ELECTRICITY INDUSTRY PARTICIPATION CODE
DISTRIBUTED UNMETERED LOAD AUDIT REPORT

VERITEK

For

INVERCARGILL CITY COUNCIL AND MERCURY NZ LIMITED

Prepared by: Steve Woods

Date audit commenced: 22 June 2021

Date audit report completed: 30 June 2021

Audit report due date: 11-Aug-21

TABLE OF CONTENTS

EXECUTIVE SUMMARY

This audit of the Invercargill City Council (**ICC**) Unmetered Streetlights DUML database and processes was conducted at the request of Mercury NZ Limited (**Mercury**) 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.

ICC switched from Trustpower to Mercury on 01/03/2020. Four additional ICPs, 0008801050TPB20, 0008801051TP765, 0008803013NV255, and 0088030031NVB6F were created by ICC in November 2020 to assist with the management of the local network and NZTA networks.

Mercury use ICC's RAMM database for submission. ICC provide a monthly report to Mercury of this database. Mercury reconciles the ICC DUML load using the HHR profile in accordance with exemption 233. Wattages are derived from a RAMM database extract. On and off times are derived from a data logger.

ICC's contractor for streetlight installation and maintenance is Network Electrical Servicing.

The field audit was undertaken of a statistical sample of 439 items of load was undertaken in Invercargill on the 23rd of June 2021. This found that the database is not within the allowable +/-5% accuracy threshold and over submission is likely to be occurring as a result:

- In absolute terms the installed capacity is estimated to be 27 kW lower than the database indicates.
- There is a 95% level of confidence that the installed capacity is between 8 kW and 53 kW lower than the database.
- In absolute terms, total annual consumption is estimated to be 114,700 kWh lower than the DUML database indicates.
- There is a 95% level of confidence that the annual consumption is between 32,400 and 226,900 kWh p.a. lower than the database indicates.

The audit found four non-compliances and makes no recommendations. The future risk rating of 20 indicates that the next audit be completed in three months. I have considered this in conjunction with Mercury's responses and recommend that the next audit be in 6 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	Database is not confirmed as accurate with a 95% level of confidence. In absolute terms, total annual consumption is estimated to be 114,700 kWh lower than the DUML database indicates as recorded in **section 3.1** Incorrect ballast applied for two lamps.	Moderate	High	6	Investigating
All load recorded in database	2.5	11(2A) of Schedule 15.3	Six additional lights were found in the field.	Moderate	Low	2	Investigating
Database accuracy	3.1	15.2 and 15.37B(b)	Database is not confirmed as accurate with a 95% level of confidence. In absolute terms, total annual consumption is estimated to be 114,700 kWh lower than the DUML database indicates. Incorrect ballast applied for two lamps resulting in an estimated very minor submission of kWh per annum.	Moderate	High	6	Investigating

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)	Database is not confirmed as accurate with a 95% level of confidence. In absolute terms, total annual consumption is estimated to be 114,700 kWh lower than the DUML database indicates as recorded in **section 3.1**. Incorrect ballast applied for two lamps.	High	Moderate	6	Investigating
Future Risk Rating						20	

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	Description	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

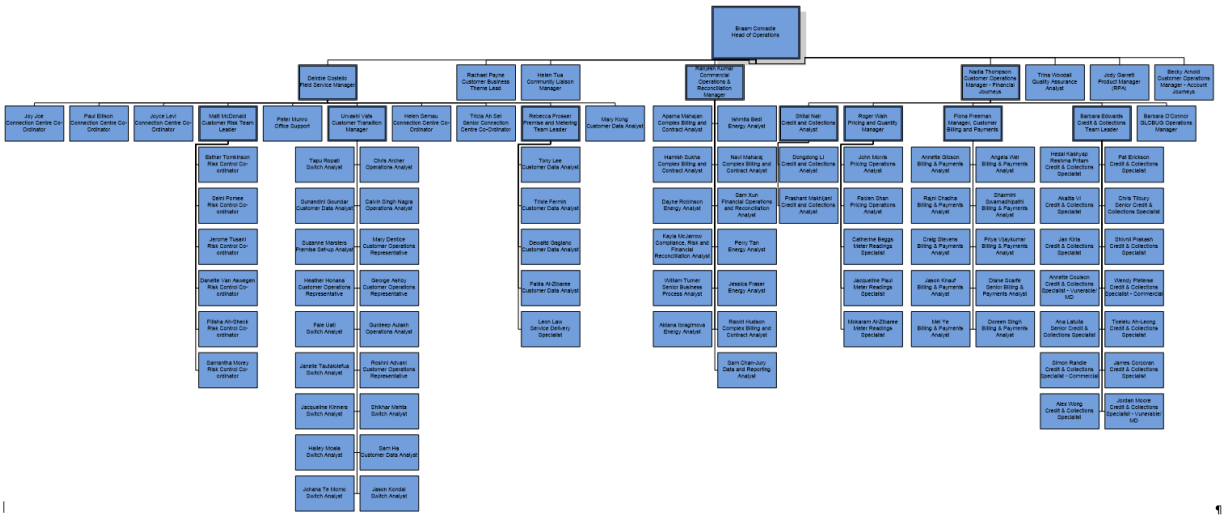
Section 11 of the Electricity Industry Act provides for the Electricity Authority to exempt any participant from compliance with all or any of the clauses.

