ELECTRICITY INDUSTRY PARTICIPATION CODE
DISTRIBUTED UNMETERED LOAD AUDIT REPORT

VERITEK

For

CHRISTCHURCH CITY COUNCIL AND CONTACT ENERGY LIMITED

NZBN: 9429038549977

Prepared by: Steve Woods

Date audit commenced: 24 February 2022

Date audit report completed: 11 April 2022

Audit report due date: 18 April 2022

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EXECUTIVE SUMMARY

This audit of the **Christchurch City Council (CCC) 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.

Contact reconciles this DUML load using the DST profile. Simply Energy on behalf of Contact send the monthly kW values to EMS. EMS prepare the submission file using the data logger hours to determine the burn hours and the file is then sent to Contact who submit the data under the CTCS code.

CCC undertakes dimming of lamps on the network, this leads to over submission by the trader, as they are submitting more than is consumed. If it is assumed that 31,000 lights are dimmed by 20% for a quarter of the night and the average wattage per light is 67 watts (the current average from the database), then the total over submission is estimated to be:

31,000 * 0.067 * 4271 * 0.2 * 0.25 = 443,543 kWh per annum.

It is intended that submission will use the dimming profile that has recently been approved by the Electricity Authority for these lamps. This project is still progressing, and it is expected that the appropriate agreements will be in place and ICP's created to support this in the next few months.

The field audit was undertaken of a statistical sample of sample of 524 items of load on 4th - 8th March 2022. This found the database is not confirmed to be accurate 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 185 kW lower than the database indicates,
- there is a 95% level of confidence that the installed capacity is between 50 kW to 461 kW lower than the database,
- in absolute terms, total annual consumption is estimated to be 792,200 kWh lower than the DUML database indicates, and
- there is a 95% level of confidence that the annual consumption is between 212,900 kWh to 1,967,800 kWh p.a. lower to than the database indicates.

Orion manage the database and field work. The fault, maintenance, new connection, and upgrade work is completed by Orion's approved contractors. The contractors provide paperwork to Orion confirming that work is complete, and Orion uses this information to update the database.

This audit found four non-compliances, and no recommendations were raised. The future risk rating of 26 indicates that the next audit be completed in three months I have considered this in conjunction with Contact's responses and recommend that the next audit be in six months.

The matters raised are detailed below:

AUDIT SUMMARY

NON-COMPLIANCES

Subject	Section	Clause	Non-Compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
Deriving submission information	2.1	11(1) of Schedule 15.3	The database is not confirmed as accurate with a 95% level of confidence resulting in an estimated annual under submission of 792,200 kWh. 45 lamps have incorrect total wattages, resulting in an estimated under submission of 279W or 1,192 kWh p.a. based on 4,271 burn hours. Estimated over submission of 443,543 kWh per annum based on dimming of 31,000 lamps.	Weak	High	9	Identified
All load recorded in database	2.5	11(2A) of Schedule 15.3	One additional light not recorded in the database was located in the field.	Moderate	Low	2	Identified
Database accuracy	3.1	15.2 and 15.37B (b)	The database is not confirmed as accurate with a 95% level of confidence resulting in an estimated annual under submission of 792,200 kWh. 45 lamps have incorrect total wattages, resulting in an estimated under submission of 279W or 1,192 kWh p.a. based on 4,271 burn hours.	Moderate	High	6	Identified
Volume information accuracy	3.2	15.2 and 15.37B (c)	The database is not confirmed as accurate with a 95% level of confidence resulting in an estimated annual under submission of 792,200 kWh. 45 lamps have incorrect total wattages, resulting in an estimated under submission of 279W or 1,192 kWh p.a. based on 4,271 burn hours. Estimated over submission of 443,543 kWh per annum based on dimming of 31,000 lamps.	Weak	High	9	Identified
Future Risk Rating						26	

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

RECOMMENDATIONS

Subject	Section	Recommendation
		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

