



**NPDC
1 to 3 Dawson Street
BTW Survey Peer Review
22 July 2021**

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Revision History

Rev 1	23/07/2021	S Kiss	Reviewed and Report Finalised
Rev 0	22/07/2021	J Lucas	Issued for Comment

1.0 Background

This project involves reviewing the BTW survey of 1-3 Dawson Street.

2.0 Scope of Work

The specific scope of work as determined by NPDC is:

- Audit Survey Report
- Audit Ground Contour Topo
- Audit Selected Points in BIM

3.0 Survey Methods

3.1 Coordinate System and Datum's

All surveying carried out on this project is in terms of Taranaki 2000. Taranaki 2000 is formally defined in the LINZ standard LINZ25002 (Standard for New Zealand Geodetic Datum 2000 Projections)

Vertical datum is in terms of Taranaki Vertical Datum 1970 (TVD1970).

3.2 Survey Control

Survey control of the BTW survey was supplied by BTW and this was independently measured. The 5th order mark RM II SO 13123 was used as the site calibration as per the BTW survey.

SS 5 SO 7186, AKD1/C Caverhill, IS II SO 13301, IS 1 DP 377813, IB I DP 19148 and SS 103 SO 7186 have been connected to as well as the various nails used in the BTW scan survey.

See 4.0 Survey Observations for reporting on these marks.

3.3 Survey Work carried out

All survey work has been carried out under the direction of Luke Balchin - NPDC. Daily HSE toolbox meetings are carried out prior to any work commencing.

All survey control marks along with other survey marks in the area, have been surveyed using RTK GPS (Leica GS 14/16 equipment). All survey control points are surveyed for a minimum of 30 seconds, then the pole is rotated 180° and another 30 seconds of observations are recorded.

Four Total Station resection setups were used to take reflector-less measurements to eaves and positions on the buildings to audit the point cloud supplied by BTW.

4.0 Survey Observations

This survey was carried out on Thursday 15 July 2021.

4.1 Survey Control Mark Results

The below tables show the differences between the Taylor Patrick GPS observations, the supplied BTW coordinates and Published LINZ (or adopted) coordinates.

SS 5 SO 7186			
	mN	mE	Z
Observed	808765.657	386273.695	10.362
BTW Observed	808765.641	386273.673	10.345
LINZ	808765.655	386273.693	10.350
Diff to BTW	0.016	0.021	0.016
Diff to LINZ	0.002	0.001	0.011

AKD1/ C Caverhill			
	mN	mE	Z
Observed	807846.267	385743.096	65.836
BTW Observed	807846.262	385743.092	65.818
LINZ	807846.276	385743.095	65.837
Diff to BTW	0.005	0.004	0.018
Diff to LINZ	-0.009	0.001	-0.001

IS II SO 13301			
	mN	mE	Z
Observed	808734.170	386075.553	12.913
BTW Observed	808734.166	386075.551	12.901
Adopted	808734.160	386075.547	NA
Diff to BTW	0.004	0.002	0.012
Diff to LINZ	0.010	0.006	NA

IS 1 DP 377813			
	mN	mE	Z
Observed	808791.060	386054.265	9.515
BTW Observed	808791.054	386054.267	9.501
Adopted	808791.055	386054.255	NA
Diff to BTW	0.006	-0.002	0.014
Diff to LINZ	0.005	0.010	NA

SS 103 SO 7186			
	Mn	Me	Z
Observed	808718.179	385885.779	14.162
BTW Observed	808718.150	385885.776	14.125
Adopted	808718.170	385885.790	NA
Diff to BTW	0.029	0.003	0.037
Diff to LINZ	0.008	-0.011	NA

IB I DP 19148			
	Mn	Me	Z
Observed	808796.312	386082.850	8.136
Adopted	808796.303	386082.839	NA
Diff to Adopted	0.008	0.011	NA

Nail 5 DP 521079			
	Mn	Me	Z
Observed	808762.833	386130.505	12.020
BTW Observed	808762.820	386130.503	12.016
Adopted	808762.808	386130.504	
Diff to BTW	0.013	0.002	0.004
Diff to Adopted	0.025	0.001	NA

ST1(Nail) BTW			
	Mn	Me	Z
Observed	808808.363	386158.303	7.324
BTW Observed	808808.358	386158.284	7.325
Diff to BTW	0.005	0.019	-0.001

