ELECTRICITY INDUSTRY PARTICIPATION CODE
DISTRIBUTED UNMETERED LOAD AUDIT REPORT

For

NZTA OTAGO AND TRUSTPOWER

Prepared by: Rebecca Elliot

Date audit commenced: 23 March 2018

Date audit report completed: 23 May 2018

Audit report due date: 1 June 2018

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EXECUTIVE SUMMARY

This audit of the NZTA Otago (NZTA) Aurora network DUML database and processes was conducted at the request of Trustpower (Trustpower) in accordance with clause 15.37B. The purpose of this audit is to verify that the volume information is being calculated accurately, and that profiles have been correctly applied.

The audit was conducted in accordance with the audit guidelines for DUML audits version 1.1, which became effective on 1 June 2017.

The database is managed by Aurora and the data is held in their GIS system. Delta is the field contractor.

There is some inaccurate data within the database used to calculate submissions resulting in an estimated under submission of 46,200 kWh per annum.

The future risk rating of 14 indicates that the next audit be completed in 12 months and I agree with this recommendation. Four non-compliances were identified, and no recommendations were raised. The matters raised are detailed below:

AUDIT SUMMARY

NON-COMPLIANCES

Subject	Section	Clause	Non-Compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
Deriving submission information	2.1	11(1) of Schedule 15.3	The database accuracy is assessed to be 90.9% indicating an estimated over submission of 46,200 kWh per annum. Incorrect ballasts applied resulting in an estimated under submission of 802.95 kWh.	Moderate	Medium	4	Identified
Description and capacity of load	2.4	11(2)(c) of Schedule 15.3	Ten items of load with incomplete lamp descriptions.	Moderate	Low	2	Identified
Database accuracy	3.1	15.2 and 15.37B(b)	The database accuracy is assessed to be 90.9% indicating an estimated over submission of 46,200 kWh per annum. Incorrect ballasts applied resulting in an estimated under submission of 802.95 kWh.	Moderate	Medium	4	Identified
Volume information accuracy	3.2	15.2 and 15.37B(c)	The database accuracy is assessed to be 90.9% indicating an estimated over submission of 46,200 kWh per annum. Incorrect ballasts applied resulting in an estimated under submission of 802.95 kWh.	Moderate	Medium	4	Identified
Future Risk Rating						14	

Future risk rating	1-3	4-6	7-8	9-17	18-26	27+
Indicative audit frequency	36 months	24 months	18 months	12 months	6 months	3 months

RECOMMENDATIONS

Subject	Section	Description	Remedial Action
		Nil	

ISSUES

Subject	Section	Description	Issue
		Nil	

1. ADMINISTRATIVE

1.1. Exemptions from Obligations to Comply with Code

Code reference

Section 11 of Electricity Industry Act 2010.

Code related audit information

Section 11 of the Electricity Industry Act provides for the Electricity Authority to exempt any participant from compliance with all or any of the clauses.

Audit observation

The Electricity Authority's website was reviewed to identify any exemptions relevant to the scope of this audit.

Audit commentary

There are no exemptions in place relevant to the scope of this audit.

1.2. Structure of Organisation

Trustpower provided a copy of their organisational structure.

1.3. Persons involved in this audit

Auditor:

Rebecca Elliot

Veritek Limited

Electricity Authority Approved Auditor

Other personnel assisting in this audit were:

Name	Title	Company
Alan Miller	Corporate Account Manager	Trustpower
Delwyn Jeffrey	Commercial and Industrial Billing Manager	Trustpower
Richard Starkey	Commercial Development Manager	Aurora
Neville Hopkins	Assets System Team	Aurora
Suzanne Fraser	Contracts co-ordinator	Delta
Simeon Dwyer	Network Billing Analyst	Aurora

1.4. Hardware and Software

The GIS database used for the management of DUML is managed by Aurora.

The database back up is in accordance with standard industry procedures. Access to the database is secure by way of password protection.

1.5. Breaches or Breach Allegations

There are no breach allegations relevant to the scope of this audit.

