ELECTRICITY INDUSTRY PARTICIPATION CODE
DISTRIBUTED UNMETERED LOAD AUDIT REPORT

VERITEK

For

HUTT CITY COUNCIL AND CONTACT ENERGY LIMITED

Prepared by: Tara Gannon

Date audit commenced: 4 November 2019

Date audit report completed: 29 November 2019

Audit report due date: 1 December 2019

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EXECUTIVE SUMMARY

This audit of the **Hutt City Council (HCC)** 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. The scope of the audit encompasses the collection, security and accuracy of the data, including the preparation of submission information.

Streetlight information is recorded in a GIS database managed by HCC. New connection, fault and maintenance work is completed by Fulton Hogan, who provide database changes to HCC via email. HCC enters this information into the GIS. HCC provide a monthly report to Contact from the GIS.

A separate RAMM database is maintained by Fulton Hogan, and HCC is investigating using RAMM to provide submission information.

Database accuracy is described as follows:

Result	Percentage	Comments
The point estimate of R	90.3	Wattage from survey is higher than the database wattage by 9.7%
R_L	80.9	With a 95% level of confidence it can be concluded that the error could be between -3.3% and -19.1%
R_H	96.7	

The variability of the sample results across the strata means that the true wattage (installed in the field) could be between 3.1% and 19.1% 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 127 kW lower than the database indicates.
- There is a 95% level of confidence that the installed capacity is between 43 kW to 250 kW lower than the database.
- In absolute terms, total annual consumption is estimated to be 540,600 kWh lower than the DUML database indicates.
- There is a 95% level of confidence that the annual consumption is between 182,800 to 1,069,300 kWh p.a. lower than the database indicates.

Contact reconciles this DUML load using the HHR profile. Submissions are based on the database information, with on and off times derived from data logger information.

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

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

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

The future risk rating of 33 indicates that the next audit be completed in three months. During the audit period the Traffic Engineer Network Operations who maintained the database resigned, and responsibility for database maintenance shifted. This combined with an increased number of database changes due to the LED upgrade appears to have led to some late updates of upgraded lights and database inaccuracy. I recommend that the next audit be completed in a minimum of six months, to enable time for the new team to improve database processes and accuracy.

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 as recorded in **section 3.1**. 23 items of load do not have model or wattage information recorded. 14 items of load have inaccurate wattages recorded. 47 items of load do not have ICP numbers recorded in the database. Six items of load had incorrect ICP numbers recorded in the database and were corrected during the audit. The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot. Livening dates are not recorded for new connections, and change dates may not reflect the date the change is made.	Weak	Low	9	Identified
ICP identifier and items of load	2.2	11(2)(a) and (aa) of Schedule 15.3	46 unmetered items of load do not have an ICP number assigned.	Moderate	Medium	4	Identified
Description and capacity of load	2.4	11(2)(c) and (d) of Schedule 15.3	23 items of load do not have model or wattage information recorded.	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.	Weak	Low	9	Identified

Subject	Section	Clause	Non-Compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
			23 items of load do not have model or wattage information recorded. 14 items of load have inaccurate wattages recorded. 47 items of load do not have ICP numbers recorded in the database. Six items of load had incorrect ICP numbers recorded in the database and were corrected during the audit. The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot. Livening dates are not recorded for new connections, and change dates may not reflect the date the change is made.				
Volume information accuracy	3.2	15.2 and 15.37B(c)	The database is not confirmed as accurate with a 95% level of confidence as recorded in **section 3.1**. 23 items of load do not have model or wattage information recorded. 14 items of load have inaccurate wattages recorded. 47 items of load do not have ICP numbers recorded in the database. Six items of load had incorrect ICP numbers recorded in the database and were corrected during the audit. The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot. Livening dates are not recorded for new connections, and change dates may not reflect the date the change is made.	Weak	Low	9	Identified
Future Risk Rating						33	

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
Database accuracy	3.1	Confirm and record correct wattages for Christmas lights.

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.

