

Survey Audits and Investigations

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Toitū Te Whenua LINZ Survey Audits and Investigations ICS Christchurch 2022

Overview



- Background
- Authority to carry out audits
- Objectives and goals
- The survey audit process
- Outcomes Positive and Alternative Positive
- Examples from previous audits
- The future ?
- Investigations
- Question and Answer

Authority to carry out audits



- Cadastral Survey Act 2002 Section 7(1)(j)
- Toitū Te Whenua LINZ undertakes compliance audits of survey firms and associated Licensed Cadastral Surveyors (LCS)
- Section 7(1)(d) of CSA 2002 requires Surveyor-General to advise CSLB of any significant failures
- Audits are performed in conformance with the Institute of Internal Auditors' International Professional Practices Framework (II A Standards)

Objectives and Goals



The aim of the audit programme is to provide reasonable assurance to the Surveyor-General that a firm has adequate processes and controls in place to ensure:

- Compliance with the Cadastral Survey Act 2002 and the Cadastral Survey Rules 2021
- Cadastral Survey Datasets (CSD's) supplied to Toitū Te Whenua LINZ are complete
- CSD's do not contain errors that could impact on the accuracy and integrity of the cadastre.

The Process

- Survey firm selection
- CSD selection
- Field Audit Process
- Accuracy checks and boundary definition analysis
- Field audit reporting
- Common non-compliances
- Office audit process
- Following the audit

Survey Firm Selection

Random :

- Geographic Location
- Number of CSD's Number of Surveyors
- Requisition Statistics
- Previous audits
- Surveyor can request an audit

Targeted :

- Property Rights (via OSG)
- Office of the Surveyor-General (OSG)
- Cadastral Surveyors Licensing Board (CSLB)



CSD Selection



- List of CSD's from LOL (Approved as to survey)
- Select from Class A and Class B surveys
- Audit 2 different LCS's in the firm if possible
- Assess complexity of CSD's
- Investigate Survey Reports
- Search underlying survey data
- CSD's with new traverse marks preferred
- Bearing corrections/ limited titles/ disturbed marks/ water boundaries
- SO or ML rather than a simple DP
- Several back-up CSD's also searched.

Traffic hazard





Field Audit Process

- 4WD vehicle, Total Station and GNSS
- Field Assistant (always)
- Significant number of lines re-measured
 - New traverse lines
 - > Peg ties

Boundary intersection marks

- Check quality of all ground marking especially PRM's
- Detailed check of Occupation Diagram
- Photographs as evidence of non-compliance
- Locate additional old marks that may affect boundary definition
- Talk to client if available

Accuracy checks and boundary definition analysis



- Prepare a spreadsheet showing Comparison of Field
 Measurements and accuracy compliance
- Request Field Records if information in LOL not complete
- Thorough search and study of survey data
- Identify relevant marks not found and check survey report for explanations
- Rebuilt entire job in 12d and check boundary definition, parcel closes, boundary intersection calculations, and area calculations
- Recalculate survey based on any field audit variances and/or additional old marks located during the field audit
- Compare differences (Rules 19,20 and 21)



