ELECTRICITY INDUSTRY PARTICIPATION CODE
DISTRIBUTED UNMETERED LOAD AUDIT REPORT

VERITEK

For

CARTERTON DISTRICT COUNCIL AND MERCURY ENERGY LIMITED

Prepared by: Tara Gannon

Date audit commenced: 27 February 2020

Date audit report completed: 14 May 2020

Audit report due date: 1 June 2020

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EXECUTIVE SUMMARY

This audit of the **Carterton District Council (CDC)** DUML database and processes was conducted at the request of **Mercury Energy Limited (Mercury)** in accordance with clause 15.37B. The purpose of this audit is to verify that the volume information is being calculated accurately, and that profiles have been correctly applied.

The audit was conducted in accordance with the audit guidelines for DUML audits version 1.1. The scope of the audit encompasses the collection, security and accuracy of the data, including the preparation of submission information.

The CDC DUML ICP switched to Mercury on 01/10/2019.

A RAMM database is held by CDC. **Power Services Wairarapa (PSW)** are responsible for all field work including new connections, removals, repairs and maintenance. Fulton Hogan inspect the work completed by PSW and provide support as necessary. PSW update RAMM using a PC at Fulton Hogan's office in Masterton, because they do not have access to update RAMM remotely.

Mercury reconciles the CDC DUML load using the HHR profile in accordance with exemption 233. Wattages are derived from the monthly database extracts provided by CDC, and on and off times are derived from data logger information.

A field audit was conducted of a statistical sample of 139 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	101.0	Wattage from the survey is higher than the database wattage by 1.0%
R_L	98.8	With a 95% level of confidence it can be concluded that the error could be between -1.2% and +2.7%
R_H	102.7	

These results were categorised in accordance with the "Distributed Unmetered Load Statistical Sampling Audit Guideline", effective from 01/02/19. The best available estimate indicates that the database is accurate within ± 5.0%.

- The variability of the sample results across the strata means that the true wattage (installed in the field) could be between 1.2% lower and 2.7% higher than the wattage recorded in the DUML database.
- In absolute terms the installed capacity is estimated to be 0 kW higher than the database indicates.
- There is a 95% level of confidence that the installed capacity is between 0 kW and 1 kW higher than the database.
- In absolute terms, total annual consumption is estimated to be 1,800 kWh higher than the DUML database indicates.
- There is a 95% level of confidence that the annual consumption is between 300 kWh lower and 4,900 kWh higher than the database indicates.

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, which is non-compliant. Mercury applies the kW value for the last day of the month when calculating submission volumes. Mercury completes revision submissions where corrections are required, and has not yet updated their processes to be compliant with the Authority's memo.

Five non-compliances were identified, and one recommendation was raised. The future risk rating of 12 indicates that the next audit be completed in 12 months. I recommend that the next audit is completed in 18 months based on the relatively small number of exceptions, and that CDC and Mercury intend to work together to resolve the issues.

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 contains some inaccurate data. • Six items of load do not have an ICP number recorded. There is no impact because the RAMM database extract is manually amended to include the missing information before it is provided to Mercury. • One light (pole ID 939) has a lamp model of UNK (UNK, 0 watts) with a zero lamp and gear wattage recorded. I found that the light was a CA 7022 24 LED (21W) and the light details and wattage had been manually added to the extract that was provided to Mercury for submission. • Four LED lights (pole IDs 900, 901, 904 and 905) have a blank gear wattage but zero should be recorded. • 15 ITAL (ITRO, 55 watts) have a lamp wattage which differs from the expected value in the lamp specifications. • Two PH (50E, 50 watts) and two UNK (50E, 50 watts) have a gear wattage which differs from Authority's standardised wattages. The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot.	Moderate	Low	2	Identified
ICP identifier and items of load	2.2	11(2)(a) and (aa) of Schedule 15.3	Six items of load do not have an ICP number recorded.	Moderate	Low	2	Identified
Description and capacity of load	2.4	11(2)(c) and (d) of Schedule 15.3	One item of load connected to ICP 0020903000WRADA (pole ID 939) has a lamp model of UNK (UNK, 0 watts) and a zero lamp and gear wattage in the database. The correct lamp details and wattages are manually added prior to providing the database extract to Mercury. Four items of load connected to ICP 0020903000WRADA (pole IDs 900, 901, 904 and 905) have a blank gear wattage but zero is expected.	Moderate	Low	2	Identified

