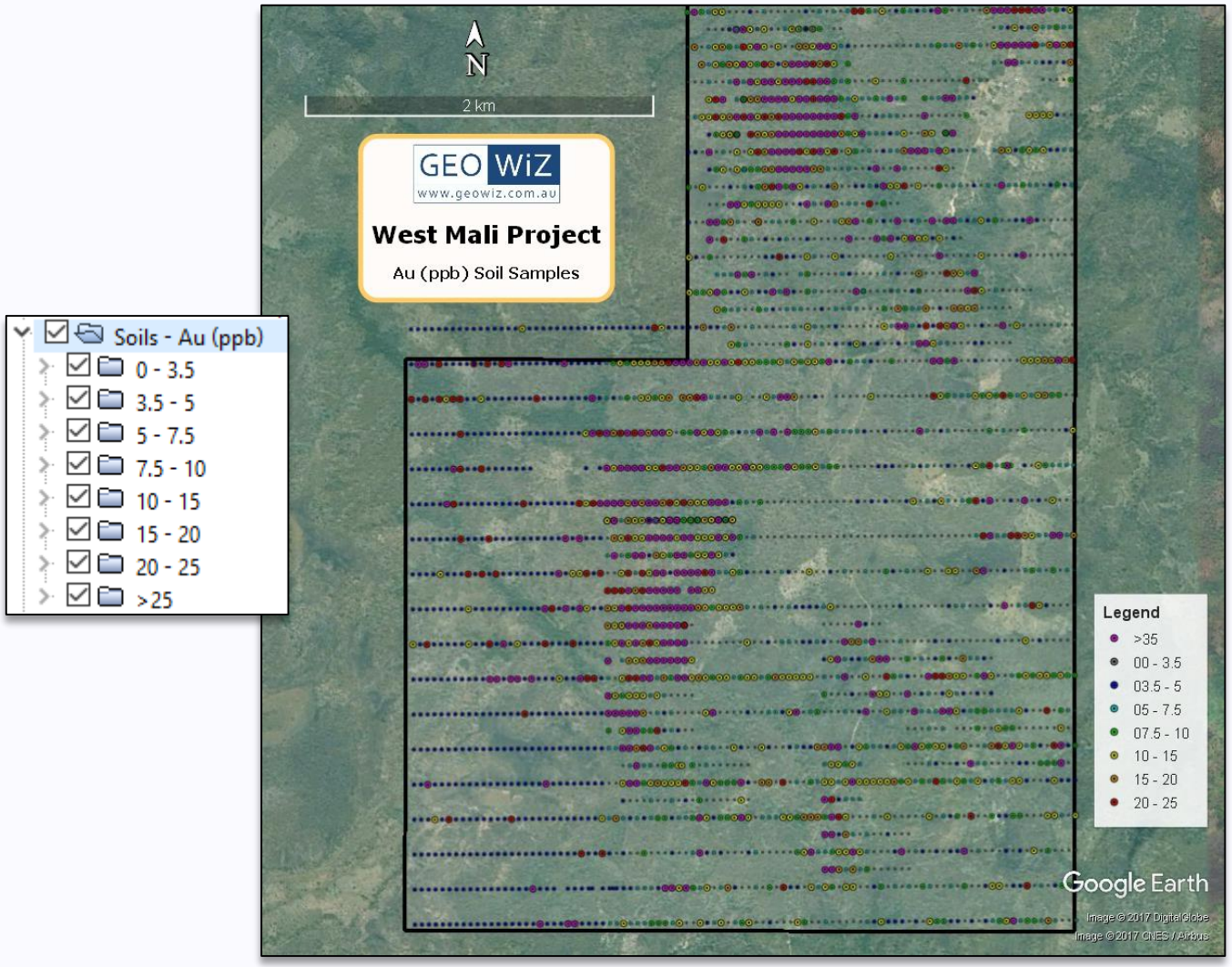
Select the Datum and Zone



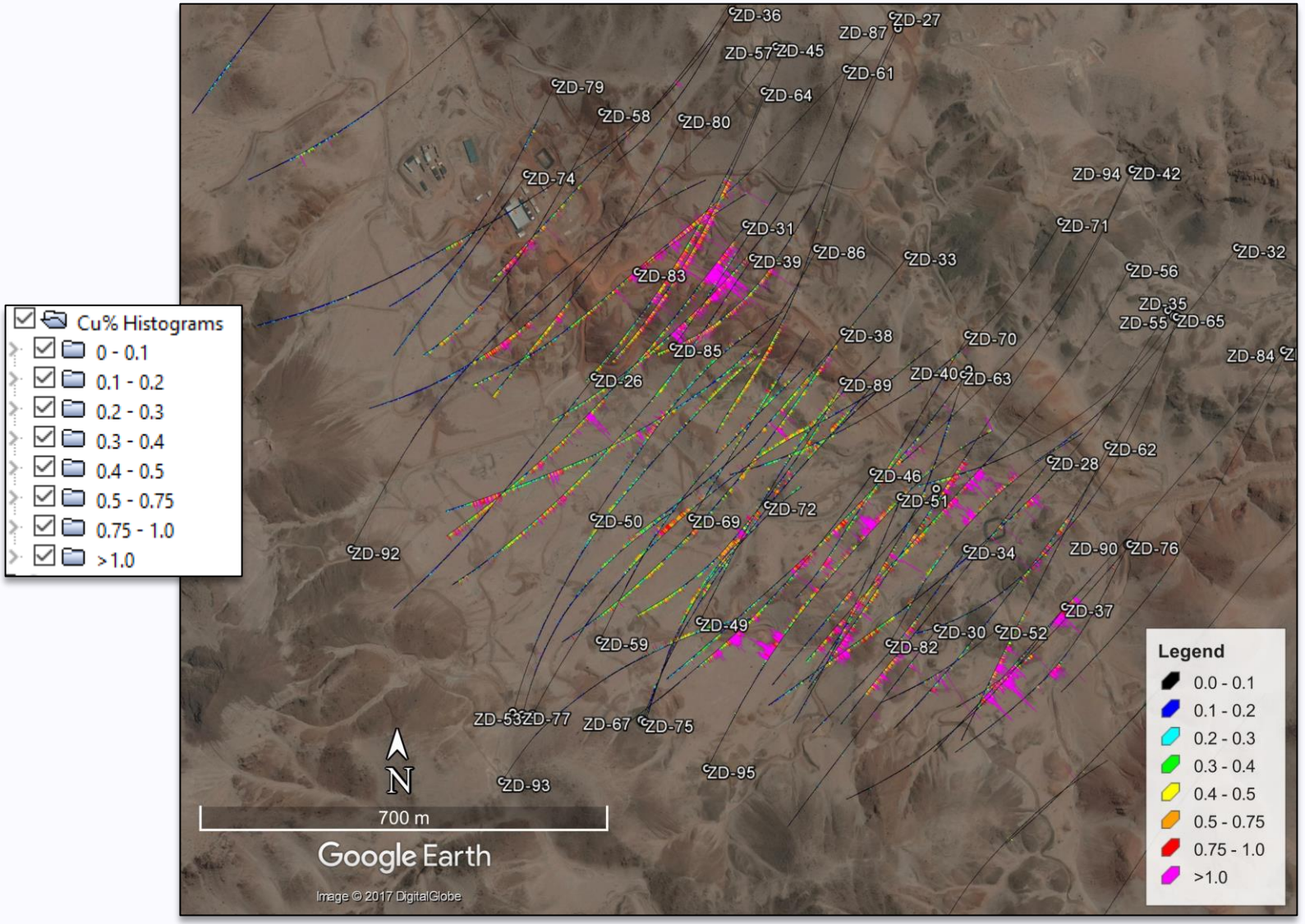
Points - drill hole collars – *Database-Extract-Drill hole layout*



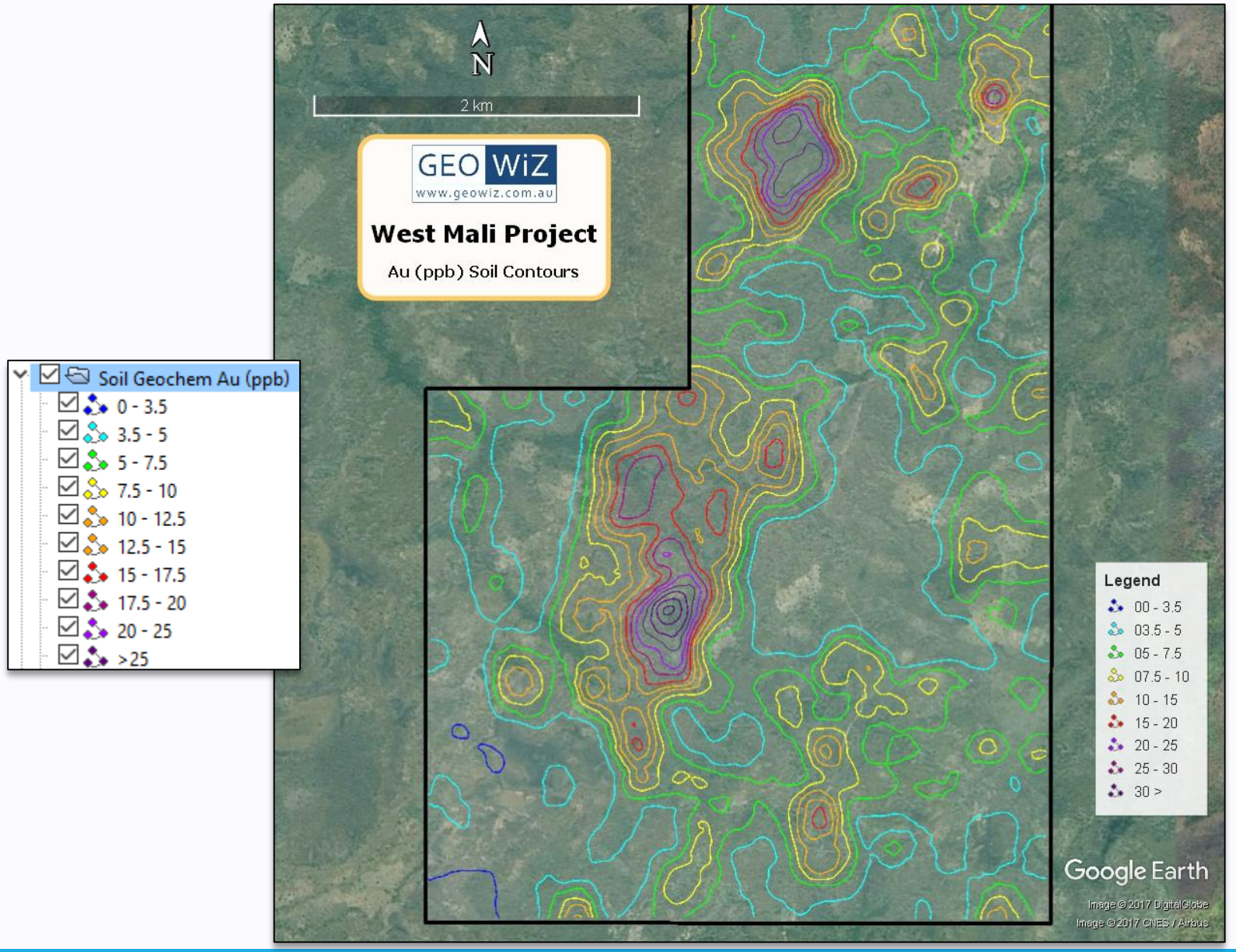
Geochem points classified in **Surpac** – *File Tools-Classify strings by numbers* each string number comes into **Google Earth** in separate folders so the properties can be changed for each class



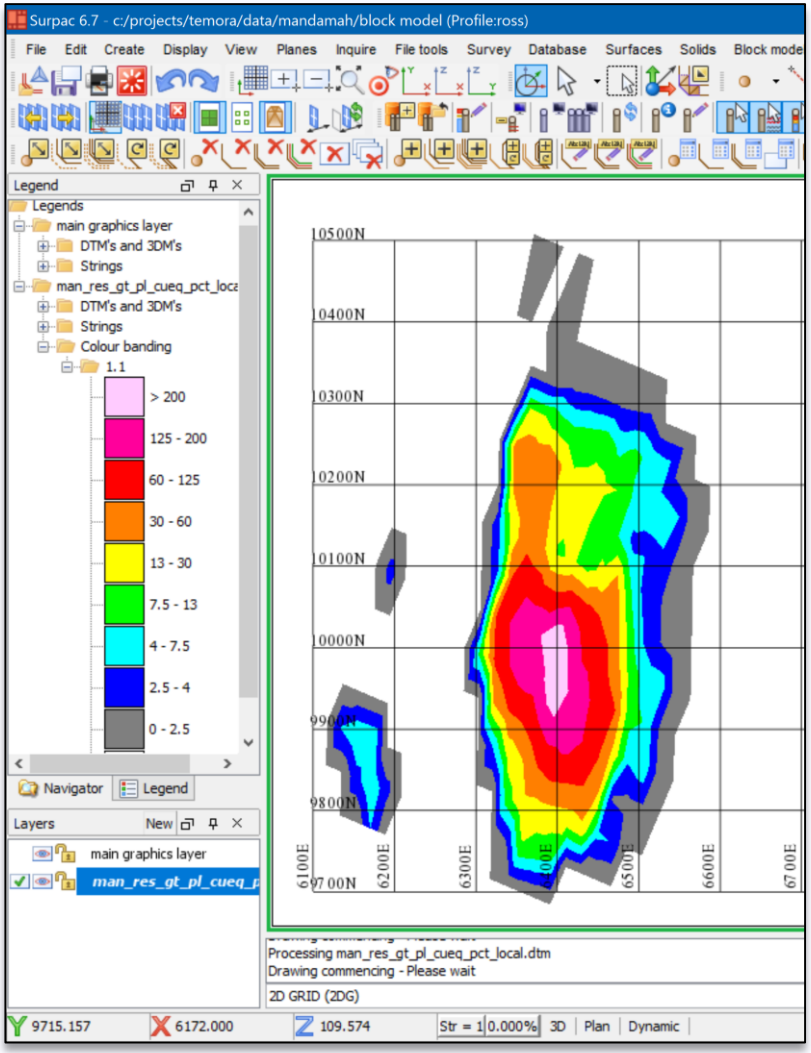
Lines - drill hole traces and Cu assays histograms from **Surpac –** *Database-Extract-Plans for plotting*

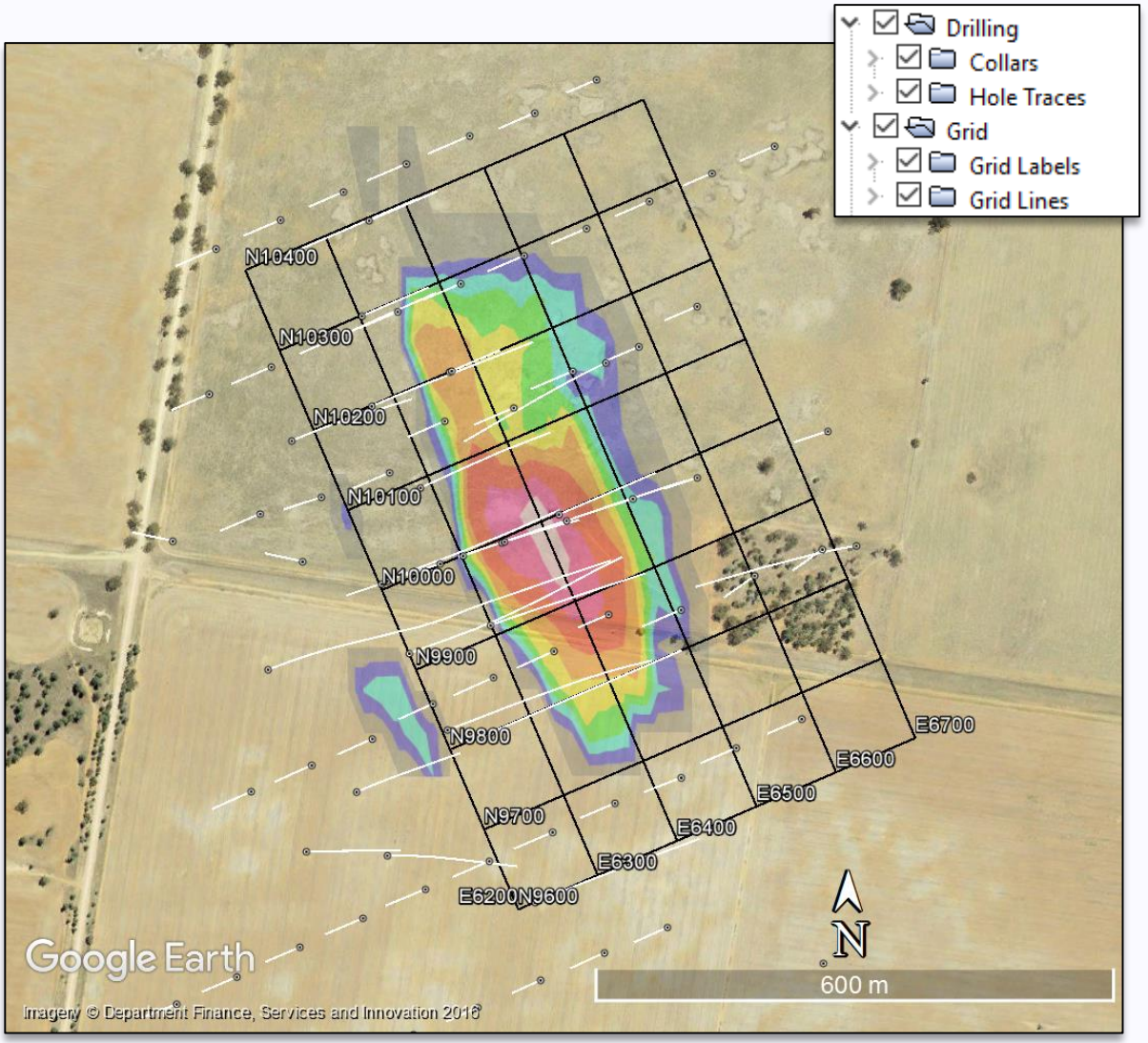


Lines – soil geochem contours generated in **Surpac**

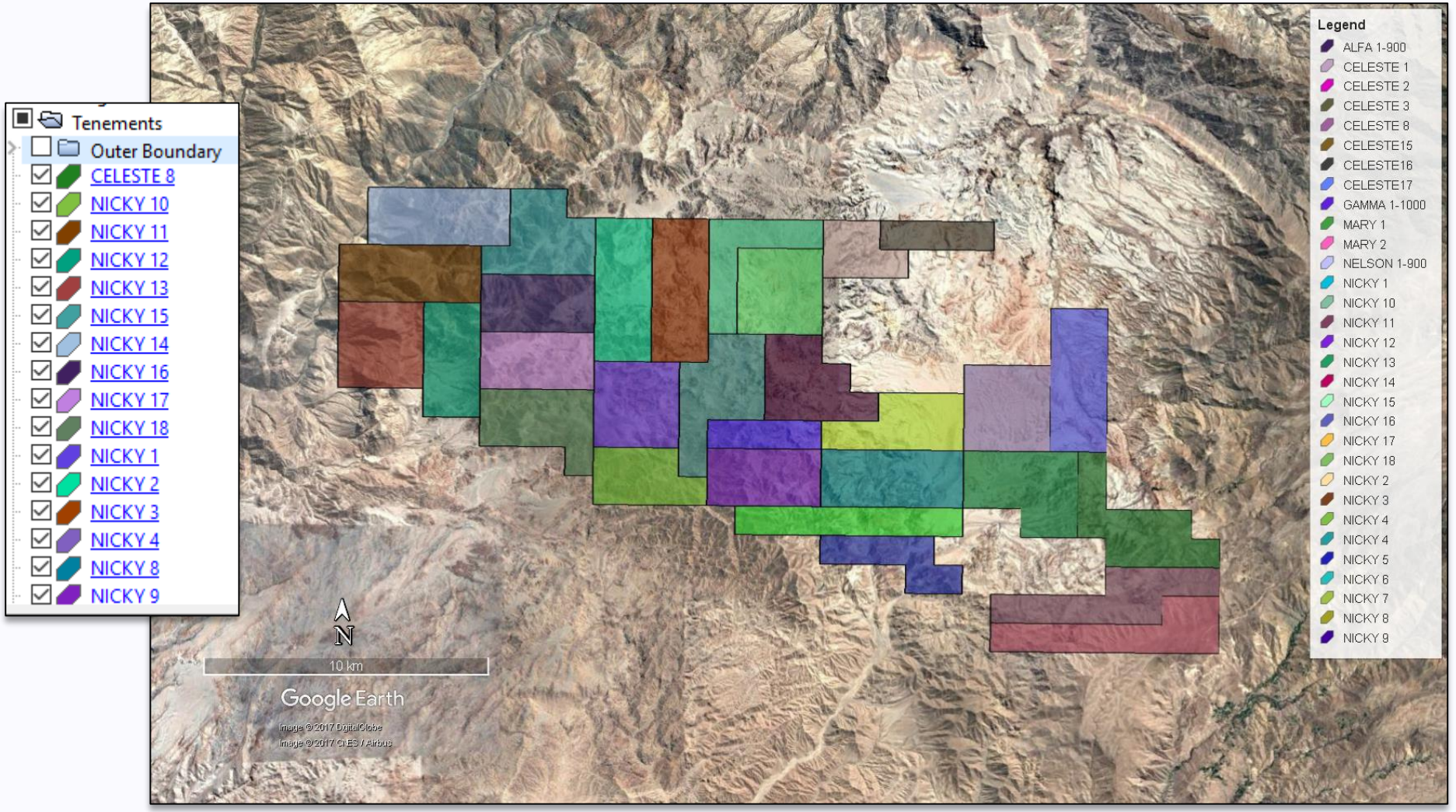


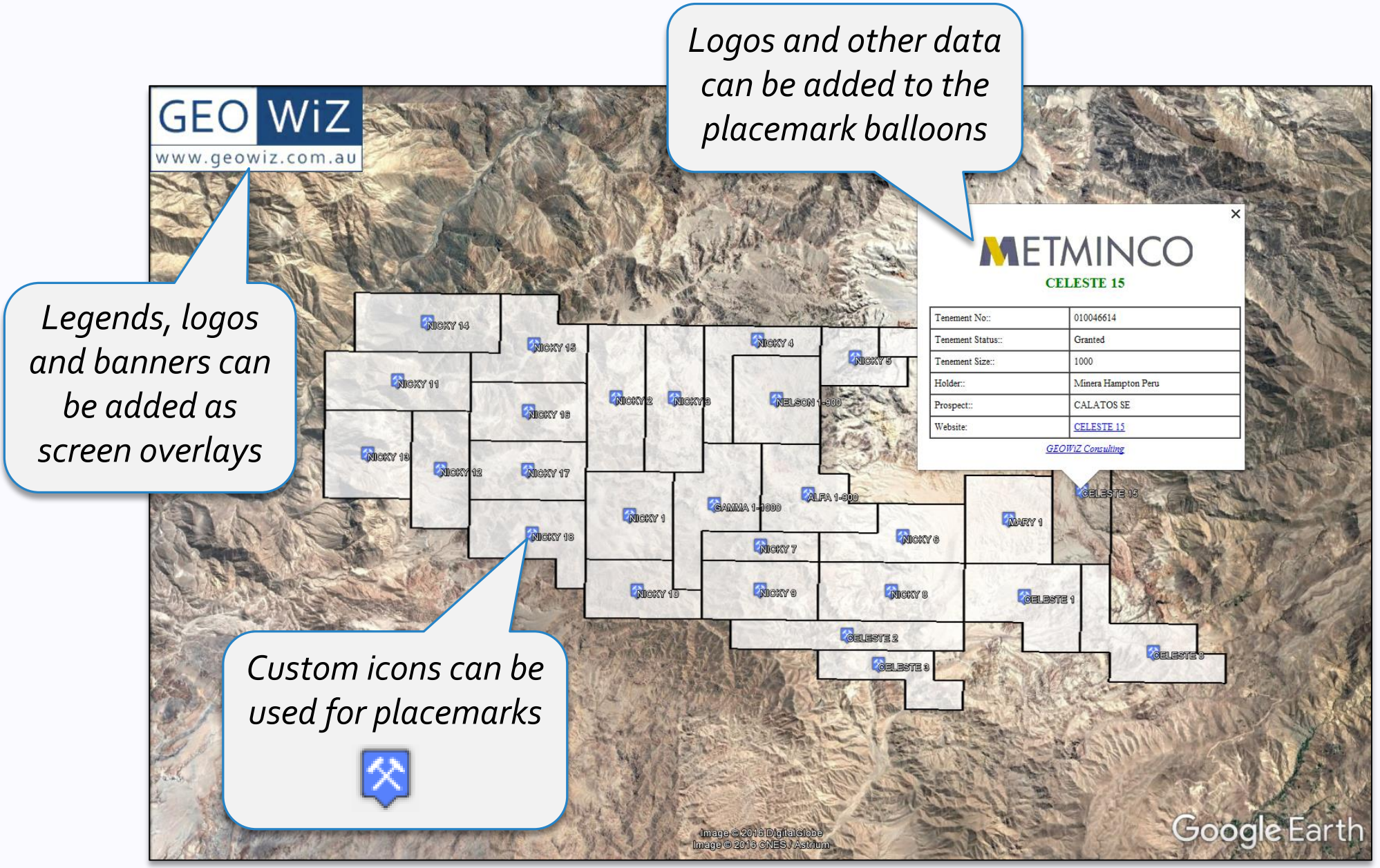
Lines - local grid line strings and labels automatically generated in **Surpac** and exported to Google earth



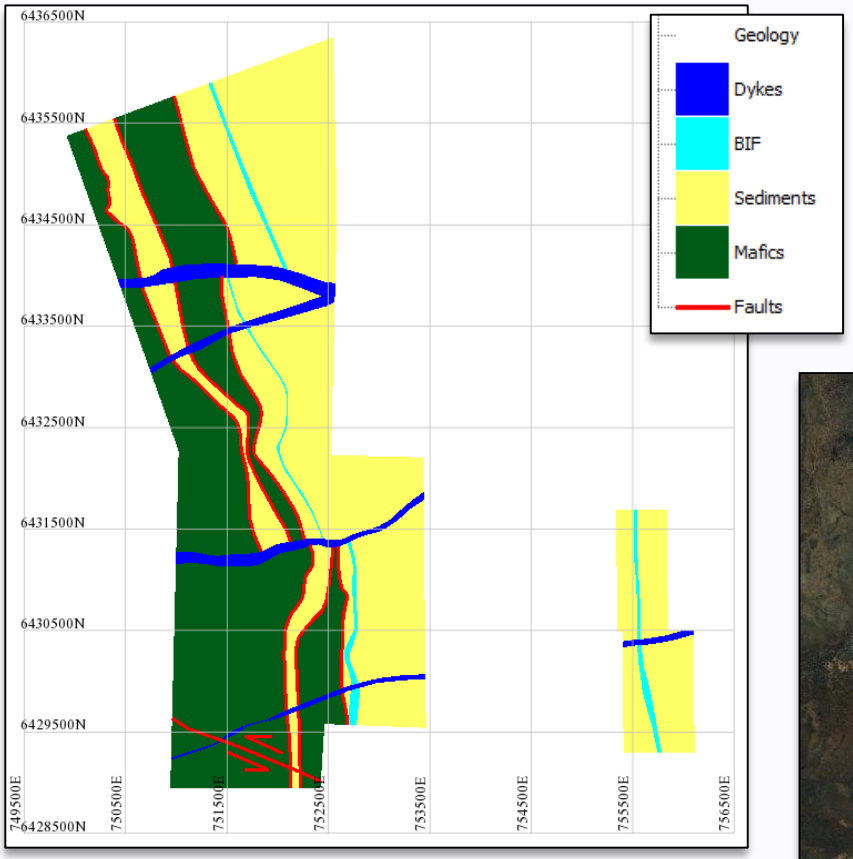


Polygons - closed tenement strings exported from **Surpac** with D1 field containing tenement name

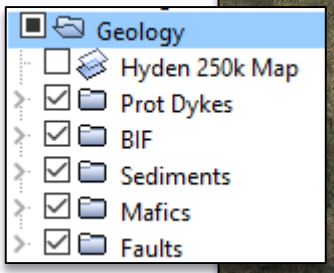


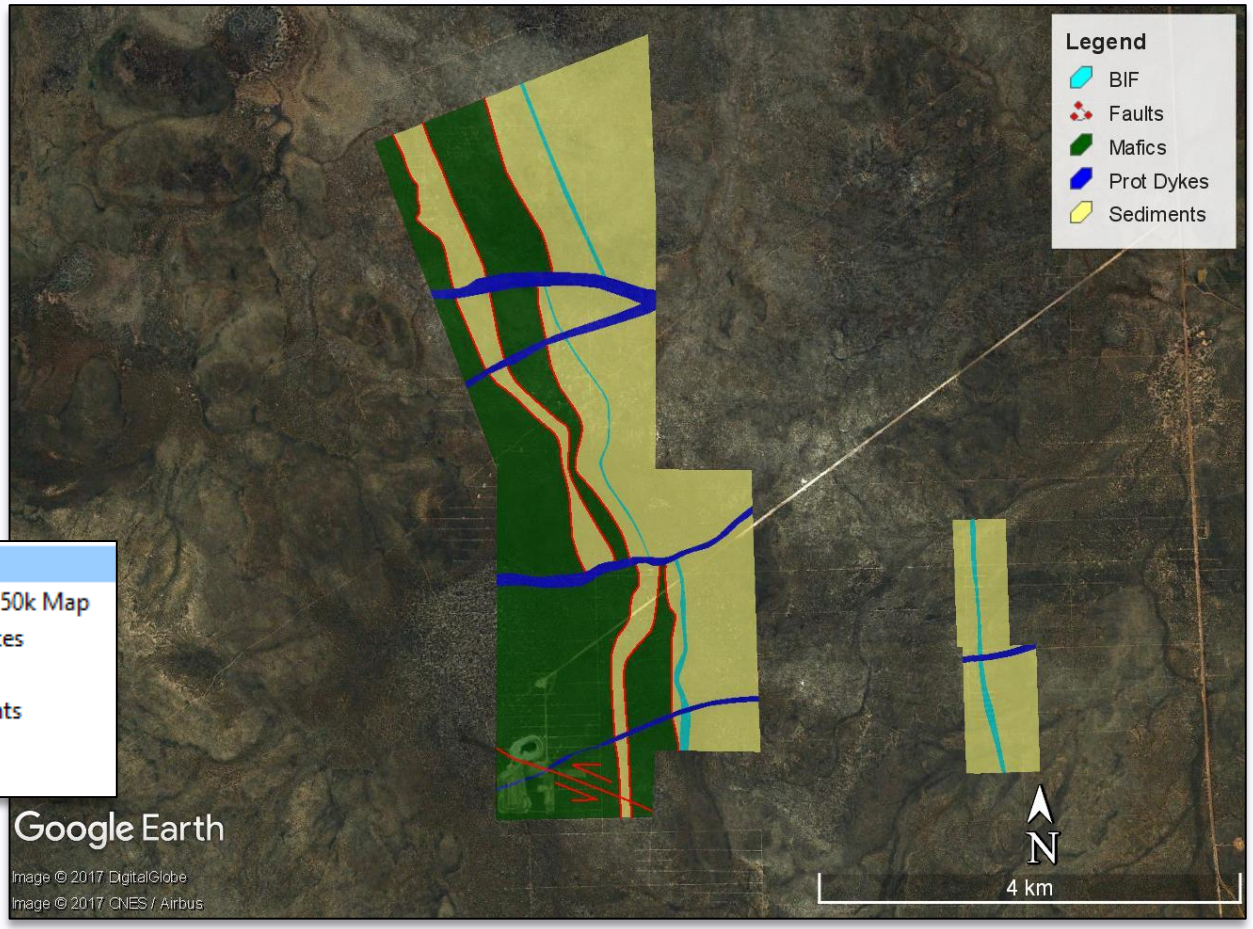

Logos and other data can be added to the placemark balloons
Legends, logos and banners can be added as screen overlays
Custom icons can be used for placemarks
GEO WiZ
www.geowiz.com.au
METMINCO
CELESTE 15
Tenement No:: 010046614
Tenement Status:: Granted
Tenement Size:: 1000
Holder:: Minera Hampton Peru
Prospect:: CALATOS SE
Website: CELESTE 15
GEOWiZ Consulting
NICKY 14
NICKY 15
NICKY 11
NICKY 16
NICKY 13
NICKY 12
NICKY 17
NICKY 18
NICKY 1
NICKY 2
NICKY 3
NICKY 4
NICKY 5
NELSON 1-900
ALFA 1-900
GAMMA 1-1000
NICKY 7
NICKY 6
NICKY 10
NICKY 9
NICKY 8
MARY 1
CELESTE 15
CELESTE 1
CELESTE 2
CELESTE 3
CELESTE 4
Image © 2013 DigitalGlobe
Image © 2013 CNES / Astrium
Google Earth

Polygons - closed geology strings and fault lines

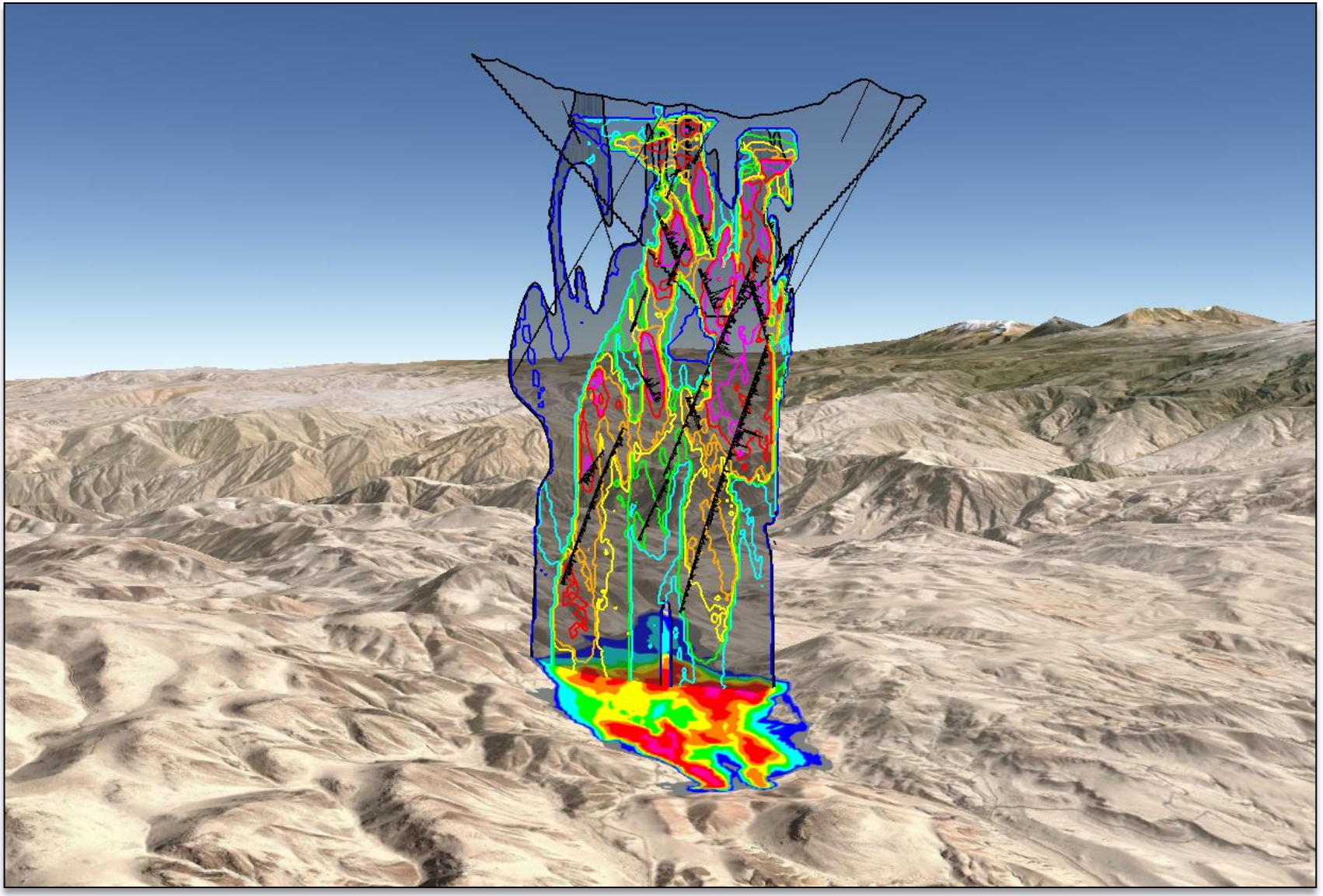


Surpac Graphics

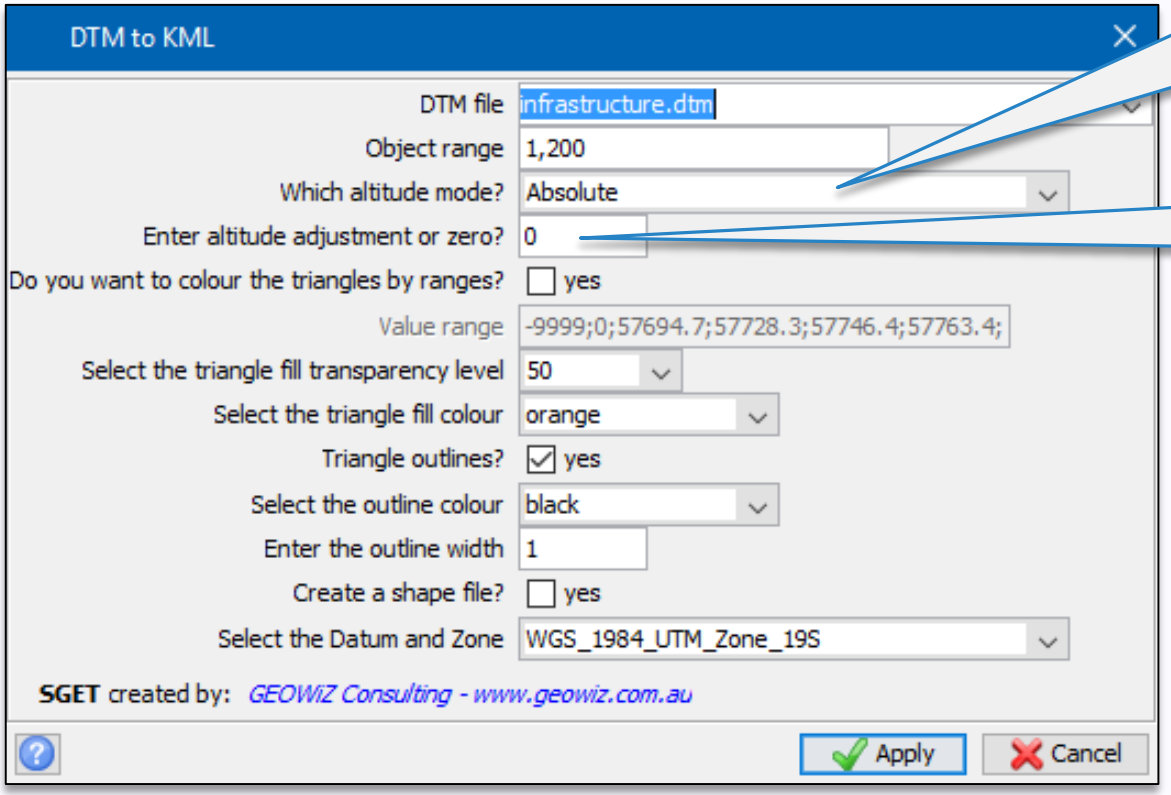




Lines & polygons – section strings generated in **Surpac**



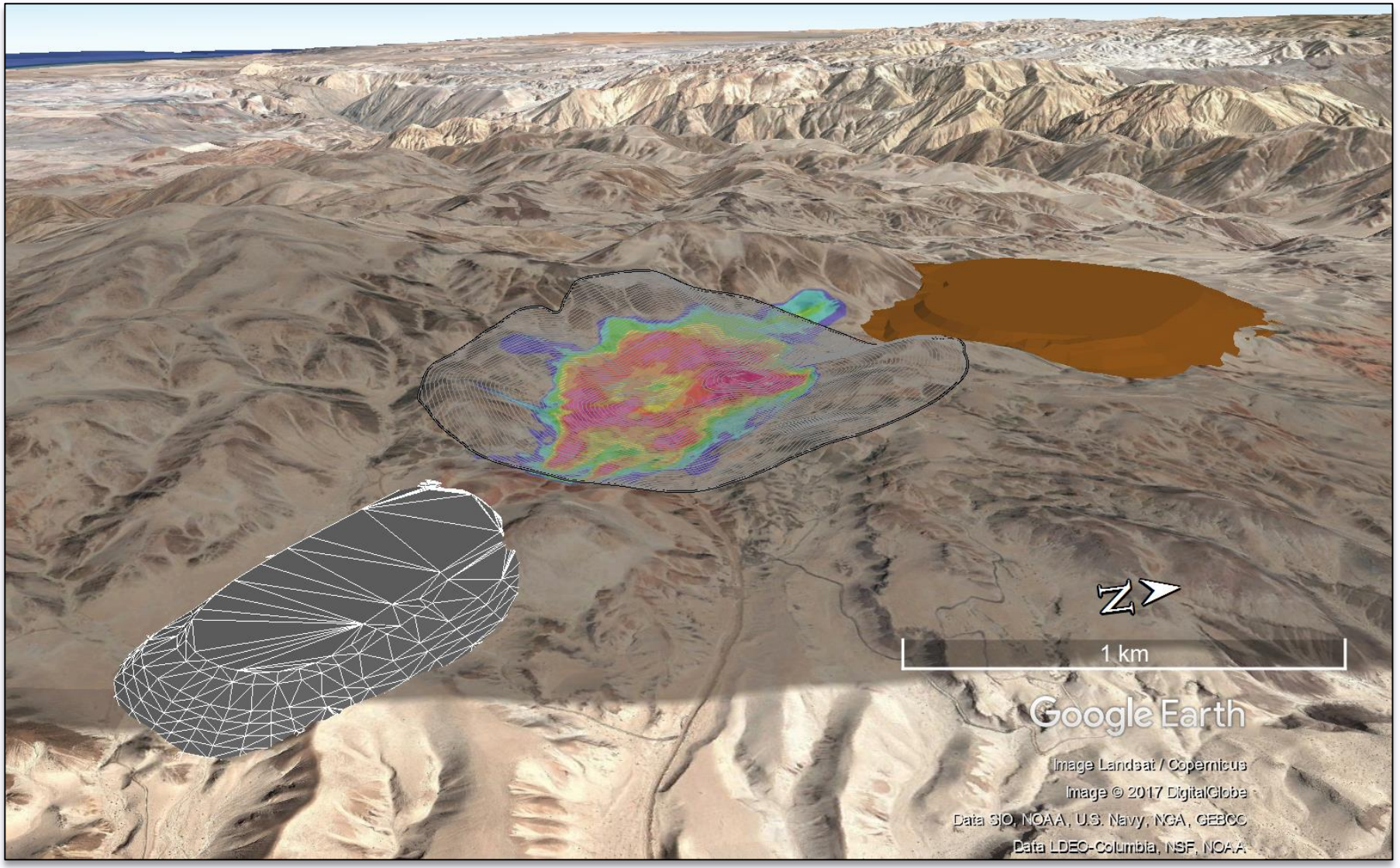
Exporting **Surpac** DTM/3DM data to **Google Earth**