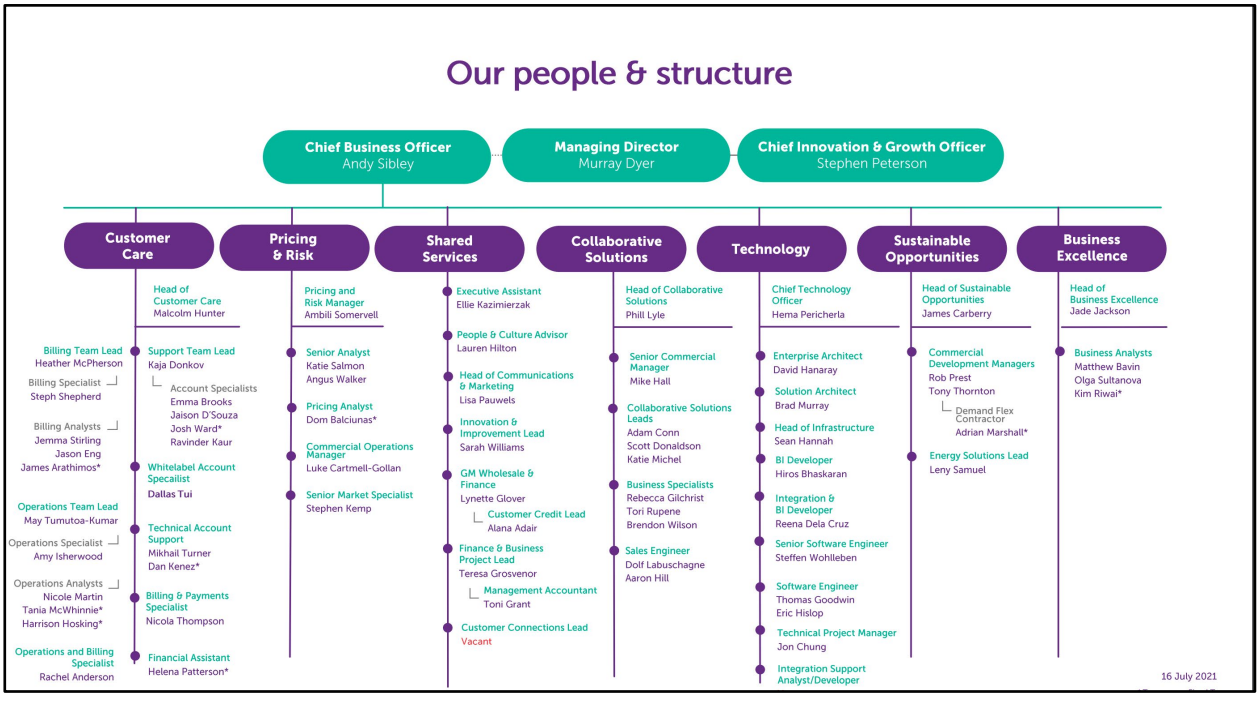
The Electricity Authority's website was reviewed to identify any exemptions relevant to the scope of this audit.

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

Auditor:

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
Penny Lawrence	Operations Services	Orion
Luke Cartmell-Gollan	Commercial Operations Manager	Contact Energy

1.4. Hardware and Software

Orion use a purpose-built Oracle Streetlighting/DUML database for the management of the DUML information. Backup and restoration procedures are in place, and access to the Orion network (including the database) is restricted using logins and passwords.

Systems used by the trader and their agent 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

ICP Number	Description	NSP	Profile	Number of items of load	Database wattage (watts)
0007102593RN8D3	Orion_CCC GXP street light ICP	BRY0661	DST	14,755	996,797.6
0007102594RN519	Orion_CCC GXP street light ICP	ISL0331	DST	3,823	275,815.3
0007102595RN95C	Orion_CCC GXP street light ICP	ISL0661	DST	25,713	1,769,902
Total				44,291	3,042,514.9

CCC has some unmetered smart lights connected on its LV network, which are available 24 hours, and are turned on and off by a light sensor:

ICP Number	Description	NSP	Profile	Number of items of load	Database wattage (watts)
0007182097RN3F9	Orion CCC GXP smart street light ICP	BRY0661	RPS	55	2.66
0007182098RNC27	Orion CCC GXP smart street light ICP	ISL0331	RPS	16	0.41
0007182100RN8D0	Orion CCC GXP smart street light ICP	ISL0661	RPS	461	41.60
Total				532	44.67

These are recorded with "inactive - reconciled elsewhere" status, and the volumes are expected to be submitted against the corresponding DUML ICP for the NSP as discussed in **sections 2.1** and **3.2**.

1.7. Authorisation Received

All information was provided directly by Contact, Simply Energy and Orion.

1.8. Scope of Audit

This audit of the CCC 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.