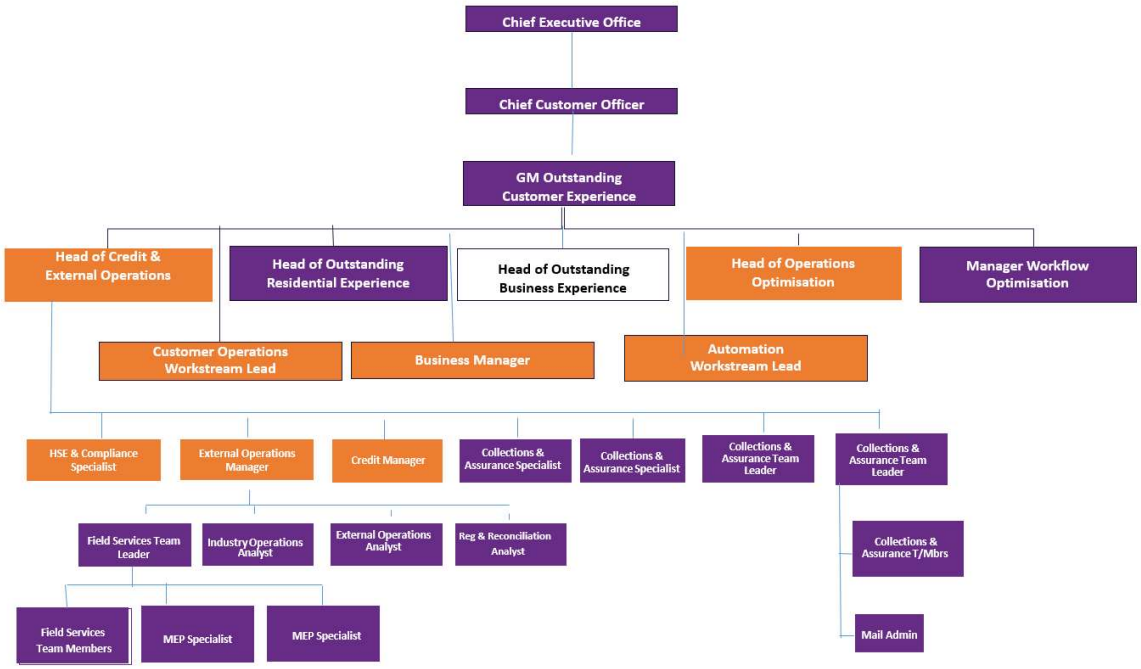
Audit commentary

There is one exemption in place relevant to the scope of this audit:

Exemption No. 177: Exemption to clause 8(g) of schedule 15.3 of the Electricity Industry Participation Code 2010 ("Code") in respect of providing half-hour ("HHR") submission information instead of non half-hour ("NHH") submission information for distributed unmetered load ("DUML"). This exemption expires at the close of 31 October 2023.

1.2. Structure of Organisation

Contact Energy provided a copy of their organisational structure.



1.3. Persons involved in this audit

Auditor:

Tara Gannon

Veritek Limited

Electricity Authority Approved Auditor

Other personnel assisting in this audit were:

Name	Title	Company
Graham Carson	Traffic Asset Manager	Hutt City Council
Threesa Malki	Traffic Engineer	Hutt City Council
Tate Kelly	Maintenance Manager Commercial Signals	Hutt City Council
Nigel Parkin	Contracts Officer Contracts Division - City Infrastructure	Hutt City Council
Allie Jones	External Operations	Contact Energy
Rajdeep Kaur	Registry and Reconciliation Analyst	Contact Energy

1.4. Hardware and Software

HCC's GIS is used to record streetlight information. The database is backed up as part of HCC's network back ups, and 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	Profile	Number of items of load	Database wattage (watts)
0001255305UNA9F	SL LH	MLG0111	HHR	2,828	263,847
0001256863UN50E	SHP17 HUTT ROAD	MLG0331	HHR	5,128	435,701
0001256864UN8C4	SHP1 HUTT ROAD	GFD0331	HHR	5,162	494,331.7
0001256868UNBDA	MASTER STL ICP HCC HAY0111	HAY0111	HHR	1,631	114,089
Total				**14,749**	**1,307,968.7**

1.7. Authorisation Received

All information was provided directly by Contact or HCC.