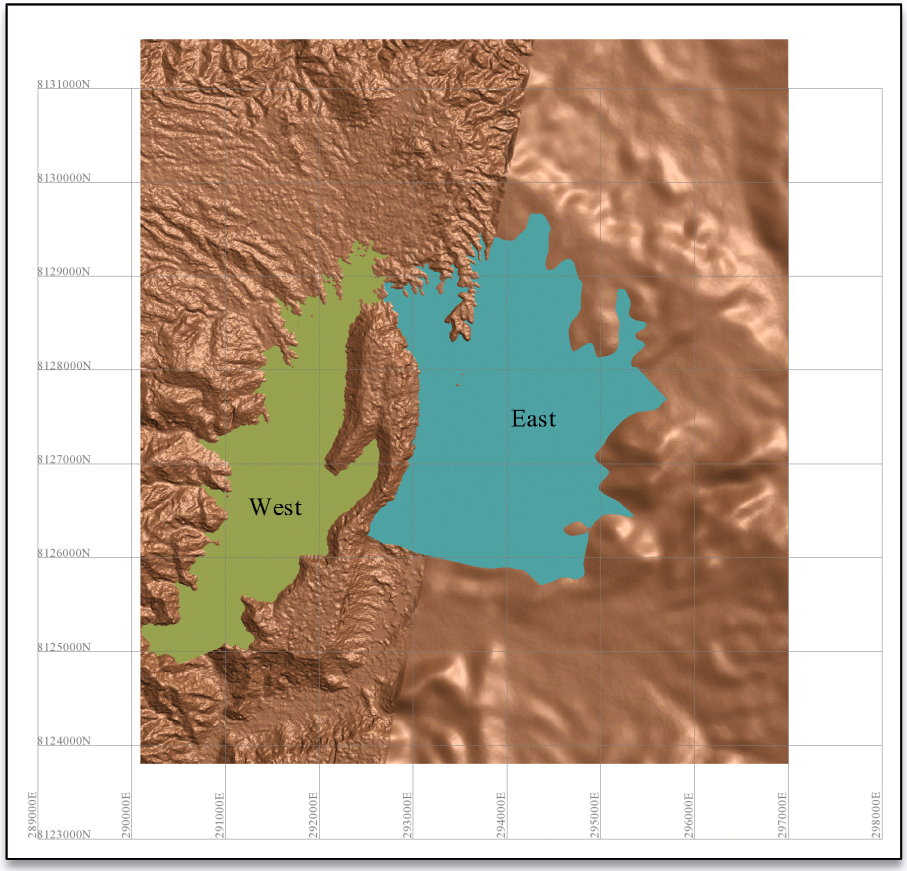
- *Absolute*
- *Clamped to the ground*
- *Relative to the ground*
- *Relative to minimum z*

Altitude adjustment if required

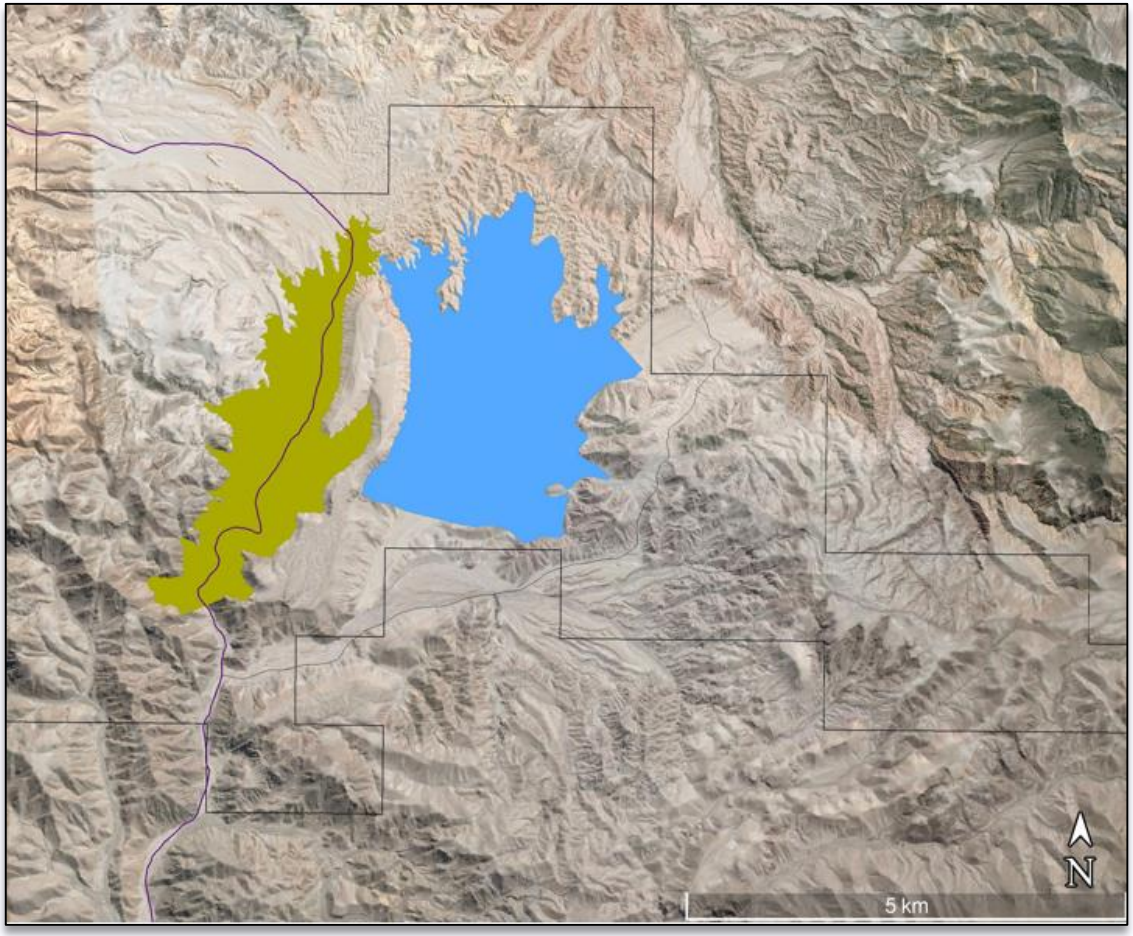
DTM's – waste dump and stockpile DTM's created in **Surpac**



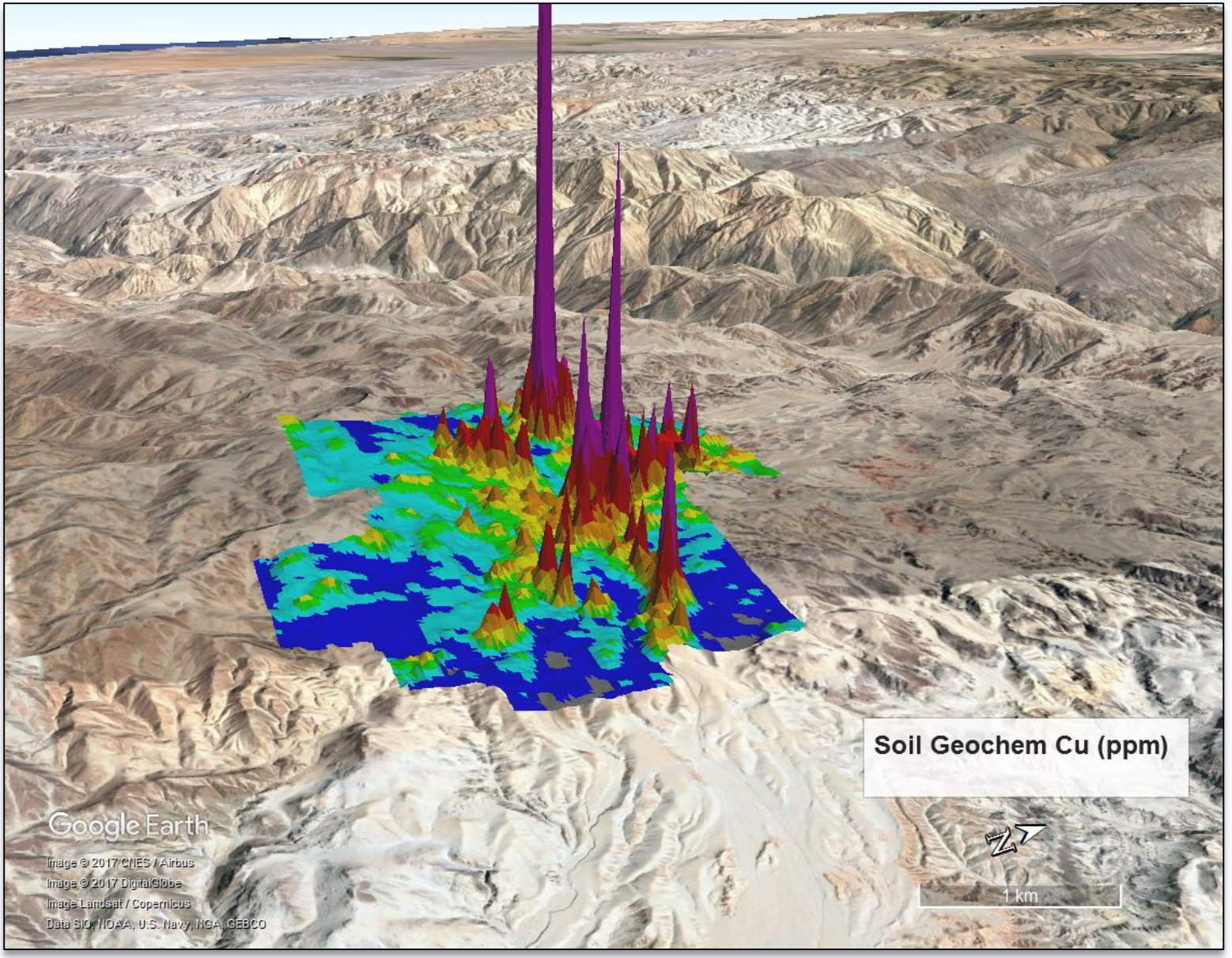
DTM's – tailings dams designed in **Surpac**



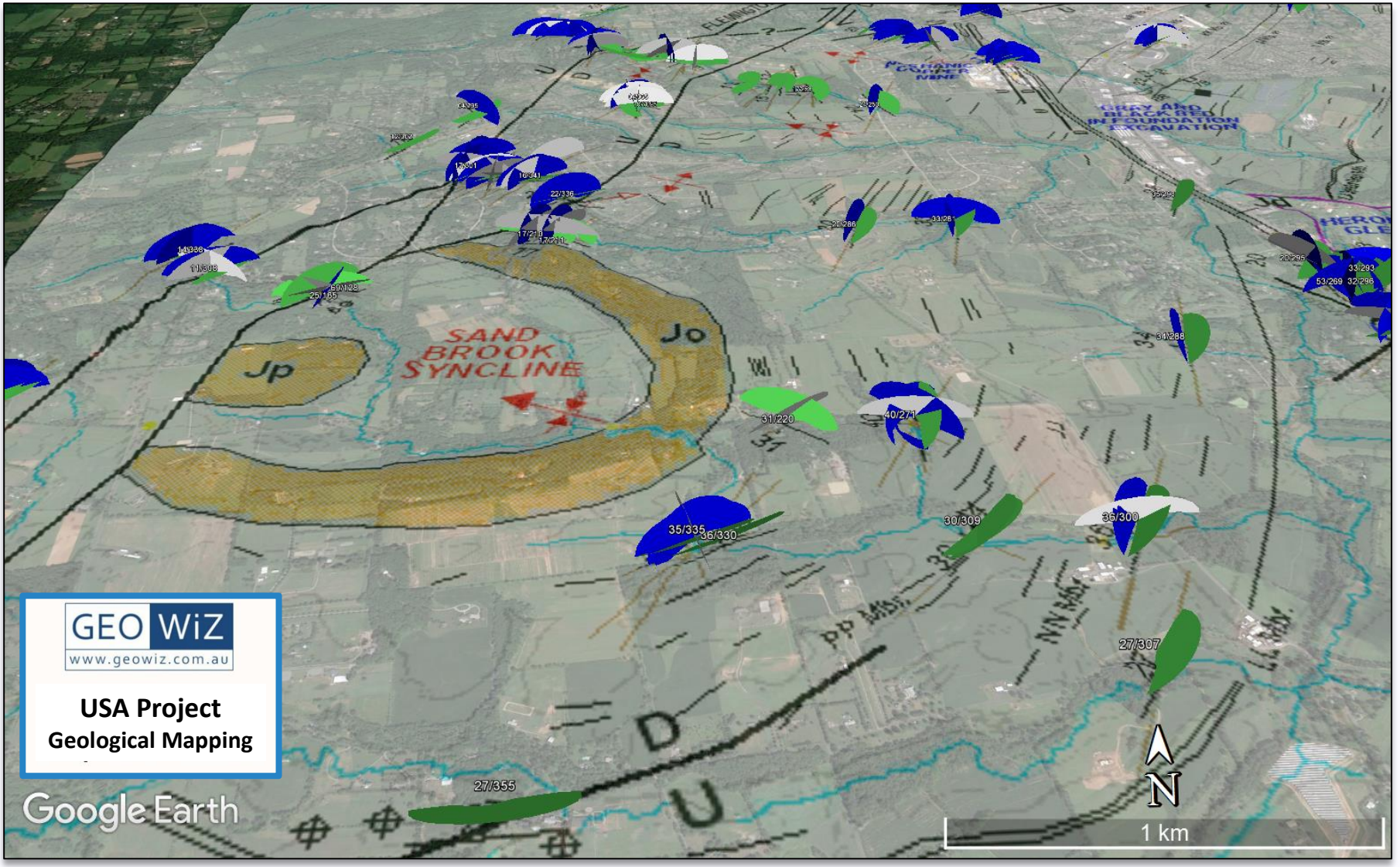
Surpac Graphics



DTM's – soil geochem surface generated in **Surpac**

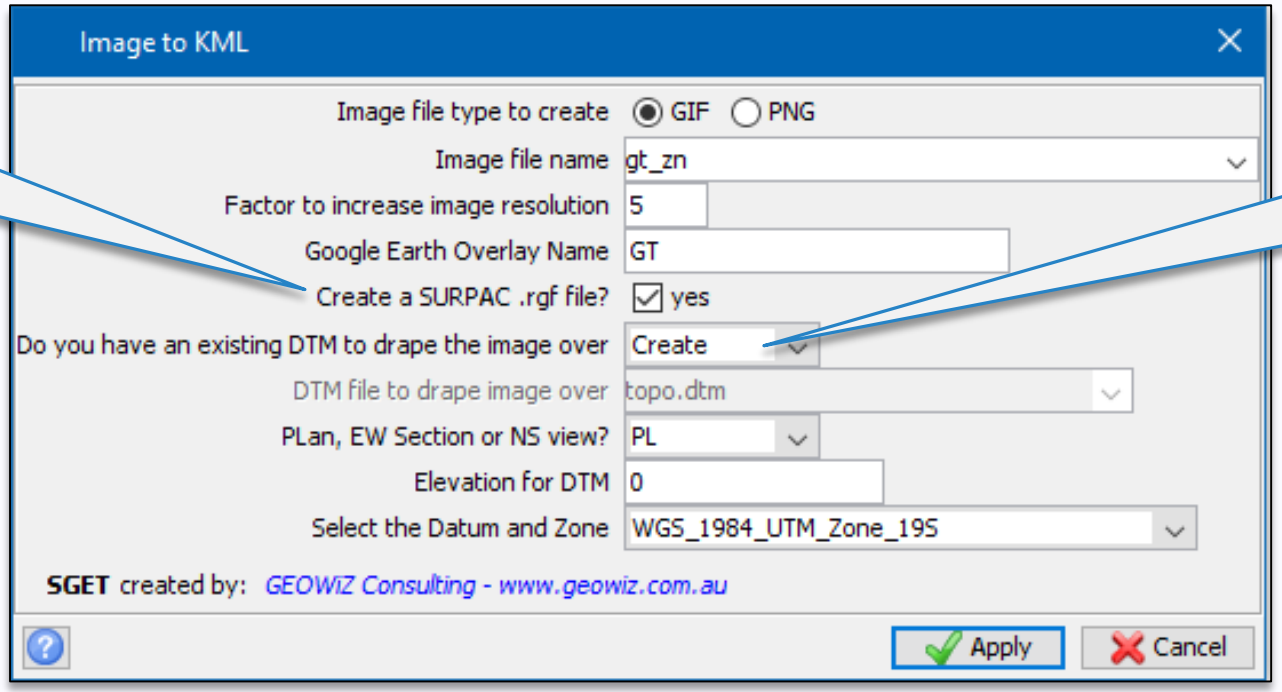


DTM's – structural dip planes generated in **Surpac**



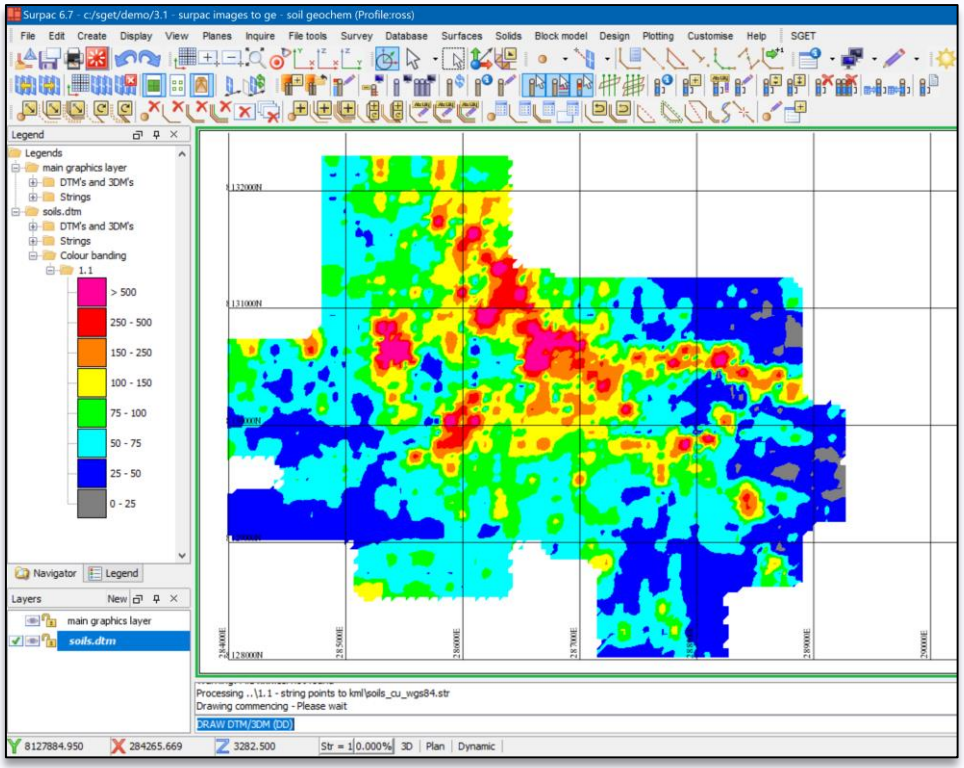
Exporting **Surpac** screen images to **Google Earth**

*Option to create a **Surpac** RGF file at the same time*

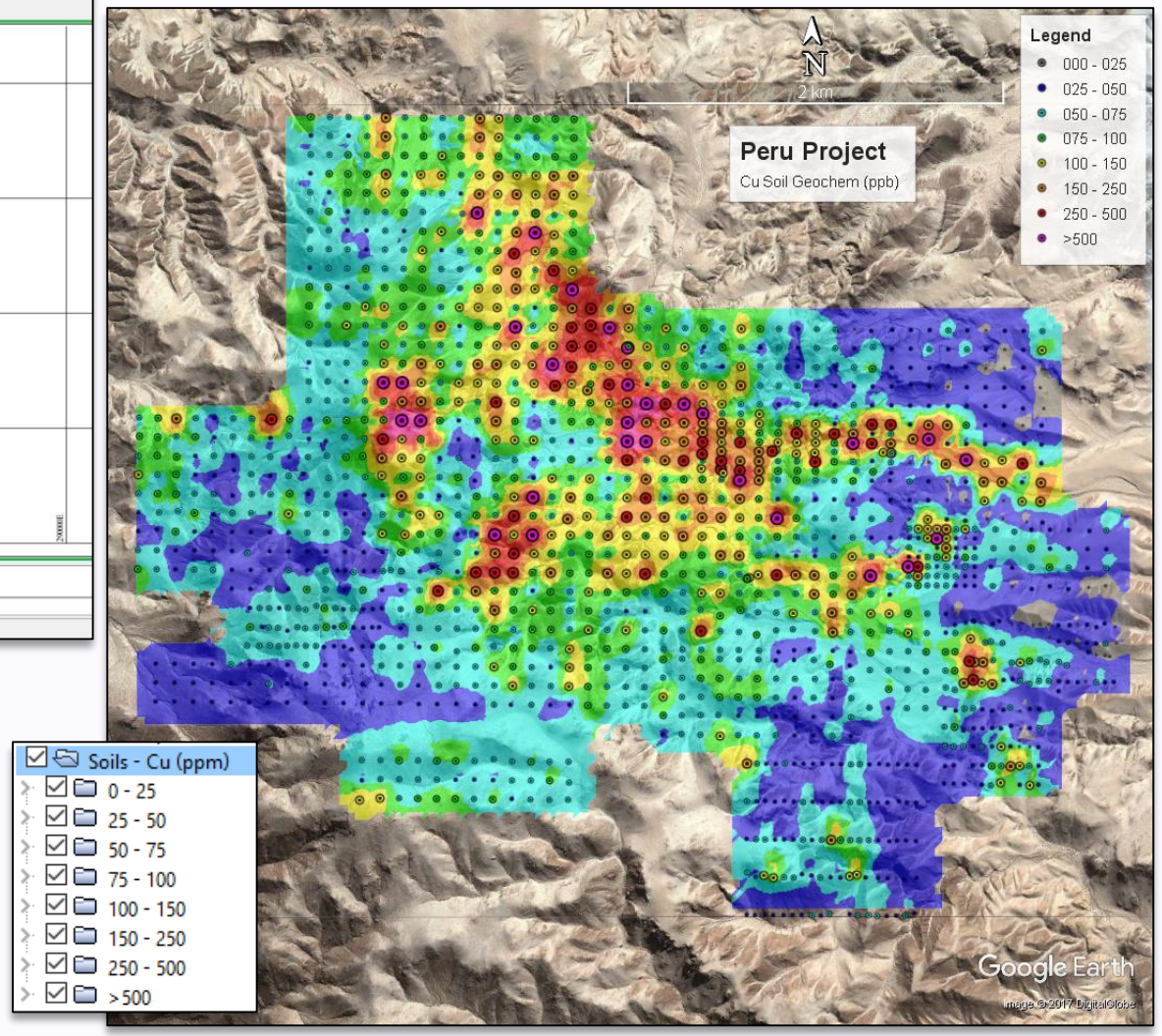


Create DTM or Drape over DTM

Images – Geochem surface with colour banding from **Surpac**

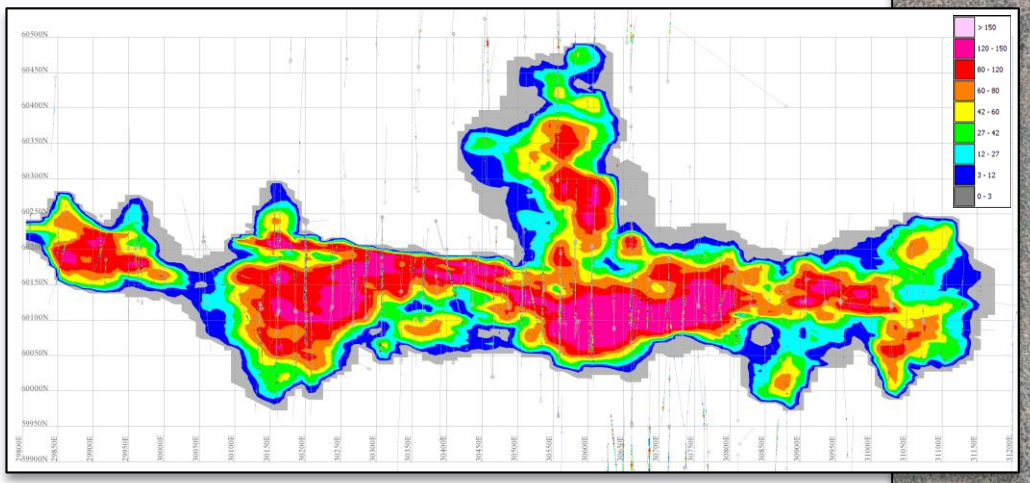


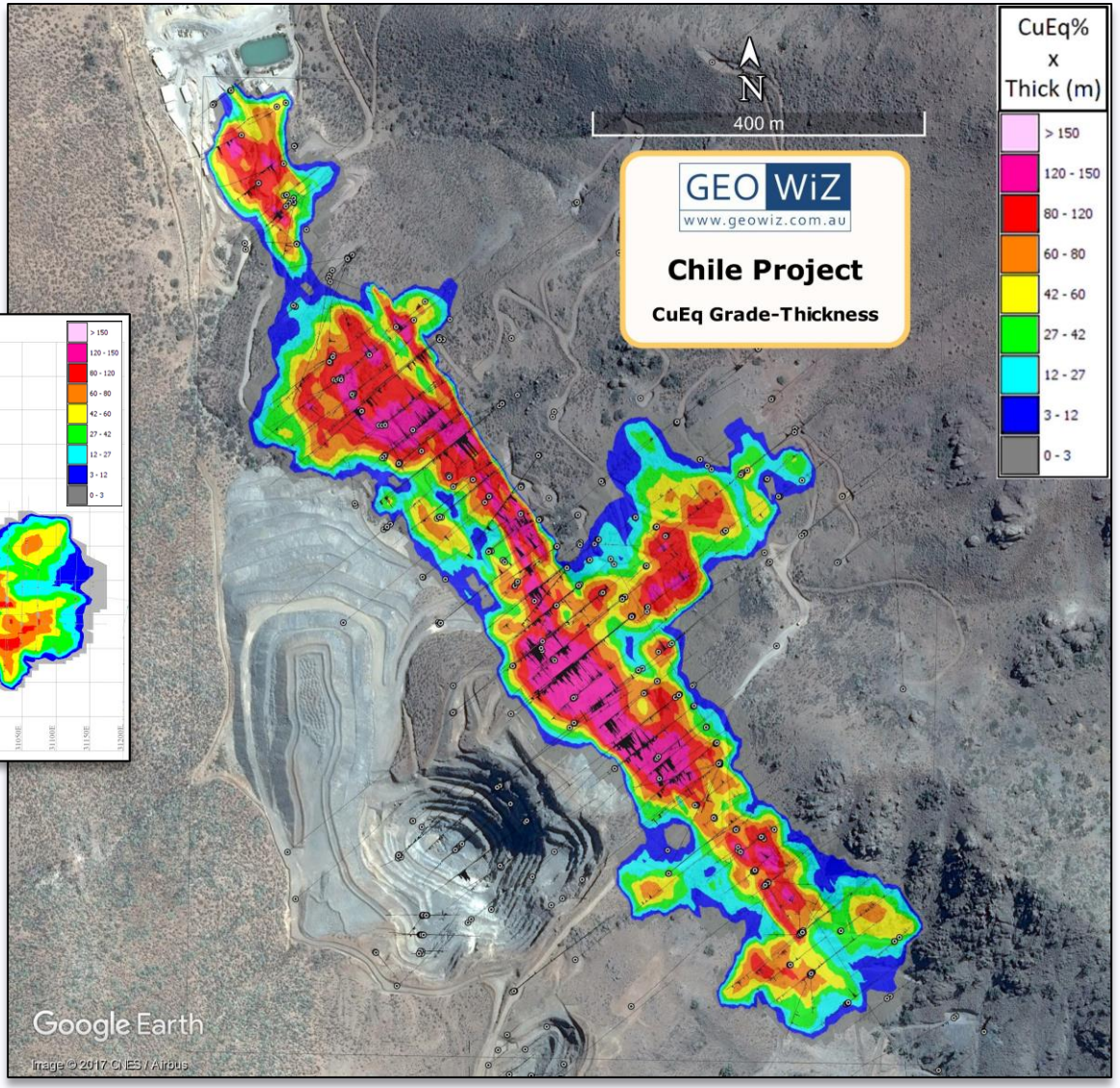
Surpac Graphics



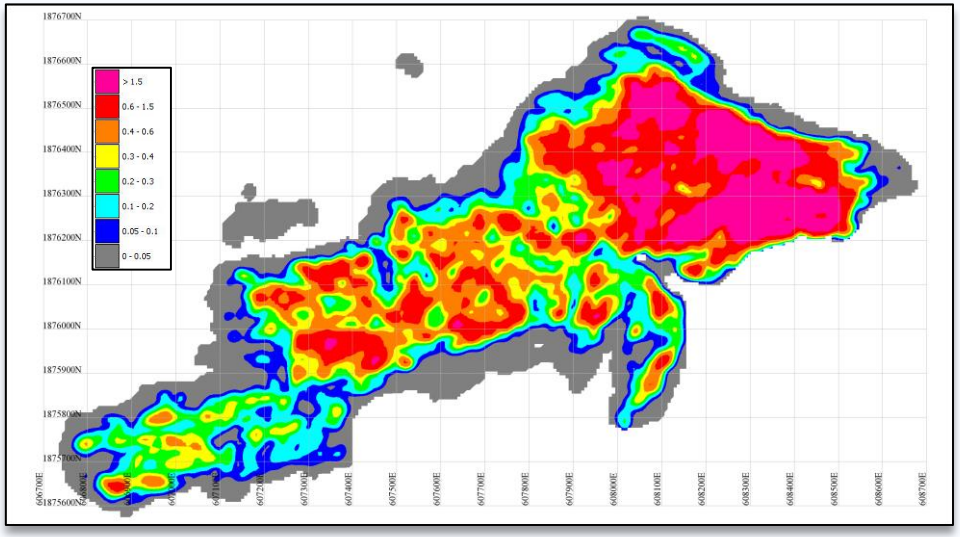
Images – Block model grade-thickness with colour banding image and legend from **Surpac**

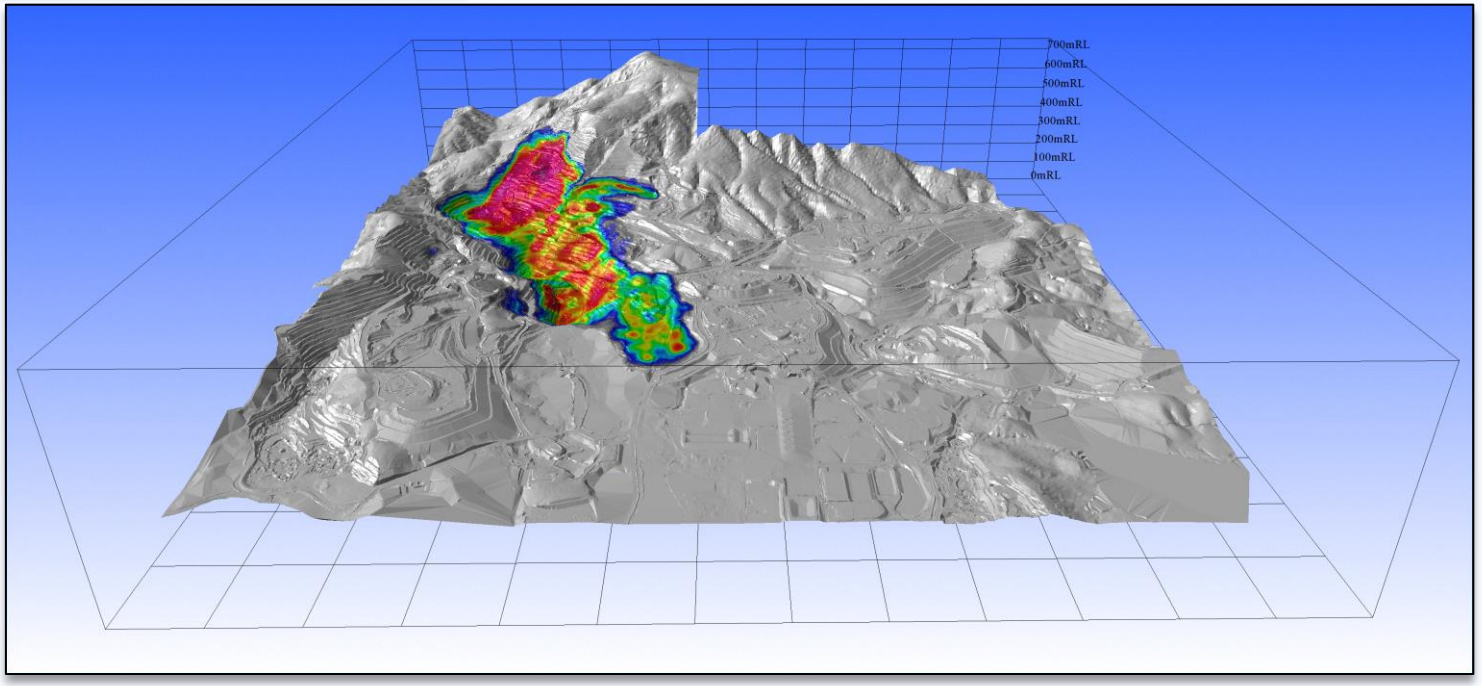
Surpac Graphics



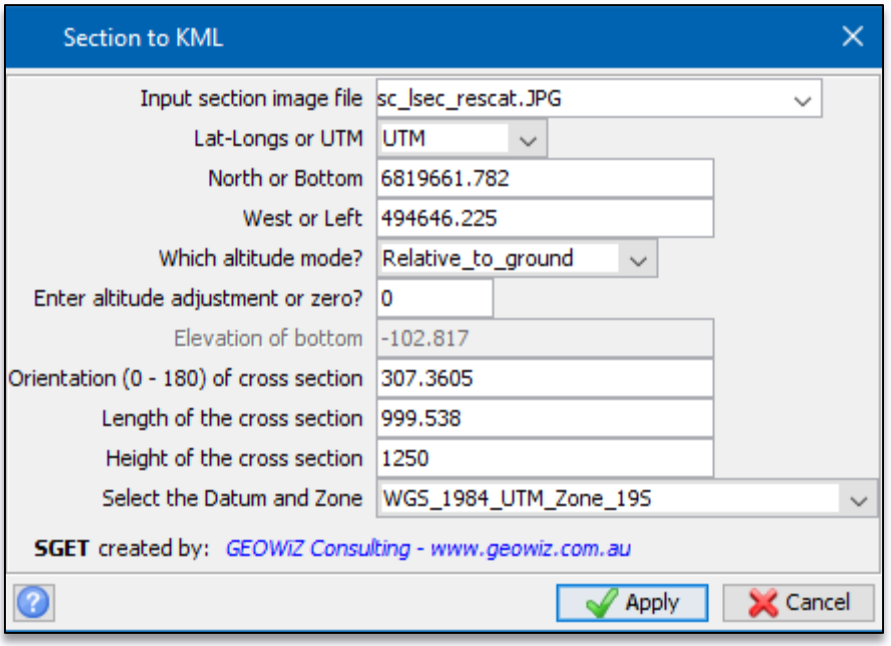


When exporting images, option is provided to drape over topography in **Surpac**

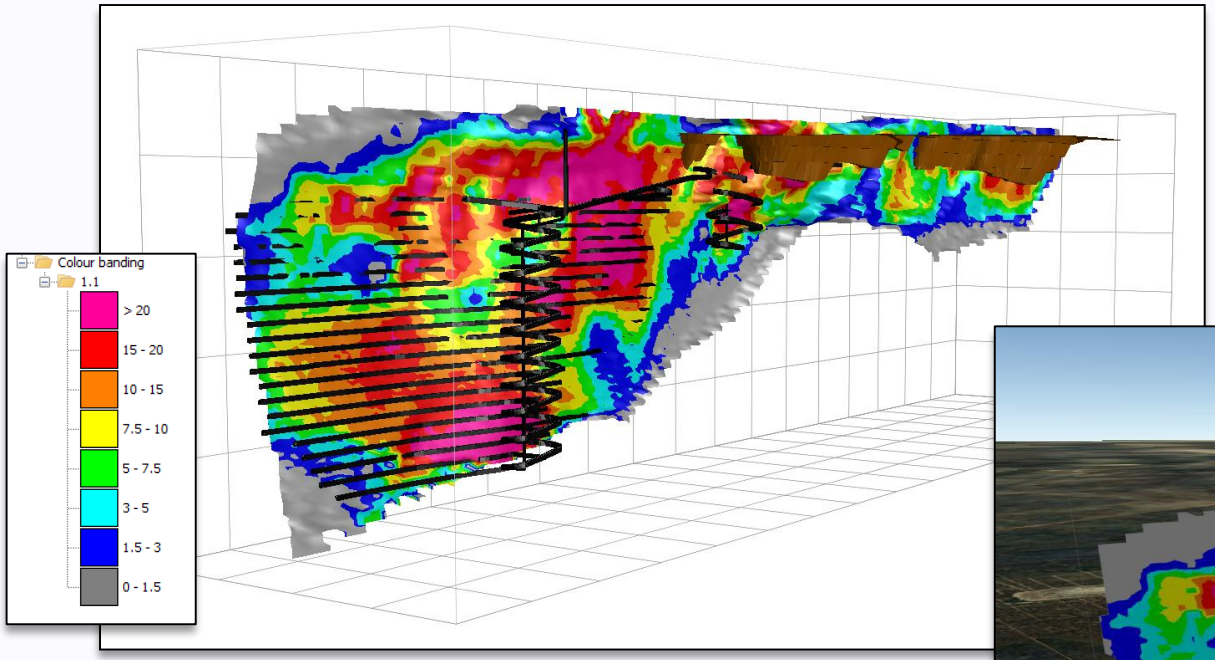




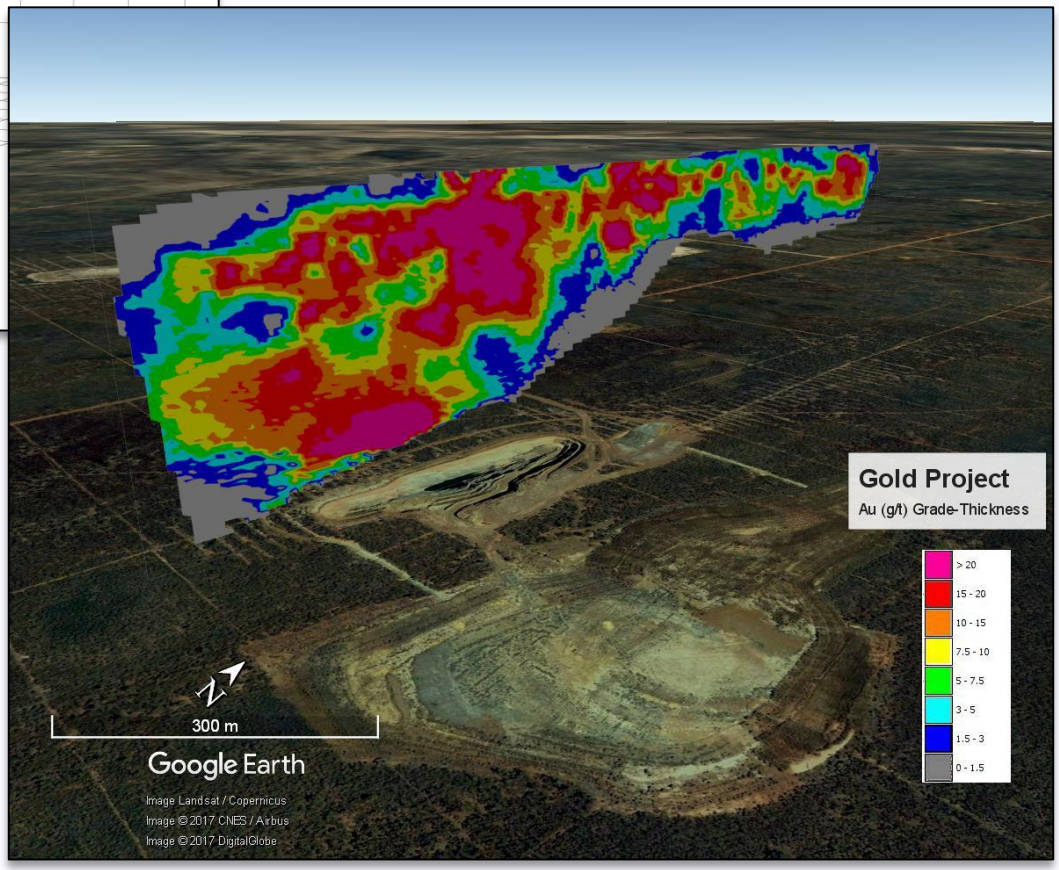
Exporting **Surpac** section images to **Google Earth**



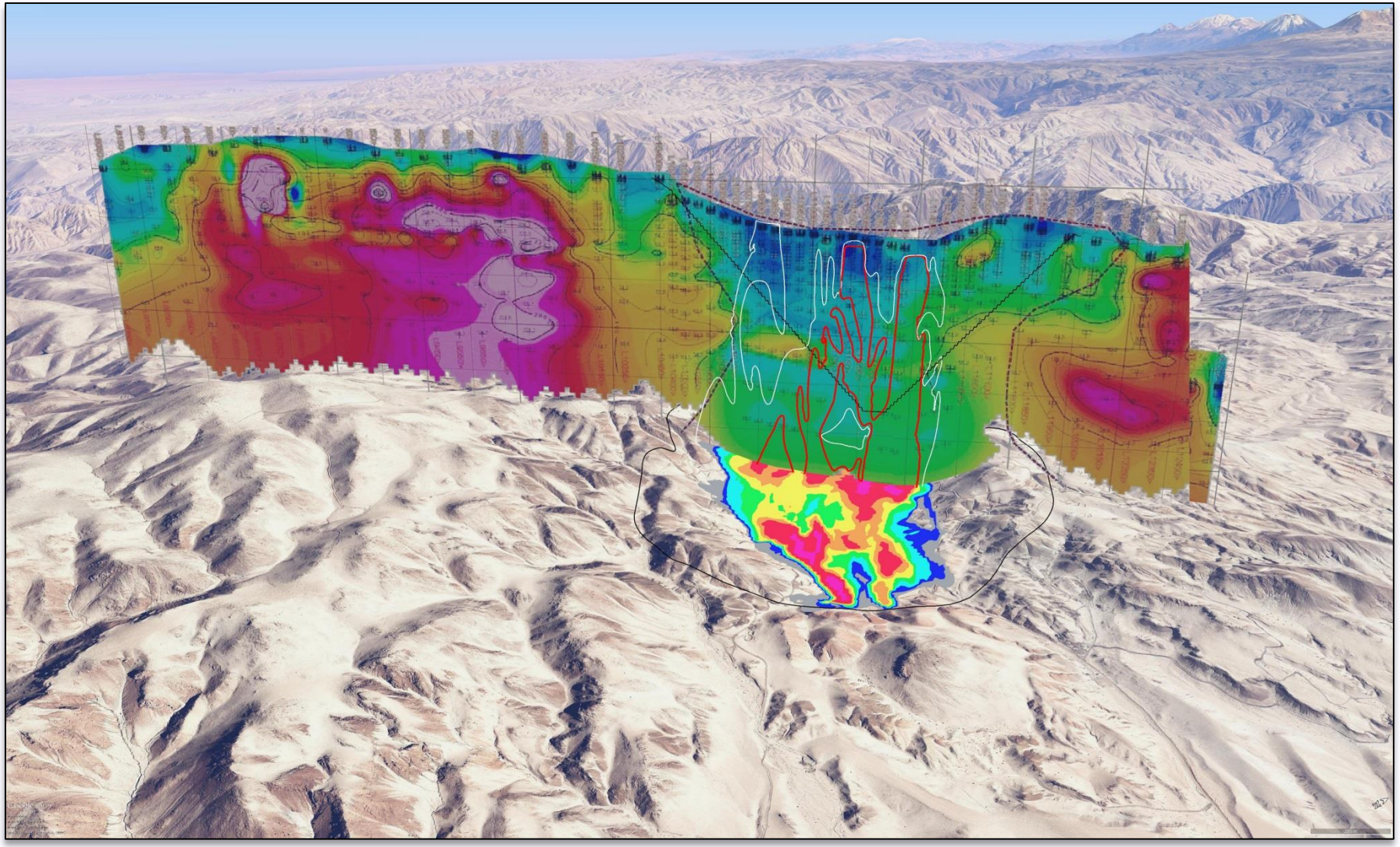
Sections – Block model grade-thickness with colour banding from **Surpac**



Surpac Graphics



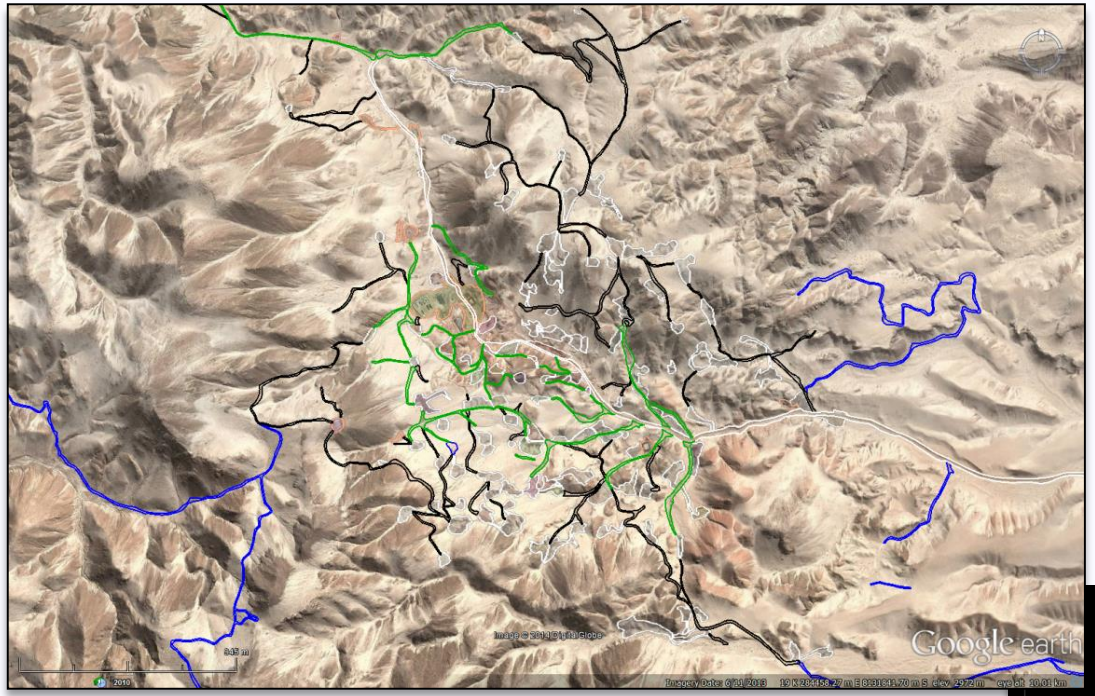
Sections – IP resistivity section image from PDF report with ore zone and open pit strings from **Surpac**

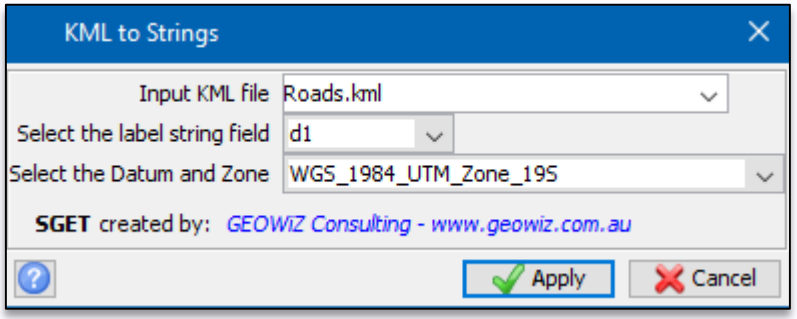


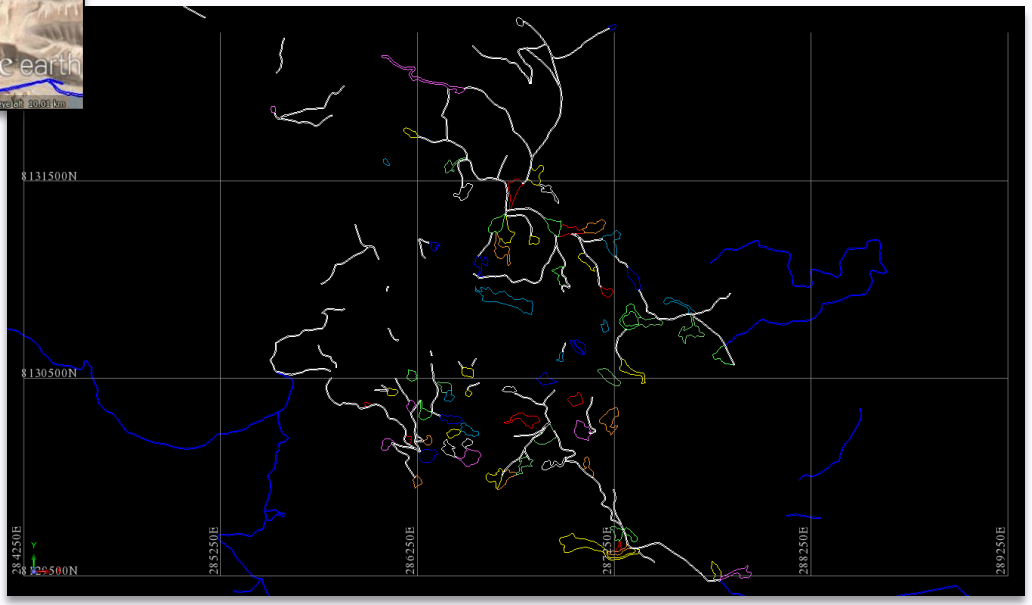
What **Google Earth** data can be imported to **Surpac**?

