

ELECTRICITY INDUSTRY PARTICIPATION CODE  
DISTRIBUTED UNMETERED LOAD AUDIT REPORT

VERITEK

For

CHRISTCHURCH CITY COUNCIL  
UNMETERED TRAFFIC LIGHTS  
AND CONTACT ENERGY LIMITED  
NZBN:9429038549977

Prepared by: Steve Woods

Date audit commenced: 9 February 2023

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Audit report due date: 18 April 2023

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## EXECUTIVE SUMMARY

This audit of the **Christchurch City Council's Christchurch Transport Operation Centre (CTOC)** Unmetered Traffic Light DUML database and processes was conducted at the request of **Contact Energy Limited (Contact)**, 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.

Traffic light data is maintained in RTOAD (Real Time Operations Asset Database) by CTOC. RTOAD records the quantity of each equipment type, including vehicle lanterns of various types and wattages, pedestrian lanterns of various types and wattages, illuminated signs, speed zone signs and traffic safety cameras at each intersection. The wattage for each item is multiplied by the estimated number of hours on per day, power level, and kW per hour to give a daily kWh value.

The profile for ICP 0000298513MPF38 was backdated to RPS UML on 23/03/22 with a backdated effective date of 29/12/21 as there is metered and unmetered load associated with this ICP. During the audit period Contact have been able to determine which items of load are on the metered and unmetered load circuits and the unmetered load has been adjusted accordingly.

Review of the code wording states that only unmetered load should be associated with a DUML ICP:

**distributed unmetered load** means **unmetered load** with a single **profile** supplied across more than 1 **point of connection** to either 1 customer of a **retailer** or to 1 **direct purchaser**

Clause 1.1(1) **distributed unmetered load**: amended, on 1 November 2018, by clause 4(2) of the Electricity Industry Participation Code Amendment (Code Review Programme) 2018.

Therefore, a new ICP for the metered load must be created. This has no impact on reconciliation accuracy but is recorded as non-compliance below.

The profile for ICP 0007102604RN9FD was backdated to RPS UML 09/05/22 with an effective date of 01/10/20. A meter was installed on 01/10/20 but it is unclear what is being read by the meter and what is on the unmetered circuit. Contact have tried working with the MEP but have been unable to resolve this. Therefore, there is likely to be over submission occurring, but I am not able to determine the volumes associated with this. This is recorded as non-compliance.

As stated for ICP 0000298513MPF38, a new ICP is required for the metered load associated with ICP 0007102604RN9FD as a DUML ICP cannot have both metered and unmetered load associated. This is recorded as non-compliance below.

The field audit confirmed that the database accuracy fell within the allowable thresholds.

Six non-compliances were identified, and this audit makes no recommendations. The future risk rating of 11 indicates that the next audit be completed in 12 months. I have considered this in conjunction with Contact's comments. I recommend that the next audit be in 12 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	<p>Two DUML ICPs with metered load associated.</p> <p>Over submission occurring as both metered and unmetered load are being submitted for the same items of load. The quantity is unable to be determined as the items of load being measured by the meter are unknown.</p> <p>Daily kWh information for PedCams was not included in the daily calculations for 74 sites, and one set of traffic lights, resulting in under submission of an estimated 4,260 kWh per annum.</p> <p>The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot.</p>	Moderate	Low	2	Investigating
Description and Capacity of load	2.4	11(2)(c) and (d) of Schedule 15.3	One item of load does not have any equipment type associated to the site name, to indicate the vehicle lantern type and wattage.	Strong	Low	1	Identified
All load recorded in database	2.5	11(2A) of Schedule 15.3	Two additional items of load found in the field of 100 items of load sampled.	Strong	Low	1	Identified
Audit trail	2.7	11(4) of Schedule 15.3	No audit trail of changes made in the access database.	Weak	Low	3	Identified

Subject	Section	Clause	Non-Compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
Database accuracy	3.1	15.2 and 15.37B(b)	Daily kWh information for PedCams was not included in the daily calculations for 74 sites, and one set of traffic lights, resulting in under submission of an estimated 4,260 kWh per annum.	Moderate	Low	2	Identified
Volume information accuracy	3.2	15.2 and 15.37B(c)	<p>Two DUML ICPs with metered load associated.</p> <p>Over submission occurring as both metered and unmetered load are being submitted for the same items of load. The quantity is unable to be determined as the items of load being measured by the meter are unknown.</p> <p>Daily kWh information for PedCams was not included in the daily calculations for 74 sites, and one set of traffic lights, resulting in under submission of an estimated 4,260 kWh per annum.</p> <p>The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot.</p>	Moderate	Low	2	Investigating
<b>Future Risk Rating</b>						<b>11</b>	