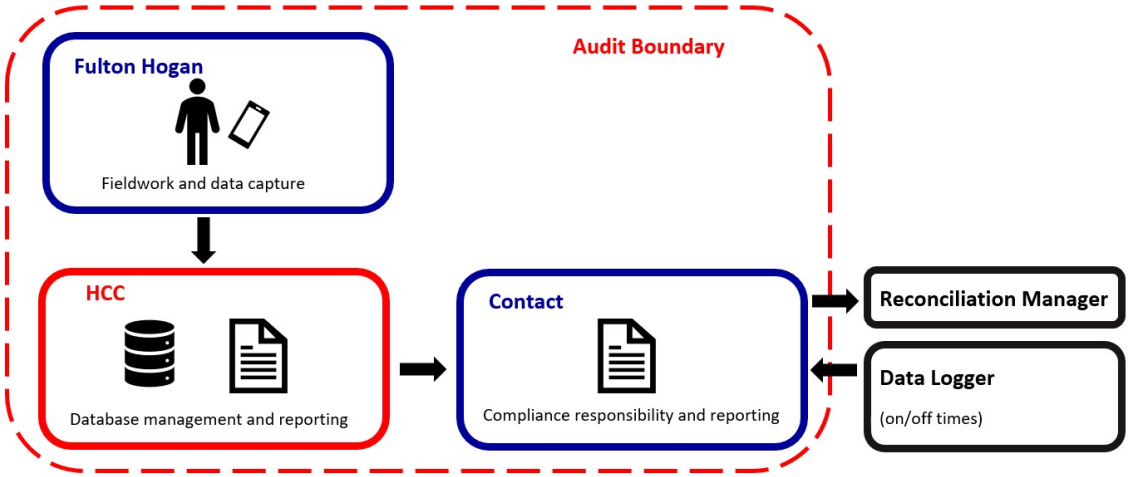
1.8. Scope of Audit

This audit of the HCC 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.

Streetlight information is recorded in a GIS database managed by HCC. New connection, fault and maintenance work is completed by Fulton Hogan, who provide database changes to HCC via email. HCC enters this information into the GIS. HCC provide a monthly report to Contact from the GIS.

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 317 items of load on 4 November 2019.

1.9. Summary of previous audit

The previous audit of this database was undertaken by Tara Gannon of Veritek Limited in April 2018. 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.

Subject	Section	Clause	Non-compliance	Status
Deriving submission information	2.1	11(1) of Schedule 15.3	The database used to prepare submissions contains some inaccurate information.	Still existing
Description and capacity of load	2.4	11(2)(c) and (d) of Schedule 15.3	Six lights connected to HCC ICPs do not have make and model information recorded.	Still existing

Subject	Section	Clause	Non-compliance	Status
Database accuracy	3.1	15.2 and 15.37B(b)	The database used to prepare submissions contains some inaccurate information.	Still existing
Volume information accuracy	3.2	15.2 and 15.37B(c)	The database used to prepare submissions contains some inaccurate information. Incorrect profiles are recorded on the registry.	Still existing

Subject	Section	Description	Recommendation	Status
Database accuracy	3.1	Database accuracy	Confirm and record correct wattages for Christmas lights.	Not yet implemented

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 HHR profile, in accordance with exemption number 177. This exemption is discussed further in **section 1.1**.

- Submissions are based on the database information. The database is not confirmed as accurate with a 95% level of confidence as recorded in **section 3.1**.
- On and off times are derived from data logger information.

Festive light information is provided with connection and disconnection dates, and they are included in submission data when connected.

I reviewed the submission information for September 2019, and confirmed that it was calculated accurately based on the database wattage information and logger hours.

Sources of inaccuracy are as follows:

Issue	Estimated volume information impact (annual kWh)
23 items of load do not have model or wattage information recorded.	Unknown under submission
14 items of load have inaccurate wattages recorded.	Over submission of 98 kWh per annum
47 items of load do not have ICP numbers recorded in the database.	Under submission of 11,570 kWh per annum
Six items of load had incorrect ICP numbers recorded in the database and were corrected during the audit.	None, because all ICPs are in the same balancing area.