1.6. ICP Data

ICP Number	Description	NSP	Profile	Number of items of load	Database wattage (watts)
0000027638CECB5	Central Otago State Highways FKN0331	FKN0331	STL	315	69,619
0000486694CE943	Central Otago State Highways CYD0331	CYD0331	STL	223	36,468
0000486695CE506	Central Otago State Highways CML0331	CML0331	STL	85	16,825

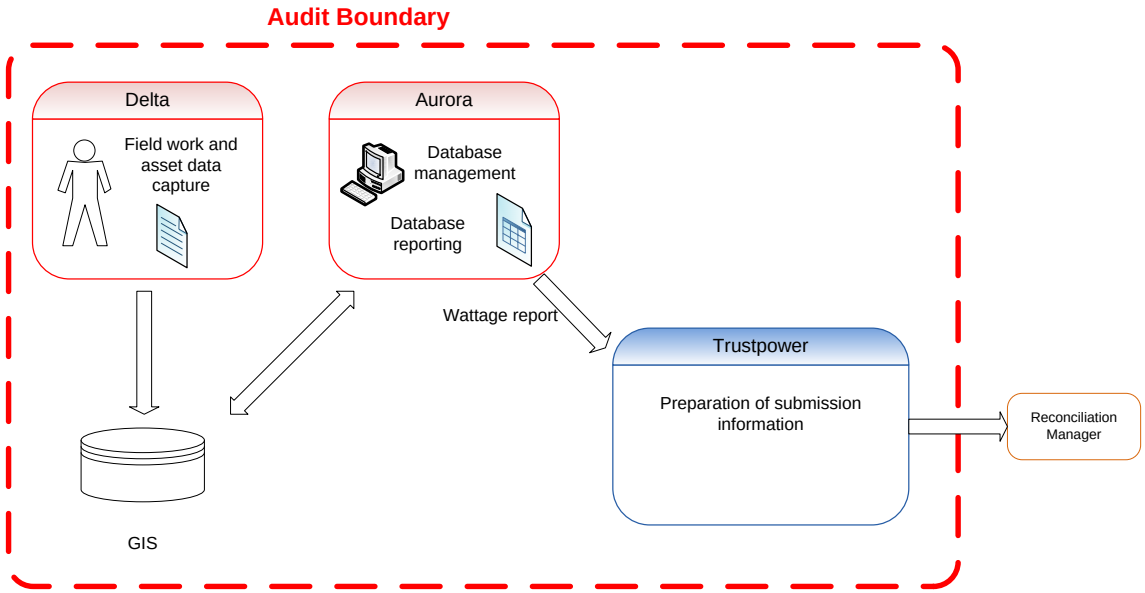
1.7. Authorisation Received

All information was provided directly by Trustpower and Aurora.

1.8. Scope of Audit

The database is managed by Aurora and the data is held in their GIS system. Delta is the field contractor. Reports are received monthly by Trustpower.

The scope of the audit encompasses the collection, security and accuracy of the data, including the preparation of submission information based on the database reporting. The diagram below shows the audit boundary for clarity.



The audit was carried out at Aurora's premises in Cromwell on March 21st, 2018. The field audit was undertaken of 147 lights using the statistical sampling methodology.

1.9. Summary of previous audit

The previous audit was completed in September 2016 by Barry Harkerss of Trustpower. This audit found compliance with the code.

1.10. Distributed unmetered load audits (Clause 16A.26 and 17.295F)

Code reference

Clause 16A.26 and 17.295F

Code related audit information

Retailers must ensure that DUML database audits are completed:

1. *by 1 June 2018 (for DUML that existed prior to 1 June 2017)*
2. *within three months of submission to the reconciliation manager (for new DUML)*
3. *within the timeframe specified by the Authority for DUML that has been audited since 1 June 2017.*

Audit observation

Trustpower have requested Veritek to undertake this streetlight audit.

Audit commentary

This audit report confirms that the requirement to conduct an audit has been met for this database within the required timeframe. Compliance is confirmed.

2. DUML DATABASE REQUIREMENTS

2.1. Deriving submission information (Clause 11(1) of Schedule 15.3)

Code reference

Clause 11(1) of Schedule 15.3

Code related audit information

The retailer must ensure the:

- *DUML database is up to date*
- *methodology for deriving submission information complies with Schedule 15.5.*

Audit observation

The process for calculation of consumption was examined.

