ELECTRICITY INDUSTRY PARTICIPATION CODE
DISTRIBUTED UNMETERED LOAD AUDIT REPORT

For

RUAPEHU DISTRICT COUNCIL
AND TRUSTPOWER LIMITED

Prepared by: Tara Gannon

Date audit commenced: 17 July 2020

Date audit report completed: 20 August 2020

Audit report due date: 01 September 2020

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EXECUTIVE SUMMARY

This audit of the **Ruapehu District Council (RDC)** DUML database and processes was conducted at the request of **Trustpower Limited (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. The scope of the audit encompasses the collection, security, and accuracy of the data, including the preparation of submission information.

A RAMM database is managed by **Alf Downs Streetlighting Limited (Alf Downs)** on behalf of RDC. The field work, asset data capture and database population is conducted by Alf Downs. Alf Downs staff update the database from the field using Pocket RAMM.

Trustpower reconciles this DUML load using the STL profile. Wattages are derived from a RAMM extract provided by Alf Downs each month, and on and off times are derived from a data logger. I found that submission information was calculated correctly, but some incorrect kW inputs into the calculation resulted in over submission of 135 kWh for June 2020.

Database accuracy is described as follows:

Result	Percentage	Comments
The point estimate of R	95.9	Wattage from survey is lower than the database wattage by 4.1%.
R_L	87.3	With a 95% level of confidence it can be concluded that the error could be between 0.0% and -12.7%.
R_H	100.0	

The variability of the sample results across the strata means that the true wattage (installed in the field) could be 0.0% to 12.7% lower than the wattage recorded in the DUML database.

These results were categorised in accordance with the "Distributed Unmetered Load Statistical Sampling Audit Guideline", effective from 01/02/19. The best available estimate is not precise enough to conclude that the database is accurate within ±5.0%.

- In absolute terms the installed capacity is estimated to be 7 kW lower than the database indicates.
- There is a 95% level of confidence that the installed capacity is between 0 and 20 kW lower than the database.
- In absolute terms, total annual consumption is estimated to be 28,100 kWh lower than the DUML database indicates.
- There is a 95% level of confidence that the annual consumption is between 0 and 86,300 kWh p.a. lower than the database indicates.

On 18 June 2019, the Electricity Authority issued a memo clarifying the memo of 2012 that stated that a monthly snapshot was sufficient to calculate submission from, and confirmed the code requirement to calculate the correct monthly load must:

- take into account when each item of load was physically installed or removed, and
- wash up volumes must take into account where historical corrections have been made to the DUML load and volumes.

The current monthly report is provided as a snapshot and is non-compliant, and Trustpower completes revision submissions where corrections are required. Trustpower has not updated their processes to be consistent with the Authority's memo.

The future risk rating of 10 indicates that the next audit be completed in 12 months. Given that one non-compliance is already cleared, and Trustpower intends to investigate and resolve the remaining issues, I recommend that the next audit is completed in a minimum of 15 months.

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 is not confirmed as accurate with a 95% level of confidence. The wattages supplied by Alf Downs were not applied for ICPs 0001111171WM17A, 0001111172WMDBA and 0008807442WME14 for June 2020, resulting in over submission of 135 kWh. Pole ID 1998 had a blank gear wattage and gear wattage description, when "no gear" and zero is expected. Pole ID 2117 had a blank ICP group, and was updated to ICP 0008807442WME14 during the audit. The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot. The installation and change dates recorded in the database reflect the date of data collection, which is not always consistent with the date that the change occurred.	Weak	Low	3	Identified
11(2)(a) and (aa) of Schedule 15.3	2.2	11(2)(a) and (aa) of Schedule 15.3	Pole ID 2117 had a blank ICP group and was updated to ICP 0008807442WME14 during the audit.	Strong	Low	1	Cleared
Description and capacity of load	2.4	11(2)(c) and (d) of Schedule 15.3	Pole ID 1998 had a blank gear wattage and gear wattage description, when "no gear" and zero is expected.	Strong	Low	1	Identified
Database accuracy	3.1	15.2 and 15.37B(b)	The database is not confirmed as accurate with a 95% level of confidence. Pole ID 1998 had a blank gear wattage and gear wattage description, when "no gear" and zero is expected. Pole ID 2117 had a blank ICP group, and was updated to ICP 0008807442WME14 during the audit. The installation and change dates recorded in the database reflect the date of data collection, which is not always consistent with the date that the change occurred.	Moderate	Low	2	Identified

Subject	Section	Clause	Non-Compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
Volume information accuracy	3.2	15.2 and 15.37B(c)	The database is not confirmed as accurate with a 95% level of confidence. The wattages supplied by Alf Downs were not applied for ICPs 0001111171WM17A, 0001111172WMDBA and 0008807442WME14 for June 2020, resulting in over submission of 135 kWh. Pole ID 1998 had a blank gear wattage and gear wattage description, when "no gear" and zero is expected. Pole ID 2117 had a blank ICP group, and was updated to ICP 0008807442WME14 during the audit. The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot. The installation and change dates recorded in the database reflect the date of data collection, which is not always consistent with the date that the change occurred.	Weak	Low	3	Identified
Future Risk Rating						10	

Future risk rating	0	1-4	5-8	9-15	16-18	19+
Indicative audit frequency	36 months	24 months	18 months	12 months	6 months	3 months

