The Discovery Programme
Centre for Archaeology and Innovation Ireland

Sceilg Mhichíl Monitoring Survey

(DP/OPW MOU 2025)

Summary Report

Rob Shaw, June 2025

CONTENTS

1. Project Background

Since September 2015, high-precision measurements have been carried out at three primary locations around the Monastery on Sceilg Mhichíl (see Figure 1). At these sites, marine-grade brass bolts were installed in both the bedrock and built fabric, establishing a local control network and key monitoring points. Detailed coordinates for these survey points are provided in the report appendices.

These locations have been revisited annually for monitoring, with the exception of 2019 and 2022, when adverse sea and weather conditions prevented access. An additional interim survey was conducted at Area 2 in May 2019 in response to emerging concerns about structural stability.

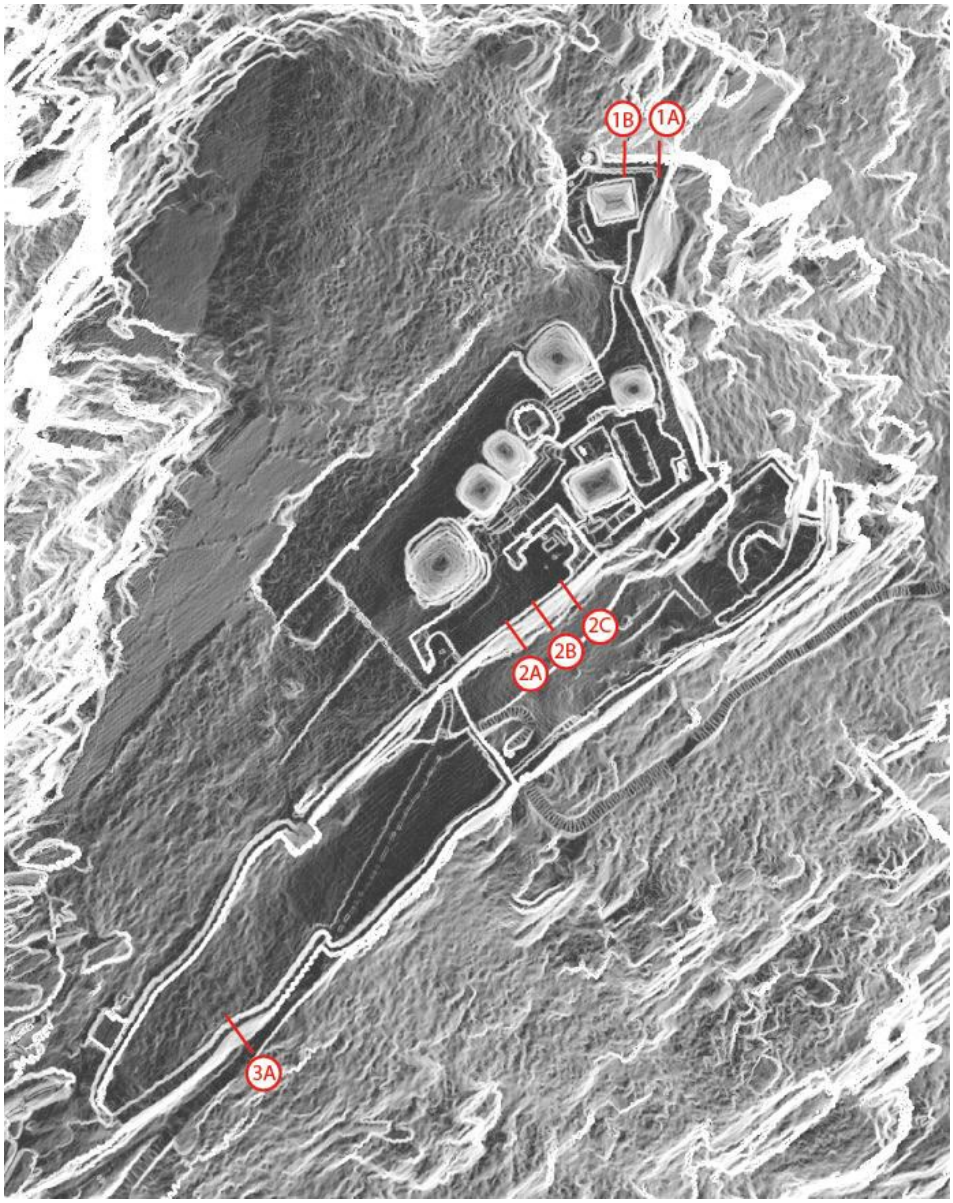


FIGURE 1 - INITIAL LOCATION OF THE MONITORING PROJECT

In July 2017, four additional locations were incorporated into the monitoring network on the South Peak of the island. These new locations are identified and numbered according to the instrument's position during observations, as shown in Figure 2. Since 2017, a total of seven areas have been monitored annually, subject to access. In 2018, four more lines of markers were added to Area 2, increasing the total network to 101 brass survey markers.

The monitoring surveys are conducted by the Discovery Programme on behalf of the OPW. This report presents the results of the latest survey conducted in June 2025, along with basic analysis of the results and the significance of vector changes over the course of the project.

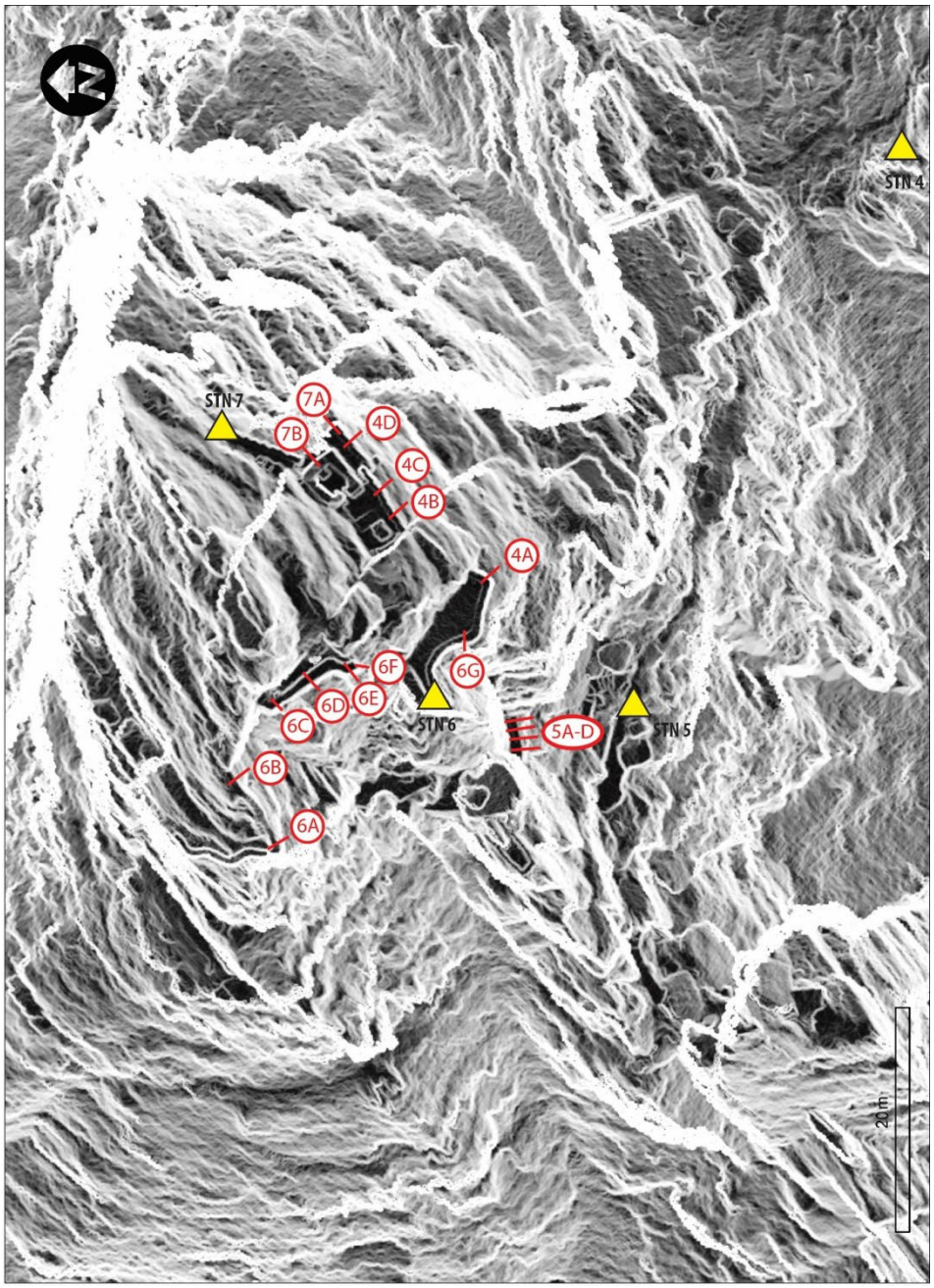


FIGURE 2 – 2017 MONITORING NETWORK

2. Equipment & Observations 2025

The observations took place in on the 16th, 17th and 18th June 2025. The instrument used was a Trimble VX total station, Figure 3, operated in standard DR (reflectorless mode) which has a manufacturer defined accuracy (RSME) of 2mm + 2ppm, set to average 5 readings per observation. The full specification of the instrument is available online:-

http://trl.trimble.com/docushare/dsweb/Get/Document-348124/022543-261G_TrimbleVX_DS_0613_LR.pdf

FIGURE 3– VX TOTAL STATION

This was the same instrument has been used for the observations since 2015 and is subject to regular maintenance and calibration. It was most recently calibrated on 28 November 2024

KOREC™

Certificate of Calibration

Customer DISCOVERY PROGRAMME
Instrument VX SPATIAL STATION
Serial No. 93520011
Plant No.

We hereby certify that the above instrument has been calibrated to the manufacturer's specifications

Cert. No. DUB/023536
Date 28/11/2024
Signature
D. O'Sullivan

Trimble
Authorised Distribution Partner

KOREC Group Ltd, Unit B7 Riverview Business Park, Nangor Road, Dublin 12, Ireland
T: 01 4564702, F: 01 4503786, W: www.korecgroup.com, VAT No. IE 8228469, Company No. 228469

FIGURE 4 - CALIBRATION CERTIFICATE

Two sets of observations, from independent resections were taken at each of the seven locations. Weather conditions were variable, with some wind and low sunshine making for some difficult observing conditions.

For each set of readings an average value is taken to establish a final set of coordinates for each monitoring survey marker.

The following sections present the June 2025 list of final coordinates for each area, and the calculated annual and overall 3D vector differences. The overall 3D vector shift is calculated by comparing the original coordinates (2015, 2017 or 2018 depending on when established) with the 2025 values. This is the critical value to consider as it indicates the overall stability, or otherwise of the survey markers.

Also included for each area is a comment on the significance of the survey data, and suggestions of appropriate survey actions.

3. Area 1 – Results

JUNE 2025 COORDS - AREA 1

POINT		X (m)	Y (m)	Z (m)
1-m-a-1		1495.301	1509.922	95.182
1-m-a-2		1495.337	1509.941	94.588
1-m-a-3		1495.376	1510.052	93.851
1-m-a-4		1495.427	1510.364	92.449
1-m-b-1		1497.838	1509.396	95.347
1-m-b-2		1497.780	1509.300	94.949
1-m-b-3		1497.792	1509.320	94.582
1-m-b-4		1497.884	1509.425	93.863

FIGURE 5 - TABLE OF AREA 1 FINAL COORDINATES, JUNE 2025

AREA 1 3D VECTOR SHIFTS – Annual & Cumulative (in metres)

POINT	VECTOR SHIFT (2015 - 2016)	VECTOR SHIFT (2016 - 2017)	VECTOR SHIFT (2017 – 2018)	VECTOR SHIFT (2018 - 2020) Two years	VECTOR SHIFT (2020 - 2021)	VECTOR SHIFT (2021 – 2022)	VECTOR SHIFT (June 2022 – Sept 2024) 21 months	VECTOR SHIFT (2024 – 2025)	VECTOR SHIFT (2015 -2025) 10 years cumulative
1-m-a-1	0.001	0.001	0.001	0.001	0.004	0.001	0.001	**0.003**	**0.002**
1-m-a-2	0.001	0.002	0.010	0.009	0.002	0.018	0.014	**0.008**	**0.018**
1-m-a-3	0.001	0.001	0.003	0.005	0.001	0.002	0.003	**0.003**	**0.002**
1-m-a-4	0.001	0.002	0.002	0.004	0.002	0.001	0.002	**0.001**	**0.003**
1-m-b-1	0.000	0.000	0.001	0.003	0.001	0.001	0.000	**0.000**	**0.003**
1-m-b-2	0.000	0.000	0.001	0.004	0.001	0.001	0.000	**0.000**	**0.003**
1-m-b-3	0.004	0.004	0.002	0.004	0.002	0.004	0.005	**0.003**	**0.006**
1-m-b-4	0.001	0.002	0.001	0.003	0.001	0.001	0.000	**0.001**	**0.002**

FIGURE 6 - AREA 1, VECTOR SHIFT CALCULATED ANNUALLY AND THE OVERALL CUMULATIVE VECTOR CALCULATED FROM ORIGINAL TO LATEST POSITION. THIS IS NOT THE SUM OF THE ANNUAL SHIFTS AS MOVEMENT IS NOT NECESSARILY LINEAR

COMMENT

Area 1 continues to show a high level of stability and consistency of reading, see Figure 6. After 10 years of observations the average vector shift across the eight marker points is 4.9mm. Marker 1-m-a-2 distorts this figure and has given some unusually high vector shifts over recent years, suggesting it could be loose, or vegetation is impacting the readings. It is not easy to inspect as would require abseiling to get a close view, but this would be advisable before the next set of readings.

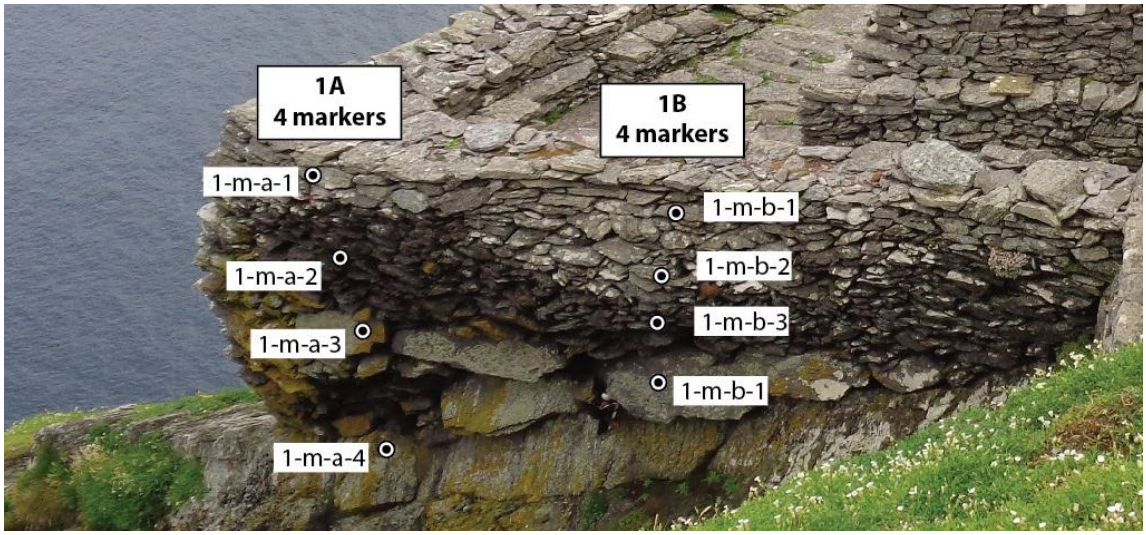


FIGURE 7 - SURVEY MARKER LOCATIONS, AREA 1

4. Area 2 - Results

JUNE 2025 COORDS - AREA 2

POINT	X (m)	Y (m)	Z (m)
2-m-a-1	2498.725	2508.699	105.199
2-m-a-2	2498.84	2509.512	106.582
2-m-a-3	2498.882	2510.094	108.006
2-m-a-4	2499.013	2510.654	109.504
2-m-b-1	2503.975	2508.896	104.286
2-m-b-2	2504.004	2509.563	105.838
2-m-b-3	2504.082	2510.196	106.985
2-m-b-4	2503.993	2510.601	107.874
2-m-b-5	2503.983	2510.946	109.156
2-m-c-1	2507.660	2509.695	104.016
2-m-c-2	2507.527	2510.136	105.112
2-m-c-3	2507.450	2510.715	106.613
2-m-c-4	2507.38	2510.938	107.652
2-m-c-5	2507.339	2511.119	108.256
2-m-d-1	2496.600	2509.180	105.636
2-m-d-2	2496.526	2509.610	106.544
2-m-d-3	2496.512	2509.830	107.462
2-m-d-4	2496.548	2510.199	108.400
2-m-d-5	2496.512	2510.699	109.192
2-m-d-6	2496.516	2510.758	109.739
2-m-e-1	2498.443	2505.061	102.074
2-m-e-2	2498.396	2505.084	102.600
2-m-e-3	2498.500	2505.142	103.004
2-m-f-1	2504.120	2505.930	101.111
2-m-f-2	2504.162	2505.980	101.612
2-m-f-3	2504.194	2506.028	101.944
2-m-f-4	2504.166	2506.056	102.629
2-m-g-1	2508.156	2507.051	100.876
2-m-g-2	2508.145	2507.130	101.498
2-m-g-3	2508.178	2507.163	101.999
2-m-g-4	2508.202	2507.238	102.466