Audit commentary

Trustpower reconciles this DUML load using the STL profile. The on and off times are derived from data logger information. Trustpower receive a monthly wattage report.

I recalculated the submissions for February 2018 using the data logger and the database information. I confirmed that the calculation method was correct, and the figures aligned.

There is some inaccurate data within the database used to calculate submissions. This is detailed in **sections 3.1** and **3.2**.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.1 With: Clause 11(1) of Schedule 15.3 From: unknown To: 30-Apr-18	The database accuracy is assessed to be 90.9% indicating an estimated over submission of 46,200 kWh per annum. Incorrect ballasts applied resulting in an estimated under submission of 802.95 kWh. Potential impact: Medium Actual impact: Medium Audit history: None Controls: Moderate Breach risk rating: 4
Audit risk rating	**Rationale for audit risk rating**
Medium	The controls are rated as moderate as they are will mitigate risk and remove errors most of the time. The impact is assessed to be medium, based on the kWh differences described above.

Actions taken to resolve the issue	Completion date	Remedial action status
TRUS will work with Aurora to review and update the database anomalies as required	30/09/18	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
Validation of data to occur as it comes in from the field	Ongoing	

2.2. ICP identifier and items of load (Clause 11(2)(a) and (aa) of Schedule 15.3)

Code reference

Clause 11(2)(a) and (aa) of Schedule 15.3

Code related audit information

The DUML database must contain:

- *each ICP identifier for which the retailer is responsible for the DUML*
- *the items of load associated with the ICP identifier.*

Audit observation

The database was checked to confirm an ICP is recorded for each item of load.

Audit commentary

All items of load had an ICP recorded as required by this clause.

Audit outcome

Compliant

2.3. Location of each item of load (Clause 11(2)(b) of Schedule 15.3)

Code reference

Clause 11(2)(b) of Schedule 15.3

Code related audit information

The DUML database must contain the location of each DUML item.

Audit observation

The database was checked to confirm the location is recorded for all items of load.

Audit commentary

The database contains either the nearest street address and Global Positioning System (GPS) coordinates for each item of load and users in the office and field can view these locations on a mapping system.

Audit outcome

Compliant

2.4. Description and capacity of load (Clause 11(2)(c) and (d) of Schedule 15.3)

Code reference

Clause 11(2)(c) and (d) of Schedule 15.3

Code related audit information

The DUML database must contain:

- *a description of load type for each item of load and any assumptions regarding the capacity*
- *the capacity of each item in watts.*

Audit observation

The database was checked to confirm that it contained a field for lamp type and wattage capacity and included any ballast or gear wattage.

Audit commentary

The database contains three fields for lamp description, wattage, and "lamp losses". The lamp losses (ballast wattage) is expected to be a calculated figure which accounts for any variation from the input wattage and includes losses associated with ballasts. Examination of the database found all the wattages and lamp losses were populated for all items, but found ten items of load with incomplete lamp descriptions as detailed in the table below:

Lamp descriptions	Lamp Quantity
LED Lighting	1
Monument light, or ped cross, no beacons	2
Pedestrian crossing beacon with floodlights	4
Pedestrian crossing beacon without floodlights	2
Street name illuminator or Bollard	1

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.4 With: Clause 11(2)(c) of Schedule 15.3 From: unknown To: 30-Apr-18	Ten items of load with incomplete lamp descriptions. Potential impact: Low Actual impact: Low Audit history: None Controls: Moderate Breach risk rating: 2
Audit risk rating	**Rationale for audit risk rating**
Low	The controls are rated as moderate as they will mitigate risk and remove errors most of the time. The impact is assessed to be low as only ten items of load are affected.

Actions taken to resolve the issue	Completion date	Remedial action status
TRUS will work with Aurora to review and update the database anomalies as required	30/09/18	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
Validation of data to occur as it comes in from the field	Ongoing	

2.5. All load recorded in database (Clause 11(2A) of Schedule 15.3)

Code reference

Clause 11(2A) of Schedule 15.3

Code related audit information

The retailer must ensure that each item of DUML for which it is responsible is recorded in this database.

