

ELECTRICITY INDUSTRY PARTICIPATION CODE
DISTRIBUTED UNMETERED LOAD AUDIT REPORT



For

MASTERTON DISTRICT COUNCIL AND
MERCURY NZ LIMITED
NZBN: 9429037705305

Prepared by: Tara Gannon

Date audit commenced: 13 March 2023

Date audit report completed: 9 May 2023

Audit report due date: 1 June 2023

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EXECUTIVE SUMMARY

This audit of the **Masterton District Council (MDC)** DUML database and processes was conducted at the request of **Mercury NZ 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.

A RAMM database is held by MDC. Alf Downs and Power Services Wairarapa complete repairs, maintenance, upgrades, new installations, and removals. The database is updated by Alf using Pocket RAMM. New installations in subdivisions are completed by developers and the lights are recorded in the database by MDC once they have been vested.

Mercury reconciles this DUML load using the HHR profile in accordance with exemption 233. This exemption expires on 31 October 2023, and Mercury is planning to request an extension and if that is unsuccessful will apply for a new profile. MDC provides a monthly report from the database to Mercury, which is used to determine wattages. On hours are derived using data logger information.

Mercury is able to produce submissions with different kW values for different days (including to account for festive lights when connected) and produces revision submissions where required. The monthly report is provided as a snapshot reflecting the current details for each light on the day the report is generated, but MDC supplies dates that festive lights are connected, so that they can be correctly included in submission data for the days they are connected.

Database accuracy is described as follows:

Result	Percentage	Comments
The point estimate of R	98.1	Wattage from survey is lower than the database wattage by 2.9%.
R _L	92.3	With a 95% level of confidence, it can be concluded that the error could be between -7.7% and -0.3%.
R _H	99.7	

These results were categorised in accordance with the “Distributed Unmetered Load Statistical Sampling Audit Guideline”, effective from 1 February 2019. The conclusion from this scenario is that the best available estimate is not precise enough to conclude that the database is accurate within $\pm 5\%$. In absolute terms the installed capacity is estimated to be 2 kW lower than the database indicates, and total annual consumption is estimated to be 7,300 kWh lower than the DUML database indicates.

The four non-compliances identified all have a low impact, and the future risk rating of eight indicates that the next audit be completed in 18 months. I have considered this in conjunction with information provided by MDC which indicates that they intend to resolve all issues identified promptly, and I agree with this recommendation.

The matters raised are detailed below:

AUDIT SUMMARY

NON-COMPLIANCES

Subject	Section	Clause	Non-Compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
Deriving submission information	2.1	11(1) of Schedule 15.3	<p>January 2023 kW values were applied when calculating the February 2023 submission in error, resulting in over submission of 84.36 kWh for February 2023 for ICP 0020902000WRB7A. There was no difference for ICP 0020901000WR99A because the kW values were the same for January and February 2023. Mercury processed a correction for ICP 0020902000WRB7A during the audit and revised submission data will be washed up.</p> <p>Based on the field audit of 224 items of load, the best available estimate is not precise enough to conclude that the database is accurate within $\pm 5\%$. The field audit concluded that in absolute terms, total annual consumption is estimated to be 7,300 kWh lower than the DUML database indicates.</p> <p>Seven 160W Mercury Vapour lights had a zero-gear wattage recorded when 15W is expected, leading to under submission of 448.5 kWh per annum.</p> <p>55 19W LED lights had a blank gear wattage when zero is expected. There is no impact on submission.</p> <p>Seven LED 4000k (120W) lights are recorded with a 102W lamp wattage when 120W is expected, leading to under submission of 538.1 kWh per annum.</p> <p>Five Teceo 1 32LEDS Pedestrian lights are recorded with a lamp wattage of 71W when 51W is expected, leading to over submission of 427.1 kWh per annum.</p> <p>The monthly database extract is provided as a snapshot.</p> <p>Vesting dates are recorded as the installation date for new connections and change dates may not reflect the date of the change if they are not processed in the database at the time that the change occurs.</p>	Moderate	Low	2	Identified
Description and capacity of load	2.4	11(2)(c) and (d) of Schedule 15.3	Seven 160W Mercury Vapour lights had a zero-gear wattage recorded when 15W is expected, leading to under submission of 448.5 kWh per annum.	Moderate	Low	2	Identified

