# ELECTRICITY INDUSTRY PARTICIPATION CODE
# DISTRIBUTED UNMETERED LOAD AUDIT REPORT

VERITEK

For

# INVERCARGILL CITY COUNCIL AND TRUSTPOWER LIMITED

Prepared by: Rebecca Elliot

Date audit commenced: 21 March 2019

Date audit report completed: 10 May 2019

Audit report due date: 01-Apr-19

## TABLE OF CONTENTS


Executive summary ..... 3
Audit summary ..... 4

Non-compliances ..... 4
Recommendations ..... 5
Issues 5

1. Administrative ..... 6

1.1. Exemptions from Obligations to Comply with Code ..... 6
1.2. Structure of Organisation ..... 6
1.3. Persons involved in this audit ..... 7
1.4. Hardware and Software ..... 7
1.5. Breaches or Breach Allegations ..... 7
1.6. ICP Data ..... 7
1.7. Authorisation Received ..... 8
1.8. Scope of Audit ..... 8
1.9. Summary of previous audit ..... 9
1.10. Distributed unmetered load audits (Clause 16A.26 and 17.295F) ..... 9

2. DUML database requirements ..... 11

2.1. Deriving submission information (Clause 11(1) of Schedule 15.3) ..... 11
2.2. ICP identifier and items of load (Clause 11(2)(a) and (aa) of Schedule 15.3) ..... 13
2.3. Location of each item of load (Clause 11(2)(b) of Schedule 15.3) ..... 13
2.4. Description and capacity of load (Clause 11(2)(c) and (d) of Schedule 15.3) ..... 14
2.5. All load recorded in database (Clause 11(2A) of Schedule 15.3) ..... 14
2.6. Tracking of load changes (Clause 11(3) of Schedule 15.3) ..... 17
2.7. Audit trail (Clause 11(4) of Schedule 15.3) ..... 18

3. Accuracy of DUML database ..... 19

3.1. Database accuracy (Clause 15.2 and 15.37B(b)) ..... 19
3.2. Volume information accuracy (Clause 15.2 and 15.37B(c)) ..... 21

Conclusion ..... 23

Participant response ..... 24

## EXECUTIVE SUMMARY

This audit of the Invercargill City Council (**ICC**) Unmetered Streetlights 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.

Trustpower use data from the ICC RAMM database to reconcile this load. ICC provide a monthly report to Trustpower of this database.

The field audit was undertaken of a statistical sample of 292 items of load on 9th April 2019.

The LED rollout currently underway is expected to be completed by June 2019. The incorrect ballasts found in the last audit have been addressed for all but 16 items of load.

The field audit found a relatively high error rate. I used a more recent data set post the field audit to ensure I reflected as accurate a picture as possible. The high level of error included LEDs being recorded in the database, but older lights e.g high pressure sodium lights were still present in the field. This suggests that the controls in place to ensure accurate data is captured need review. The results of the field audit have been provided to ICC for review.

The audit found five non-compliances and makes no recommendations. The future risk rating of 31 indicates that the next audit be completed in three months. I have considered this in conjunction with Trustpower's responses and recommend the next audit be in six months' time.

The matters raised are detailed below:

## AUDIT SUMMARY

### NON-COMPLIANCES

| Subject | Section | Clause | Non-Compliance | Controls | Audit Risk Rating | Breach Risk Rating | Remedial Action |
|---|---|---|---|---|---|---|---|
| Distributed unmetered load audits | 1.10 | 16A.26 | Audit not completed by the due date. | Strong | Low | 1 | Identified |
| Deriving submission information | 2.1 | 11(1) of Schedule 15.3 | The database accuracy is assessed to be 77.4% indicating a potential over submission of approximately 699,900 kWh per annum.<br>16 items of load with either an incorrect lamp description or wattage or ballast applied. | Weak | High | 9 | Identified |
| All load recorded in database | 2.5 | 11(2A) of Schedule 15.3 | Three additional lights were found in the field. | Weak | Low | 3 | Identified |
| Database accuracy | 3.1 | 15.2 and 15.37B(b) | The database accuracy is assessed to be 77.4% indicating a potential over submission of approximately 699,900 kWh per annum.<br>16 items of load with either an incorrect lamp description or wattage or ballast applied. | Weak | High | 9 | 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 accuracy is assessed to be 77.4% indicating a potential over submission of approximately 699,900 kWh per annum.<br><br>16 items of load with either an incorrect lamp description or wattage or ballast applied. | Weak | High | 9 | Identified |
| Future Risk Rating | | | | | | 31 | |