Subject	Section	Clause	Non-Compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
			Three items of load with a blank ICP number have no lamp model, lamp wattage or gear wattage recorded in the database. The correct lamp details and wattages are manually added prior to providing the database extract to Mercury.				
Audit trail	2.7	11(4) of Schedule 15.3	Where manual changes to the database extract occur to populate missing information, an audit trail is not created.	Moderate	Low	2	Identified
Database accuracy	3.1	15.2 and 15.37B(b)	The database contains some inaccurate data. • Six items of load do not have an ICP number recorded. There is no impact because the RAMM database extract is manually amended to include the missing information before it is provided to Mercury. • One light (pole ID 939) has a lamp model of UNK (UNK, 0 watts) with a zero lamp and gear wattage recorded. I found that the light was a CA 7022 24 LED (21W) and the light details and wattage had been manually added to the extract that was provided to Mercury for submission. • Four LED lights (pole IDs 900, 901, 904 and 905) have a blank gear wattage but zero should be recorded. • 15 ITAL (ITRO, 55 watts) have a lamp wattage which differs from the expected value in the lamp specifications. • Two PH (50E, 50 watts) and two UNK (50E, 50 watts) have a gear wattage which differs from Authority's standardised wattages.	Moderate	Low	2	Identified
Volume information accuracy	3.2	15.2 and 15.37B(c)	The database contains some inaccurate data. • Six items of load do not have an ICP number recorded. There is no impact because the RAMM database extract is manually amended to include the missing information before it is provided to Mercury. • One light (pole ID 939) has a lamp model of UNK (UNK, 0 watts) with a zero lamp and gear wattage recorded. I found that the light was a CA 7022 24 LED (21W) and the light details and wattage had been	Moderate	Low	2	Identified

Subject	Section	Clause	Non-Compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
			manually added to the extract that was provided to Mercury for submission. • Four LED lights (pole IDs 900, 901, 904 and 905) have a blank gear wattage but zero should be recorded. • 15 ITAL (ITRO, 55 watts) have a lamp wattage which differs from the expected value in the lamp specifications. • Two PH (50E, 50 watts) and two UNK (50E, 50 watts) have a gear wattage which differs from Authority's standardised wattages. The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot.				
Future Risk Rating						12	

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 the correct lamp wattages for ITAL (ITRO, 55 watts). Confirm the correct gear wattages for PH (50E, 50 watts) and UNK (50E, 50 watts). Update RAMM as necessary with the confirmed wattages.

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

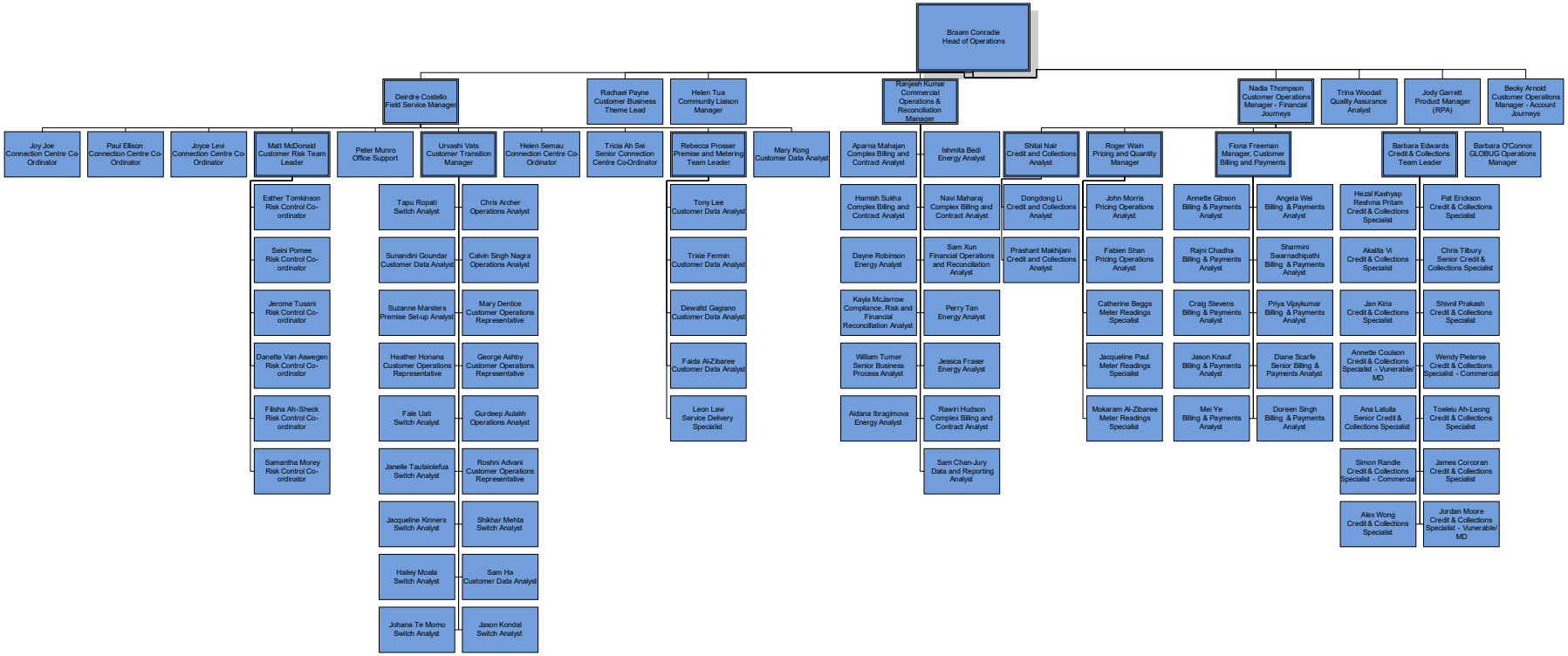
Current code exemptions were reviewed on the Electricity Authority website.