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

## RECOMMENDATIONS

Subject	Section	Recommendation
		Nil

## ISSUES

Subject	Section	Description	Issue
		Nil	

# 1. ADMINISTRATIVE

## 1.1. Exemptions from Obligations to Comply with Code

### Code reference

Section 11 of Electricity Industry Act 2010.

### Code related audit information

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

### Audit observation

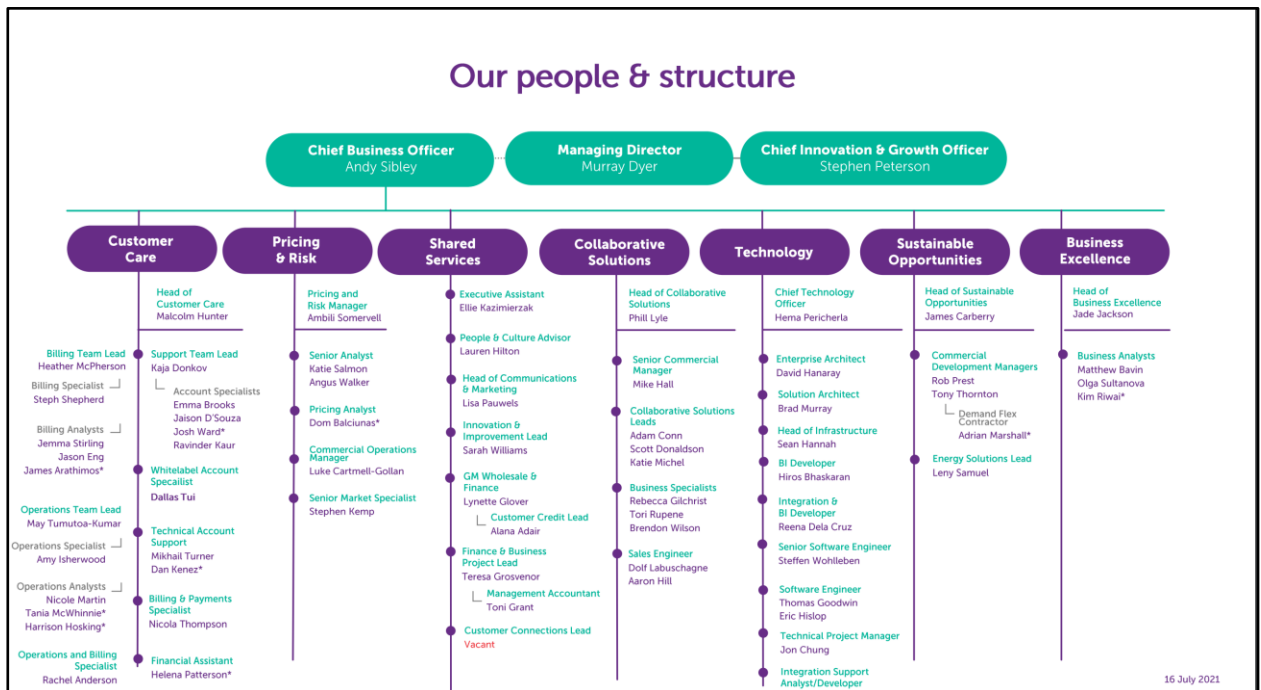
The Electricity Authority’s website was reviewed to identify any exemptions relevant to the scope of this audit.

### Audit commentary

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

## 1.2. Structure of Organisation

Contact Energy provided a copy of their organisational structure.



### 1.3. Persons involved in this audit

Auditors:

Name	Company	Role
Steve Woods	Veritek Limited	Lead Auditor
Claire Stanley	Veritek Limited	Supporting Auditor

Other personnel assisting in this audit were:

Name	Title	Company
Vanessa Nuttall	Real Time Operations Engineer	Christchurch Transport Operation Centre – Christchurch City Council
Luke Cartmell-Gollan	Commercial Operations Manager	Contact Energy
Dallas Tui	White Label Account Specialist	Contact Energy

### 1.4. Hardware and Software

Traffic light data is maintained in RTOAD Access database by CTOC. Backup and restoration procedures are in accordance with normal industry protocols.