Subject	Section	Clause	Non-Compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
			55 19W LED lights had a blank gear wattage when zero is expected. There is no impact on submission.				
Database accuracy	3.1	15.2 and 15.37B (b)	<p>Based on the field audit of 224 items of load, the best available estimate is not precise enough to conclude that the database is accurate within $\pm 5\%$. The field audit concluded that in absolute terms, total annual consumption is estimated to be 7,300 kWh lower than the DUML database indicates.</p> <p>Seven 160W Mercury Vapour lights had a zero-gear wattage recorded when 15W is expected, leading to under submission of 448.5 kWh per annum.</p> <p>55 19W LED lights had a blank gear wattage when zero is expected. There is no impact on submission.</p> <p>Seven LED 4000k (120W) lights are recorded with a 102W lamp wattage when 120W is expected, leading to under submission of 538.1 kWh per annum.</p> <p>Five Teceo 1 32LEDS Pedestrian lights are recorded with a lamp wattage of 71W when 51W is expected, leading to over submission of 427.1 kWh per annum.</p> <p>Vesting dates are recorded as the installation date for new connections and change dates may not reflect the date of the change if they are not processed in the database at the time that the change occurs.</p>	Moderate	Low	2	Identified
Volume information accuracy	3.2	15.2 and 15.37B (c)	<p>January 2023 kW values were applied when calculating the February 2023 submission in error, resulting in over submission of 84.36 kWh for February 2023 for ICP 0020902000WRB7A. There was no difference for ICP 0020901000WR99A because the kW values were the same for January and February 2023. Mercury processed a correction for ICP 0020902000WRB7A during the audit and revised submission data will be washed up.</p> <p>Based on the field audit of 224 items of load, the best available estimate is not precise enough to conclude that the database is accurate within $\pm 5\%$. The field audit concluded that in absolute terms, total annual consumption is estimated to be 7,300 kWh lower than the DUML database indicates.</p>	Moderate	Low	2	Identified

Subject	Section	Clause	Non-Compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
			<p>Seven 160W Mercury Vapour lights had a zero-gear wattage recorded when 15W is expected, leading to under submission of 448.5 kWh per annum.</p> <p>55 19W LED lights had a blank gear wattage when zero is expected. There is no impact on submission.</p> <p>Seven LED 4000k (120W) lights are recorded with a 102W lamp wattage when 120W is expected, leading to under submission of 538.1 kWh per annum.</p> <p>Five Teceo 1 32LEDS Pedestrian lights are recorded with a lamp wattage of 71W when 51W is expected, leading to over submission of 427.1 kWh per annum.</p> <p>The monthly database extract is provided as a snapshot.</p> <p>Vesting dates are recorded as the installation date for new connections and change dates may not reflect the date of the change if they are not processed in the database at the time that the change occurs.</p>				
Future Risk Rating						8	

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

RECOMMENDATIONS

Subject	Section	Recommendation
		Nil

ISSUES

Subject	Section	Description	Issue
		Nil	

1. ADMINISTRATIVE

1.1. Exemptions from Obligations to Comply with Code

Code reference

Section 11 of Electricity Industry Act 2010.

Code related audit information

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

Audit observation

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, and Mercury is planning to request an extension and if that is unsuccessful will apply for a new profile.

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
Chris Posa	Compliance Reconciliation Analyst	Mercury Energy
Glenn Malcolm	Urban Roding Engineer	Masterton District Council
Kerry Smith	Traffic Management Coordinator/Corridor Manager	Masterton District Council
Bernie Lett	Director	Power Services Wairarapa

1.4. Hardware and Software

RAMM

The SQL database used for the management of DUML is remotely hosted by Thinkproject NZ 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.

Thinkproject NZ Ltd 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)
0020901000WR99A	MSTN DISTRICT COUNCIL (RURAL)	MST0331	HHR	96	3078
0020902000WRB7A	MASTERTON DISTRICT COUNCIL	MST0331	HHR	2,551	87,795
NZTA				395	55,282
Total				3,042	146,155

Waka Kotahi (NZTA) lights are now included in the Waka Kotahi Lower North Island DUML database and settled under Waka Kotahi ICPs.

1.7. Authorisation Received

All information was provided directly by Mercury, PSW and MDC.