Audit commentary

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

1.2. Structure of Organisation

Mercury provided their current 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
Jean-Paul Irwin	Network Operations	Ruamāhanga Roads, a joint roading venture with Carterton and South Wairarapa District Councils
Bernie Lett	Director	Power Services Wairarapa
Kayla McJarrow	Compliance, Risk & Financial Reconciliation Analyst	Mercury Energy

1.4. Hardware and Software

RAMM

The SQL database used for the management of DUML is remotely hosted by RAMM Software Ltd. The database is commonly known as "RAMM" which stands for "Roading Asset and Maintenance Management". The specific module used for DUML is called RAMM Contractor.

RAMM Software Limited backs up the database and assists with disaster recovery as part of their hosting service. Nightly backups are performed. As a minimum, daily backups are retained for the previous five working days, weekly backups are retained for the previous four weeks, and monthly backups are retained for the previous six months.

Access to the database is secure by way of password protection.

Mercury systems

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

ICP Number	Description	NSP	Profile	Number of items of load	Database wattage (watts)
0020903000WRADA	STREET LIGHTING CARTERTON	MST0331	HHR	744	42,476
Blank	-	-	-	6	89
Total				750	42,565

Six items of load did not have an ICP number recorded in the database, and I found these were manually corrected to 0020903000WRADA in the database extract provided to Mercury. The missing ICPs numbers are recorded as non-compliance in **section 2.2**.

1.7. Authorisation Received

All information was provided directly by Mercury, PSW or Ruamāhanga Roads.

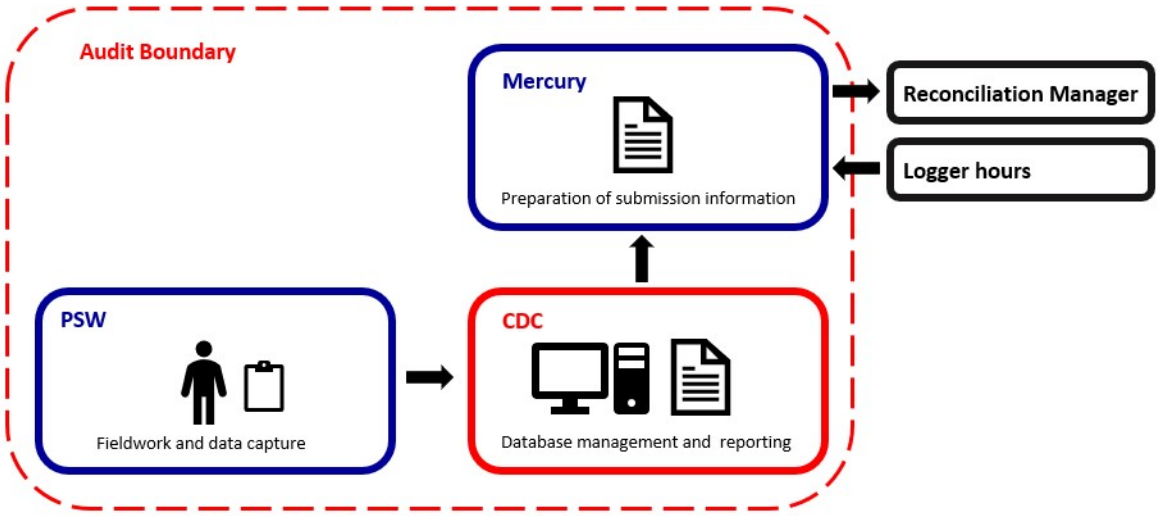
1.8. Scope of Audit

This audit of the CDC DUML database and processes was conducted at the request of Mercury in accordance with clause 15.37B. The purpose of this audit is to verify that the volume information is being calculated accurately, and that profiles have been correctly applied. The audit was conducted in accordance with the audit guidelines for DUML audits version 1.1.

A RAMM database is held by CDC. PSW are responsible for all field work including new connections, removals, repairs and maintenance. Fulton Hogan inspect the work completed by PSW and provide support as necessary. PSW update RAMM using a PC at Fulton Hogan's office in Masterton, because they do not have access to update RAMM remotely.

Mercury reconciles the CDC DUML load using the HHR profile in accordance with exemption 233. Wattages are derived from the monthly database extracts provided by CDC, and on and off times are derived from data logger information.

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 139 items of load on 27 February 2020.

1.9. Summary of previous audit

The previous audit of this database was undertaken by Tara Gannon of Veritek Limited in September 2017. 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
Profiles	2.1	11(1) of Schedule 15.3	An incorrect profile is recorded on the registry for ICP 0020903000WRADA.	Cleared.
Wattages	2.4	11(2)(c) & (d) of Schedule 15.3	113 lamps have incorrect gear wattage.	Most exceptions have been corrected but some discrepancies still exist.
Database accuracy	3.1	Clause 15.2 & 15.37(b)	113 lamps have incorrect gear wattage.	Most exceptions have been corrected but some discrepancies still exist.