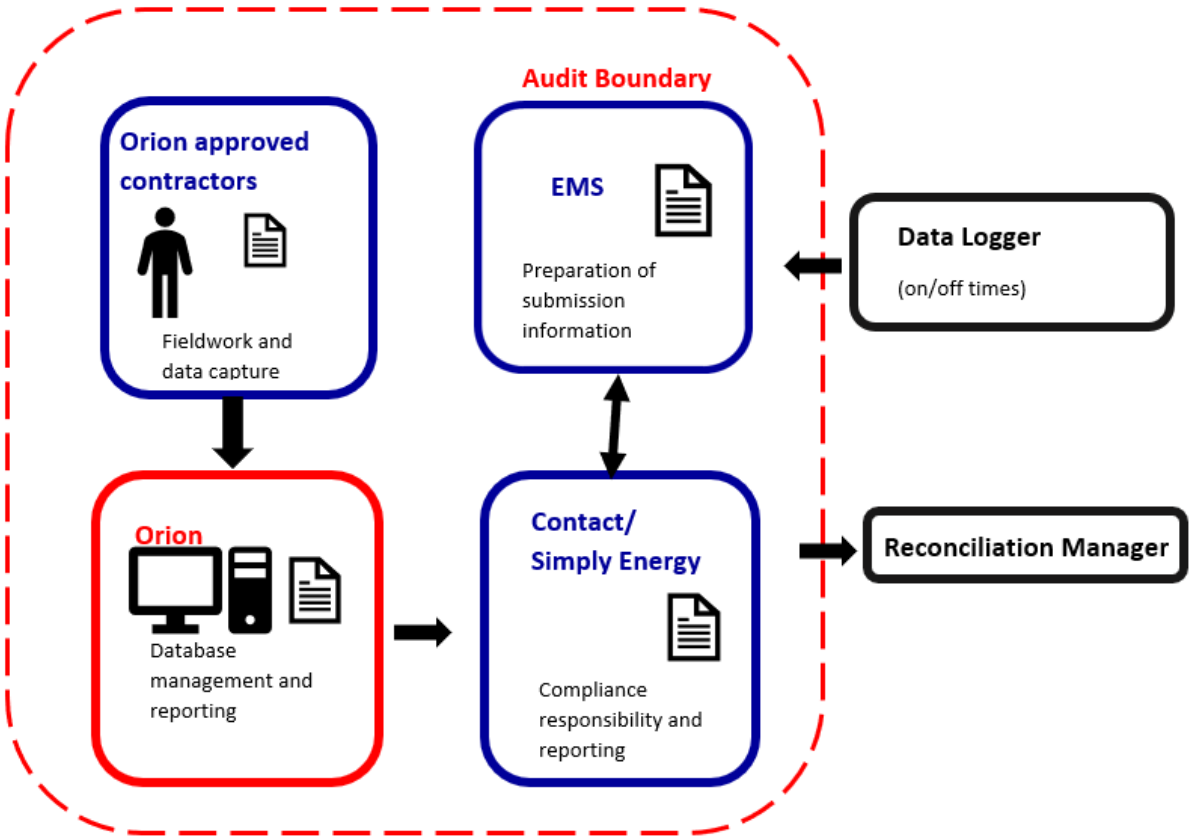
The audit was conducted in accordance with the audit guidelines for DUML audits version 1.1.

The unmetered load is managed by Orion and the data is held in their DUML database, on behalf of CCC, who is Contact's customer.

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 diagrams below show the audit boundaries for clarity.

Orion's fault, maintenance, new connection and upgrade work is completed by Orion's approved contractors. The contractors provide paperwork to Orion confirming that work is complete, and Orion uses this information to update the database.

The smart light ICPs 0007182097RN3F9, 0007182098RNC27 and 0007182100RN8D0 are recorded with "inactive - reconciled elsewhere" status, and the volumes are expected to be submitted against the corresponding DUML ICP for the NSP. This is discussed in **sections 2.1** and **3.2**.



A field audit was undertaken of a statistical sample of 524 items of load on 4th - 8th March 2022.

1.9. Summary of previous audit

The previous audit of this database was undertaken by Rebecca Elliot of Veritek Limited in March 2021. The summary table below shows the statuses of the non-compliances raised in the previous audit. Further comment is made in the relevant sections of this report.