Audit commentary

Mercury has been granted exemption No. 233. This allows them to provide half-hour ("HHR") submission information instead of non-half-hour ("NHH") submission information for distributed unmetered load ("DUML"). This exemption expires on 31 October 2023.

1.2. Structure of Organisation

Mercury provided a copy of their organisational structure:



1.3. Persons involved in this audit

Auditors:

Name	Title	Company
Steve Woods	Auditor	Veritek
Claire Stanley	Supporting Auditor	Veritek

Other personnel assisting in this audit were:

Name	Title	Company
David McCormick	Engineering Services	Invercargill City Council
Kayla McJarrow	Compliance, Risk & Financial Reconciliation Analyst	Mercury NZ Ltd

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".

ICC confirmed that 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	Number of items of load	Database wattage (watts)
0008801003TPFE8	ICC LIGHTS – TPC URBAN	INV0331	1,119	55,184
0008801013TP545	ICC LIGHTS - TPC RURAL	INV0331	99	9,202
0008803002NV4BD	ICC LIGHTS - EIL INVERCARGILL	INV0331	4673	261,477
0008803012NVE10	ICC LIGHTS - EIL INVERCARGILL	INV0331	444	19,508.4
0008801050TPB20	ICC HIGHWAY LIGHTS - TPC URBAN	INV0331	172	44,970
0008801051TP765	ICC HIGHWAY LIGHTS - TPC RURAL	INV0331	87	19,567
0008803013NV255	ICC HIGHWAY LIGHTS EIL BLUFF	INV0331	71	11,954
0088030031NVB6F	ICC HIGHWAY LIGHTS EIL INVERCARGILL	INV0331	420	119,333
Total			**7085**	**541,196**

As previously noted, the database has 1,183 items of load where the ICP is recorded as "PRIVATE". Powernet have confirmed that these are as recorded as standard or shared unmetered load against the relevant ICP and are therefore excluded from submission and the scope of this audit.

Four additional ICPs, 0008801050TPB20, 0008801051TP765, 0008803013NV255, and 0088030031NVB6F were created by ICC in November 2020 to assist with the management of the local network and NZTA networks.

1.7. Authorisation Received

All information was provided directly by Mercury and ICC.