1.10. Distributed unmetered load audits (Clause 16A.26 and 17.295F)

Code reference

Clause 16A.26 and 17.295F

Code related audit information

Retailers must ensure that DUML database audits are completed:

1. *by 1 June 2018 (for DUML that existed prior to 1 June 2017)*
2. *within three months of submission to the reconciliation manager (for new DUML)*
3. *within the timeframe specified by the Authority for DUML that has been audited since 1 June 2017.*

Audit observation

Mercury have requested Veritek to undertake this streetlight audit.

Audit commentary

This audit report confirms that the requirement to conduct an audit has been met for this database 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

Mercury reconciles this DUML load using the HHR profile in accordance with exemption 233.

- Wattages are derived from an extract provided by CDC each month. The best available estimate indicates that the database is accurate within ± 5 % as discussed in **section 3.1**.
- On and off times are derived from a data logger.

I reviewed the submission information for February 2020 and confirmed that the calculation methodology was correct, and that wattages were based on the extract and on hours were based on data logger information.

Volume inaccuracy is present in the database as follows:

Issue	Estimated volume information impact (annual kWh)
Six items of load do not have an ICP number recorded. There is no impact because the RAMM database extract is manually amended to include the missing information before it is provided to Mercury.	0
One light (pole ID 939) has a lamp model of UNK (UNK, 0 watts) with a zero lamp and gear wattage recorded. I found that the light was a CA 7022 24 LED (21W) and the light details and wattage had been manually added to the extract that was provided to Mercury for submission.	0
Four LED lights (pole IDs 900, 901, 904 and 905) have a blank gear wattage but zero should be recorded.	0

Issue	Estimated volume information impact (annual kWh)
15 ITAL (ITRO, 55 watts) have a lamp wattage which differs from the expected value in the lamp specifications. Two PH (50E, 50 watts) and two UNK (50E, 50 watts) have a gear wattage which differs from Authority's standardised wattages. This could result in an estimated annual over submission of 290 kWh. I recommend that the correct wattages for these lights are confirmed and updated if necessary.	Over submission of 290 kWh p.a.

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 this practice is non-compliant. When a wattage is changed in the database due to a physical change or a correction, only the record present at the time the report is run is recorded, not the historical information showing dates of changes. Mercury completes revision submissions where corrections are required. Mercury has not yet updated their processes to be consistent with the Authority's memo, and no corrections have been required since Mercury became the retailer on 01/10/19.

Additions, removals and changes are entered into RAMM at Fulton Hogan's office in Masterton by PSW. The database contains a "light install date" and a "lamp install date" but there is not a field for "livening date" for newly connected lights. Change dates are automatically generated by RAMM when records change, but cannot be edited by the user. PSW normally enters the data into RAMM soon after the changes occur.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.1 With: Clause 11(1) of Schedule 15.3 From: 01-Feb-20 To: 29-Feb-20	The database contains some inaccurate data. • Six items of load do not have an ICP number recorded. There is no impact because the RAMM database extract is manually amended to include the missing information before it is provided to Mercury. • One light (pole ID 939) has a lamp model of UNK (UNK, 0 watts) with a zero lamp and gear wattage recorded. I found that the light was a CA 7022 24 LED (21W) and the light details and wattage had been manually added to the extract that was provided to Mercury for submission. • Four LED lights (pole IDs 900, 901, 904 and 905) have a blank gear wattage but zero should be recorded. • 15 ITAL (ITRO, 55 watts) have a lamp wattage which differs from the expected value in the lamp specifications. • Two PH (50E, 50 watts) and two UNK (50E, 50 watts) have a gear wattage which differs from Authority's standardised wattages. The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot. Potential impact: Medium Actual impact: Unknown Audit history: Once Controls: Moderate Breach risk rating: 2
Audit risk rating	**Rationale for audit risk rating**
Low	Controls are rated as moderate. • The missing information is known but has not been updated in RAMM yet, and in the meantime the database extract is manually amended. • The differences between recorded and expected wattages are small and affect as small number of lights. CDC intends to confirm the correct wattages and update RAMM. The impact is assessed to be low, because the data is manually adjusted in the extract prior to it being sent to Mercury. The wattage differences identified above have a low impact.

Actions taken to resolve the issue	Completion date	Remedial action status
Mercury will follow up to ensure the database is updated with the missing data and that the correct wattages are updated as necessary. We will also work with CDC to have the database reflect changes on a daily basis to ensure accurate consumption reporting.	Sep 20	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	

Mercury will follow up to ensure the database is updated with the missing data and that the correct wattages are updated as necessary. We will also work with CDC to have the database reflect changes on a daily basis to ensure accurate consumption reporting.	Sep 20	

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

The database contains load connected to DUML ICP 0020903000WRADA, as well as metered ICPs 0666003741PC35F, 0063024000WR98D and 0063068001WR5DD, and unmetered solar load.