FIGURE 8 - TABLE OF AREA 2 FINAL COORDINATES, JUNE 2025

AREA 2 3D VECTOR SHIFTS – Annual & Cumulative (in metres)

POINT	VECTOR SHIFT Sept 2015 – Sept 2016	VECTOR SHIFT Sept 2016 – Sept 2017	VECTOR SHIFT Sept 2017 – Sept 2018	VECTOR SHIFT (8months) Sept 2018 – May 2019	VECTOR SHIFT (16 months) May 2019 - Sept 2020	VECTOR SHIFT Sept 2020 – Sept 2021	VECTOR SHIFT Sept 2021 – Sept 2022	VECTOR SHIFT (21 months) Sept 2022 – June 2024	VECTOR SHIFT June 2024 – June 2025	TOTAL SHIFT (7 years cumulative Sept 2018 – June 2025	TOTAL SHIFT 10 years cumulative Sept 2015 – June 2025
2-m-a-1	0.006	0.005	0.003	0.003	0.010	0.006	0.004	0.008	**0.004**	**0.031**	**0.048**
2-m-a-2	0.005	0.004	0.006	0.005	0.010	0.003	0.004	0.008	**0.002**	**0.032**	**0.048**
2-m-a-3	0.004	0.006	0.007	0.003	0.010	0.004	0.004	0.009	**0.003**	**0.033**	**0.050**
2-m-a-4	0.006	0.007	0.007	0.003	0.013	0.005	0.004	0.011	**0.003**	**0.038**	**0.057**
2-m-b-1	0.006	0.006	0.010	0.005	0.015	0.007	0.003	0.007	**0.003**	**0.031**	**0.050**
2-m-b-2	0.004	0.007	0.004	0.005	0.009	0.003	0.004	0.009	**0.004**	**0.032**	**0.046**
2-m-b-3	0.004	0.005	0.008	0.003	0.010	0.005	0.002	0.008	**0.002**	**0.030**	**0.046**
2-m-b-4	0.006	0.005	0.006	0.004	0.008	0.005	0.004	0.008	**0.001**	**0.029**	**0.047**
2-m-b-5	0.005	0.006	0.005	0.004	0.007	0.001	0.003	0.006	**0.003**	**0.028**	**0.043**
2-m-c-1	0.002	0.003	0.003	0.001	0.007	na	na	0.004	**0.002**	**0.015**	**0.021**
2-m-c-2	0.002	0.003	0.003	0.001	0.006	0.002	0.001	0.003	**0.001**	**0.012**	**0.018**
2-m-c-3	0.004	0.002	0.004	0.001	0.008	0.002	0.003	0.004	**0.001**	**0.018**	**0.026**
2-m-c-4	0.003	0.003	0.004	0.001	0.007	0.003	0.002	0.004	**0.002**	**0.019**	**0.027**
2-m-c-5	0.00	0.004	0.004	0.001	0.008	0.002	0.002	0.004	**0.002**	**0.017**	**0.025**
2-m-d-1				0.003	0.009	0.003	0.003	0.006	**0.001**	**0.025**	**na**
2-m-d-2				0.002	0.009	0.004	0.002	0.007	**0.002**	**0.027**	**na**
2-m-d-3				0.004	0.009	0.002	0.004	0.007	**0.002**	**0.027**	**na**
2-m-d-4				**0.020**	**0.036**	**0.007**	**na**	**na**	**0.030**	**0.047**	**na**
2-m-d-5				0.004	0.009	0.032	na	0.008	**0.003**	**0.030**	**na**
2-m-d-6				0.003	0.010	0.003	0.004	0.008	**0.003**	**0.029**	**na**
2-m-e-1				0.002	0.004	0.001	0.000	0.010	**0.012**	**0.004**	**na**
2-m-e-2				0.001	0.003	0.001	0.001	0.004	**0.005**	**0.006**	**na**
2-m-e-3				0.002	0.004	0.001	0.000	0.001	**0.003**	**0.003**	**na**
2-m-f-1				0.001	0.004	0.005	0.000	0.001	**0.002**	**0.004**	na
2-m-f-2				0.001	0.005	0.001	0.002	0.001	**0.001**	**0.005**	na
2-m-f-3				0.001	0.004	0.000	0.006	0.001	**0.001**	**0.004**	na
2-m-f-4				0.001	0.005	0.000	0.000	0.002	**0.002**	**0.006**	na
2-m-g-1				0.002	0.005	0.001	0.000	0.001	**0.002**	**0.005**	na
2-m-g-2				0.002	0.005	0.001	0.001	0.003	**0.002**	**0.003**	na
2-m-g-3				0.001	0.003	0.001	0.001	0.001	**0.001**	**0.006**	na
2-m-g-4				0.002	0.004	0.001	0.000	0.002	**0.002**	**0.005**	na

FIGURE 9- AREA 2, VECTOR SHIFT CALCULATED ANNUALLY, AND THE OVERALL CUMULATIVE VECTOR CALCULATED FROM ORIGINAL TO LATEST POSITION. THIS IS NOT THE SUM OF THE ANNUAL SHIFTS AS MOVEMENT IS NOT NECESSARILY LINEAR.

COMMENT

In Area 2, survey lines A, B, and C were part of the original monitoring network installed in 2015. In 2018, additional lines—D, E, F, and G—were added in response to notable positional movement detected along lines A and B. These original lines had shown consistent shifts of 5–10 mm per year since the beginning of the monitoring program. By 2018, the cumulative displacement had reached 15–20 mm, with the movement trending forward and downward.

FIGURE 10 -SURVEY MARKERS IN AREA 2

Area 2 remains the area of highest concern, with persistent and measurable movement recorded over the entire monitoring period. Each year's observations provide valuable data that helps clarify long-term movement patterns.

The 2025 measurements confirmed that movement is still occurring along Lines A, B, and C, continuing the same forward and downward trend seen in earlier years. However, the magnitude of movement this year was smaller compared to the previous year. Over the ten years of monitoring:

- **Line A** markers have moved the most, averaging **5.1 mm/year**.
- **Line B** shows an average movement of **4.7 mm/year**.
- **Line C** has moved more slowly, at an average of **2.3 mm/year**.

As a result, some markers—particularly in Line A—have now shifted **over 5 cm** since 2015.

Line D, added in 2018 to better track changes in Area 2, shows a similar movement pattern to Lines A and B, averaging **4.2 mm/year**. One marker in this line, **2-m-d-4**, continues to produce inconsistent and

unusually high readings. It is recommended that this marker be inspected for possible loosening or displacement of the stone.

In contrast, the lower wall areas covered by Lines E, F, and G appear **largely stable**, with minimal movement recorded—well within the expected tolerance limits of the survey instruments and methodology.

Survey Quality and Instrument Checks

In 2025, the quality of the two independent resection measurements was slightly lower than in previous years. A physical inspection of key bedrock reference points is recommended prior to the 2026 survey to ensure the reliability of future data.

Graphical Illustration

To better understand the nature of the wall movement, 3D graphs have been created showing the positional changes of markers in Lines A, B, C, and D. These graphs treat each marker's original location as the origin point (0,0,0), and plot changes in position over time using (x, y, z) coordinates. This allows both the **magnitude** and **direction** of movement to be visualized.

For each line, a 3D isometric graph is included, followed by 2D projections showing:

- Forward vs vertical change (x,z)
- Lateral vs vertical change (y,z)

It is important to note that observation intervals vary slightly between years. Surveys were originally conducted in **September**, except in 2019 (May) and from **2024 onward** (June). These variations affect the time spans between readings—for example, the interval from 2018–2019 was 8 months, while 2019–2020 was 16 months, and 2022–2024 was 21 months—and should be taken into account when interpreting movement trends in the graphs.

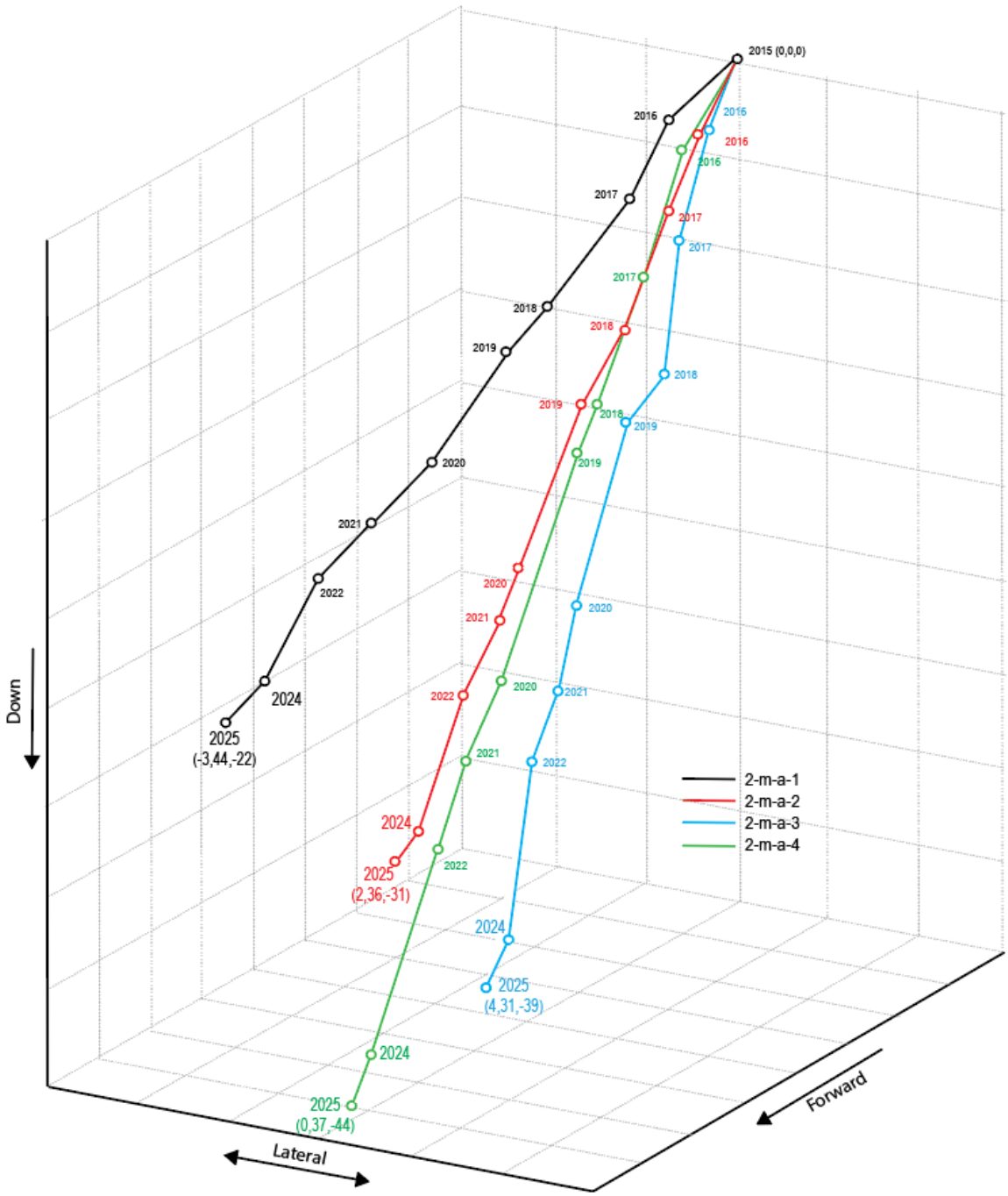


FIGURE 11 - AREA 2, LINE A, SCHEMATIC 3D DIAGRAM OF MOVEMENT OVER DURATION OF THE MONITORING SURVEY OF EACH SURVEY MARKER