Audit observation

The field audit was undertaken of a statistical sample of 147 items of load on 21st March 2018.

Audit commentary

The field audit findings are detailed in the table below:

Street	Database count	Field count	Light count differences	Wattage recorded incorrectly	Comments
Urban					
Alpha Street	2	2			
Ballarat Street	2	1	-1	1	1x 107W LED found in the field. Database has 2x 250W HPS recorded
Camp Street	1	1			
Centennial Avenue	45	45		4	4x pedestrian crossing lights with incorrect wattages
Golden Terrace	2	2			
Henderson Drive	3	3			
Humphrey Street	2	2			
Limerick Street	1	1			
Lucas Place	5	5			
Ripponvale Road	1	1			
Ross Street	2	1	-1		1x 70W HPS not found in field
Scotland Street	38	38		1	1x 400W MV changed to 107W LED
Shortcut Road	2	2			
Spruce Close	2	1	-1		1x 70W HPS not found in the field
Stanley Street	8	8		3	3x 250W HPS replaced with 107W LED
Tweed Street	1	1			
Rural					
Albert Town-Lake Hawea Road	3	3			
Aubrey Road	1	1			

Street	Database count	Field count	Light count differences	Wattage recorded incorrectly	Comments
Cromwell-Clyde Road	6	6			
Main Road	7	7			
Old Bridge Road	2	2		1	160W MV not present. 70W HPS found
Reid Avenue	1	1			
Tarras-Cromwell Road	2	2			
Templeton Street	3	3			
Willoughby Place	5	5			
Grand Total	147	142	3	10	

No additional items of load were found in the field. The field audit variances found are recorded as non-compliance in **section 3.1**.

Audit outcome

Compliant

2.6. Tracking of load changes (Clause 11(3) of Schedule 15.3)

Code reference

Clause 11(3) of Schedule 15.3

Code related audit information

The DUML database must track additions and removals in a manner that allows the total load (in kW) to be retrospectively derived for any given day.

Audit observation

The process for tracking of changes in the database was examined.

Audit commentary

Any changes that are made during any given month take effect from the beginning of that month. The information is available which would allow for the total load in kW to be retrospectively derived for any day. On 20 September 2012, the Authority sent a memo to retailers and auditors advising that tracking of load changes at a daily level was not required if the database contained an audit trail. I have interpreted this to mean that the production of a monthly "snapshot" report is sufficient to achieve compliance.

The database is managed by Aurora and the data is held in their GIS system. Delta carry out all fault and maintenance work. Any changes made in the field are passed to Aurora to update the database.

Aurora advised there have been no new connections made during the audit period. Currently work packages are provided to Aurora for new developments but these are not passed to the GIS team to load until the work is complete and signed off. This can be sometime after electrical connection has occurred. The new connection process is under review to improve the timeliness and accuracy of the data going into the database.

There is no plan for an LED rollout, but LEDs are sometimes used to replace existing lamps in the field on a reactive basis.

Delta carries out outage patrols in the urban areas as part of their patrols for Queenstown Lakes DC and Central Otago DC.

No festive lighting is connected to the Aurora NZTA unmetered streetlight network.

Audit outcome

Compliant

2.7. Audit trail (Clause 11(4) of Schedule 15.3)

Code reference

Clause 11(4) of Schedule 15.3

Code related audit information

The DUML database must incorporate an audit trail of all additions and changes that identify:

- *the before and after values for changes*
- *the date and time of the change or addition*
- *the person who made the addition or change to the database*

Audit observation

The database was checked for audit trails.

Audit commentary

A complete audit trail of all additions and changes to the database information.

Audit outcome

Compliant

3. ACCURACY OF DUML DATABASE

3.1. Database accuracy (Clause 15.2 and 15.37B(b))

Code reference

Clause 15.2 and 15.37B(b)

Code related audit information

Audit must verify that the information recorded in the retailer's DUML database is complete and accurate.

Audit observation

The DUML Statistical Sampling Guideline was used to determine the database accuracy. The table below shows the survey plan.