			·		COMPARIS	SON OF HO	RIZONTAL	FIELD MEA	SUREMEN	TS - DP 5186	95					
OBS	ERVATION	BEARINGS			DISTANCES			VECTORS	TORS							
										Allowable Difference (Rule 3)						
										Non-boundary	Non-boundary	Class A	Class B	Boundary Point	Boundary Point	
	From	То	Dataset	Audit	Difference	Dataset	Audit	Difference	Difference	at 95% CL	(100%)	Witnessing	Boundary Witnessing	Point at 95%	to Boundary Point (100%)	Yes / No
1	ALP 1	OALP 2 DP 479843	99.°01'40"	99.°01'33"	-0.°00'07''	275.42	275.42	0.00	0.009	0.037	(-			Yes
2	ALP 1	ALP 2	160.°22'30"	160.°22'54"	0.°00'24''	45.53	45.54	0.01	0.011	0.025						Yes
3	ALP 1	ALP 3	186.°54'40"	186.°55'01"	0.°00'21''	78.58	78.59	0.01	0.013	0.026						Yes
4	ALP 2	OIS II DP 180860	102.°45'45"	102.°46'24"	0.°00'39''	74.19	74.19	0.00	0.014	0.026						Yes
5	ALP 2	ALP 3	215.°10'20"	215.°10'24"	0.°00'04''	42.96	42.97	0.01	0.010	0.025						Yes
6	ALP 3	OIS II DP 180860	79.°05'00"	79.°05'09"	0.°00'09''	98.89	98.89	0.00	0.004	0.027						Yes
7	ALP 3	OIT I DP 335248 (EHK2)	290.°22'00"	290.°21'38"	-0.°00'22''	149.46	149.47	0.01	0.019	0.029						Yes
8	OIS II DP 180860	OIT V DP 180860	205.°53'10"	205.°53'07"	-0.°00'03''	402.60	402.61	0.01	0.012	0.047						Yes
9	OIS II DP 180860	OALP 2 DP 479843	85.°01'10"	85.°00'57"	-0.°00'13''	185.06	185.04	-0.02	0.023	0.031						Yes
10	OALP 3 DP 479843	OALP 4 DP 479843	324.°13'20"	324.°13'40"	0.°00'20''	43.85	43.84	-0.01	0.011	0.025						Yes
11	OALP 3 DP 479843	OALP 2 DP 479843	44.°25'10"	44.°24'51"	-0.°00'19''	37.56	37.56	0.00	0.003	0.025						Yes
12	OALP 3 DP 479843	OALP 1 DP 493621	240.°59'00"	240.°58'25"	-0.°00'35''	66.15	66.16	0.01	0.015	0.026		ĺ				Yes
13	OALP 2 DP 493621	OALP 1 DP 493621	7.°24'00"	7.º24'50"	0.°00'50''	22.72	22.72	0.00	0.006	0.025						Yes
14	OALP 2 DP 493621	OALP 3 DP 493621	194.°04'00"	194.º04'10"	0.°00'10''	34.52	34.51	-0.01	0.010	0.025						Yes
15	OALP 1 DP 493622	OALP 3 DP 493621	39.°39'00"	39.°38'34"	-0.°00'26''	30.60	30.60	0.00	0.004	0.025						Yes
16	OIT I DP 335248 (EHK2)	OIT V DP 180860	171.°10'07"	171.°09'57"	-0.°00'10''	400.24	400.25	0.01	0.022	0.047						Yes
17	ALP 3	PEG R	72.°06'00"	71.°36'17"	-0.°29'43''	16.01	16.08	0.07	0.155			0.040				No
18	ALP 3	PEG 1A	53.°16'00"	53.°20'35"	0.°04'35''	13.08	13.07	-0.01	0.020			0.040				Yes
19	ALP 3	PEG Z	78.°36'00"	78.°27'17"	-0.°08'43''	6.53	6.51	-0.02	0.026			0.040				Yes
20	ALP 3	PEG H	158.°14'30"	158.°17'26"	0.°02'56''	43.69	43.65	-0.04	0.055			0.040				No
21	ALP 3	PEG Y	173.°24'00"	173.°17'42"	-0.°06'18''	2.15	2.14	-0.01	0.011			0.040				Yes
22	ALP 3	PEG I	221.°38'00"	217.°50'48"	-3.°47'12"	29.26	28.84	-0.42	1.964			0.040				No
23	ALP 3	PEG J	257.°35'00"	257.°41'38"	0.°06'38''	7.64	7.67	0.03	0.033			0.040				Yes
24	ALP 3	PEG A	293.°32'10"	293.°29'05"	-0.°03'05"	37.99	37.99	0.00	0.034			0.040				Yes
25	ALP 3	PEG K	19.°37'00"	19.°18'41"	-0.°18'19''	6.88	6.88	0.00	0.037			0.040				Yes
26	ALP 3	OP 1C DP 351842	319.°38'45"	319.°37'27"	-0.°01'18''	39.74	39.71	-0.03	0.034			0.040				Yes
27	ALP 2	PEG D	40.°25'00"	40.°25'12"	0.°00'12''	27.78	27.81	0.03	0.030			0.040				Yes
28	ALP 2	PEG E	90.°11'10"	90.°08'29"	-0.°02'41''	52.04	52.07	0.03	0.051			0.040				No
29	ALP 2	PEG 1B	119.°14'30"	119.°14'08"	-0.°00'22''	44.51	44.52	0.01	0.011			0.040				Yes
30	ALP 2	PEG S	102.°39'00"	102.°45'05"	0.°06'05''	5.20	5.21	0.01	0.014			0.040				Yes
31	ALP 2	PEG L	227.°39'00"	227.°45'57"	0.°06'57''	14.93	14.95	0.02	0.036			0.040				Yes
32	ALP 2	PEG M	238.°56'00"	239.°00'39"	0.°04'39"	15.90	15.91	0.01	0.024			0.040				Yes
33	ALP 2	PEG N	314.°00'00"	313.°46'24"	-0.°13'36"	7.49	7.51	0.02	0.036			0.040				Yes
34	ALP 2	PEG O	339.°47'00"	339.°41'47"	-0.°05'13"	12.05	12.08	0.03	0.035			0.040				Yes
35	ALP2	PEG P	341.°05'00"	341.°04'06"	-0.°00'54''	18.01	18.04	0.03	0.030			0.040				Yes
36	ALP 2	PEG Q	337.°39'20"	337.°39'34"	0.°00'14''	24.17	24.17	0.00	0.002			0.040				Yes
37	ALP 2	PEG B	281.°34'50"	281.°35'00"	0.°00'10''	43.23	43.23	0.00	0.002			0.040				Yes
38	ALP 1	PEG C	251.°55'00"	252.°00'43"	0.°05'43''	8.45	8.50	0.05	0.052			0.040				No
39	ALP 1	O DISK 3 DP 483626	267.°29'30"	267.°37'09"	0.°07'39''	6.63	6.63	0.00	0.015			0.040				Yes
40	OIS II DP 180860	PEG F	312.°47'30"	312.°48'47"	0.°01'17''	15.93	15.95	0.02	0.021			0.040				Yes
41	OIS II DP 180860	PEG X	244.°09'00"	244.°08'39"	-0.°00'21''	29.48	29.50	0.02	0.020			0.040				Yes
42	OIS II DP 180860	PEG U	240.°28'10"	240.°29'54"	0.°01'44''	32.93	32.93	0.00	0.017			0.040				Yes
43	OIT I DP 335248 (EHK2)	OP 1C DP 351842	100.°45'10"	100.°45'29"	0.°00'19''	116.44	116.43	-0.01	0.015			0.040				Yes
44	OIT I DP 335248 (EHK2)	O DISK 3 DP 483626	79.°47'58"	79.°47'52"	-0.°00'06''	145.27	145.25	-0.02	0.020			0.040				Yes
45	OIT I DP 335248 (EHK2)	PEG (25) DP 180860	122.°35'53"	122.°36'00"	0.°00'07''	109.26	109.25	-0.01	0.011			0.040				Yes