A copy of the traffic light asset information is also maintained within RAMM. RAMM is periodically reconciled for RTOAD to ensure that it holds all traffic light information.

Systems used by the trader to calculate submissions are assessed as part of their reconciliation participant audits.

### 1.5. Breaches or Breach Allegations

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



## 1.6. ICP Data

The following ICPs are relevant to the scope of this audit. The database expresses the wattage as kWh per day.

ICP Number	Description	NSP	Profile	Number of sites	Database kWh per day
0007102602RN872	Ref Orion_Bromley 66kV GXP Traffic Lights	BRY0661	UML	70	407.88
0007102603RN437	Ref Orion_Islington 33kV GXP Traffic Lights	ISL0331	UML	19	146.03
0007102604RN9FD	Ref Orion_Islington 66kV GXP Traffic Lights	ISL0661	RPS UML	315	2,105.4
0000298513MPF38	TRAFFIC LIGHTS OFF RAMP	KAI0111	RPS UML	2	0.24
<b>Total</b>				<b>406</b>	<b>2,659.55</b>

## 1.7. Authorisation Received

All information was provided directly by Contact or the CTOC.

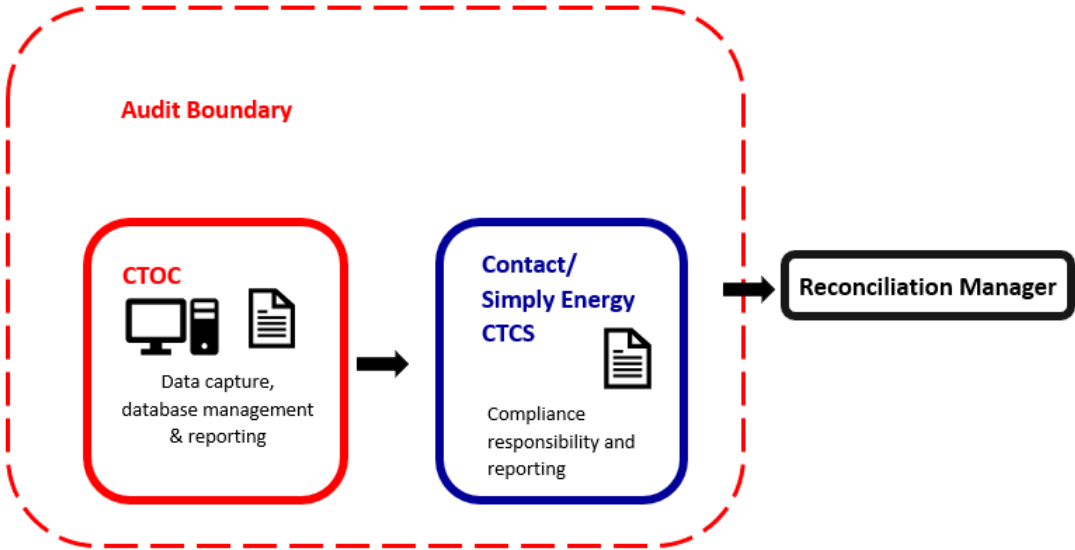
## 1.8. Scope of Audit

This audit of the CTOC DUML database and processes was conducted at the request of Contact 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.

Traffic light data is maintained in RTOAD (Real Time Operations Asset Database) database by CTOC. RTOAD records the quantity of each equipment type, including vehicle lanterns of various types and wattages, pedestrian lanterns of various types and wattages, illuminated signs, speed zone signs and traffic safety cameras at each intersection. The wattage for each item is multiplied by the estimated number of hours on per day, power level, and kW per hour to give a daily kWh value. The hours and power level are based on historic metering information, from when a sample of lights were metered to determine these values.

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 field audit was undertaken of a statistical sample of 100 sites on 20 February 2023.

**1.9. Summary of previous audit**

Contact provided a copy of the last audit report undertaken by Rebecca Elliot of Veritek Limited, completed in April 2022. The table below records the findings.