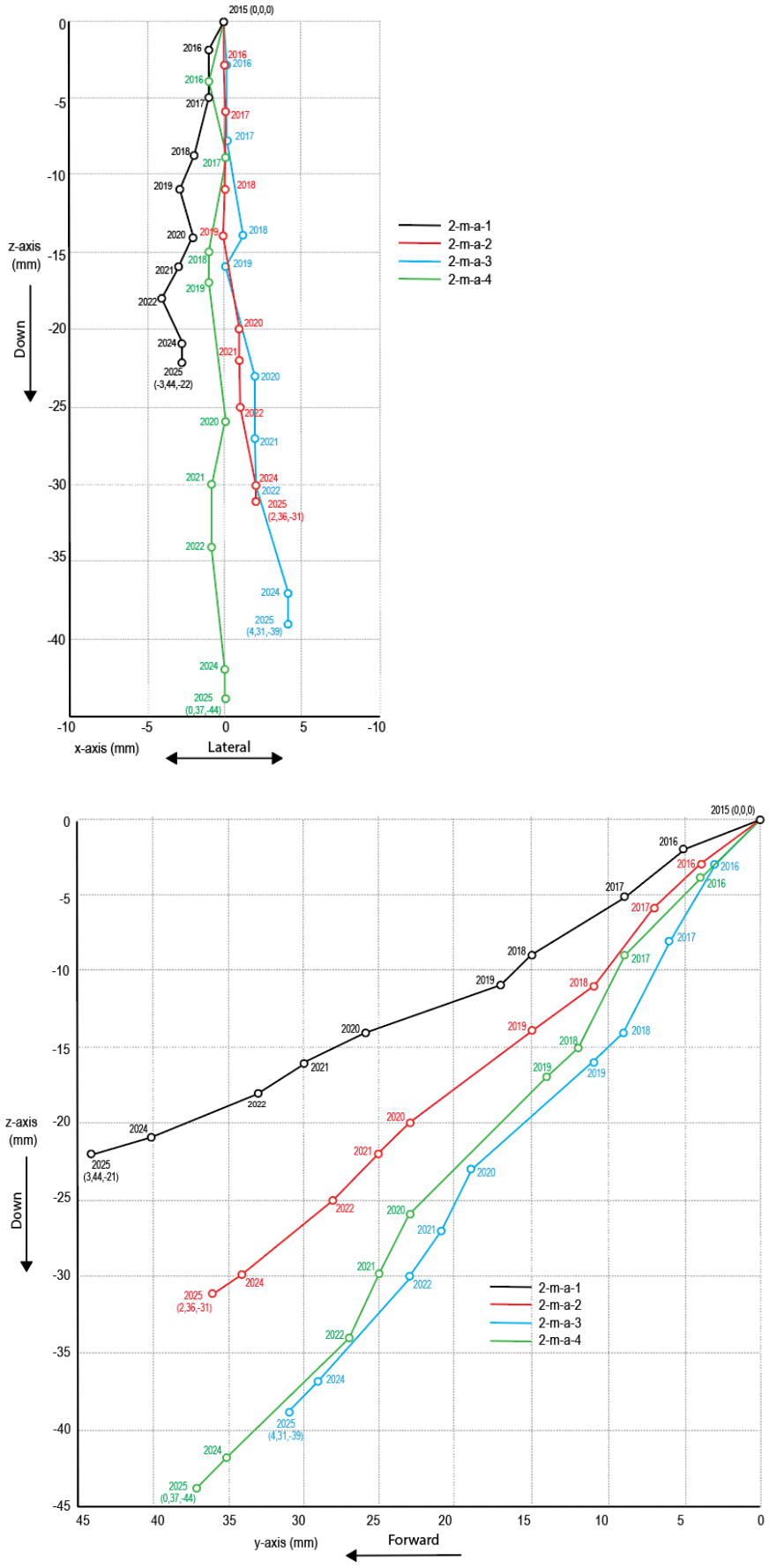


FIGURE 12 – AREA 2, LINE A, LATERAL AND FORWARD MOVEMENT 2D GRAPHS

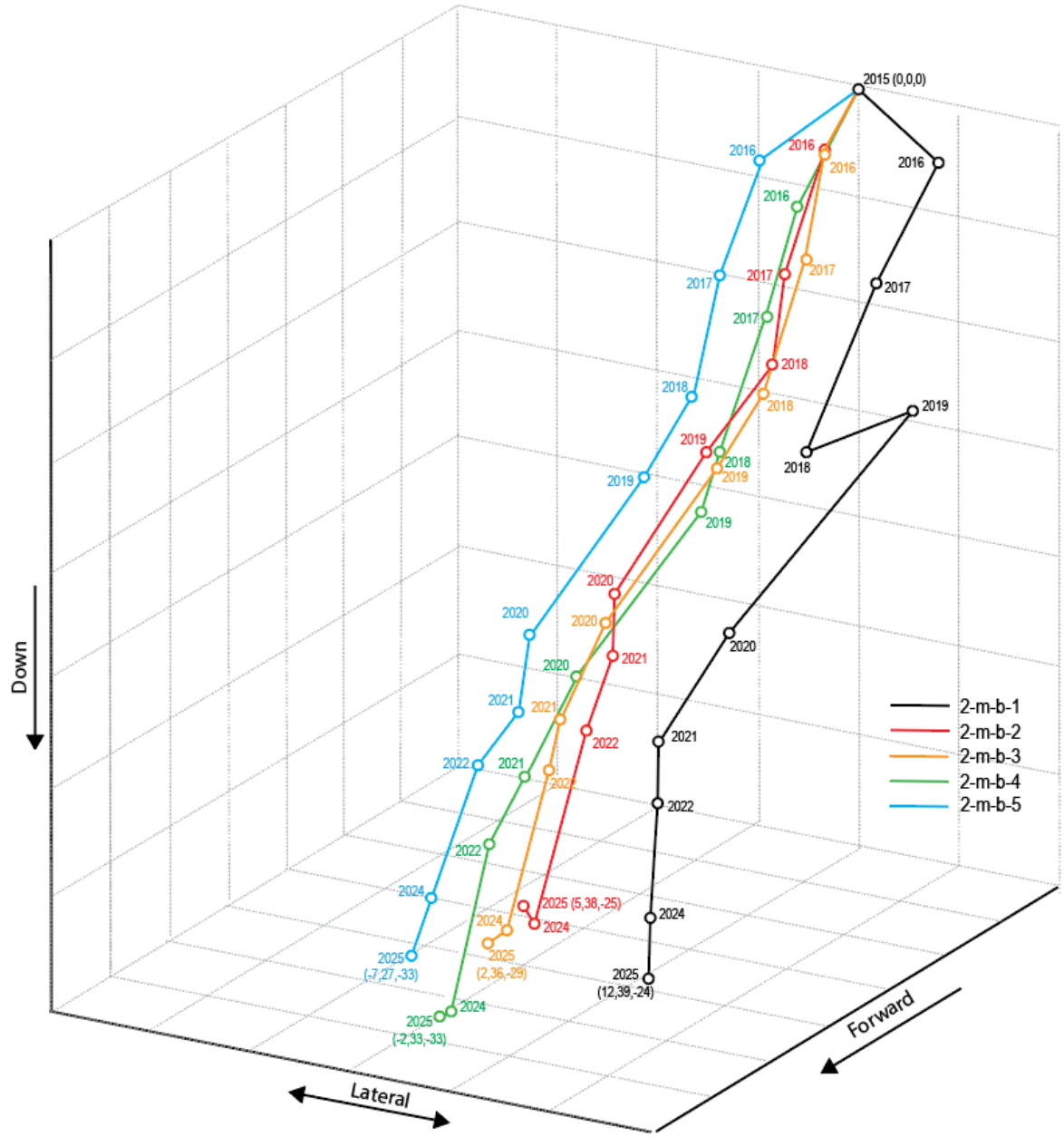


FIGURE 13- AREA 2, LINE B, SCHEMATIC 3D DIAGRAM OF MOVEMENT OVER DURATION OF THE MONITORING SURVEY OF EACH SURVEY MARKER

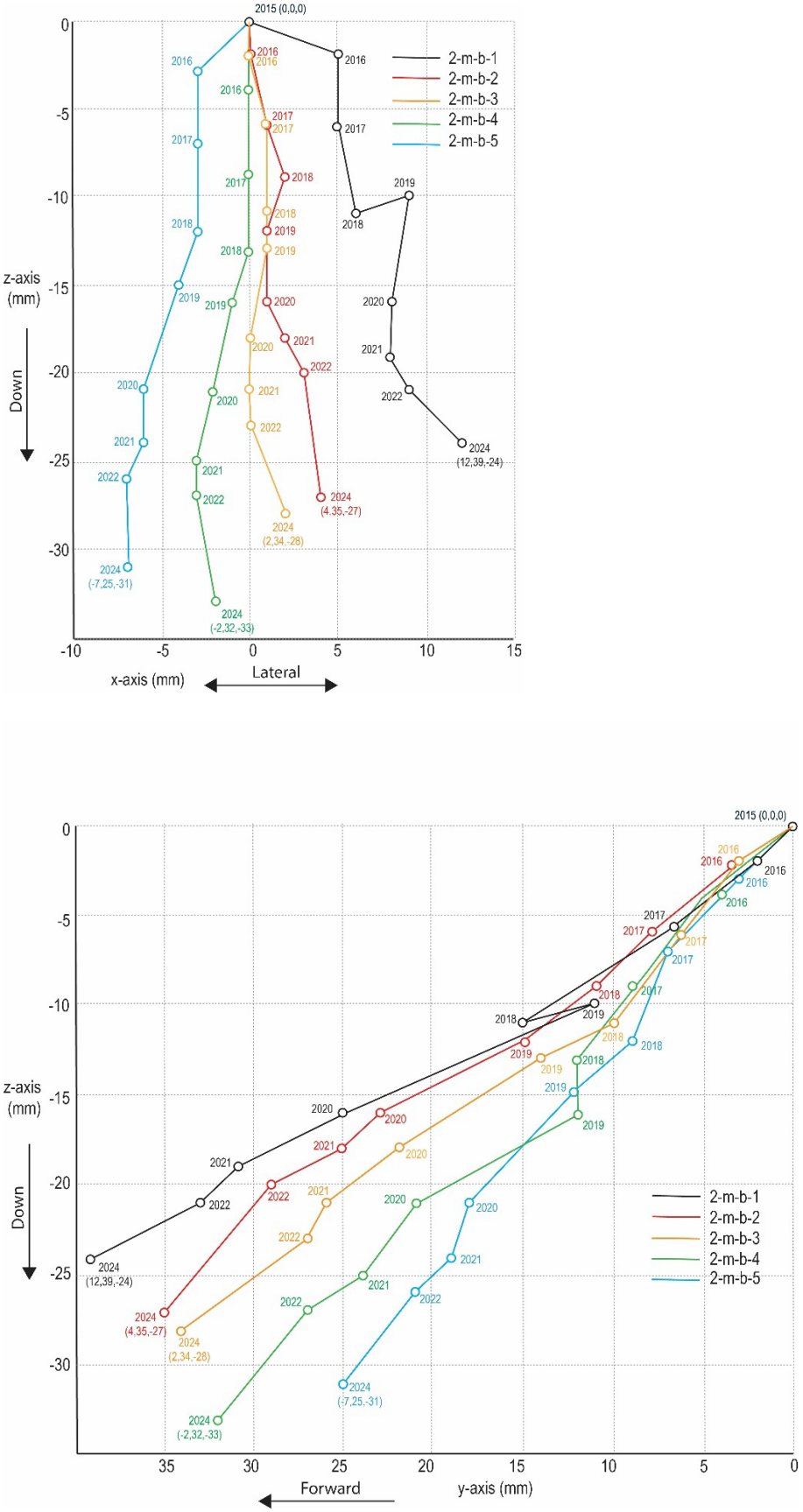


FIGURE 14 - AREA 2, LINE B, LATERAL AND FORWARD MOVEMENT 2D GRAPHS

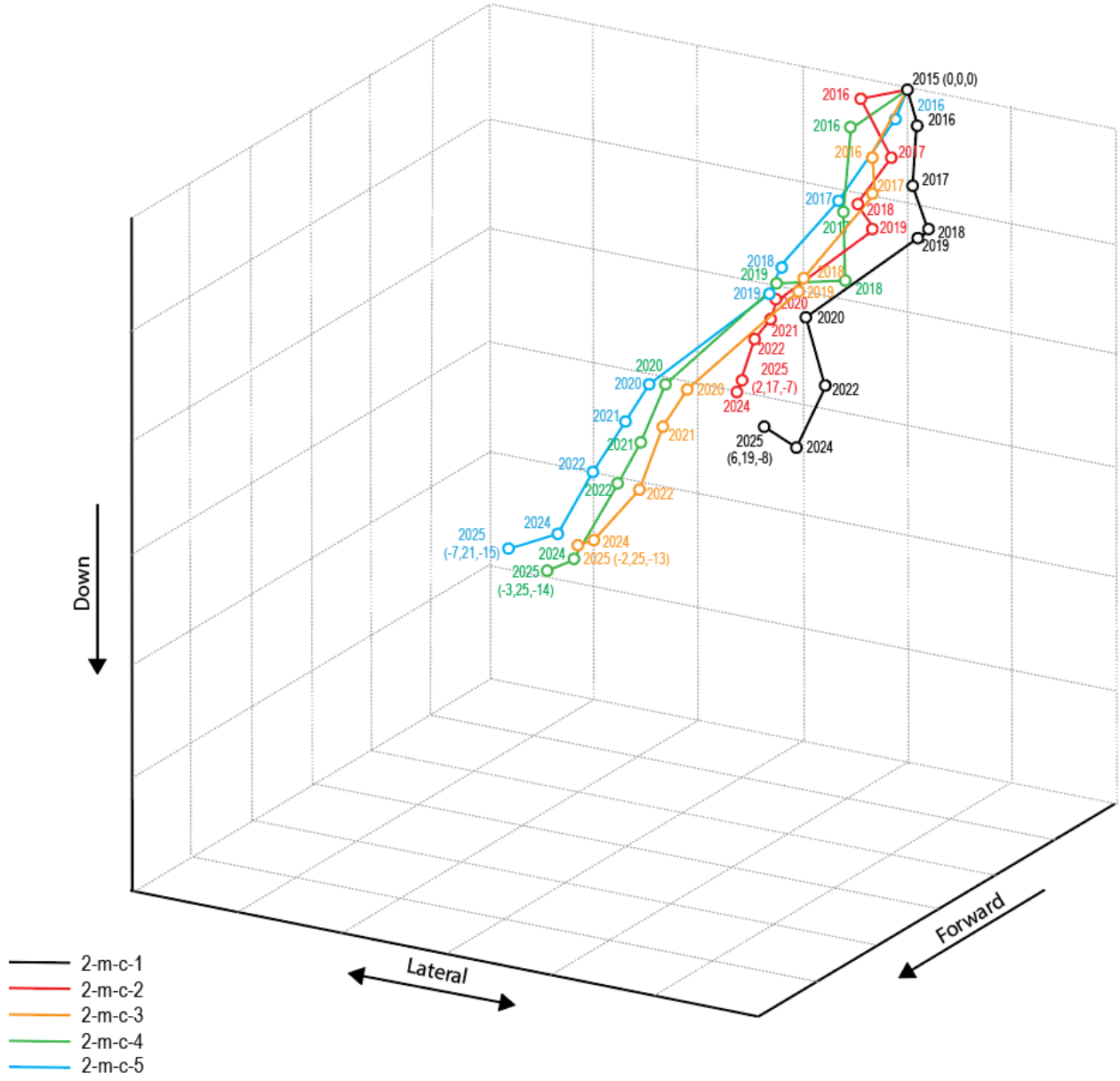
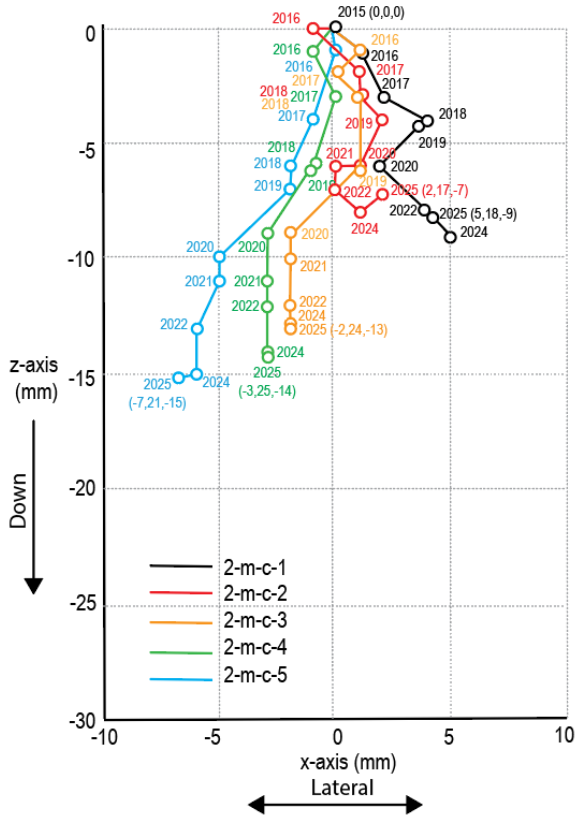


FIGURE 15 - AREA 2, LINE C, SCHEMATIC 3D DIAGRAM OF MOVEMENT OVER DURATION OF THE MONITORING SURVEY OF EACH SURVEY MARKER