- Point data eg. placemarks
- Line data eg. digitized roads and other features
- Polygon data
- Topography
- Images – anything displayed in **Google Earth**
- Images from reports, PDF's, ASX announcements

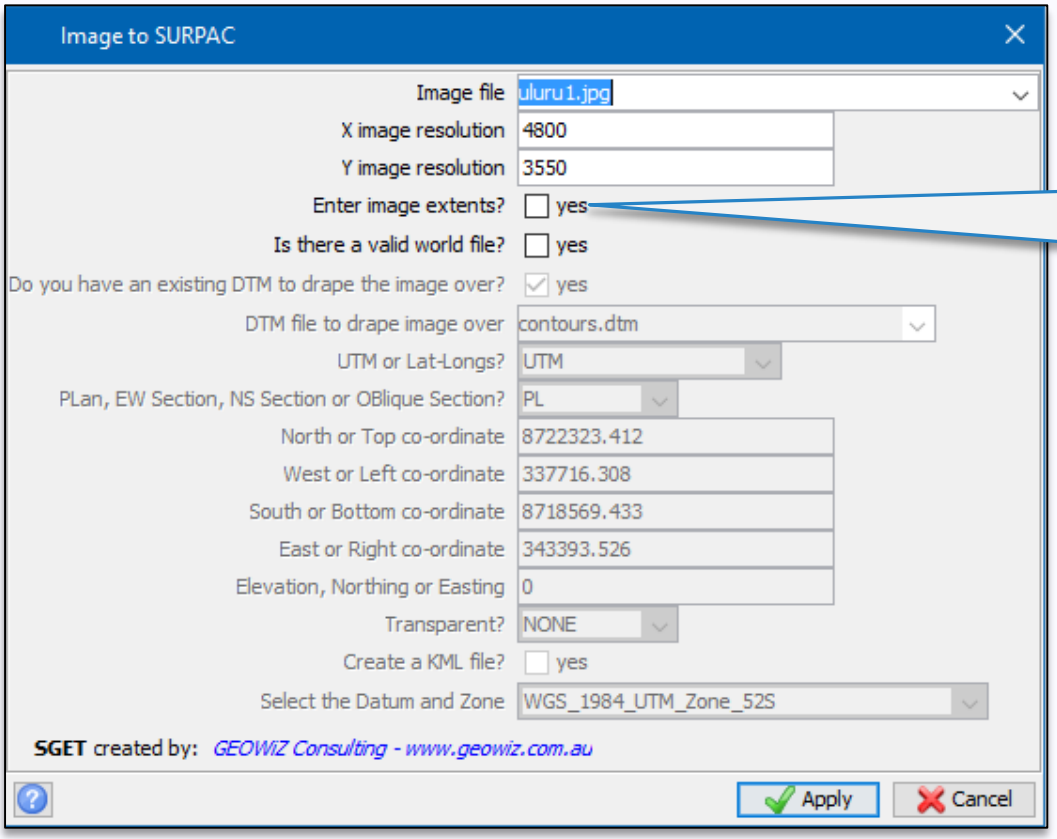
Roads and drill pads digitized in **Google Earth** exported directly to **Surpac**







Importing **Google Earth** images into **Surpac**



If you have the image extents, then the image will be georeferenced automatically

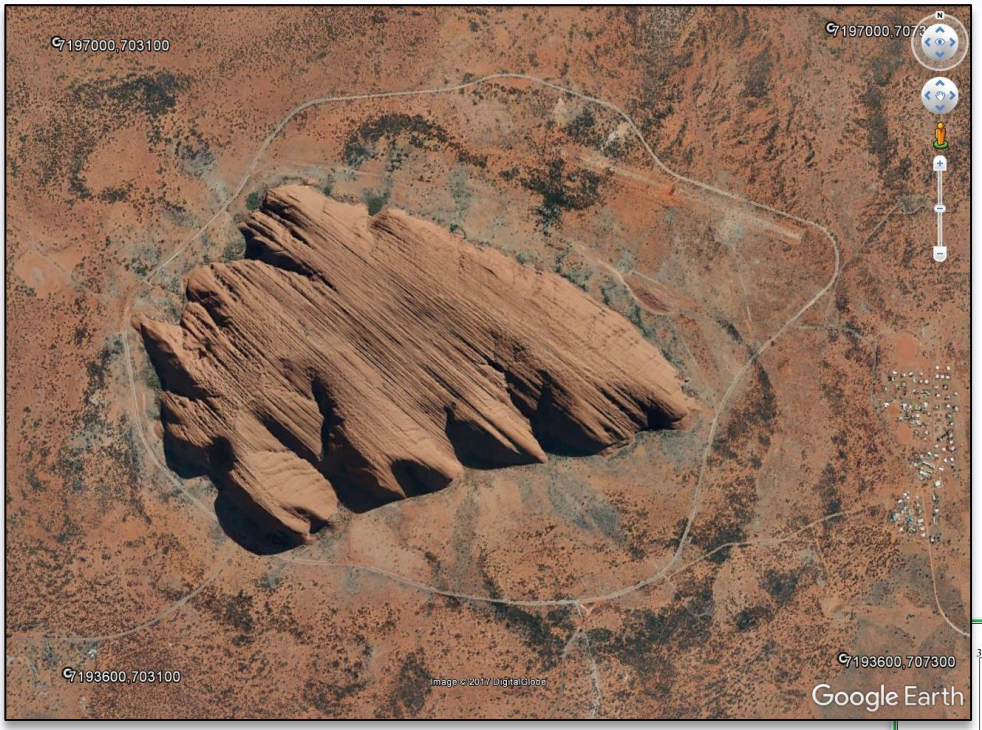
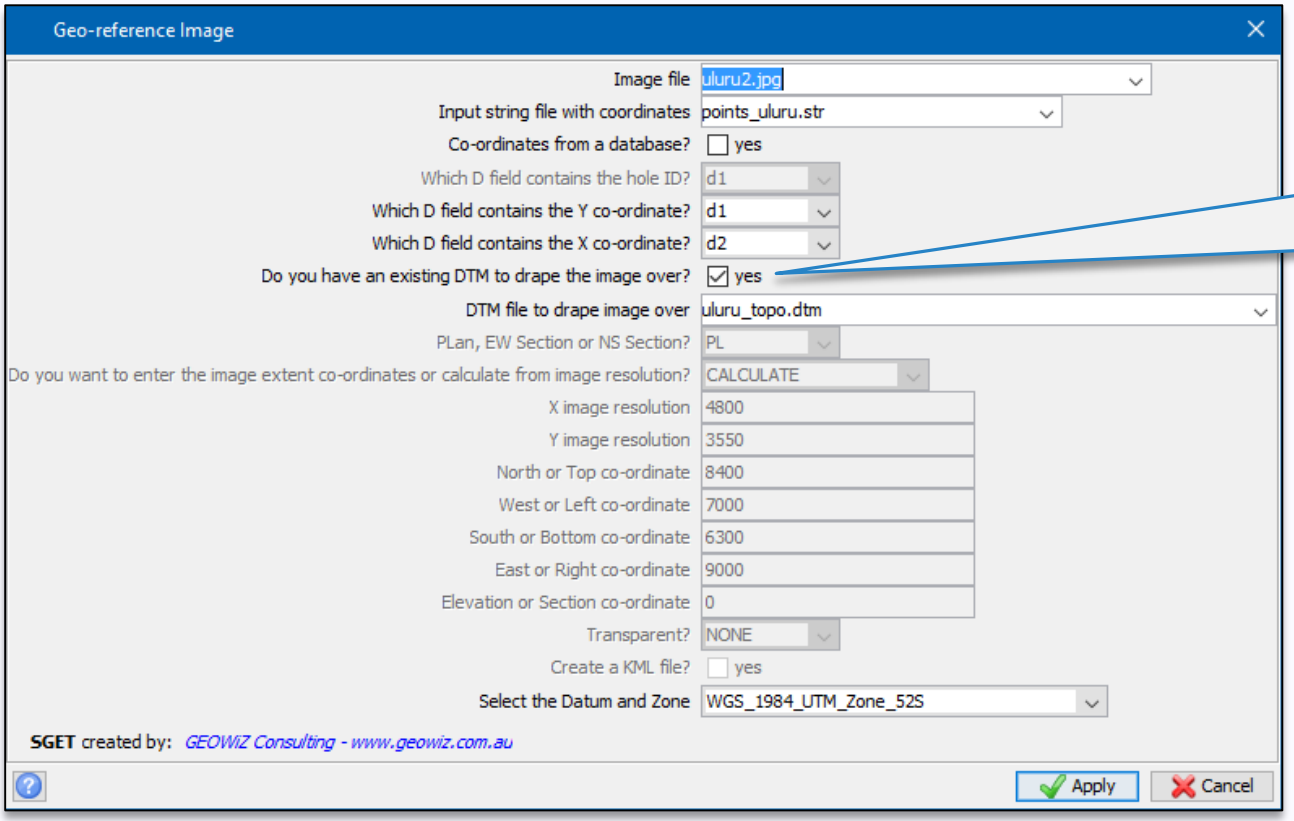


Image saved from
Google Earth

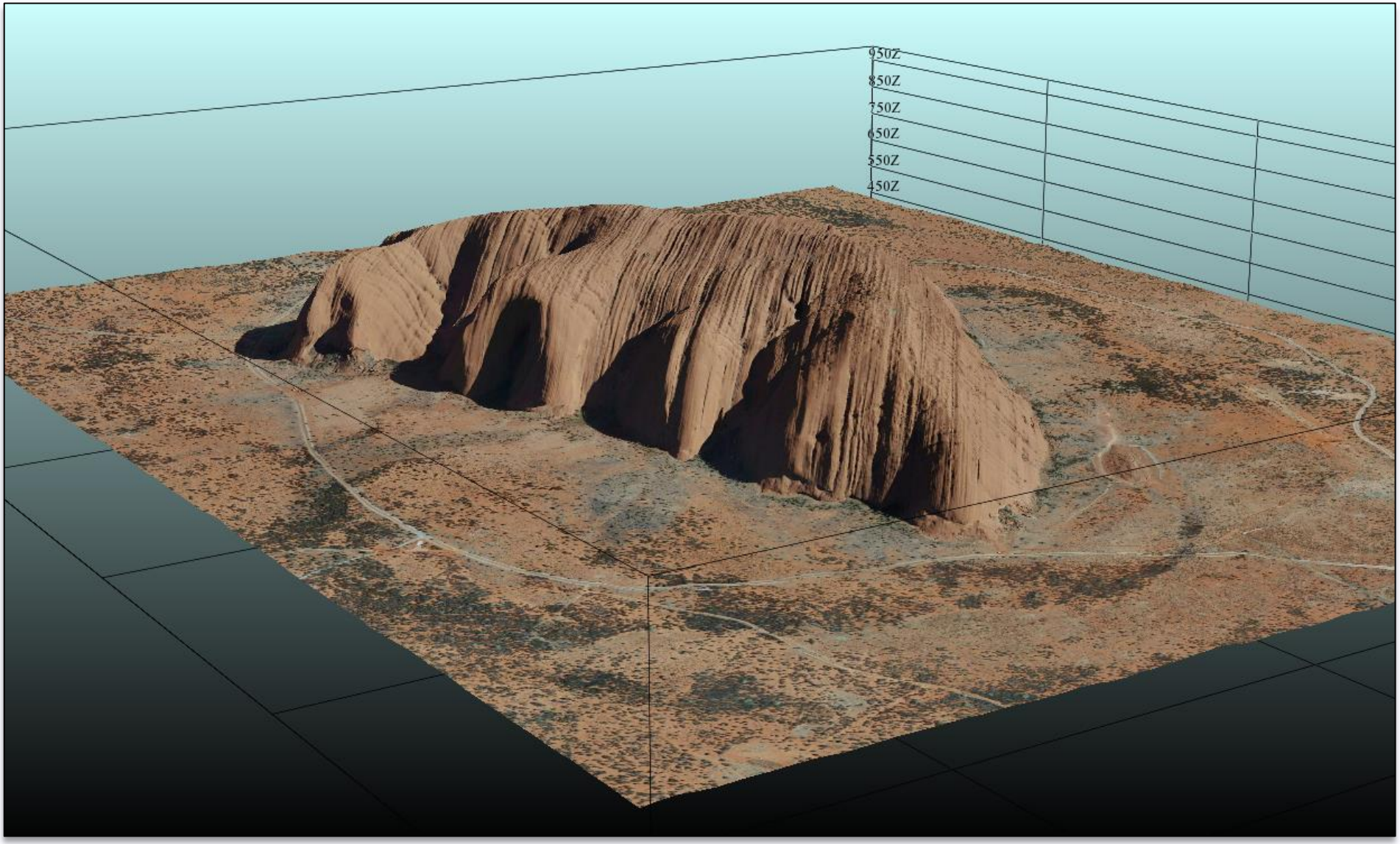
Imported straight into
Surpac using pixels
as co-ordinates

Geo-referencing **Google Earth** images in **Surpac**

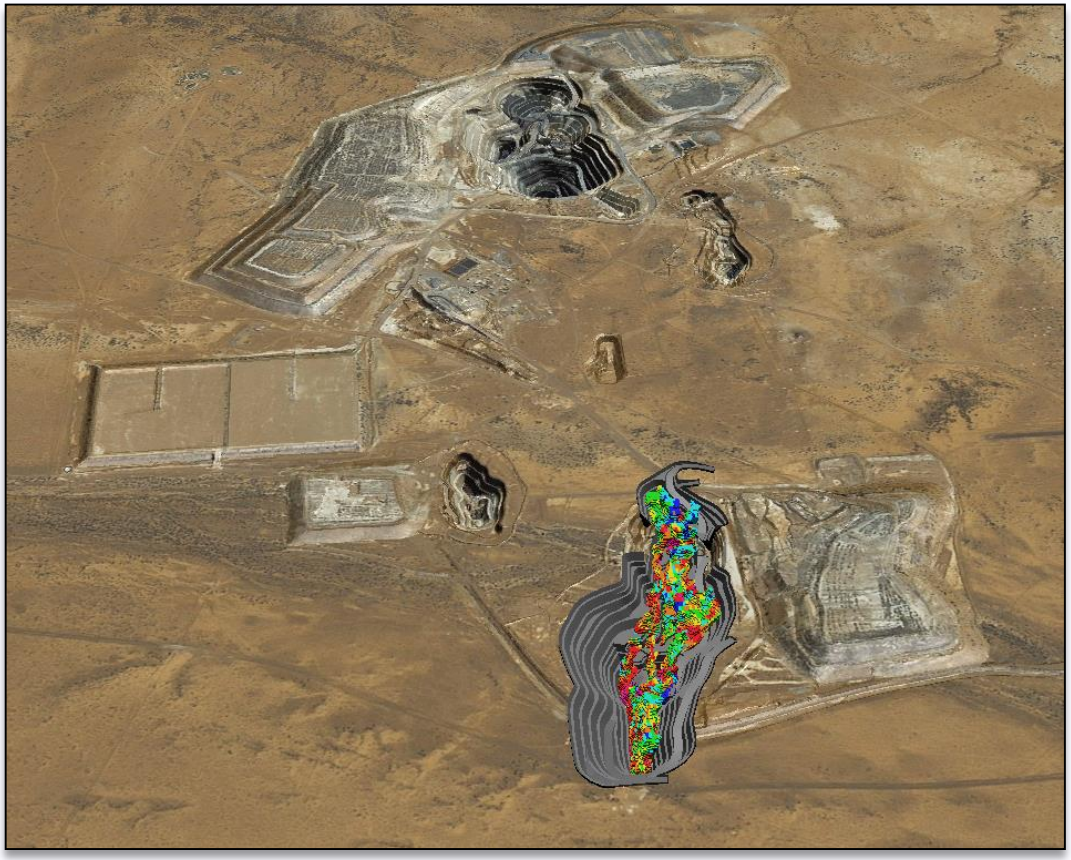


Can drape onto topography if it exists

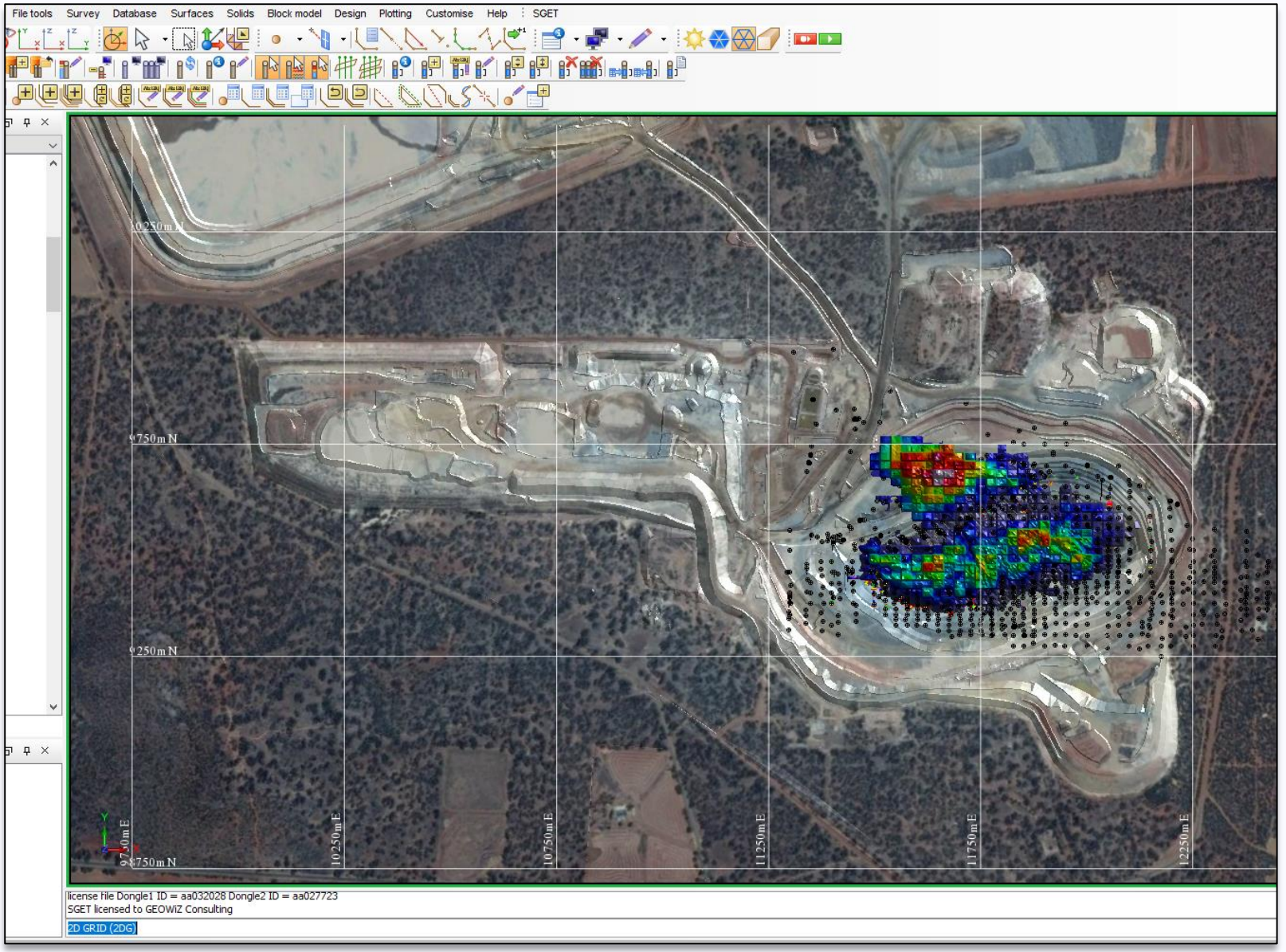
Google Earth image displayed in **Surpac** Graphics draped over ASTER Global Digital Elevation Map (GDEM) topography



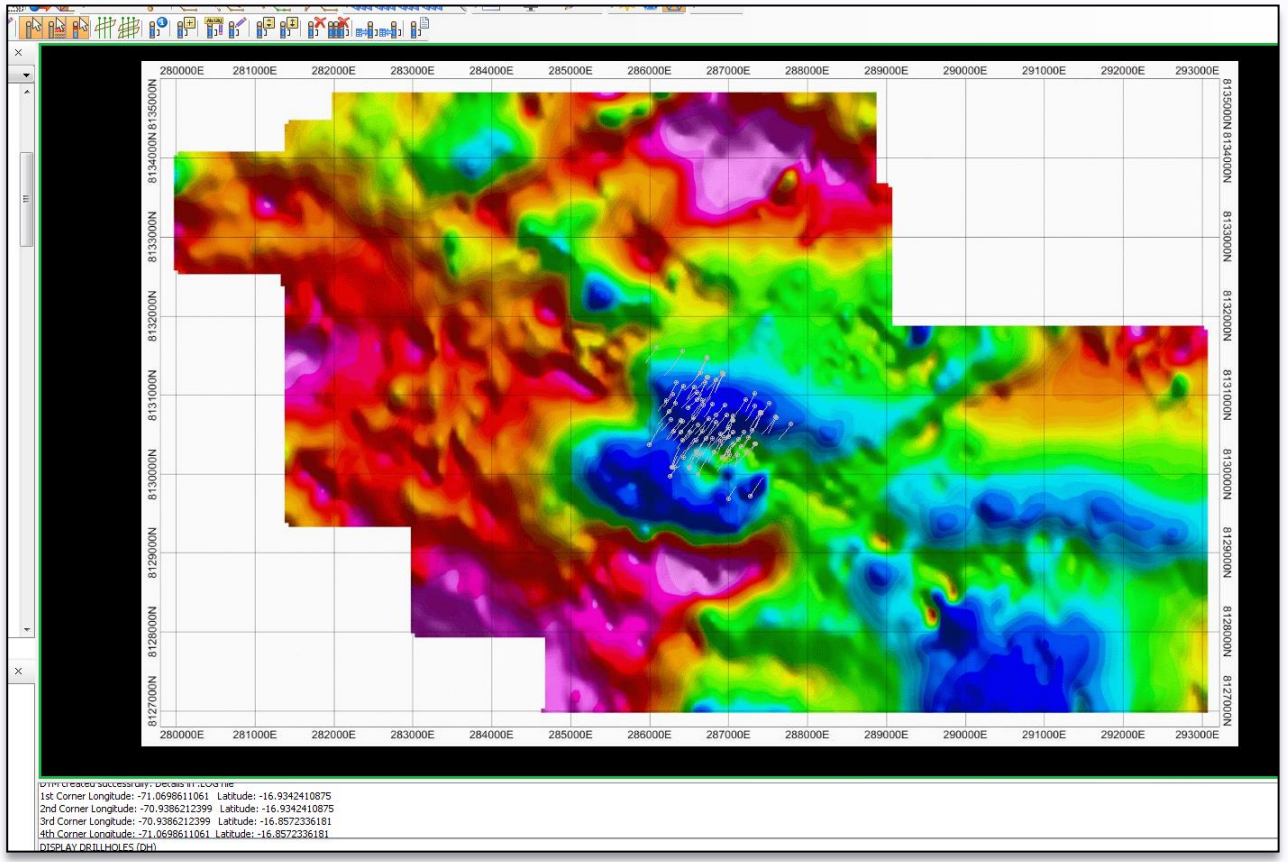
Google Earth image with DTM surfaces in **Surpac**

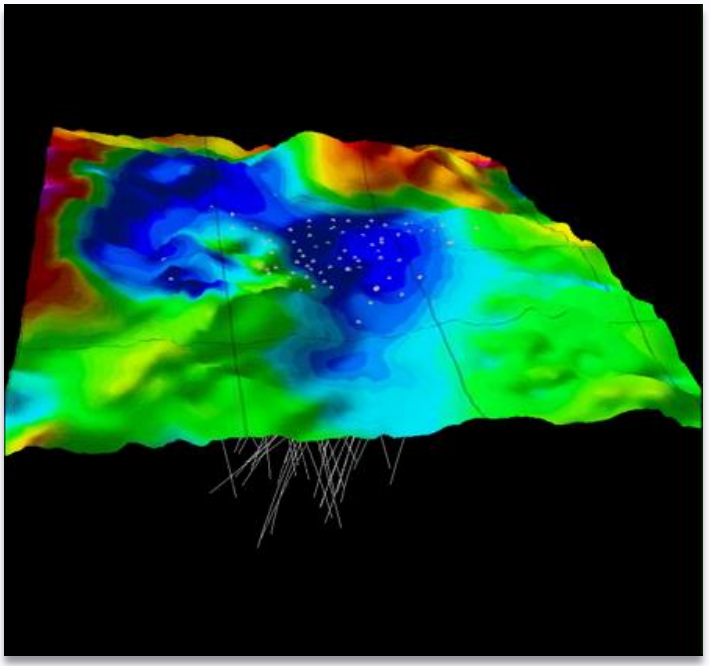


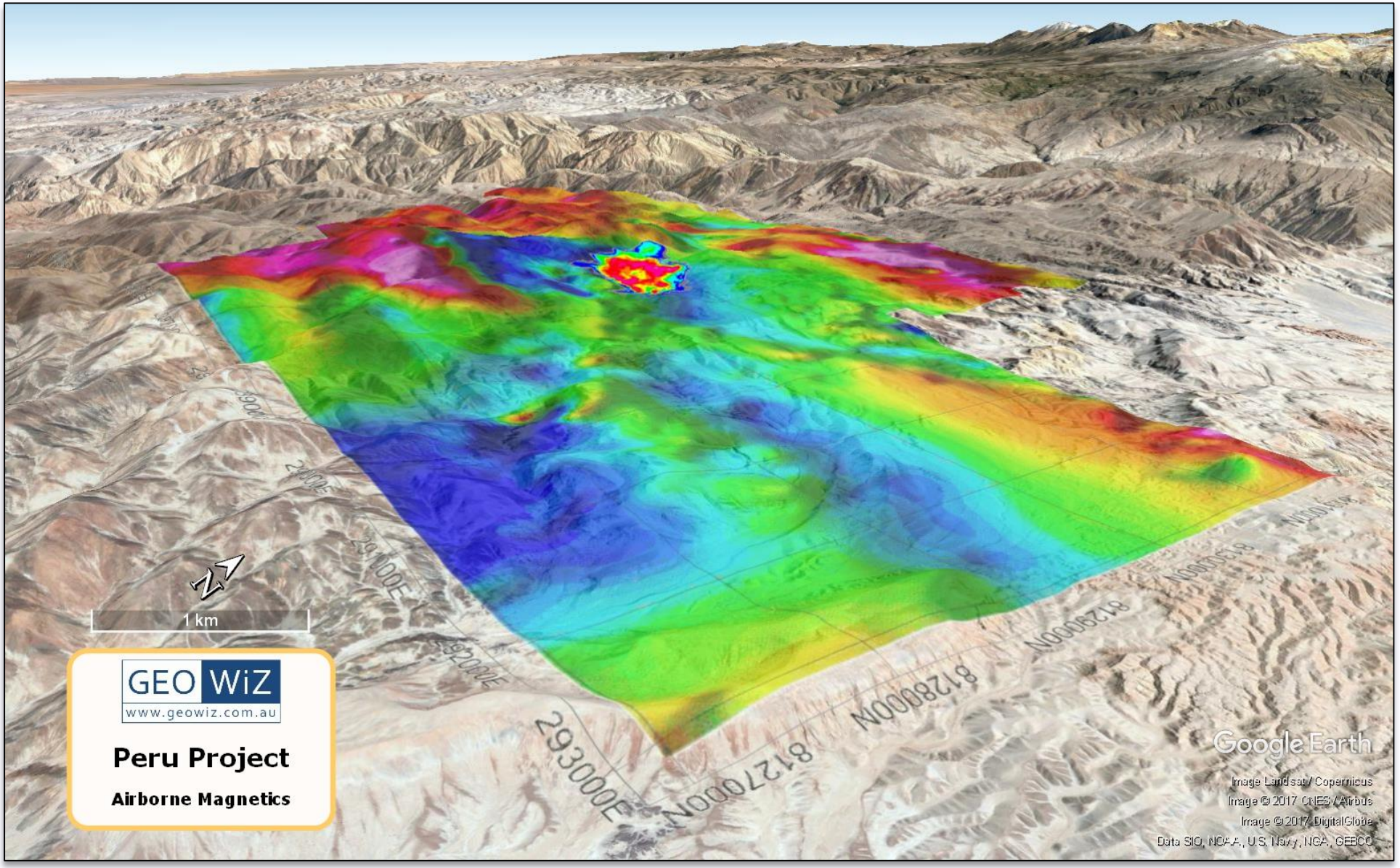
Google Earth image can be imported into **Surpac** directly to a local grid



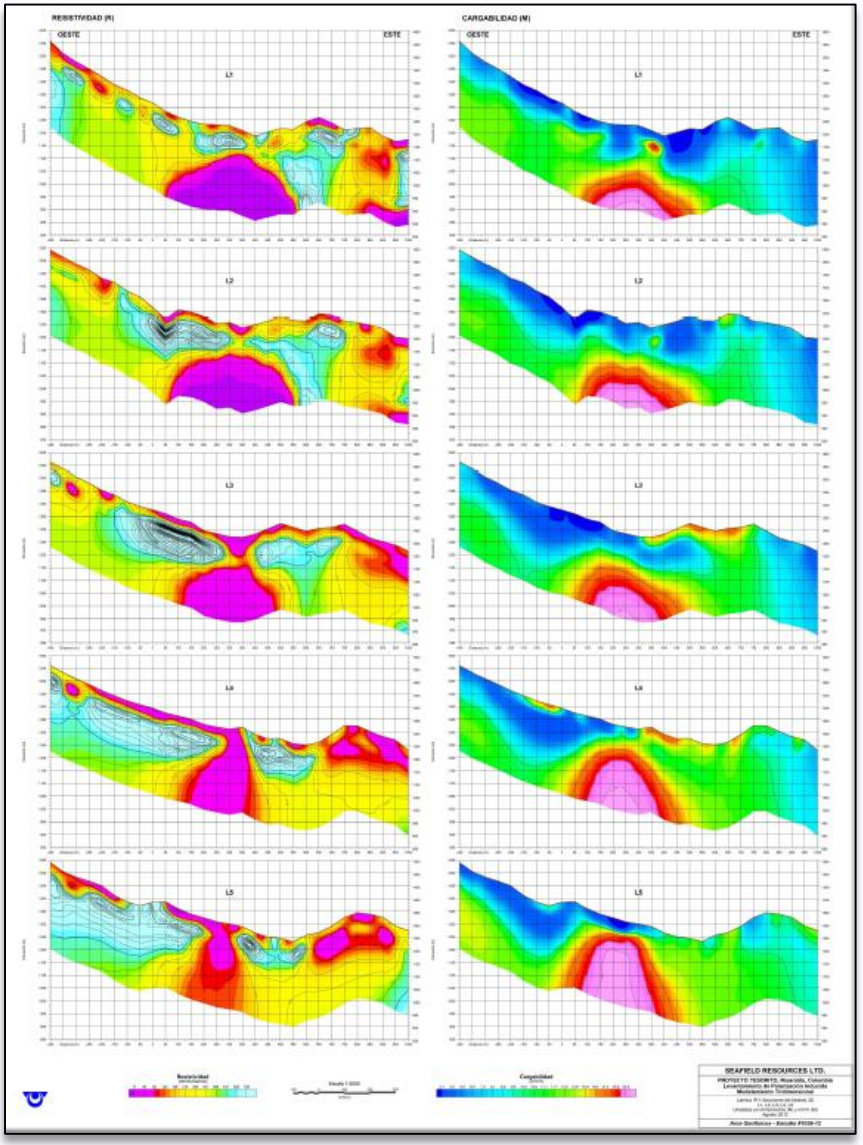
The same tools can be used to import images from PDF's into **Surpac.** Any other images taken from PDF's for example can be imported to **Surpac** and then geo-referenced and draped over topography and then exported to **Google Earth**.

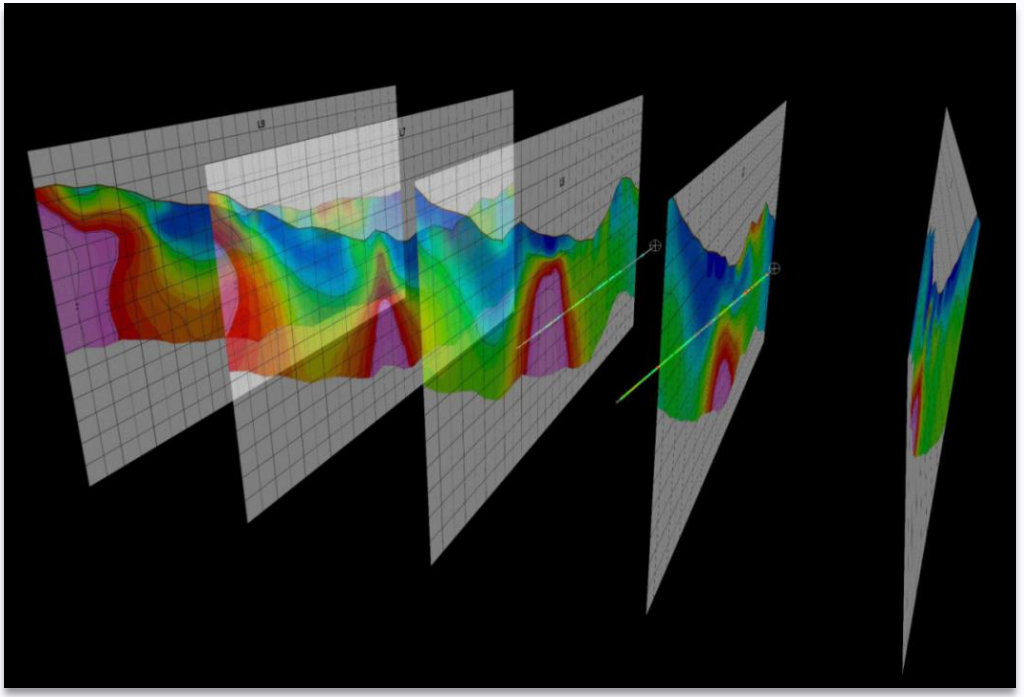




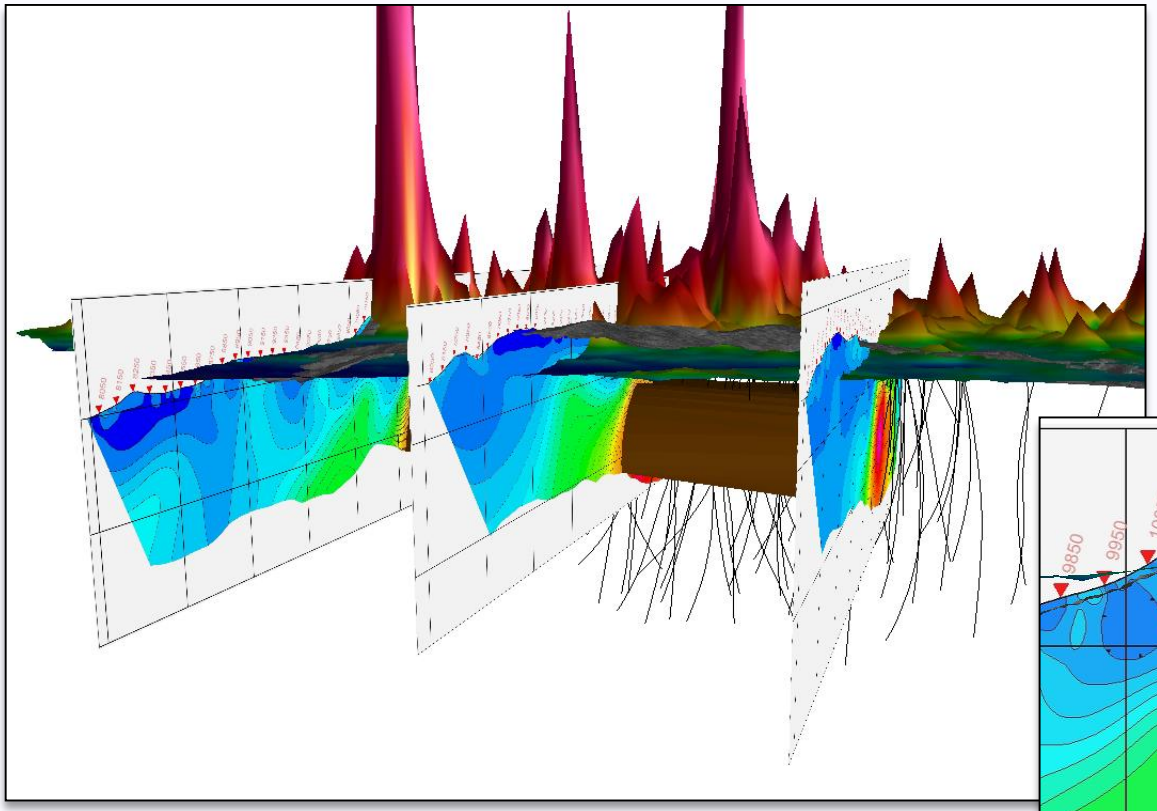

1 km
GEO WiZ
www.geowiz.com.au
Peru Project
Airborne Magnetics
293000E
8127000N
8128000N
8129000N
Google Earth
Image Landsat / Copernicus
Image © 2017 CNES / Airbus
Image © 2017 DigitalGlobe
Data SIO, NOAA, U.S. Navy, NGA, GEBCO

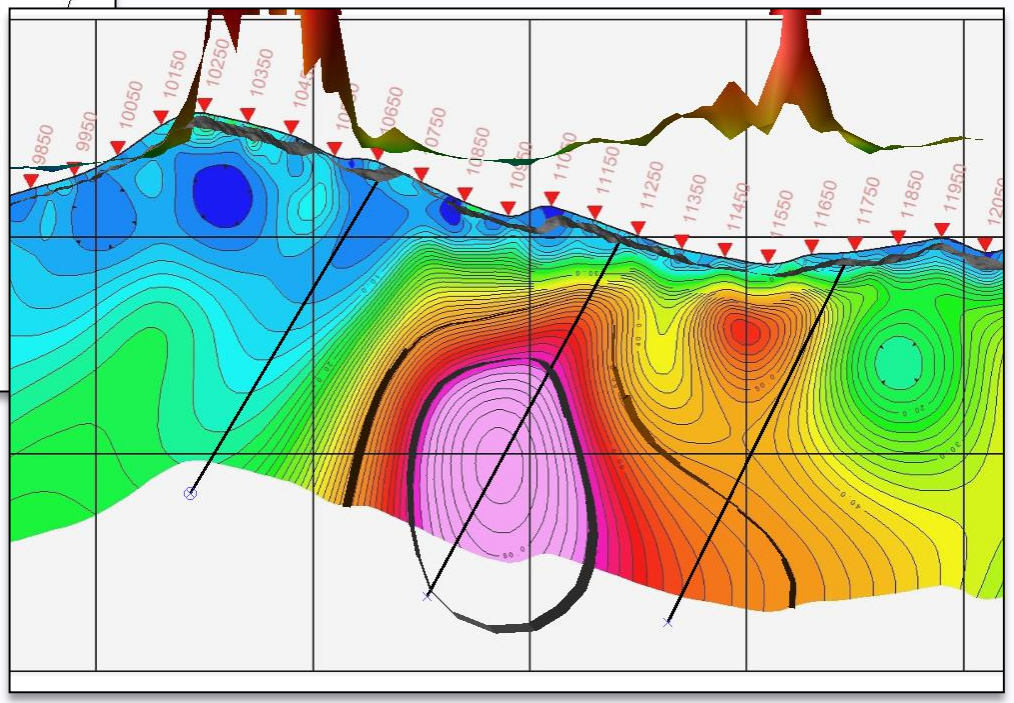
Geophysics – IP chargeability cross sections from PDF report into **Surpac**



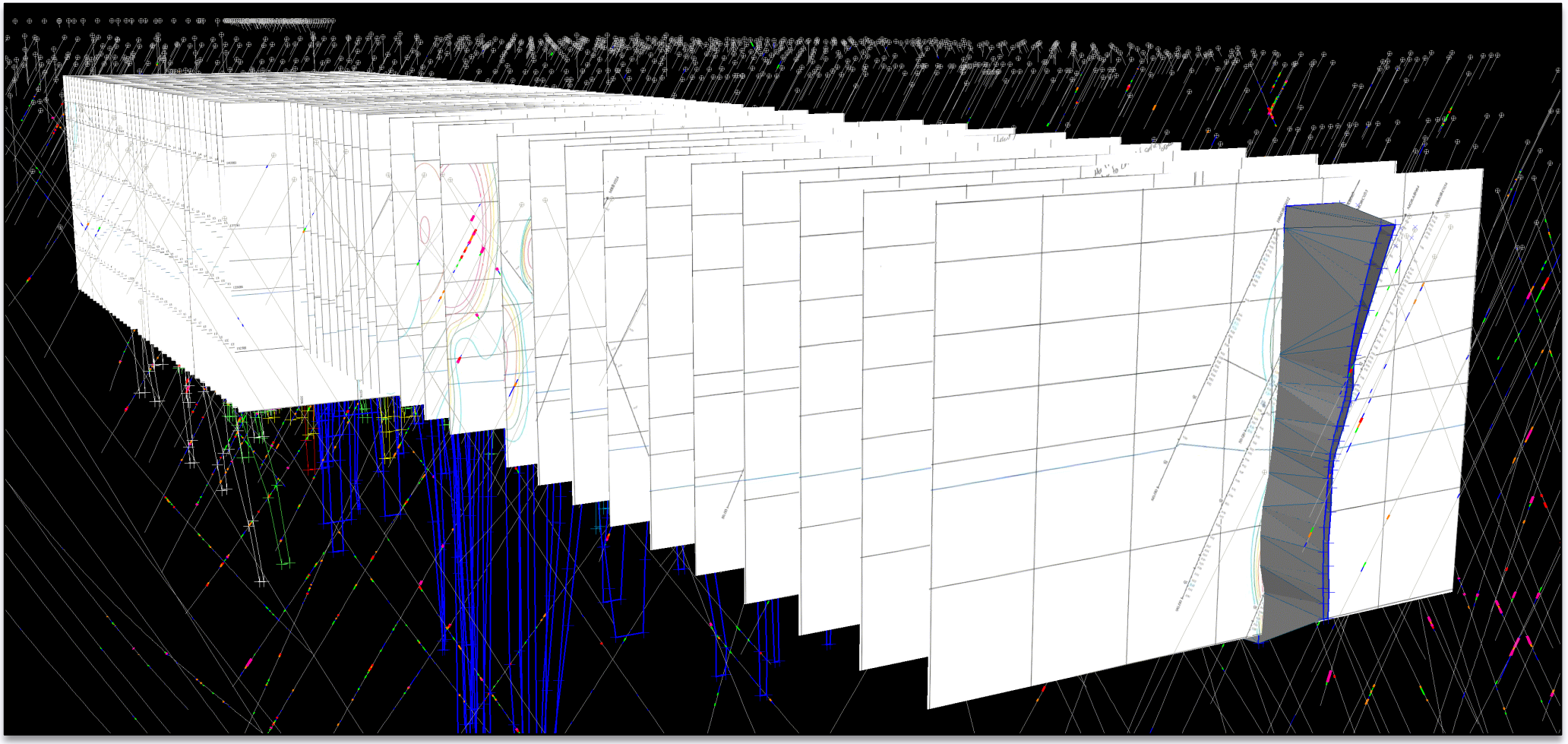


Anomaly digitised in **Surpac** from chargeability sections and solid model created for drill hole targeting





Geology interpretation done on 65 A3 cross section plots which were scanned and imported into **Surpac** and digitised



Example 1 - Integra Goldrush Challenge

GEOWiZ Consulting and Gavin Daneel & Associates participated in the Integra Goldrush Challenge as the Geowizards team and were selected as one of the Top 20 finalists and awarded a CA$10,000 prize.