| **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

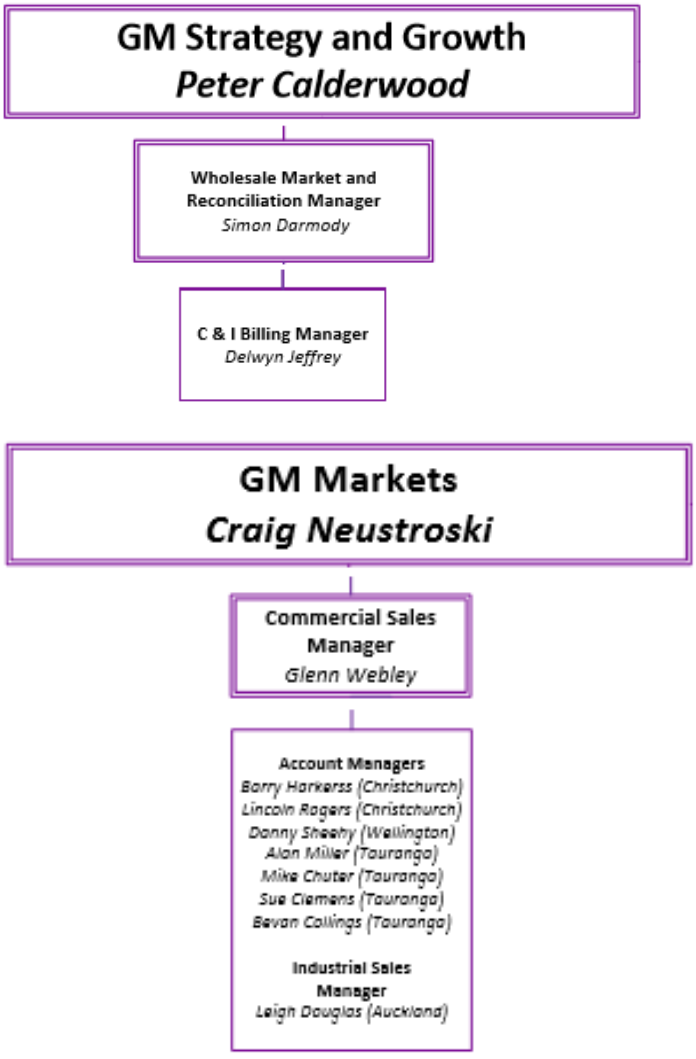
Section 11 of the Electricity Industry Act provides for the Electricity Authority to exempt any participant from compliance with all or any of the clauses.

### Audit commentary

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 |
|---|---|---|
| Russell Pearson | Roading Manager | Invercargill City Council |
| David McCormick | Engineering Services | Invercargill City Council |
| Robbie Diederen | Reconciliation Analyst | Trustpower |
| Barry Harkerss | Commercial Account Manager | 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".

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 | 1,1156 | 121,002 |
| 0008801013TP545 | ICC LIGHTS - TPC RURAL | INV0331 | 182 | 35,778 |
| 0008803002NV4BD | ICC LIGHTS - EIL INVERCARGILL | INV0331 | 5,103 | 529,664 |
| 0008803012NVE10 | ICC LIGHTS - EIL INVERCARGILL | INV0331 | 382 | 40,101 |

| ICP Number | Description | NSP | Number of items of load | Database wattage (watts) |
|---|---|---|---|---|
| **Total** | | | **6,823** | **726,545** |

I note that the database has 1,171 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. This is discussed further in **section 2.2**.