1.8. Scope of Audit

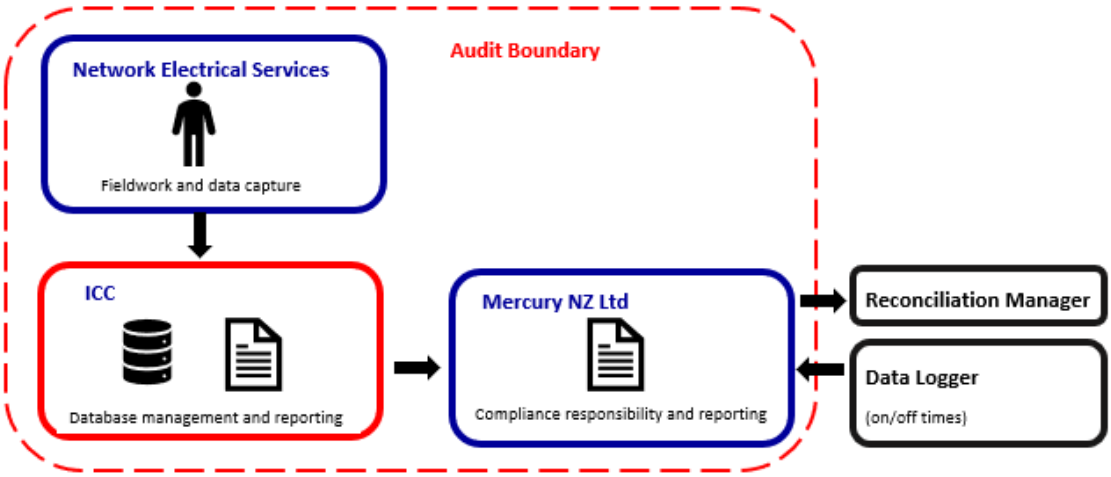
This audit of the ICC DUML database and processes was conducted at the request of Mercury, in accordance with clause 15.37B. The purpose of this audit is to verify that the volume information is being calculated accurately, and that profiles have been correctly applied.

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

Mercury use ICC's RAMM database for submission. ICC provide a monthly report to Mercury of this database. Mercury reconciles the ICC DUML load using the HHR profile in accordance with exemption 233. Wattages are derived from a RAMM database extract. On and off times are derived from a data logger.

ICC's contractor for streetlight installation and maintenance is Network Electrical Servicing.

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 ICC's premises and a field audit of 439 items of load was undertaken in Invercargill on the 23rd June 2021.

1.9. Summary of previous audit

The previous audit was undertaken by Rebecca Elliot of Veritek Limited in January 2020 for Trustpower. Five non-compliances were identified, and no recommendations were made. The status of the non-compliances and recommendation are described below.

Table of Non-Compliance

Subject	Section	Clause	Non-Compliance	Status
Deriving submission information	2.1	11(1) of Schedule 15.3	Database is not confirmed as accurate with a 95% level of confidence resulting in a minor potential under submission of 900kWh per annum as recorded in **section 3.**1.	Still existing
Location of each item of load	2.3	11(2)(b) of Schedule 15.3	Two items of load with insufficient details to locate them.	Cleared
All load recorded in database	2.5	11(2A) of Schedule 15.3	Nine additional lights were found in the field.	Still existing for different items of load
Database accuracy	3.1	15.2 and 15.37B(b)	Database is not confirmed as accurate with a 95% level of confidence. In absolute terms, total annual consumption is estimated to be 900 kWh higher than the DUML database indicates.	Still existing

Subject	Section	Clause	Non-Compliance	Status
Volume information accuracy	3.2	15.2 and 15.37B(c)	Database is not confirmed as accurate with a 95% level of confidence as recorded in **section 3.**1.	Still existing

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

Mercury 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.

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

This clause requires that the distributed unmetered load database must satisfy the requirements of schedule 15.5 regarding the methodology for deriving submission information.

Mercury reconciles this DUML load using the HHR profile in accordance with exemption 233. On and off times are derived from a data logger. Changes are tracked on a daily basis within the database. This is then multiplied by the logger hours to produce the kWh value. I confirmed the calculation for May 2021 was correct.

The current monthly report is compliant, and Mercury completes revision submissions where corrections are required.

As detailed in **section 3.1**, there are 2 items of load with the incorrect ballasts being applied, this will be resulting in an estimated very minor annual over submission of 60 kWh per annum.

The field audit found that the database was not within the allowable +/-5% accuracy threshold. In absolute terms, total annual consumption is estimated to be 114,700 kWh lower than the DUML database indicates.