Plan Item	Comments
Area of interest	NZTA Otago on the Aurora network
Strata	The database contains items of load Otago Aurora network area. The area has two distinct sub groups of urban and rural. The processes for the management of NZTA Aurora Otago items of load are the same, but I decided to place the items of load into two strata, as follows: 1. Urban 2. Rural.
Area units	I created a pivot table of the roads in each area and I used a random number generator in a spreadsheet to select a total of 25 sub-units.
Total items of load	147 items of load were checked.

Wattages were checked for alignment with the published standardised wattage table produced by the Electricity Authority.

Audit commentary

The database was found to contain some inaccuracies.

The field data was 90.9% of the database data for the sample checked. The total wattage recorded in the database for the sample was 29,108 watts. The estimated total wattage found in the field for the sample checked was 26,405 watts, a difference of 2,703 watts. This will result in an estimated over submission of 46,200 kWh per annum (based on annual burn hours of 4,271 as detailed in the DUML database auditing tool).

Wattages for all items of load were checked against the published standardised wattage table produced by the Electricity Authority in the database and found errors. I calculated the impact on submission if these were used for submission and estimate minor under submission of 802.95 kWh per annum.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 3.1 With: Clause 15.2 and 15.37B(b) From: unknown To: 30-Apr-18	The database accuracy is assessed to be 90.9% indicating an estimated over submission of 46,200 kWh per annum. Incorrect ballasts applied resulting in an estimated under submission of 802.95 kWh. Potential impact: Medium Actual impact: Medium Audit history: None Controls: Moderate Breach risk rating: 4
Audit risk rating	**Rationale for audit risk rating**
Medium	The controls are rated as moderate as they are will mitigate risk and remove errors most of the time. The impact is assessed to be medium, based on the kWh differences described above.

Actions taken to resolve the issue	Completion date	Remedial action status
TRUS will work with Aurora to review and update the database anomalies as required	30/09/18	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
Validation of data to occur as it comes in from the field	Ongoing	

3.2. Volume information accuracy (Clause 15.2 and 15.37B(c))

Code reference

Clause 15.2 and 15.37B(c)

Code related audit information

The audit must verify that:

- *volume information for the DUML is being calculated accurately*
- *profiles for DUML have been correctly applied.*

Audit observation

The submission was checked for accuracy for the month the database extract was supplied. This included:

- checking the registry to confirm that all ICPs have the correct profile and submission flag
- checking the database extract combined with the burn hours against the submitted figure to confirm accuracy.

Audit commentary

Trustpower reconciles this DUML load using the STL profile. The on and off times are derived from data logger information. Trustpower receive a monthly wattage report.

I recalculated the submissions for February 2018 using the data logger and the database information. I confirmed that the calculation method was correct, and the figures aligned.

There is some inaccurate data within the database used to calculate submissions. This is detailed in **sections 2.1** and **3.1**.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 3.2 With: Clause 15.2 and 15.37B(c) From: unknown To: 30-Apr-18	The database accuracy is assessed to be 90.9% indicating an estimated over submission of 46,200 kWh per annum. Incorrect ballasts applied resulting in an estimated under submission of 802.95 kWh. Potential impact: Medium Actual impact: Medium Audit history: None Controls: Moderate Breach risk rating: 4
Audit risk rating	**Rationale for audit risk rating**
Medium	The controls are rated as moderate as they are will mitigate risk and remove errors most of the time. The impact is assessed to be medium, based on the kWh differences described above.

Actions taken to resolve the issue	Completion date	Remedial action status
TRUS will work with Aurora to review and update the database anomalies as required	30/09/18	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
Validation of data to occur as it comes in from the field	Ongoing	

CONCLUSION

The database is managed by Aurora and the data is held in their GIS system. Delta is the field contractor.

There is some inaccurate data within the database used to calculate submissions resulting in an estimated under submission of 46,200 kWh per annum.

The future risk rating of 14 indicates that the next audit be completed in 12 months and I agree with this recommendation. Four non-compliances were identified, and no recommendations were raised.

PARTICIPANT RESPONSE

Trustpower will work with Aurora to identify and correct current anomalies in the database, as well as to validate new items as they are added.