RECOMMENDATIONS

Subject	Section	Recommendation
Private streetlights – The Lines Company depot	2.2	Confirm whether pole IDs 539 and 1687 are metered or unmetered, and update the database details accordingly.
Private streetlights – DoC lights near Chateau Tongariro	2.2	Complete the investigation into the DoC lights at the Chateau and confirm whether they should be part of the RDC DUML load. Work with the Whakapapa Village DoC DUML database owner to ensure that lights in the area are recorded and assigned to the correct ICP in either the Whakapapa Village – DoC DUML database or the RDC DUML database.
SH 4 (TAUMARUNUI) BRDG 100KM/H lights	2.5	Investigate the lights at this location to confirm the correct wattages and whether they are unmetered and update the database accordingly.
Confirm light wattages	3.1	Confirm the correct wattages for the three poles with models which did not match the specifications I located, or I could not locate specifications for. Update the wattages in RAMM as necessary.

Subject	Section	Recommendation
Decorative lights on Hakiaha Street, Taumaranui	3.1	Confirm whether the decorative lights on Hakiaha Street, Taumaranui are ever connected. If they are, include them in the database with the correct ICP numbers and develop procedures to provide on and off dates to Trustpower for submission.

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 organisation structure.

1.3. Persons involved in this audit

Auditor:

Tara Gannon

Veritek Limited

Electricity Authority Approved Auditor

Other personnel assisting in this audit were:

Name	Title	Company
Phil Harris	Street Lighting Contract Administration	Alf Downs Streetlighting Limited
Robbie Diederen	Reconciliation Analyst	Trustpower
Wendy Pyne	Assurance & Compliance Specialist	Trustpower

1.4. Hardware and Software

The SQL database used for the management of DUML is remotely hosted by RAMM Software Ltd. The database is commonly known as "RAMM" which stands for "Roading Asset and Maintenance Management". The specific module used for DUML is called RAMM Contractor.

RAMM Software Limited backs up the database and assists with disaster recovery as part of their hosting service. Nightly backups are performed. As a minimum daily backups are retained for the previous five working days, weekly backups are retained for the previous four weeks, and monthly backups are retained for the previous six months.

Trustpower's systems used in the process are discussed in their reconciliation audit report.

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)
0001111171WM17A	STREETLIGHTS TRANSIT URBAN TAUMARUNUI	ONG0331	STL	134	21,146
0001111172WMDBA	STREETLIGHTS RUAPEHU DISTRICT COUNCIL NATIONAL PARK	NPK0331	STL	73	6,179

ICP Number	Description	NSP	Profile	Number of items of load	Database wattage (watts)
0001111173WM1FF	STREETLIGHTS TRANSIT URBAN NATIONAL PARK	NPK0331	STL	26	4,503
0001111174WMC35	STREETLIGHTS RUAPEHU DISTRICT COUNCIL OHAKUNE	OKN0111	STL	365	33,072
0001111175WM070	STREETLIGHTS TRANSIT URBAN OHAKUNE	OKN0111	STL	37	6,951
0008807442WME14	STREETLIGHTS RUAPEHU DISTRICT COUNCIL TAUMARUNUI	ONG0331	STL	945	86,020
Private				20	1,480
(blank)				1	51
Total				**1,601**	**159,401**

Private lights

20 private lights are recorded in the database but excluded from submission.

- Two lights are located at The Lines Company's depot. Alf Downs could not confirm whether these lights were metered through the Lines Company's installation or are connected to the streetlight circuits.
- Two lights are metered through the Top 10 Holiday Park's installation, and are not part of the DUML load.
- 16 lights are owned by DoC and situated near Chateau Tongariro. DoC has asked RDC to take responsibility for the streetlights. Alf Downs has recorded the lights in the database as private lights until investigation is completed to confirm whether the lights are metered or unmetered, and the correct lamp and gear wattages. Some of these lights also appear to be recorded in the Whakapapa Village – DoC DUML database (ICP 0088055801WMB6F).

I have raised a recommendation in **section 2.2** to confirm whether the lights at The Lines Company depot and Chateau Tongariro are unmetered and should be recorded against a RDC DUML ICP, and if so, update the database with correct lamp and gear details.

Light with a blank ICP number

Pole ID 2117 had a blank ICP group. The correct ICP is 0008807442WME14, and the record was updated during the audit.

1.7. Authorisation Received

All information was provided directly by Trustpower and Alf Downs.