Six items of load did not have an ICP number recorded in the database, and I found these had been manually corrected in the database extract provided to Mercury:

RAMM database extract as at 25/02/2020						RAMM database extract provided to Mercury Energy as at 29/02/2020
Pole ID	Road Name	Light Owner	Lamp Make Model	Lamp Wattage	Gear Wattage	
957	GLADSTONE ROAD	CDC Roading	VNC			Missing data is populated: 0020903000WRADA and VNC 28W.
936	HARTLEY AVE	CDC Roading	OPT (33W, 33 watts)	33	0	Missing data is populated: 0020903000WRADA.
948	HARTLEY AVE	CDC Roading				Missing data is populated: 0020903000WRADA and CA 7032 24 LED 27W.
926	HOWARD STREET	CDC Roading	IBEX (VMAR, 28 watts)	28	0	Missing data is populated: 0020903000WRADA.
947	MOLESWORTH STREET	CDC Roading	IBEX (VMAR, 28 watts)	28	0	Missing data is populated: 0020903000WRADA.
946	MOLESWORTH STREET	CDC Roading				Missing data is populated: 0020903000WRADA and IBEX (VMAR, 28 watts).

The accuracy of ICP identifiers 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: 25-Feb-20 To: 25-Feb-20	Six items of load do not have an ICP number recorded. Potential impact: High Actual impact: Unknown Audit history: None Controls: Moderate Breach risk rating: 2
Audit risk rating	**Rationale for audit risk rating**
Low	Controls are rated as moderate. The missing information is known but has not been updated in RAMM yet, and in the meantime the database extract is manually amended. The impact is assessed to be low, because the data is manually adjusted in the extract prior to it being sent to Mercury.

Actions taken to resolve the issue	Completion date	Remedial action status
Mercury will follow up to ensure the database is updated with the missing data.	Sep 20	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
Mercury will follow up to ensure the database is updated with the missing data.	Sep 20	

2.3. Location of each item of load (Clause 11(2)(b) of Schedule 15.3)

Code reference

Clause 11(2)(b) of Schedule 15.3

Code related audit information

The DUML database must contain the location of each DUML item.

Audit observation

The database was checked to confirm the location is recorded for all items of load.

Audit commentary

The database contains fields for the road name, displacement, pole number and GPS coordinates. The items of load without GPS coordinates have a road name and displacement recorded, and are locatable.

Address accuracy is discussed further in **section 3.1**.

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

A description of each light is recorded in the lamp model field, and wattages are recorded in the lamp wattage and gear wattage fields.

I checked the completeness of light description and wattage information in the database extract.

All items of load connected to ICP 0020903000WRADA have a value recorded in the lamp model and lamp wattage fields. One light (pole ID 939) has a lamp model of UNK (UNK, 0 watts) with a zero lamp and gear wattage recorded. I found that the light was a CA 7022 24 LED (21W) and the light details and wattage had been manually added to the extract that was provided to Mercury for submission.

Four LED lights (pole IDs 900, 901, 904 and 905) have a blank gear wattage but zero should be recorded. These blank gear wattages have no impact, but should be corrected for completeness. The discrepancies were provided to CDC who intend to update them in the database.

Three items of load with a blank ICP number have no lamp model, lamp wattage or gear wattage recorded. The light details and wattages were manually added to the extract provided to Mercury for submission.

RAMM database extract as at 25/02/2020						RAMM database extract provided to Mercury Energy as at 29/02/2020
Pole ID	Road Name	Light Owner	Lamp Make Model	Lamp Wattage	Gear Wattage	
957	GLADSTONE ROAD	CDC Roading	VNC			Missing data is populated: 0020903000WRADA and VNC 28W.
948	HARTLEY AVE	CDC Roading				Missing data is populated: 0020903000WRADA and CA 7032 24 LED 27W.

RAMM database extract as at 25/02/2020						RAMM database extract provided to Mercury Energy as at 29/02/2020
Pole ID	Road Name	Light Owner	Lamp Make Model	Lamp Wattage	Gear Wattage	
946	MOLESWORTH STREET	CDC Roading				Missing data is populated: 0020903000WRADA and IBEX (VMAR, 28 watts).

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: 25-Feb-20 To: 25-Feb-20	One item of load connected to ICP 0020903000WRADA (pole ID 939) has a lamp model of UNK (UNK, 0 watts) and a zero lamp and gear wattage in the database. The correct lamp details and wattages are manually added prior to providing the database extract to Mercury. Four items of load connected to ICP 0020903000WRADA (pole IDs 900, 901, 904 and 905) have a blank gear wattage but zero is expected. Three items of load with a blank ICP number have no lamp model, lamp wattage or gear wattage recorded in the database. The correct lamp details and wattages are manually added prior to providing the database extract to Mercury. Potential impact: Medium Actual impact: Unknown Audit history: Once Controls: Moderate Breach risk rating: 2
Audit risk rating	**Rationale for audit risk rating**
Low	Controls are rated as moderate. The missing information is known but has not been updated in RAMM yet, and in the meantime the database extract is manually amended. The impact is assessed to be low, because the data is manually adjusted in the extract prior to it being sent to Mercury.