Table of Non-compliances

Subject	Section	Clause	Non-compliance	Status
Deriving submission information	2.1	11(1) of Schedule 15.3	Estimated under submission of 30,934.87 kWh from October to December 2020 due to the smart light volumes being omitted from submission.	Cleared
			The database is not confirmed as accurate with a 95% level of confidence resulting in an estimated annual under submission of 5,300 kWh.	Still existing
			45 lamps have incorrect total wattages, resulting in an estimated under submission of 279W or 1,192 kWh p.a. based on 4,271 burn hours.	Still existing

Subject	Section	Clause	Non-compliance	Status
			42.36 kW relating to smart lights connected to "reconciled elsewhere" status ICPs 0007182097RN3F9, 0007182098RNC27 and 0007182100RN8D0, are reconciled under the DUML ICP for the same NSP. The on hours for these ICPs may differ to the logger hours, because they are controlled by daylight sensors.	Still existing
All load recorded in database	2.5	11(2A) of Schedule 15.3	Three lights not recorded in the database.	Still existing for a different lamp
Database accuracy	3.1	15.2 and 15.37B (b)	The database is not confirmed as accurate with a 95% level of confidence resulting in an estimated annual under submission of 5,300 kWh. 45 lamps have incorrect total wattages, resulting in an estimated under submission of 279W or 1,192 kWh p.a. based on 4,271 burn hours.	Still existing Still existing
Volume information accuracy	3.2	15.2 and 15.37B (c)	Estimated under submission of 30,934.87 kWh from October to December 2020 due to the smart light volumes being omitted from submission. The database is not confirmed as accurate with a 95% level of confidence resulting in an estimated annual under submission of 5,300 kWh. 45 lamps have incorrect total wattages, resulting in an estimated under submission of 279W or 1,192 kWh p.a. based on 4,271 burn hours. 42.36 kW relating to smart lights connected to "reconciled elsewhere" status ICPs 0007182097RN3F9, 0007182098RNC27 and 0007182100RN8D0, are reconciled under the DUML ICP for the same NSP. The on hours for these ICPs may differ to the logger hours, because they are controlled by daylight sensors.	Cleared Still existing Still existing 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

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

Contact reconciles this DUML load using the DST profile. Simply Energy on behalf of Contact send the monthly kW values to EMS. EMS prepare the submission file using the data logger hours to determine the burn hours and the file is then sent to Contact who submit the data under the CTCS code.

I checked the data submission for January 2022 and found some differences:

ICP	Submitted kWh Value	Expected kWh Value	kWh difference
0007102593RN8D3	297,685.02	284,274.17	-13410.85
0007102594RN519	79,173.64	78,566.33	-607.31
0007102595RN95C	532,321.02	515,242.69	-17,078.33
		TOTAL	-31,096.49

It is expected that this is due a timing issue, as there has been significant activity in the CCC area with the database being updated with the removal of approximately 339 lamps in the Red Zone and the update to the database for the last batches of the LED roll-out, which was also a significant number.

CCC undertakes dimming of lamps on the network, this leads to over submission by the trader, as they are submitting more than is consumed. If it is assumed that 31,000 lights are dimmed by 20% for a quarter of the night and the average wattage per light is 67 watts (the current average from the database), then the total over submission is estimated to be:

31,000 * 0.067 * 4271 * 0.2 * 0.25 = 443,543 kWh per annum.

It is intended that submission will use the dimming profile that has recently been approved by the Authority for these lamps. This project is still progressing, and it is expected that the appropriate agreements will be in place and ICP's created to support this in the next few months.

The previous audit identified smart light ICPs with the status "reconciled elsewhere" that were being missed from submission. This has been checked, this is now being included and submission corrections have been made.

The field audit found that the database accuracy was not confirmed as accurate with a 95% level of confidence resulting in an estimated annual over submission of 792,200 kWh.

A small number of lights were found to have the incorrect ballast applied resulting in an estimated under submission of 1,192 kWh per annum. This is detailed in **section 3.1**.