**Table of Non-compliance**

Subject	Section	Clause	Non-compliance	Status
Deriving submission information	2.1	11(1) of Schedule 15.3	Metered volume missing from the November submission and the unmetered volume is missing from the January 2022 submission.	Cleared
			The database contained missing daily kWh information for one set of traffic lights, resulting in minor under submission of an estimated 2,964 kWh per annum.	Cleared
			The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot.	Still existing
Location of each item of load	2.4	11(2)(b) of Schedule 15.3	One item of load does not have any equipment type associated to the site name, to indicate the vehicle lantern type and wattage.	Cleared
Audit trails	2.6	11(4) of Schedule 15.3	No audit trail of changes made in the access database.	Still existing
Database accuracy	3.1	15.2 and 15.37B(b)	The database contained some incorrect daily kWh information, resulting in minor under submission of an estimated 2,964 kWh per annum.	Cleared

Subject	Section	Clause	Non-compliance	Status
Volume information accuracy	3.2	15.2 and 15.37B(c)	Metered volume missing from the November submission and the unmetered volume is missing from the January 2022 submission.	Cleared
			The database contained missing daily kWh information for one set of traffic lights, resulting in minor under submission of an estimated 2,964 kWh per annum.	Cleared
			The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot.	Still existing

Subject	Section	Recommendation	Status
Incorrect submission volumes	2.1	Investigate the metered volumes that are missing from the November 2021 submission and the unmetered volume missing from the January 2022 submission.	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

Contact 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

RTOAD records the quantity of each equipment type, including vehicle lanterns of various types and wattages, pedestrian lanterns of various types and wattages, illuminated signs, speed zone signs and traffic safety cameras at each intersection. CCC provided the usage calculation formulas used. The wattage for each item is multiplied by the estimated number of hours on per day, power level, and kW per hour to give a daily kWh value.

The load is submitted as NHH using the UML profile for ICPs 0007102602RN872 and 007102603RN437. I checked the submission for these ICPs for the month of January 2023 and confirmed that the volumes were correctly calculated.

The profile for ICP 0000298513MPF38 was backdated to RPS UML on 23/03/22 with a backdated effective date of 29/12/21 as there is metered and unmetered load associated with this ICP. During the audit period Contact have been able to determine which items of load are on the metered and unmetered load circuits and the unmetered load has been adjusted accordingly.

Review of the code wording states that only unmetered load should be associated with a DUML ICP:

**distributed unmetered load** means **unmetered load** with a single **profile** supplied across more than 1 **point of connection** to either 1 customer of a **retailer** or to 1 **direct purchaser**

Clause 1.1(1) **distributed unmetered load**: amended, on 1 November 2018, by clause 4(2) of the Electricity Industry Participation Code Amendment (Code Review Programme) 2018.

Therefore, a new ICP for the metered load must be created. This has no impact on reconciliation accuracy but is recorded as non-compliance below.

The profile for ICP 0007102604RN9FD was backdated to RPS UML 09/05/22 with an effective date of 01/10/20. A meter was installed on 01/10/20 but it is unclear what is being read by the meter and what is on the unmetered circuit. Contact have tried working with the MEP but have been unable to resolve this. Therefore, there is likely to be over submission occurring, but I am not able to determine the volumes associated with this. This is recorded as non-compliance.

As stated for ICP 0000298513MPF38, a new ICP is required for the metered load associated with ICP 0007102604RN9FD as a DUML ICP cannot have both metered and unmetered load associated. This is recorded as non-compliance below.

The field audit confirmed that the database accuracy fell within the allowable thresholds.

As detailed in **section 3.1**, analysis of the database found daily kWh information was not included in the daily calculations for PedCams for 74 sites, and for one set of traffic lights, resulting in under submission of an estimated 4,260 kWh per annum.

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 data supplied to Contact each month is based on a snapshot from RTOAD and does not achieve compliance with the requirements above.