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

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

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

The database contains an "edited date", and "last serviced date" but there is not a field for "livening date" for newly connected lights. The "edited date" is automatically populated with the date the change occurred, and the "last serviced date" indicates when the work was completed. Where there is a delay in entering a change, the change date may be incorrect.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.1 With: Clause 11(1) of Schedule 15.3 From: 01-Oct-19 To: 31-Oct-19	The database is not confirmed as accurate with a 95% level of confidence as recorded in **section 3.1**. 23 items of load do not have model or wattage information recorded. 14 items of load have inaccurate wattages recorded. 47 items of load do not have ICP numbers recorded in the database. Six items of load had incorrect ICP numbers recorded in the database and were corrected during the audit. The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot. Livening dates are not recorded for new connections, and change dates may not reflect the date the change is made. Potential impact: High Actual impact: Unknown Audit history: Once Controls: Weak Breach risk rating: 9
Audit risk rating	**Rationale for audit risk rating**
High	The controls over the database are rated as weak. Based on the field audit findings there appear to be delays in entering updated light information (e.g. SON lights in the database when LEDs were present on the street), and some issues with information accuracy (e.g. different LED lights recorded in the database to in the field). The update process will not necessarily ensure that the correct change date is recorded where an existing light is changed. The audit risk rating is high based on kWh variances discussed in **section 3.1**.

Actions taken to resolve the issue	Completion date	Remedial action status
Contact will work with HCC to update their database to ensure accuracy of model/wattage and correct ICP number Contact will work with the customer to ensure that they are setup to deliver their data for any given time, as required by the EA Contact will work with HCC to ensure that their process for New Connections reflects actual usage.	Ongoing	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
Contact will complete quarterly database checks to ensure the accuracy of HCC's database	Ongoing	

2.2. ICP identifier and items of load (Clause 11(2)(a) and (aa) of Schedule 15.3)

Code reference

Clause 11(2)(a) and (aa) of Schedule 15.3

Code related audit information

The DUML database must contain:

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

Audit observation

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

Audit commentary

47 items of load do not have ICP numbers recorded in the database.

- 46 items of load (2,686 W) have the ICP listed as Properties UrbanPlus. 44 are at the Petone Library and should be connected to 0001256863UN50E, and two are at Walter Nash Park and should be connected to 0001255305UNA9F.
- Object ID 14238 (23 W), which is recorded against GFD0331 and should have had 0001256864UN8C4 assigned.

The accuracy of ICP numbers is discussed in **section 3.1**.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.2 With: Clause 11(2)(a) and (aa) of Schedule 15.3 From: 01-Oct-19 To: 31-Oct-19	46 unmetered items of load do not have an ICP number assigned. Potential impact: Medium Actual impact: Medium Audit history: None Controls: Moderate Breach risk rating: 4
Audit risk rating	**Rationale for audit risk rating**
Medium	The controls over the database are rated as moderate. The missing ICP for object ID 14238 occurred due to an oversight, and invalid ICP numbers for Properties UrbanPlus related to a specific group of lights and did not affect the wider database. The impact is assessed to be medium. The total wattage not recorded against an ICP number is 2709 W or 11,570 kWh per annum based on 4,271 burn hours.

Actions taken to resolve the issue	Completion date	Remedial action status
Contact will work with HCC to ensure that they have the correct ICP added for each item of unmetered load	Ongoing	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
Contact will complete quarterly database checks to ensure the accuracy of HCC's database	Ongoing	

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

Global Positioning System (GPS) coordinates and location IDs are recorded for all items of load and users in the office and field can view these locations on a mapping system.

The database contains the nearest property address for most items of load, but 1,397 items have no street address information recorded.

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

Lamp model information is included in the database, and the corresponding ballast and true (total) wattage is maintained in a separate wattage table.

23 items of load do not have any lamp model information recorded. Because the lamp model information is used to determine the correct wattage from the wattage table, the missing values result in no wattage being recorded for these lamps.

