



Transalloy - Volumes

Aerial LiDAR Survey

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1. Introduction

Promap was approached Tranalloy to do a LiDAR survey of the Transalloy stockpile areas, Mpumalanga.

1.1 Survey Areas

Figure 1.1 below shows the area of interest.

Figure 1.1 Study area for LiDAR survey



1.2 Flight Specifications

The following flight specifications were applied during the survey:

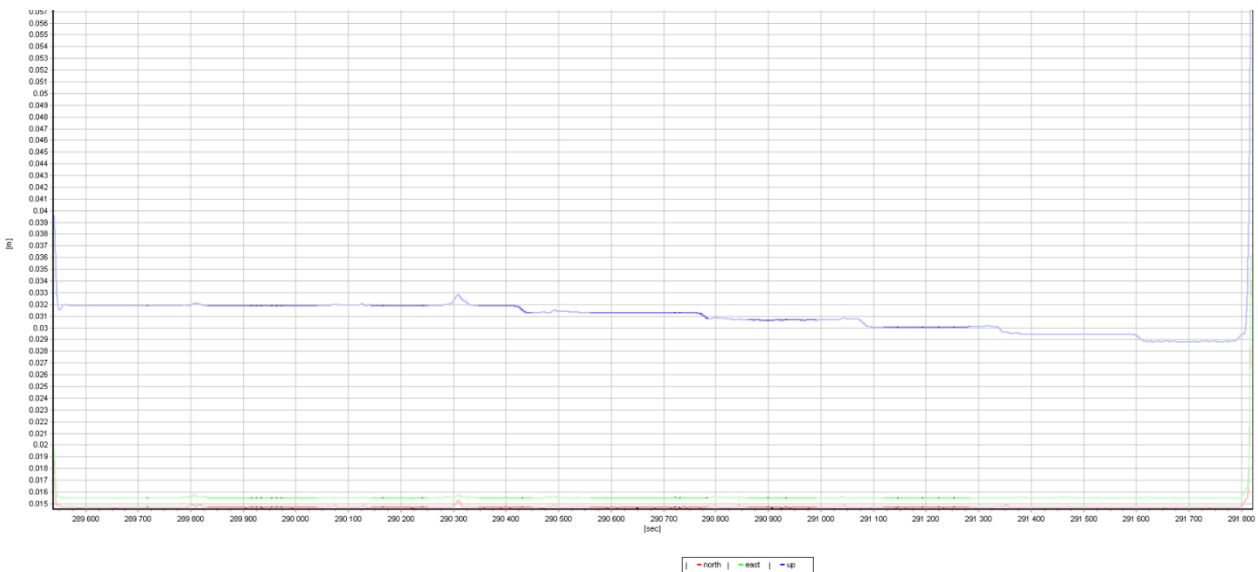
- Survey took place with a Cherokee
- Flying height – 700 meters over study areas
- Flying speed – 100 knots
- Scan Rate – 1000 KHz
- Point density p/m² - >15 points per sqm

2. Network for Survey

The projection of the whole survey area was Transverse Mercator, Cape Clark 1880, Central meridian 29.