**Audit outcome**

Non-compliant

Non-compliance	Description		
<p>Audit Ref: 2.1</p> <p>With: Clause 11(1) of Schedule 15.3</p> <p>From: 8 March 2022</p> <p>To: 17 February 2023</p>	<p>Two DUMML ICPs with metered load associated.</p> <p>Over submission occurring as both metered and unmetered load are being submitted for the same items of load. The quantity is unable to be determined as the items of load being measured by the meter are unknown.</p> <p>Daily kWh information for PedCams was not included in the daily calculations for 74 sites, and one set of traffic lights, resulting in under submission of an estimated 4,260 kWh per annum.</p> <p>The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot.</p> <p>Potential impact: Low</p> <p>Actual impact: Low</p> <p>Audit history: Multiple times previously</p> <p>Controls: Moderate</p> <p>Breach risk rating: 2</p>		
Audit risk rating	Rationale for audit risk rating		
<b>Low</b>	<p>The controls are rated as moderate because they ensure most information is accurate.</p> <p>The impact is assessed to be low as the discrepancy found will only have a minor effect on submission.</p>		
Actions taken to resolve the issue		Completion date	Remedial action status
<p>CCC working with Orion &amp; MEP to confirm location of meter at 0007102604RN9FD.</p> <p>NZTA are due to take responsibility for the last remaining 2 unmetered assets at 0000298513MPF38 by 30 June 2023, at which point 0000298513MPF38 will be a metered ICP.</p> <p>CCC have added daily kWh info for PedCams.</p> <p>CCC currently using Access database, will be moving all records to RAMM database within 12 months and they will then have the functionality available to track changes and view audit trails</p>		<p>30 June 2023</p> <p>May 2024</p>	Investigating
Preventative actions taken to ensure no further issues will occur		Completion date	

## 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 DUMML database must contain:

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

#### **Audit observation**

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

#### **Audit commentary**

All items of load have an ICP recorded.

#### **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**

All items of load have a site name recorded which includes the location and GPS coordinates for most items of load. 45 school speed signs do not have the GPS co-ordinates recorded; however, the signs all have a school name and a street name recorded in the site name field, which ensures they are locatable. There can be between two, and ten speed signs around a school at various locations, these are recorded as one site in RTOAD.

#### **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 contains load types and capacities.

#### **Audit commentary**

RTOAD records the quantity of each equipment type, including vehicle lanterns of various types and wattages, pedestrian lanterns of various types and wattages, illuminated signs, speed zone signs and traffic safety cameras at each intersection. The wattage for each item is multiplied by the estimated number of hours on per day, power level, and kW per hour to give a daily kWh value. The hours and

power level are based on historic metering information, from when a sample of lights were metered to determine these values.

The capacity in watts is recorded in the database as part of the daily kWh calculation and is also set out in the CTOC Traffic Signal Database Traffic Signal Power Calculation Formula document.

All items of load have site units per day recorded, except one item of load that does not have any equipment type associated to the site name that would indicate the vehicle lantern type and wattage. The wattage value is required to calculate the daily site units. The site only has the controller charge applied.

SiteName	NumPwrCons	ContType	IntUnitsPerDay
Hawkins/Lower Styx/Marshland	1	ATSC4v6	0.23

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: 8 March 2022 To: 17 February 2023	One item of load does not have any equipment type associated to the site name, to indicate the vehicle lantern type and wattage.  Potential impact: Low  Actual impact: Low  Audit history: None  Controls: Strong  Breach risk rating: 1		
Audit risk rating	Rationale for audit risk rating		
<b>Low</b>	The controls are recorded as strong because they mitigate risk to an acceptable level.  The impact on settlement and participants is minor; therefore, the audit risk rating is low.		
Actions taken to resolve the issue		Completion date	Remedial action status
CCC have added missing equipment type		05/04/2023	Identified
Preventative actions taken to ensure no further issues will occur		Completion date	
CCC currently using Access database, will be moving all records to RAMM database within 12 months and they will then have the functionality available to make the equipment type field mandatory		May 2024	



## 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 100 sites on 20 February 2023.

### Audit commentary

The following differences were identified during the field audit:

Address	Database Count	Field Count	Count differences	Wattage differences	Comments
Bellewood/Main Road/Belfast Road	0	1	+1	-	Vehicle lanterns located in the field at this intersection are not recorded in the database.
Fitzgerald/Hereford	1	2	+1	-	Vehicle lanterns are recorded in the database, 1 additional camera located in the field not recorded in the database.
Total	406	408	+2		

Two additional items of load found in the field of 100 items of load sampled.