## 1.7. Authorisation Received

All information was provided directly by Trustpower and ICC.

## 1.8. Scope of Audit

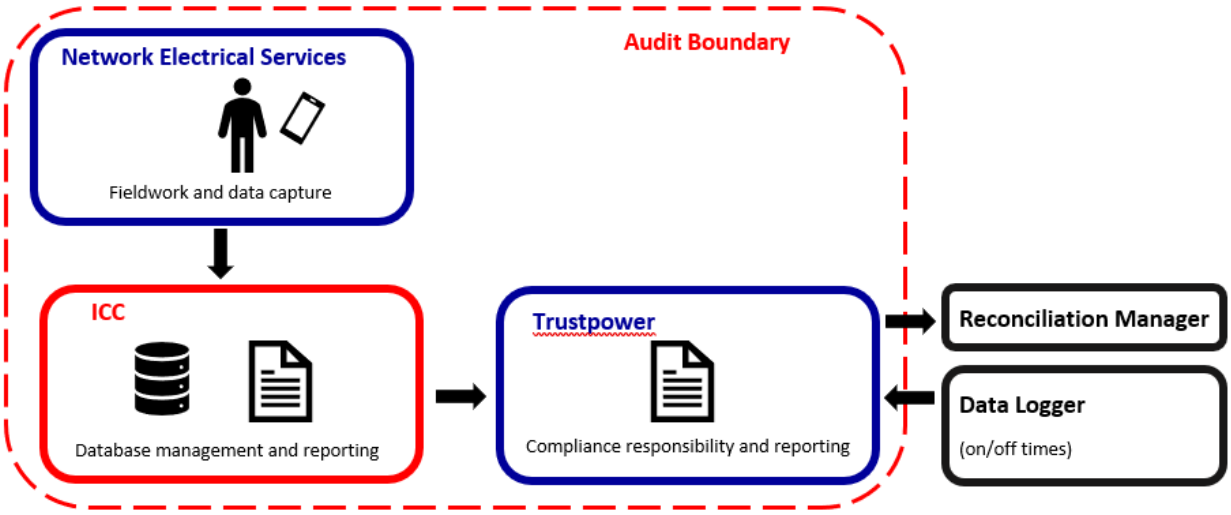
This audit of the ICC DUML database and processes was conducted at the request of Trustpower, in accordance with clause 15.37B. The purpose of this audit is to verify that the volume information is being calculated accurately, and that profiles have been correctly applied.

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

Trustpower use ICC's RAMM database for submission. ICC provide a monthly report to Trustpower of this database.

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 field audit of 292 items of load were undertaken in Invercargill on the 9th April 2019.

## 1.9. Summary of previous audit

The previous audit was undertaken by Rebecca Elliot of Veritek Limited in October 2018. Four non-compliances were identified, and one recommendation was made. The statuses 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 | The database accuracy is assessed to be 92.1% indicating an estimated under submission of 283,400 kWh per annum.<br>Incorrect wattage and ballasts in the database resulting in an estimated 10,340.5 kWh over submission. | Still existing<br>Cleared for all but 16 items of load |
| All load recorded in database | 2.5 | 11(2A) of Schedule 15.3 | One 70W HPS lamp located on McQuarrie Street that is not included in the database. | Still existing |
| Database accuracy | 3.1 | 15.2 and 15.37B(b) | The database accuracy is assessed to be 92.1% indicating an estimated under submission of 283,400 kWh per annum.<br>Database inaccuracies amount to an estimated 10,340.5 kWh over submission. | Still existing |
| Volume information accuracy | 3.2 | 15.2 and 15.37B(c) | Incorrect database wattage and ballast values amount to an estimated 10,340.5 kWh over submission.<br>The database accuracy is assessed to be 92.1% indicating an estimated under submission of 283,400 kWh per annum. | Still existing |

### Table of Recommendations

| Subject | Section | Recommendation for Improvement | Status |
|---|---|---|---|
| ICP Identifier | 2.2 | Liaise with PowerNet to confirm these are private lights and not incorrectly recorded as private. | Cleared |

## 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. This was not completed by the deadline of 1 April 2019, due to late provision of audit information from ICC.