Actions taken to resolve the issue	Completion date	Remedial action status
Mercury will follow up to ensure the database is updated with the missing data and that the correct wattages are updated as necessary.	Sep 20	Identified

Preventative actions taken to ensure no further issues will occur	Completion date	
Mercury will follow up to ensure the database is updated with the missing data and that the correct wattages are updated as necessary.	Sep 20	

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 139 items of load on 27 February 2020. The sample was selected from three strata, as follows:

1. CDC Roading,
2. NZTA, and
3. other light owners.

Audit commentary

The field audit discrepancies are detailed in the table below:

Street	Database count	Field count	Light count difference	Wattage recorded incorrectly	Comments
CDC Roading					
MEMORIAL SQUARE	1	1	-	1	One L60,5A was recorded in the database as ITAL (ITRO, 55 watts). According to the specifications the wattage should be 51W.
PARK ROAD	10	10	-	1	One L60,5A was recorded in the database as ITAL (ITRO, 55 watts). According to the specifications the wattage should be 51W.
Other					
HOLLOWAY STREET	6	6	-	2	Two lights in the carpark by St John were recorded as CRE (2S, 40W) but are 60W Cosmo Polis.
Grand Total	**139**	**139**	**-**	**4**	

The field audit did not find any items of load missing from the database. The wattage differences identified 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 RAMM database functionality achieves compliance with the code.

The change management process and the compliance of the database reporting provided to Mercury 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.

Where changes are manually made to the RAMM extract prior to sending to populate missing ICP and lamp information, an audit trail is not recorded. This is recorded as non-compliance below.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.7 With: Clause 11(4) of Schedule 15.3 From: 25-Feb-20 To: 25-Feb-20	Where manual changes to the database extract occur to populate missing information, an audit trail is not created. Potential impact: Low Actual impact: Low Audit history: None Controls: Moderate Breach risk rating: 2
Audit risk rating	**Rationale for audit risk rating**
Low	Controls are rated as moderate, because most changes are made directly in RAMM. For the small number of manual changes made the user who made the change, the approximate date and time of the change, and before and after values can be determined from the other information available. The impact is assessed to be low, because the manually made changes can be identified by comparing the unmodified RAMM extract to the modified one. All changes are made by the same user, at the same time.

Actions taken to resolve the issue	Completion date	Remedial action status
We will work with CDC to ensure timely database updates to reduce the need for manual changes.	Sep 20	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
We will work with CDC to ensure timely database updates to reduce the need for manual changes.	Sep 20	

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

Mercury's submissions are based on a monthly extract from the RAMM database. A database extract was provided in February 2020 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	Carterton DC streetlights
Strata	The database contains 750 items of load in the Carterton DC region. The management process is the same for all lights. I created three strata: 1. CDC Roading, 2. NZTA, and 3. other light owners.
Area units	I created a pivot table of the roads and I used a random number generator in a spreadsheet to select a total of 17 sub-units.
Total items of load	139 items of load were checked, making up 15% of the database.

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

Field audit findings

A field audit was conducted of a statistical sample of 138 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	101.0	Wattage from the survey is higher than the database wattage by 1.0%
R_L	98.8	With a 95% level of confidence it can be concluded that the error could be between -1.2% and +2.7%
R_H	102.7	

These results were categorised in accordance with the "Distributed Unmetered Load Statistical Sampling Audit Guideline", effective from 01/02/19. The table below shows that Scenario A (detailed below) applies, and the best available estimate indicates that the database is accurate within ± 5.0%.

- The variability of the sample results across the strata means that the true wattage (installed in the field) could be between 1.2% lower and 2.7% higher than the wattage recorded in the DUML database.
- In absolute terms the installed capacity is estimated to be 0 kW higher than the database indicates.
- There is a 95% level of confidence that the installed capacity is between 0 kW and 1 kW higher than the database.
- In absolute terms, total annual consumption is estimated to be 1,800 kWh higher than the DUML database indicates.
- There is a 95% level of confidence that the annual consumption is between 300 kWh lower and 4,900 kWh higher 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 items of load connected to ICP 0020903000WRADA have a lamp model and lamp wattage recorded. Four LED lights (pole IDs 900, 901, 904 and 905) have a blank gear wattage but zero should be recorded. These blank gear wattages have no impact, but should be corrected for completeness.

Three items of load with a blank ICP number have no lamp model, lamp wattage or gear wattage recorded. The light details and wattages were manually added to the extract provided to Mercury for submission.

RAMM database extract as at 25/02/2020						RAMM database extract provided to Mercury Energy as at 29/02/2020
Pole ID	Road Name	Light Owner	Lamp Make Model	Lamp Wattage	Gear Wattage	
957	GLADSTONE ROAD	CDC Roading	VNC			Missing data is populated: 0020903000WRADA and VNC 28W.
948	HARTLEY AVE	CDC Roading				Missing data is populated: 0020903000WRADA and CA 7032 24 LED 27W.
946	MOLESWORTH STREET	CDC Roading				Missing data is populated: 0020903000WRADA and IBEX (VMAR, 28 watts).

Lamp and gear wattages for all other lamps were compared to the expected values for ICP 0020903000WRADA, and the following exceptions were identified:

Model	Database lamp wattage	Expected lamp wattage	Quantity	Total wattage difference	Comment
ITAL (ITRO, 55 watts)	55	51	15	-60	Expected 51W based on specifications
		Total	15	-60	

Model	Database gear wattage	Expected gear wattage	Quantity	Total wattage difference	Comment
PH (50E, 50 watts)	13	11	2	-4	Expected 11W based on the Authority's standardised wattages
UNK (50E, 50 watts)	13	11	2	-4	
		Total	69	-8	

This could result in an estimated annual over submission of 290 kWh. I recommend that the correct wattages for these lights are confirmed and updated if necessary.