### Audit outcome

Non-compliant

Non-compliance	Description		
Audit Ref: 2.5 With: Clause 11(2A) of Schedule 15.3 From: 8 March 2022 To: 17 February 2023	Two additional items of load found in the field of 100 items of load sampled. Potential impact: Low Actual impact: Low Audit history: Once Controls: Strong Breach risk rating: 1		
Audit risk rating	Rationale for audit risk rating		
Low	The controls are recorded as strong because they mitigate risk to an acceptable level. The impact is assessed to be low due to the small number of additional lights found in the field in relation to the overall count of the items of load.		
Actions taken to resolve the issue		Completion date	Remedial action status
CCC have updated their database		05/04/2023	Identified
Preventative actions taken to ensure no further issues will occur		Completion date	

## 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

There has been no change to the process for new connections. The Christchurch City Council (CCC) capital programme team manage the process and the CTOC are responsible for programming the lights and ensuring that both RTOAD and RAMM are updated. A RAMM data sheet is completed, and the information is populated in the RTOAD database and in RAMM. CTOC is usually aware of any new lights to be commissioned and ensures that database information is updated as required. RAMM is periodically reconciled for RTOAD to ensure that it holds all traffic light information.

The ICP, GXP, and types and quantities of equipment installed are determined from the signal plan and “as built” information.

Additions, changes and decommissions are managed by CTOC, and the database is updated from the effective date of the change.

### 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

CTOC RTOAD Access database has no audit trail of additions and changes to the database information.

### Audit outcome

Non-compliant

Non-compliance	Description		
Audit Ref: 2.7 With: Clause 11(4) of Schedule 15.3  From: 8 March 2022 To: 17 February 2023	No audit trail of changes made in the access database.  Potential impact: Low  Actual impact: Low  Audit history: Multiple times  Controls: Weak  Breach risk rating: 3		
Audit risk rating	Rationale for audit risk rating		
Low	The controls are rated as weak because audit trails do not exist.  The impact is rated as low, because it does not affect submission.		
Actions taken to resolve the issue		Completion date	Remedial action status
			Identified
Preventative actions taken to ensure no further issues will occur		Completion date	
CCC currently using Access database, will be moving all records to RAMM database within 12 months and they will then have the functionality available to track changes and view audit trails]		May 2021	

### 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

Contacts' submissions are based on a monthly extract from the database. A database extract was provided in February 2023. A field audit was undertaken of 100 items of load.

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

##### Audit commentary

##### Field audit findings

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	CCC unmetered traffic lights
Strata	The database contains 406 sites in the CCC area. All lights in the database have the same owner, and the management process is the same. The database was divided into two strata: <ul style="list-style-type: none"><li>• traffic lights, and</li><li>• other equipment including CCTV, pedestrian crossing lights, and speed zone signs.</li></ul>
Area units	I used a random number generator to select a total of 23 sub-units across the two strata.
Total items of load	100 items of load were checked.

The calculation of daily kWh in the database was checked, by reperforming the calculation based on the CTOC Traffic Signal Database Traffic Signal Power Calculation Formula document.

##### Audit commentary

##### Database accuracy based on the field audit

The unmetered load does not operate only during night hours and is recorded as a daily kWh value. To account for this when assessing database accuracy, I adjusted the data entered into the Authority's DUML database auditing tool as follows:

- I entered the daily kWh for each sub-unit instead of watts, and
- I modified the on hours per annum to 365,000 to reflect (1) that the values entered were kWh not watts, and (2) that the daily average kWh needs to be multiplied by 365 to give annual consumption, instead of 4,271 night burn hours.

Result	Percentage	Comments
The point estimate of R	100.8	Wattage from survey is higher than the database wattage by 0.8%
R <sub>L</sub>	100.0	With a 95% level of confidence, it can be concluded that the error could be 4.8%.
R <sub>H</sub>	104.8	

These results were categorised in accordance with the “Distributed Unmetered Load Statistical Sampling Audit Guideline”, effective from 1 February 2019 and the table below shows that Scenario A (detailed below) applies.

The conclusion from Scenario A is that the variability of the sample results across the strata means that the true wattage (installed in the field) could be 4.8% higher than the wattage recorded in the DUML database. Compliance is confirmed.

There is a 95% level of confidence that the installed capacity is the same as the database.

In absolute terms, total annual consumption is estimated to be 7,800 kWh higher than the DUML database indicates.

There is a 95% level of confidence that the annual consumption is up to 46,200 kWh p.a. higher than the database indicates.

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

### Change management process findings

For new connections the Christchurch City Council (CCC) capital programme team manage the process and the CTOC are responsible for programming the lights and ensuring that both RTOAD and RAMM are

updated. A RAMM data sheet is completed, and the information is populated in the RTOAD database and in RAMM. CTOC is usually aware of any new lights to be commissioned and ensures that database information is updated as required. RAMM is periodically reconciled for RTOAD to ensure that it holds all traffic light information.