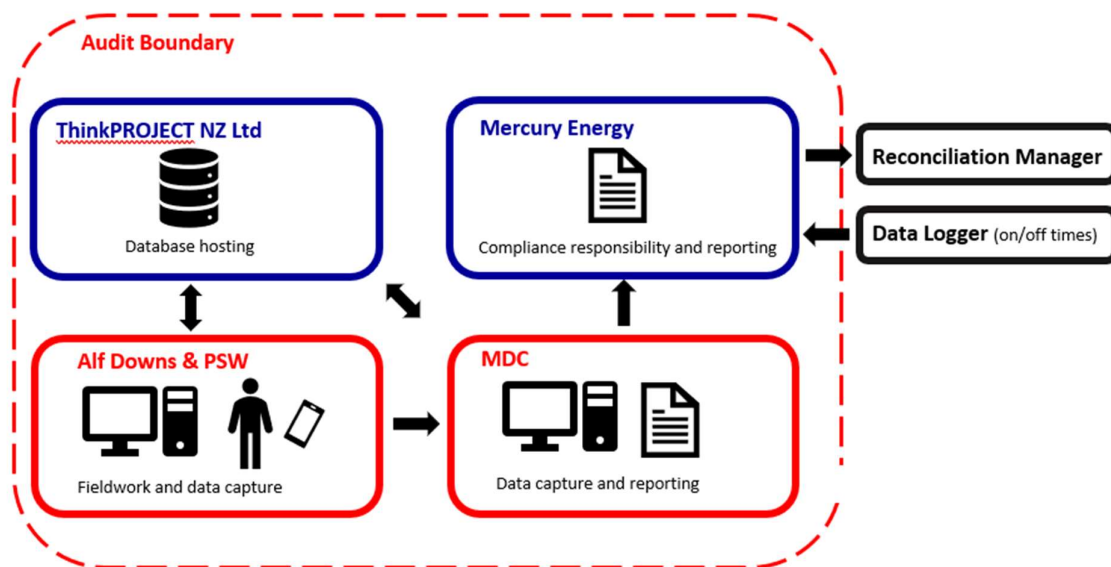
1.8. Scope of Audit

This audit of the MDC 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 MDC. Alf Downs and Power Services Wairarapa complete repairs, maintenance, upgrades, new installations, and removals. The database is updated by Alf using Pocket RAMM. New installations in subdivisions are completed by developers and the lights are recorded in the database by MDC once they have been vested.

Mercury reconciles this DUML load using the HHR profile in accordance with exemption 233. This exemption expires on 31 October 2023, and Mercury is planning to request an extension and if that is unsuccessful will apply for a new profile. MDC provides a monthly report from the database to Mercury, which is used to determine wattages. On hours are derived using 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 224 items of load on 29 April 2023.

1.9. Summary of previous audit

The previous audit of this database was undertaken by Bernie Cross of Veritek Limited in November 2022. 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	<ol style="list-style-type: none"> The field audit concluded that in absolute terms, total annual consumption is estimated to be 22,900 kWh lower than the DUML database indicates. 53 festive lights not recorded in the database along SH2 with an assessed capacity of 2.811 kW. Vesting dates are recorded as the installation date for new connections, and change dates may not reflect the date of the change if they are not processed in the database at the time that the change occurs 	<ol style="list-style-type: none"> Still existing. Cleared, lights are not used. Still existing.
Description and capacity of load	2.4	11(2)(c) and (d) of Schedule 15.3	Five items of load have a description of Teceo 1 32LED PED but a database wattage of 71 watts and a field label of L51.	Still existing.
All load recorded in database	2.5	11(2A) of Schedule 15.3	11 additional lights found in the field.	Cleared.
Database accuracy	3.1	15.2 and 15.37B (b)	<ol style="list-style-type: none"> The field audit concluded that in absolute terms, total annual consumption is estimated to be 22,900 kWh lower than the DUML database indicates. 	<ol style="list-style-type: none"> Still existing. Still existing. Cleared, lights are not used. Still existing.