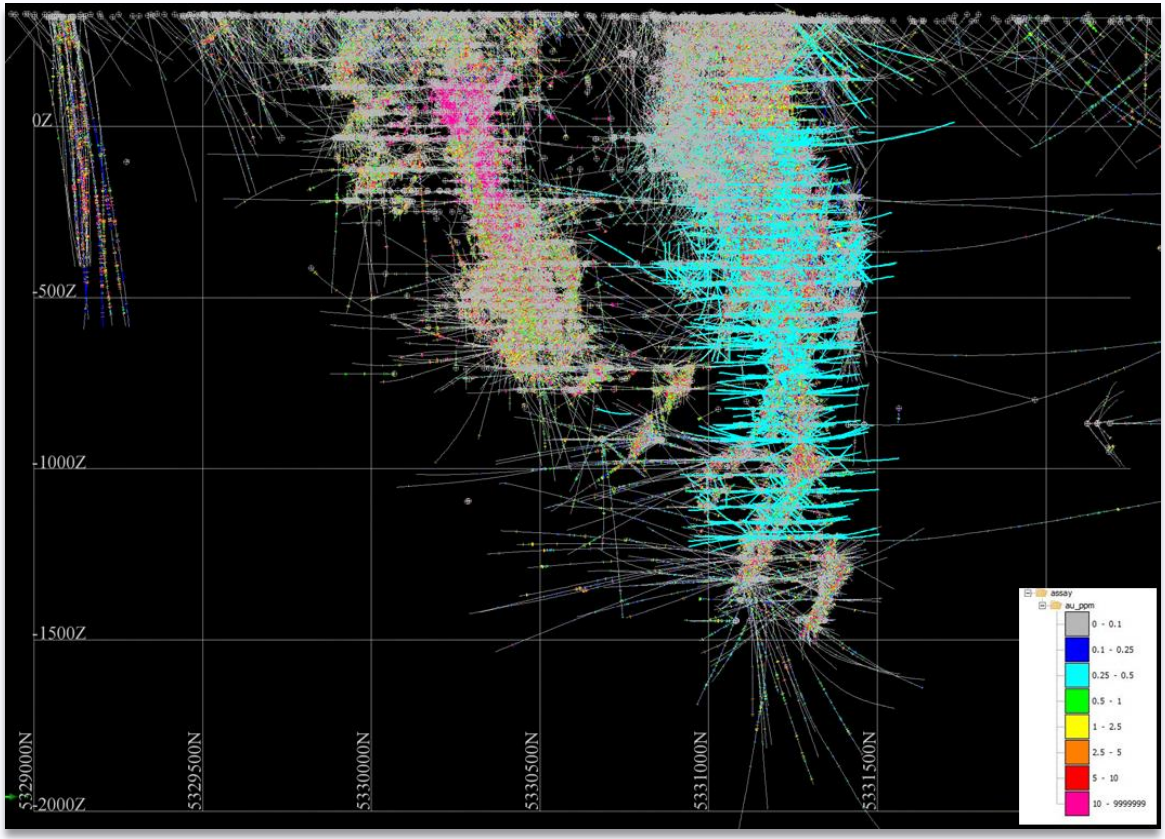
The Integra Goldrush Challenge was one of the largest mining industry focused crowdsourcing analytical challenges ever created, consisting of more than 6 terabytes of digital mining and exploration data, spanning more than 75 years of mining activity and 9 million ounces of gold production in the Val-d'Or district of Quebec, Canada.

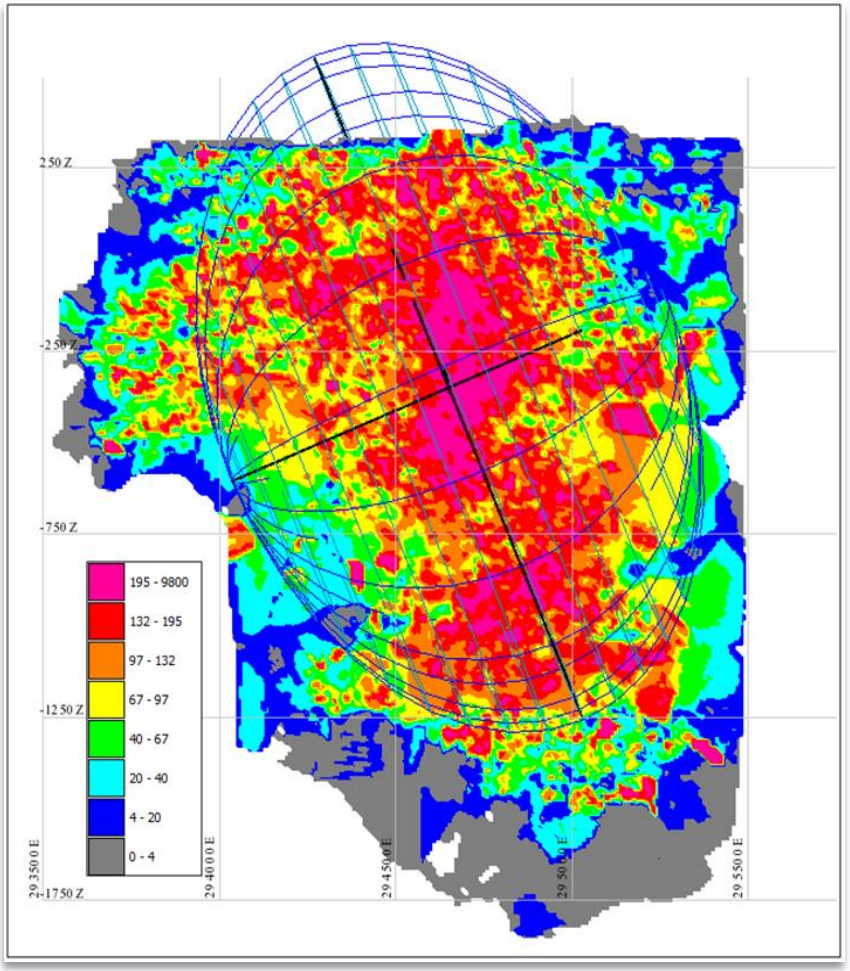
1,342 participants from 83 countries competed for a total prize consideration of CA$1 million by submitting their proposals as to where to find the next big gold discovery.

- 26 gigabytes of data downloaded
- 700,000 assay points
- 1.74 million metres of drilling
- 35,000 drill holes
- Over 500 pre-existing meshes

Integra Goldrush Challenge

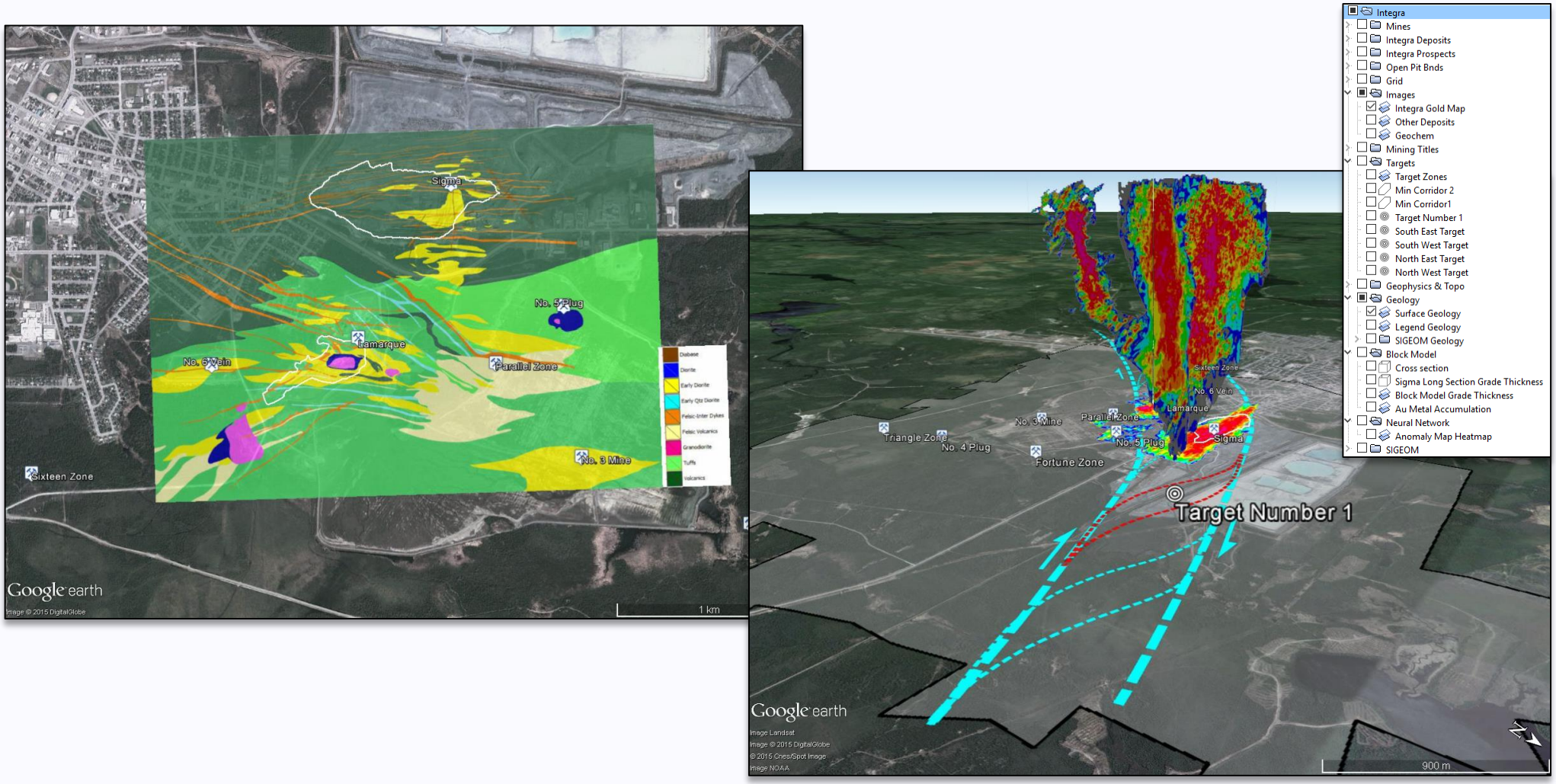
Surpac was used to visualize and model the data





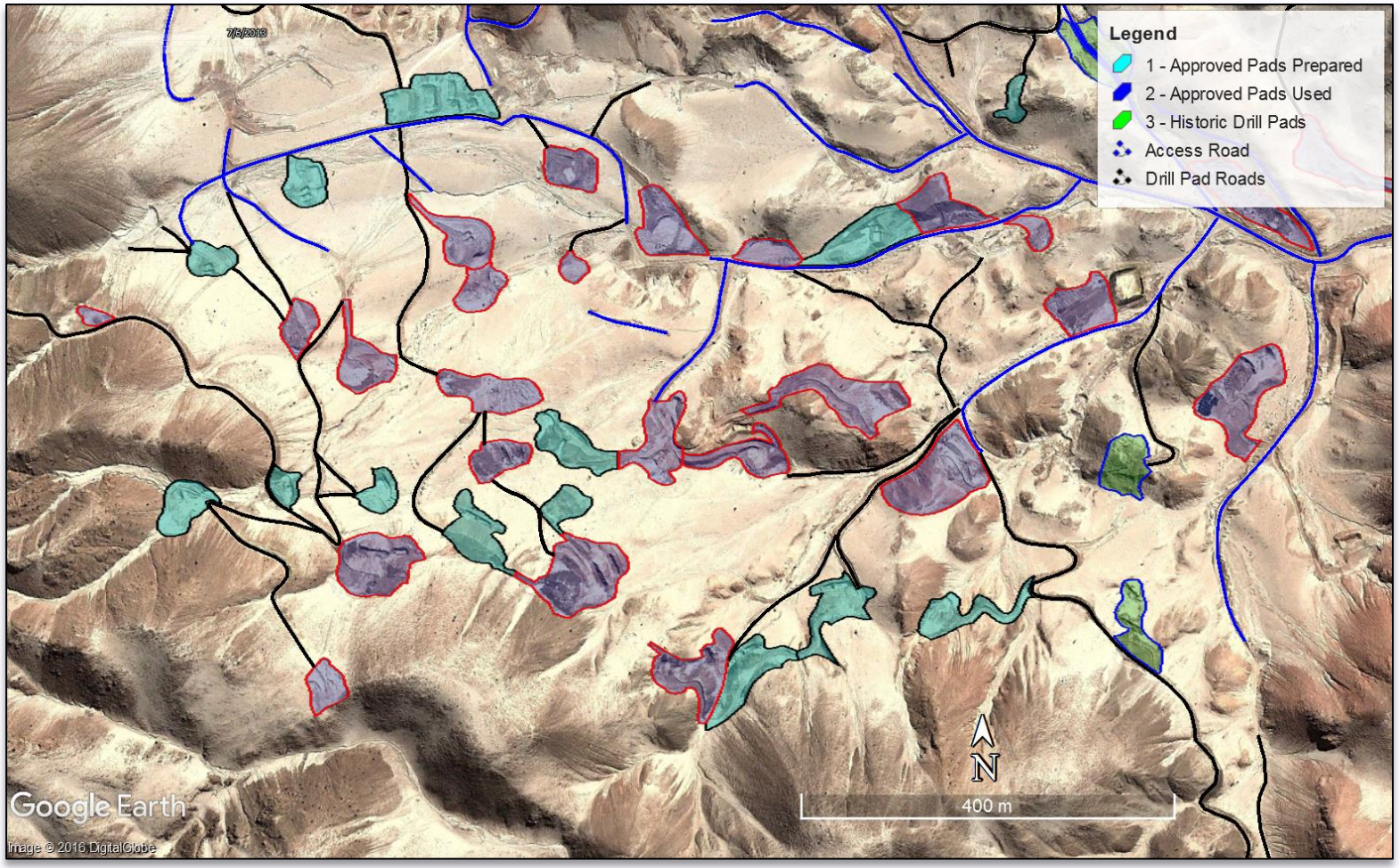
Integra Goldrush Challenge

Results were presented in **Google Earth** – just 1 kmz file 2.2mb in size

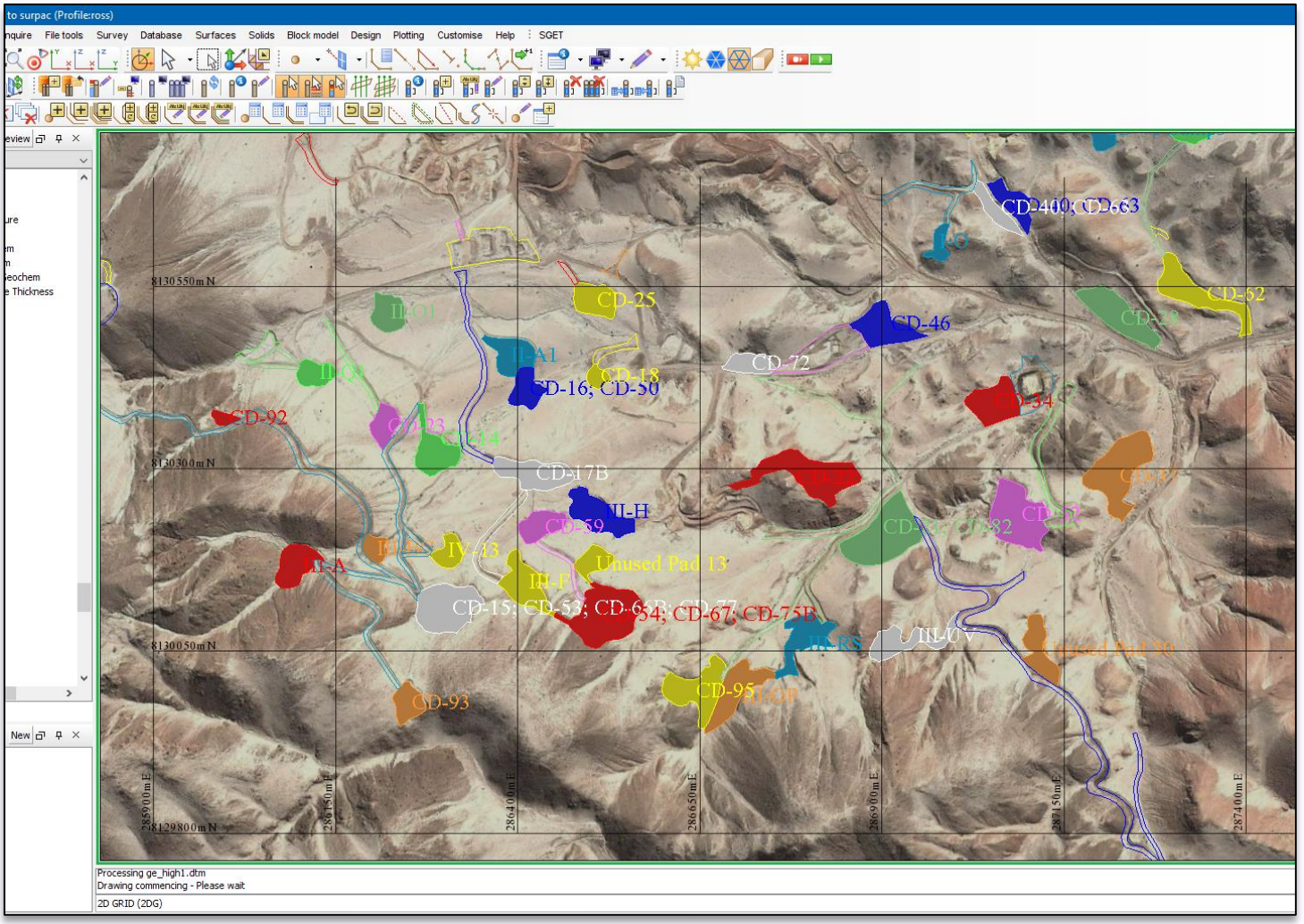


Example 2 – Calculate the Disturbed Area

The surface area of the ground disturbances from drill pads and access roads was required for government reporting. The disturbances were digitised in **Google Earth**.



The digitized features were saved as a kml file and imported directly into **Surpac**. Road outlines using the "*Road from Centreline*" function were created from the digitized road centerlines.



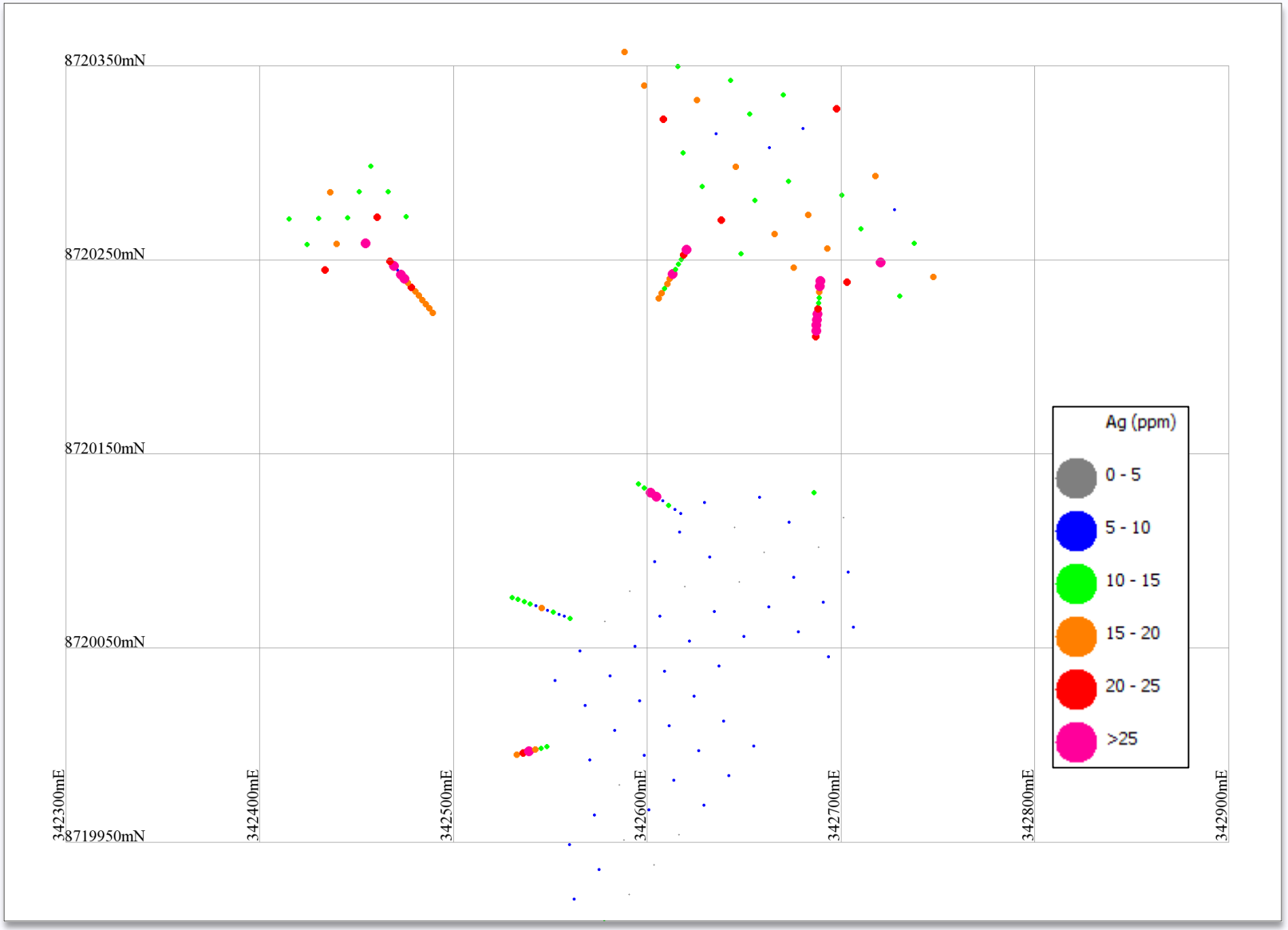
The **Surpac** String File Summary function was used to report the area of the digitized disturbances.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	Surpac Min	2013														
2																
3	String Summary Report															
4																
5																
6	File: pads.str															
7	Date: 29-Aug-13	Purpose: Created using STR MATHS from pads.str														
8																
9																
10																
11	String	Segment	Direction	# Points	2d Len	3d Len	Area	X Min	X Max	Y Min	Y Max	Z Min	Z Max	C2dlen	C3dlen	C Area
12	1	1	Clockwise	69	513.7	513.7	3991.1	287248.2	287380	8130100	8130247	0	0	513.7	513.7	3991.1
13	2	1	Clockwise	32	195.2	195.2	2518.6	286259.3	286322.1	8130290	8130352	0	0	195.2	195.2	2518.6
14	3	1	Clockwise	28	103.1	103.1	717	286494.5	286527.2	8130409	8130444	0	0	103.1	103.1	717
15	4	1	Clockwise	27	164.9	164.9	1693.2	286228	286273.4	8129947	8130009	0	0	164.9	164.9	1693.2
16	5	1	Clockwise	20	106.3	106.3	529.5	285979.3	286024.4	8130358	8130380	0	0	106.3	106.3	529.5
17	6	1	Clockwise	28	148.9	148.9	1500.8	286197.1	286238.6	8130335	8130391	0	0	148.9	148.9	1500.8
18	7	1	Clockwise	32	219.9	219.9	2686.8	286383	286445	8131074	8131148	0	0	219.9	219.9	2686.8
19	8	1	Clockwise	31	165.8	165.8	1534.1	286307.3	286362.3	8131145	8131190	0	0	165.8	165.8	1534.1
20	9	1	Clockwise	18	108.2	108.2	665.4	286076.9	286110	8131577	8131615	0	0	108.2	108.2	665.4
21	10	1	Clockwise	19	144.2	144.2	1358.5	286387.6	286433	8131539	8131588	0	0	144.2	144.2	1358.5
22	11	1	Clockwise	25	276.5	276.5	3983.6	286609.2	286689.2	8131237	8131327	0	0	276.5	276.5	3983.6
23	12	1	Clockwise	24	164.4	164.4	1727.3	286818	286869.2	8131179	8131223	0	0	164.4	164.4	1727.3

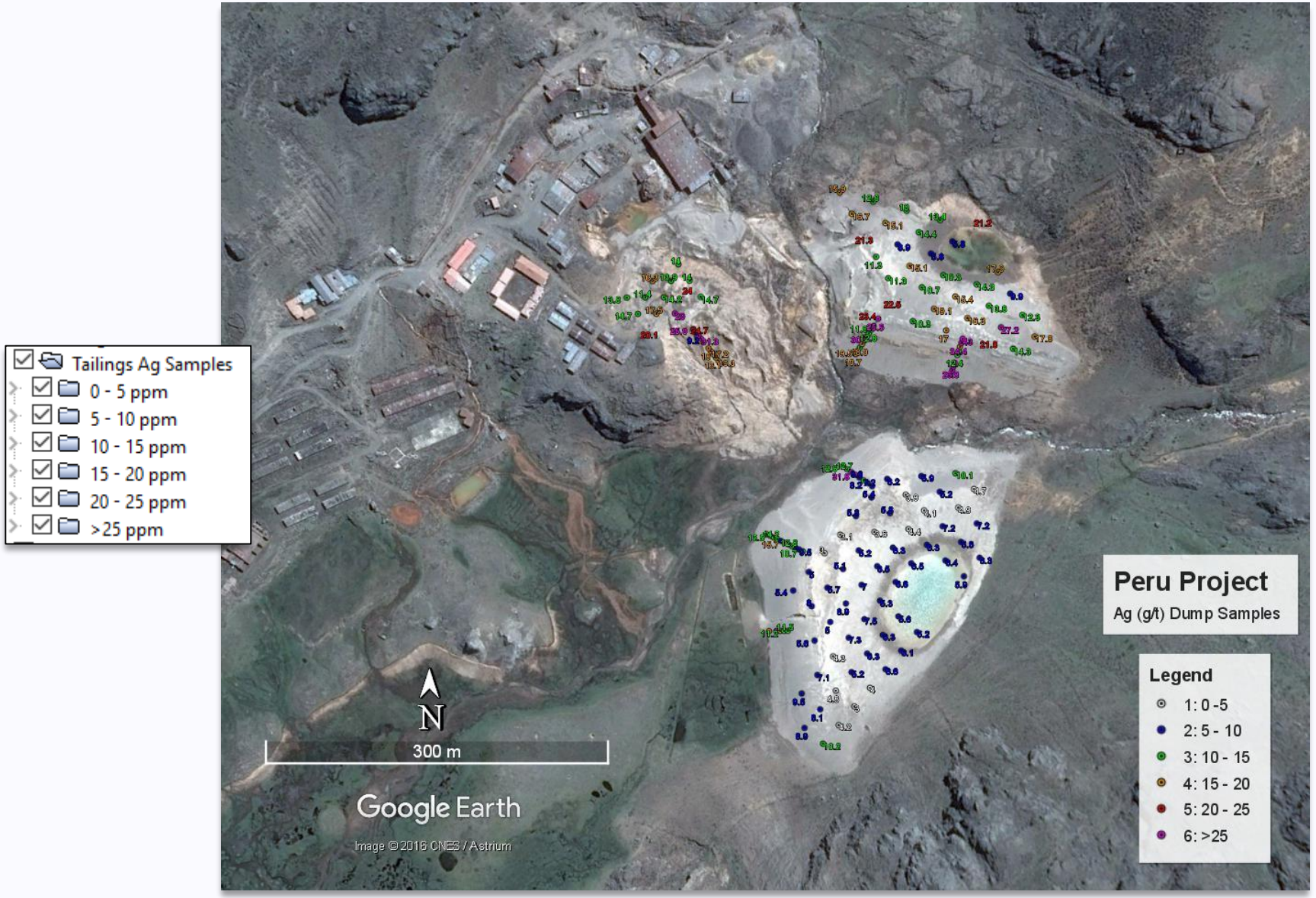
78	67	1	Clockwise	104	571.8	571.8	4406.8	287279	287380.7	8130744	8130877	0	0	571.8	571.8	4406.8
79	68	1	Clockwise	51	427.7	427.7	4068.9	287278.3	287407.6	8130473	8130597	0	0	427.7	427.7	4068.9
80	69	1	Clockwise	60	438.5	438.5	6285.2	287174.8	287272.3	8130214	8130352	0	0	438.5	438.5	6285.2
81	70	1	Clockwise	45	374.1	374.1	4732	287298.6	287360.8	8130286	8130435	0	0	374.1	374.1	4732
82	71	1	Clockwise	33	218.7	218.7	3062	287013.5	287090.1	8130358	8130421	0	0	218.7	218.7	3062
83				3212	21497.9	21497.9	225412.6	284948.9	287945.2	8129480	8132721	0	0	21497.9	21497.9	225412.6
84	File Summary :-															
85	Location = pads.str															
86	ID range =															
87																
88																
89																
90	2d Len	3d Len	Area	X Min	X Max	Y Min	Y Max	Z Min	Z Max							
91	21497.9	21497.9	225412.6	284948.9	287945.2	8129480	8132721	0	0							
92																
93	String Summary Report				1/1											
94																

Total disturbed area inside digitised polygons

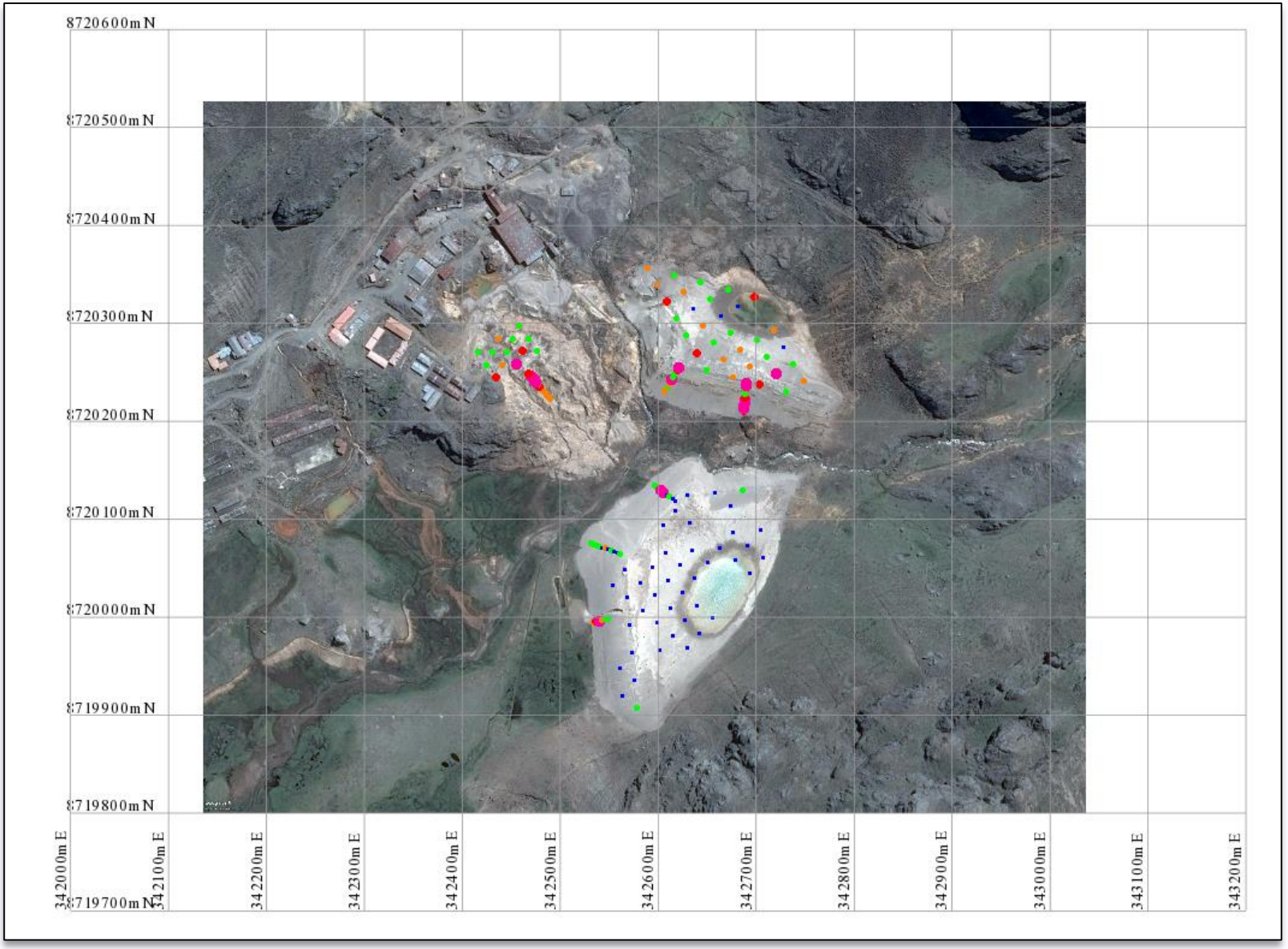
Example 3 - Calculate the Volume of Tailings Dumps from Sample Points



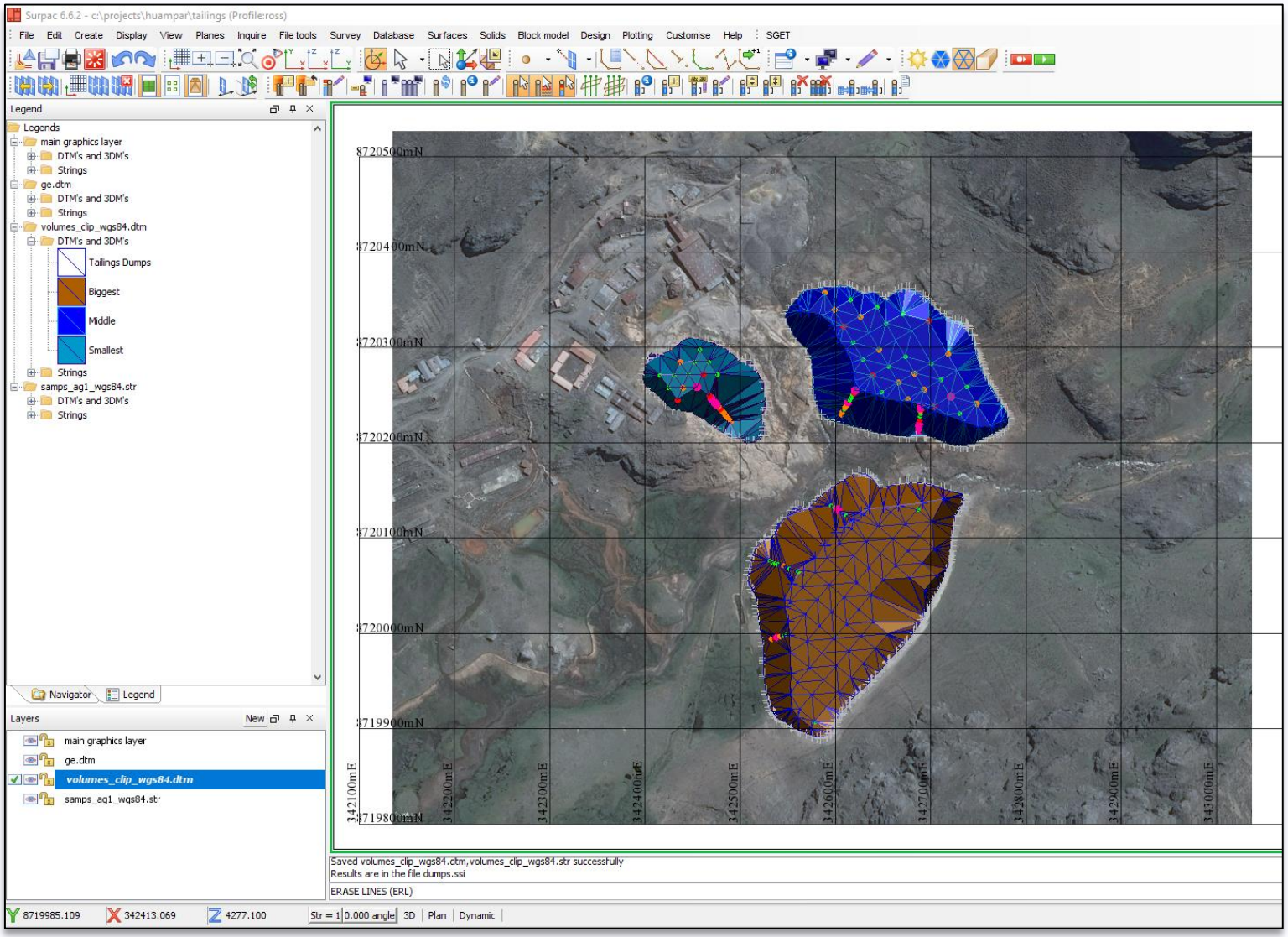
Samples are exported from **Surpac** to **Google Earth** and image is saved



Google Earth image is imported and georeferenced in **Surpac**

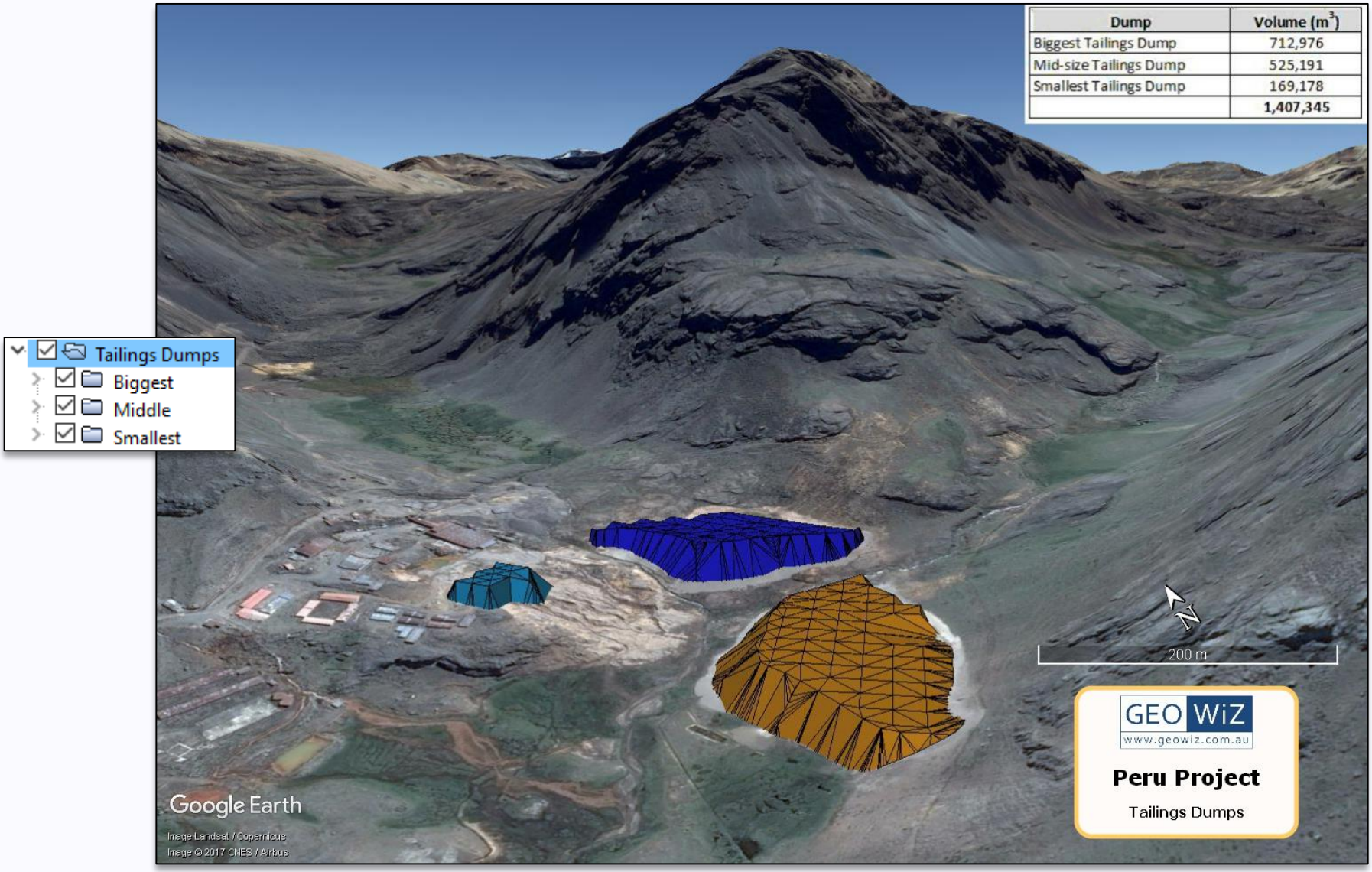


Dump crests and toes were digitized and elevations assigned from the topography and dump sampling points. DTM's were created and volumes of the dumps calculated using *Volume Between 2 DTM Surfaces* function.




```
                                VOLUME BETWEEN DTM SURFACES



Upper surface: volumes1.dtm
Upper surface object ID: 1
Upper surface trisolation ID: 1
Lower surface: toes.dtm
Lower surface object ID: 1
Lower surface trisolation ID: 1

Boundary file: toes.str
Boundary string: 1
Number of segments: 3
Density: 1

Volumes
Segment 1:
   (Volume)  712976
   (Tonnage) 712976
Segment 2:
   (Volume)  525191
   (Tonnage) 525191
Segment 3:
   (Volume)  169178
   (Tonnage) 169178
Total: 1407345
```