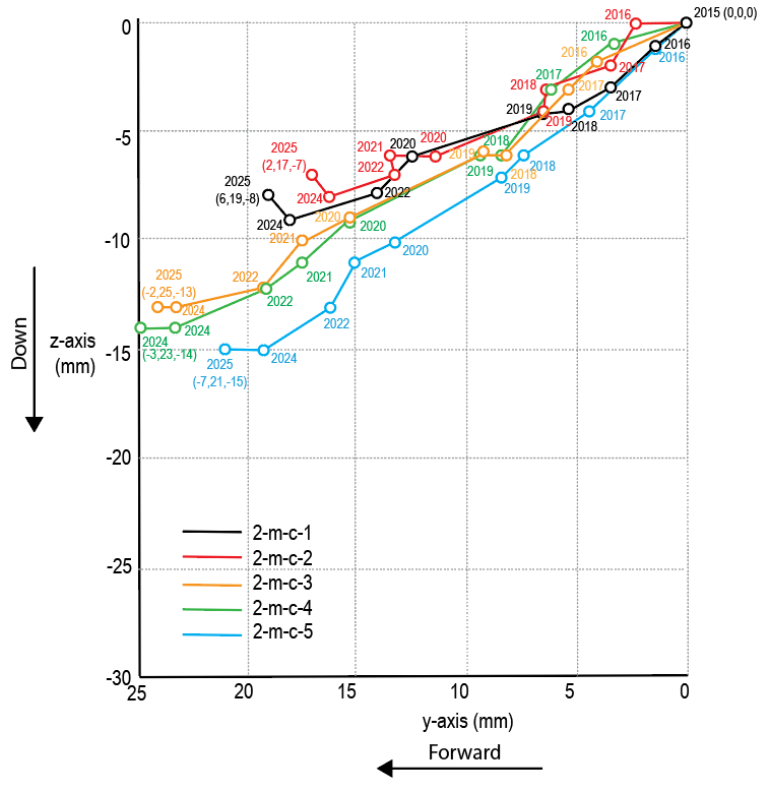


FIGURE 16 - AREA 2, LINE C, LATERAL AND FORWARD MOVEMENT 2D

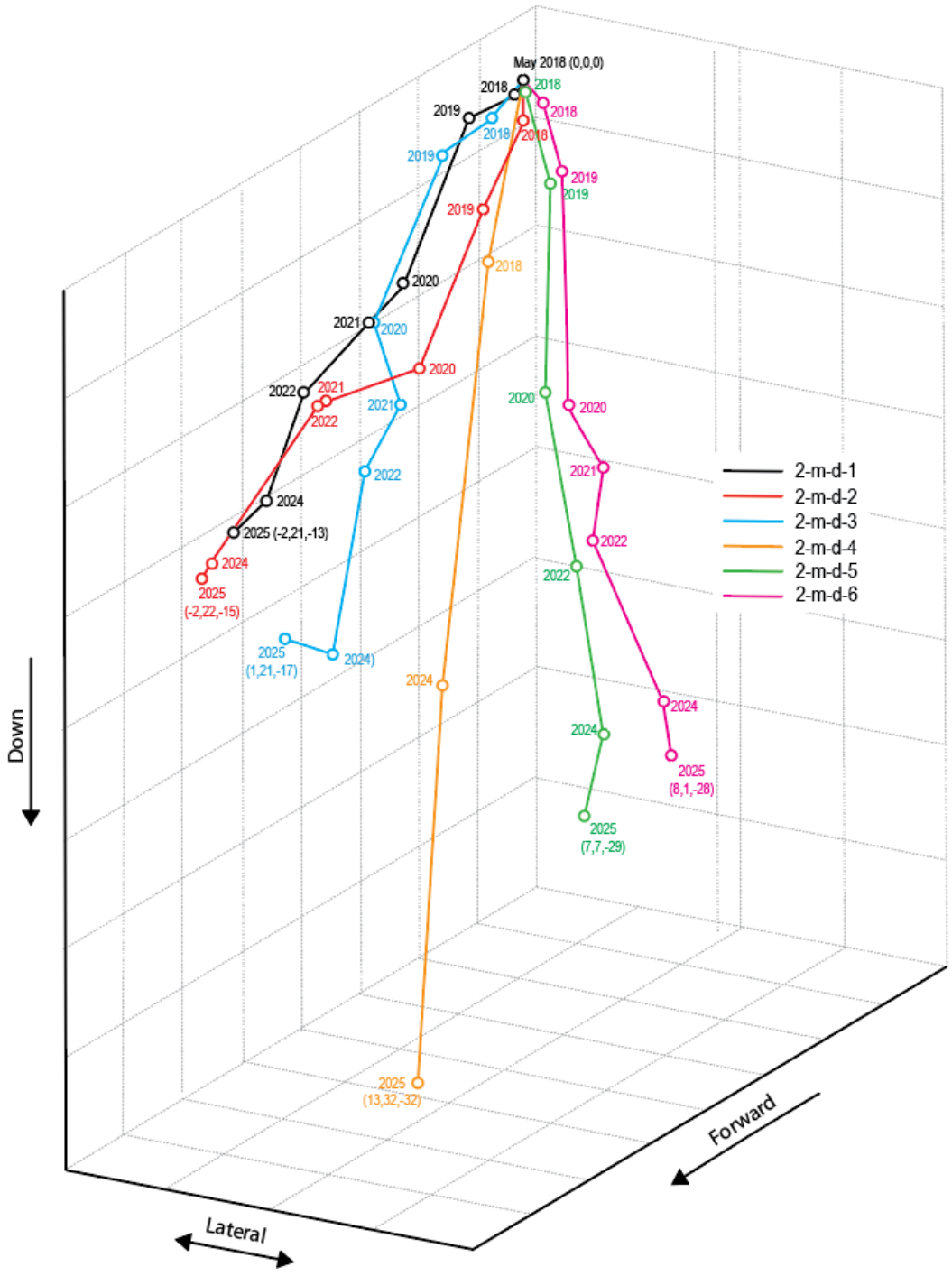


FIGURE 17- AREA 2, LINE D, SCHEMATIC 3D DIAGRAM OF MOVEMENT OVER DURATION OF THE MONITORING SURVEY OF EACH SURVEY MARKER

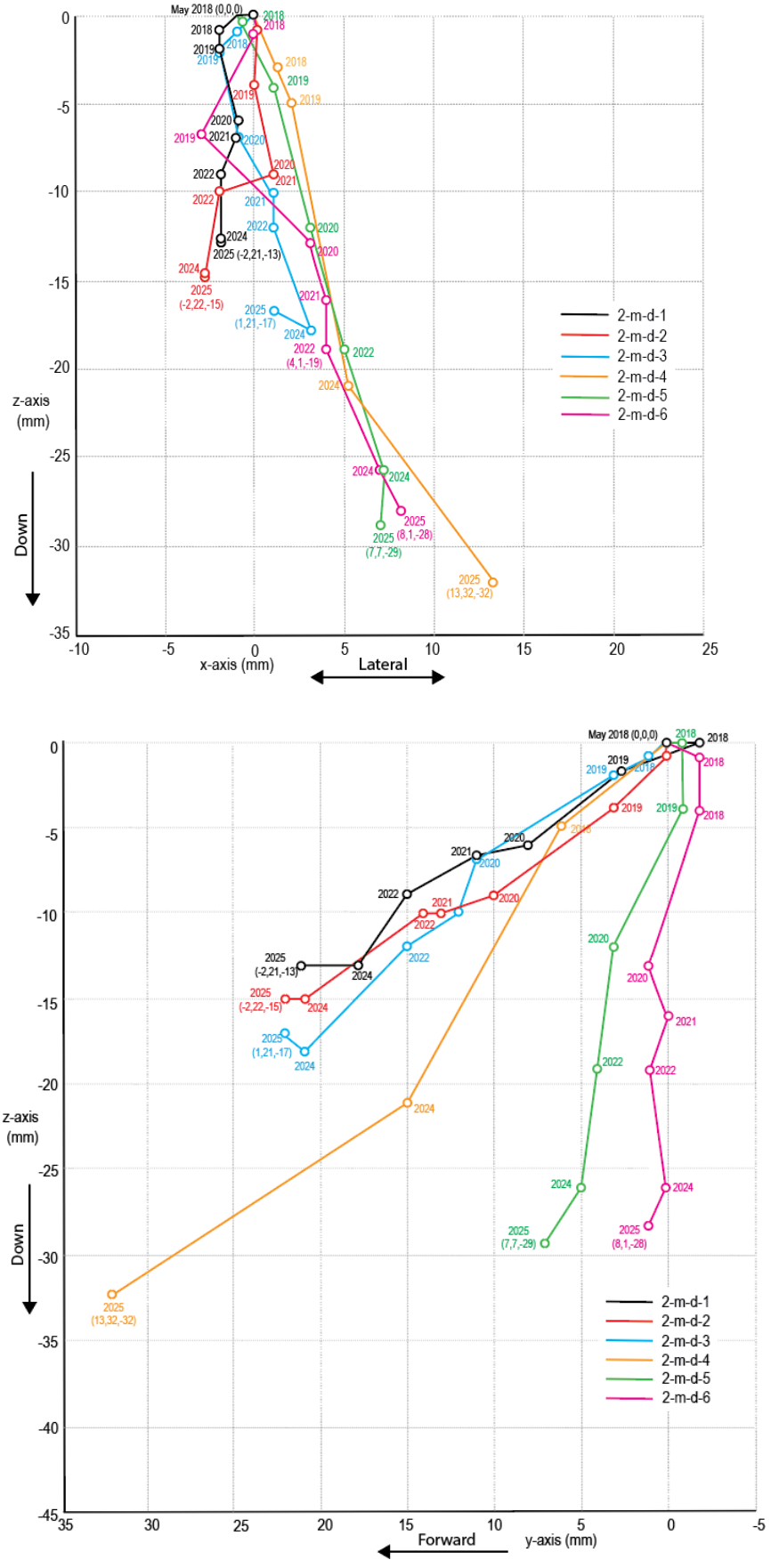


FIGURE 18 - AREA 2, LINE D, LATERAL AND FORWARD MOVEMENT 2D

5. Area 3 Results

JUNE 2025 COORDS - AREA 3

POINT	X (m)	Y (m)	Z (m)
3-m-a-1	3500.038	3502.912	101.412
3-m-a-2	3500.172	3503.34	102.274
3-m-a-3	3500.268	3503.622	102.917
3-m-a-4	3500.365	3504.13	104.022

FIGURE 19 - TABLE OF AREA 3 FINAL COORDINATES, JUNE 2025

AREA 3 3D VECTOR SHIFTS – Annual & Cumulative (in metres)

POINT	VECTOR SHIFT (2015 - 2016)	VECTOR SHIFT (2016 - 2017)	VECTOR SHIFT (2017 – 2018)	VECTOR SHIFT (2018 - 2020) Two years	VECTOR SHIFT (2020 – 2021)	VECTOR SHIFT (2021 - 2022)	VECTOR SHIFT (21 months) Sept 2022 –June 2024	VECTOR SHIFT (2024-2025)	VECTOR SHIFT (2015 -2025) Ten-years cumulative
3-m-a-1	0.002	0.001	0.001	0.003	0.000	0.001	0.001	**0.001**	**0.003**
3-m-a-2	0.000	0.001	0.001	0.003	0.000	0.004	0.005	**0.002**	**0.004**
3-m-a-3	0.004	0.000	0.001	0.003	0.002	0.002	0.001	**0.002**	**0.006**
3-m-a-4	0.003	0.001	0.003	0.007	0.002	0.002	0.002	**0.002**	**0.010**

FIGURE 20 - AREA 3, ANNUAL VECTOR SHIFT, AND THE OVERALL CUMULATIVE VECTOR CALCULATED FROM ORIGINAL TO LATEST POSITION. THIS IS NOT THE SUM OF THE ANNUAL SHIFTS AS MOVEMENT IS NOT NECESSARILY LINEAR.

COMMENT

After 10 years of observations a minor trend is beginning to appear. The wall is very slowly slumping backwards, with the magnitude increasing higher up the wall. At the base it is less has 0.5mm annually, with the upper marker after ten years having moved 10mm in total.

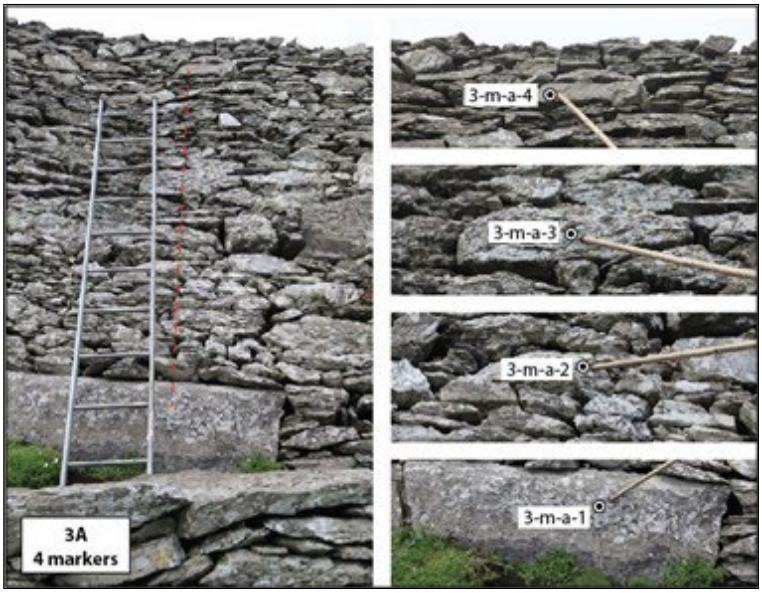


FIGURE 21- SURVEY MARKERS IN AREA 3

6. Area 4 Results

JUNE 2025 COORDS - AREA 4

POINT	X (m)	Y (m)	Z (m)
4-m-a-1	4533.268	4546.02	141.03
4-m-a-2	4533.218	4546.118	141.684
4-m-a-3	4533.313	4546.118	142.12
4-m-b-1	4542.385	4539.617	142.314
4-m-b-2	4542.6	4539.704	142.73
4-m-b-3	4542.693	4539.752	143.048
4-m-b-4	4542.723	4539.812	143.393
4-m-c-1	4543.368	4537.936	141.664
4-m-c-2	4543.814	4538.098	142.29
4-m-c-3	4544.078	4538.292	142.948
4-m-c-4	4544.126	4538.272	143.29
4-m-d-1	4546.25	4535.02	140.986
4-m-d-2	4546.316	4535.088	141.542
4-m-d-3	4546.302	4535.172	141.887

FIGURE 22 - TABLE OF AREA 4 FINAL COORDINATES, SEPTEMBER 2025

AREA 4 VECTOR SHIFTS – Annual & Cumulative (in metres)

POINT	VECTOR SHIFT (2017 -2018)	VECTOR SHIFT (2018 - 2020) Two years	VECTOR SHIFT (2020 - 2021)	VECTOR SHIFT (2021 - 2022	VECTOR SHIFT (21 months) Sept 2022 – June 2024	VECTOR SHIFT 2024 - 2025	VECTOR SHIFT (2017-2025) Eight years cumulative
4-m-a-1	0.003	0.003	0.008	0.001	0.004	**0.002**	**0.012**
4-m-a-2	0.002	0.012	0.003	0.002	0.002	**0.005**	**0.020**
4-m-a-3	0.003	0.007	0.003	0.001	0.003	**0.005**	**0.015**
4-m-b-1	0.005	0.048	0.110	n/a	n/a	**0.011**	**0.038**
4-m-b-2	0.004	0.012	0.005	0.001	n/a	**0.079**	**0.022**
4-m-b-3	0.003	0.003	0.002	0.001	0.004	**0.006**	**0.010**
4-m-b-4	0.002	0.002	0.004	0.002	0.002	**0.007**	**0.009**
4-m-c-1	0.002	0.014	0.013	0.005	0.016	**0.046**	**0.067**
4-m-c-2	0.003	0.018	0.013	0.002	n/a	**n/a**	**0.007**
4-m-c-3	0.002	0.005	0.002	0.002	0.003	**0.005**	**0.006**
4-m-c-4	0.003	0.005	0.001	0.002	0.005	**0.006**	**0.011**
4-m-d-1	0.002	0.005	0.001	0.002	0.003	**0.006**	**0.010**
4-m-d-2	0.004	0.006	0.003	0.000	0.002	**0.005**	**0.009**
4-m-d-3	0.002	0.005	0.005	0.002	0.00	**0.005**	**0.006**

FIGURE 23 - AREA 4, ANNUAL VECTOR SHIFT, AND THE OVERALL CUMULATIVE VECTOR CALCULATED FROM ORIGINAL TO LATEST POSITION. THIS IS NOT THE SUM OF THE ANNUAL SHIFTS AS MOVEMENT IS NOT NECESSARILY LINEAR. READINGS AFFECTED BY VEGETATION GROWTH OBSCURING MARKERS 4-M-B-1 & 4-M-C-1

COMMENT

Area 4 monitoring markers are located on the south and southwest-facing walls of two separate terraces high on the South Peak, with observations taken from a resection position to the south, above Christ's Saddle. As noted in previous reports, this requires observations over longer distances (70-80m) and at acute angles (45°), which is the only feasible solution for these challenging locations. Consequently, slightly larger values might be expected due to potential sighting errors. These errors are compounded by poor weather conditions, such as low cloud, mist, or bright sunlight causing shimmer or haze.

The 2025 survey results indicate significant cumulative movements in three markers, highlighted in red in Figure 23. All three (Marker 4-m-b-1, 4-m-b-2 and 4-m-c-1 continue to show abnormal values, likely due to vegetation interference. Given the regularity of issues with these markers they should be examined close-up, using rope access to clear vegetation and check stability.

As observed in last year's observations there is a movement trend developing over the eight-year observation period in Area 4. This downward and forward trend appears to be restricted to Line A, with cumulative values of 12-20mm, though it remains modest.

4-m-a-1, 4-m-a-2, 4-m-a-3, from bottom

4-m-b-1, 4-m-b-2, 4-m-b-3, 4-m-b-4 from bottom

4-m-c-1, 4-m-c-2, 4-m-c-3, 4-m-c-4 from bottom

4-m-d-1, 4-m-d-2, 4-m-d-3, from bottom

FIGURE 24 - SURVEY MARKERS IN AREA 4

7. Area 5 Results

JUNE 2025 COORDS - AREA 5

POINT	EAST	NORTH	ELEVATION
5-m-a-1	5505.184	5508.873	107.788
5-m-a-2	5505.182	5509.284	108.43
5-m-b-1	5505.628	5507.546	107.116
5-m-b-2	5505.909	5507.823	107.565
5-m-b-3	5505.807	5507.735	107.772
5-m-b-4	5506.074	5507.982	108.357
5-m-c-1	5506.269	5506.68	106.749
5-m-c-2	5506.62	5506.98	107.698
5-m-c-3	5506.749	5507.185	108.332
5-m-d-1	5506.784	5506.022	106.764
5-m-d-2	5506.848	5506.013	107.3
5-m-d-3	5506.956	5506.176	107.82
5-m-d-4	5507.104	5506.387	108.266

FIGURE 25 - TABLE OF AREA 5 FINAL COORDINATES, JUNE 2025

AREA 5 3D VECTOR SHIFTS – Annual & Cumulative (in metres)

POINT	**VECTOR SHIFT (2017 -2018)**	**VECTOR SHIFT (2018 - 2020) Two years**	**VECTOR SHIFT (2020 - 2021)**	**VECTOR SHIFT (2021 - 2022)**	**VECTOR SHIFT (21 months) Sept 2022 –June 2024**	**VECTOR SHIFT 2024 - 2025**	**VECTOR SHIFT (2017-2025) Eight years cumulative**
5-m-a-1	0.001	0.005	0.001	0.002	0.003	**0.000**	**0.007**
5-m-a-2	0.001	0.003	0.001	0.000	0.001	**0.001**	**0.005**
5-m-b-1	0.001	0.009	0.005	0.005	0.005	**0.005**	**0.008**
5-m-b-2	0.000	0.003	0.002	0.001	0.002	**0.001**	**0.005**
5-m-b-3	0.001	0.005	0.001	0.001	0.002	**0.001**	**0.007**
5-m-b-4	0.008	0.019	0.011	0.003	0.008	**0.003**	**0.014**
5-m-c-1	0.001	0.004	0.001	0.001	0.001	**0.000**	**0.006**
5-m-c-2	0.004	0.006	0.001	0.002	0.002	**0.000**	**0.007**
5-m-c-3	0.007	0.008	0.000	0.000	0.008	**0.002**	**0.003**
5-m-d-1	0.003	0.003	0.002	0.001	0.002	**0.003**	**0.006**
5-m-d-2	0.001	0.003	0.001	0.000	0.001	**0.000**	**0.005**
5-m-d-3	0.001	0.003	0.001	0.000	0.001	**0.000**	**0.005**
5-m-d-4	0.002	n/a	n/a	0.000	0.003	**0.003**	**0.006**

FIGURE 26 - AREA 5, ANNUAL VECTOR SHIFT, AND THE OVERALL CUMULATIVE VECTOR CALCULATED FROM ORIGINAL TO LATEST POSITION. THIS IS NOT THE SUM OF THE ANNUAL SHIFTS AS MOVEMENT IS NOT NECESSARILY LINEAR

COMMENT

The 2025 observations show good consistency with the previous years readings. The low cumulative vector change over the eight year (2017-2025) indicate general stability in Area 5. Some minor shifts may have been associated with vegetation or movement of stones as this area is adjacent to the routeway to the south peak via the eye of the needle.