### Audit outcome

Non-compliant

| Non-compliance | Description |
|---|---|
| Audit Ref: 1.10<br>Clause 16A.26<br><br><br>From: 01-Apr-19<br>To: 09-May-19 | Audit not completed by the due date.<br><br>Potential impact: Low<br>Actual impact: Low<br>Audit history: None<br>Controls: Strong<br>Breach risk rating: 1 |
| **Audit risk rating** | **Rationale for audit risk rating** |
| **Low** | The controls are rated as strong, as Trustpower have good controls in place to ensure DUML audits are completed within the required timeframe but are reliant on the council to provide information which despite multiple requests was not received in sufficient time causing the audit to be deferred.<br>The impact is assessed to be low, as this has no direct impact on reconciliation. |

| Actions taken to resolve the issue | Completion date | Remedial action status |
|---|---|---|
| Have spoken to ICC about the timely suppling of the DB for the Audit purpose. They were under the understanding that the Auditors would get that from Trustpower | 22 May 2019 | Identified |
| **Preventative actions taken to ensure no further issues will occur** | **Completion date** | |
| We are happy that this wouldn't happen again as per above comments | | |

## 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**

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

I recalculated the submissions for February 2019 for using the data logger and database information. I confirmed that the calculation method was correct.

In the last audit, Trustpower advised that an issue with GTV was discovered that had affected revision 1 of their September submission. I confirmed that the corrected values were used for revision 3.

There is some inaccurate data within the database used to calculate submissions. This is recorded as non-compliance and discussed in **sections 3.1** and **3.2**.

| Issue | Volume information impact (annual kWh) |
|---|---|
| Potential over submission due to database inaccuracy | 699,900 kWh over submission |

**Audit outcome**

Non-compliant

| Non-compliance | Description |
|---|---|
| Audit Ref: 2.1<br>With: Clause 11(1) of Schedule 15.3<br><br>From: 23-Mar-18<br>To: 05-Oct-18 | The database accuracy is assessed to be 77.4% indicating a potential over submission of approximately 699,900 kWh per annum.<br>16 items of load with either an incorrect lamp description or wattage or ballast applied.<br>Potential impact: High<br>Actual impact: High<br>Audit history: Twice<br>Controls: Weak<br>Breach risk rating: 9 |
| **Audit risk rating** | **Rationale for audit risk rating** |
| **High** | The controls are rated as weak as the level of error found in the field indicates that quality controls in place do not ensure an acceptable level of accuracy.<br>The impact is assessed to be high, based on the kWh differences described above. |

| Actions taken to resolve the issue | Completion date | Remedial action status |
|---|---|---|
| This audit has identified a failure in the data updating process which should have been identified by Council.<br><br>The flow of information from the field, being the actual pole number, date and fitting name etc is correct. The bulk load process into RAMM appears to have some process error in a particular month. | 30 Jun 2019 | Identified |
| **Preventative actions taken to ensure no further issues will occur** | **Completion date** | |
| Review the data provided from the field and validate the pole numbers are in database so when the import occurs there is a 1 to 1 relationship.<br>Have additional QA process to reconcile the field payment with the actual number of fittings updated into RAMM. ( ie balance the contractor payment with the changes into the database<br>Recheck the final output ( which is sent to Trust Power) to ensure those updates are in the billing data<br>Reconcile as a total the number of installs with the number in database and maintain ongoing, checking inventory.<br>Produce visual map of upgrades vs existing fittings so see any issues.<br>Undertake field checks of all non LED lights<br>Undertake ICC random audits to verify accuracy. | 30 Jun 2019 | |

## 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 1,171 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 and GPS coordinates to assist with location.