OBJECTID_1	prop_address	ICP_NO	Specify Owner if Other
2457	14 Rail Way HUTT CENTRAL	1256864UN8C4	
2458	14 Rail Way HUTT CENTRAL	1256864UN8C4	
2459	14 Rail Way HUTT CENTRAL	1256864UN8C4	
4122	14 Rail Way HUTT CENTRAL	1256864UN8C4	
4802	62 Penrose Street WOBURN	1255305UNA9F	Private
6998	8O Cambridge Terrace WAIWHETU	1256863UN50E	
10202	37A Bloomfield Terrace HUTT CENTRAL	1256863UN50E	
10203	37A Bloomfield Terrace HUTT CENTRAL	1256863UN50E	
13950		1256863UN50E	
13951		1256863UN50E	
14002		1256864UN8C4	
14056		1256868UNBDA	
14058		1256868UNBDA	
14059		1256868UNBDA	

OBJECTID_1	prop_address	ICP_NO	Specify Owner if Other
14060		1256868UNBDA	
14061		1255305UNA9F	Private
14062		1255305UNA9F	Private
14063		1256863UN50E	Private
14064		1256863UN50E	Private
14065		1256864UN8C4	Private
14151		1256863UN50E	
14244		1256863UN50E	
14245		1256863UN50E	

Where populated, lamp models have a corresponding wattage recorded in the wattage table. No lamp or gear wattages were invalidly recorded as zero in the wattage table. 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: 01-Oct-19 To: 31-Oct-19	23 items of load do not have model or wattage information recorded. Potential impact: Low Actual impact: None Audit history: Once Controls: Moderate Breach risk rating: 2
Audit risk rating	**Rationale for audit risk rating**
Low	The controls are rated as moderate, because they are sufficient to ensure that lamp information is correctly recorded most of the time. The impact is assessed to be low, because a small 23 lamps are affected, and the wattage is expected to be low.

Actions taken to resolve the issue	Completion date	Remedial action status
Contact will work with HCC to ensure their data is accurate	Ongoing	Identified

Preventative actions taken to ensure no further issues will occur	Completion date	
Contact will complete quarterly database checks to ensure the accuracy of HCC's database	Ongoing	

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 317 items of load on 4 November 2019.

Because street address information is not consistently populated, but GPS coordinates are, I plotted all the coordinates on a chart and used gridlines to divide the chart into sections to form the strata. I numbered each of the sections on the chart and used a random number generator in a spreadsheet to select a total of three sub-units.

Audit commentary

The field audit discrepancies are detailed in the table below:

Street	Database count	Field count	Light count difference	Wattage recorded incorrectly	Comments
August Street	12	12	-	1	1 x L27 recorded in the database as LED 23W
Castle Crescent	3	3	-	3	3 x L23 recorded in the database as 1 x 50W SON and 2 x LED 22W
Delaney Drive	20	20	-	6	6 x L23 were recorded in the database as 4 x L22 and 2 x 50W SON
Hine Road	29	29	-	7	7 x L23 were recorded in the database as 1 x 250W MH, 2 x 22W LED and 4 x 50W SON
Kaitawa Street	1	1	-	1	1 x L27 recorded in the database as LED 22W
Kingsley Street	14	14	-	11	11 x L23 recorded in the database as 10 x 50W SON and 1 x LED 22W
Kowhai Street	9	9	-	1	1 x L23 recorded in the database as LED 22W
Lord Street	13	13	-	11	11 x L23 recorded in the database as 10 x 50W SON and 1 x L22

Street	Database count	Field count	Light count difference	Wattage recorded incorrectly	Comments
Manor Drive	12	12	-	10	10 x L23 recorded in the database as 50W SON
McDougall Grove	9	9	-	1	1 x L22 recorded in the database as 25W LED
McManaway Grove	3	3	-	3	3 x L23 recorded in the database as 50W SON
Peterkin Street	14	14	-	1	1 x L23 recorded in the database as LED 22W
Raukawa Street	10	10	-	2	2 x L22 recorded in the database as 1 x LED 23W and 1 x 50W SON
Rimu Street	7	7	-	1	1 x L23 recorded in the database as 50W SON
Robson Street	6	6	-	6	6 x L23 recorded in the database as 50W SON
Thomas Street	3	3	-	3	3 x L23 recorded in the database as 2 x 50W SON and 1 x 150W SON
Thomson Grove	8	8	-	1	1 x L27 recorded in the database as LED 22W
York Avenue	2	2	-	2	1 x 50W SON and 1 x L23 recorded in the database as 1 x 27W LED and 1 x 22W LED
Grand Total	**317**	**317**	**-**	**71**	

This clause relates to lights in the field that are not recorded in the database. The audit did not find any additional lights in the field. Wattage differences found during the field audit are recorded as non-compliance in **section 3.1**.