1.8. Scope of Audit

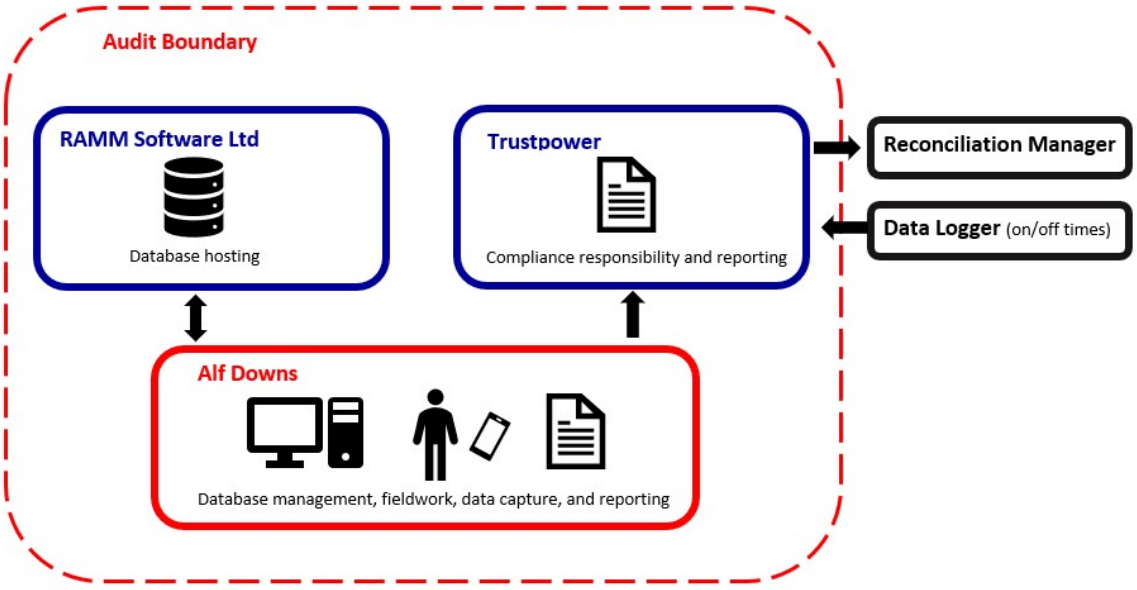
This audit of the RDC DUML database and processes was conducted at the request of Trustpower in accordance with clause 15.37B. The purpose of this audit is to verify that the volume information is being calculated accurately, and that profiles have been correctly applied.

The audit was conducted in accordance with the audit guidelines for DUML audits version 1.1.

A RAMM database is managed by Alf Downs on behalf of RDC. The field work, asset data capture and database population is conducted by Alf Downs. Alf Downs staff update the database from the field using Pocket RAMM.

Trustpower reconciles this DUML load using the STL profile. Wattages are derived from a RAMM extract provided by Alf Downs each month, and on and off times are derived from a data logger.

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.



A field audit was undertaken of a statistical sample of 182 items of load on 17 July 2020.

1.9. Summary of previous audit

The previous audit of this database was undertaken by Steve Woods of Veritek Limited in March 2017, and found full compliance. No issues or recommendations were raised.

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.

Audit outcome

Compliant

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 and the application of profiles was checked. The database was checked for accuracy.

Audit commentary

Submission

Trustpower reconciles this DUML load using the STL profile.

- Wattages are derived from a RAMM extract provided by Alf Downs each month. The field survey found that the best available estimate of field wattage is not precise enough to conclude that the database is accurate within ±5.0% as recorded in **section 3.1**.
- On and off times are derived from a data logger.

I checked the submission calculations for June 2020, and confirmed that Trustpower's DUML volume calculation process was operating correctly. For three of the ICPs, the kW input into the calculation did not match the values provided by Alf Downs, resulting in an incorrect submission value:

ICP	kW provided by Alf Downs from RAMM	kW applied by Trustpower	kW difference	kWh difference for June 2020
0001111171WM17A	21.146	21.166	-0.02	-8.90
0001111172WMDBA	6.179	6.182	-0.003	-1.51
0008807442WME14	86.0195	86.3	-0.2805	-124.72
		Total	**-0.3035**	**-135.14**

Sources of database inaccuracy are as follows:

Issue	Estimated volume information impact (annual kWh)
Pole ID 2117 had a blank ICP group, and was updated to ICP 0008807442WME14 during the audit.	Under submission of 215.7 kWh p.a.
Pole ID 1998 had a blank gear wattage and gear wattage description, when "no gear" and zero is expected.	No impact on submission, there is a zero difference.

There are decorative lights connected to some streetlight poles on Hakiaha Street, Taumaranui. The lights are not recorded in the database. Alf Downs is not responsible for connecting or disconnecting the lights, and was unable to confirm whether they are used. I have recommended confirming whether these lights are ever used and updating the database as necessary in **section 3.1**.

There are 20 private lights recorded in the database which are excluded from submission information (of which two are metered). I have recommended confirming whether the other lights are metered or unmetered and updating the database as necessary in **section 2.2**.

On 18 June 2019, the Electricity Authority issued a memo confirming that the code requirement to calculate the correct monthly load must:

- take into account when each item of load was physically installed or removed, and
- wash up volumes must take into account where historical corrections have been made to the DUML load and volumes.

The current monthly report is provided as a snapshot and this practice is non-compliant. When a wattage is changed in the database due to a physical change or a correction, only the record present at the time the report is run is recorded, not the historical information showing dates of changes. Trustpower has not updated their processes to be consistent with the Authority's memo.