Subject	Section	Clause	Non-compliance	Status
			<ol style="list-style-type: none"> 2. Five items of load have a description of Teceo 1 32LED PED but a database wattage of 71 watts and a field label of L51. 3. 53 festive lights not recorded in the database along SH2 with an assessed capacity of 2.811 kW. 4. Vesting dates are recorded as the installation date for new connections, and change dates may not reflect the date of the change if they are not processed in the database at the time that the change occurs 	
Volume information accuracy	3.2	15.2 and 15.37B (c)	<ol style="list-style-type: none"> 1. The field audit concluded that in absolute terms, total annual consumption is estimated to be 22,900 kWh lower than the DUML database indicates. 2. Five items of load have a description of Teceo 1 32LED PED but a database wattage of 71 watts and a field label of L51. 3. 53 festive lights not recorded in the database along SH2 with an assessed capacity of 2.811 kW. 4. Vesting dates are recorded as the installation date for new connections, and change dates may not reflect the date of the change if they are not processed in the database at the time that the change occurs 	<ol style="list-style-type: none"> 1. Still existing. 2. Still existing. 3. Cleared, lights are not used. 4. Still existing.

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

Code reference

Clause 16A.26 and 17.295F

Code related audit information

Retailers must ensure that DUML database audits are completed:

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

Audit observation

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 each month by MDC. On and off times are derived from a data logger.

I reviewed the submission information for February 2023 and confirmed that the calculation methodology was correct, with wattages based on database extract totals and on hours based on data logger information.

I found that the January 2023 kW values were applied for February 2023 in error, resulting in over submission of 84.36 kWh for February 2023 for ICP 0020902000WRB7A. There was no difference for ICP 0020901000WR99A because the kW values were the same for January and February 2023. Mercury processed a correction for ICP 0020902000WRB7A during the audit and revised submission data will be washed up.

Volume inaccuracy is present in the database as follows:

Issue	Estimated volume information impact (annual kWh)
Based on the field audit of 224 items of load, the best available estimate is not precise enough to conclude that the database is accurate within $\pm 5\%$. The field audit concluded that in absolute terms, total annual consumption is estimated to be 7,300 kWh lower than the DUML database indicates.	Over submission of 7,300 kWh per annum
Seven 160W Mercury Vapour lights had a zero-gear wattage recorded when 15W is expected.	Under submission of 448.5 kWh per annum
55 19W LED lights had a blank gear wattage when zero is expected.	No impact, because the expected wattage is zero
Seven LED 4000k (120W) lights are recorded with a 102W lamp wattage when 120W is expected.	Under submission of 538.1 kWh per annum
Five Teceo 1 32LEDS Pedestrian lights are recorded with a lamp wattage of 71W when 51W is expected based on the label found on a sample of these lamps during the previous audit.	Over submission of 427.1 kWh per annum

The previous audit found that the festive lights connected to Waka Kotahi street light poles along State Highway 2 (Chapel Street, Queen Street and Dixon Street) were removed from the MDC database when the Waka Kotahi streetlights were added to the Waka Kotahi Lower North Island database in 2021. MDC confirmed that when Waka Kotahi upgraded the lights to LEDs the streetlight circuit was changed, and MDC was no longer able to turn on the lights. The festive lights have not been used since and were not connected at all during the 2022-2023 festive period. These unused festive lights will be removed as work crews have time; the work is not considered urgent as it is not a safety issue.

On 18 June 2019, the Electricity Authority issued a memo confirming that the code requirement to calculate the correct monthly load must:

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

Mercury is able to produce submissions with different kW values for different days (including to account for festive lights when connected) and produces revision submissions where required. The monthly report is provided as a snapshot reflecting the current details for each light on the day the report is generated, but MDC supplies dates that festive lights are connected, so that they can be correctly included in submission data for the days they are connected.

The RAMM database records light installation and replacement dates, which default to the date which the data is collected. Field work is conducted by Alf Downs and PSW with data collection by Alf Downs. Alf Downs staff update the database from the field using Pocket RAMM when work is completed. For new subdivisions data is entered into RAMM by MDC once the lights are vested, which may not reflect the date of livening.