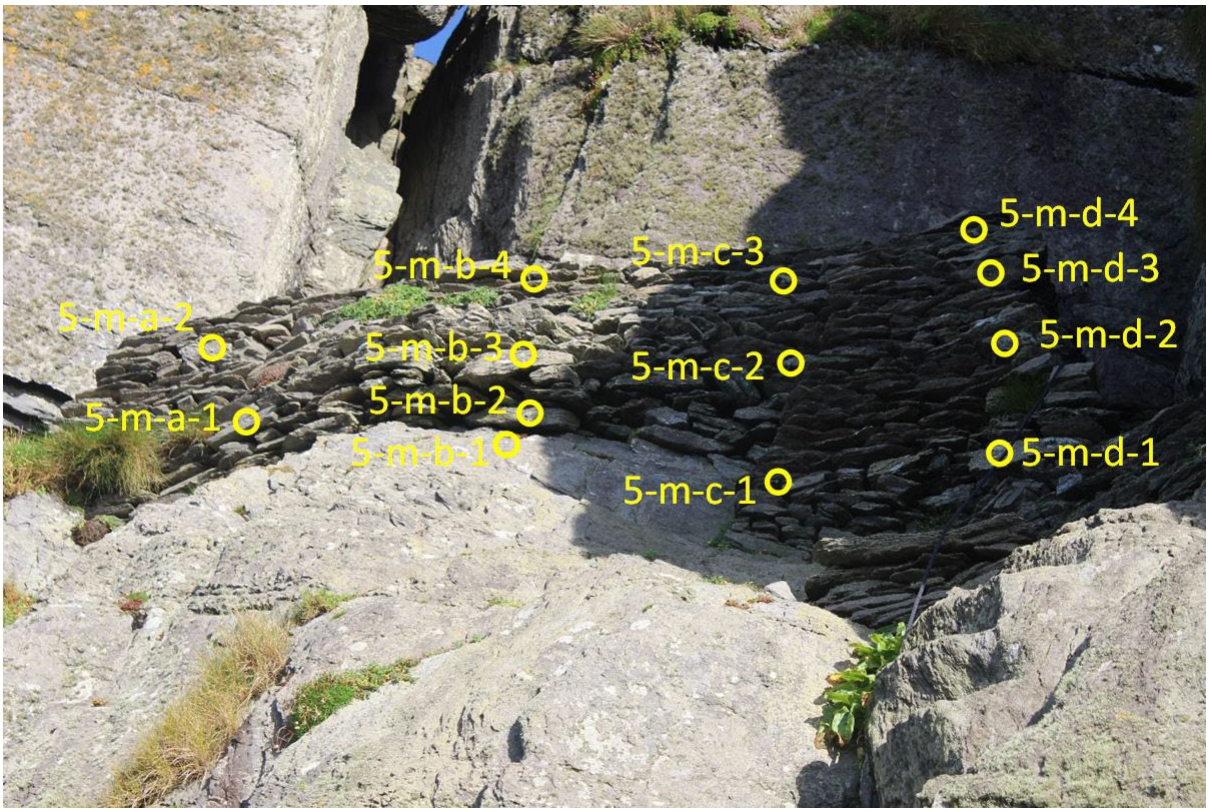


FIGURE 27 - SURVEY MARKERS IN AREA 5

8. Area 6 Results

JUNE 2025 COORDS - AREA 6

POINT	X (m)	Y (m)	Z (m)
6-m-a-1	6499.126	6517.84	101.052
6-m-a-2	6499.181	6517.817	101.506
6-m-a-3	6499.145	6517.836	102.058
6-m-a-4	6499.191	6517.902	102.589
6-m-b-1	vegetation	vegetation	vegetation
6-m-b-2	6504.361	6516.799	105.108
6-m-b-3	6504.548	6516.896	105.669
6-m-c-1	6507.325	6509.214	103.886
6-m-c-2	6507.86	6509.881	104.484
6-m-c-3	6507.943	6509.784	104.842
6-m-c-4	6507.999	6509.86	105.244
6-m-d-1	6507.282	6506.216	103.592
6-m-d-2	6507.33	6506.302	103.865
6-m-d-3	6507.374	6506.288	104.399
6-m-e-1	6505.57	6503.284	103.404
6-m-e-2	6505.674	6503.199	103.842
6-m-e-3	6505.75	6503.147	104.419
6-m-f-1	6504.805	6502.07	102.694
6-m-f-2	6505.434	6502.681	103.486
6-m-f-3	6505.473	6502.577	103.884
6-m-f-4	6505.586	6502.519	104.485
6-m-g-1	6500.625	6494.16	96.96
6-m-g-2	6500.65	6494.072	97.171
6-m-g-3	6500.774	6494.188	97.579

FIGURE 28 - TABLE OF AREA 6 FINAL COORDINATES, JUNE 2025

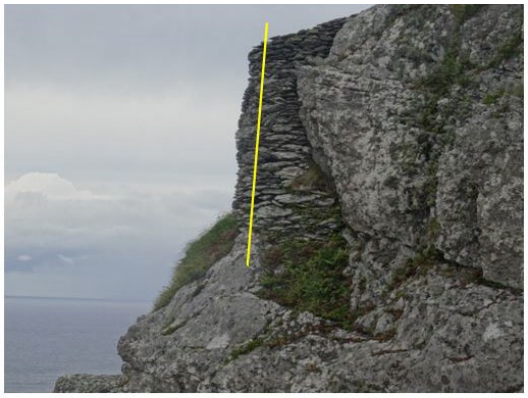
AREA 6 3D VECTOR SHIFTS – Annual & Cumulative (in metres)

POINT	VECTOR SHIFT (2017 - 2018)	VECTOR SHIFT (2018 - 2020) Two years	VECTOR SHIFT (2020 - 2021)	VECTOR SHIFT (2021 - 2022)	VECTOR SHIFT (21 months) Sept 2022 –June 2024	VECTOR SHIFT (2024 - 2025)	VECTOR SHIFT (2017 - 2025) Eight years cumulative
6-m-a-1	0.003	0.003	0.002	0.001	0.001	0.000	0.003
6-m-a-2	0.003	0.004	0.002	0.002	0.001	0.003	0.007
6-m-a-3	0.001	0.004	0.001	0.001	0.002	0.002	0.006
6-m-a-4	0.002	0.008	0.003	0.002	0.000	0.003	0.010
6-m-b-1	0.001	0.004	0.002	0.004	0.004	n/a	n/a
6-m-b-2	0.001	0.005	0.001	0.001	0.001	0.002	0.005
6-m-b-3	0.001	0.005	0.001	0.002	0.001	0.002	0.007
6-m-c-1	0.002	0.013	0.008	0.021	0.002	0.001	0.000
6-m-c-2	0.001	0.018	0.004	0.008	0.001	0.003	0.005
6-m-c-3	0.001	0.003	0.001	0.003	0.002	0.001	0.005
6-m-c-4	0.002	0.003	0.001	0.002	0.002	0.003	0.007
6-m-d-1	0.001	n/a	n/a	n/a	n/a	0.001	0.004
6-m-d-2	0.001	0.002	0.003	0.002	0.002	0.033	0.033
6-m-d-3	0.001	0.003	0.001	0.001	0.001	0.001	0.002
6-m-e-1	0.001	0.015	0.014	0.005	0.005	0.002	0.001
6-m-e-2	0.001	0.024	0.019	0.002	0.008	0.007	0.004
6-m-e-3	0.002	0.004	0.001	0.002	0.001	0.002	0.008
6-m-f-1	0.002	0.002	0.003	0.001	0.001	0.002	0.002
6-m-f-2	0.004	0.005	0.010	n/a	n/a	0.002	0.011
6-m-f-3	0.003	0.002	n/a	n/a	0.001	0.002	0.005
6-m-f-4	0.005	0.009	0.001	0.002	0.002	0.005	0.016
6-m-g-1	0.002	0.001	0.001	0.002	0.002	0.001	0.001
6-m-g-2	0.002	0.001	0.003	0.001	0.001	0.004	0.008
6-m-g-3	0.004	0.001	0.002	0.001	0.001	0.001	0.002

FIGURE 29 - AREA 6, ANNUAL VECTOR SHIFT, AND THE OVERALL CUMULATIVE VECTOR CALCULATED FROM ORIGINAL TO LATEST POSITION. THIS IS NOT THE SUM OF THE ANNUAL SHIFTS AS MOVEMENT IS NOT NECESSARILY LINEAR.

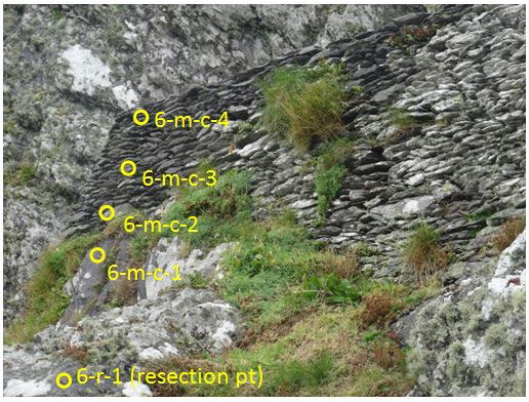
COMMENT

The vector shifts measured at Area 6 over the 2017-2025 eight-year observation period are generally within tolerance and continue to indicate no significant change. Accessible markers were cleared on the day of observation ensuring reliable readings, leaving only 6-m-b-1 obscured. The buttress on which lines e and f are located were particularly overgrown. Two markers need to be checked for local stability and potential issues with sightlines that were not apparent on when taking this year's readings, 6-m-d-2 and 6-m-f-4, highlighted in red.



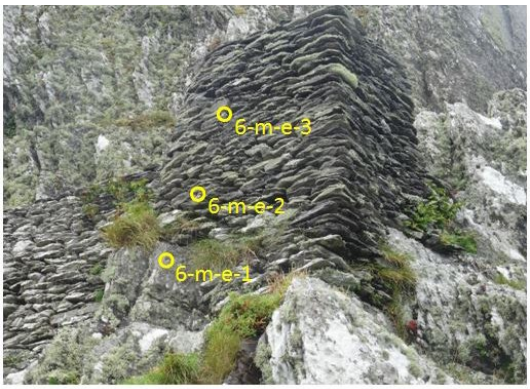
6-m-a-1, 6-m-a-2, 6-m-a-3, 6-m-a-4 from bottom

6-m-b-1, 6-m-b-2, 6-m-b-3 from bottom

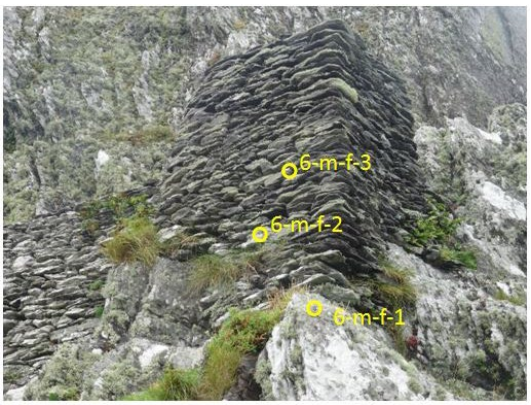


6-m-c-1, 6-m-c-2, 6-m-c-3, 6-m-c-4

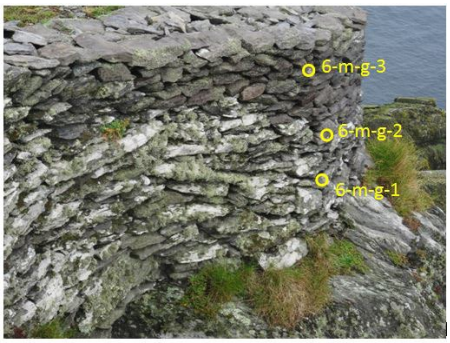
6-m-d-1, 6-m-d-2, 6-m-d-3



6-m-e-1, 6-m-e-2, 6-m-e-3



6-m-f-1, 6-m-f-2, 6-m-f-3



6-m-g-1, 6-m-g-2, 6-m-g-3

FIGURE 26 - SURVEY MARKERS IN AREA 6

9. Area 7 results

JUNE 2025 COORDS - AREA 7

POINT	EAST	NORTH	ELEVATION
7-m-a-1	7507.502	7503.248	96.438
7-m-a-2	7507.474	7503.245	96.66
7-m-a-3	7507.438	7503.216	96.984
7-m-a-4	7507.446	7503.143	97.279
7-m-b-1	7506.814	7500.077	98.284
7-m-b-2	7506.802	7500.052	98.442

FIGURE 27- TABLE OF AREA 7 FINAL COORDINATES, JUNE 2025

AREA 7 VECTOR SHIFTS – Annual & Cumulative

POINT	VECTOR SHIFT (2017 -2018)	VECTOR SHIFT (2018-2020) Two years	VECTOR SHIFT (2020 - 2021)	VECTOR SHIFT (2021 - 2022)	VECTOR SHIFT (21 months) Sept 2022 –June 2024	VECTOR SHIFT (2024 - 2025)	VECTOR SHIFT (2017-2025) Eight years cumulative
7-m-a-1	0.002	0.003	0.005	0.001	0.004	**0.003**	**0.005**
7-m-a-2	0.002	0.002	0.001	0.002	0.002	**0.001**	**0.004**
7-m-a-3	0.002	0.003	0.006	0.001	0.003	**0.002**	**0.006**
7-m-a-4	0.002	0.001	0.001	0.001	0.002	**0.001**	**0.003**
7-m-b-1	0.002	0.001	0.001	0.000	0.002	**0.002**	**0.002**
7-m-b-2	0.004	0.002	0.001	0.000	0.001	**0.001**	**0.004**

FIGURE 28 - AREA 7, ANNUAL VECTOR SHIFT, AND THE OVERALL CUMULATIVE VECTOR CALCULATED FROM ORIGINAL TO LATEST POSITION. THIS IS NOT THE SUM OF THE ANNUAL SHIFTS AS MOVEMENT IS NOT NECESSARILY LINEAR.

COMMENT

The 2025 survey results again indicate that all Area 7 markers are within tolerance over the eight-year 2017-2025 period.

7-m-a-1, 7-m-a-2, 7-m-a-3, 7-m-a-4

7-m-b-1, 7-m-b-2

FIGURE 29 - SURVEY MARKERS IN AREA 7

10. Conclusions

Area 2, the retaining wall below St Michael's Church, still presents the largest vector shifts, and subsequently the greatest concern. As in previous years the results should be considered by the OPW engineers alongside other scientific evidence when considering appropriate responses.

To create a more detailed record of the wall additional survey data in the form of terrestrial laser scanning and photogrammetric imagery was again captured. The laser scan data will be compared with similar data from 2015 and the resulting deviation model should help better understand the dynamics of the wall over time. The photogrammetric model will add texture and reveal the different phases of conservation work which have taken place to date. This analysis will be require further processing and be presented as soon as available.

Given this is the 10th year of observation it may be an appropriate point to consult again with geomatics specialist to whether technological advances offer better solutions. This approach only provides a limited snapshot of stones in limited parts of the island, and is always vulnerable to weather and access issues