The RAMM database records light installation and replacement dates, which default to the date which the data is collected. Alf Downs does not adjust the installation and replacement dates when records are added or changed, so the date the data is collected is applied as the installation or change date. For maintenance work, RAMM is updated at the time the work is completed and the date is expected to be correct. For upgrades and new connections, data is collected after the work in the area is completed but usually within the month it was completed.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.1 With: Clause 11(1) of Schedule 15.3 From: 01-Jun-20 To: 30-Jun-20	The database is not confirmed as accurate with a 95% level of confidence. The wattages supplied by Alf Downs were not applied for ICPs 0001111171WM17A, 0001111172WMDBA and 0008807442WME14 for June 2020, resulting in over submission of 135 kWh. Pole ID 1998 had a blank gear wattage and gear wattage description, when "no gear" and zero is expected. Pole ID 2117 had a blank ICP group, and was updated to ICP 0008807442WME14 during the audit. The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot. The installation and change dates recorded in the database reflect the date of data collection, which is not always consistent with the date that the change occurred. Potential impact: Low Actual impact: Low Audit history: None Controls: Weak Breach risk rating: 3

Audit risk rating	Rationale for audit risk rating
Low	The controls over the database are rated as moderate. Most of the field audit accuracy issues related to one light location, and a small number of database accuracy issues were identified. The controls over submission are weak. Trustpower's DUML calculations operate correctly, but incorrect inputs into the calculation resulted in incorrect submission for the three of the six ICPs for June 2020. The audit risk rating is low based on the volume differences identified.

Actions taken to resolve the issue	Completion date	Remedial action status
We have updated the data , as per the EA standardised wattage table, for the three ICPs mentioned above and are working with the Contractor to look at accurately determining the Ballast of the lamps. This was the reply from the contractor . *"the standard for Fluorescent lamps that you are referring to, is based on Magnetic Ballast which indicate an operating wattage of between 8-10 Watts, this is based on several variables with include supply voltage assuming 240V , lamp efficiency, Ballast efficiency therefore to assume 9 watts is a fair deal.* *However Magnetic ballast are no longer used. The fluorescent lighting in use today uses Electronic Ballasts which are more efficient, with more efficient tubes therefore the operating watts can be calculated much lower, link attached."* *https://www.xcelenergy.com/staticfiles/xe/Marketing/MN-Bus-Lighting-Input-Wattage-Guide.pdf*	28/08/2020	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
The discrepancy is around defining the correct Ballast and we are discussing this with the Contractor to ensure us and them are in agreement	01/10/2020	

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 the correct ICP was recorded against each item of load.

Audit commentary

ICP number is recorded in the ICP group field in the database. All items of load have an ICP number recorded except:

- Pole ID 2117, which had a blank ICP group. The correct ICP is 0008807442WME14, and the record was updated during the audit.

- 20 private lights which are recorded in the database with "private" as the ICP group.

Pole IDs	No of lights	Expected wattage	Commentary
539 1687	2	166W	These two poles have 70W HPS connected and are located at The Lines Company's depot. Alf Downs could not confirm whether these lights were metered through the Lines Company's installation or are connected to the streetlight circuits. Compliance is recorded because it is not known whether the lights are metered or unmetered, and a recommendation is made below.
2100 2101	2	166W	These two poles have 70W HPS connected and are located at The Top 10 Holiday Park. They are metered through the holiday park's installation, and are not part of the DUML load.
2056 2068-69 2078-79 2081-85 2087-92	16	1148W estimated	These poles are owned by DoC and situated near Chateau Tongariro. DoC has asked RDC to take responsibility for the streetlights. Some of these lights also appear to be recorded in the Whakapapa Village – DoC DUML database (ICP 0088055801WMB6F). Alf Downs has recorded the lights in the database as private lights until investigation is completed to confirm whether the lights are metered or unmetered, and the correct lamp and gear wattages. Compliance is recorded because it is not known whether the lights are metered or unmetered, and a recommendation is made below.

Recommendation	Description	Audited party comment	Remedial action
Private streetlights – The Lines Company depot	Confirm whether pole IDs 539 and 1687 are metered or unmetered, and update the database details accordingly.	We have emailed TLC, and have a reminder to follow up on 8 Sept.	Investigating

Recommendation	Description	Audited party comment	Remedial action
Private streetlights – DoC lights near Chateau Tongariro	Complete the investigation into the DoC lights at the Chateau and confirm whether they should be part of the RDC DUML load. Work with the Whakapapa Village DoC DUML database owner to ensure that lights in the area are recorded and assigned to the correct ICP in either the Whakapapa Village – DoC DUML database or the RDC DUML database.	We will be asking our Customer if they are going to take over the responsibility for the DOC owned lights. If RDC do not, then this becomes an issue between DOC and their Retailer to resolve, Trustpower does not accept any responsibility to ensure that the DOC lights are part of any DUML we are responsible for. We will of course endeavour to assist in resolving this issue.	Investigating

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.2 With: Clause 11(2)(a) and (aa) of Schedule 15.3 From: 10-Jul-20 To: 14-Aug-20	Pole ID 2117 had a blank ICP group, and was updated to ICP 0008807442WME14 during the audit. Potential impact: Low Actual impact: Unknown Audit history: None Controls: Moderate Breach risk rating: 2
Audit risk rating	**Rationale for audit risk rating**
Low	The controls are rated as moderate, because almost all lights are assigned to a settled ICP. The impact is assessed to be low. Light ID 2117 is 50.5W or 215.7 kWh p.a., and the ICP number was corrected during the audit.

Actions taken to resolve the issue	Completion date	Remedial action status
Resolved during the Audit	28/08/2020	Cleared
Preventative actions taken to ensure no further issues will occur	**Completion date**	
No Action required	28/08/2020	

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 fields for road name, displacement, GPS coordinates, and pole numbers.