Audit outcome

Non-compliant

Non-compliance	Description
<p>Audit Ref: 2.1 With: Clause 11(1) of Schedule 15.3</p>	<p>January 2023 kW values were applied when calculating the February 2023 submission in error, resulting in over submission of 84.36 kWh for February 2023 for ICP 0020902000WRB7A. There was no difference for ICP 0020901000WR99A because the kW values were the same for January and February 2023. Mercury processed a correction for ICP 0020902000WRB7A during the audit and revised submission data will be washed up.</p> <p>Based on the field audit of 224 items of load, the best available estimate is not precise enough to conclude that the database is accurate within $\pm 5\%$. The field audit concluded that in absolute terms, total annual consumption is estimated to be 7,300 kWh lower than the DUML database indicates.</p> <p>Seven 160W Mercury Vapour lights had a zero-gear wattage recorded when 15W is expected, leading to under submission of 448.5 kWh per annum.</p> <p>55 19W LED lights had a blank gear wattage when zero is expected. There is no impact on submission.</p> <p>Seven LED 4000k (120W) lights are recorded with a 102W lamp wattage when 120W is expected, leading to under submission of 538.1 kWh per annum.</p> <p>Five Teceo 1 32LEDS Pedestrian lights are recorded with a lamp wattage of 71W when 51W is expected, leading to over submission of 427.1 kWh per annum.</p> <p>The monthly database extract is provided as a snapshot.</p>

From: 10-Mar-23 To: 29-Apr-23	Vesting dates are recorded as the installation date for new connections and change dates may not reflect the date of the change if they are not processed in the database at the time that the change occurs. Potential impact: Medium Actual impact: Low Audit history: Three times Controls: Moderate Breach risk rating: 2		
Audit risk rating	Rationale for audit risk rating		
Low	The controls are moderate because they mitigate risk most of the time but there is room for improvement in database accuracy. The impact on settlement is assessed to be low, based on the kWh differences described above.		
Actions taken to resolve the issue		Completion date	Remedial action status
Masterton DC have been made aware of the audit findings and are taking actions to ensure that the database is accurate.		May 2023	Identified
Preventative actions taken to ensure no further issues will occur		Completion date	
Masterton DC are aware of the importance of ensuring that the database is accurate.		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 an ICP was recorded against each item of load.

Audit commentary

All connected unmetered items of load have an ICP recorded against them, apart from the 395 lights which have NZTA recorded in the ICP group field. Waka Kotahi (NZTA) lights have now been separated out of the MDC database and are included in the Waka Kotahi Lower North Island DUML database. Compliance is recorded for the lights which MDC is responsible for.

Audit outcome

Compliant

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

Code reference

Clause 11(2)(b) of Schedule 15.3

Code related audit information

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

Audit observation

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

Audit commentary

The database extract provided contains fields for the road name, house number, pole number, displacement, and GPS coordinates.

2,539 of the 2,647 items of load connected to DUML ICPs have GPS coordinates recorded. 102 of the other 108 items of load have a road name and house number, location displacement and/or pole number recorded allowing the items to be readily located.

Six records with ICP group 0020902000WRB7A contain no location information, and also do not record any light details. MDC advised that these are new connections which are not yet connected, and that the missing details will be populated when the connection is completed and roading details are updated in RAMM. Compliance is recorded because all connected lights have a location 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

The database contains fields for lamp model, light wattage, and gear wattage.

I checked for missing and invalid zero lamp model, lamp wattage and gear wattage information for lights connected to the DUML ICPs and found the following exceptions:

Lamp model	Issue	Potential submission error
160W Mercury Vapour	Seven 160W Mercury Vapour lights had a zero-gear wattage recorded when 15W is expected.	Under submission of 105W or 448.5 kWh per annum.
19W LED	55 19W LED lights had a blank gear wattage when zero is expected.	None, because the expected wattage is zero.
Blank	10 lights have a blank lamp model, lamp wattage and gear wattage. Six of these also have no location information and are discussed in section 2.3 . MDC advised that these are new connections which are not yet connected, and that the missing details will be populated when the connection is completed. The missing information does not cause non-compliance because the lights are not yet connected.	None, because the lights are not connected.

MDC intends to investigate and correct the blank gear wattages for 19W LED lights, and zero gear wattages for the 160W Mercury Vapour lights.

The accuracy of populated wattages is discussed in **section 3.1**.