The monthly report is provided with a daily kW value. The daily value is used for submission. Revisions are carried out if the data changes. This meets the requirements of the code.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.1 With: Clause 11(1) of Schedule 15.3 From: 01-Jan-21 To: 24-Feb-22	The database is not confirmed as accurate with a 95% level of confidence resulting in an estimated annual over submission of 792,200 kWh. 45 lamps have incorrect total wattages, resulting in an estimated under submission of 1,192 kWh p.a. based on 4,271 burn hours. Estimated over submission of 443,543 kWh per annum based on dimming of 31,000 lamps. Potential impact: High Actual impact: High Audit history: Multiple times previously Controls: Weak Breach risk rating: 9
Audit risk rating	**Rationale for audit risk rating**
High	Controls are rated as weak as the reconciliation process has weak checks in place to ensure submission is correct. The impact is assessed to be high based on the effect on submission due to dimming of lights, and over submission kWh volume.

Actions taken to resolve the issue	Completion date	Remedial action status
Orion re-calculate and submit kw values every month for the R3 and R14 submissions; As backdated changes are made in the RAMM database these new values will flow into those calculations and will flow into the submission values provided to the market by Contact Energy.	Ongoing	Identified
Incorrect ballast values have all been corrected and back dated and will flow into the usual revision submission process.	30/4/2022	
Preventative actions taken to ensure no further issues will occur	**Completion date**	
The lights with dimming are centrally controlled via a CMS and work is underway to transition these lights on to new ICPs, which will be reconciled with the newly approved profile owned by LGNZ that allows CMS derived consumption values to be used in submission.	31/7/2022	

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

An ICP is recorded for each item of load. CCC's database contains a GXP code that is linked to the relevant ICP in the customer table in Access.

Audit commentary

All Orion 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 databases were checked to confirm the location is recorded for all items of load.

Audit commentary

The database contains fields for the street name, number, and GPS coordinates. GPS coordinates are recorded for all items of load.

Audit outcome

Compliant

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

Code reference

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

Code related audit information

The DUML database must contain:

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

Audit observation

The database was checked to confirm that:

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

Audit commentary

The database contains a lamp type, which corresponds to a lamp total wattage including ballast wattage. All items of load have a lamp type and total wattage recorded. The accuracy of the recorded wattages is discussed in **section 3.1**.

I confirmed that no light types had an invalid zero or blank total wattage recorded, and all light types which required a gear wattage had a valid lamp and gear wattage recorded. The accuracy of the recorded wattages 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

A field audit was undertaken of a statistical sample of 524 items of load on 4th - 8th March 2022. The sample was selected from four strata, as follows:

- street names A – K,
- street names L – Z,
- BRY, and
- ISL.

Audit commentary

The field audit discrepancies are detailed in the table below:

Address	Database count	Field count	Count difference	Wattage difference	Comments
Aorangi Road	35	35		2	1 x 250W HPS recorded in the database but 1 x 67W LED located in the field 1 x 60W LED recorded in the database but 1 x 20W LED located in the field
Brockworth Pl	20	19	-1		2*20W FF recorded in the database but not located in the field

Address	Database count	Field count	Count difference	Wattage difference	Comments
Canon St	17	18	+1		1 additional 36W LED not recorded in the database but located in the field
Grants Rd	22	21	-1		1 x 29W LED recorded in the database but not located in the field
Averill St	7	7		1	1 x 2*30W FF recorded in the database but 1 x 24W LED located in the field
Wakefield Ave opp	42	41	-1	1	1 x 51W LED recorded in the database but 1 x 106W LED located in the field 1 x 60W LED recorded in the database but not located in the field
Woolley St	12	7	-5	7	6 x 2*30W FF recorded in the database but 6 x 29W LED located in the field 1 x 70W HPS recorded in the database but 1 x 29W LED located in the field 4 x 2*30W FF recorded in the database but not located in the field 1 x 70W HPS recorded in the database but not located in the field
Sioux Ave	24	24		3	1 x 51W LED recorded in the database but 1 x 60W LED located in the field 1 x 43W LED recorded in the database but 1 x 51W LED located in the field 1 x 100W HPS recorded in the database but 1 x 51W LED located in the field
Lady Isaac Way	4	4		1	1 x 24W LED recorded in the database but 1 x 70W SON located in the field
Leinster Rd	17	16	-1		1 x 70W HPS recorded in the database but not located in the field
Stallion Ave	9	8	-1		1 x 100W HPS recorded in the database but not located in the field

Address	Database count	Field count	Count difference	Wattage difference	Comments
Estuary Rd	44	44		1	1 x 150W HPS recorded in the database but 100W LED located in the field
Wakefield Ave	42	42		3	3 x 150W HPS recorded in the database but 3 x 80W LED located in the field
Grand Total	**44,291**	**44,282**	**-9 (-10, +1)**	**19**	

The field audit identified one additional items of load missing from the database. This is recorded as non-compliance in **section 3.1**. Orion has undertaken a programme of work to remove the lights in the Red Zone, this is reflected in the number of lights removed.