The **Surpac** dump DTM's were exported back into **Google Earth**

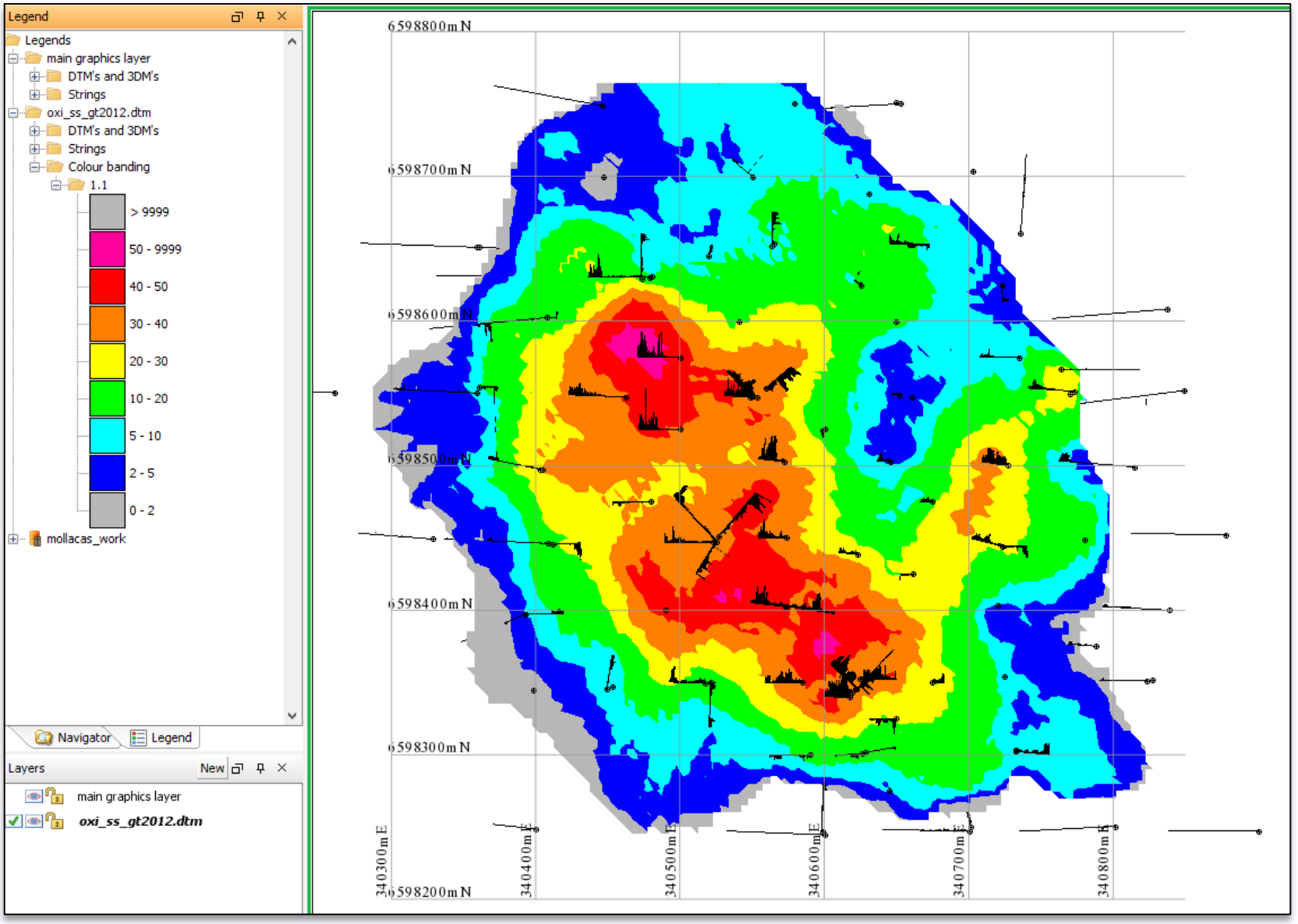


Example 4 – Use Historical imagery to show land usage

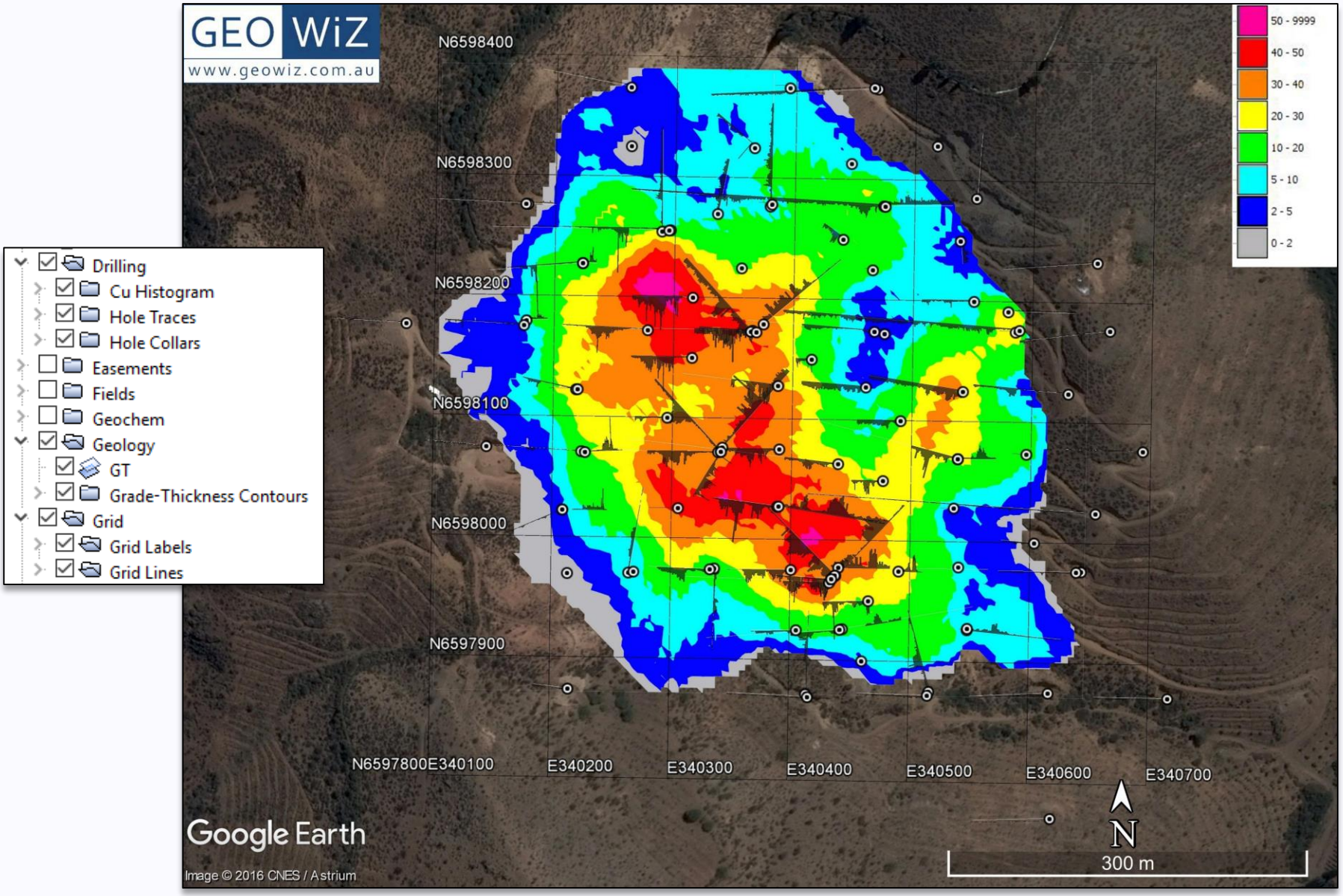
In this example, a porphyry copper project in Chile was drilled out over a number of years but the land owner then decided that he didn't want a mine to go ahead so he took the company to court claiming that he had always used the ground for growing walnuts.

Using the historical imagery available in **Google Earth**, a time lapse was built up showing the progression of the drilling imported from **Surpac.**

Block Model Cu% x Thickness image in **Surpac**



Block Model Cu% x Thickness image in **Google Earth**



Google Earth image taken in 2005 – no drill pads and no crops

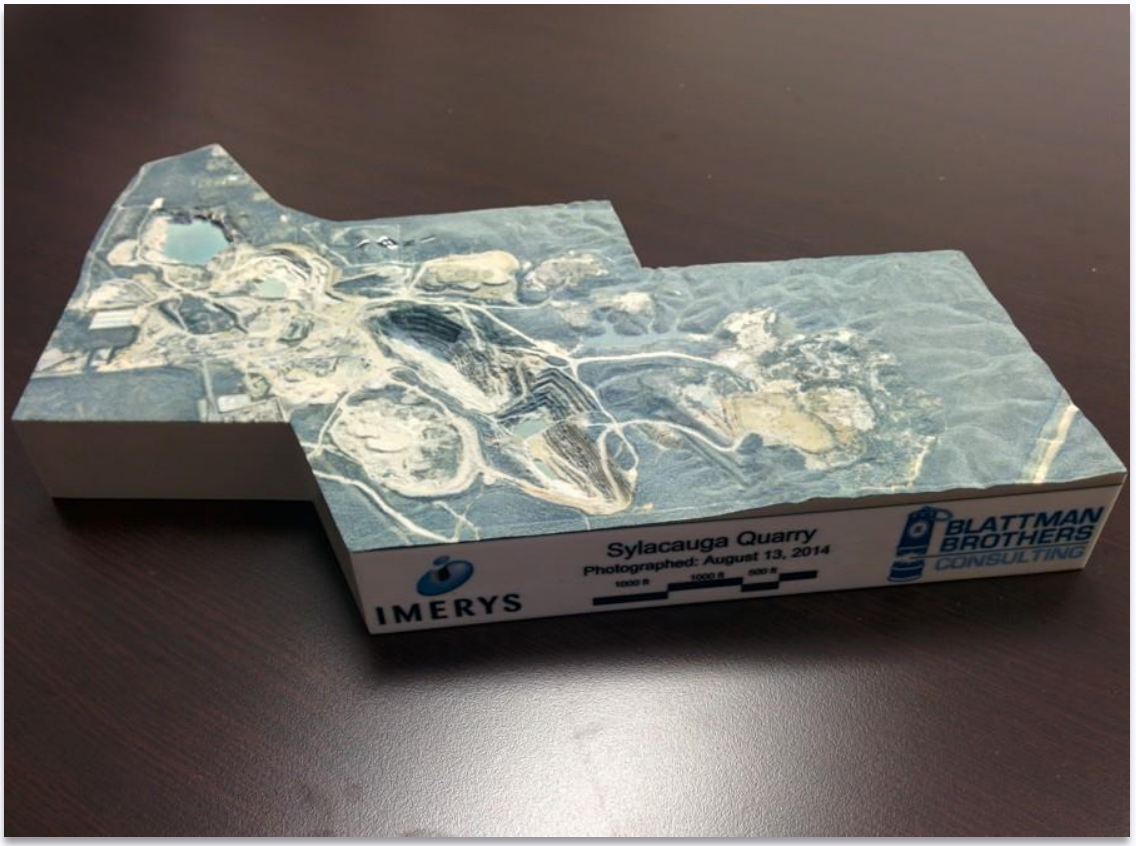
Google Earth image taken in 2007 – some drill pads but no crops

Google Earth image taken in 2010 – all drill pads and no crops

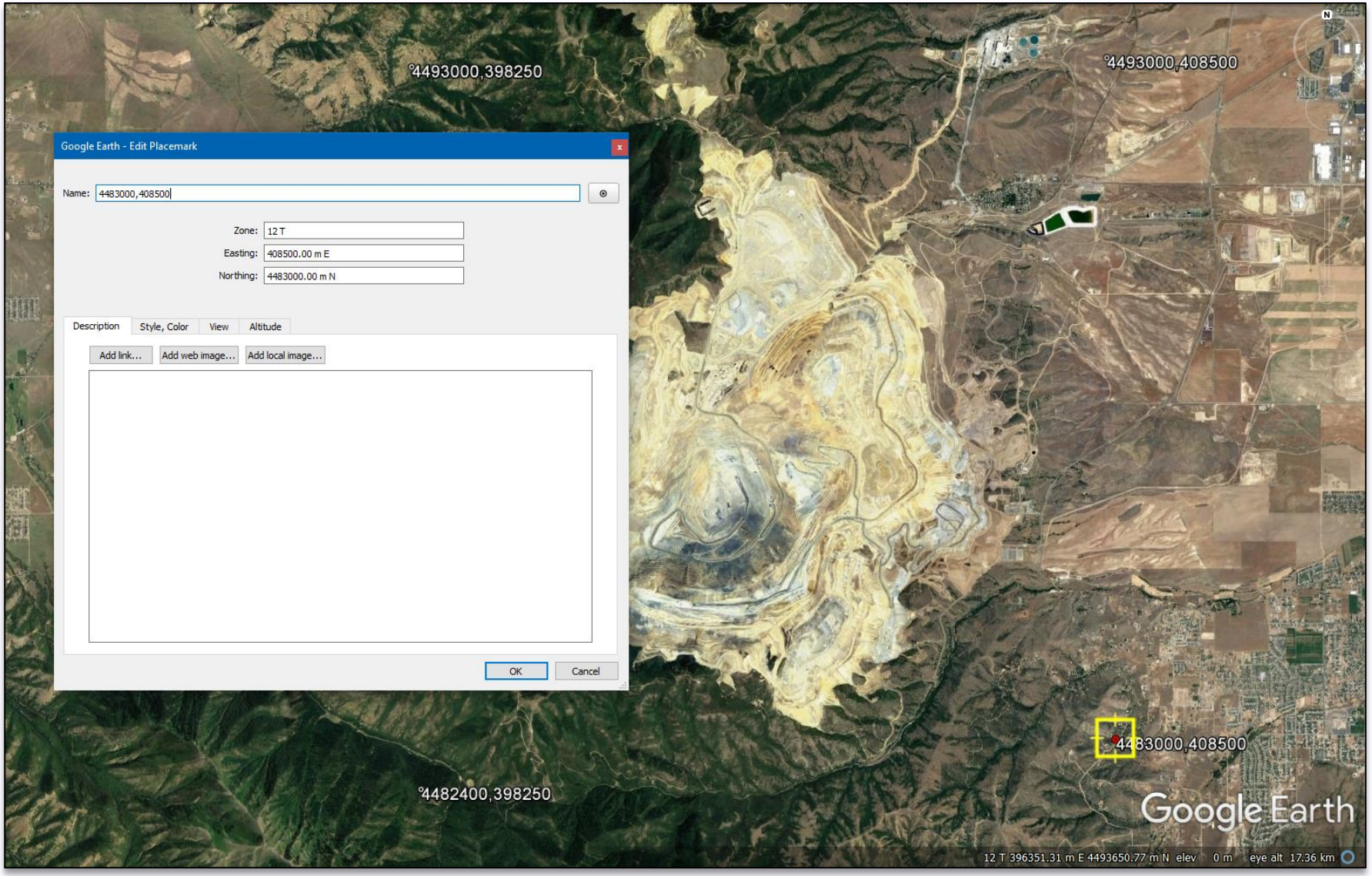
Google Earth image taken in 2013 – all drill pads and crops planted

Example 5 – Save an Image and Overlay on Topography

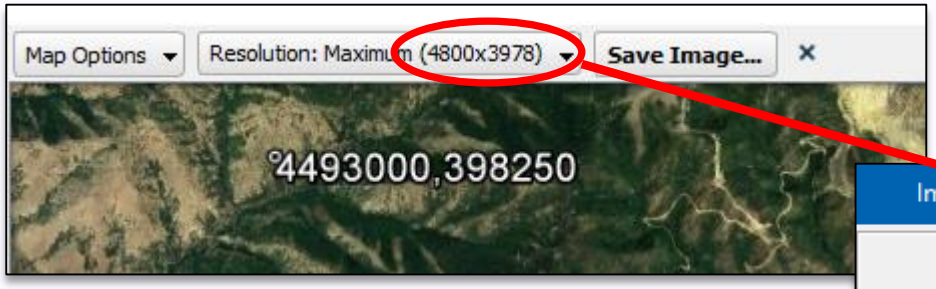
Matt Blattman who is now The Director of Technical Services for GEOVIA in North America has been using 3D printing to create 3D topography models. He asked GEOWiZ to create a 3D **Surpac** model of the Bingham Canyon mine in Arizona.



Step 1 – Search for the location in **Google Earth and** add 4 placemarks around the mine and use the co-ordinates as the point names



Step 2 – Save the image twice at the highest resolution with and without the placemarks. Enter the image resolution X and Y pixels.



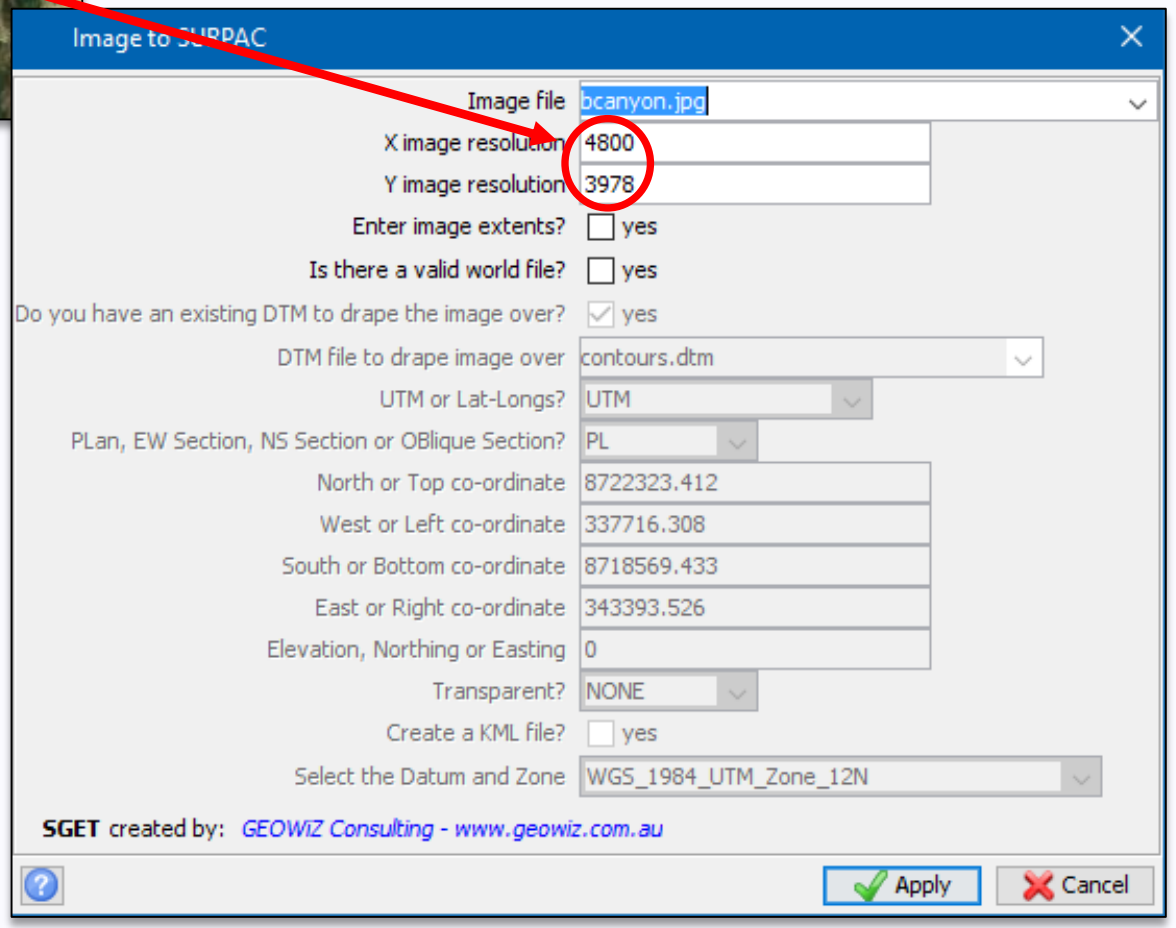
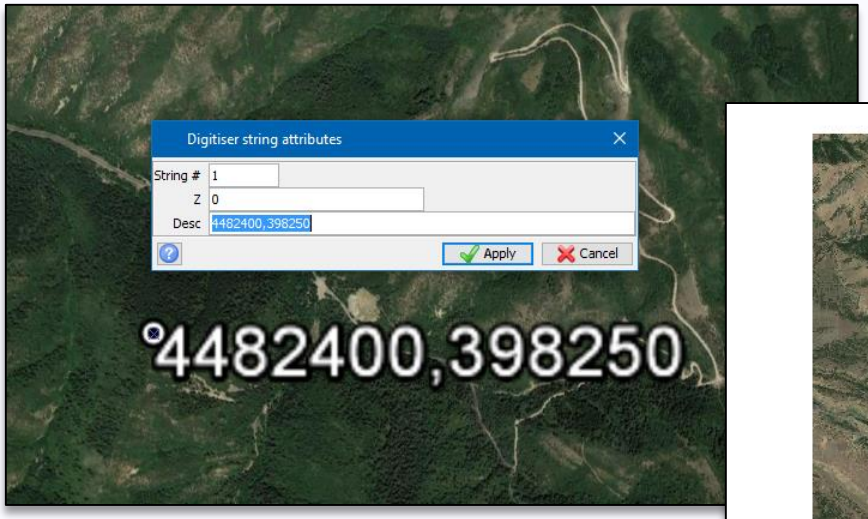


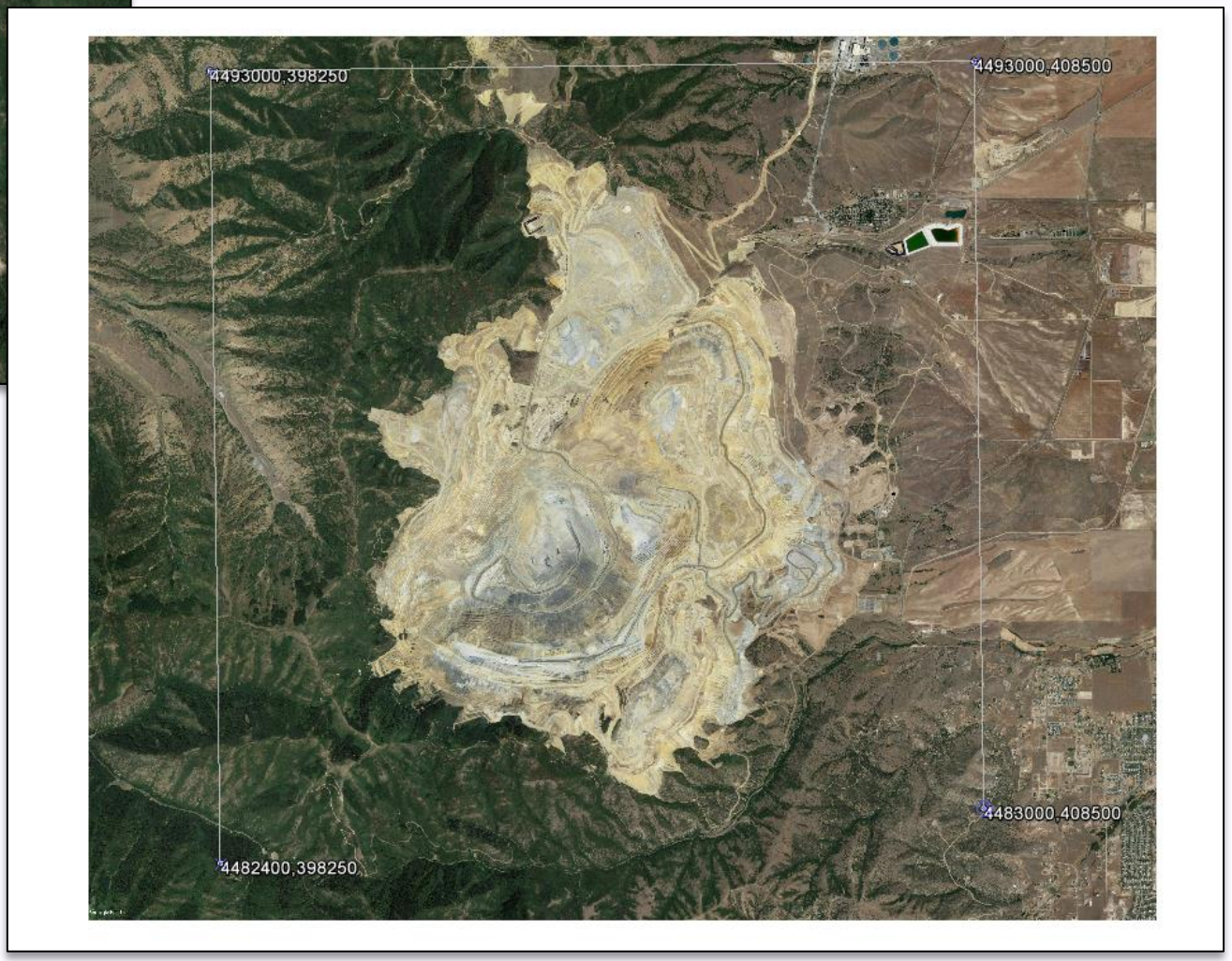
Image imported into **Surpac** with pixels used as co-ordinates

x = 4800
y = 3978

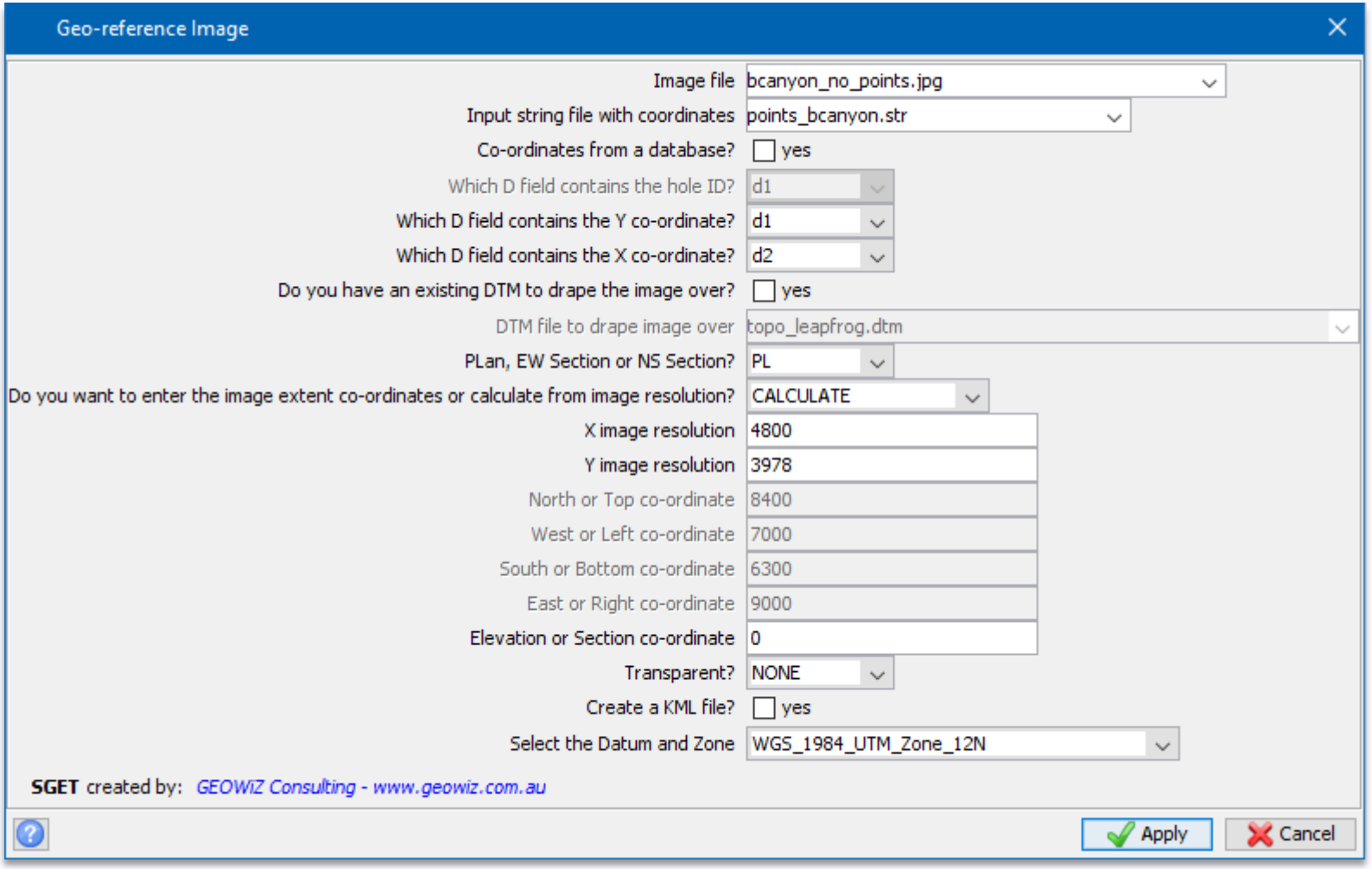
x = 0
y = 0

Step 3 – Turn on the Digitizer "Enter Attributes for Each Point" and digitize the grid points and enter the actual Y and X co-ordinate into the D1 and D2 fields

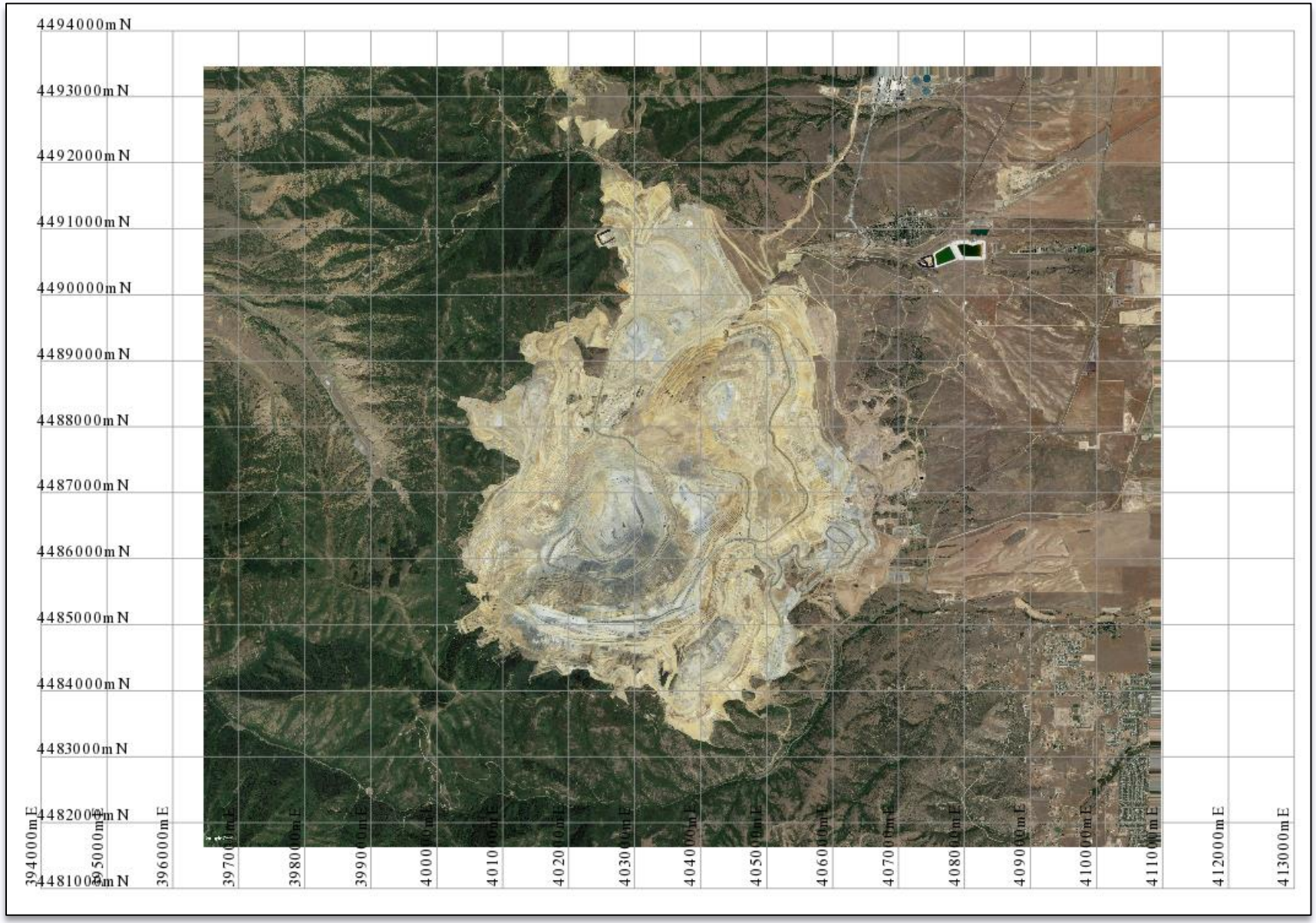




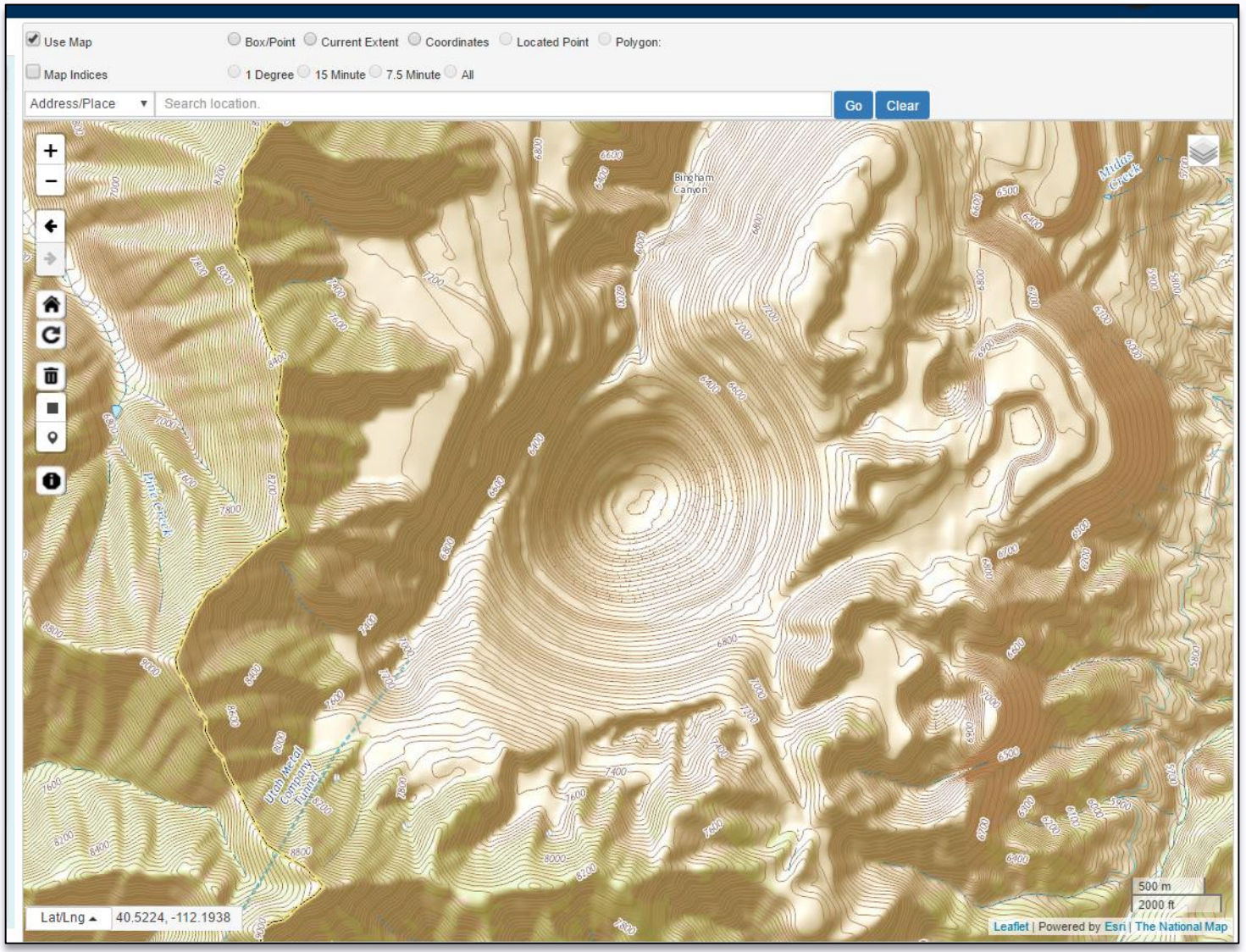
Step 4 - Use the Geo-reference tool to transform the image without the placemarks to the correct co-ordinates using the digitized points



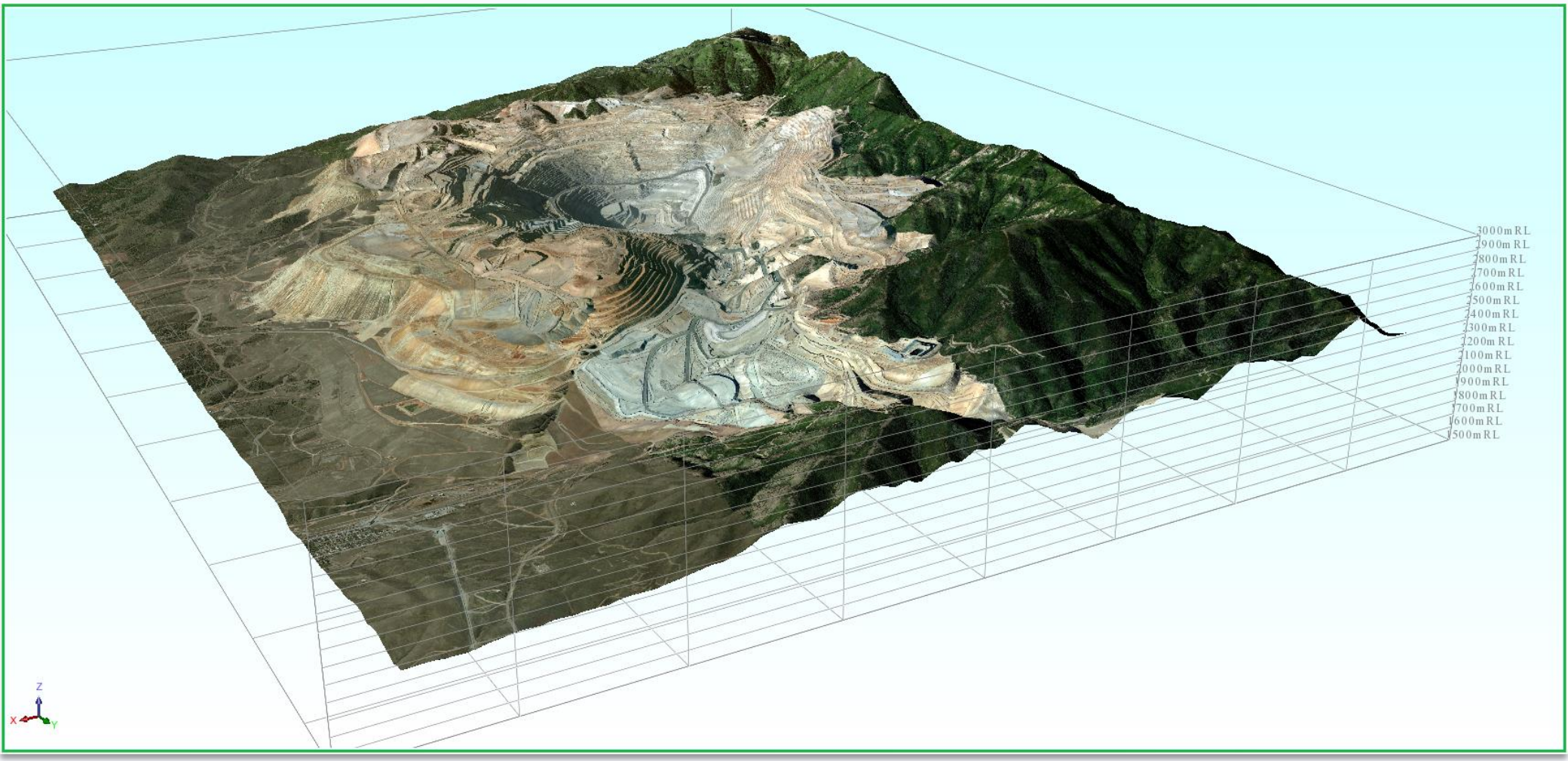
Georeferenced image in **Surpac**



Step 5 – Download the topography from the USGS National Elevation Dataset (NED) or from the ASTER Global Digital Elevation Map (GDEM) and import into **Surpac**



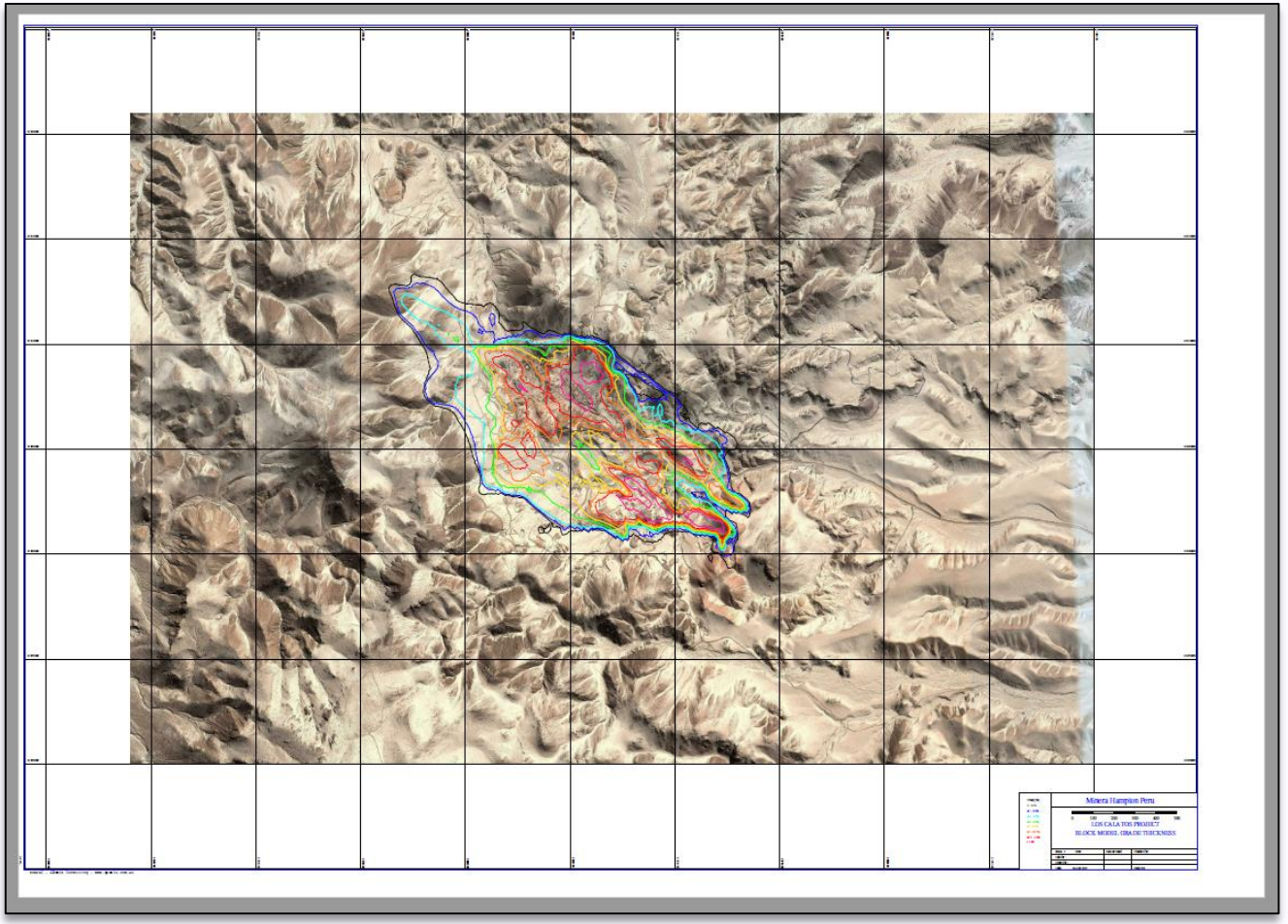
Step 6 – Re-run the Geo-reference tool but this time select the downloaded topography DTM to drape the image over.



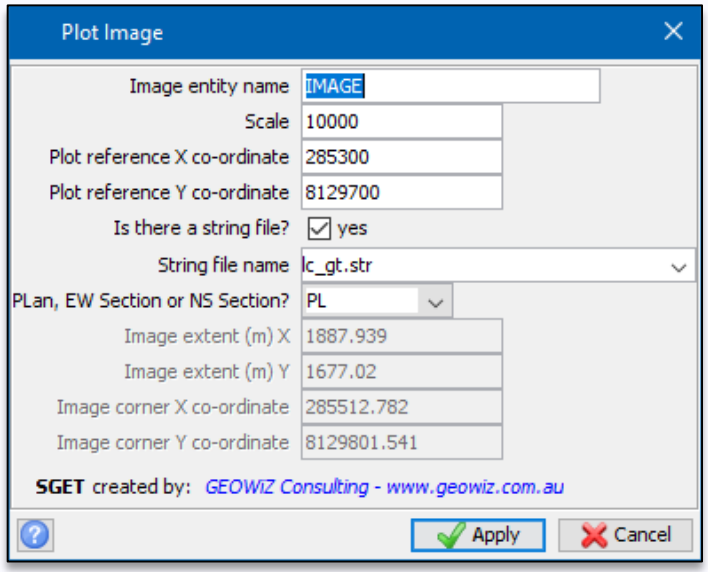
Plotting **Google Earth** images to scale from **Surpac**?