Audit outcome

Non-compliant

Non-compliance	Description	
<p>Audit Ref: 2.4</p> <p>With: Clause 11(2)(c) and (d) of Schedule 15.3</p> <p>From: 13-Mar-23</p> <p>To: 13-Mar-23</p>	<p>Seven 160W Mercury Vapour lights had a zero-gear wattage recorded when 15W is expected, leading to under submission of 448.5 kWh per annum.</p> <p>55 19W LED lights had a blank gear wattage when zero is expected. There is no impact on submission.</p> <p>Potential impact: Low</p> <p>Actual impact: Low</p> <p>Audit history: Multiple times</p> <p>Controls: Moderate</p> <p>Breach risk rating: 2</p>	
Audit risk rating	Rationale for audit risk rating	
Low	<p>Controls are rated as moderate, as they will ensure that valid descriptions, lamp wattages and gear wattages are applied most of the time. 62 exceptions were identified relating to two light types.</p> <p>The impact is low. All items of load have a description and valid lamp wattage. The missing or incorrect gear wattages is estimated to result in under submission of 105W or 448.5 kWh per annum.</p>	
Actions taken to resolve the issue		Completion date
Masterton DC have been made aware of the audit findings and are taking actions to ensure that the database is accurate.		May 2023
		Identified

Preventative actions taken to ensure no further issues will occur	Completion date
Masterton DC are aware of the importance of ensuring that the database is accurate.	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 224 items of load on 29 April 2023. The sample was selected from three strata, as follows:

- other lighting,
- urban road names A to Madden, and
- urban road names Makora to Z.

Audit commentary

The following differences were identified during the field audit.

Address	Database Count	Field Count	Count differences	Wattage differences	Comments
Urban road names A to Madden					
Fergusson Street	14	14	-	2	Two L16 lights in the walkway between 57 and 59 Fergusson St were recorded as L27 in the database.
Other lighting					
Kuripuni Street	19	18	-1	-	A 70W HPS light was not present at the GPS location recorded for pole 5656.
Urban road names A to Madden					
Upper Plains Road	17	16	-1	-	A LED 4000k unit for Mini Martin (28W) was not present at the GPS location recorded for pole 832727.
Total	224	222	-2	2	

The previous audit found that festive lights connected to Waka Kotahi street light poles along State Highway 2 (Chapel Street, Queen Street and Dixon Street) were removed from the MDC database when the Waka Kotahi streetlights were added to the Waka Kotahi Lower North Island database in 2021. MDC

confirmed that when Waka Kotahi upgraded the lights to LEDs the streetlight circuit was changed, and MDC was no longer able to turn on the lights. The festive lights have not been used since and were not connected at all during the 2022-2023 festive period. These unused festive lights will be removed as work crews have time; the work is not considered urgent as it is not a safety issue.

Compliance is recorded because no additional lights were found in the field. The light count and 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 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.

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

Mercury's submissions are based on a monthly extract from the RAMM database. A database extract was provided in March 2023, 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	Masterton DC streetlights
Strata	The database contains 2,647 items of load in the MDC region. The management process is the same for all lights. I created three strata: <ul style="list-style-type: none"> • other lighting, • urban road names A to Madden, and • urban road names Makora to Z.
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 15 sub-units.
Total items of load	224 items of load were checked, making up 8% 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 224 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	98.1	Wattage from survey is lower than the database wattage by 2.9%
R _L	92.3	With a 95% level of confidence, it can be concluded that the error could be between -7.7% and -0.3%
R _H	99.7	

These results were categorised in accordance with the "Distributed Unmetered Load Statistical Sampling Audit Guideline", effective from 1 February 2019. The table below shows that Scenario C (detailed below) applies. The conclusion from this scenario is that the best available estimate is not precise enough to conclude that the database is accurate within $\pm 5\%$.

- The true wattage (installed in the field) could be between 0.3 and 7.7% lower than the wattage recorded in the DUMML database.
- In absolute terms the installed capacity is estimated to be 2 kW lower than the database indicates.
- There is a 95% level of confidence that the installed capacity is between 0 and 7 kW lower than the database.
- In absolute terms, total annual consumption is estimated to be 7,300 kWh lower than the DUMML database indicates.
- There is a 95% level of confidence that the annual consumption is between 1,100 kWh 30,100 kWh lower than the database indicates.

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

MDC has been provided details of the field audit discrepancies and intends to check the affected lights and update the database as necessary.