Recommendation	Description	Audited party comment	Remedial action
Database accuracy	Confirm the correct lamp wattages for ITAL (ITRO, 55 watts). Confirm the correct gear wattages for PH (50E, 50 watts) and UNK (50E, 50 watts). Update RAMM as necessary with the confirmed wattages.	Mercury will follow up with CDC to ensure the correct wattages are confirmed and are updated in the database as necessary.	Identified

ICP number accuracy

All DUML load is connected to ICP 0020903000WRADA.

As discussed in **section 2.2**, six items of load did not have an ICP number recorded in the database, and I found these had been manually corrected in the database extract provided to Mercury

To check ICP number accuracy, I compared the ICP number to the light owner.

- All lights connected to metered ICPs were owned by "Parks".
- All lights recorded as solar were owned by "CDC Solar Lighting" or "Parks" and the lighting details indicated that they were solar powered.

Address location accuracy

As discussed in **section 2.3**, all lights have an address recorded, and I did not identify any inaccurate addresses.

Change management process findings

PSW are responsible for all field work including new connections, removals, repairs and maintenance. Fulton Hogan inspect the work completed by PSW and provide support as necessary. PSW update RAMM using a PC at Fulton Hogan's office in Masterton, because they do not have access to update RAMM remotely.

For new connections, CDC is only responsible once the subdivision is "vested" in council. Developers install the lights and provide as built plans and request a section 224 subdivision certification. Once the roading team receives the light details as part of this process they are updated in RAMM. The roading team has asked developers not to liven the lights until this process is complete, and staff periodically check pending new connections at night to determine whether they have been connected early. Most new subdivisions in the region are rural and do not have streetlights, and it is estimated that two or three new subdivisions are connected per annum.

Outage patrols are conducted every four months by Fulton Hogan. Outages are also reported by residents within the CDC region and work orders are raised with PSW as required.

CDC's LED upgrade project was completed by the end of the last financial year. CDC intends to upgrade under verandah lights as a future project, and is awaiting instruction from NZTA regarding upgrading NZTA lights.

Festive lights

Two festive lights are recorded in the database against ICP 0020903000WRADA. They are switched on and off by PSW, and I saw evidence that the festive light wattages, connection and disconnection dates are added to the database extract provided to Mercury during months where the festive lights are connected. Zero wattages are reported for these lights when they are disconnected.

Private lights

To the best of CDC's knowledge, all unmetered streetlights are recorded in the database. Some lights recorded in the database are owned by private organisations such as Salvation Army housing.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 3.1 With: Clause 15.2 and 15.37B(b) From: 27-Feb-20 To: 27-Feb-20	The database contains some inaccurate data. • Six items of load do not have an ICP number recorded. There is no impact because the RAMM database extract is manually amended to include the missing information before it is provided to Mercury. • One light (pole ID 939) has a lamp model of UNK (UNK, 0 watts) with a zero lamp and gear wattage recorded. I found that the light was a CA 7022 24 LED (21W) and the light details and wattage had been manually added to the extract that was provided to Mercury for submission. • Four LED lights (pole IDs 900, 901, 904 and 905) have a blank gear wattage but zero should be recorded. • 15 ITAL (ITRO, 55 watts) have a lamp wattage which differs from the expected value in the lamp specifications. • Two PH (50E, 50 watts) and two UNK (50E, 50 watts) have a gear wattage which differs from Authority's standardised wattages. Potential impact: Medium Actual impact: Unknown Audit history: Once Controls: Moderate Breach risk rating: 2
Audit risk rating	**Rationale for audit risk rating**
Low	Controls are rated as moderate. • The missing information is known but has not been updated in RAMM yet, and in the meantime the database extract is manually amended. • The differences between recorded and expected wattages are small and affect as small number of lights. CDC intends to confirm the correct wattages and update RAMM. The impact is assessed to be low, because the data is manually adjusted in the extract prior to it being sent to Mercury. The wattage differences identified above have a low impact.

Actions taken to resolve the issue	Completion date	Remedial action status
Mercury will follow up to ensure the database is updated with the missing data and that the correct wattages are updated as necessary.	Sep 20	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
Mercury will follow up to ensure the database is updated with the missing data and that the correct wattages are updated as necessary.	Sep 20	

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

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

Volume inaccuracy is present in the database as follows:

Issue	Estimated volume information impact (annual kWh)
Six items of load do not have an ICP number recorded. There is no impact because the RAMM database extract is manually amended to include the missing information before it is provided to Mercury.	0
One light (pole ID 939) has a lamp model of UNK (UNK, 0 watts) with a zero lamp and gear wattage recorded. I found that the light was a CA 7022 24 LED (21W) and the light details and wattage had been manually added to the extract that was provided to Mercury for submission.	0
Four LED lights (pole IDs 900, 901, 904 and 905) have a blank gear wattage but zero should be recorded.	0
15 ITAL (ITRO, 55 watts) have a lamp wattage which differs from the expected value in the lamp specifications. Two PH (50E, 50 watts) and two UNK (50E, 50 watts) have a gear wattage which differs from Authority's standardised wattages. This could result in an estimated annual over submission of 290 kWh. I recommend that the correct wattages for these lights are confirmed and updated if necessary.	Over submission of 290 kWh p.a.