The RAMM database contains a “replacement date” and a “lamp install date”. The monthly reporting includes the replacement date so that it is clear in the reporting to the trader there has been a change in the field.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.1 With: Clause 11(1) of Schedule 15.3 From: 01-Oct-19 To: 30-Jun-21	Database is not confirmed as accurate with a 95% level of confidence. In absolute terms, total annual consumption is estimated to be 114,700 kWh lower than the DUML database indicates as recorded in **section 3.**1 Incorrect ballast applied for two lamps. Potential impact: High Actual impact: High Audit history: Multiple Controls: Moderate Breach risk rating: 6
Audit risk rating	**Rationale for audit risk rating**
High	Controls are rated as moderate, as they are sufficient to mitigate the risk most of the time but there is room for improvement. The impact is assessed to be high, based on the database accuracy detailed in **section 3.1.**

Actions taken to resolve the issue	Completion date	Remedial action status
We have provided ICC with a full list of the non-compliances identified in the audit and will be working with them to ensure the issues are addressed. We will be requesting ICC to investigate the estimated over submission due to database inaccuracies and to look at process changes/improvements to assist with this and to ensure for ongoing accuracy.	Ongoing	Investigating
Preventative actions taken to ensure no further issues will occur	**Completion date**	
As above.	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 the correct ICP was recorded against each item of load.

Audit commentary

There are 1,194 items of load recorded as 'PRIVATE'. These have been confirmed as private lights with Powernet and are recorded as either shared or standard unmetered load against the relevant ICP. These are therefore excluded from this audit.

All other items of load have an ICP recorded against them.

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 fields for road name, house address, location (displacement), pole number, GPS coordinates and distance from the end of the road to assist with location.

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, and that each item of load had a value recorded in these fields.

Audit commentary

The extract provided has fields for lamp make and lamp model as well as lamp wattage, gear wattage and total wattage and all were populated.

The accuracy of the lamp description, capacity and ballasts recorded is discussed in **section 3.1**.

Audit outcome

Compliant

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 348 lights using the statistical sampling methodology. The population was divided into the following strata:

- Urban Local Authority A-G
- Urban Local Authority H-P
- Urban Local Authority Q-Z
- NZTA A-M
- NZTA N-Z.

Audit commentary

The field audit findings for the sample of lamps was accurate with the exception of the streets detailed in the table below:

Location	Database Count	Field Count	Count differences	Wattage differences	Comments
ARGYLE ST	3	4	+1		1 additional 33W LED found in the field
BRADSHAW ST	6	6		1	1 x 70W HPS recorded in the database but 1 x 22W LED found in the field
BROOKE ST	3	4	+1		1 additional 33W LED located in the field
FINDLAY RD	11	8	-3		3 x 77W LED recorded in the database not found in the field.
FLAGSTAFF RD	5	3	-2		1 x 80W MV recorded in the database but not found in the field. 1 x 21.4W LED recorded in the database but not found in the field.
FOYLE ST WEST	22	22		5	5 x 70W HPS recorded in the database but 5 x 19.9W LED found in the field.
GLOUCESTER ST	8	9	+1	1	1 x 77W HPS recorded in the database but 1 x 77w LED found in the field. 1 x 77W LED not recorded in the database found in the field.

Location	Database Count	Field Count	Count differences	Wattage differences	Comments
NORTHWOOD AVE RAB	10	10		4	4 x 70W HPS recorded in the database, but 4 x 21.4 LED found in the field
PARRETT ST	7	7		2	1 x 150W HPS recorded in the database but 1 x 19.9W LED found in the field. 1 x 70W HPS recorded in the database but 1 x 19.9W LED found in the field.
PILCHER AVE	8	8		1	1 x 40W Fluro recorded in the database but 1 x 19.9W LED found in the field.
PRESTON ST	11	12	-2	1	2 x 77W LED recorded in the database but not located in the field. 1 x 40W Fluro recorded in the database but 1 x 77W LED found in the field.
PRICE ST	5	8	+3	3	3 x additional 21.4W LED found in the field 1 x 60W Fluro recorded in the database but 1 x 21.4W LED found in the field. 2 x 70W HPS recorded in the database, but 2 x 21.4 LED found in the field
MARINE PARADE (SH1)	24	24		1	1 x 40W Fluro recorded in the database but 1 x 70W HPS located in the field.
MOTU RIMU RD	5	4	-1		1 x 250W HPS recorded in the database but not located in the field.
GRAND TOTAL	**439**	**431**	**14**	**19**	

The field audit found six additional lights in the field. This is recorded as non-compliance below.

The accuracy of the database is discussed in **section 3.1**.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.5 With: Clause 11(2A) of Schedule 15.3 From: 01-Oct-19 To: 30-Jun-21	Six additional lights were found in the field. Potential impact: Low Actual impact: Low Audit history: Three times previously Controls: Moderate Breach risk rating: 2
Audit risk rating	**Rationale for audit risk rating**
Low	The controls are rated as moderate because they ensure most information is accurate. The impact is assessed to be low based on kWh variances detailed in **section 3.1**.