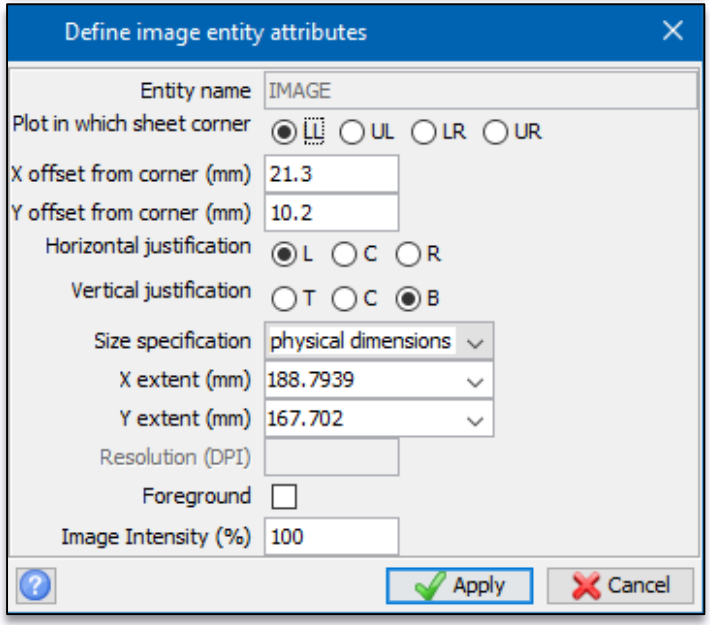
The tools used to import an image and geo-reference the image in **Surpac** also calculate the image extents and the boundary co-ordinates which can then be used to create an image entity to plot the image at a specified scale using the **Surpac** plotting functions.

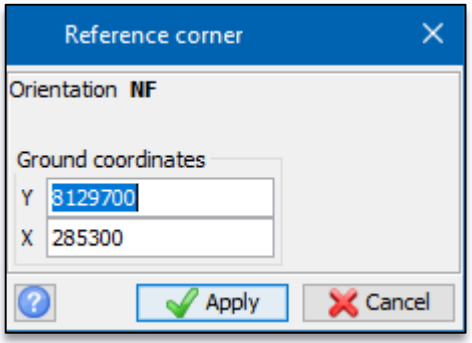
Google Earth image plotted on an A0 sheet at 1:5000 scale



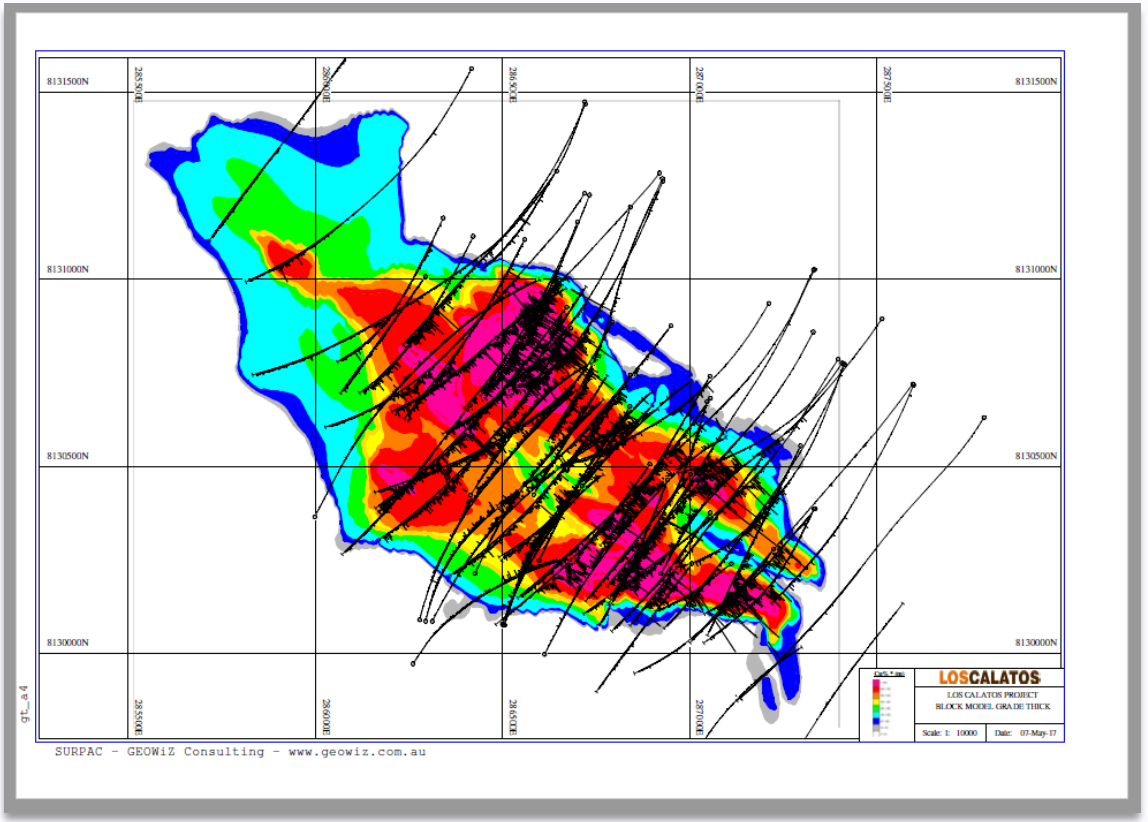
Any images saved from **Surpac** Graphics can also easily be plotted to scale



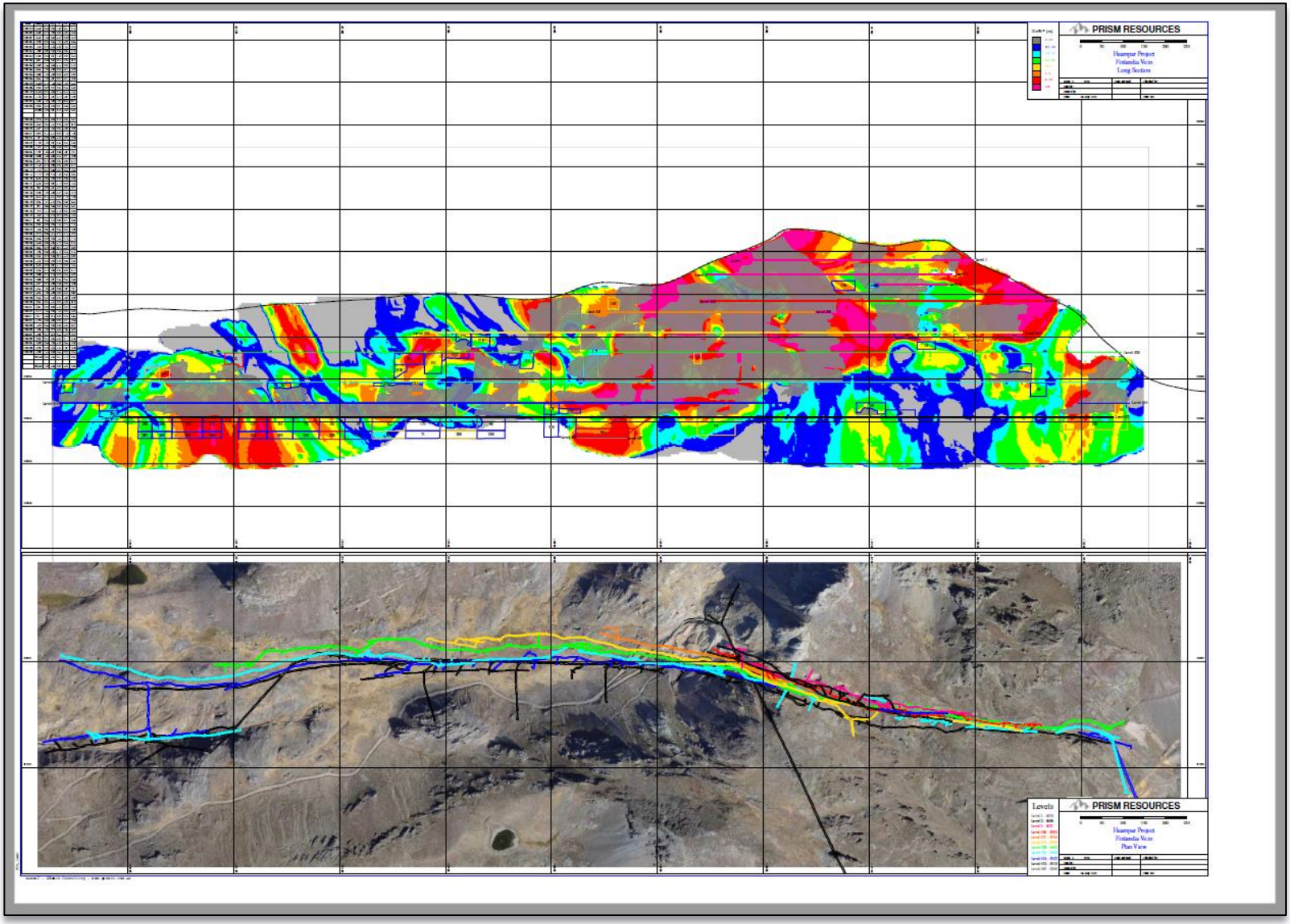




Grade thickness colour banding image on an A4 plot at 1:10000 scale

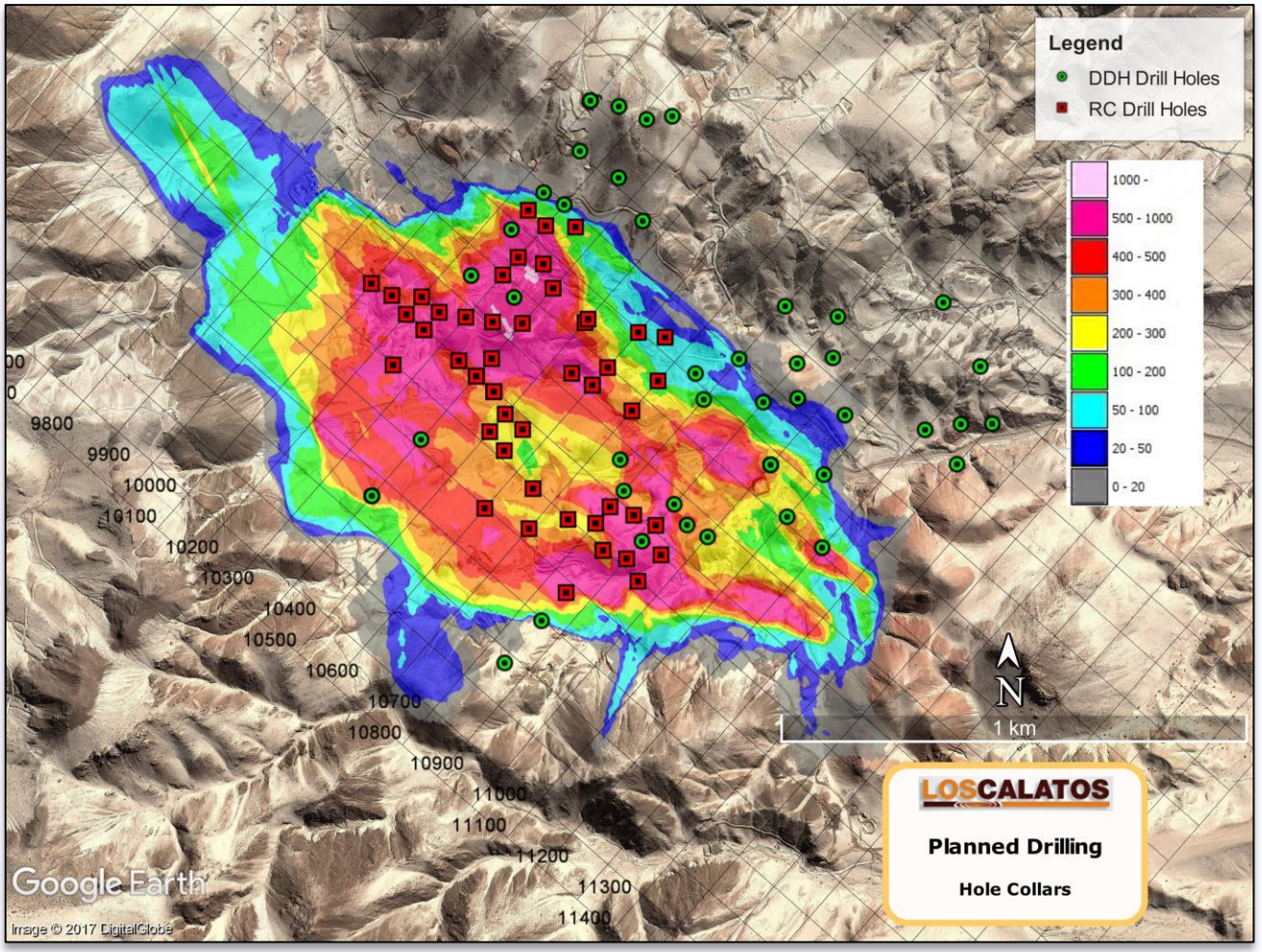


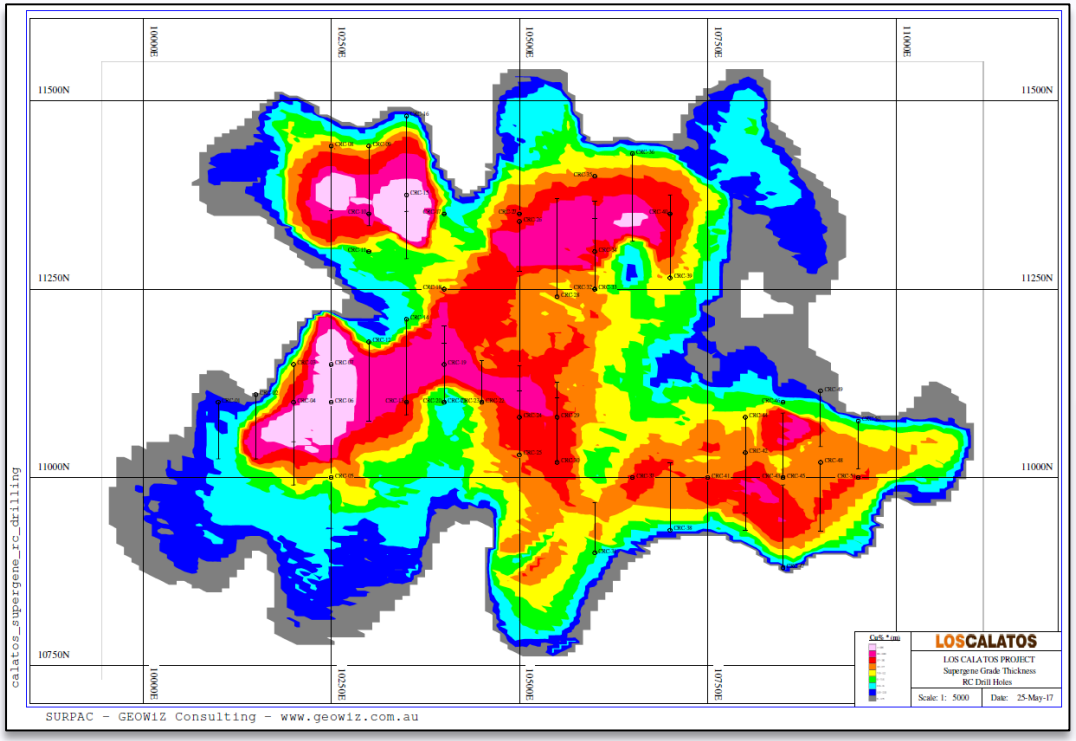
Grade thickness colour banding on long section with plan view **Google Earth** image plot on an Ao sheet at 1:2500 scale



Plotting **Surpac** data from **Google Earth**?

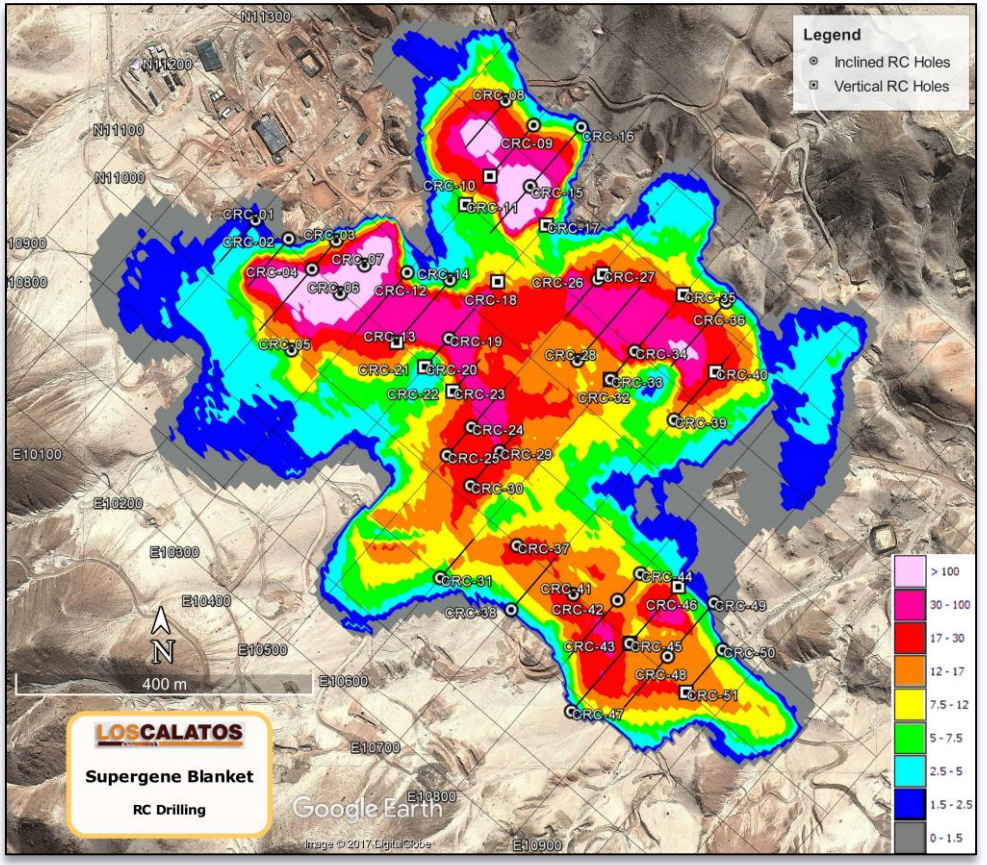
High quality images can be saved from **Google Earth** and although they cannot be printed to scale, local grids and a scale bar can be displayed.



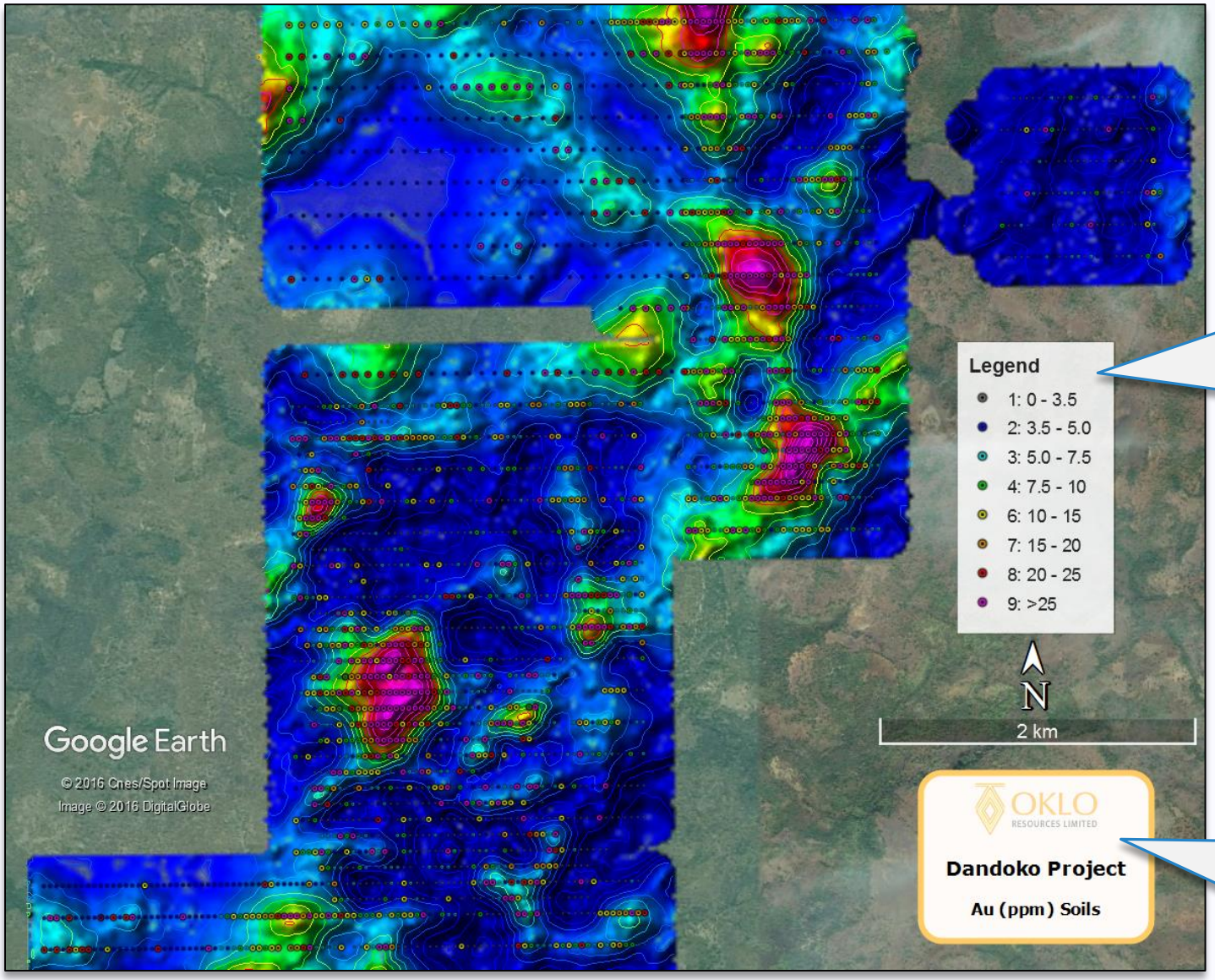


Surpac A4 plot at 1:5000 scale

Google Earth image at 4800 x 4205 pixels



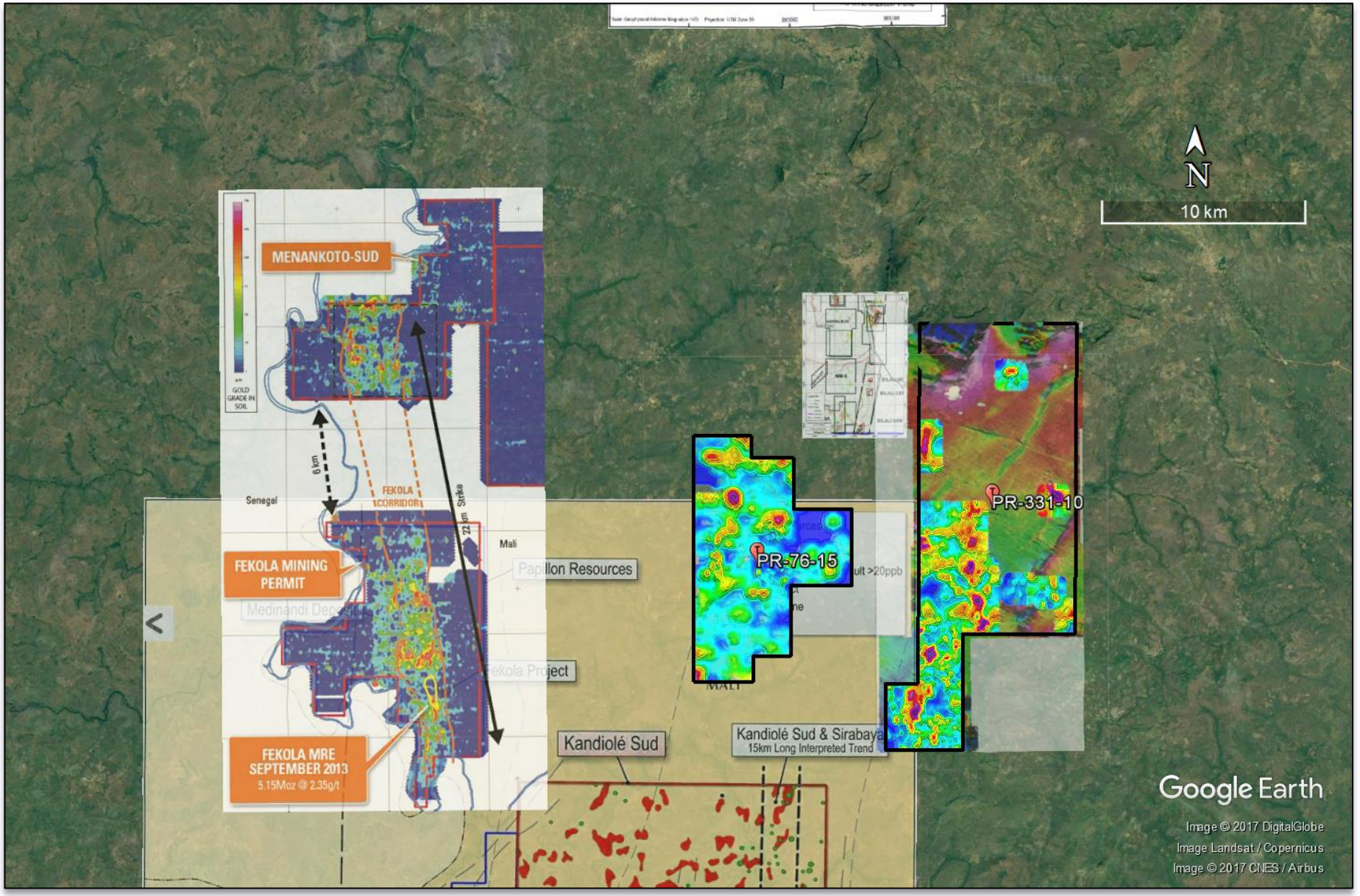
Soil geochem image with soil samples classified by Au grade



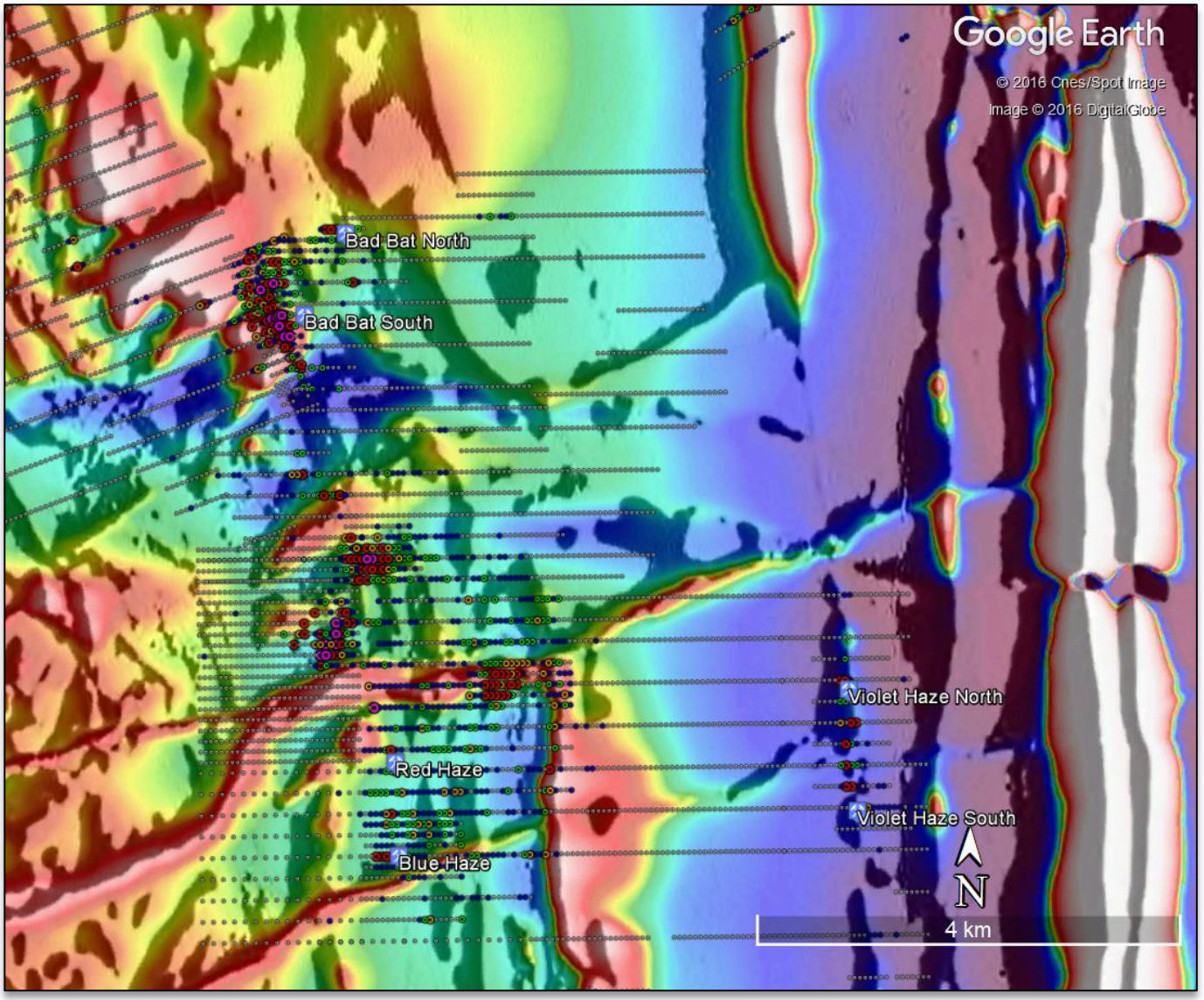
Google Earth *creates a legend based on the displayed elements which can be customized*

Company logos can be included in title blocks which can be saved to use again

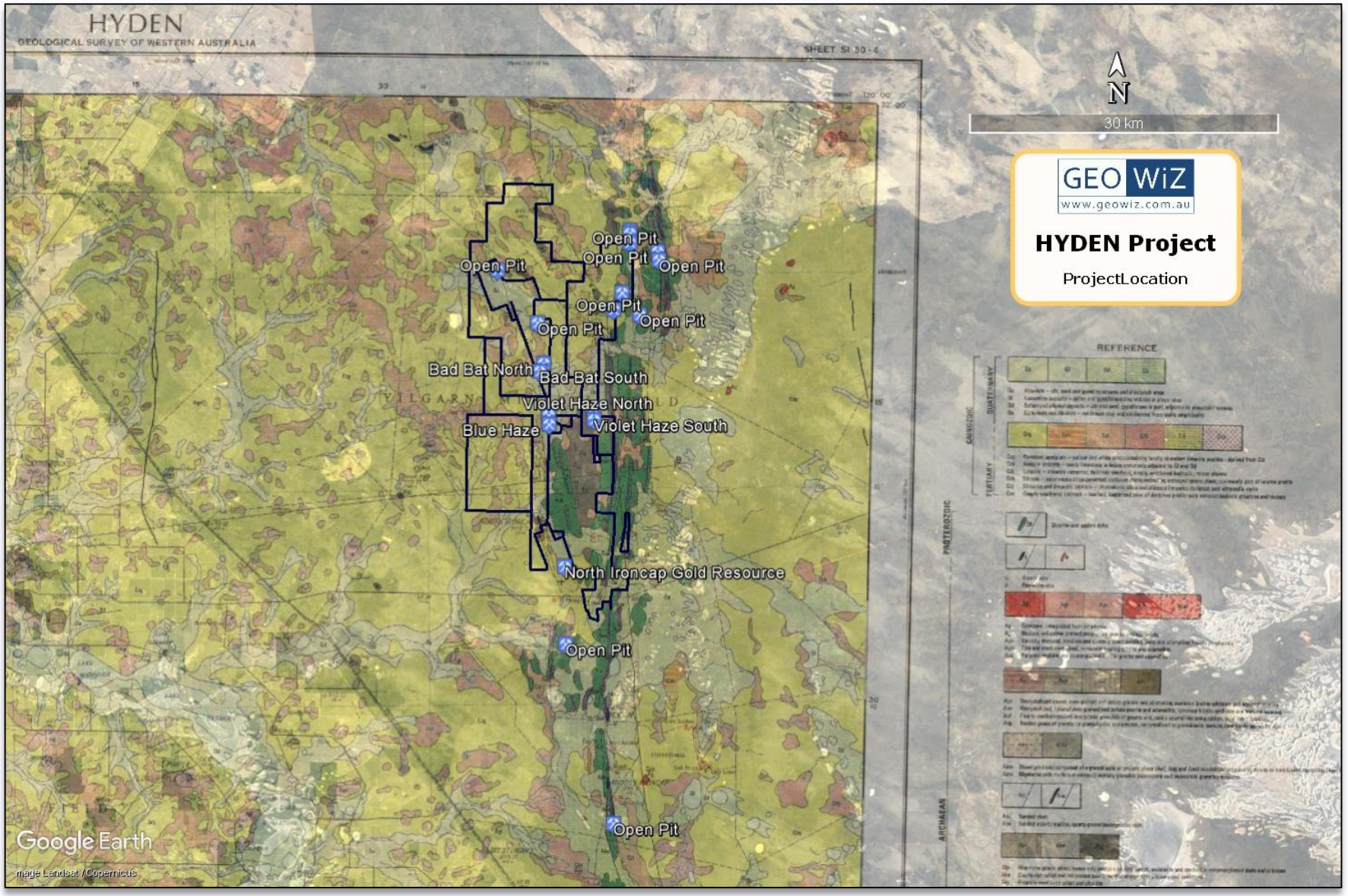
Overlay images taken from other company public reports



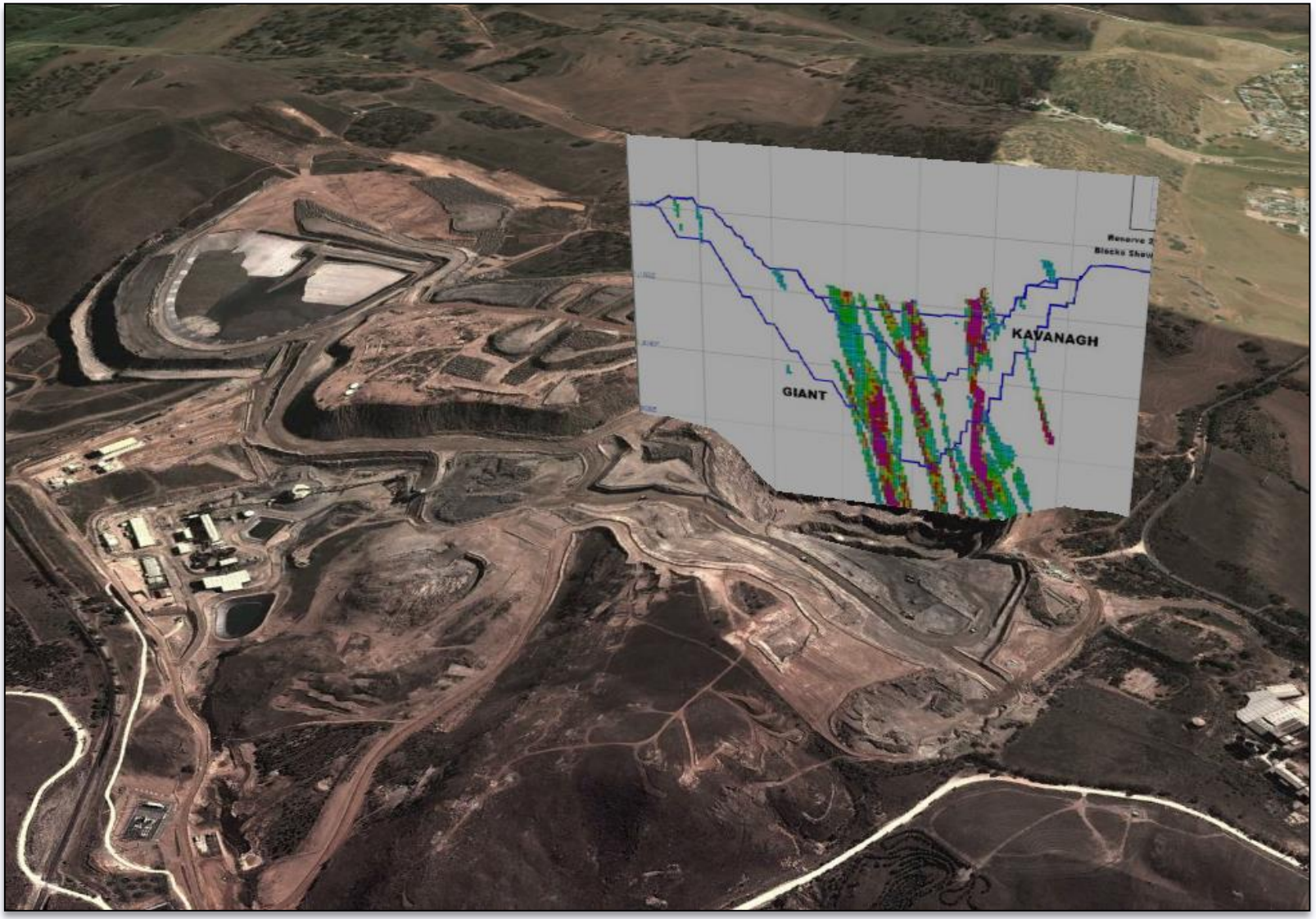
Import large image files eg. Airborne magnetics



Geological Survey 1:250k Geology Sheets



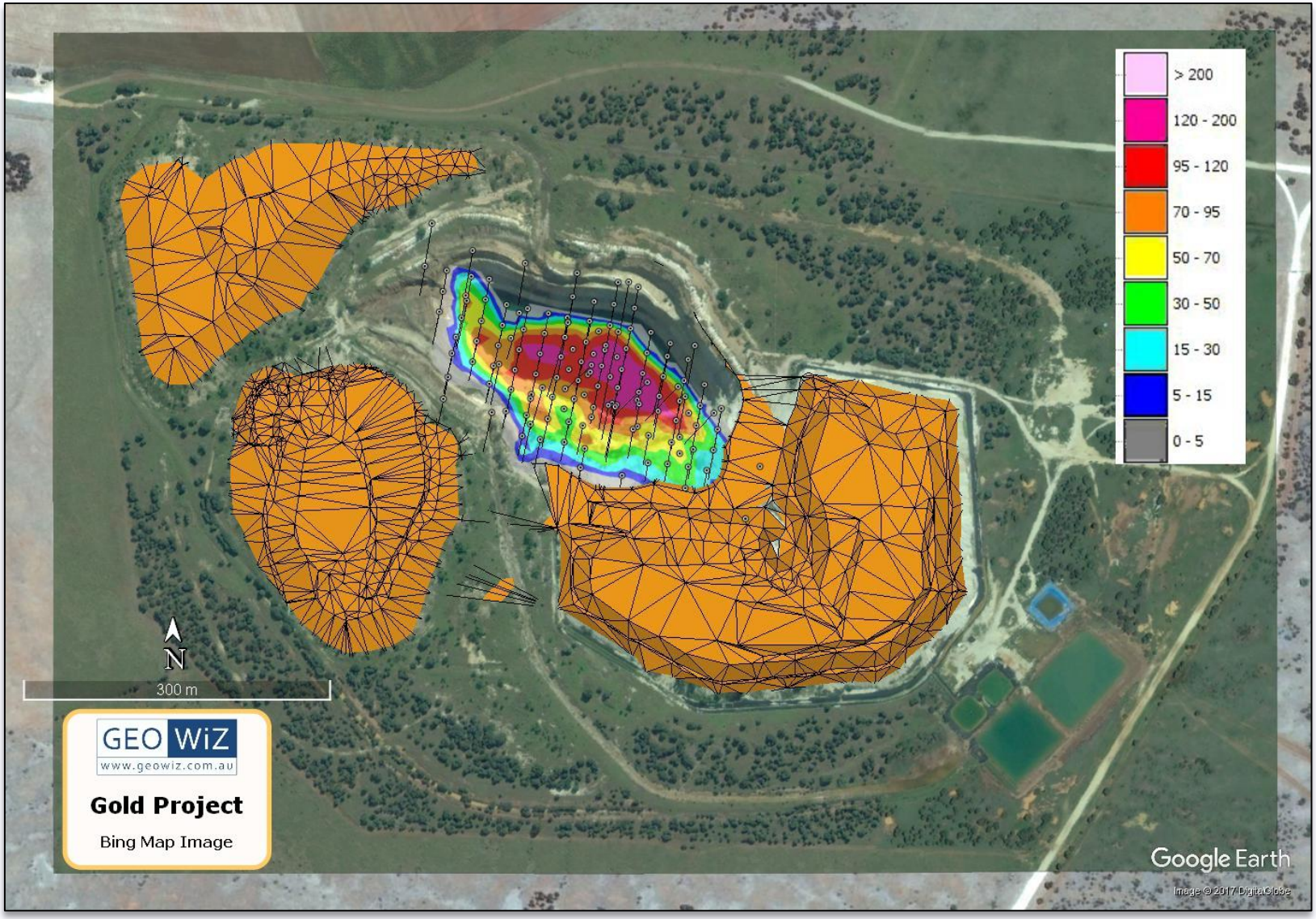
Show section images clipped from online reports



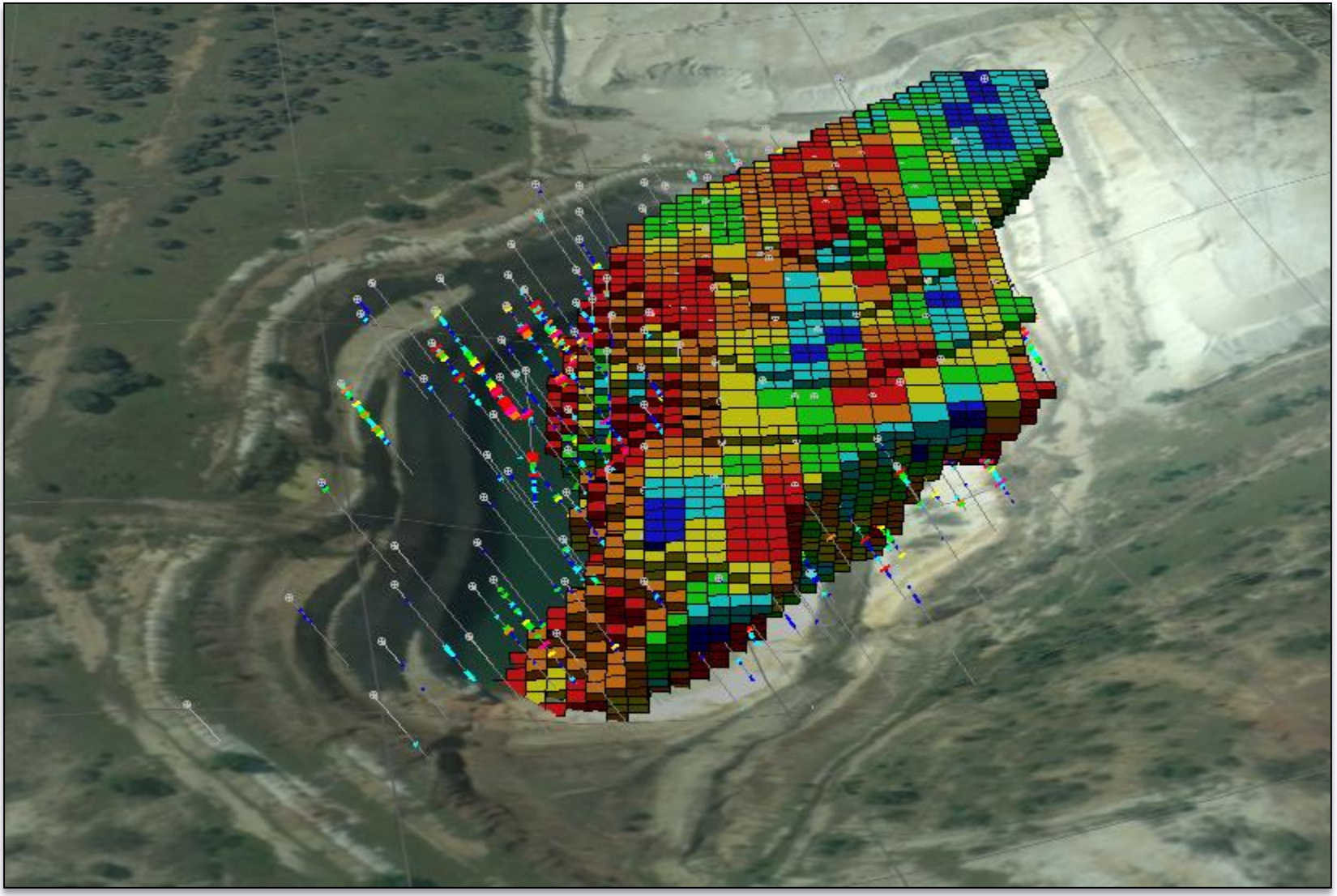
Sometimes **Google Earth** image is to old or unclear