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 this practice is non-compliant. When a wattage is changed in the database due to a physical change or a correction, only the record present at the time the report is run is recorded, not the historical information showing dates of changes. Mercury completes revision submissions where corrections are required. Mercury has not yet updated their processes to be consistent with the Authority's memo, and no corrections have been required since Mercury became the retailer on 01/10/19.

Additions, removals and changes are entered into RAMM at Fulton Hogan's office in Masterton by PSW. The database contains a "light install date" and a "lamp install date" but there is not a field for "livening date" for newly connected lights. Change dates are automatically generated by RAMM when records change, but cannot be edited by the user. PSW normally enters the data into RAMM soon after the changes occur.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 3.2 With: Clause 15.2 and 15.37B(c) From: 01-Feb-20 To: 29-Feb-20	The database contains some inaccurate data. • Six items of load do not have an ICP number recorded. There is no impact because the RAMM database extract is manually amended to include the missing information before it is provided to Mercury. • One light (pole ID 939) has a lamp model of UNK (UNK, 0 watts) with a zero lamp and gear wattage recorded. I found that the light was a CA 7022 24 LED (21W) and the light details and wattage had been manually added to the extract that was provided to Mercury for submission. • Four LED lights (pole IDs 900, 901, 904 and 905) have a blank gear wattage but zero should be recorded. • 15 ITAL (ITRO, 55 watts) have a lamp wattage which differs from the expected value in the lamp specifications. • Two PH (50E, 50 watts) and two UNK (50E, 50 watts) have a gear wattage which differs from Authority's standardised wattages. The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot. Potential impact: High Actual impact: Unknown Audit history: None Controls: Moderate Breach risk rating: 2

Audit risk rating	Rationale for audit risk rating
Low	Controls are rated as moderate. • The missing information is known but has not been updated in RAMM yet, and in the meantime the database extract is manually amended. • The differences between recorded and expected wattages are small and affect as small number of lights. CDC intends to confirm the correct wattages and update RAMM. The impact is assessed to be low, because the data is manually adjusted in the extract prior to it being sent to Mercury. The wattage differences identified above have a low impact.

Actions taken to resolve the issue	Completion date	Remedial action status
Mercury will follow up to ensure the database is updated with the missing data and that the correct wattages are updated as necessary. We will also work with CDC to have the database reflect changes on a daily basis to ensure accurate consumption reporting.	Sep 20	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
Mercury will follow up to ensure the database is updated with the missing data and that the correct wattages are updated as necessary. We will also work with CDC to have the database reflect changes on a daily basis to ensure accurate consumption reporting.	Sep 20	

CONCLUSION

A RAMM database is held by CDC. PSW are responsible for all field work including new connections, removals, repairs and maintenance. Fulton Hogan inspect the work completed by PSW and provide support as necessary. PSW update RAMM using a PC at Fulton Hogan's office in Masterton, because they do not have access to update RAMM remotely.

Mercury reconciles the CDC DUML load using the HHR profile in accordance with exemption 233. Wattages are derived from the monthly database extracts provided by CDC, and on and off times are derived from data logger information.

A field audit was conducted of a statistical sample of 139 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	101.0	Wattage from the survey is higher than the database wattage by 1.0%
R_L	98.8	With a 95% level of confidence it can be concluded that the error could be between -1.2% and +2.7%
R_H	102.7	

These results were categorised in accordance with the "Distributed Unmetered Load Statistical Sampling Audit Guideline", effective from 01/02/19. The best available estimate indicates that the database is accurate within ± 5.0%.

- The variability of the sample results across the strata means that the true wattage (installed in the field) could be between 1.2% lower and 2.7% higher than the wattage recorded in the DUML database.
- In absolute terms the installed capacity is estimated to be 0 kW higher than the database indicates.
- There is a 95% level of confidence that the installed capacity is between 0 kW and 1 kW higher than the database.
- In absolute terms, total annual consumption is estimated to be 1,800 kWh higher than the DUML database indicates.
- There is a 95% level of confidence that the annual consumption is between 300 kWh lower and 4,900 kWh higher than the database indicates.

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, which is non-compliant. Mercury applies the kW value for the last day of the month when calculating submission volumes. Mercury completes revision submissions where corrections are required, and has not yet updated their processes to be compliant with the Authority's memo.

Five non-compliances were identified, and one recommendation was raised. The future risk rating of 12 indicates that the next audit be completed in 12 months. I recommend that the next audit is completed in 18 months based on the relatively small number of exceptions, and that CDC and Mercury intend to work together to resolve the issues.

PARTICIPANT RESPONSE

Mercury have reviewed this report and their comments are contained within its body.