All items have the road name field populated in addition to one or more, often all, of the other location fields.

**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 280 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 |
|---|---|---|---|---|---|
| CRINAN ST (5306) | 35 | 35 | | 26 | 26x incorrect wattages recorded e.g. database recorded as 77W but 21.4W found in the field. |
| DEVERON ST (5320) | 18 | 16 | -2 | 16 | 2x 250W HPS not found in the field.<br>16x 250W HPS replaced with 77W LED. |
| FLORA RD EAST (5209) | 4 | 3 | -1 | | 1x 80W MV not found in the field. |
| KOWHAI AVE (5449) | 7 | 7 | | 1 | 1x 21.4W LED recorded in the database but 70W HPS found in the field. |
| LAYARD ST (5457) | 42 | 42 | | 4 | All recorded as LED but 4x pedestrian crossings still with HPS or similar lights. |
| LEITH ST (5460) | 8 | 8 | | 1 | 1x 70W HPS recorded in the database. 21.4W LED found in the field. |
| LITHGOW PL WEST (5469) | 2 | 2 | | 1 | 1x 70W HPS recorded in the database. 21.4W LED found in the field. |
| METZGER ST (5503) | 23 | 23 | | 4 | 2x pedestrian crossing lights recorded as LED but HPS or similar found in the field.<br>2x HPS lights recorded in the database but LED found in the field. |
| MIROMIRO WWAY (5885) | 1 | 1 | | 1 | 1x 21.4 LED recorded in the database. 70W HPS found in the field. |
| PERTH ST (5546) | 6 | 6 | | 1 | 1x 70W HPS recorded in the database. 21.4W LED found in the field. |
| PILCHER AVE (1860) | 5 | 7 | +2 | 4 | 2x extra 70W HPS found in the field.<br>4x incorrect wattages found. |
| TAY ST NORTH (SH1) (2) (5776) | 6 | 4 | -2 | | 2x HPS not found in the field. |
| RACECOURSE RD EAST (5561 & 5576) | 17 | 17 | | 2 | 2x 250W HPS recorded in the database but 21.4W LED found in the field. |
| ROCKDALE RD (5099) | 1 | 1 | -4<br>+1 | 3 | 4x 77W LKED not found in the field.<br>1x extra 250W HPS found in the field. |

| Location | Database Count | Field Count | Count differences | Wattage differences | Comments |
|---|---|---|---|---|---|
| | | | | | 3x 80W MV recorded in the database. 77W LED found in the field. |
| WAIHOPAI ST (5656) | 9 | 7 | -2 | | 2x 21.4 LED not found in the field. |
| **GRAND TOTAL** | **292** | **284** | **14** | **64** | |

I checked the field audit against a more recent data extract to ensure that only those variances found had been present for more than one month. The field audit found three additional lights in the field. This is recorded as non-compliance below.

11 lights were not found in the field. There were 64 lamp wattage discrepancies found and I note seven of these were where older lights types e.g. HPS were recorded as LED in the database. These were found in Kowhai Avenue, Layard Street, Metzger Street and Miromiro walkway. The accuracy of the database is discussed in **section 3.1**.