Audit outcome

Non-compliant

Non-compliance	**Description**
Audit Ref: 2.5 With: Clause 11(2A) of Schedule 15.3 From: 01-Jan-21 To: 24-Feb-22	One additional light not recorded in the database was located in the field. Potential impact: Low Actual impact: Low Audit history: Multiple times Controls: Moderate Breach risk rating: 2
Audit risk rating	**Rationale for audit risk rating**
Low	Controls are rated as moderate. The volume of errors occurring since the LED rollout indicate there is room for improvement. The impact is assessed to be low, due to the only one additional light found as part of the field audit.

Actions taken to resolve the issue	**Completion date**	**Remedial action status**
This light has been added to the database and will be picked up in the revision submission process. Orion/CCC will also complete a field audit to confirm other findings in the field audit including lights not found in the field and wattage discrepancies.	31/5/2022	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

The database functionality achieves compliance with the code.

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

Audit outcome

Compliant

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

Code reference

Clause 11(4) of Schedule 15.3

Code related audit information

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

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

Audit observation

The databases were checked for audit trails.

Audit commentary

The database has a complete audit trail of all additions and changes to the database information. The user who processed the change is stored in the back end of the database.

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	CCC streetlights connected to the Orion network within the CCC geographical boundary.
Strata	The database contains 44,104 items of load. The processes for the management of all CCC items of load is the same. The database was divided into four strata: • street names A to K, • street names L to Z, • BRY, and • ISL.
Area units	I created a pivot table of the roads in each database and used a random number generator to select a total of 36 sub-units across the four strata.
Total items of load	524 items of load were checked.

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

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

Audit commentary

A field audit was conducted of a statistical sample of 524 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	93.9	Wattage from survey is lower than the database wattage by 6.1%.
R_L	84.9	With a 95% level of confidence, it can be concluded that the error could be between -15.1% and -1.6%
R_H	98.4	

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

The conclusion from Scenario B is that the variability of the sample results across the strata means that the true wattage (installed in the field) could be between -15.1% lower and -1.6% lower than the wattage recorded in the DUML database. Non-compliance is recorded because the potential error is greater than 5.0%.

In absolute terms the installed capacity is estimated to be 185 kW lower than the database indicates.

There is a 95% level of confidence that the installed capacity is between 461 kW lower to 50 kW lower than the database.

In absolute terms, total annual consumption is estimated to be 792,200 kWh lower than the DUML database indicates.

There is a 95% level of confidence that the annual consumption is between 1,967,800 kWh p.a. lower to 212,900 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 %

Light description and capacity accuracy

As discussed in **section 2.4**, all lights have a lamp and gear wattage recorded.

Lamp and gear wattages for all other lamps were compared to the expected values, and the following exceptions were identified:

Model	Database wattage	Correct wattage	Quantity	Total difference
36W FF	42	46	12	48
58W FF	65	72	33	231
		Total	45	279 W

This could result in an estimated annual under submission of 1,192 kWh per annum (based on annual burn hours of 4,271 as is detailed in the DUML database auditing tool).

Address location accuracy

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

Where Orion is aware that lights are installed but CCC has not provided roading information, Orion records the GPS locations of the lights and a placeholder for road name such as “Road 1”, “Unknown” or “Unnamed”. Once the street details are provided the road names are updated.

Change management process findings

Fault, maintenance, new connection, and upgrade work is completed by Orion’s approved contractors. The contractors provide paperwork to Orion confirming that work is complete, and Orion uses this information to update the Streetlighting/DUML database and GIS. For new subdivisions, this paperwork includes “as built” plans.

Upon receipt, paperwork is checked for completeness and accuracy and any issues are followed up with the contractor. The information is sent to the GIS team so that the GIS can be updated, and then returned to the connections team to update the Streetlighting/DUML database from the date the change or new connection was effective. Once data entry is complete, the values loaded are checked against the paperwork provided, and some spot checks in the field are completed. Paperwork is normally promptly provided electronically and processed within two to three business days of receipt.