Import image from **Bing Maps** into **Google Earth**

Overlay drill holes and block model grade-thickness over the **Bing Map** image in **Google Earth**



Import the **Bing Map** image into **Surpac** and display with drill holes and block model

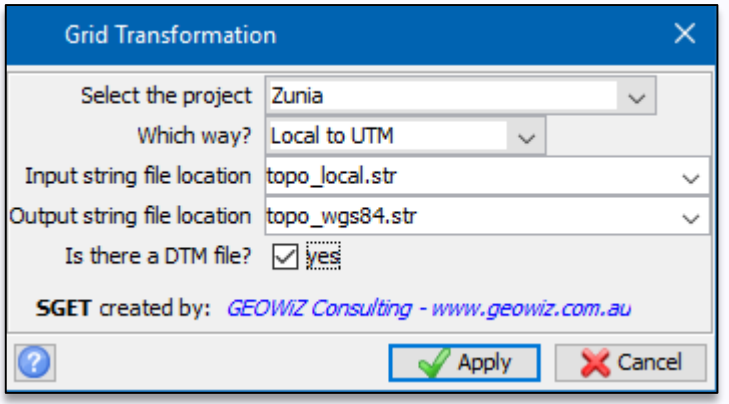


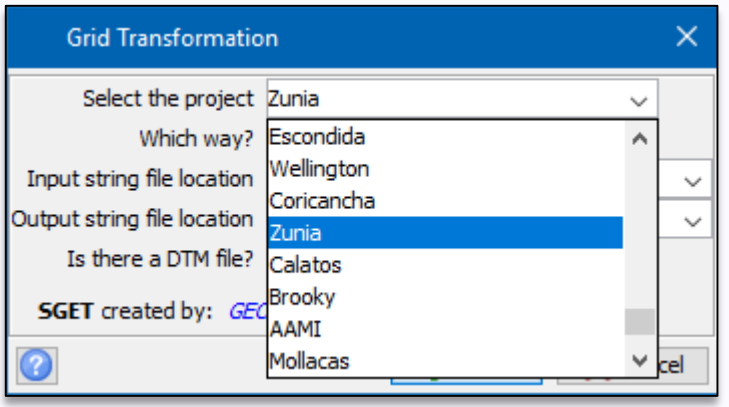
Additional **Surpac** Macros

Grid transformation from a central text file

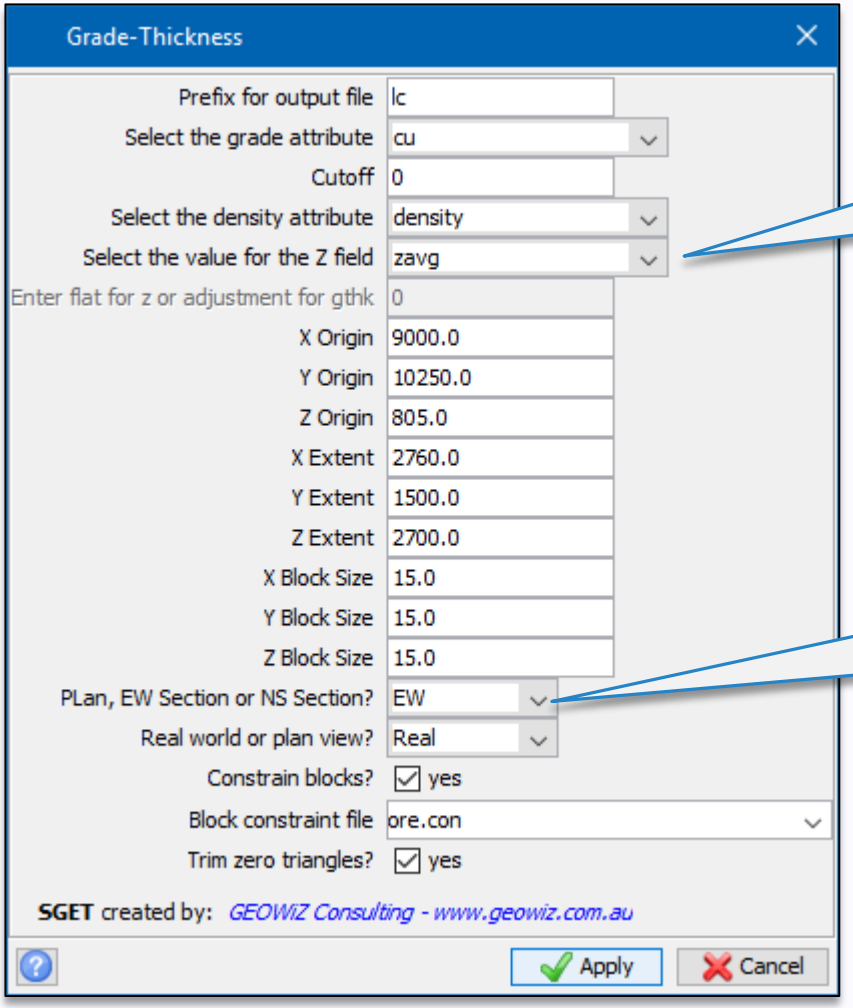
Grid transformations can be either 2 point method or 1 point and a rotation

```
############################################################
project : Coricancha
y_utm   : 8696744.798
x_utm   : 358912.992
y_local : 0
x_local : 0
ang_deg : 205.50
z_diff  : 0.0
############################################################
project : Zunia
y_utm   : 8130623.767
x_utm   : 286346.913
y_local : 11000
x_local : 10300
ang_deg : 40.000
z_diff  : 0.0
############################################################
project : Calatos
y_utm1  : 8130623.767
x_utm1  : 286346.913
y_loc1  : 11000
x_loc1  : 10300
y_utm2  : 8130342.863
x_utm2  : 288004.047
y_loc2  : 11850
x_loc2  : 11750
z_diff  : 0.0
############################################################
```





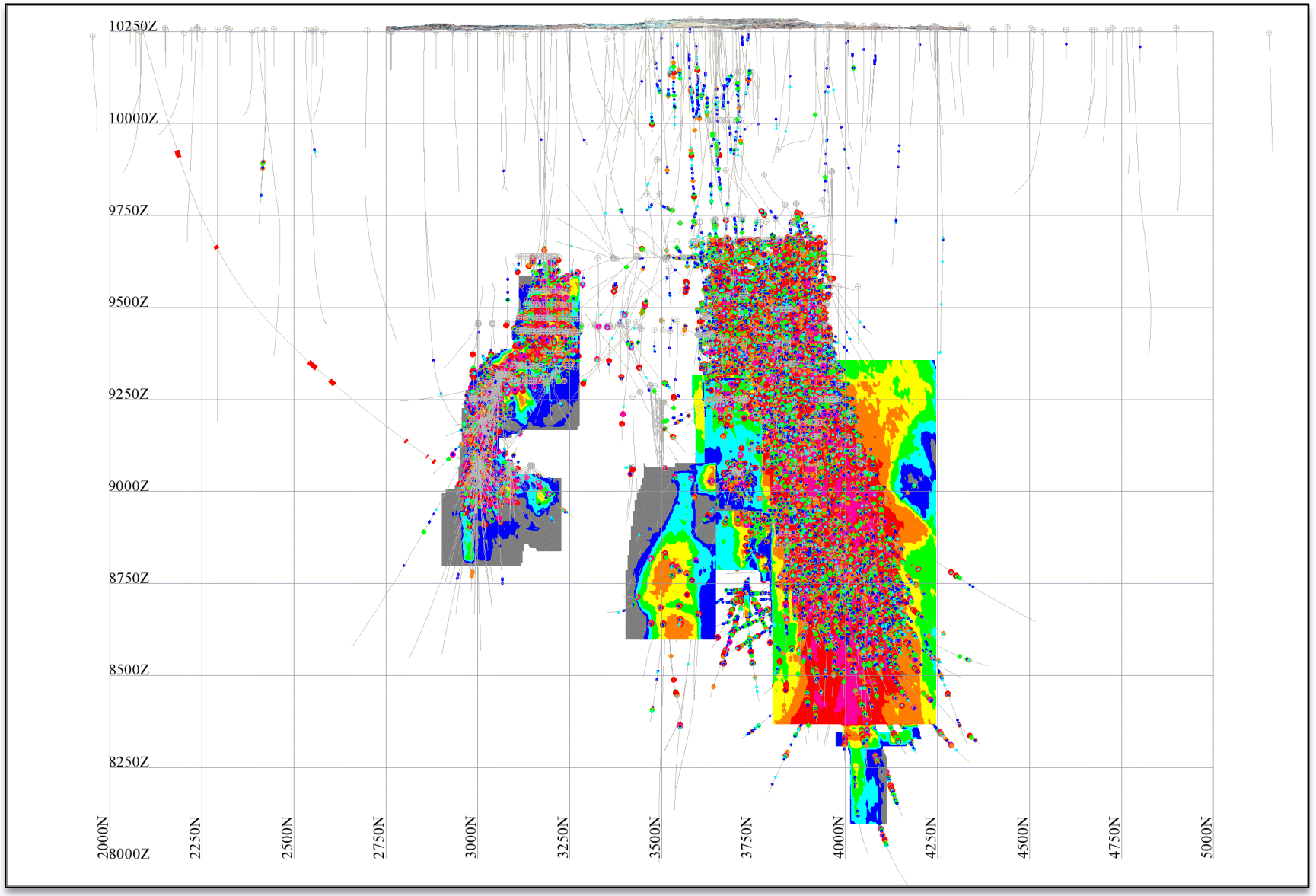
Automatically generate grade-thickness images from block models including Vulcan and Datamine models.

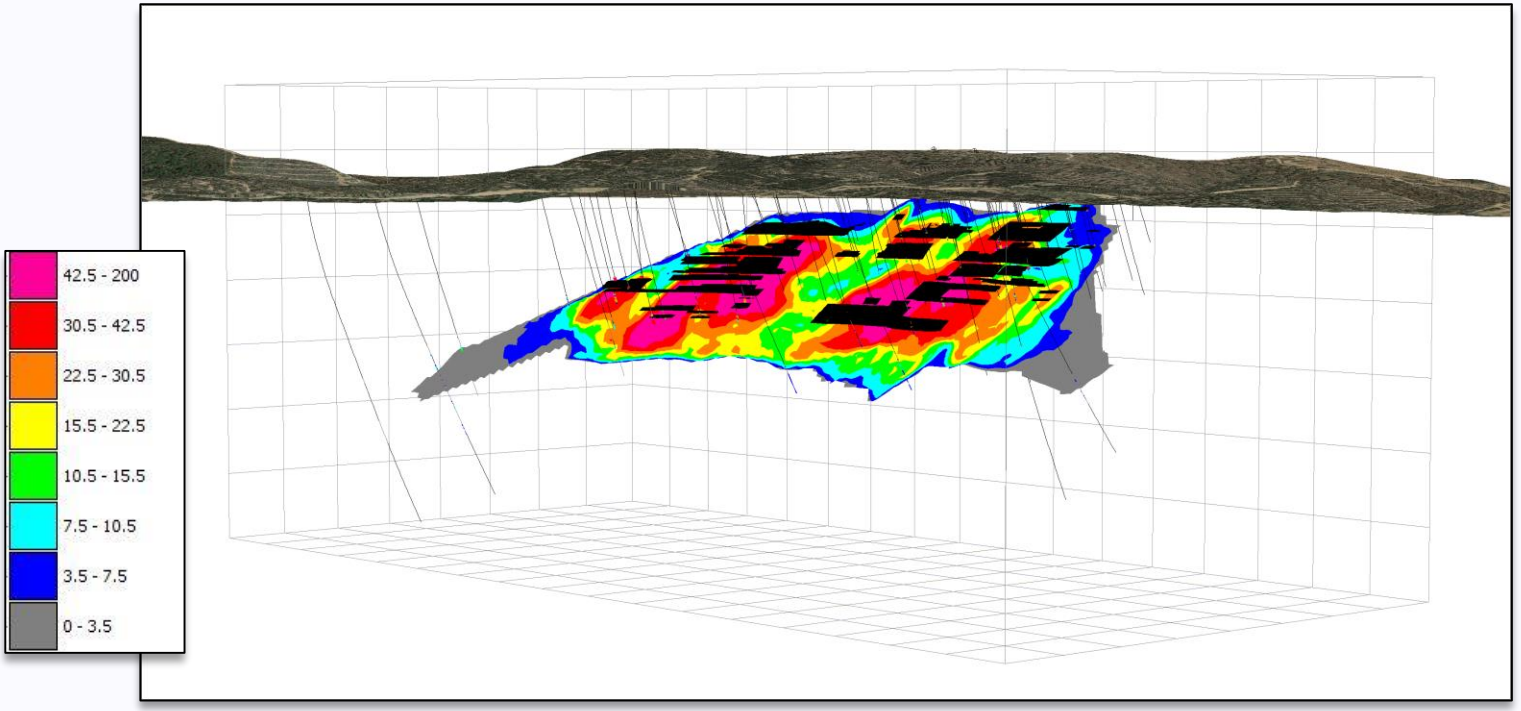


- *gthick*
- *flat*
- *zavg*

- *plan*
- *east-west*
- *north-south*

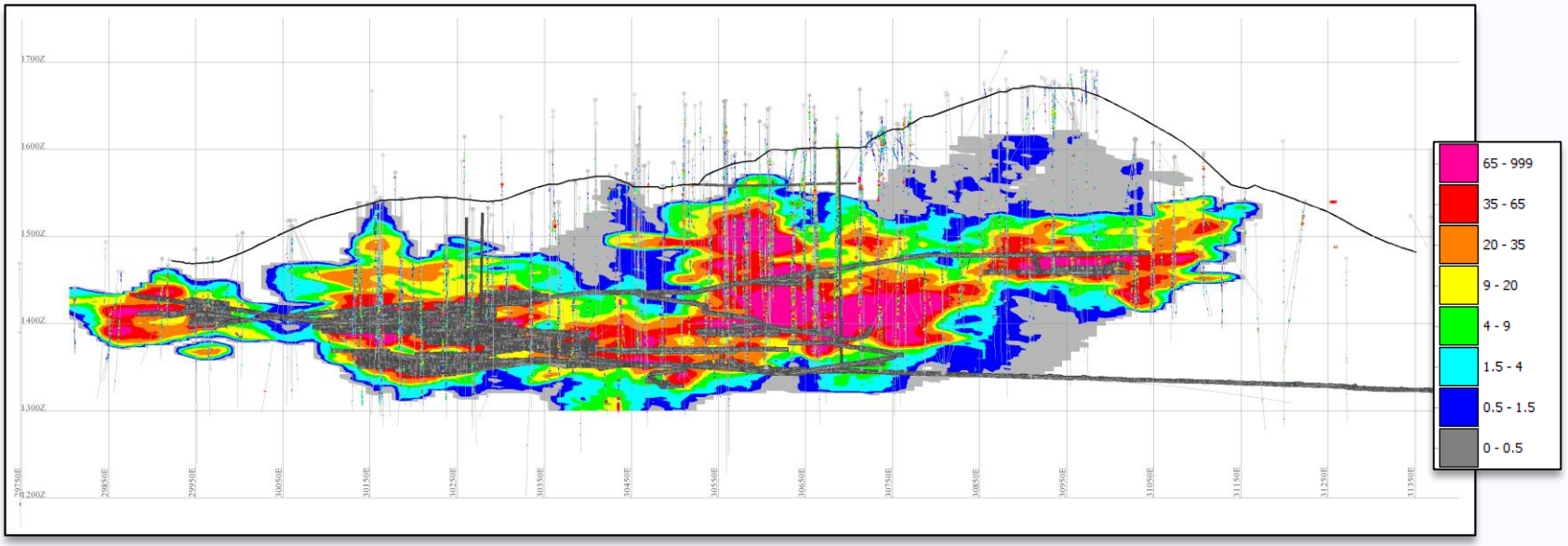
Grade-thickness images generated from multiple Vulcan block models



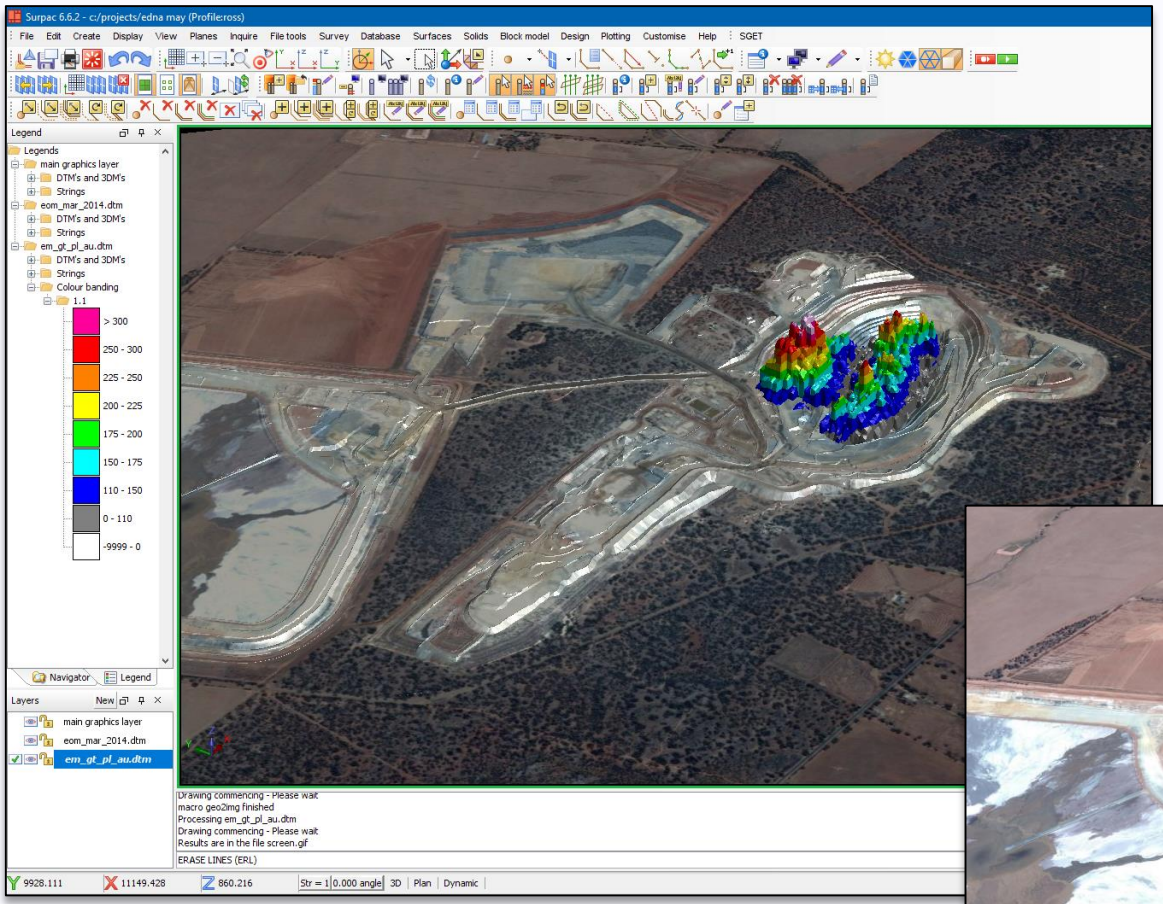


Plan with Z values averaged

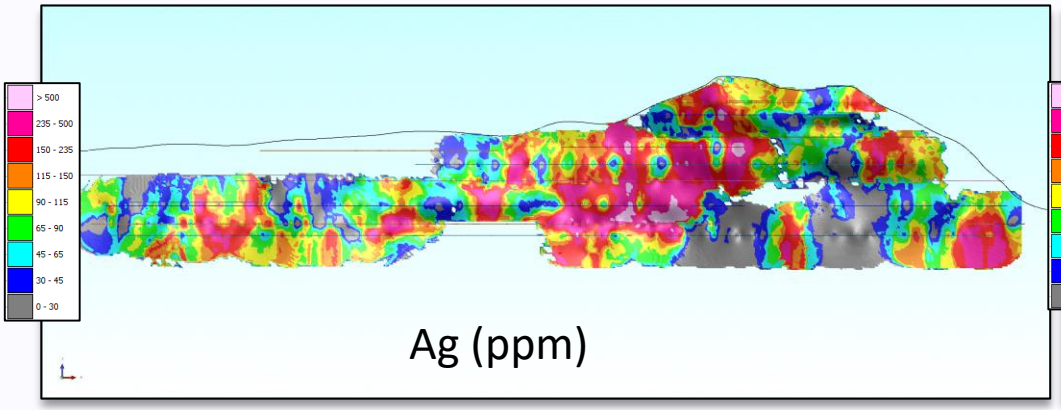
East-West Long section



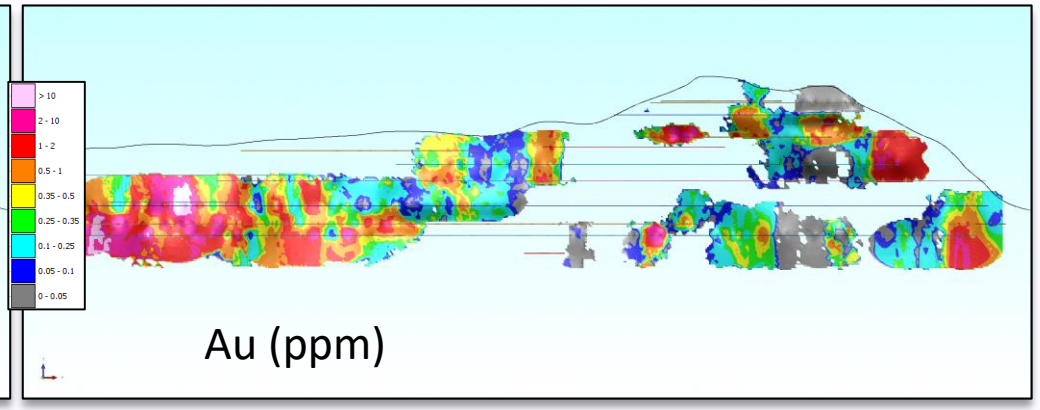
Plan with
grade-thickness
as Z values



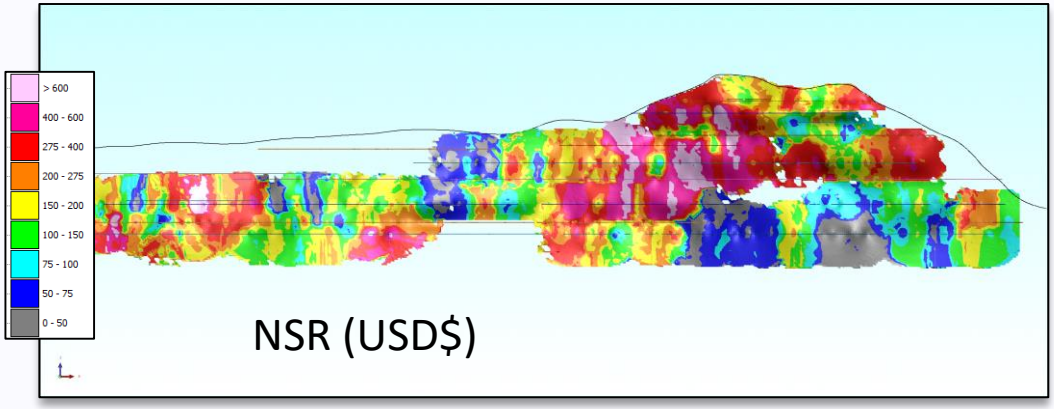
Surpac Graphics



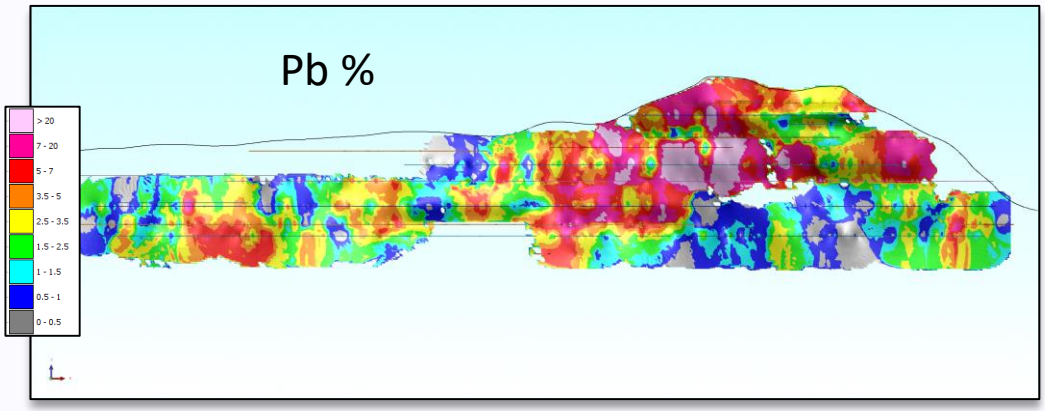
Ag (ppm)



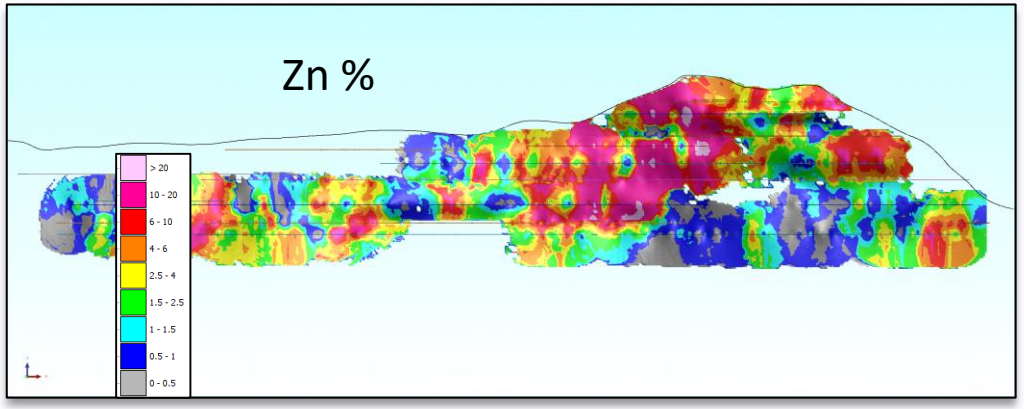
Au (ppm)



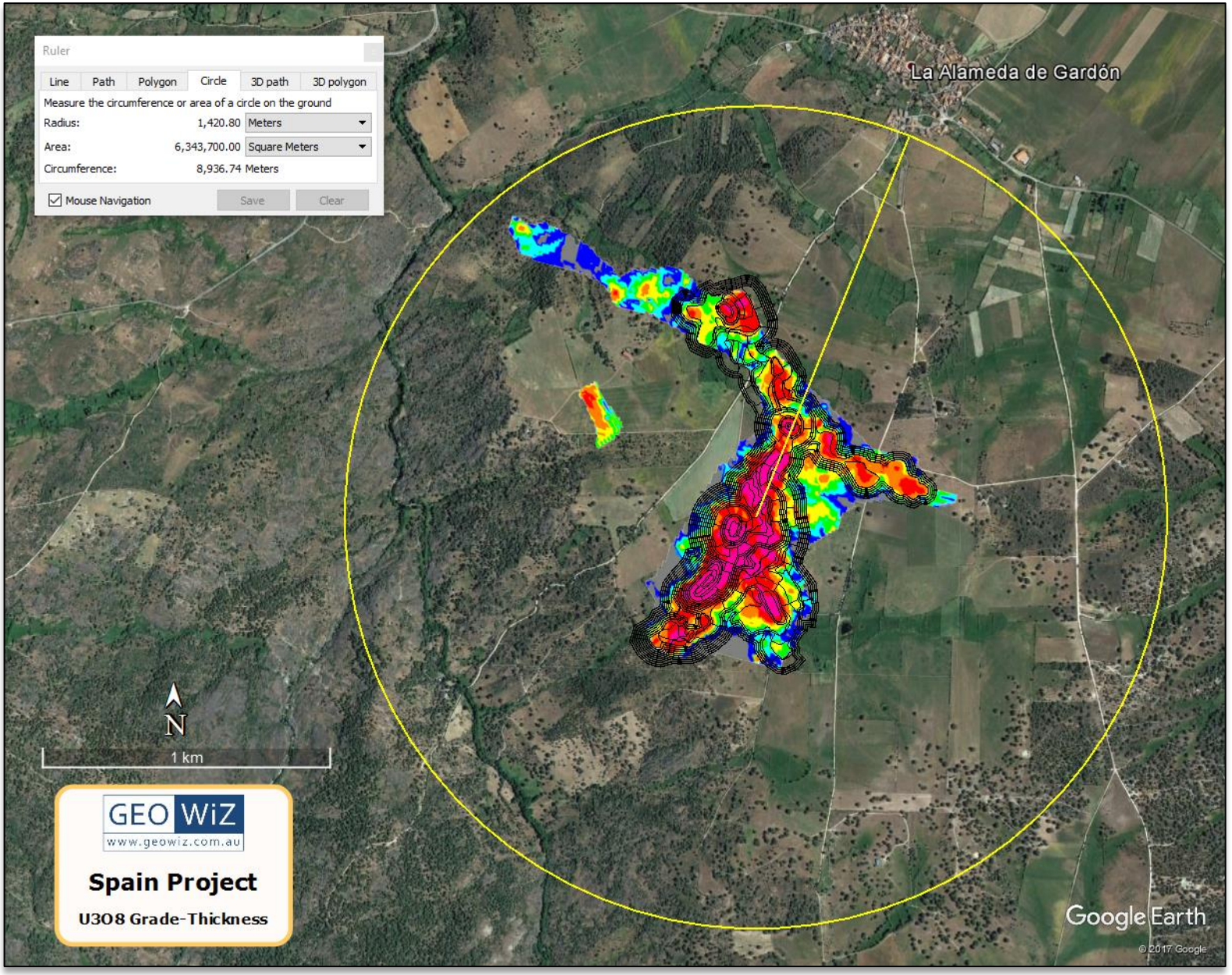
NSR (USD$)



Pb %

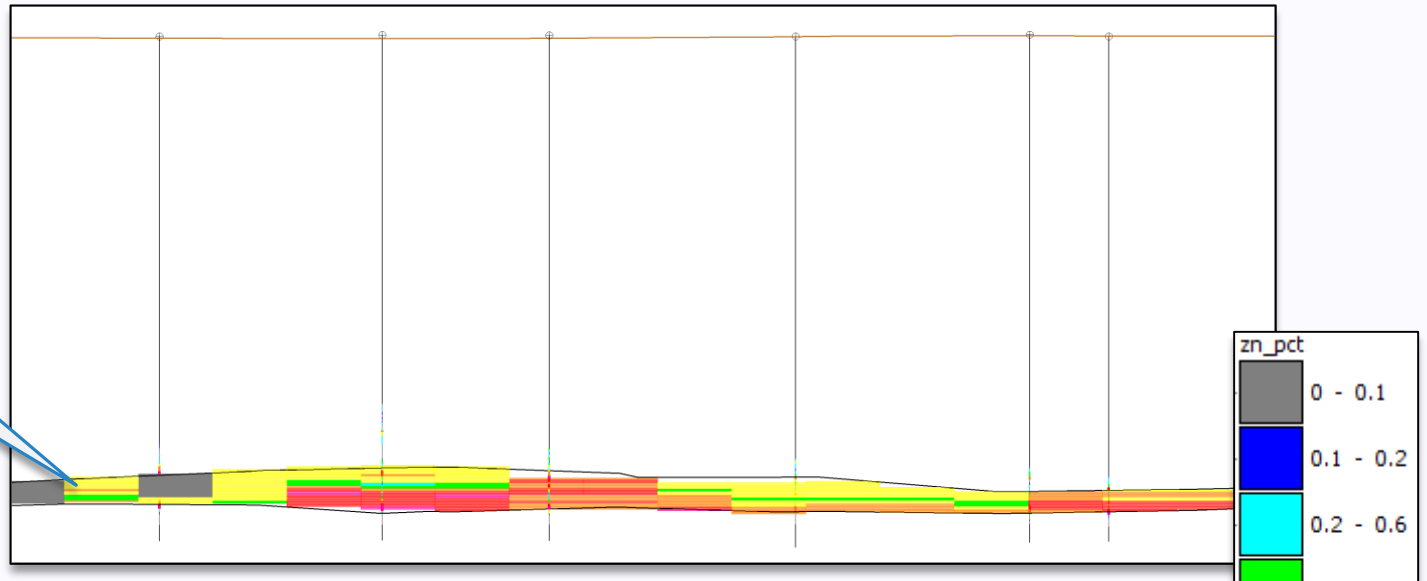


Zn %


Ruler
Line
Path
Polygon
Circle
3D path
3D polygon
Measure the circumference or area of a circle on the ground
Radius: 1,420.80 Meters
Area: 6,343,700.00 Square Meters
Circumference: 8,936.74 Meters
Mouse Navigation
Save
Clear
La Alameda de Gardón
N
1 km
GEO WiZ
www.geowiz.com.au
Spain Project
U3O8 Grade-Thickness
Google Earth
© 2017 Google

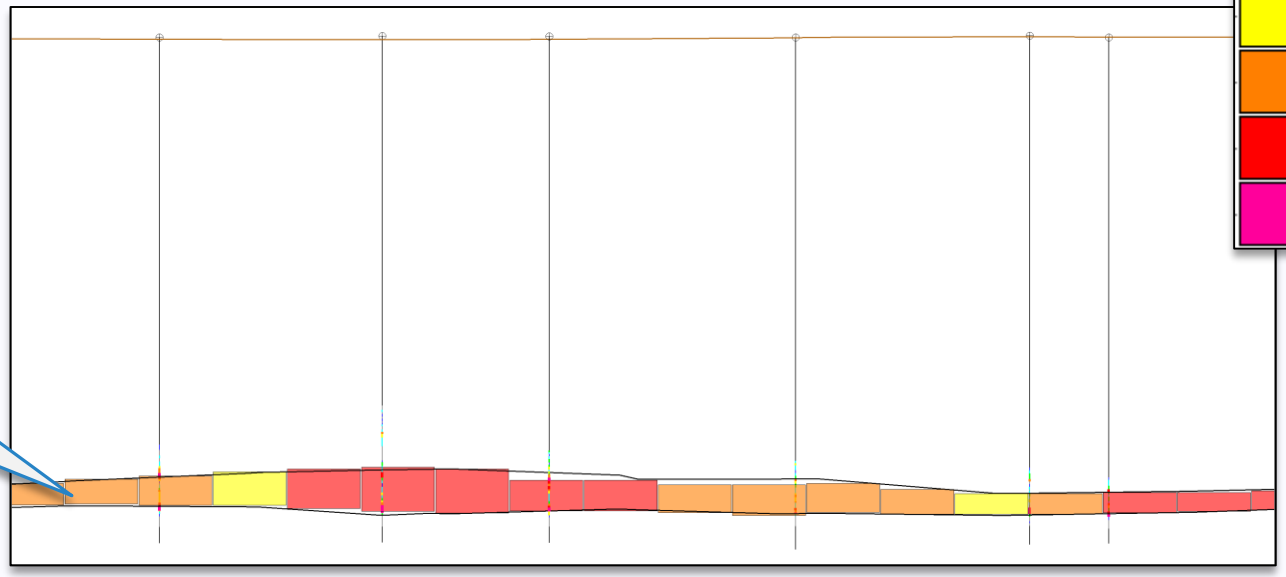
Grade-thickness output can also be used to create 2D block models

***Surpac** block model with fixed "z" block size*



eg. replacement stratiform Pb-Zn deposit in Poland

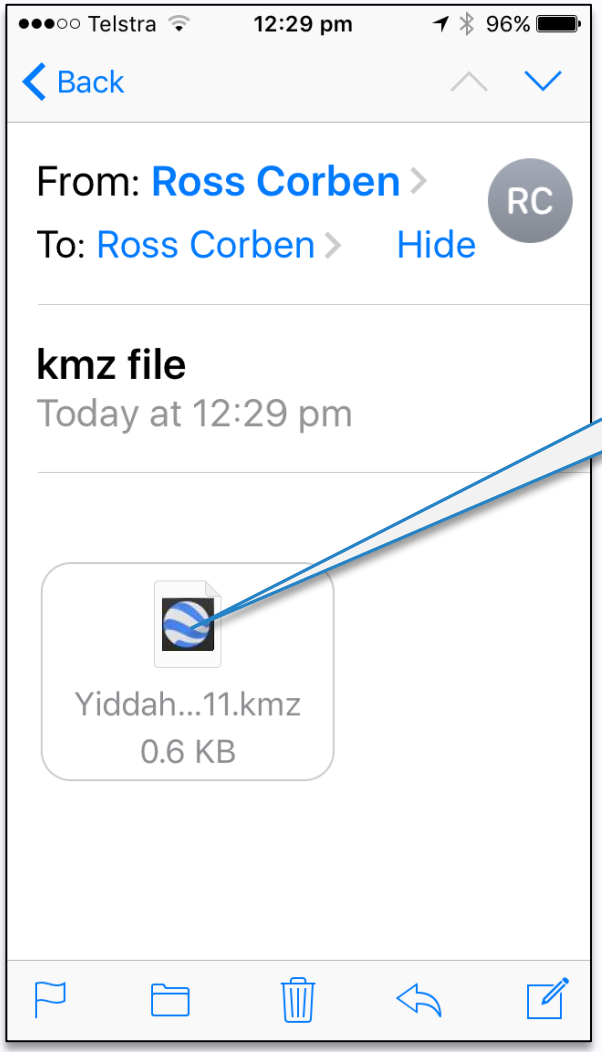
***Surpac** free block model with variable "z" elevation and block size*



Display **Surpac** data in **Google Earth** on a mobile phone

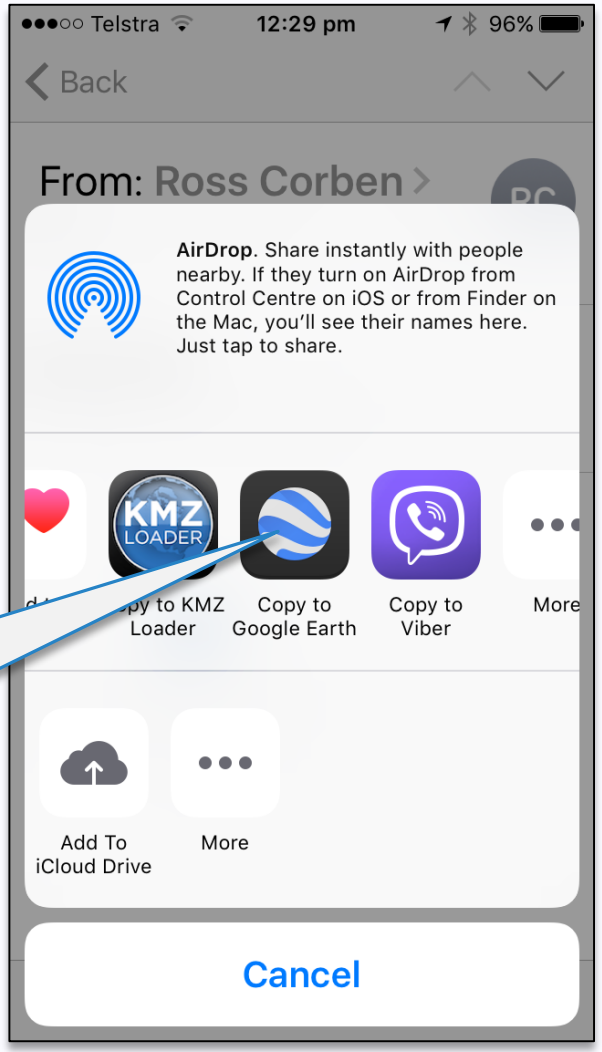
- **Google Earth** is available as a free downloadable app on all mobile devices
- KMZ/KML files can be directly opened from email attachments
- Placemark balloons can be viewed by tapping the placemark icon
- KMZ/KML files can be stored in other free apps and opened in **Google Earth** at any time
- Your current location can be shown as a blue dot

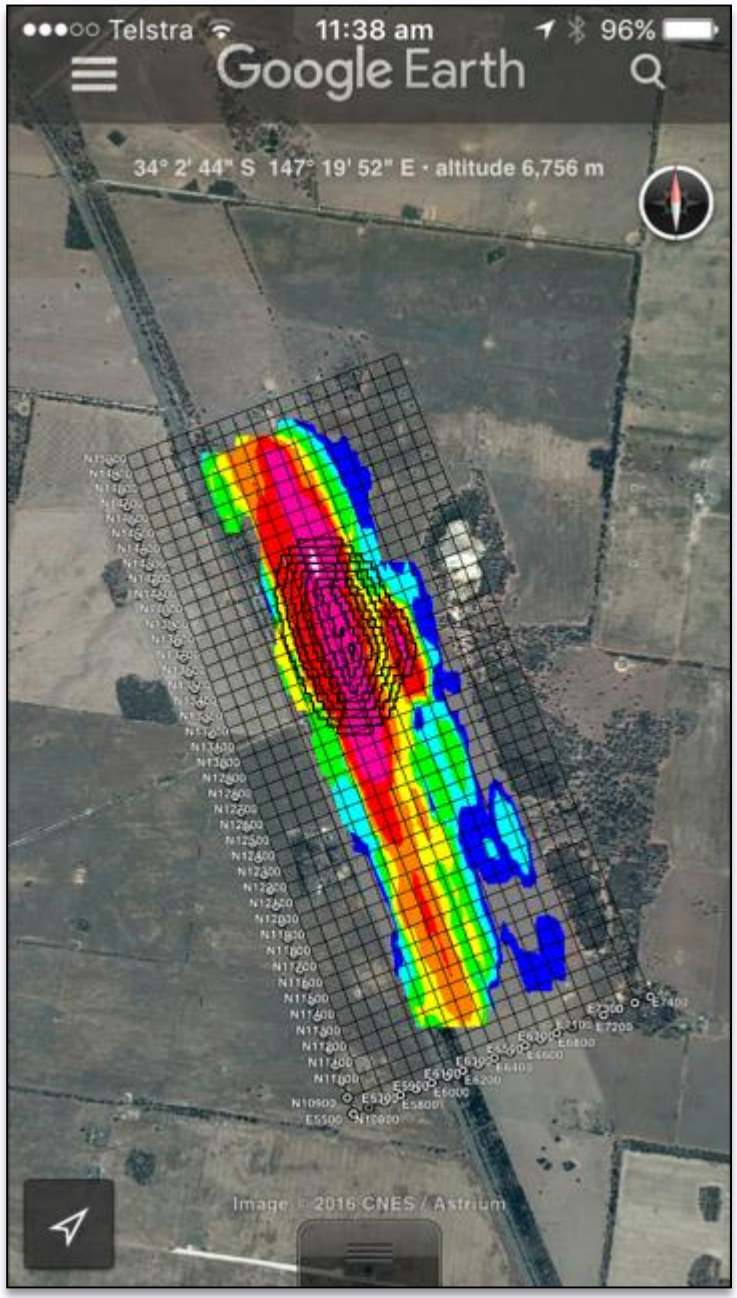
Double click on email attachment and select **Google Earth** icon