### Audit outcome

Non-compliant

| Non-compliance | Description |
|---|---|
| Audit Ref: 2.5<br>With: Clause 11(2A) of Schedule 15.3<br><br>From: 08-Oct-18<br>To: 31-Mar-19 | Three additional lights were found in the field.<br>Potential impact: Medium<br>Actual impact: Low<br>Audit history: Once<br>Controls: Weak<br>Breach risk rating: 3 |
| **Audit risk rating** | **Rationale for audit risk rating** |
| **Low** | The controls are rated as weak as the level of error found in the field indicates that quality control in relation to what is entered into the database and what is in the field is not identifying discrepancies.<br>The impact is assessed to be low based on small number of additional lights found in the field compared to the overall sample checked. |

| Actions taken to resolve the issue | Completion date | Remedial action status |
|---|---|---|
| This result is over emphasised as the same input error is repeated 25 and 16 times. This makes the overall result look much worse than the actual update error which has been identified earlier | 22nd May 2019 | Identified |
| **Preventative actions taken to ensure no further issues will occur** | **Completion date** | |
| Following this audit ICC has instigated their own audit process because they have all the checks in place but had not had any one person check that they all application were carried out | 30th June 2019 | |

## 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 20th September 2012, the Authority sent a memo to Retailers and auditors advising that tracking of load changes at a daily level was not required, as long as 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 tracks additions and removals as required by this clause.

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 about every six weeks and fortnightly for pedestrian crossings. There are no outage patrols for the LED lights as the failure rate is so low.

The LED replacement project currently underway is expected to be completed by June 2019. As part of the replacement project, the entire database is being reviewed – lamp types and wattage, pole numbers, positioning etc. The level of error found in the field audit indicates that the controls in place to ensure data entered is poor. Changes are endeavoured to be made to the database by the 25th of the month so they can be included in the monthly report. The accuracy of the database is discussed in **section 3.1**.

There is a dimming trial under way, but this is on a specific metered ICP and there are no immediate plans to introduce dimming on the rest of the network.

Festive lights are connected to a metered circuit therefore they were not examined.

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

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.<br>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:<br>1. Urban Local Authority A-G<br>2. Urban Local Authority H-P<br>3. Urban Local Authority Q-Z<br>4. NZTA A-M<br>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 34 sub-units or 4% of the total database wattage. |
| Total items of load | 292 items of load were checked. |

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

**Audit commentary**

The results of the field audit are detailed in **section 2.5**.

A statistical sample of 292 items of load found that the field data was 77.4% of the database data for the sample checked. This is outside the +/- 5% acceptable database variance. The statistical sampling tool reported with 95% confidence the precision of the sample was 16.3% and the true load in the field will be between 67.6% to 83.9% of the load recorded in the database. The sample is not sufficiently precise due to the inaccuracy of the data to be able to determine the database accuracy but indicates that the database is likely to be over submitting.

The tool indicated that there is potentially 699,900 kWh per annum (based on annual burn hours of 4,271 as detailed in the DUML database auditing tool) of over submission. The statistical sampling tool reported with 95% confidence that there is a potential estimated submission variance range of between 1,004,500 kWh and 501,100 kWh per annum over submission.

It appears that the accuracy of the database has declined since the last audit. Some of the variances found will be due to the current LED roll out but as detailed in **section 2.5**, the accuracy of the data being entered in the field appears to be relatively poor and the controls in place to ensure good data accuracy weak. The estimated over submission is recorded as non-compliance below.

Wattages for all items of load were checked against the published standardised wattage table produced by the Electricity Authority. The accuracy of the lamp ballasts has improved during the audit period and I found all were correct with the exception of 16 items of load as detailed in the table below:

| Incorrect lamp wattages and ballasts | Volume information impact (annual kWh) |
|---|---|
| 14 x Philip 80W Eliptical HPS | No such light- these likely to be metal halide. If this is correct, then the ballast being added is correct |
| 1 x 70W HPS have a total wattage of 90W and not the correct 83W | 30 kWh over submission |
| 1 x Radium 100W Tubular MH has no ballast but should have 14W ballast | 60 kWh under submission |

This is also recorded as non-compliance in **sections 2.1** and **3.2**.