Actions taken to resolve the issue	Completion date	Remedial action status
We have sent a full list of the non-compliance issues identified in the audit, to ICC. We will be working with them to ensure light discrepancies found in the field audit are investigated and corrected in the database as necessary.	Ongoing	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
We will be requesting ICC to look into how processes can be improved to ensure for an accurate database.	Ongoing	

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.

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

RAMM has 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	Invercargill City Council region
Strata	The database contains items of load in Invercargill City Council area. The processes for the management of ICC items of load are the same, but I decided to place the items of load into five strata, as follows: 1. Urban Local Authority A-G 2. Urban Local Authority H-P 3. Urban Local Authority Q-Z 4. NZTA A-M 5. NZTA N-Z.
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 66 sub-units.
Total items of load	439 items of load were checked.

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

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

Audit commentary

A field audit was conducted of a statistical sample of 439 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	95.0%	Wattage from survey is lower than the database wattage by 5.0%
R_L	90.2%	With a 95% level of confidence, it can be concluded that the error could be between -9.8.2% and -1.4%.
R_H	98.6%	

These results were categorised in accordance with the "Distributed Unmetered Load Statistical Sampling Audit Guideline", effective from 01/02/19 and the table below shows that Scenario C (detailed below) applies.

The conclusion from Scenario C is that the variability of the sample results across the strata means that the true wattage (installed in the field) could be between 1.4% and 9.8% lower than the average wattage recorded in the database. Non-compliance is recorded because the potential error is greater than +/-5.0%.

In absolute terms the installed capacity is estimated to be 27 kW lower than the database indicates.

There is a 95% level of confidence that the installed capacity is between 8 kW and 53 kW lower than the database.

In absolute terms, total annual consumption is estimated to be 114,700 kWh lower than the DUML database indicates.

There is a 95% level of confidence that the annual consumption is between 32,400 and 226,900 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 %

Lamp description and capacity accuracy

The database was checked against the published standardised wattage table, and manufacturer's specifications where available.

LED light specifications were provided in the previous audit by ICC to confirm the correct wattage and ballast is recorded in the database.

Two HPS lights were found to have the incorrect ballast applied:

Lamp model	Expected ballast	Ballast recorded	Count	Difference
Ostram POWERBALL HCI-T 70W WDL	13	20	1	-7
Philip 70W Eliptical HPS	13	20	1	-7
Totals			2	-14

The incorrect ballasts being applied will be resulting in an estimated very minor annual over submission of 60 kWh per annum.

Change management process findings

The processes were reviewed for new lamp connections and the tracking of load changes due to faults and maintenance. Fault, maintenance and LED upgrade work is completed by Network Electrical Services.

New subdivisions require a proposed plan to be provided and an "as built" plan once the development is complete. New streetlights are only electrically connected once they have been vested. When the lights are vested to the council they are added to the database.

Outage patrols are conducted by ICC for the NZTA lights covering the whole network monthly and fortnightly for pedestrian crossings. There are no outage patrols for the LED lights as the failure rate is so low.

The LED roll-out is complete by ICC, the remaining NZTA lights will be upgraded in the future. Expectation is that these will not be done within the next 3 years.

Festive lighting has been added to the RAMM database and these items are included when electrically connected in the monthly report to Mercury.

Private lights are recorded in the database for the council's reference and are the responsibility of PowerNet and are therefore not within the scope of this audit.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 3.1 With: Clause 15.2 and 15.37B(b) From: 01-Oct-19 To: 30-Jun-21	Database is not confirmed as accurate with a 95% level of confidence. In absolute terms, total annual consumption is estimated to be 114,700 kWh lower than the DUML database indicates. Incorrect ballast applied for two lamps resulting in an estimated very minor submission of kWh per annum. Potential impact: High Actual impact: High Audit history: Multiple times Controls: Moderate Breach risk rating: 6
Audit risk rating	**Rationale for audit risk rating**
High	Controls are rated as moderate, as they are sufficient to mitigate the risk most of the time but there is room for improvement. The impact is assessed to be high, based on the kWh difference described above.