Audit outcome

Compliant

2.6. Tracking of load changes (Clause 11(3) of Schedule 15.3)

Code reference

Clause 11(3) of Schedule 15.3

Code related audit information

The DUML database must track additions and removals in a manner that allows the total load (in kW) to be retrospectively derived for any given day.

Audit observation

The process for tracking of changes in the database was examined.

Audit commentary

The database functionality achieves compliance with the code.

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

Audit outcome

Compliant

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

Code reference

Clause 11(4) of Schedule 15.3

Code related audit information

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

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

Audit observation

The database was checked for audit trails.

Audit commentary

The database has a complete audit trail, which was viewed during the audit.

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

Contact's submissions are based on a monthly extract from the database. A database extract was provided in October 2019 and I assessed the accuracy of this by using the DUML Statistical Sampling Guideline. The table below shows the survey plan.

Plan Item	Comments
Area of interest	Hutt City Council Street Lights
Strata	The database contains the HCC items of load for DUML ICPs in the Hutt region. Because street address information is not consistently populated, but GPS coordinates are, I plotted all the coordinates on a chart and used gridlines to divide the chart into sections to form the strata.
Area units	I numbered each of the sections on the chart and used a random number generator in a spreadsheet to select a total of three sub-units.
Total items of load	317 items of load were checked, making up approximately 2.5% of the database.

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

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

Audit commentary

Field audit findings

A field audit was conducted of a statistical sample of 317 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	90.3	Wattage from survey is higher than the database wattage by 9.7%
R_L	80.9	With a 95% level of confidence it can be concluded that the error could be between -3.3% and -19.1%
R_H	96.7	

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

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 3.1% and 19.1% 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 127 kW lower than the database indicates.

There is a 95% level of confidence that the installed capacity is between 43 kW to 250 kW lower than the database.

In absolute terms, total annual consumption is estimated to be 540,600 kWh lower than the DUML database indicates.

There is a 95% level of confidence that the annual consumption is between 182,800 to 1,069,300 kWh p.a. lower than the database indicates.

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

Light description and capacity accuracy

As discussed in **section 2.4**, 23 items of load do not have any lamp model information recorded. Because the lamp model information is used to determine the correct wattage from the wattage table, the missing values result in no wattage being recorded for these lamps.

Wattages for all items of load were checked against the published standardised wattage tables produced by the Electricity Authority and Veritek, or the manufacturer's specifications. The following discrepancies were identified, and HCC confirmed the correct total wattage.

Lamp Type	Count	Total wattage	Correct total wattage	Total wattage difference	Annual kWh difference (based on 4,271 hours)
MCF – 40W MCF	3	51	58	+21	+90
58W FLUORO	11	62	58	-44	-188
Total	14			-23	-98

Some signs are recorded in the database. These have two batteries drawing 50W which are charged when the streetlight circuit is connected, which power the signs when the streetlight circuit is switched off. The wattages for these signs are correctly recorded.

ICP number accuracy

As recorded in **section 2.2**, 47 items of load do not have ICP numbers recorded in the database.

GXP accuracy

I compared the NSP and ICP recorded for each item of load, and found six object IDs (5730, 13162, 4873, 5803, 14065 and 14148) with discrepancies. In all cases the NSP was correctly recorded, and the ICP number was updated during the audit. All of the NSPs are within the same balancing area, and there was no impact on reconciliation results.

Change management process findings

Streetlight information is recorded in a GIS database managed by HCC. New connection, fault and maintenance work is completed by Fulton Hogan, who provide database changes to HCC via email. HCC enters this information into the GIS. HCC provide a monthly report to Contact from the GIS.

Data is reviewed by Contact Energy prior to billing and submission to identify missing or inconsistent information, and any discrepancies are referred to HCC.