All items of load are locatable and have GPS coordinates and road names recorded. No inaccurate locations were identified during the audit.

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 light type and wattage capacity,
- wattage capacities include any ballast or gear wattage, and
- each item of load has a light type, light wattage, and gear wattage recorded.

Audit commentary

A description of each light is recorded in the lamp model field, and wattages are recorded in the lamp wattage and gear wattage fields.

One Ambius 4 LED (pole ID 1998) connected to a DUML ICP had a blank gear wattage and gear wattage description, when "no gear" and zero is expected.

14 DoC lights at Chateau Tongariro with "private" recorded as the ICP group had wattage information was missing, or invalidly recorded as zero:

- 13 x 80W MV with a zero gear wattage and gear description of "no gear"; and
- 1 x F18 with a blank lamp wattage.

Alf Downs has recorded the lights in the database as private lights until investigation is completed to determine whether the lights are metered or unmetered, and the correct lamp and gear wattages. I have raised a recommendation in **section 2.2** to confirm whether the lights Chateau Tongariro should be recorded against a DUML ICP, and update the database with the correct details.

The accuracy of the recorded wattages is discussed in **section 3.1**.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.4 With: Clause 11(2)(c) and (d) of Schedule 15.3 From: 10-Jul-20 To: 10-Jul-20	Pole ID 1998 had a blank gear wattage and gear wattage description, when "no gear" and zero is expected. Potential impact: Low Actual impact: Low Audit history: None Controls: Strong Breach risk rating: 1
Audit risk rating	**Rationale for audit risk rating**
Low	The controls are rated as strong. Almost all lights had gear model and wattage recorded. There is no impact, the missing gear wattage was expected to be zero.

Actions taken to resolve the issue	Completion date	Remedial action status
Have asked Contractor to update blank with Zero	28/08/2020	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
No Action required	28/08/2020	

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 182 items of load on 17 July 2020. The sample was selected from four strata, as follows:

1. Ruapehu DC street names A – MILL
2. Ruapehu DC street names MILM - SH 4
3. Ruapehu DC street names SH 49 – Z, and
4. Transit and other.

Audit commentary

The field audit discrepancies are detailed in the table below:

Street	Database count	Field count	Light count difference	Wattage recorded incorrectly	Comments
Ruapehu DC street names A - MILL					
KYDD LANE	7	7	-	1	Pole 10001 was recorded in the database as 70W Metal Halide but an LED is present. The wattage for the LED is estimated to be 30W.
Ruapehu DC street names SH 49 - Z					
SH 49 (TOHUNGA ROAD)	18	18	-	-	I could not confirm the wattage for Pole ID 1117 (LED144PCS) was correct during the lamp and gear wattage checks. I have recorded compliance, and recommend this is checked in **section 3.1**.
Transit and other					
SH 4 (TAUMARUNUI) BRDG 100KM/H	11	8	3	4	Pole 12202 is recorded in the database with 10 x 36w Twin Fluorescent, but none are present and the pole was not found. The database did not record 4 x LEDs which were positioned on two poles beside the river, or 3 x LEDs were connected to the sign showing recreational activities in the region. The missing lights have been estimated to be 30W each. The King Tawhiao sign may be illuminated at night, and was also not recorded in the database.
Grand total	182	179	3	5	

This clause relates to lights in the field that are not recorded in the database. I did not record non-compliance for missing lights because (1) I was unable to confirm whether the extra lights found in the field were metered or unmetered, and (2) the count of lights in the database exceeded those in the field so the differences were treated as "wattage" rather than missing lights.

Recommendation	Description	Audited party comment	Remedial action
SH 4 (TAUMARUNUI) BRDG 100KM/H lights	Investigate the lights and signs at this location to confirm the correct wattages and whether they are unmetered, and update the database accordingly.	We have asked the Contractor to update the missing lamps in the database	Identified

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

The RAMM database functionality achieves compliance with the code.

The change management process and the compliance of the database reporting provided to Trustpower is detailed in **sections 3.1** and **3.2**.

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

The database has a complete audit trail.

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

Trustpower's submissions are based on a monthly extract from the RAMM database.

A RAMM database extract was provided in July 2020 and I assessed the accuracy of this by using the DUML Statistical Sampling Guideline. The table below shows the survey plan.

Plan Item	Comments
Area of interest	Ruapehu District Council streetlights
Strata	The database contains the RDC items of load for the DUML ICPs in the Ruapehu region. The processes for the management of all RDC items of load are the same, but I decided to place the items of load into five strata: 1. Ruapehu DC street names A – MILL 2. Ruapehu DC street names MILM - SH 4 3. Ruapehu DC street names SH 49 – Z, and 4. Transit and other.
Area units	I created a pivot table of the roads and I used a random number generator in a spreadsheet to select a total of 23 sub-units.
Total items of load	182 items of load making up 11% of the total load were checked.

Wattages were checked for alignment with the published standardised wattage table produced by the Electricity Authority against the database or in the case of LED lights against the LED light specification.

The change management process and timeliness of database updates was evaluated.

Audit commentary

Field audit findings

A field audit was conducted of a statistical sample of 182 items of load. The "database auditing tool" was used to analyse the results, which are shown in the table below.