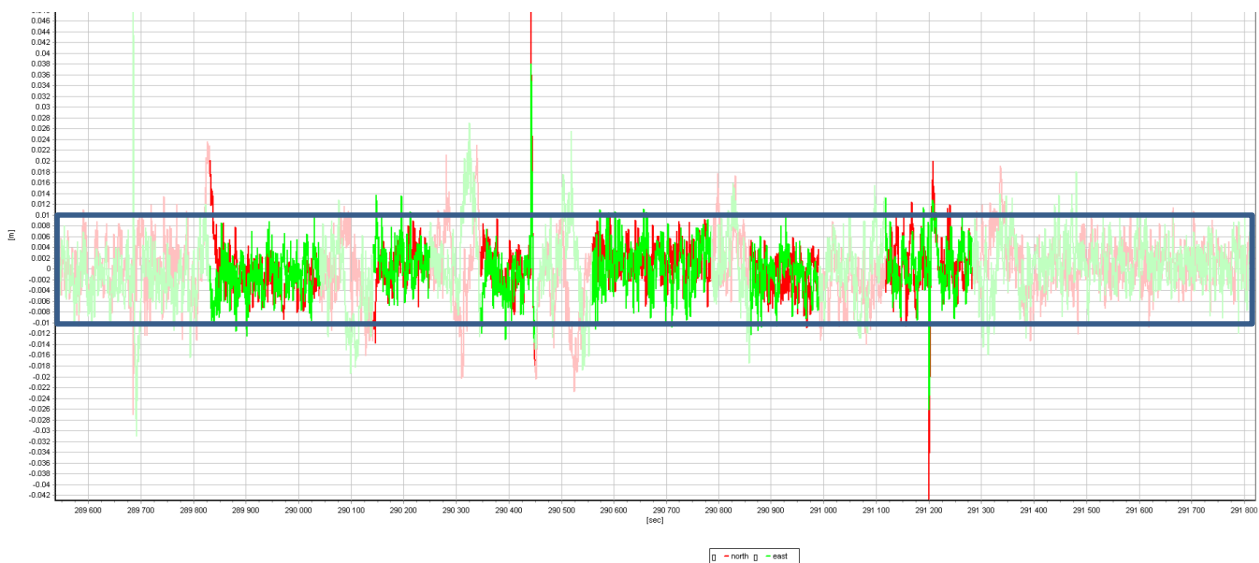
3. Trajectory QC

Figure 3.1 Trajectory RMS values of x, y and Z



From the figure it is apparent that the trajectory solution had a RMS values for x, y and z under 35mm.

Figure 3.2 Trajectory RMS values of x, y and Z



The range difference for the GPS solution compared to the IMU/INS solution variate between 10mm positive and 10mm negative (range 20mm)

4. Image QC

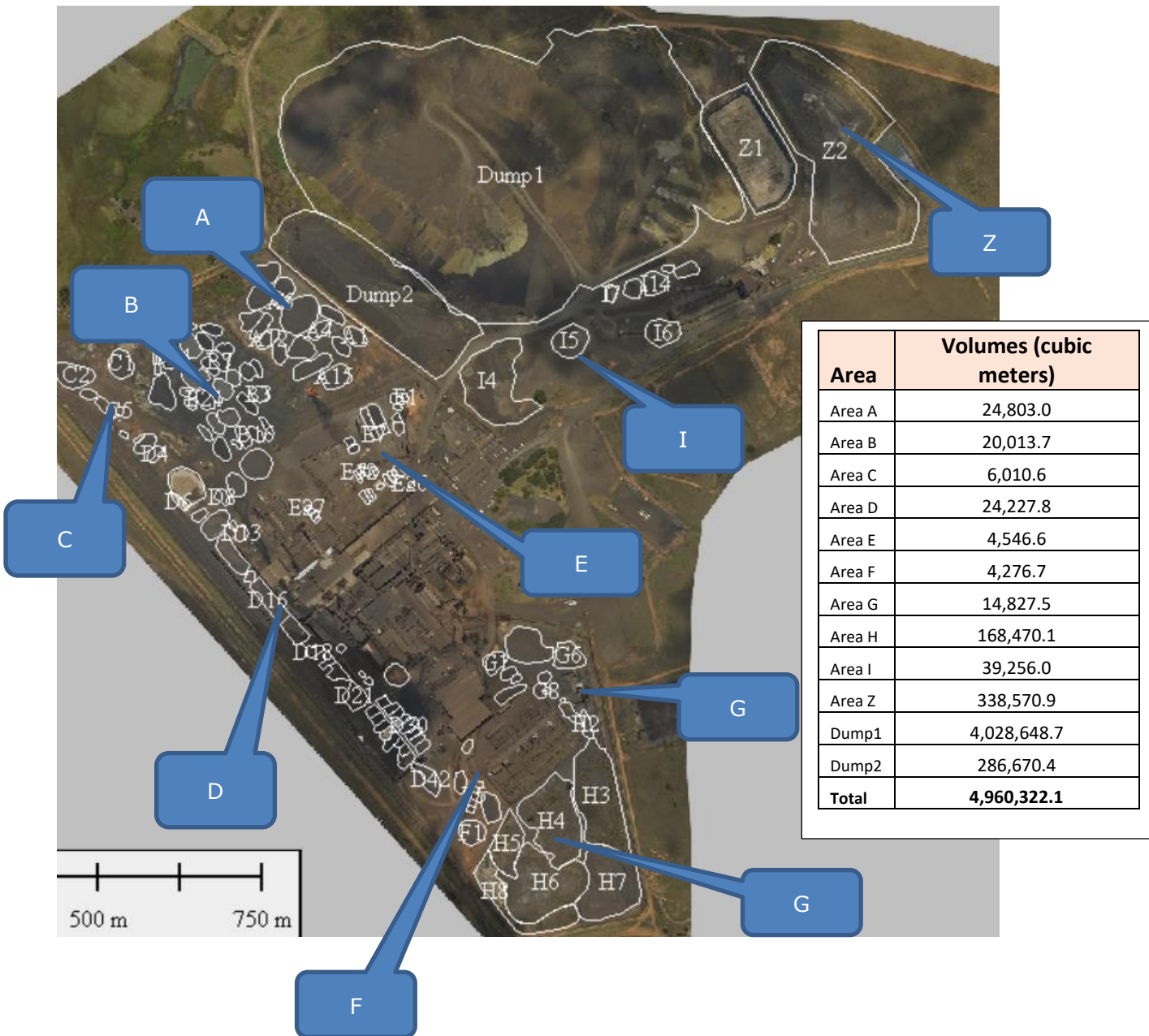
Table 3.2 Imagery Arial Triangulation report