**Wattage accuracy**

The accuracy of the wattages recorded in the database was confirmed by reperforming the wattage calculation for each type of equipment and summing the result by site. The recalculation was according to the CTOC Traffic Signal Database Traffic Signal Power Calculation Formula document.

The following discrepancy was identified in the database:

Site Name	SiteUnitsPerDay	Comment
SZ Rangī Ruru Girls School (Hewitts/Merivale/Rossall)	0.12	SZSigns is recorded as 4. NumPerCons = 2, this should be updated to 4. The Units per day are correct.

Where PedCams are recorded in the database, they are not included in the daily kWh calculation. PedCams consume 0.048 kWh per day, and this was across 74 sites. This resulted in a difference of 3.552 Units per day.

This will result in an estimated under submission of 1,296 kWh per annum, which is recorded as a non-compliance below.

As discussed in **section 2.4**, one item of load does not have site units per day recorded. This will be resulting in an estimated under submission of 2,964 kWh per annum, this is recorded as a non-compliance below.

The capacity in watts is recorded in the database as part of the daily kWh calculation and is also set out in the CTOC Traffic Signal Database Traffic Signal Power Calculation Formula document.

**Address location accuracy**

As discussed in **section 2.3**, all lights have an address recorded.

**Audit outcome**

Non-compliant

Non-compliance	Description		
Audit Ref: 3.1 With: Clause 15.2 and 15.37B(b)  From: 8 March 2022 To: 17 February 2023	Daily kWh information for PedCams was not included in the daily calculations for 74 sites, and one set of traffic lights, resulting in under submission of an estimated 4,260 kWh per annum.  Potential impact: Low  Actual impact: Low  Audit history: Multiple times previously  Controls: Moderate  Breach risk rating: 2		
Audit risk rating	Rationale for audit risk rating		
<b>Low</b>	The controls are rated as moderate because they ensure most information is accurate.  The impact is assessed to be low as the discrepancy found will only have a minor effect on submission.		
Actions taken to resolve the issue		Completion date	Remedial action status
CCC have updated their database		05/04/2023	Identified
Preventative actions taken to ensure no further issues will occur		Completion date	

### 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

RTOAD records the quantity of each equipment type, including vehicle lanterns of various types and wattages, pedestrian lanterns of various types and wattages, illuminated signs, speed zone signs and traffic safety cameras at each intersection. CCC provided the usage calculation formulas used. The wattage for each item is multiplied by the estimated number of hours on per day, power level, and kW per hour to give a daily kWh value.

The load is submitted as NHH using the UML profile for ICPs 0007102602RN872 and 007102603RN437. I checked the submission for these ICPs for the month of January 2023 and confirmed that the volumes were correctly calculated.

The profile for ICP 0000298513MPF38 was backdated to RPS UML on 23/03/22 with a backdated effective date of 29/12/21 as there is metered and unmetered load associated with this ICP. During the audit period Contact have been able to determine which items of load are on the metered and unmetered load circuits and the unmetered load has been adjusted accordingly.

Review of the code wording states that only unmetered load should be associated with a DUML ICP:

**distributed unmetered load** means **unmetered load** with a single **profile** supplied across more than 1 **point of connection** to either 1 customer of a **retailer** or to 1 **direct purchaser**

Clause 1.1(1) **distributed unmetered load**: amended, on 1 November 2018, by clause 4(2) of the Electricity Industry Participation Code Amendment (Code Review Programme) 2018.

Therefore, a new ICP for the metered load must be created. This has no impact on reconciliation accuracy but is recorded as non-compliance below.

The profile for ICP 0007102604RN9FD was backdated to RPS UML 09/05/22 with an effective date of 01/10/20. A meter was installed on 01/10/20 but it is unclear what is being read by the meter and what is on the unmetered circuit. Contact have tried working with the MEP but have been unable to resolve this. Therefore, there is likely to be over submission occurring, but I am not able to determine the volumes associated with this. This is recorded as non-compliance.

As stated for ICP 0000298513MPF38, a new ICP is required for the metered load associated with ICP 0007102604RN9FD as a DUML ICP cannot have both metered and unmetered load associated. This is recorded as non-compliance below.

The field audit confirmed that the database accuracy fell within the allowable thresholds.