Robert Shaw

The Discovery Programme

July 2025

Appendix I - Resection Networks

Area 1

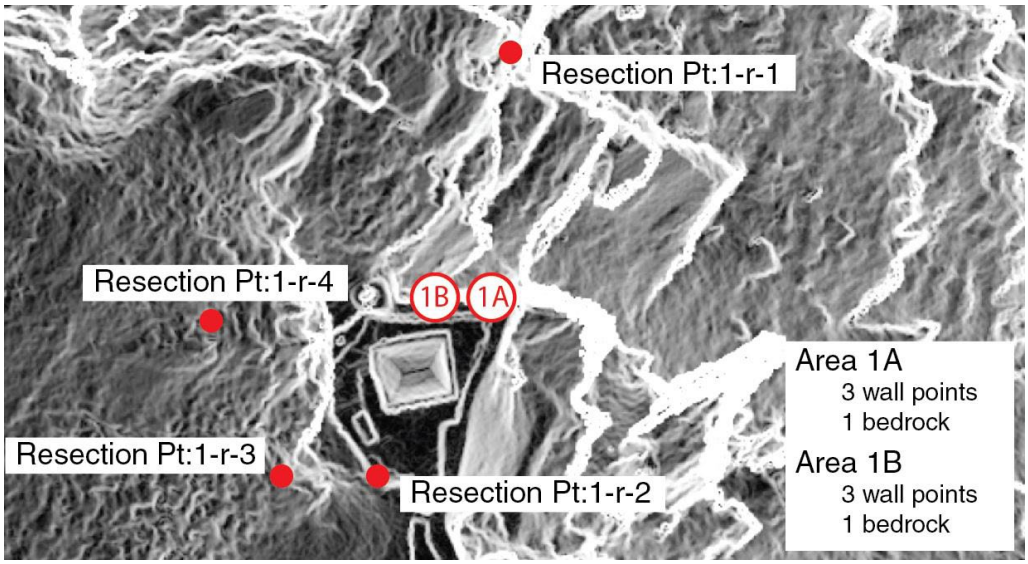


FIGURE I - PLAN LOCATING RESECTION CONTROL NETWORK FOR AREA 1

FIGURE I - PHOTOS TO IDENTIFY AREAS 1 RESECTION MARKERS

Area 2

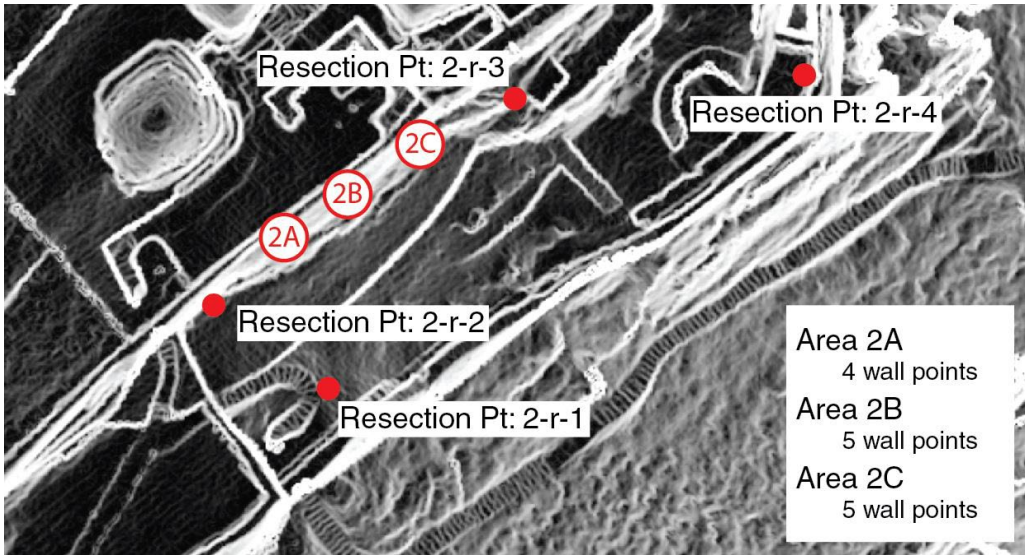


FIGURE II - PLAN LOCATING RESECTION CONTROL NETWORK FOR AREA 2

FIGURE III - PHOTOS TO IDENTIFY AREAS 2 RESECTION MARKERS

Area 3

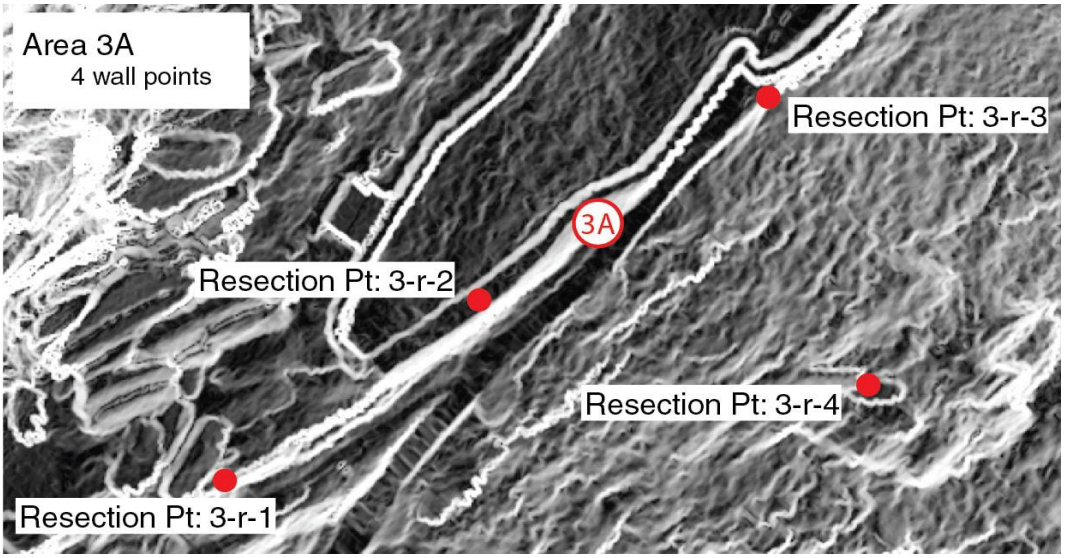


FIGURE IV - PLAN LOCATING RESECTION CONTROL NETWORK FOR AREA 3

FIGURE V - PHOTOS TO IDENTIFY AREAS 3 RESECTION MARKERS

Area 4

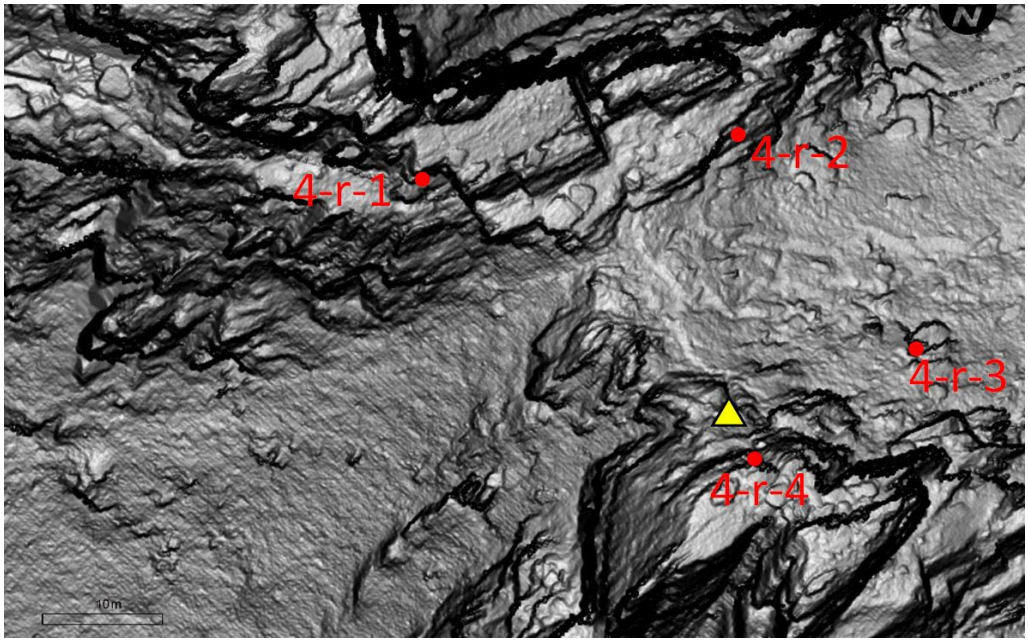


FIGURE VI - PLAN LOCATING RESECTION CONTROL NETWORK FOR AREA 4

4-r-1 4-r-2

4-r-3 4-r-4 (approx. only)

FIGURE VII PHOTOS TO IDENTIFY AREAS 4 RESECTION MARKERS

Area 5

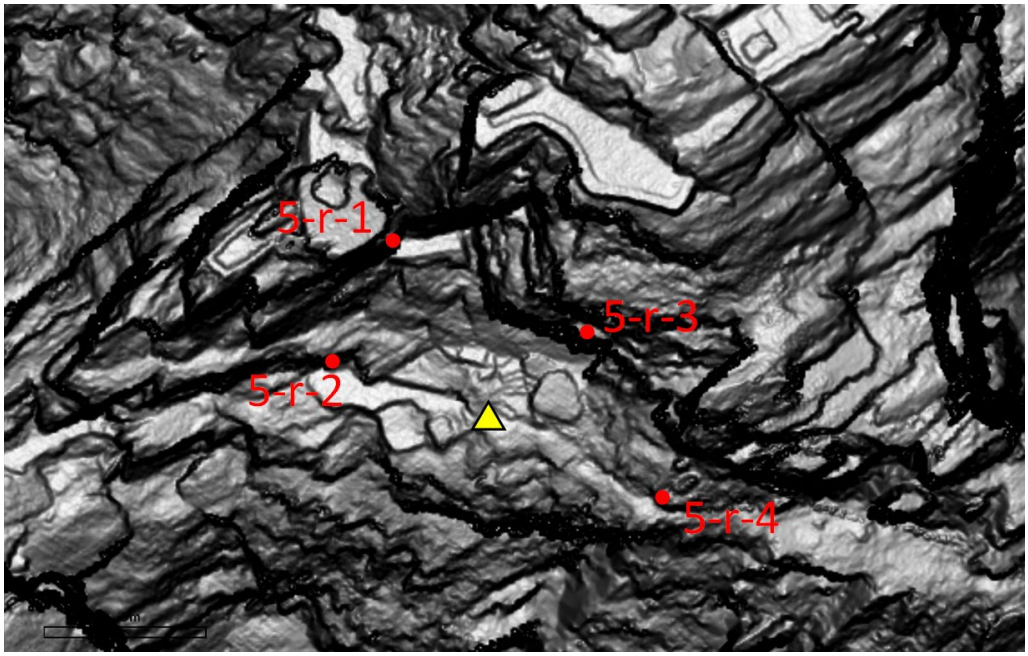


FIGURE VIII - PLAN LOCATING RESECTION CONTROL NETWORK FOR AREA 5

FIGURE IX - PHOTOS TO IDENTIFY AREAS 5 RESECTION MARKERS

Area 6

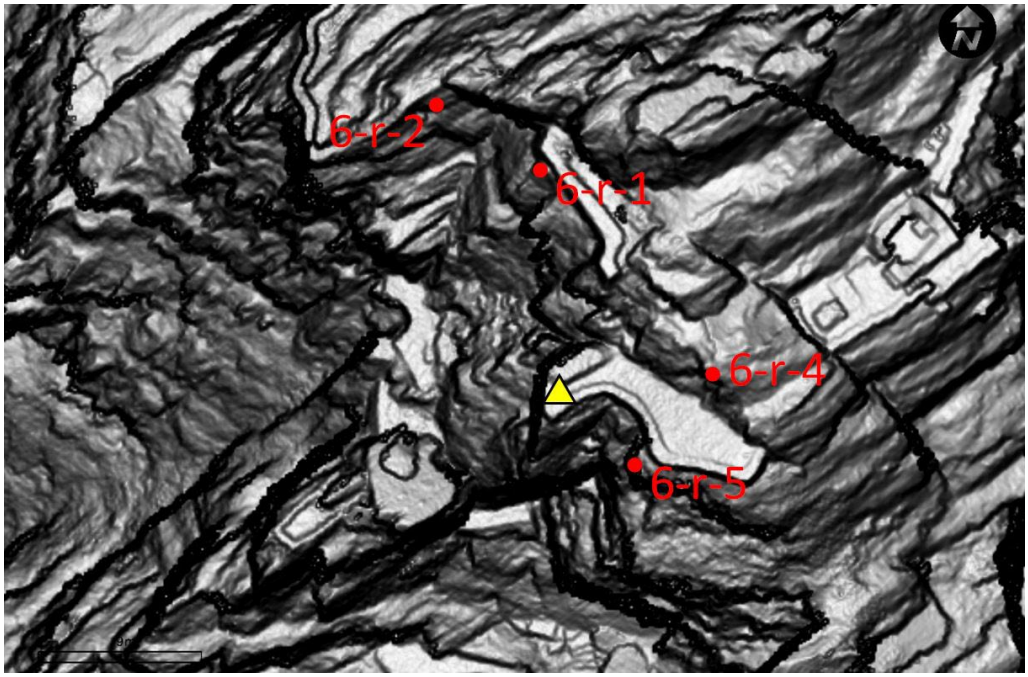


FIGURE X PLAN LOCATING RESECTION CONTROL NETWORK FOR AREA 6

FIGURE XI - PHOTOS TO IDENTIFY AREAS 6 RESECTION MARKERS

Area 7

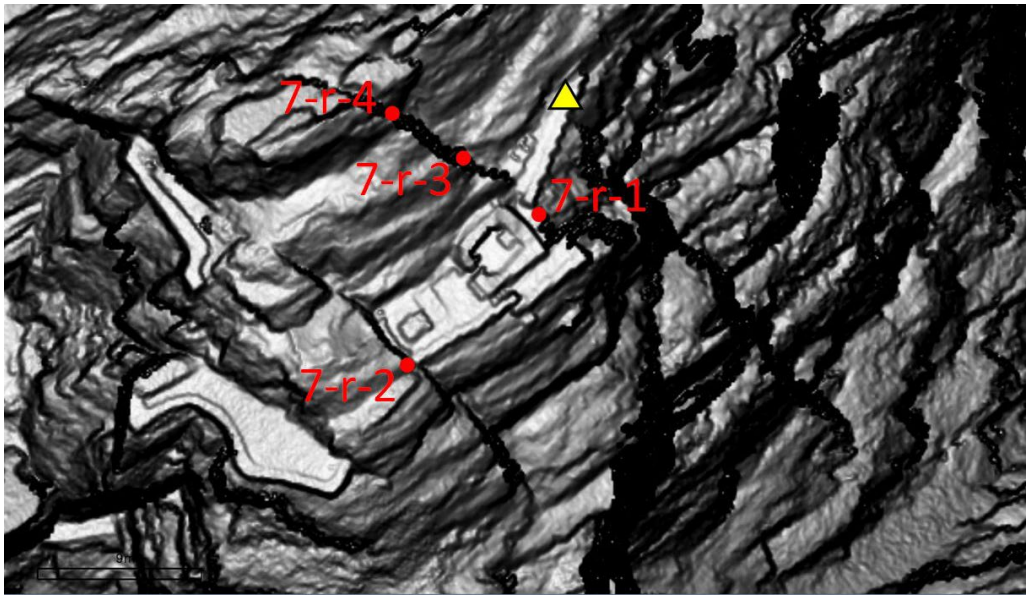


FIGURE XII - PLAN LOCATING RESECTION CONTROL NETWORK FOR AREA 6

7-r-3 (approx.)

7-r-4

7-r-1

7-r-2

FIGURE XIII - PHOTOS TO IDENTIFY AREAS 7 RESECTION MARKERS

Appendix II - Resection Point Coordinate Lists

Area 1

POINT	X COORD(m)	Y COORD (m)	Z COORD (m)
1-r-1	1493.380	1490.603	101.814
1-r-2	1503.874	1518.655	96.169
1-r-3	1508.541	1517.604	99.624
1-r-4	1511.401	1508.181	105.085

Area 2

POINT	X COORD(m)	Y COORD (m)	Z COORD (m)
2-r-1	2495.86	2500.888	102.184
2-r-2	2494.024	2509.697	106.525
2-r-3	2509.455	2510.428	105.374
2-r-4	2529.449	2501.391	97.352

Area 3

POINT	X COORD(m)	Y COORD (m)	Z COORD (m)
3-r-1	3471.063	3509.188	103.28
3-r-2	3493.696	3503.877	101.411
3-r-3	3516.941	3499.897	98.889
3-r-4	3503.643	3484.744	88.498

Area 4

POINT	X COORD(m)	Y COORD (m)	Z COORD (m)
4-r-1	4515.563	4523.675	103.916
4-r-2	4522.681	4500.303	90.815
4-r-3	4508.317	4487.155	88.061
4-r-4	4496.091	4498.067	102.521

Area 5

POINT	X COORD(m)	Y COORD (m)	Z COORD (m)
5-r-1	5505.584	5509.863	110.1
5-r-2	5492.348	5515.485	98.521
5-r-3	5507.077	5497.315	102.117
5-r-4	5501.321	5490.037	98.23

Area 6

POINT	X COORD(m)	Y COORD (m)	Z COORD (m)
6-r-1	6505.561	6507.147	102.375
6-r-2	6505.737	6515.834	104.464
6-r-4	6505.355	6493.549	99.289
6-r-5	6500.437	6493.73	96.62

Area 7

POINT	X COORD(m)	Y COORD (m)	Z COORD (m)
7-r-1	7506.146	7500.693	97.826
7-r-2	7515.189	7494.625	100.349
7-r-3	7504.306	7497.76	99.985
7-r-4	7503.356	7493.865	104.055

Appendix III - Annual Monitoring Point Coordinate Lists from previous surveys (2015 – 2022)

2015

POINT	X COORD(m)	Y COORD (m)	Z COORD (m)
1-m-a-1	1495.302	1509.924	95.182
1-m-a-2	1495.351	1509.933	94.597
1-m-a-3	1495.377	1510.053	93.85
1-m-a-4	1495.426	1510.366	92.447
1-m-b-1	1497.838	1509.399	95.346
1-m-b-2	1497.78	1509.303	94.948
1-m-b-3	1497.795	1509.325	94.582
1-m-b-4	1497.884	1509.427	93.862
2-m-a-1	2498.728	2508.743	105.221
2-m-a-2	2498.838	2509.548	106.613
2-m-a-3	2498.878	2510.125	108.045
2-m-a-4	2499.013	2510.691	109.548
2-m-b-1	2503.962	2508.937	104.312
2-m-b-2	2503.999	2509.601	105.863
2-m-b-3	2504.08	2510.232	107.014
2-m-b-4	2503.995	2510.634	107.907
2-m-b-5	2503.99	2510.973	109.189
2-m-c-1	2507.654	2509.714	104.024
2-m-c-2	2507.525	2510.153	105.119
2-m-c-3	2507.452	2510.739	106.626
2-m-c-4	2507.383	2510.963	107.666
2-m-c-5	2507.346	2511.14	108.271
3-m-a-1	3500.04	3502.913	101.414
3-m-a-2	3500.175	3503.338	102.276
3-m-a-3	3500.269	3503.617	102.92
3-m-a-4	3500.365	3504.123	104.029

2016

POINT	X COORD(m)	Y COORD (m)	Z COORD (m)
1-m-a-1	1495.302	1509.923	95.182
1-m-a-2	1495.35	1509.933	94.597
1-m-a-3	1495.376	1510.053	93.85
1-m-a-4	1495.426	1510.366	92.446
1-m-b-1	1497.838	1509.399	95.346
1-m-b-2	1497.78	1509.303	94.948
1-m-b-3	1497.795	1509.321	94.584
1-m-b-4	1497.883	1509.427	93.862
2-m-a-1	2498.727	2508.738	105.219
2-m-a-2	2498.838	2509.544	106.61
2-m-a-3	2498.878	2510.122	108.042
2-m-a-4	2499.012	2510.687	109.544
2-m-b-1	2503.967	2508.935	104.31
2-m-b-2	2503.999	2509.598	105.861

2-m-b-3	2504.08	2510.229	107.012
2-m-b-4	2503.995	2510.629	107.903
2-m-b-5	2503.987	2510.97	109.186
2-m-c-1	2507.655	2509.713	104.023
2-m-c-2	2507.524	2510.151	105.119
2-m-c-3	2507.452	2510.735	106.624
2-m-c-4	2507.382	2510.96	107.665
2-m-c-5	2507.346	2511.139	108.27
3-m-a-1	3500.041	3502.914	101.413
3-m-a-2	3500.175	3503.338	102.276
3-m-a-3	3500.269	3503.621	102.921
3-m-a-4	3500.366	3504.126	104.03

2017

POINT	X COORD(m)	Y COORD (m)	Z COORD (m)
1-m-a-1	1495.302	1509.924	95.182
1-m-a-2	1495.351	1509.932	94.598
1-m-a-3	1495.377	1510.054	93.85
1-m-a-4	1495.427	1510.365	92.447
1-m-b-1	1497.838	1509.399	95.346
1-m-b-2	1497.78	1509.303	94.948
1-m-b-3	1497.795	1509.324	94.582
1-m-b-4	1497.885	1509.427	93.862
2-m-a-1	2498.727	2508.734	105.216
2-m-a-2	2498.838	2509.541	106.607
2-m-a-3	2498.878	2510.119	108.037
2-m-a-4	2499.013	2510.682	109.539
2-m-b-1	2503.967	2508.93	104.306
2-m-b-2	2504	2509.593	105.857
2-m-b-3	2504.081	2510.226	107.008
2-m-b-4	2503.995	2510.626	107.899
2-m-b-5	2503.987	2510.966	109.182
2-m-c-1	2507.656	2509.711	104.021
2-m-c-2	2507.526	2510.15	105.117
2-m-c-3	2507.453	2510.734	106.623
2-m-c-4	2507.383	2510.958	107.663
2-m-c-5	2507.345	2511.136	108.267
3-m-a-1	3500.041	3502.914	101.414
3-m-a-2	3500.175	3503.339	102.276
3-m-a-3	3500.269	3503.621	102.921
3-m-a-4	3500.367	3504.127	104.03
4-m-a-1	4533.276	4546.03	141.04
4-m-a-2	4533.228	4546.132	141.694
4-m-a-3	4533.32	4546.128	142.129
4-m-b-1	4542.404	4539.635	142.335
4-m-b-2	4542.659	4539.757	142.788
4-m-b-3	4542.696	4539.753	143.051