All jobs are tracked using job numbers by the connections team as part of the works management process. Late paperwork from contractors, and late updates by the GIS team are followed up. A checklist is followed to ensure that all steps in the process are completed.

Orion’s approved contractors have access to a web-based version of the Streetlighting/DUML database in the field and advise Orion’s connections team if they notice any discrepancies in the data recorded. Orion’s operation team acts on these notifications and checks and updates the data where necessary.

The LED upgrade project is in the final stages, the final batches of upgraded lights have recently been uploaded to RAMM. The upgrade data including pole, light, and installation date information is provided in spreadsheet form and the IT team run scripts to load the information in the database. The IT and connections teams complete testing on the updates to ensure that the records are correct.

Orion also has a programme of work underway to remove all lamps in the Red Zone, this is in the final stages.

Quarterly outage patrols are completed by Orion’s contractors as part of the maintenance programme. Outages are also reported by residents within the CCC region and work orders are raised with contractors as required.

Orion's database records a "start date" and "created date". The "start date" is entered by the user and reflects the date that the light was installed or changed, and system controls prevent future "start dates" from being entered. The "created date" reflects when the database record was created. Full history of the records that applied from each start date can be viewed in the database.

Festive lights

Festive lights are recorded in the database with a class of "miscellaneous" and street address which includes "Christmas lights". These lights are listed as 'Out of Service' in the database when disconnected and made active when they are connected so that they can be included in submission data. The festive lights have not been connected for about five years. They have been correctly excluded from submission information.

Private lights

New private lights are not accepted, and where private lights are identified Orion arranges for standard or shared unmetered load to be created. In the meantime, private unmetered lights are recorded in the database against the appropriate ICP number and reported in the monthly extracts.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 3.1 With: Clause 15.2 and 15.37B(b) From: 01-Jan-21 To: 24-Feb-22	The database is not confirmed as accurate with a 95% level of confidence resulting in an estimated annual over submission of 792,200 kWh. 45 lamps have incorrect total wattages, resulting in an estimated under submission of 279W or 1,192 kWh p.a. based on 4,271 burn hours. Potential impact: Medium Actual impact: Low Audit history: Multiple times previously Controls: Moderate Breach risk rating: 6
Audit risk rating	**Rationale for audit risk rating**
High	Controls are rated as moderate. The high volume of errors have been occurring during the LED rollout, this project is in the final stages so it is expected there will be an improvement. The impact is assessed to be high, based on the potential kWh variances detailed above.

Actions taken to resolve the issue	Completion date	Remedial action status
Ballast values have all been corrected and back dated and will flow into the usual revision submission process.	30/4/2022	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
The transition to using the CMS to reconcile volume will see a significant improvement in the accuracy as majority of lights are now on the CMS system.	31/7/2022	

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

Code reference

Clause 15.2 and 15.37B(c)

Code related audit information

The audit must verify that:

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

Audit observation

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

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

Audit commentary

Contact reconciles this DUML load using the DST profile. Simply Energy on behalf of Contact send the monthly kW values to EMS. EMS prepare the submission file using the data logger hours to determine the burn hours and the file is then sent to Contact who submit the data under the CTCS code.

I checked the data submission for January 2022 and found some differences:

ICP	Submitted kWh Value	Expected kWh Value	kWh difference
0007102593RN8D3	297,685.02	284,274.17	-13410.85
0007102594RN519	79,173.64	78,566.33	-607.31
0007102595RN95C	532,321.02	515,242.69	-17,078.33
		TOTAL	-31,096.49

It is expected that this is due a timing issue, as there has been significant activity in the CCC area with the database being updated with the removal of approximately 339 lamps in the Red Zone and the update to the database for the last batches of the LED roll-out, which was also a significant number.

CCC undertakes dimming of lamps on the network, this leads to over submission by the trader, as they are submitting more than is consumed. If it is assumed that 31,000 lights are dimmed by 20% for a quarter of the night and the average wattage per light is 67 watts (the current average from the database), then the total over submission is estimated to be:

31,000 * 0.067 * 4271 * 0.2 * 0.25 = 443,543 kWh per annum.

It is intended that submission will use the dimming profile that has recently been approved by the Authority for these lamps. This project is still progressing, and it is expected that the appropriate agreements will be in place and ICP's created to support this in the next few months.