ST6(Nail) BTW			
	Mn	Me	Z
Observed	808786.547	386036.490	9.797
BTW Observed	808786.536	386036.493	9.782
Diff to BTW	0.011	-0.003	0.015

ST8(Nail) BTW			
	Mn	Me	Z
Observed	808784.233	386178.731	10.408
BTW Observed	808784.236	386178.713	10.388
Diff to BTW	-0.003	0.018	0.020

ST9(Nail) BTW			
	Mn	Me	Z
Observed	808773.581	386152.524	10.347
BTW Observed	808773.566	386152.514	10.332
Diff to BTW	0.015	0.010	0.015

T11(Nail) BTW			
	Mn	Me	Z
Observed	808756.171	386117.210	13.958
BTW Observed	808756.157	386117.210	13.917
Diff to BTW	0.014	-0.001	0.041

T2(Nail) BTW			
	Mn	Me	Z
Observed	808790.472	386165.728	8.125
BTW Observed	808790.447	386165.733	8.125
Diff to BTW	0.024	-0.005	-0.001

As can be seen from the above results, the coordinates of the control marks observed agree with the BTW supplied coordinates with the only significant difference on site being in the Z value of the nail T11. The BTW Z value is 0.041m below the Taylor Patrick GPS measurement. An independent Total Station measurement was taken of this nail which had a Z value of 13.950m, 0.031m above the BTW value.

4.2 Ground Topo Results

The floor level of the basement was surveyed with a reflector-less total station to give a level of 9.00m. This compares perfectly with the BTW level of 9.00m.

A number of topographic points were observed, and a selection of the comparison results are shown below.

2021 – Sump			
	Mn	Me	Z
Observed	808778.288	386084.141	8.711
BTW	808778.267	386084.188	8.670
Diff to BTW	0.021	-0.046	0.041

2022 – MH			
	Mn	Me	Z
Observed	808794.543	386063.528	8.656
BTW	808794.532	386063.541	8.670
Diff to BTW	0.011	-0.014	-0.015

3018 – MH			
	Mn	Me	Z
Observed	808756.671	386072.645	11.551
BTW	808756.680	386072.689	11.570
Diff to BTW	-0.009	-0.044	-0.019

3015 - SH			
	mN	mE	Z
Observed	808752.368	386103.417	13.465
BTW	808752.424	386103.411	13.453
Diff to BTW	-0.056	0.006	0.012

2017 - SH			
	mN	mE	Z
Observed	808789.395	386105.849	8.836
BTW	808789.329	386105.815	8.861
Diff to BTW	0.066	0.034	-0.025

4.3 Point Cloud Results

The below tables show the differences between a selection of Taylor Patrick reflector-less total station observations of building features, the BTW supplied observations and the point cloud coordinates from the supplied BTW Survey Report.

1005-EAVE1			
	mN	mE	Z
Observed	808770.540	386191.816	39.543
BTW Observed	808770.542	386191.833	39.546
Point Cloud	808770.556	386191.824	39.533
Diff to BTW	-0.002	-0.017	-0.003
Diff to Point Cloud	-0.016	-0.008	0.010