4-m-b-4	4542.724	4539.814	143.395
4-m-c-1	4543.359	4537.924	141.652
4-m-c-2	4544.076	4538.323	142.539
4-m-c-3	4544.081	4538.296	142.95
4-m-c-4	4544.129	4538.275	143.294
4-m-d-1	4546.254	4535.025	140.991
4-m-d-2	4546.319	4535.093	141.545
4-m-d-3	4546.305	4535.176	141.891
5-m-a-1	5505.187	5508.877	107.791
5-m-a-2	5505.185	5509.288	108.433
5-m-b-1	5505.632	5507.551	107.121
5-m-b-2	5505.913	5507.826	107.567
5-m-b-3	5505.812	5507.74	107.775
5-m-b-4	5506.077	5507.986	108.361
5-m-c-1	5506.273	5506.682	106.75
5-m-c-2	5506.621	5506.983	107.7
5-m-c-3	5506.747	5507.184	108.325
5-m-d-1	5506.787	5506.025	106.764
5-m-d-2	5506.851	5506.018	107.303
5-m-d-3	5506.959	5506.18	107.823
5-m-d-4	5507.106	5506.39	108.269
6-m-a-1	6499.125	6517.846	101.052
6-m-a-2	6499.181	6517.827	101.507
6-m-a-3	6499.146	6517.842	102.06
6-m-a-4	6499.195	6517.906	102.595
6-m-b-1	6504.433	6516.684	104.414
6-m-b-2	6504.363	6516.803	105.108
6-m-b-3	6504.55	6516.902	105.671
6-m-c-1	6507.326	6509.215	103.885
6-m-c-2	6507.869	6509.885	104.487
6-m-c-3	6507.948	6509.787	104.844
6-m-c-4	6508.002	6509.862	105.247
6-m-d-1	6507.285	6506.218	103.594
6-m-d-2	6507.354	6506.323	103.876
6-m-d-3	6507.375	6506.289	104.399
6-m-e-1	6505.57	6503.284	103.403
6-m-e-2	6505.676	6503.199	103.844
6-m-e-3	6505.755	6503.146	104.423
6-m-f-1	6504.805	6502.07	102.694
6-m-f-2	6505.44	6502.683	103.489
6-m-f-3	6505.475	6502.577	103.885
6-m-f-4	6505.594	6502.523	104.492
6-m-g-1	6500.625	6494.162	96.961
6-m-g-2	6500.65	6494.067	97.169
6-m-g-3	6500.774	6494.192	97.58
7-m-a-1	7507.507	7503.244	96.44
7-m-a-2	7507.479	7503.242	96.661

7-m-a-3	7507.44	7503.212	96.987
7-m-a-4	7507.448	7503.141	97.281
7-m-b-1	7506.815	7500.075	98.283
7-m-b-2	7506.803	7500.05	98.442

2018 May

POINT	X COORD(m)	Y COORD (m)	Z COORD (m)
2-m-a-1	2498.726	2508.729	105.213
2-m-a-2	2498.838	2509.537	106.603
2-m-a-3	2498.878	2510.116	108.033
2-m-a-4	2499.012	2510.68	109.536
2-m-b-1	2503.968	2508.924	104.302
2-m-b-2	2504.001	2509.591	105.854
2-m-b-3	2504.081	2510.222	107.004
2-m-b-4	2503.994	2510.623	107.896
2-m-b-5	2503.987	2510.965	109.179
2-m-c-1	2507.658	2509.709	104.02
2-m-c-2	2507.525	2510.147	105.116
2-m-c-3	2507.452	2510.731	106.621
2-m-c-4	2507.383	2510.956	107.661
2-m-c-5	2507.345	2511.134	108.266
2-m-d-1	2496.603	2509.199	105.649
2-m-d-2	2496.53	2509.633	106.56
2-m-d-3	2496.511	2509.851	107.48
2-m-d-4	2496.533	2510.237	108.437
2-m-d-5	2496.505	2510.705	109.221
2-m-d-6	2496.508	2510.757	109.768
2-m-e-1	2498.442	2505.064	102.071
2-m-e-2	2498.396	2505.086	102.597
2-m-e-3	2498.5	2505.143	103.002
2-m-f-1	2504.122	2505.93	101.108
2-m-f-2	2504.166	2505.983	101.609
2-m-f-3	2504.196	2506.031	101.942
2-m-f-4	2504.169	2506.062	102.627
2-m-g-1	2508.152	2507.049	100.875
2-m-g-2	2508.137	2507.128	101.497
2-m-g-3	2508.179	2507.169	101.998
2-m-g-4	2508.202	2507.244	102.465

2018 July

POINT	X COORD(m)	Y COORD (m)	Z COORD (m)
2-m-a-1	2498.726	2508.729	105.212
2-m-a-2	2498.838	2509.536	106.602
2-m-a-3	2498.879	2510.115	108.032
2-m-a-4	2499.013	2510.679	109.534

2-m-b-1	2503.969	2508.924	104.302
2-m-b-2	2504.001	2509.59	105.854
2-m-b-3	2504.082	2510.221	107.004
2-m-b-4	2503.995	2510.622	107.895
2-m-b-5	2503.988	2510.964	109.178
2-m-c-1	2507.658	2509.708	104.02
2-m-c-2	2507.527	2510.147	105.116
2-m-c-3	2507.453	2510.731	106.621
2-m-c-4	2507.383	2510.955	107.661
2-m-c-5	2507.343	2511.132	108.264
2-m-d-1	2496.602	2509.2	105.649
2-m-d-2	2496.529	2509.633	106.561
2-m-d-3	2496.511	2509.851	107.479
2-m-d-4	2496.534	2510.236	108.436
2-m-d-5	2496.505	2510.706	109.221
2-m-d-6	2496.508	2510.758	109.768
2-m-e-1	2498.442	2505.064	102.071
2-m-e-2	2498.396	2505.086	102.597
2-m-e-3	2498.5	2505.143	103.002
2-m-f-1	2504.123	2505.93	101.108
2-m-f-2	2504.165	2505.983	101.609
2-m-f-3	2504.195	2506.029	101.942
2-m-f-4	2504.17	2506.062	102.627
2-m-g-1	2508.152	2507.051	100.875
2-m-g-2	2508.136	2507.126	101.497
2-m-g-3	2508.178	2507.168	101.998
2-m-g-4	2508.201	2507.243	102.464

2018 September

POINT	X COORD(m)	Y COORD (m)	Z COORD (m)
1-m-a-1	1495.301	1509.924	95.181
1-m-a-2	1495.345	1509.938	94.592
1-m-a-3	1495.375	1510.055	93.848
1-m-a-4	1495.426	1510.366	92.446
1-m-b-1	1497.838	1509.399	95.345
1-m-b-2	1497.78	1509.302	94.948
1-m-b-3	1497.794	1509.322	94.582
1-m-b-4	1497.884	1509.427	93.861
2-m-a-1	2498.726	2508.728	105.212
2-m-a-2	2498.838	2509.537	106.602
2-m-a-3	2498.879	2510.116	108.031
2-m-a-4	2499.012	2510.679	109.533
2-m-b-1	2503.968	2508.922	104.301
2-m-b-2	2504.001	2509.59	105.854
2-m-b-3	2504.081	2510.22	107.003
2-m-b-4	2503.995	2510.622	107.894
2-m-b-5	2503.987	2510.964	109.177

2-m-c-1	2507.658	2509.709	104.02
2-m-c-2	2507.526	2510.147	105.116
2-m-c-3	2507.452	2510.731	106.62
2-m-c-4	2507.383	2510.955	107.66
2-m-c-5	2507.344	2511.133	108.265
2-m-d-1	2496.602	2509.201	105.649
2-m-d-2	2496.529	2509.632	106.559
2-m-d-3	2496.511	2509.851	107.479
2-m-d-4	2496.535	2510.231	108.432
2-m-d-5	2496.505	2510.706	109.221
2-m-d-6	2496.508	2510.759	109.767
2-m-e-1	2498.443	2505.063	102.071
2-m-e-2	2498.396	2505.085	102.597
2-m-e-3	2498.5	2505.142	103.001
2-m-f-1	2504.122	2505.93	101.108
2-m-f-2	2504.164	2505.983	101.609
2-m-f-3	2504.195	2506.03	101.941
2-m-f-4	2504.169	2506.061	102.627
2-m-g-1	2508.151	2507.052	100.875
2-m-g-2	2508.135	2507.127	101.497
2-m-g-3	2508.176	2507.167	101.998
2-m-g-4	2508.199	2507.242	102.464
3-m-a-1	3500.04	3502.914	101.414
3-m-a-2	3500.174	3503.34	102.276
3-m-a-3	3500.269	3503.622	102.921
3-m-a-4	3500.367	3504.13	104.031
4-m-a-1	4533.276	4546.029	141.037
4-m-a-2	4533.227	4546.131	141.692
4-m-a-3	4533.32	4546.127	142.126
4-m-b-1	4542.401	4539.633	142.331
4-m-b-2	4542.661	4539.76	142.787
4-m-b-3	4542.698	4539.752	143.049
4-m-b-4	4542.726	4539.814	143.394
4-m-c-1	4543.358	4537.923	141.651
4-m-c-2	4544.079	4538.323	142.539
4-m-c-3	4544.082	4538.295	142.949
4-m-c-4	4544.132	4538.274	143.293
4-m-d-1	4546.255	4535.024	140.989
4-m-d-2	4546.322	4535.092	141.543
4-m-d-3	4546.306	4535.175	141.889
5-m-a-1	5505.187	5508.878	107.792
5-m-a-2	5505.185	5509.287	108.433
5-m-b-1	5505.633	5507.551	107.12
5-m-b-2	5505.913	5507.826	107.567
5-m-b-3	5505.812	5507.739	107.775
5-m-b-4	5506.081	5507.991	108.366
5-m-c-1	5506.274	5506.683	106.75

5-m-c-2	5506.624	5506.985	107.701
5-m-c-3	5506.751	5507.187	108.33
5-m-d-1	5506.789	5506.025	106.766
5-m-d-2	5506.851	5506.017	107.302
5-m-d-3	5506.959	5506.179	107.823
5-m-d-4	5507.108	5506.391	108.269
6-m-a-1	6499.125	6517.843	101.052
6-m-a-2	6499.181	6517.824	101.506
6-m-a-3	6499.146	6517.842	102.059
6-m-a-4	6499.196	6517.907	102.596
6-m-b-1	6504.432	6516.684	104.415
6-m-b-2	6504.363	6516.804	105.109
6-m-b-3	6504.55	6516.902	105.672
6-m-c-1	6507.325	6509.214	103.886
6-m-c-2	6507.87	6509.885	104.487
6-m-c-3	6507.947	6509.786	104.844
6-m-c-4	6508.003	6509.864	105.248
6-m-d-1	6507.285	6506.219	103.593
6-m-d-2	6507.353	6506.323	103.877
6-m-d-3	6507.376	6506.289	104.399
6-m-e-1	6505.571	6503.285	103.403
6-m-e-2	6505.677	6503.2	103.844
6-m-e-3	6505.757	6503.146	104.423
6-m-f-1	6504.807	6502.07	102.694
6-m-f-2	6505.443	6502.685	103.491
6-m-f-3	6505.478	6502.578	103.886
6-m-f-4	6505.598	6502.524	104.494
6-m-g-1	6500.626	6494.16	96.96
6-m-g-2	6500.651	6494.065	97.168
6-m-g-3	6500.775	6494.189	97.578
7-m-a-1	7507.505	7503.245	96.44
7-m-a-2	7507.477	7503.242	96.661
7-m-a-3	7507.438	7503.212	96.988
7-m-a-4	7507.446	7503.141	97.281
7-m-b-1	7506.813	7500.075	98.284
7-m-b-2	7506.799	7500.05	98.443

2019 May

POINT	X COORD(m)	Y COORD (m)	Z COORD (m)
2-m-a-1	2498.725	2508.726	105.21
2-m-a-2	2498.838	2509.533	106.599
2-m-a-3	2498.878	2510.114	108.029
2-m-a-4	2499.012	2510.677	109.531
2-m-b-1	2503.971	2508.926	104.302
2-m-b-2	2504.001	2509.586	105.851

2-m-b-3	2504.081	2510.218	107.001
2-m-b-4	2503.994	2510.62	107.891
2-m-b-5	2503.986	2510.961	109.174
2-m-c-1	2507.658	2509.708	104.02
2-m-c-2	2507.527	2510.147	105.115
2-m-c-3	2507.452	2510.73	106.62
2-m-c-4	2507.382	2510.954	107.66
2-m-c-5	2507.344	2511.132	108.264
2-m-d-1	2496.601	2509.198	105.648
2-m-d-2	2496.528	2509.63	106.558
2-m-d-3	2496.511	2509.848	107.476
2-m-d-4	2496.542	2510.216	108.42
2-m-d-5	2496.506	2510.706	109.217
2-m-d-6	2496.509	2510.759	109.764
2-m-e-1	2498.442	2505.064	102.072
2-m-e-2	2498.396	2505.086	102.597
2-m-e-3	2498.499	2505.143	103.002
2-m-f-1	2504.123	2505.931	101.108
2-m-f-2	2504.165	2505.983	101.61
2-m-f-3	2504.195	2506.031	101.942
2-m-f-4	2504.169	2506.061	102.628
2-m-g-1	2508.152	2507.053	100.876
2-m-g-2	2508.136	2507.128	101.498
2-m-g-3	2508.177	2507.167	101.999
2-m-g-4	2508.2	2507.243	102.465

2020 September

POINT	X COORD(m)	Y COORD (m)	Z COORD (m)
1-m-a-1	1495.301	1509.923	95.182
1-m-a-2	1495.348	1509.933	94.596
1-m-a-3	1495.377	1510.051	93.851
1-m-a-4	1495.427	1510.363	92.449
1-m-b-1	1497.838	1509.396	95.347
1-m-b-2	1497.78	1509.3	94.949
1-m-b-3	1497.794	1509.319	94.584
1-m-b-4	1497.884	1509.424	93.864
2-m-a-1	2498.726	2508.717	105.207
2-m-a-2	2498.839	2509.525	106.593
2-m-a-3	2498.88	2510.106	108.022
2-m-a-4	2499.013	2510.668	109.522
2-m-b-1	2503.97	2508.912	104.296
2-m-b-2	2504.001	2509.578	105.847
2-m-b-3	2504.08	2510.21	106.996
2-m-b-4	2503.993	2510.613	107.886
2-m-b-5	2503.984	2510.955	109.168
2-m-c-1	2507.656	2509.702	104.018

2-m-c-2	2507.525	2510.142	105.113
2-m-c-3	2507.45	2510.724	106.617
2-m-c-4	2507.38	2510.948	107.657
2-m-c-5	2507.341	2511.127	108.261
2-m-d-1	2496.602	2509.191	105.643
2-m-d-2	2496.529	2509.622	106.553
2-m-d-3	2496.513	2509.841	107.471
2-m-d-4	2496.553	2510.189	108.398
2-m-d-5	2496.508	2510.702	109.209
2-m-d-6	2496.511	2510.756	109.755
2-m-e-1	2498.444	2505.061	102.072
2-m-e-2	2498.397	2505.083	102.597
2-m-e-3	2498.501	2505.14	103.002
2-m-f-1	2504.121	2505.928	101.109
2-m-f-2	2504.162	2505.979	101.61
2-m-f-3	2504.193	2506.027	101.942
2-m-f-4	2504.166	2506.057	102.627
2-m-g-1	2508.155	2507.05	100.874
2-m-g-2	2508.143	2507.129	101.497
2-m-g-3	2508.177	2507.164	101.998
2-m-g-4	2508.201	2507.24	102.464
3-m-a-1	3500.04	3502.912	101.412
3-m-a-2	3500.175	3503.338	102.274
3-m-a-3	3500.269	3503.62	102.918
3-m-a-4	3500.366	3504.127	104.025
4-m-a-1	4533.275	4546.028	141.034
4-m-a-2	4533.221	4546.123	141.686
4-m-a-3	4533.316	4546.122	142.124
4-m-b-1	4542.375	4539.605	142.302
4-m-b-2	4542.655	4539.752	142.781
4-m-b-3	4542.695	4539.751	143.049
4-m-b-4	4542.724	4539.813	143.395
4-m-c-1	4543.368	4537.929	141.659
4-m-c-2	4544.067	4538.313	142.529
4-m-c-3	4544.08	4538.291	142.947
4-m-c-4	4544.129	4538.271	143.291
4-m-d-1	4546.251	4535.021	140.988
4-m-d-2	4546.318	4535.089	141.54
4-m-d-3	4546.302	4535.174	141.887
5-m-a-1	5505.185	5508.874	107.789
5-m-a-2	5505.183	5509.285	108.431
5-m-b-1	5505.628	5507.545	107.116
5-m-b-2	5505.911	5507.824	107.565
5-m-b-3	5505.809	5507.736	107.773
5-m-b-4	5506.072	5507.979	108.355
5-m-c-1	5506.271	5506.68	106.749
5-m-c-2	5506.62	5506.981	107.698