The previous audit identified smart light ICPs with the status "reconciled elsewhere" that were being missed from submission. This has been checked, this is now being included and submission corrections have been made.

The field audit found that the database accuracy was not confirmed as accurate with a 95% level of confidence resulting in an estimated annual over submission of 792,200 kWh.

A small number of lights were found to have the incorrect ballast applied resulting in an estimated under submission of 1,192 kWh per annum. This is detailed in **section 3.1**.

The monthly report is provided with a daily kW value. The daily value is used for submission. Revisions are carried out if the data changes. This meets the requirements of the code.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 3.2 With: Clause 15.2 and 15.37B(c) From: 01-Jan-21 To: 24-Feb-22	The database is not confirmed as accurate with a 95% level of confidence resulting in an estimated annual over submission of 792,200 kWh. 45 lamps have incorrect total wattages, resulting in an estimated under submission of 1,192 kWh p.a. based on 4,271 burn hours. Estimated over submission of 443,543 kWh per annum based on dimming of 31,000 lamps. Potential impact: High Actual impact: High Audit history: Multiple times previously Controls: Weak Breach risk rating: 9
Audit risk rating	**Rationale for audit risk rating**
High	Controls are rated as weak as the reconciliation process has weak checks in place to ensure submission is correct. The impact is assessed to be high based on the effect on submission due to dimming of lights, and over submission kWh volume.

Actions taken to resolve the issue	Completion date	Remedial action status
Orion re-calculate and submit kw values every month for the R3 and R14 submissions; As backdated changes are made in the RAMM database these new values will flow into those calculations and will flow into the submission values provided to the market by Contact Energy. Ballast values have all been corrected and back dated and will flow into the usual revision submission process.	Ongoing	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
The lights with dimming are centrally controlled via a CMS and work is underway to transition these lights on to new ICPs, which will be reconciled with the newly approved profile owned by LGNZ that allows CMS derived consumption values to be used in submission.	31/7/2022	

CONCLUSION

Contact reconciles this DUML load using the DST profile. Simply Energy on behalf of Contact send the monthly kW values to EMS. EMS prepare the submission file using the data logger hours to determine the burn hours and the file is then sent to Contact who submit the data under the CTCS code.

CCC undertakes dimming of lamps on the network, this leads to over submission by the trader, as they are submitting more than is consumed. If it is assumed that 31,000 lights are dimmed by 20% for a quarter of the night and the average wattage per light is 67 watts (the current average from the database), then the total over submission is estimated to be:

31,000 * 0.067 * 4271 * 0.2 * 0.25 = 443,543 kWh per annum.

It is intended that submission will use the dimming profile that has recently been approved by the Electricity Authority for these lamps. This project is still progressing, and it is expected that the appropriate agreements will be in place and ICP's created to support this in the next few months.

The field audit was undertaken of a statistical sample of sample of 524 items of load on 4th - 8th March 2022. This found the database is not confirmed to be accurate 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 185 kW lower than the database indicates,
- there is a 95% level of confidence that the installed capacity is between 50 kW to 461 kW lower than the database,
- in absolute terms, total annual consumption is estimated to be 792,200 kWh lower than the DUML database indicates, and
- there is a 95% level of confidence that the annual consumption is between 212,900 kWh to 1,967,800 kWh p.a. lower to than the database indicates.

Orion manage the database and field work. The fault, maintenance, new connection, and upgrade work is completed by Orion's approved contractors. The contractors provide paperwork to Orion confirming that work is complete, and Orion uses this information to update the database.

This audit found four non-compliances, and no recommendations were raised. The future risk rating of 26 indicates that the next audit be completed in three months I have considered this in conjunction with Contact's responses and recommend that the next audit be in six months.

PARTICIPANT RESPONSE

The large LED deployment has caused some delays and timeliness issues in the database being updated, however we believe we have mitigated this risk by Orion providing 3 and 14 month revision database summaries that are used to revise submission values – so it does a short term impact on the market, however we believe we capture these changes before the market is finalised.

Work is progressing very well towards using the CMS and the new profiles available to submit consumption for the majority of the Council's lights, which will strengthen controls and account for all dimming. We hope to have this in place for the July submission period (processed August 2022) and our hope is that the authority takes this into account when scheduling the next audit. It would be great if the next audit cycle was looking into how the CMS and processes surrounding that was operating.