Start average 9.1172 cm
Final average 4.3548 cm

Image	Dx	Dy	Dz	Heading	Roll	Pitch
Avg magnitu	0.036	0.028	0.000	0.008	0.003	0.003
Average	-0.029	-0.005	+0.000	-0.000	+0.000	+0.002
Median	-0.024	-0.002	+0.000	-0.001	+0.001	+0.001

5. Demarcated Areas & Volumes (Stockpiles)

Fig 5.1 Orientation of Areas (Stockpiles)



Area A:



Table 5.1 Area A Volumes

Stockpile Name	Volume (cubic meters)	Area (ha)	Footprint perimeter (m)
A1	1,189.9	0.0738	107.2
A2	1,068.0	0.0601	102.4
A3	740.1	0.0500	91.3
A4	956.6	0.0622	104.2
A5	5,901.5	0.2681	190.6
A6	263.9	0.0261	67.2
A7	1,104.8	0.0634	96.2
A8	2,029.5	0.1078	127.6
A9	2,357.3	0.1091	123.4
A10	992.9	0.0702	110.1
A11	934.4	0.0613	110.2
A12	850.6	0.0525	98.8
A13	911.6	0.0553	98.2
A13	1,749.5	0.1036	126.3
A14	1,794.4	0.1161	156.8
A15	1,957.9	0.1018	127.8
Total	24,803.0	1.4	1,838.3

Area B:

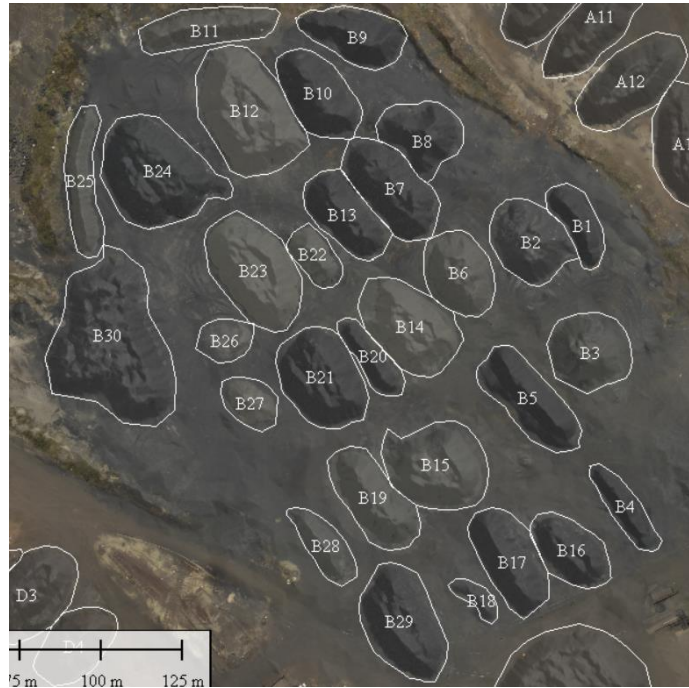


Table 5.2 Area B Volumes

Stockpile Name	Volume (cubic meters)	Area (ha)	Footprint perimeter (m)
B1	195.4	0.0245	70.0
B2	749.9	0.0463	84.0
B3	658.8	0.0468	81.8
B4	104.9	0.0201	74.3
B5	530.0	0.0516	99.2
B6	577.7	0.0427	78.4
B7	893.0	0.0588	96.9
B8	500.3	0.0430	81.5
B9	505.6	0.0416	85.6
B10	717.2	0.0473	86.0
B11	322.9	0.0341	100.1
B12	1,747.7	0.0882	117.9
B13	513.8	0.0397	84.6
B14	899.1	0.0605	97.6
B15	1,001.3	0.0660	101.3

Stockpile Name	Volume (cubic meters)	Area (ha)	Footprint perimeter (m)
B16	370.7	0.0307	76.1
B17	590.4	0.0467	90.8
B18	29.6	0.0083	44.7
B19	633.5	0.0480	93.1
B20	121.9	0.0223	68.7
B21	1,042.8	0.0613	94.5
B22	205.4	0.0203	56.3
B23	1,257.7	0.0706	104.2
B24	1,616.8	0.0863	119.9
B25	210.6	0.0313	105.8
B26	21.2	0.0166	51.1
B27	151.4	0.0184	55.2
B28	178.7	0.0207	69.7
B29	916.2	0.0633	100.6
B30	2,749.3	0.1453	157.7
Total	20,013.7	1.4	2,627.7

Area C & D:



Table 5.3 Area C Volumes

Stockpile Name	Volume (cubic meters)	Area (ha)	Footprint perimeter (m)
C1	1,864.1	0.1025	129.5
C2	3,091.8	0.1661	161.6
C3	352.3	0.0284	69.5
C4	601.4	0.0461	95.3
C5	101.0	0.0138	44.0
Total	6,010.6	0.4	499.9

Table 5.4 Area D Volumes

Stockpile Name	Volume (cubic meters)	Area (ha)	Footprint perimeter (m)	Stockpile Name	Volume (cubic meters)	Area (ha)	Footprint perimeter (m)
D1	48.0	0.0083	39.1	D22	29.0	0.0045	40.1
D2	53.1	0.0079	47.1	D23	2.0	0.0011	29.3
D3	860.9	0.0568	97.4	D24	72.9	0.0079	39.6
D4	547.9	0.0378	77.7	D25	547.4	0.0880	112.9
D5	3,545.9	0.1968	178.4	D26	1.4	0.0007	64.5
D6	58.4	0.0169	83.4	D27	0.1	0.0004	66.8
D7	370.4	0.0287	69.5	D28	0.6	0.0004	70.9
D8	434.6	0.0347	72.1	D29	1.5	0.0010	71.1
D9	1,329.2	0.0759	106.6	D30	376.9	0.0261	85.1
D10	3,115.7	0.1522	147.2	D31	47.3	0.0057	73.5
D11	2,333.4	0.1216	135.8	D32	172.5	0.0119	68.4
D12	95.0	0.0135	45.2	D33	244.0	0.0182	72.2
D13	359.1	0.0334	72.4	D34	102.2	0.0143	67.8
D14	2,189.4	0.1323	170.3	D35	59.7	0.0120	66.9
D15	137.7	0.0121	55.0	D36	49.4	0.0093	72.0
D16	2,207.0	0.1403	191.9	D37	14.7	0.0033	71.2
D17	1,398.8	0.0835	131.9	D38	318.0	0.0254	85.8
D18	152.8	0.0252	77.2	D39	6.3	0.0011	46.5
D19	90.9	0.0227	82.3	D40	2.1	0.0008	58.6
D20	215.1	0.0433	104.8	D41	149.1	0.0229	91.9
D21	815.0	0.0675	128.5	D42	1,672.5	0.0922	149.7
Total				Total	24,227.8	1.7	3,618.4

Area E:



Table 5.5 Area E Volumes

Stockpile Name	Volume (cubic meters)	Area (ha)	Footprint perimeter (m)
E1	27.9	0.0095	46.5
E2	165.7	0.0179	55.3
E3	56.7	0.0083	38.5
E4	569.5	0.0357	112.8
E5	124.0	0.0126	50.4
E6	273.1	0.0135	49.1
E7	294.7	0.0144	51.7
E8	1,154.1	0.0552	100.0
E9	499.8	0.0295	88.7
E10	162.0	0.0153	49.7
E11	240.6	0.0155	50.1
E12	53.1	0.0077	36.4
E13	73.9	0.0115	49.6
E14	19.4	0.0041	32.7
E15	4.9	0.0037	26.4
E16	34.1	0.0055	41.9
E17	130.1	0.0171	53.8
E18	64.5	0.0092	40.8
E19	82.3	0.0122	48.8
E20	117.5	0.0148	58.5
E21	20.9	0.0052	31.6
E22	27.4	0.0060	42.2
E24	40.4	0.0086	46.7
E25	109.6	0.0151	57.5
E26	14.7	0.0035	31.4
E27	36.7	0.0064	29.6
E28	51.1	0.0076	32.9
E29	62.0	0.0097	40.5
E30	36.0	0.0057	30.2
Total	4,546	0.4	1,424.4

Please note: There is no E23

Area F:



Table 5.6 Area F Volumes

Stockpile Name	Volume (cubic meters)	Area (ha)	Footprint perimeter (m)
F1	1,739.2	0.1008	126.9
F2	1,556.3	0.0896	125.3
F3	92.7	0.0113	45.6
F4	171.3	0.0132	46.1
F5	123.3	0.0108	45.2
F6	33.3	0.0119	43.9
F7	56.4	0.0118	47.4
F8	38.4	0.0062	33.7
F9	182.8	0.0192	57.6
F10	283.1	0.0262	85.2
Total	4,276.7	0.3	657.0

Area G:



Table 5.7 Area G Volumes

Stockpile Name	Volume (cubic meters)	Area (ha)	Footprint perimeter (m)
G1	960.5	0.0694	109.0
G2	328.5	0.0275	71.7
G3	165.8	0.0142	49.0
G4	993.4	0.0620	121.3
G5	9,655.1	0.2768	212.7
G6	2,324.0	0.1360	150.9
G7	349.3	0.0257	63.0
G8	36.3	0.0077	34.3
G9	14.6	0.0032	23.5
Total	14,827.5	0.6	835.4

Area H:



Table 5.8 Area H Volumes

Stockpile Name	Volume (cubic meters)	Area (ha)	Footprint perimeter (m)
H1	474.8	0.0389	93.3
H2	398.0	0.0397	103.1
H3	28,641.2	0.9300	443.6
H4	7,634.7	0.5990	406.7
H5	11,025.5	0.3163	251.8
H6	62,269.2	0.9980	470.7
H7	42,892.0	0.7920	363.7
H8	15,134.6	0.4631	498.8
Total	168,470.1	4.2	2,631.7

Area Dumps, Z & I



Table 5.9 Area I, Z and Dumps

Stockpile Name	Volume (cubic meters)	Area (ha)	Footprint perimeter (m)
I4	29,207.9	0.7380	448.2
I5	2,273.9	0.1784	169.1
I6	5,427.1	0.1491	156.5
I7	95.0	0.0191	73.8
I8	225.5	0.0419	98.6
I9	105.0	0.0116	50.7
I10	859.7	0.0484	99.6
I14	1,061.8	0.0869	120.8
Total	39,256.0	1.3	1,217.3

Stockpile Name	Volume (cubic meters)	Area (ha)	Footprint perimeter (m)
Z1	42,978.9	1.6000	515.8
Z2	295,592.0	4.5000	983.8
Total	338,570.9	6.1	1,499.6

Stockpile Name	Volume (cubic meters)	Area (ha)	Footprint perimeter (m)
Dump1	4,028,648.7	22.1000	1,980.0
Dump2	286,670.4	3.4000	854.5
Total	4,315,319.1	25.5	2,834.5

6. Deliverables

Following the deliverables:

- DTM XYZ format
- Imagery 10cm GSD ECW tiles/composite
- Volumes Report