An LED upgrade project is underway, and a CMS will be used for new installations and retrofitted to existing LEDs. HCC intends to work with Contact Energy to ensure that use of the CMS is handled compliantly.

I walked through the new connection process. The new connections process for subdivisions has the following steps:

1. A plan is prepared by the developer and approved by HCC.
2. The installation is completed.
3. HCC notifies Contact that livening is required.
4. Contact requests livening from Wellington Electricity.
5. An “as built” plan is provided to HCC.
6. The database is updated.

Steps 5 and 6 can be delayed in some cases. I did not see any examples of late updates for new connections during the audit.

The current monthly report is provided as a snapshot and is non-compliant. The database contains an “edited date”, and “last serviced date” but there is not a field for “livening date” for newly connected lights. The “edited date” is automatically populated with the date the change occurred, and the “last serviced date” indicates when the work was completed. Where there is a delay in entering a change, the change date may be incorrect.

Outage patrols occur weekly in the CBD, and the faults process is relied upon to identify issues with other lights.

Festive lights

Festive lights are recorded in the database and reported separately with on and off dates when they are connected.

All 149 Christmas lights are recorded with 19 W per Christmas light, rather than the true wattage of each light. HCC advised that the average Lower Hutt CBD pole with festive lights has a 15 lamp holder harness and draws 45W. I recommend that the database is updated to reflect the correct wattage for the Christmas lights recorded in the database.

Description	Recommendation	Audited party comment	Remedial action
Database accuracy	Confirm and record correct wattages for Christmas lights.	Contact will work with HCC to ensure the accuracy of festive lighting	Identified

Private lights

There are 42 private lights recorded in the database, and each has a valid ICP number assigned. Six of the private lights do not have any model or wattage information recorded, and this is recorded as non-compliance above and in **section 2.4**.

HCC does not bill consumers for these lights, and does not expect to be billed for them. They are included in the database for completeness, and so that HCC is aware that the are private in the event that a fault is recorded.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 3.1 With: Clause 15.2 and 15.37B(b) From: 01-Oct-19 To: 31-Oct-19	The database is not confirmed as accurate with a 95% level of confidence. 23 items of load do not have model or wattage information recorded. 14 items of load have inaccurate wattages recorded. 47 items of load do not have ICP numbers recorded in the database. Six items of load had incorrect ICP numbers recorded in the database and were corrected during the audit. The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot. Livening dates are not recorded for new connections, and change dates may not reflect the date the change is made. Potential impact: High Actual impact: Unknown Audit history: Once Controls: Weak Breach risk rating: 9

Audit risk rating	Rationale for audit risk rating
High	The controls over the database are rated as weak. Based on the field audit findings there appear to be delays in entering updated light information (e.g. SON lights in the database when LEDs were present on the street), and some issues with information accuracy (e.g. different LED lights recorded in the database to in the field). The update process will not necessarily ensure that the correct change date is recorded where an existing light is changed. The audit risk rating is high based on the potential kWh variances identified during the field audit. A small amount of database information was found to be incomplete or inaccurate.

Actions taken to resolve the issue	Completion date	Remedial action status
Contact will work with HCC to update their database to ensure accuracy of model/wattage and correct ICP number Contact will work with the customer to ensure that they are setup to deliver their data for any given time, as required by the EA Contact will work with HCC to ensure that their process for New Connections reflects actual usage.	Ongoing	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
Contact will complete quarterly database checks to ensure the accuracy of HCC's database	Ongoing	

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

Code reference

Clause 15.2 and 15.37B(c)

Code related audit information

The audit must verify that:

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

Audit observation

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

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

Audit commentary

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

Contact reconciles this DUML load using the HHR profile, in accordance with exemption number 177. This exemption is discussed further in **section 1.1**.

- Submissions are based on the database information. The database is not confirmed as accurate with a 95% level of confidence as recorded in **section 3.1**.
- On and off times are derived from data logger information.

Festive light information is provided with connection and disconnection dates, and they are included in submission data when connected.

I reviewed the submission information for September 2019, and confirmed that it was calculated accurately based on the database wattage information and logger hours.