Actions taken to resolve the issue	Completion date	Remedial action status
We have provided ICC with a full list of the non-compliances identified in the audit and will be working with them to ensure the issues are addressed. We will be requesting ICC to investigate the estimated over submission due to database inaccuracies and to look at process changes/improvements to assist with this and to ensure for ongoing accuracy.	Ongoing	Investigating
Preventative actions taken to ensure no further issues will occur	**Completion date**	
As above.	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 the ICP has the correct profile and submission flag; and

- checking the database extract combined with the burn hours against the submitted figure to confirm accuracy.

Audit commentary

Mercury reconciles this DUML load using the HHR profile in accordance with exemption 233. On and off times are derived from a data logger. Changes are tracked on a daily basis within the database. This is then multiplied by the logger hours to produce the kWh value. I confirmed the calculation for May 2021 was correct.

The current monthly report is compliant, and Mercury completes revision submissions where corrections are required.

As detailed in **section 3.1**, there are 2 items of load with the incorrect ballasts being applied, this will be resulting in an estimated very minor annual over submission of 60 kWh per annum.

The field audit found that the database was not within the allowable +/-5% accuracy threshold. In absolute terms, total annual consumption is estimated to be 114,700 kWh lower than the DUML database indicates.

The RAMM database contains a "replacement date" and a "lamp install date". The monthly reporting includes the replacement date so that it is clear in the reporting to the trader there has been a change in the field.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 3.2 With: Clause 15.2 and 15.37B(c) From: 01-Oct-19 To: 30-Jun-21	Database is not confirmed as accurate with a 95% level of confidence. In absolute terms, total annual consumption is estimated to be 114,700 kWh lower than the DUML database indicates as recorded in **section 3.1**. Incorrect ballast applied for two lamps. Potential impact: High Actual impact: High Audit history: Multiple times Controls: Moderate Breach risk rating: 6
Audit risk rating	**Rationale for audit risk rating**
High	Controls are rated as moderate, as they are sufficient to mitigate the risk most of the time but there is room for improvement. The impact is assessed to be high, based on the kWh difference described above
Actions taken to resolve the issue	**Completion date** / **Remedial action status**

We have provided ICC with a full list of the non-compliances identified in the audit and will be working with them to ensure the issues are addressed. We will be requesting ICC to investigate the estimated over submission due to database inaccuracies and to look at process changes/improvements to assist with this and to ensure for ongoing accuracy.	Ongoing	Investigating
Preventative actions taken to ensure no further issues will occur	**Completion date**	
As above.	Ongoing	

CONCLUSION

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

ICC switched from Trustpower to Mercury on 1/3/2020. Four additional ICPs, 0008801050TPB20, 0008801051TP765, 0008803013NV255, and 0088030031NVB6F were created by ICC in November 2020 to assist with the management of the local network and NZTA networks.

Mercury use ICC's RAMM database for submission. ICC provide a monthly report to Mercury of this database. Mercury reconciles the ICC DUML load using the HHR profile in accordance with exemption 233. Wattages are derived from a RAMM database extract. On and off times are derived from a data logger.

ICC's contractor for streetlight installation and maintenance is Network Electrical Servicing.

The field audit was undertaken of a statistical sample of 439 items of load was undertaken in Invercargill on the 23rd June 2021. This found that the database is not within the allowable +/-5% accuracy threshold and over submission is likely to be occurring as a result:

- In absolute terms the installed capacity is estimated to be 27 kW lower than the database indicates.
- There is a 95% level of confidence that the installed capacity is between 8 kW and 53 kW lower than the database.
- In absolute terms, total annual consumption is estimated to be 114,700 kWh lower than the DUML database indicates.
- There is a 95% level of confidence that the annual consumption is between 32,400 and 226,900 kWh p.a. lower than the database indicates.

The audit found four non-compliances and makes no recommendations. The future risk rating of 20 indicates that the next audit be completed in three months. I have considered this in conjunction with Mercury's responses and recommend that the next audit be in 6 months.

PARTICIPANT RESPONSE

We have provided ICC with a full list of the non-compliances identified in the audit and will be working with them to ensure the issues are addressed. We will be requesting ICC to investigate the estimated over submission due to database inaccuracies and to look at process changes/improvements to assist with this and to ensure for ongoing accuracy.