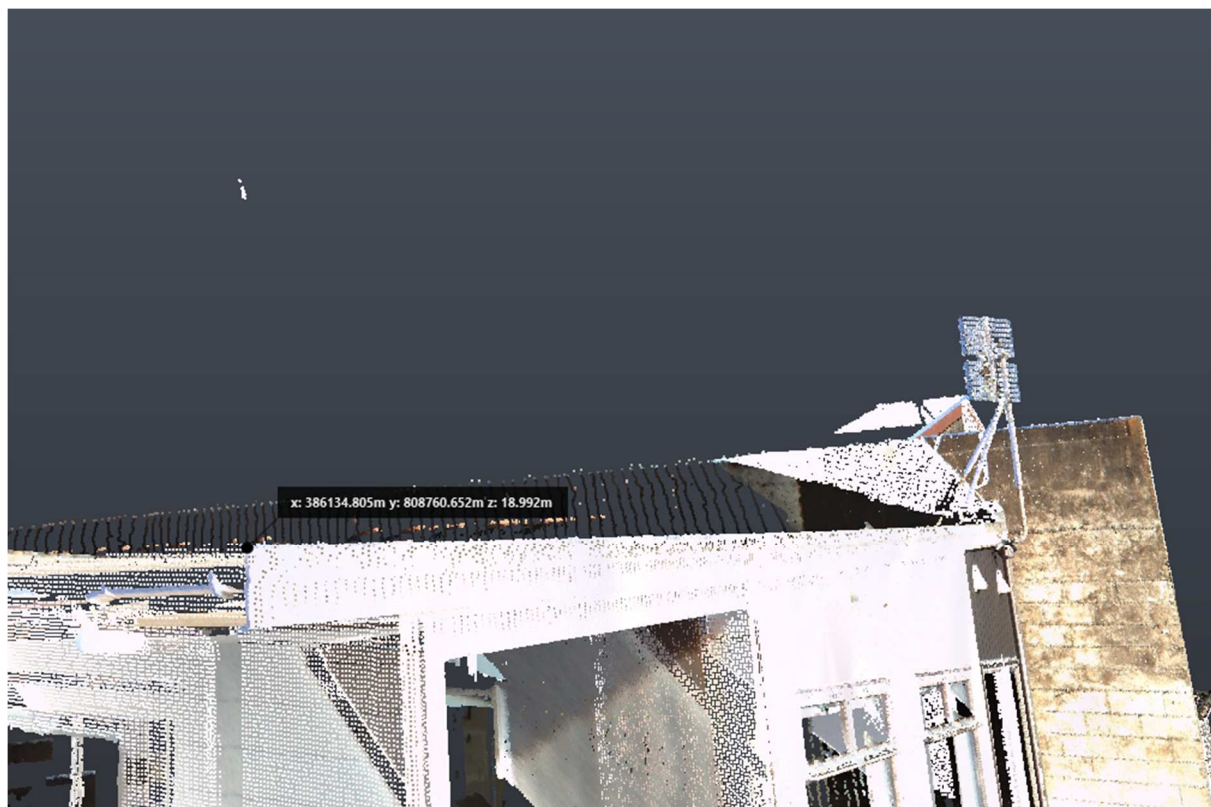
1006-EAVE1			
	mN	mE	Z
Observed	808765.275	386178.387	39.565
BTW Observed	808765.271	386178.403	39.565
Point Cloud	808765.284	386178.382	39.552
Diff to BTW	0.004	-0.016	0.000
Diff to Point Cloud	-0.009	0.005	0.013

1007-EAVE1			
	mN	mE	Z
Observed	808751.847	386183.557	39.530
BTW Observed	808751.841	386183.581	39.528
Point Cloud	808751.850	386183.566	39.512
Diff to BTW	0.006	-0.024	0.002
Diff to Point Cloud	-0.003	-0.009	0.018

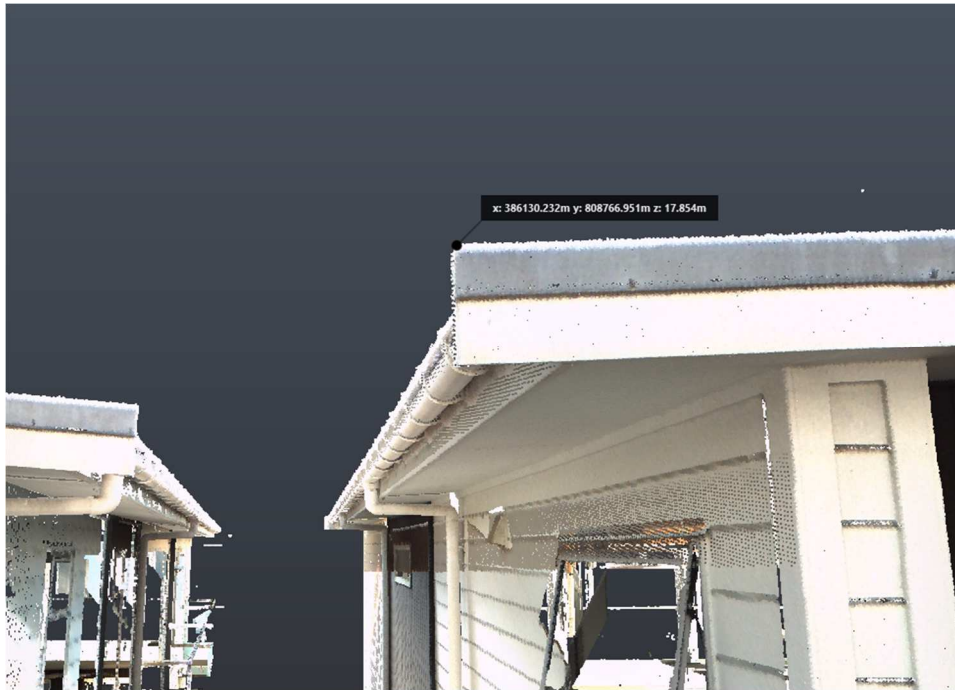
1008-EAVE2			
	mN	mE	Z
Observed	808786.587	386136.194	18.561
BTW Observed	808786.585	386136.212	18.562
Point Cloud	808786.580	386136.208	18.556
Diff to BTW	0.002	-0.018	-0.001
Diff to Point Cloud	0.007	-0.014	0.005