5-m-c-3	5506.748	5507.183	108.326
5-m-d-1	5506.784	5506.021	106.762
5-m-d-2	5506.849	5506.015	107.301
5-m-d-3	5506.957	5506.177	107.821
5-m-d-4	na	na	na
6-m-a-1	6499.125	6517.84	101.051
6-m-a-2	6499.181	6517.82	101.505
6-m-a-3	6499.146	6517.837	102.058
6-m-a-4	6499.194	6517.9	102.592
6-m-b-1	6504.432	6516.68	104.413
6-m-b-2	6504.362	6516.8	105.107
6-m-b-3	6504.549	6516.898	105.669
6-m-c-1	6507.318	6509.205	103.88
6-m-c-2	6507.858	6509.873	104.48
6-m-c-3	6507.945	6509.785	104.842
6-m-c-4	6508.001	6509.862	105.245
6-m-d-1	na	na	na
6-m-d-2	6507.353	6506.322	103.875
6-m-d-3	6507.374	6506.287	104.398
6-m-e-1	6505.56	6503.278	103.396
6-m-e-2	6505.66	6503.189	103.831
6-m-e-3	6505.754	6503.146	104.421
6-m-f-1	6504.805	6502.069	102.694
6-m-f-2	6505.439	6502.683	103.488
6-m-f-3	6505.476	6502.578	103.885
6-m-f-4	6505.591	6502.522	104.488
6-m-g-1	6500.626	6494.16	96.959
6-m-g-2	6500.651	6494.065	97.168
6-m-g-3	6500.775	6494.19	97.578
7-m-a-1	7507.502	7503.245	96.44
7-m-a-2	7507.475	7503.242	96.662
7-m-a-3	7507.435	7503.213	96.988
7-m-a-4	7507.445	7503.141	97.281
7-m-b-1	7506.813	7500.076	98.284
7-m-b-2	7506.801	7500.051	98.442

2021 September

POINT	X COORD(m)	Y COORD (m)	Z COORD (m)
1-m-a-1	1495.303	1509.92	95.183
1-m-a-2	1495.35	1509.934	94.596
1-m-a-3	1495.378	1510.052	93.851
1-m-a-4	1495.428	1510.364	92.448
1-m-b-1	1497.839	1509.396	95.347
1-m-b-2	1497.781	1509.3	94.949
1-m-b-3	1497.796	1509.319	94.585
1-m-b-4	1497.885	1509.424	93.864

2-m-a-1	2498.725	2508.713	105.205
2-m-a-2	2498.839	2509.523	106.591
2-m-a-3	2498.88	2510.104	108.018
2-m-a-4	2499.012	2510.666	109.518
2-m-b-1	2503.97	2508.906	104.293
2-m-b-2	2504.002	2509.576	105.845
2-m-b-3	2504.08	2510.206	106.993
2-m-b-4	2503.992	2510.61	107.882
2-m-b-5	2503.984	2510.954	109.165
2-m-c-1	n/a	n/a	n/a
2-m-c-2	2507.526	2510.14	105.113
2-m-c-3	2507.45	2510.722	106.616
2-m-c-4	2507.38	2510.946	107.655
2-m-c-5	2507.341	2511.125	108.26
2-m-d-1	2496.602	2509.188	105.642
2-m-d-2	2496.528	2509.62	106.55
2-m-d-3	2496.512	2509.839	107.47
2-m-d-4	2496.556	2510.184	108.394
2-m-d-5	2496.519	2510.68	109.188
2-m-d-6	2496.512	2510.757	109.752
2-m-e-1	2498.444	2505.06	102.072
2-m-e-2	2498.397	2505.084	102.598
2-m-e-3	2498.5	2505.142	103.002
2-m-f-1	2504.123	2505.933	101.109
2-m-f-2	2504.162	2505.98	101.61
2-m-f-3	2504.193	2506.027	101.942
2-m-f-4	2504.166	2506.057	102.627
2-m-g-1	2508.156	2507.05	100.875
2-m-g-2	2508.144	2507.13	101.497
2-m-g-3	2508.178	2507.165	101.998
2-m-g-4	2508.202	2507.24	102.464
3-m-a-1	3500.04	3502.912	101.412
3-m-a-2	3500.175	3503.338	102.274
3-m-a-3	3500.27	3503.622	102.918
3-m-a-4	3500.367	3504.128	104.026
4-m-a-1	4533.272	4546.021	141.032
4-m-a-2	4533.22	4546.12	141.685
4-m-a-3	4533.316	4546.12	142.122
4-m-b-1	4542.312	4539.543	142.236
4-m-b-2	4542.658	4539.754	142.784
4-m-b-3	4542.696	4539.749	143.048
4-m-b-4	4542.724	4539.81	143.392
4-m-c-1	4543.36	4537.921	141.653
4-m-c-2	4544.076	4538.32	142.536
4-m-c-3	4544.079	4538.289	142.946
4-m-c-4	4544.128	4538.27	143.292
4-m-d-1	4546.252	4535.02	140.987

4-m-d-2	4546.318	4535.087	141.542
4-m-d-3	4546.304	4535.17	141.888
5-m-a-1	5505.184	5508.874	107.788
5-m-a-2	5505.182	5509.284	108.43
5-m-b-1	5505.626	5507.542	107.113
5-m-b-2	5505.91	5507.822	107.565
5-m-b-3	5505.809	5507.736	107.772
5-m-b-4	5506.077	5507.986	108.362
5-m-c-1	5506.27	5506.679	106.749
5-m-c-2	5506.62	5506.98	107.698
5-m-c-3	5506.748	5507.183	108.326
5-m-d-1	5506.785	5506.021	106.763
5-m-d-2	5506.785	5506.021	106.763
5-m-d-3	5506.849	5506.014	107.3
5-m-d-4	5506.957	5506.176	107.821
6-m-a-1	6499.126	6517.842	101.051
6-m-a-2	6499.182	6517.819	101.506
6-m-a-3	6499.147	6517.838	102.058
6-m-a-4	6499.195	6517.903	102.591
6-m-b-1	6504.433	6516.678	104.414
6-m-b-2	6504.363	6516.8	105.107
6-m-b-3	6504.55	6516.898	105.669
6-m-c-1	6507.314	6509.198	103.878
6-m-c-2	6507.86	6509.876	104.482
6-m-c-3	6507.946	6509.784	104.843
6-m-c-4	6508.002	6509.862	105.246
6-m-d-1	na	na	na
6-m-d-2	6507.351	6506.32	103.875
6-m-d-3	6507.375	6506.287	104.398
6-m-e-1	6505.571	6503.284	103.403
6-m-e-2	6505.676	6503.199	103.842
6-m-e-3	6505.754	6503.147	104.422
6-m-f-1	6504.807	6502.071	102.695
6-m-f-2	6505.447	6502.686`	103.494
6-m-f-3	na	na	na
6-m-f-4	6505.59	6502.521	104.488
6-m-g-1	6500.625	6494.16	96.959
6-m-g-2	6500.65	6494.068	97.168
6-m-g-3	6500.774	6494.188	97.578
7-m-a-1	7507.498	7503.244	96.442
7-m-a-2	7507.476	7503.243	96.661
7-m-a-3	7507.44	7503.215	96.986
7-m-a-4	7507.445	7503.142	97.28
7-m-b-1	7506.814	7500.076	98.284
7-m-b-2	7506.802	7500.051	98.442

2022 September

POINT	X COORD(m)	Y COORD (m)	Z COORD (m)
1-m-a-1	1495.302	1509.921	95.183
1-m-a-2	1495.336	1509.942	94.588
1-m-a-3	1495.376	1510.052	93.85
1-m-a-4	1495.427	1510.364	92.448
1-m-b-1	1497.838	1509.396	95.347
1-m-b-2	1497.78	1509.3	94.949
1-m-b-3	1497.792	1509.318	94.584
1-m-b-4	1497.884	1509.424	93.864
2-m-a-1	2498.724	2508.71	105.203
2-m-a-2	2498.839	2509.52	106.588
2-m-a-3	2498.88	2510.102	108.015
2-m-a-4	2499.012	2510.664	109.514
2-m-b-1	2503.971	2508.904	104.291
2-m-b-2	2504.002	2509.572	105.843
2-m-b-3	2504.08	2510.205	106.991
2-m-b-4	2503.992	2510.607	107.88
2-m-b-5	2503.983	2510.952	109.163
2-m-c-1	2507.658	2509.7	104.016
2-m-c-2	2507.525	2510.14	105.112
2-m-c-3	2507.45	2510.72	106.614
2-m-c-4	2507.38	2510.944	107.654
2-m-c-5	2507.34	2511.124	108.258
2-m-d-1	2496.6	2509.186	105.64
2-m-d-2	2496.527	2509.618	106.549
2-m-d-3	2496.512	2509.836	107.467
2-m-d-4	n/a	n/a	n/a
2-m-d-5	2496.51	2510.702	109.202
2-m-d-6	2496.512	2510.758	109.748
2-m-e-1	2498.444	2505.06	102.072
2-m-e-2	2498.396	2505.084	102.598
2-m-e-3	2498.5	2505.14	103.002
2-m-f-1	2504.12	2505.928	101.109
2-m-f-2	2504.162	2505.98	101.61
2-m-f-3	2504.193	2506.028	101.942
2-m-f-4	2504.166	2506.057	102.627
2-m-g-1	2508.156	2507.05	100.875
2-m-g-2	2508.144	2507.13	101.496
2-m-g-3	2508.178	2507.164	101.998
2-m-g-4	2508.202	2507.24	102.464
3-m-a-1	3500.039	3502.913	101.412
3-m-a-2	3500.175	3503.334	102.274
3-m-a-3	3500.269	3503.62	102.917
3-m-a-4	3500.366	3504.128	104.024

4-m-a-1	4533.271	4546.021	141.032
4-m-a-2	4533.22	4546.118	141.685
4-m-a-3	4533.315	4546.12	142.122
4-m-b-1	n/a	n/a	n/a
4-m-b-2	4542.658	4539.755	142.784
4-m-b-3	4542.696	4539.75	143.048
4-m-b-4	4542.725	4539.811	143.394
4-m-c-1	4543.364	4537.924	141.655
4-m-c-2	4544.077	4538.318	142.537
4-m-c-3	4544.08	4538.29	142.948
4-m-c-4	4544.129	4538.269	143.292
4-m-d-1	4546.252	4535.018	140.987
4-m-d-2	4546.318	4535.087	141.542
4-m-d-3	4546.304	4535.17	141.886
5-m-a-1	5505.184	5508.875	107.79
5-m-a-2	5505.182	5509.284	108.43
5-m-b-1	5505.628	5507.546	107.116
5-m-b-2	5505.91	5507.823	107.566
5-m-b-3	5505.808	5507.736	107.773
5-m-b-4	5506.078	5507.988	108.364
5-m-c-1	5506.27	5506.68	106.75
5-m-c-2	5506.62	5506.982	107.699
5-m-c-3	5506.748	5507.183	108.326
5-m-d-1	5506.785	5506.021	106.763
5-m-d-2	5506.785	5506.021	106.764
5-m-d-3	5506.849	5506.014	107.3
5-m-d-4	5506.957	5506.176	107.821
6-m-a-1	6499.126	6517.841	101.052
6-m-a-2	6499.181	6517.821	101.506
6-m-a-3	6499.146	6517.838	102.058
6-m-a-4	6499.193	6517.904	102.59
6-m-b-1	6504.432	6516.682	104.414
6-m-b-2	6504.362	6516.801	105.108
6-m-b-3	6504.548	6516.898	105.669
6-m-c-1	6507.324	6509.215	103.886
6-m-c-2	6507.863	6509.883	104.485
6-m-c-3	6507.945	6509.787	104.843
6-m-c-4	6508.001	6509.864	105.246
6-m-d-1	na	na	na
6-m-d-2	6507.352	6506.322	103.876
6-m-d-3	6507.374	6506.288	104.398
6-m-e-1	6505.567	6503.283	103.401
6-m-e-2	6505.674	6503.2	103.842
6-m-e-3	6505.753	6503.148	104.42
6-m-f-1	6504.807	6502.07	102.694

6-m-f-2	na	na	na
6-m-f-3	6505.476	6502.578	103.885
6-m-f-4	6505.588	6502.522	104.487
6-m-g-1	6500.626	6494.162	96.96
6-m-g-2	6500.651	6494.068	97.169
6-m-g-3	6500.775	6494.189	97.579
7-m-a-1	7507.497	7503.244	96.442
7-m-a-2	7507.474	7503.243	96.662
7-m-a-3	7507.44	7503.215	96.985
7-m-a-4	7507.444	7503.142	97.28
7-m-b-1	7506.814	7500.076	98.284
7-m-b-2	7506.802	7500.051	98.442

2024 June

POINT	X COORD(m)	Y COORD (m)	Z COORD (m)
1-m-a-1	1495.303	1509.92	95.183
1-m-a-2	1495.347	1509.936	94.594
1-m-a-3	1495.378	1510.05	93.852
1-m-a-4	1495.428	1510.363	92.449
1-m-b-1	1497.838	1509.396	95.347
1-m-b-2	1497.78	1509.3	94.949
1-m-b-3	1497.794	1509.322	94.582
1-m-b-4	1497.884	1509.424	93.864
2-m-a-1	2498.725	2508.703	105.2
2-m-a-2	2498.84	2509.514	106.583
2-m-a-3	2498.882	2510.096	108.008
2-m-a-4	2499.013	2510.656	109.506
2-m-b-1	2503.974	2508.898	104.288
2-m-b-2	2504.003	2509.566	105.836
2-m-b-3	2504.082	2510.198	106.986
2-m-b-4	2503.993	2510.602	107.874
2-m-b-5	2503.983	2510.948	109.158
2-m-c-1	2507.659	2509.696	104.015
2-m-c-2	2507.526	2510.137	105.111
2-m-c-3	2507.45	2510.716	106.613
2-m-c-4	2507.38	2510.94	107.652
2-m-c-5	2507.34	2511.121	108.256
2-m-d-1	2496.601	2509.181	105.636
2-m-d-2	2496.527	2509.612	106.545
2-m-d-3	2496.514	2509.831	107.462
2-m-d-4	2496.538	2510.222	108.416
2-m-d-5	2496.512	2510.7	109.195
2-m-d-6	2496.515	2510.757	109.742

2-m-e-1	2498.449	2505.051	102.071
2-m-e-2	2498.398	2505.08	102.598
2-m-e-3	2498.5	2505.14	103.003
2-m-f-1	2504.12	2505.928	101.11
2-m-f-2	2504.162	2505.98	101.611
2-m-f-3	2504.194	2506.028	101.943
2-m-f-4	2504.167	2506.058	102.628
2-m-g-1	2508.155	2507.05	100.875
2-m-g-2	2508.142	2507.128	101.496
2-m-g-3	2508.178	2507.163	101.998
2-m-g-4	2508.202	2507.238	102.464
3-m-a-1	3500.039	3502.912	101.412
3-m-a-2	3500.174	3503.339	102.274
3-m-a-3	3500.27	3503.621	102.917
3-m-a-4	3500.366	3504.13	104.024
4-m-a-1	4533.268	4546.02	141.03
4-m-a-2	4533.218	4546.118	141.684
4-m-a-3	4533.313	4546.118	142.12
4-m-b-1	4542.385	4539.617	142.314
4-m-b-2	4542.6	4539.704	142.73
4-m-b-3	4542.693	4539.752	143.048
4-m-b-4	4542.723	4539.812	143.393
4-m-c-1	4543.368	4537.936	141.664
4-m-c-2	4543.814	4538.098	142.29
4-m-c-3	4544.078	4538.292	142.948
4-m-c-4	4544.126	4538.272	143.29
4-m-d-1	4546.25	4535.02	140.986
4-m-d-2	4546.316	4535.088	141.542
4-m-d-3	4546.302	4535.172	141.887
5-m-a-1	5505.184	5508.873	107.788
5-m-a-2	5505.182	5509.284	108.429
5-m-b-1	5505.626	5507.542	107.114
5-m-b-2	5505.909	5507.822	107.564
5-m-b-3	5505.807	5507.734	107.772
5-m-b-4	5506.074	5507.983	108.36
5-m-c-1	5506.269	5506.68	106.749
5-m-c-2	5506.62	5506.98	107.698
5-m-c-3	5506.751	5507.186	108.333
5-m-d-1	5506.784	5506.02	106.762
5-m-d-2	5506.848	5506.013	107.3
5-m-d-3	5506.956	5506.176	107.82
5-m-d-4	5507.102	5506.386	108.264
6-m-a-1	6499.126	6517.84	101.052
6-m-a-2	6499.182	6517.82	101.506
6-m-a-3	6499.147	6517.836	102.058

6-m-a-4	6499.193	6517.904	102.59
6-m-b-1	6504.432	6516.678	104.414
6-m-b-2	6504.362	6516.8	105.107
6-m-b-3	6504.549	6516.898	105.669
6-m-c-1	6507.325	6509.213	103.886
6-m-c-2	6507.863	6509.882	104.484
6-m-c-3	6507.944	6509.785	104.842
6-m-c-4	6508.001	6509.862	105.245
6-m-d-1	6507.283	6506.216	103.592
6-m-d-2	6507.354	6506.322	103.876
6-m-d-3	6507.375	6506.288	104.398
6-m-e-1	6505.571	6503.285	103.403
6-m-e-2	6505.669	6503.196	103.838
6-m-e-3	6505.752	6503.148	104.42
6-m-f-1	6504.807	6502.071	102.695
6-m-f-2	6505.436	6502.682	103.487
6-m-f-3	6505.475	6502.578	103.884
6-m-f-4	6505.59	6502.521	104.488
6-m-g-1	6500.625	6494.16	96.959
6-m-g-2	6500.65	6494.068	97.169
6-m-g-3	6500.775	6494.188	97.578
7-m-a-1	7507.500	7503.246	96.440
7-m-a-2	7507.474	7503.244	96.660
7-m-a-3	7507.437	7503.215	96.985
7-m-a-4	7507.446	7503.142	97.279
7-m-b-1	7506.812	7500.076	98.284
7-m-b-2	7506.801	7500.051	98.442

Appendix IV - Available resources

All the original survey files (trimble .job format) are available on request
The coordinate lists are available as excel spreadsheets or .csv files.

All previous reports are available as pdf documents