Result	Percentage	Comments
The point estimate of R	95.9	Wattage from survey is lower than the database wattage by 4.1%.
R_L	87.3	With a 95% level of confidence it can be concluded that the error could be between 0.0% and -12.7%.
R_H	100.0	

The variability of the sample results across the strata means that the true wattage (installed in the field) could be 0.0% to 12.7% lower than the wattage recorded in the DUML database.

These results were categorised in accordance with the "Distributed Unmetered Load Statistical Sampling Audit Guideline", effective from 01/02/19. The best available estimate is not precise enough to conclude that the database is accurate within ±5.0%.

- In absolute terms the installed capacity is estimated to be 7 kW lower than the database indicates.
- There is a 95% level of confidence that the installed capacity is between 0 and 20 kW lower than the database.
- In absolute terms, total annual consumption is estimated to be 28,100 kWh lower than the DUML database indicates.
- There is a 95% level of confidence that the annual consumption is between 0 and 86,300 kWh p.a. lower than the database indicates.

Scenario	Description
A - **Good accuracy, good precision**	This scenario applies if: (a) R_H is less than 1.05; and (b) R_L is greater than 0.95 The conclusion from this scenario is that: (a) the best available estimate indicates that the database is accurate within +/- 5 %; and (b) this is the best outcome.
B - **Poor accuracy, demonstrated with statistical significance**	This scenario applies if: (a) the point estimate of R is less than 0.95 or greater than 1.05 (b) as a result, either R_L is less than 0.95 or R_H is greater than 1.05. There is evidence to support this finding. In statistical terms, the inaccuracy is statistically significant at the 95% level
C - **Poor precision**	This scenario applies if: (a) the point estimate of R is between 0.95 and 1.05 (b) R_L is less than 0.95 and/or R_H is greater than 1.05 The conclusion from this scenario is that the best available estimate is not precise enough to conclude that the database is accurate within +/- 5 %

Light description and capacity accuracy

As discussed in **section 2.4**, one Ambius 4 LED (pole ID 1998) connected to a DUML ICP had a blank gear wattage and gear wattage description, when "no gear" and zero is expected.

14 DoC lights at Chateau Tongariro with "private" recorded as the ICP group had wattage information was missing, or invalidly recorded as zero. Alf Downs has recorded the lights in the database as private lights until investigation is completed to determine whether the lights are metered or unmetered, and the correct lamp and gear wattages.

Lamp and gear wattages were checked for alignment with the published standardised wattage table produced by the Electricity Authority, or in the case of LED lights against the LED light specification. Where lamp or gear wattage were different to the expected values for lights recorded against DUML ICPs, I confirmed that the correct gear wattages were applied with Alf Downs wherever possible. Correct wattages for the following lights could not be confirmed, and I recommend these are checked:

Pole ID	Lamp Model	Recorded wattage	Comment
1836	LED144PCS	23W lamp, 0 W gear	Believed to be Aristo IP65 lights, with expected wattage between 30 and 69W.
1117	LED144PCS	23W lamp, 0 W gear	
1980	20 LED Module	27W lamp, 0 W gear	Believed to be a CREE LED 20 XL0302D, which I could not locate specifications for.

Description	Recommendation	Audited party comment	Remedial action
Confirm light wattages	Confirm the correct wattages for the three lights with models which did not match the specifications I located, or I could not locate specifications for. Update the wattages in RAMM as necessary.	We have asked the Contractor to investigate and update the Database	Investigating

ICP number and owner accuracy

As recorded in **section 2.2**, all items of load have an ICP number recorded except:

- pole ID 2117, which had a blank ICP group; the correct ICP is 0008807442WME14, and the record was updated during the audit, and
- 20 private lights which are recorded in the database with "private" as the ICP group (2 of these are metered, and Alf Downs could not confirm whether there other 18 were metered or unmetered, or the correct load).

In **section 2.2** I have raised a recommendation to confirm the metering status of the affected lights and update the database as necessary.

Analysis of the RAMM extract found:

- ten roads with lights connected to more than one NSP; all were long rural roads or intersected with highways, and seven of the ten roads had all lights connected to NSPs within one balancing area so the ICP assignment appeared reasonable for all affected lights,
- 22 roads with lights connected to RDC and NZTA owned ICPs; all were highways or main roads running through towns or intersected with highways or main roads so the ICP assignment appeared reasonable for all affected lights.

Change management process findings

The RAMM database is managed by Alf Downs on behalf of RDC. The field work, asset data capture and database population is conducted by Alf Downs. Staff update the database from the field using Pocket RAMM.

I walked through the new connection process. New connections may be completed by the distributor, a developer, or Alf Downs with RDC's approval.

- New subdivisions are rare. Once livening has occurred an "as built" plan is provided to RDC, who then takes responsibility for the lights. RDC arrange for Alf Downs to check the lights and add them to RAMM, and Alf Downs collects the information as soon as they are able.
- Other new connections are typically completed by Alf Downs and the details are loaded into Pocket RAMM once installation is complete.

The RAMM database records light installation and replacement dates, which default to the date which the data is collected. Alf Downs does not adjust the installation and replacement dates when records are added or changed, so the date the data is collected is applied as the installation or change date. For maintenance work, RAMM is updated at the time the work is completed and the date is expected to be correct. For upgrades and new connections, data is collected after the work in the area is completed but usually within the month it was completed.