Sources of inaccuracy are as follows:

Issue	Estimated volume information impact (annual kWh)
23 items of load do not have model or wattage information recorded.	Unknown under submission
14 items of load have inaccurate wattages recorded.	Over submission of 98 kWh per annum
47 items of load do not have ICP numbers recorded in the database.	Under submission of 11,570 kWh per annum
Six items of load had incorrect ICP numbers recorded in the database and were corrected during the audit.	None, because all ICPs are in the same balancing area.

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

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

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

The database contains an "edited date", and "last serviced date" but there is not a field for "livening date" for newly connected lights. The "edited date" is automatically populated with the date the change occurred, and the "last serviced date" indicates when the work was completed. Where there is a delay in entering a change, the change date may be incorrect.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 3.2 With: Clause 15.2 and 15.37B(c) From: 01-Oct-19 To: 31-Oct-19	The database is not confirmed as accurate with a 95% level of confidence as recorded in **section 3.1**. 23 items of load do not have model or wattage information recorded. 14 items of load have inaccurate wattages recorded. 47 items of load do not have ICP numbers recorded in the database. Six items of load had incorrect ICP numbers recorded in the database and were corrected during the audit. The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot. Livening dates are not recorded for new connections, and change dates may not reflect the date the change is made. Potential impact: High Actual impact: Unknown Audit history: Once Controls: Weak Breach risk rating: 9
Audit risk rating	**Rationale for audit risk rating**
High	The controls over the database are rated as weak. Based on the field audit findings there appear to be delays in entering updated light information (e.g. SON lights in the database when LEDs were present on the street), and some issues with information accuracy (e.g. different LED lights recorded in the database to in the field). The update process will not necessarily ensure that the correct change date is recorded where an existing light is changed. The audit risk rating is high based on kWh variances discussed in **section 3.1**.

Actions taken to resolve the issue	Completion date	Remedial action status
Contact will work with HCC to update their database to ensure accuracy of model/wattage and correct ICP number Contact will work with the customer to ensure that they are setup to deliver their data for any given time, as required by the EA Contact will work with HCC to ensure that their process for New Connections reflects actual usage.	Ongoing	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
Contact will complete quarterly database checks to ensure the accuracy of HCC's database	Ongoing	

CONCLUSION

This audit of the **Hutt City Council (HCC)** 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. The scope of the audit encompasses the collection, security and accuracy of the data, including the preparation of submission information.

Streetlight information is recorded in a GIS database managed by HCC. New connection, fault and maintenance work is completed by Fulton Hogan, who provide database changes to HCC via email. HCC enters this information into the GIS. HCC provide a monthly report to Contact from the GIS.

A separate RAMM database is maintained by Fulton Hogan, and HCC is investigating using RAMM to provide submission information.

Database accuracy is described as follows:

Result	Percentage	Comments
The point estimate of R	90.3	Wattage from survey is higher than the database wattage by 9.7%
R_L	80.9	With a 95% level of confidence it can be concluded that the error could be between -3.3% and -19.1%
R_H	96.7	

The variability of the sample results across the strata means that the true wattage (installed in the field) could be between 3.1% and 19.1% 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 127 kW lower than the database indicates.
- There is a 95% level of confidence that the installed capacity is between 43 kW to 250 kW lower than the database.
- In absolute terms, total annual consumption is estimated to be 540,600 kWh lower than the DUML database indicates.
- There is a 95% level of confidence that the annual consumption is between 182,800 to 1,069,300 kWh p.a. lower than the database indicates.

Contact reconciles this DUML load using the HHR profile. Submissions are based on the database information, with on and off times derived from data logger information.

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

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

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

The future risk rating of 33 indicates that the next audit be completed in three months. During the audit period the Traffic Engineer Network Operations who maintained the database resigned, and responsibility for database maintenance shifted. This combined with an increased number of database changes due to the LED upgrade appears to have led to some late updates of upgraded lights and database inaccuracy. I recommend that the next audit be completed in a minimum of six months, to enable time for the new team to improve database processes and accuracy.

PARTICIPANT RESPONSE

Contact understands that there have been staffing changes at HCC which is effecting their database accuracy

Contact will continue to work with HCC to ensure they understand the level of accuracy that is required for DUML

Contact will also recommend a full audit of the database is conducted to ensure it holds the correct information