1009-EAVE2			
	mN	mE	Z
Observed	808783.261	386125.273	17.872
BTW Observed	808783.253	386125.285	17.869
Point Cloud	808783.253	386125.273	17.867
Diff to BTW	0.008	-0.012	0.003
Diff to Point Cloud	0.008	0.000	0.005

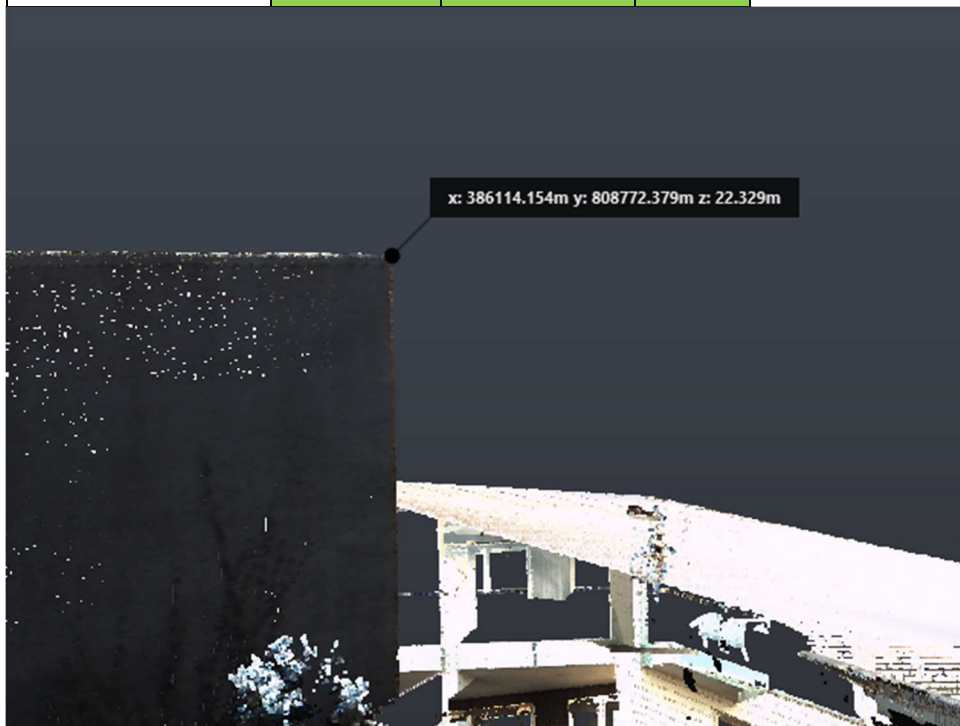
A selection of independent points were also observed to compare directly with the point cloud.



4009 - Eave			
	mN	mE	Z
Observed	808760.653	386134.807	19.005
Point Cloud	808760.652	386134.805	18.992
Diff to Point Cloud	0.001	0.002	0.013



3038 - Eave			
	mN	mE	Z
Observed	808766.935	386130.236	17.863
Point Cloud	808766.951	386130.232	17.854
Diff to Point Cloud	-0.016	0.004	0.009



3031 - Building Top			
	mN	mE	Z
Observed	808772.354	386114.164	22.341
Point Cloud	808772.379	386114.154	22.329
Diff to Point Cloud	-0.025	0.010	0.011

5.0 Conclusion

Overall, we believe that the BTW survey and associated point cloud to be an accurate representation of the existing features on site at 1-3 Dawson Street.

Appendix A – QA Points Plan