Monthly "outage patrols" are conducted by Alf Downs and the process is used to identify any incorrect wattage and location issues that may exist.

Festive lights

There are decorative lights connected to some streetlight poles on Hakiaha Street, Taumaranui. The lights are not recorded in the database. Alf Downs is not responsible for connecting or disconnecting the lights, and was unable to confirm whether they are used.

Description	Recommendation	Audited party comment	Remedial action
Decorative lights on Hakiaha Street, Taumaranui	Confirm whether the decorative lights on Hakiaha Street, Taumaranui are ever connected. If they are, include them in the database with the correct ICP numbers and develop procedures to provide on and off dates to Trustpower for submission.	We will ask our Customer if they are responsible for these lights and if they are ever livened. Depending on the response we will instigate the appropriate action. If they are not the responsibility of our customer we will pass onto the Network the information, for them to follow up.	Investigating

Private lights

There are 20 private lights recorded in the database, which are excluded from submission information.

- Two lights are located at The Lines Company's depot. Alf Downs could not confirm whether these lights were metered through the Lines Company's installation or are connected to the streetlight circuits.
- Two lights are metered through the Top 10 Holiday Park's installation, and are not part of the DUML load.
- 16 lights are owned by DoC and situated near Chateau Tongariro. DoC has asked RDC to take responsibility for the streetlights. Alf Downs has recorded the lights in the database as private lights until investigation is completed to confirm whether the lights are metered or unmetered, and the correct lamp and gear wattages.

I have raised a recommendation in **section 2.2** to confirm whether the lights at The Lines Company depot and Chateau Tongariro should be recorded against a DUML ICP, and update the database.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 3.1 With: Clause 15.2 and 15.37B(b) From: 01-Jul-20 To: 17-Jul-20	The database is not confirmed as accurate with a 95% level of confidence. Pole ID 1998 had a blank gear wattage and gear wattage description, when "no gear" and zero is expected. Pole ID 2117 had a blank ICP group, and was updated to ICP 0008807442WME14 during the audit. The installation and change dates recorded in the database reflect the date of data collection, which is not always consistent with the date that the change occurred. 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 over the database are rated as moderate. Most of the field audit accuracy issues related to one light location, and a small number of database accuracy issues were identified. The audit risk rating is low based on the volume differences identified.

Actions taken to resolve the issue	Completion date	Remedial action status
Database has been updated	28/08/2020	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
No Action required	28/08/2020	

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 the ICP has the correct profile and submission flag, and
- checking the database extract combined with the on hours against the submitted figure to confirm accuracy.

Audit commentary

Trustpower reconciles this DUML load using the STL profile, and the correct profiles and submission types are recorded on the registry.

Trustpower reconciles this DUML load using the STL profile.

- Wattages are derived from a RAMM extract provided by Alf Downs each month. The field survey found that the best available estimate of field wattage is not precise enough to conclude that the database is accurate within ±5.0% as recorded in **section 3.1**.
- On and off times are derived from a data logger.

I checked the submission calculations for June 2020, and confirmed that Trustpower's DUML volume calculation process was operating correctly. For three of the ICPs, the kW input into the calculation did not match the values provided by Alf Downs, resulting in an incorrect submission value:

ICP	kW provided by Alf Downs from RAMM	kW applied by Trustpower	kW difference	kWh difference for June 2020
0001111171WM17A	21.146	21.166	-0.02	-8.90
0001111172WMDBA	6.179	6.182	-0.003	-1.51
0008807442WME14	86.0195	86.3	-0.2805	-124.72
		Total	**-0.3035**	**-135.14**

Sources of database inaccuracy are as follows:

Issue	Estimated volume information impact (annual kWh)
Pole ID 2117 had a blank ICP group, and was updated to ICP 0008807442WME14 during the audit.	Under submission of 215.7 kWh p.a.
Pole ID 1998 had a blank gear wattage and gear wattage description, when "no gear" and zero is expected.	No impact on submission, there is a zero difference.

There are decorative lights connected to some streetlight poles on Hakiaha Street, Taumaranui. The lights are not recorded in the database. Alf Downs is not responsible for connecting or disconnecting the lights, and was unable to confirm whether they are used. I have recommended confirming whether these lights are ever used and updating the database as necessary in **section 3.1**.

There are 20 private lights recorded in the database which are excluded from submission information (of which two are metered). I have recommended confirming whether the other lights are metered or unmetered and updating the database as necessary in **section 2.2**.

On 18 June 2019, the Electricity Authority issued a memo confirming that the code requirement to calculate the correct monthly load must:

- take into account when each item of load was physically installed or removed, and
- wash up volumes must take into account where historical corrections have been made to the DUML load and volumes.

The current monthly report is provided as a snapshot and this practice is non-compliant. When a wattage is changed in the database due to a physical change or a correction, only the record present at

the time the report is run is recorded, not the historical information showing dates of changes. Trustpower has not updated their processes to be consistent with the Authority's memo.