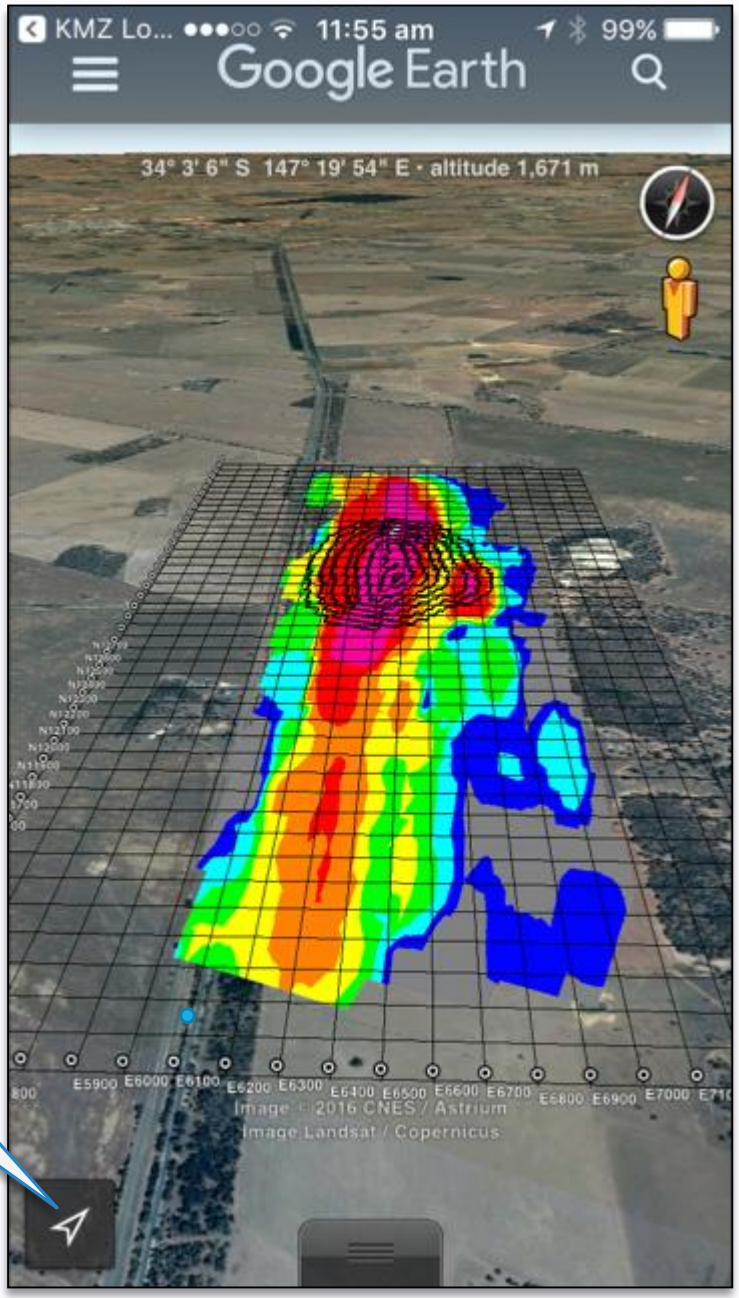
Tap on the KMZ file email attachment

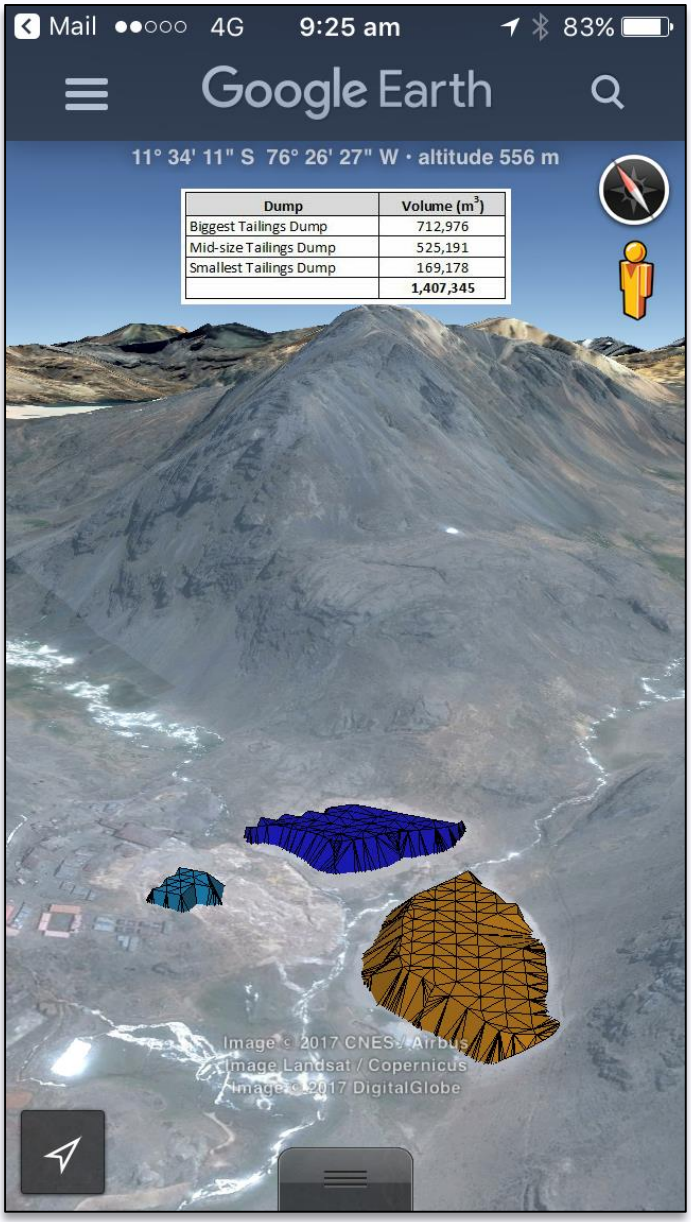
Tap on the Google Earth App to open KMZ file and display



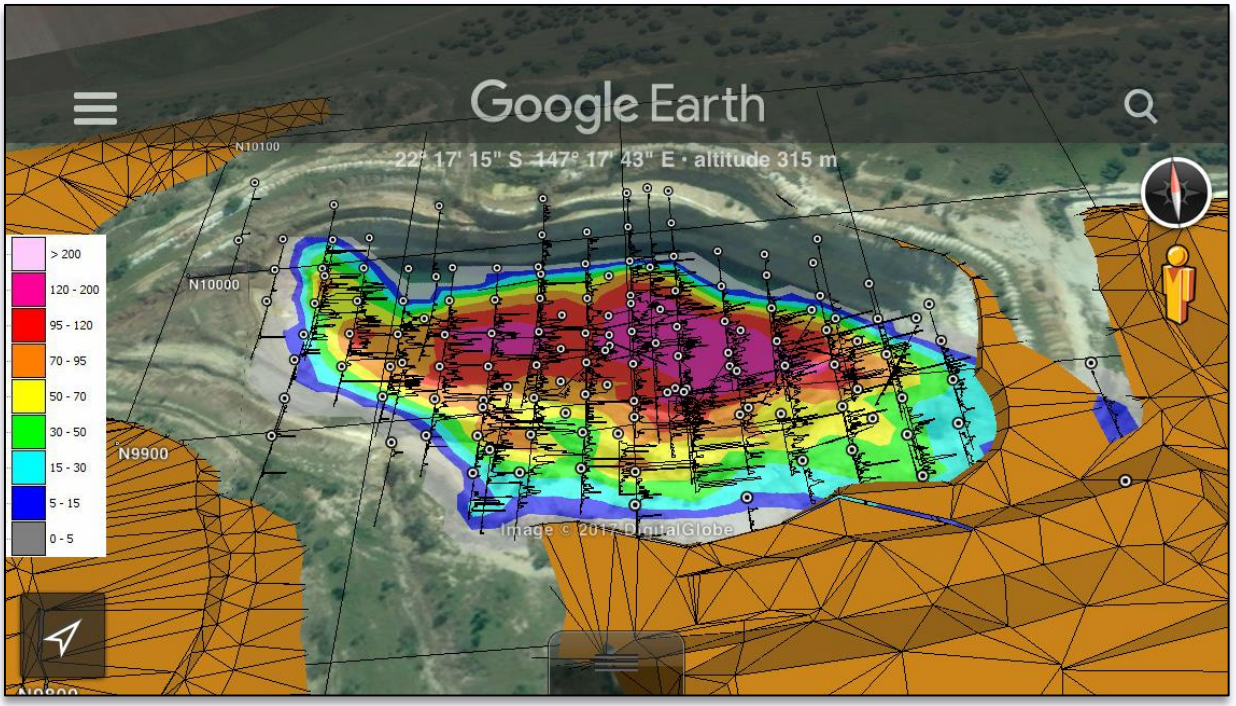


Tap on arrow to display your current location as a blue dot

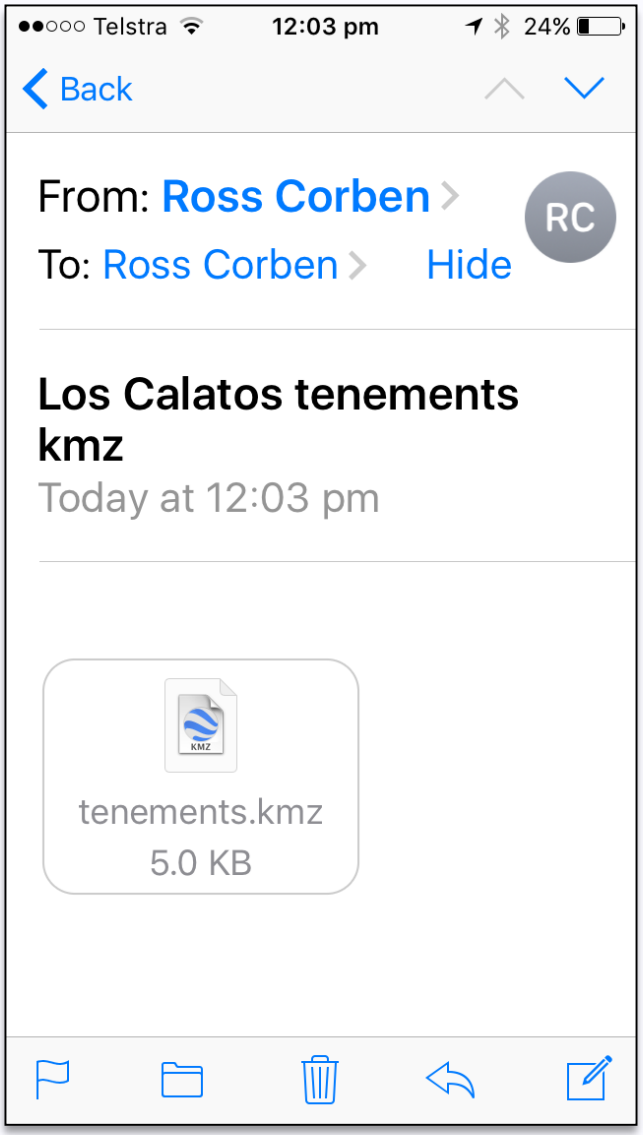


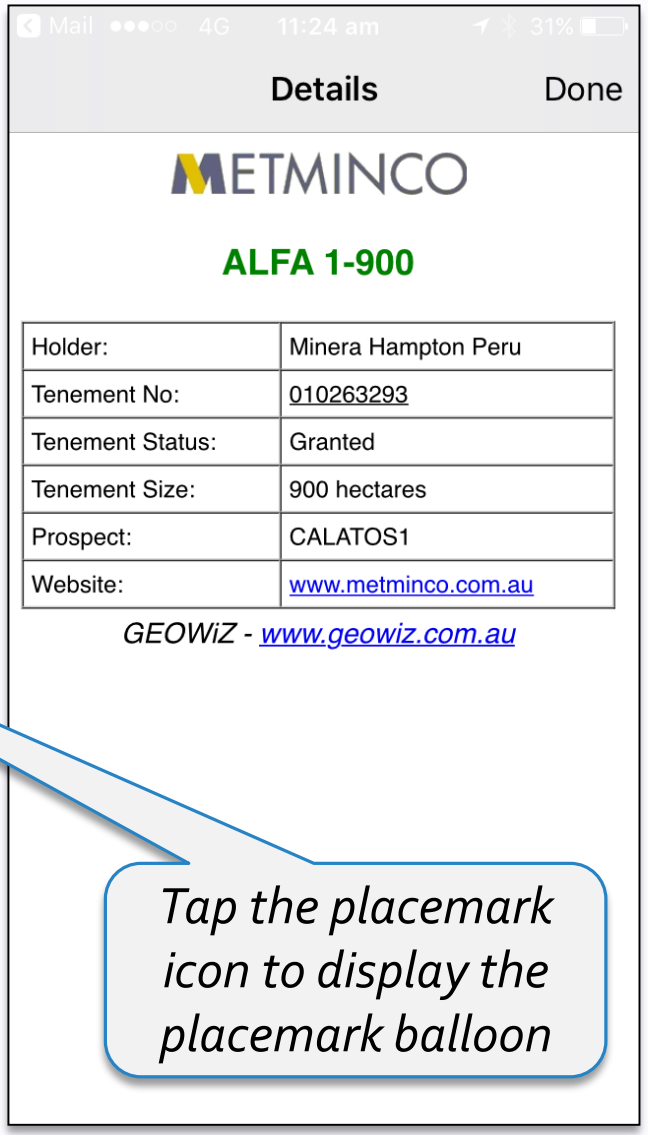


Dump	Volume (m^3)
Biggest Tailings Dump	712,976
Mid-size Tailings Dump	525,191
Smallest Tailings Dump	169,178
	1,407,345



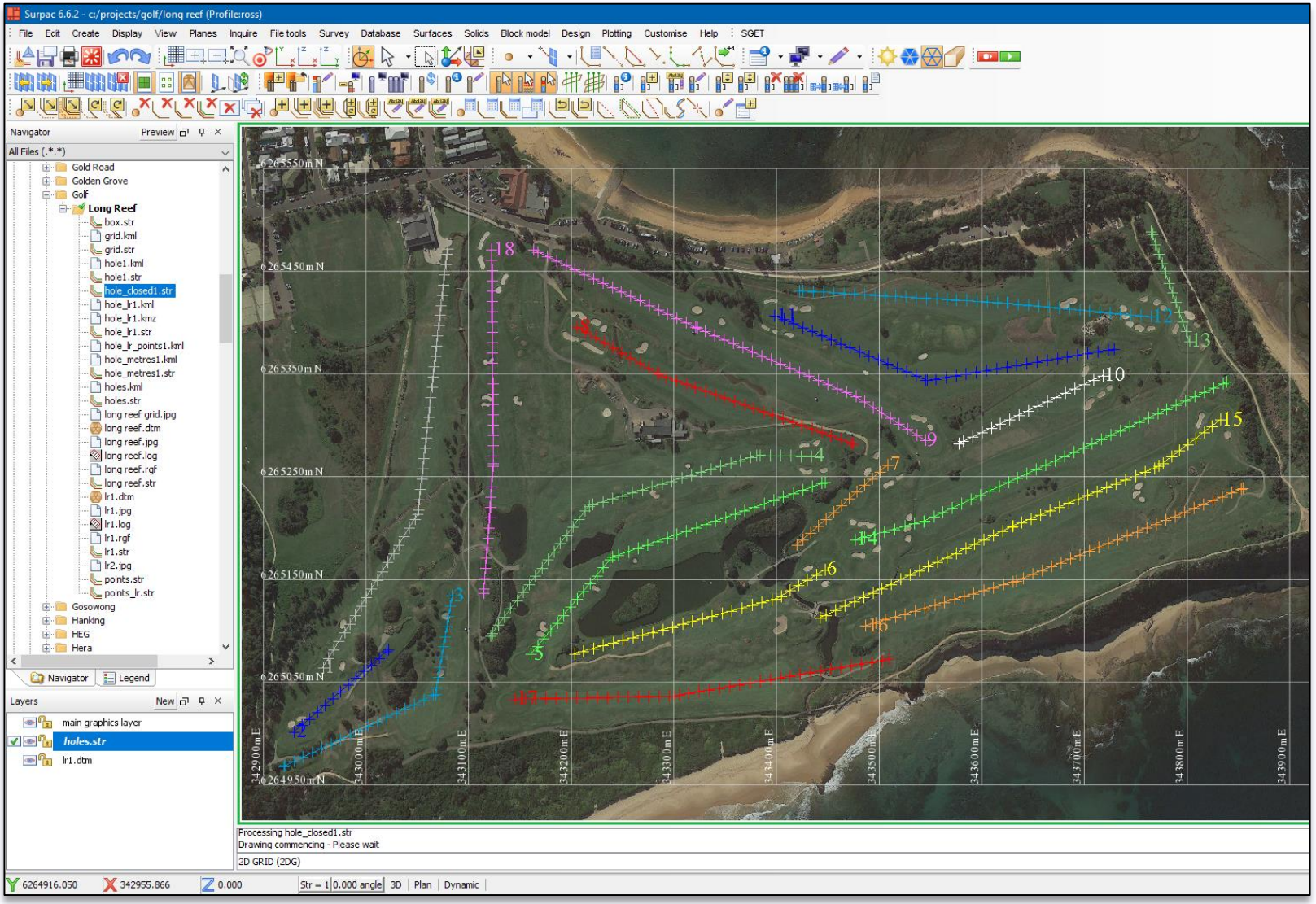
Mining tenements viewed in **Google Earth** on a mobile



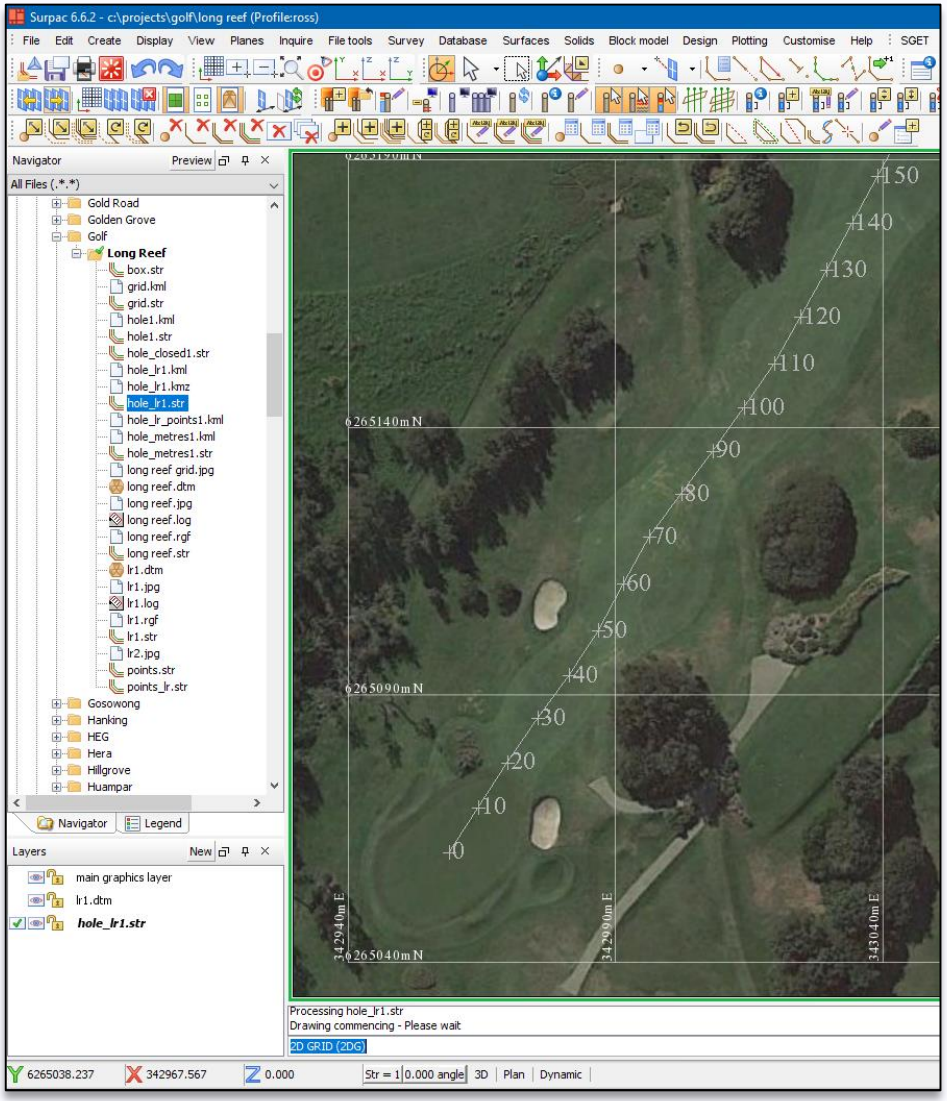


Tap the placemark icon to display the placemark balloon

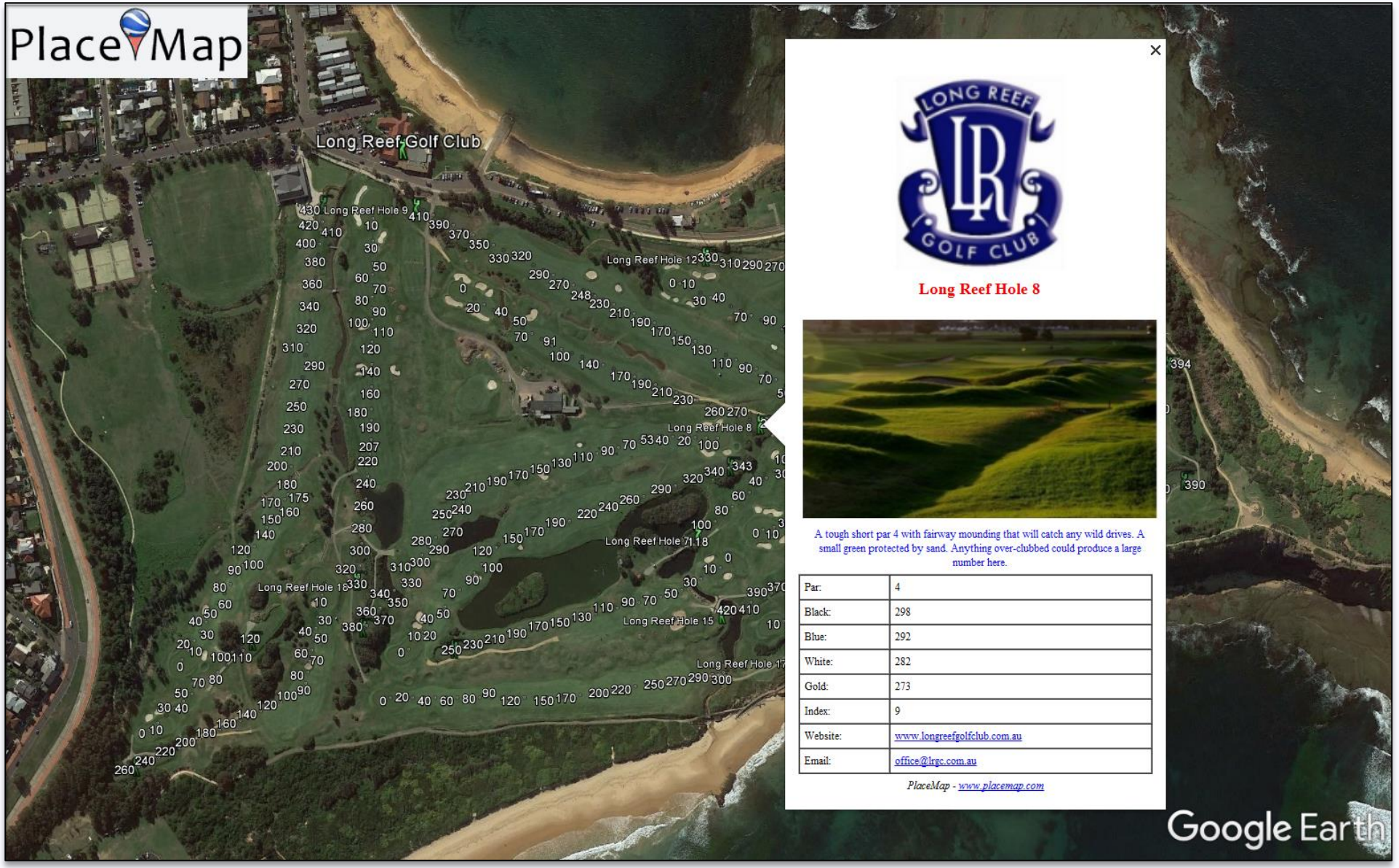
Google Earth golf course image in **Surpac**. Hole fairway centrelines digitised and 10m points inserted using *Subdivide line* function.



Hole fairway centreline strings exported from **Surpac** as a kml file and opened from email on mobile device in **Google Earth**



Current location shown as a blue dot ~ 90m from the centre of the green



Long Reef Hole 8

A tough short par 4 with fairway mounding that will catch any wild drives. A small green protected by sand. Anything over-clubbed could produce a large number here.

Par:	4
Black:	298
Blue:	292
White:	282
Gold:	273
Index:	9
Website:	www.longreefgolfclub.com.au
Email:	office@lrgc.com.au

PlaceMap - www.placemap.com

Annual real estate property sales data by suburb

Suburb boundaries downloaded from ABS website and imported into **Surpac**

EPPING — RANK 107

MEDIAN	2015	2014	Change	Trend
HOUSES	1608	1363	18%	9.2%
APARTMENTS	827	735	12.5%	7.8%
TOTAL SALES 570	Auction 207		Private treaty 363	

TOP THREE SALES	
71 Epping Av	3210
1 Brucedale Av	2970
13 Grandview Pde	2920

Houses 2%+ Apartments 3%+

ERMINGTON — RANK 215

MEDIAN	2015	2014	Change	Trend
HOUSES	1050	920	14.1%	7.7%
APARTMENTS	790	708	11.7%	7.7%
TOTAL SALES 207	Auction 49		Private treaty 158	

TOP THREE SALES	
17 Vignes St	1960
2 Blakeford Av	1575
1 Blakeford Av	1575

Houses 3%+ Apartments 3%+

GLENORIE — RANK 334

MEDIAN	2015	2014	Change	Trend
HOUSES	1003	815	23%	-
APARTMENTS	n/a	n/a	-	-
TOTAL SALES 20	Auction 5		Private treaty 15	

TOP THREE SALES	
5 Venetta Rd	2825
43 Post Office Rd	1850
16 Idlewild Rd	1085

Houses 3%+ Apartments 2%+

KELLYVILLE — RANK 202

MEDIAN	2015	2014	Change	Trend
HOUSES	1050	870	20.7%	7%
APARTMENTS	850	646	>25%	-
TOTAL SALES 492	Auction 66		Private treaty 426	

TOP THREE SALES	
25 Connelly Wy	2215
78-80 Acres Rd	2000
30 Laughton Cr	1905

Houses 3%+ Apartments 3%+

MACQUARIE PARK — RANK 294

MEDIAN	2015	2014	Change	Trend
HOUSES	900	725	24.1%	7.4%
APARTMENTS	668	595	12.3%	7.5%
TOTAL SALES 191	Auction 38		Private treaty 153	

TOP THREE SALES	
16/10 Tuckwell Pl	1185
A910/2 Saunders Cl	1120
3/10 Tuckwell Pl	1065

Houses 4%+ Apartments 3%+

MARSFIELD — RANK 255

MEDIAN	2015	2014	Change	Trend
HOUSES	952	790	20.4%	8%
APARTMENTS	738	603	22.5%	7.1%
TOTAL SALES 188	Auction 110		Private treaty 78	

TOP THREE SALES	
16 Winston St	2480
15 Betrand Cl	2402
65 Culloden Rd	2385

Houses 4%+ Apartments 3%+

MIDDLE DURAL — RANK -

MEDIAN	2015	2014	Change	Trend
HOUSES	n/a	n/a	-	-
APARTMENTS	n/a	n/a	-	-
TOTAL SALES 5	Auction 2		Private treaty 3	

TOP THREE SALES	
9 McLeod Rd	3500
4 Alinda Cl	2575
4 Vaughan Pl	2542

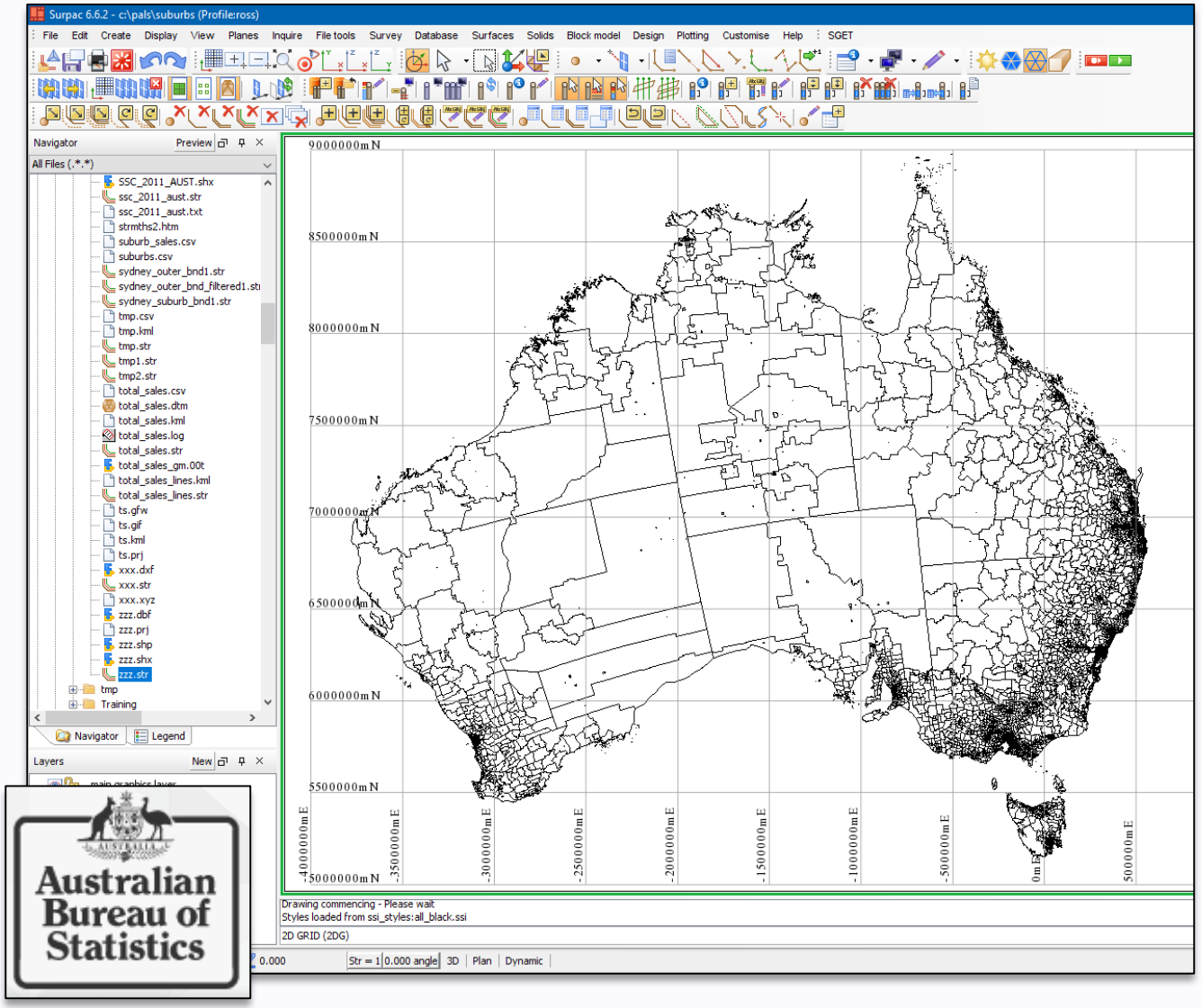
Houses 2%+ Apartments 2%+

NORMANHURST — RANK 297

MEDIAN	2015	2014	Change	Trend
HOUSES	1155	928	24.5%	8.1%
APARTMENTS	n/a	660	-	-
TOTAL SALES 71	Auction 38		Private treaty 33	

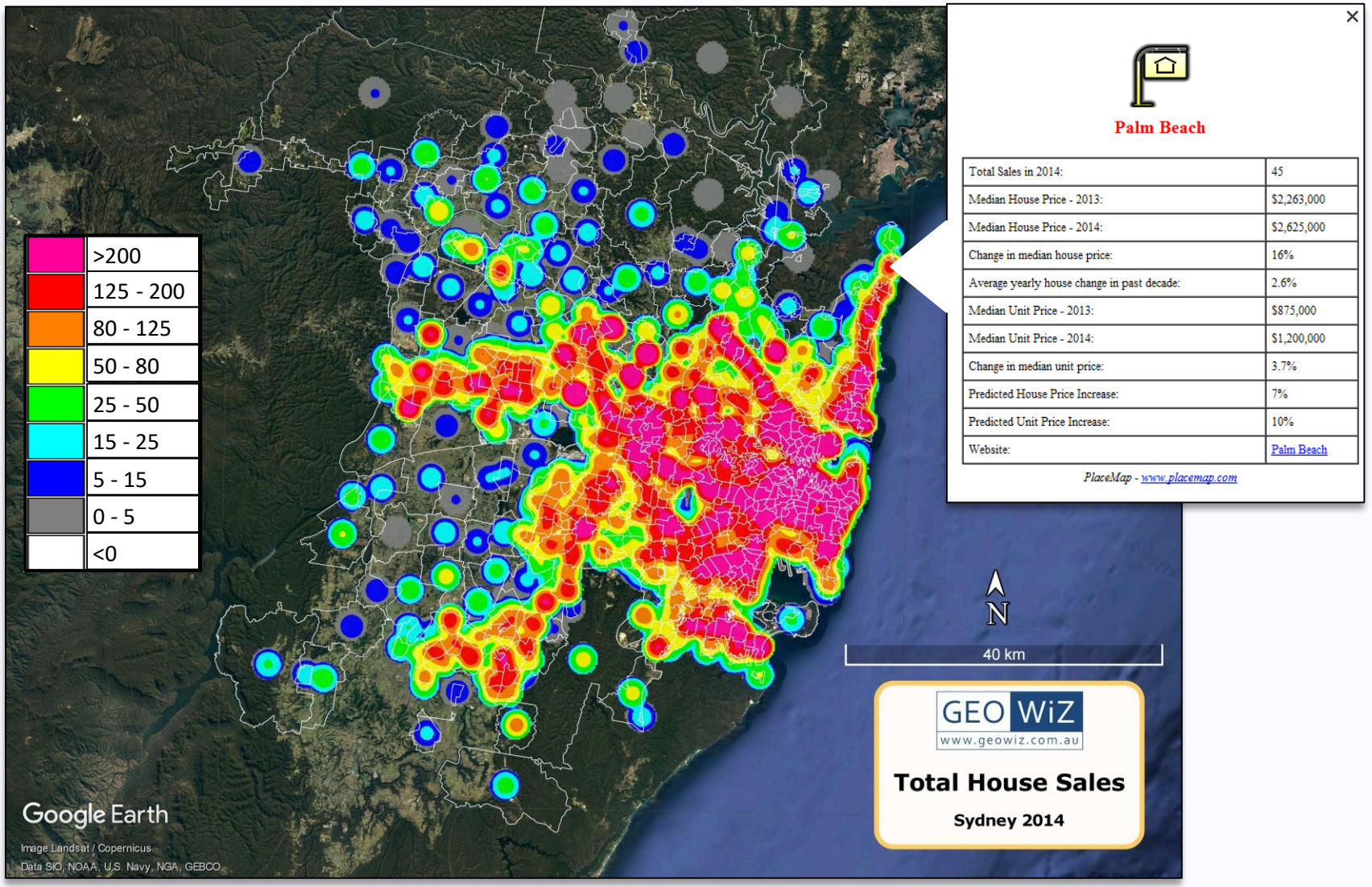
TOP THREE SALES	
88 Denman Pde	1850
62 Malsbury Rd	1750
14 Hammond Av	1610

Houses 3%+ Apartments 2%+

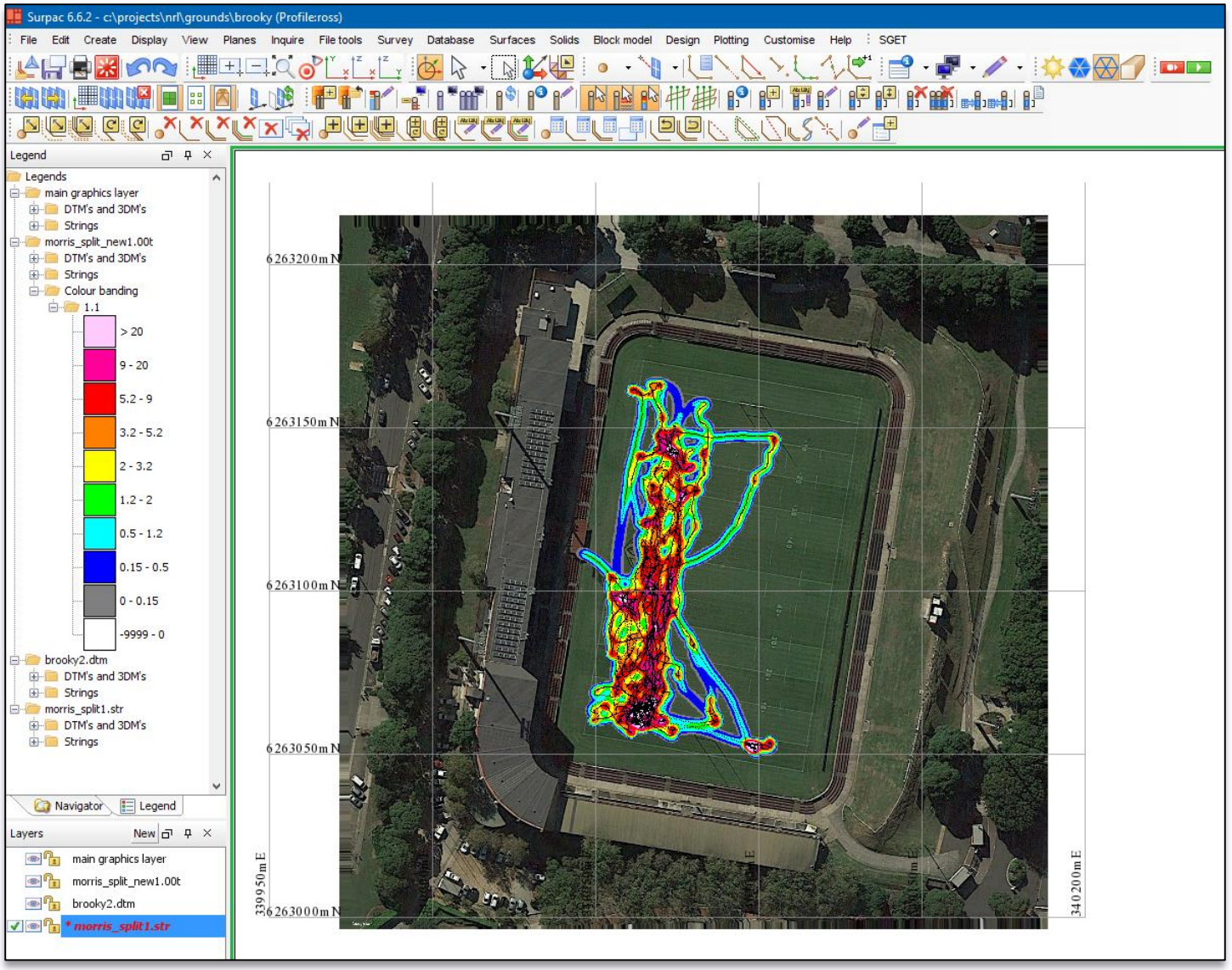


Australian Bureau of Statistics

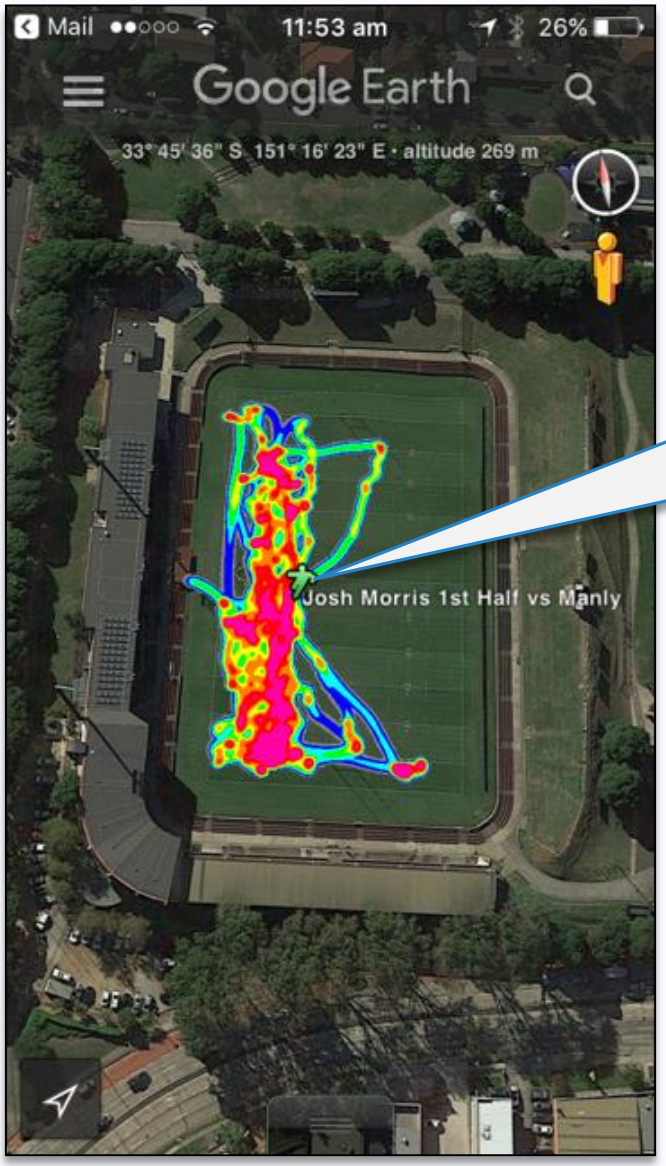
Suburb centroids were extracted using *File Tool – Create centroids from Polygons* and linked with suburb house price data which was contoured and displayed in **Surpac** using colour banding and then exported to **Google Earth**



NRL team player GPS readings (3 per second) imported into **Surpac** with a **Google Earth** image of the stadium to create a density map highlighting the player location for each half.

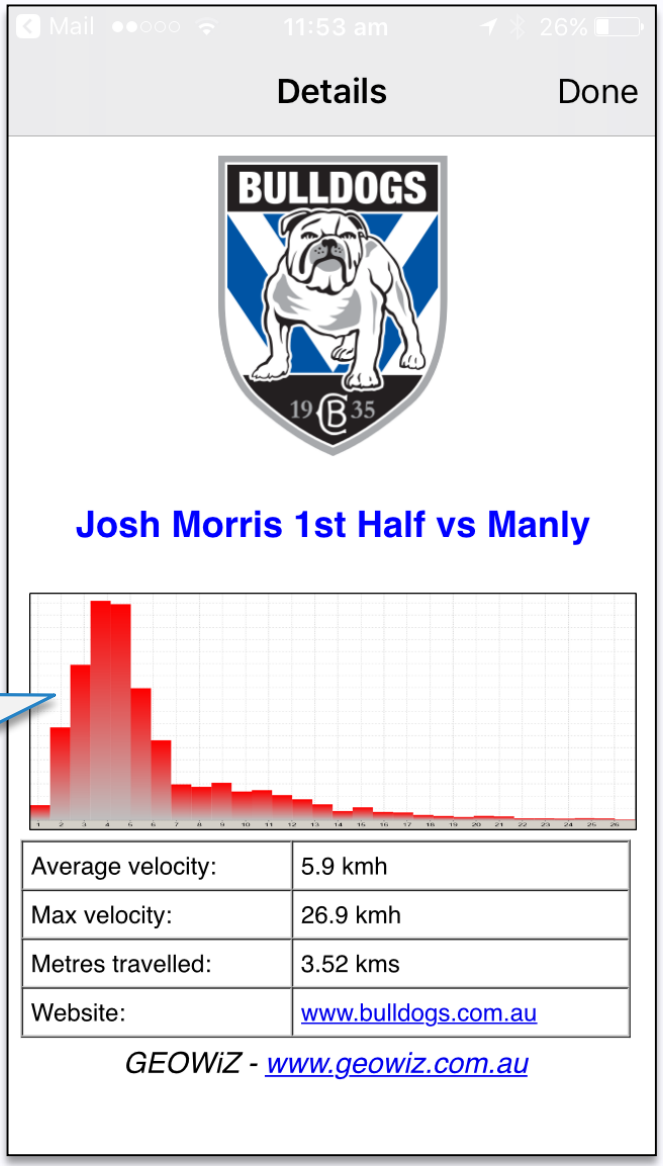


The density map and player statistics calculated using the **Surpac** Basic Statistics function are emailed to players and opened in **Google Earth**



Tap the placemark icon to display the placemark balloon

*Histogram and statistics from **Surpac** Basic Statistics*



Average velocity:	5.9 kmh
Max velocity:	26.9 kmh
Metres travelled:	3.52 kms
Website:	www.bulldogs.com.au

GEOWiZ - www.geowiz.com.au

Future of **Google Earth**

- As of the 17th April 2017 **Google Earth** now runs in the **Google Chrome** web browser
- There hasn't been a significant update in over 4 years
- In June 2012, Google started using stereophotogrammetry to automatically generate 3D meshes of cities. All major cities in Australia except Sydney have been covered and they are continuing to release new 3D meshes which are getting better as they go on.
- Updated digital images are becoming more frequent and higher resolution as new satellites are launched
- In 2009, Google introduced the ability to go underwater in **Google Earth** so the next step maybe to go underground?????
- GEOVIA are interested in adding this functionality into **Surpac**

GEOWiZ Consulting

For more information contact:

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ross@geowiz.com.au

Or visit the website: www.geowiz.com.au