As detailed in **section 3.1**, analysis of the database found daily kWh information was not included in the daily calculations for PedCams for 74 sites, and for one set of traffic lights, resulting in under submission of an estimated 4,260 kWh per annum.

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 data supplied to Contact each month is based on a snapshot and does not achieve compliance with the requirements above.

### **Audit outcome**

Non-compliant



Non-compliance	Description		
<p>Audit Ref: 3.2</p> <p>With: Clause 15.2 and 15.37B(c)</p> <p>From: 18-Mar-21</p> <p>To: 7-Mar-22</p>	<p>Two DUMML ICPs with metered load associated.</p> <p>Over submission occurring as both metered and unmetered load are being submitted for the same items of load. The quantity is unable to be determined as the items of load being measured by the meter are unknown.</p> <p>Daily kWh information for PedCams was not included in the daily calculations for 74 sites, and one set of traffic lights, resulting in under submission of an estimated 4,260 kWh per annum.</p> <p>The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot.</p> <p>Potential impact: Low</p> <p>Actual impact: Low</p> <p>Audit history: Multiple times previously</p> <p>Controls: Moderate</p> <p>Breach risk rating: 2</p>		
Audit risk rating	Rationale for audit risk rating		
<p><b>Low</b></p>	<p>The controls are rated as moderate because they ensure most information is accurate.</p> <p>The impact is assessed to be low as the discrepancy found will only have a minor effect on submission.</p>		
Actions taken to resolve the issue		Completion date	Actions taken to resolve the issue
<p>CCC working with Orion &amp; MEP to confirm location of meter at 0007102604RN9FD. NZTA are due to create new ICP for 0000298513MPF38 by 30 June 2023, at which point only unmetered load will remain on 0000298513MPF38</p>		<p>30 June 2023</p>	<p>Investigating</p>
Preventative actions taken to ensure no further issues will occur		Completion date	

## CONCLUSION

Traffic light data is maintained in RTOAD (Real Time Operations Asset Database) by CTOC. RTOAD records the quantity of each equipment type, including vehicle lanterns of various types and wattages, pedestrian lanterns of various types and wattages, illuminated signs, speed zone signs and traffic safety cameras at each intersection. The wattage for each item is multiplied by the estimated number of hours on per day, power level, and kW per hour to give a daily kWh value.

The profile for ICP 0000298513MPF38 was backdated to RPS UML on 23/03/22 with a backdated effective date of 29/12/21 as there is metered and unmetered load associated with this ICP. During the audit period Contact have been able to determine which items of load are on the metered and unmetered load circuits and the unmetered load has been adjusted accordingly.

Review of the code wording states that only unmetered load should be associated with a DUML ICP:

**distributed unmetered load** means **unmetered load** with a single **profile** supplied across more than 1 **point of connection** to either 1 customer of a **retailer** or to 1 **direct purchaser**

Clause 1.1(1) **distributed unmetered load**: amended, on 1 November 2018, by clause 4(2) of the Electricity Industry Participation Code Amendment (Code Review Programme) 2018.

Therefore, a new ICP for the metered load must be created. This has no impact on reconciliation accuracy but is recorded as non-compliance below.

The profile for ICP 0007102604RN9FD was backdated to RPS UML 09/05/22 with an effective date of 01/10/20. A meter was installed on 01/10/20 but it is unclear what is being read by the meter and what is on the unmetered circuit. Contact have tried working with the MEP but have been unable to resolve this. Therefore, there is likely to be over submission occurring, but I am not able to determine the volumes associated with this. This is recorded as non-compliance.

As stated for ICP 0000298513MPF38, a new ICP is required for the metered load associated with ICP 0007102604RN9FD as a DUML ICP cannot have both metered and unmetered load associated. This is recorded as non-compliance below.

The field audit confirmed that the database accuracy fell within the allowable thresholds.

Six non-compliances were identified, and this audit makes no recommendations. The future risk rating of 11 indicates that the next audit be completed in 12 months. I have considered this in conjunction with Contact's comments. I recommend that the next audit be in 12 months.

## PARTICIPANT RESPONSE

CCC – Traffic Lights have been quick to add missing information to their database as well as making changes to ensure all records are accounted for and that there are no additional items of load not expected. They also have a project in progress to move all their records from an access database to RAMM which will ensure changes are tracked and an audit trail is available for future audits. CCC – Traffic Lights are aware of the importance of keeping their database up to date and correct and will continue to work to achieve the best accuracy as possible.