The RAMM database records light installation and replacement dates, which default to the date which the data is collected. Alf Downs does not adjust the installation and replacement dates when records are added or changed, so the date the data is collected is applied as the installation or change date. For maintenance work, RAMM is updated at the time the work is completed and the date is expected to be correct. For upgrades and new connections, data is collected after the work in the area is completed but usually within the month it was completed.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 3.2 With: Clause 15.2 and 15.37B(c) From: 01-Jun-20 To: 30-Jun-20	The database is not confirmed as accurate with a 95% level of confidence. The wattages supplied by Alf Downs were not applied for ICPs 0001111171WM17A, 0001111172WMDBA and 0008807442WME14 for June 2020, resulting in over submission of 135 kWh. Pole ID 1998 had a blank gear wattage and gear wattage description, when "no gear" and zero is expected. Pole ID 2117 had a blank ICP group, and was updated to ICP 0008807442WME14 during the audit. The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot. The installation and change dates recorded in the database reflect the date of data collection, which is not always consistent with the date that the change occurred. Potential impact: Low Actual impact: Low Audit history: None Controls: Weak Breach risk rating: 3
Audit risk rating	**Rationale for audit risk rating**
Low	The controls over the database are rated as moderate. Most of the field audit accuracy issues related to one light location, and a small number of database accuracy issues were identified. The controls over submission are weak. Trustpower's DUML calculations operate correctly, but incorrect inputs into the calculation resulted in incorrect submission for the three of the six ICPs for June 2020. The audit risk rating is low based on the volume differences identified.

Actions taken to resolve the issue	Completion date	Remedial action status
We have updated the data, as per the EA standardised wattage table, for the three ICPs mentioned above and are working with the Contractor to look at accurately determining the Ballast of the lamps This was the reply from the contractor . *"the standard for Fluorescent lamps that you are referring to, is based on Magnetic Ballast which indicate an operating wattage of between 8-10 Watts, this is based on several variables with include supply voltage assuming 240V , lamp efficiency, Ballast efficiency therefore to assume 9 watts is a fair deal.* *However Magnetic ballast are no longer used. The fluorescent lighting in use today uses Electronic Ballasts which are more efficient, with more efficient tubes therefore the operating watts can be calculated much lower, link attached."* *https://www.xcelenergy.com/staticfiles/xe/Marketing/MN-Bus-Lighting-Input-Wattage-Guide.pdf"*	28/08/2020	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
The discrepancy is around defining the correct Ballast and we are discussing this with the Contractor to ensure us and them are in agreement	0/10/2020	

CONCLUSION

A RAMM database is managed by **Alf Downs Streetlighting Limited (Alf Downs)** on behalf of RDC. The field work, asset data capture and database population is conducted by Alf Downs. Alf Downs staff update the database from the field using Pocket RAMM.

Trustpower reconciles this DUML load using the STL profile. Wattages are derived from a RAMM extract provided by Alf Downs each month, and on and off times are derived from a data logger. I found that submission information was calculated correctly, but some incorrect kW inputs into the calculation resulted in over submission of 135 kWh for June 2020.

Database accuracy is described as follows:

Result	Percentage	Comments
The point estimate of R	95.9	Wattage from survey is lower than the database wattage by 4.1%.
R_L	87.3	With a 95% level of confidence it can be concluded that the error could be between 0.0% and -12.7%.
R_H	100.0	

The variability of the sample results across the strata means that the true wattage (installed in the field) could be 0.0% to 12.7% lower than the wattage recorded in the DUML database.

These results were categorised in accordance with the "Distributed Unmetered Load Statistical Sampling Audit Guideline", effective from 01/02/19. The best available estimate is not precise enough to conclude that the database is accurate within ±5.0%.

- In absolute terms the installed capacity is estimated to be 7 kW lower than the database indicates.
- There is a 95% level of confidence that the installed capacity is between 0 and 20 kW lower than the database.
- In absolute terms, total annual consumption is estimated to be 28,100 kWh lower than the DUML database indicates.
- There is a 95% level of confidence that the annual consumption is between 0 and 86,300 kWh p.a. lower than the database indicates.

On 18 June 2019, the Electricity Authority issued a memo clarifying the memo of 2012 that stated that a monthly snapshot was sufficient to calculate submission from, and confirmed the code requirement to calculate the correct monthly load must:

- take into account when each item of load was physically installed or removed, and
- wash up volumes must take into account where historical corrections have been made to the DUML load and volumes.

The current monthly report is provided as a snapshot and is non-compliant, and Trustpower completes revision submissions where corrections are required. Trustpower has not updated their processes to be consistent with the Authority's memo.

The future risk rating of 10 indicates that the next audit be completed in 12 months. Given that one non-compliance is already cleared, and Trustpower intends to investigate and resolve the remaining issues, I recommend that the next audit is completed in a minimum of 15 months.

PARTICIPANT RESPONSE

We believe that we have a very competent contractor who is diligently carrying out the process that are required to maintain a DUML database and ensure that we have confidence in the Data that we submit to the market. We will be clarifying with the contractor how Ballast should be applied, going forward, to ensure all parties are in agreement. All other discrepancy identified are of a minor nature and will be addressed, having minimal impact on submission volumes. The Issue of the three sets of Lights, DOC , Decorative and Lines Depot lights are not the responsibility of our Customer the Ruapheu District Council. Therefore should be excluded from our Audit for the purposes of deciding any length of time before the next Audit is required. As a responsible participant we will be proactively assisting the EA in identifying that these lights are correctly accounted for.