**Audit outcome**

Non-compliant

| Non-compliance | Description |
|---|---|
| Audit Ref: 3.1<br>With: Clause 15.2 and 15.37B(b)<br><br>From: 08-Oct-18<br>To: 31-Mar-19 | The database accuracy is assessed to be 77.4% indicating a potential over submission of approximately 699,900 kWh per annum.<br>16 items of load with either an incorrect lamp description or wattage or ballast applied.<br>Potential impact: High<br>Actual impact: High<br>Audit history: Twice<br>Controls: Weak<br>Breach risk rating:9 |
| **Audit risk rating** | **Rationale for audit risk rating** |
| **High** | The controls are rated as weak as the level of error found in the field indicates that quality controls in place do not ensure an acceptable level of accuracy.<br>The impact is assessed to be high, based on the kWh differences described above. |

| Actions taken to resolve the issue | Completion date | Remedial action status |
|---|---|---|
| Have discussed with ICC and they will check and correct the DB | 22nd May 2019 | Identified |
| **Preventative actions taken to ensure no further issues will occur** | **Completion date** | |
| ICC will check complete DB for such issues | 30th June 2019 | |

## 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

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

I recalculated the submissions for February 2019 for using the data logger and database information. I confirmed that the calculation method was correct.

As detailed in **section 2.1**, In the last audit, Trustpower advised that an issue with GTV was discovered that had affected revision 1 of their September submission. I confirmed that the corrected values were used for revision 3.

There is some inaccurate data within the ICC's database used to calculate submissions. This is recorded as non-compliance and detailed in **sections 2.1**, **2.5** and **3.1**.

**Audit outcome**

Non-compliant

| Non-compliance | Description |
|---|---|
| Audit Ref: 3.2<br>With: Clause 15.2 and 15.37B(c)<br><br>From: entire audit period | The database accuracy is assessed to be 77.4% indicating a potential over submission of approximately 699,900 kWh per annum.<br>16 items of load with either an incorrect lamp description or wattage or ballast applied.<br>Potential impact: High<br>Actual impact: High<br>Audit history: Twice<br>Controls: Weak<br>Breach risk rating: 9 |
| **Audit risk rating** | **Rationale for audit risk rating** |
| **High** | The controls are rated as weak as the level of error found in the field indicates that quality controls in place do not ensure an acceptable level of accuracy.<br>The impact is assessed to be high, based on the kWh differences described above. |

| Actions taken to resolve the issue | Completion date | Remedial action status |
|---|---|---|
| Have discussed with ICC | 22nd May 2019 | Identified |
| **Preventative actions taken to ensure no further issues will occur** | **Completion date** | |
| As ICC is nearing the completion of the complete up-grade of the entire lighting system to LED. There was always going to be some errors from getting field information to the DB. They have checks all along the path but had no one person checking these against each other to see if they all agreed, which they don't. The individual checks such as the contractor have to book each fitting out of a store and then account for the installation of the fitting before getting paid is now being checked as well as the entering such information into their DB in a timely manner to meet with the monthly reporting to TP. They are expecting to have the LED roll out completed by 30th June. They are then setting up a process to check the field changes against the DB so both will align. | 30 June 2019 | |

## CONCLUSION

Trustpower use data from the ICC RAMM database to reconcile this load. ICC provide a monthly report to Trustpower of this database.

The field audit was undertaken of a statistical sample of 292 items of load on 9th April 2019.

The LED rollout currently underway is expected to be completed by June 2019. The incorrect ballasts found in the last audit have been addressed for all but 16 items of load.

The field audit found a relatively high error rate. I used a more recent data set post the field audit to ensure I reflected as accurate a picture as possible. The high level of error included LEDs being recorded in the database, but older lights e.g high pressure sodium lights were still present in the field. This suggests that the controls in place to ensure accurate data is captured need review. The results of the field audit have been provided to ICC for review.

The audit found five non-compliances and makes no recommendations. The future risk rating of 31 indicates that the next audit be completed in three months. I have considered this in conjunction with Trustpower's responses and recommend the next audit be in six months' time.

## PARTICIPANT RESPONSE

Trustpower have reviewed this report and have provided their comments in the body of the report. No further comments were provided.