Field audit reporting



- Prepare comparison of field measurements spreadsheet to identify any non-compliances involving measurement accuracy (Rule 19,20, and 21)
- Table of audit items each item relates to a rule
- Identify non-compliances
 - *Minor* (1 point)
 - *Significant* (4 points)
 - Critical (10 points)
- Discuss serious non-compliances with other Toitū Te Whenua LINZ surveyors
- 10 points is the threshold for failure

Common non-compliances



- Inaccurate measurements due to poor GNSS horizons
- Weak or incorrect boundary definition
- Incorrect status of old marks (disturbed or reliable)
- Information in CSD not consistent with field record
- Inaccurate occupation information
- Adopted information does not match source
- Incorrect vector references
- Overwritten text
- Inaccurate and/or insufficient information in survey report

Office Audit Process



- Equipment (care, calibration and maintenance)
- Pre-field processes (data search and calculations)
- Field work processes
- CSD production
- Discuss CSD audits
- Access to rules, standards and guidance material
- Requisition process
- IT security Password security
- File reviews
- Requisition statistics and analysis
- Discuss preliminary findings

Following the audit



- Discuss issues and observations at close-out
- Prepare draft audit report with observations and recommendations if applicable
- Provide assurance assessment to S-G
 - **Reasonable Assurance** (pass field pass office)
 - Uncertain (pass one fail one)
 - **Unsatisfactory** (fail field fail office)
- LCS comments on draft report
- Follow up on implementation of recommendations



Positive outcomes may include

- Improved first time compliance reduced requisitions
- Improved boundary definition methods
- More appropriate use of equipment
- Independent third party review of processes
- Update on Toitū Te Whenua LINZ requirements
- Personal contact with Toitū Te Whenua LINZ personnel
- Peace of mind



Alternative Positive (negative) outcomes

- Section 7(1)(d) notice (S-G to CSLB)
- Section 52 notice Correcting Survey
- Error item report (added to CSD as supporting document)
- Professional misconduct complaint to CSLB

Examples



- CSD Herne Bay
- CSD Whenuapai
- Examples of poor GNSS horizons





Second sec



Poor GNSS horizons

newzealanc.gowt.nz











The future for survey audits

- Toitū Te Whenua LINZ is currently undertaking a review of the survey audit framework with the aim of increasing personnel involved and survey firm and CSD coverage.
- This involves a study of the current processes to
 - Identify high risk areas
 - Identify gaps in the process
 - Increase efficiency and output
- Investigate alternative methods of providing assurance.



- Survey Investigations are required when the survey and/or title systems have not worked as they were designed to.
- Common issues may be :
 - Possible overlap of titles requiring thorough survey investigation – field and office
 - Errors in CSDs perpetuated in subsequent CSDs
 - Incorrect boundary definition revealed by subsequent CSD – additional evidence found
 - Historical bearing adjustments may not be correct or appropriate.



Questions?

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New Zealand Government