Light description and capacity accuracy

As discussed in **section 2.4**, I checked for missing and invalid zero lamp model, lamp wattage and gear wattage information for lights connected to the DUMML ICPs and found the following exceptions:

Lamp model	Issue	Potential submission error
160W Mercury Vapour	Seven 160W Mercury Vapour lights had a zero-gear wattage recorded when 15W is expected.	Under submission of 105W or 448.5 kWh per annum
19W LED	55 19W LED lights had a blank gear wattage when zero is expected.	None, because the expected wattage is zero.

Lamp model	Issue	Potential submission error
Blank	10 lights have a blank lamp model, lamp wattage and gear wattage. Six of these also have no location information. MDC advised that these are new connections which are not yet connected, and that the missing details will be populated when the connection is completed. The missing information does not cause non-compliance because the lights are not yet connected.	None, because the lights are not connected.

I checked the accuracy of populated wattages against expected values and identified the following exceptions:

Lamp model	Issue	Potential submission error
LED 4000k (120W)	Seven LED 4000k (120W) lights are recorded with a 102W lamp wattage when 120W is expected.	Under submission of 126W or 538.1 kWh per annum
Teceo 1 32LEDS Pedestrian	Five Teceo 1 32LEDS Pedestrian lights are recorded with a lamp wattage of 71W when 51W is expected based on the label found on a sample of these lamps during the previous audit.	Over submission of 100W or 427.1 kWh per annum

ICP number accuracy

Compliance is recorded for ICP number accuracy.

Change management process findings

A RAMM database is held by MDC. Alf Downs and Power Services Wairarapa complete repairs, maintenance, upgrades, new installations, and removals. The database is updated by Alf using Pocket RAMM. New installations in subdivisions are completed by developers and the lights are recorded in the database by MDC once they have been vested.

Lights in new subdivisions are installed by the developer's electrician and are entered into the database by MDC. The lights are entered once the subdivision is "vested" in council. The RAMM database records an installation date, which is used to record the date the light is vested in council once this occurs. There is no separate liveness date. The street lighting team liaise closely with the planning team to ensure new connections are identified promptly, and developers are advised to provide connection information as soon as possible.

Other new connections are completed at MDC's request by Alf Downs or PSW who submit a customer-initiated work request to Powerco, and provide a work completion notice to Powerco, when work is complete. As part of the work completion process any new lights are entered into the database by Alf Downs.

The LED upgrade project is now complete, and there are no plans to use dimming. 2,352 (95.3%) of the 2,467 lights recorded against DUML ICPs are LEDs. The other 115 lights are fluorescent under verandah or parks lights, or high-pressure sodium, metal halide or mercury vapour lights for amenities, in car parks, the town square, parks, or community housing. There are no plans to upgrade these lights.

Regular outage patrols have not been completed since July 2019. MDC relies on the public to advise of lights which need to be maintained.

Audit risk rating	Rationale for audit risk rating		
Low	<p>The controls are moderate because they mitigate risk most of the time but there is room for improvement in database accuracy.</p> <p>The impact on settlement is assessed to be low, based on the kWh differences described above.</p>		
Actions taken to resolve the issue		Completion date	Remedial action status
Masterton DC have been made aware of the audit findings and are taking actions to ensure that the database is accurate.		May 2023	Identified
Preventative actions taken to ensure no further issues will occur		Completion date	
Masterton DC are aware of the importance of ensuring that the database is accurate.		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

Mercury reconciles this DUML load using the HHR profile in accordance with exemption 233. Wattages are derived from an extract provided each month by MDC. On and off times are derived from a data logger, and the correct profile and submission type are recorded on the registry.

I reviewed the submission information for February 2023 and confirmed that the calculation methodology was correct, with wattages based on database extract totals and on hours based on data logger information.

I found that the January 2023 kW values were applied for February 2023 in error, resulting in over submission of 84.36 kWh for February 2023 for ICP 0020902000WRB7A. There was no difference for ICP 0020901000WR99A because the kW values were the same for January and February 2023. Mercury processed a correction for ICP 0020902000WRB7A during the audit and revised submission data will be washed up.

Volume inaccuracy is present in the database as follows:

Issue	Estimated volume information impact (annual kWh)
Based on the field audit of 224 items of load, the best available estimate is not precise enough to conclude that the database is accurate within $\pm 5\%$. The field audit concluded that in absolute terms, total annual consumption is estimated to be 7,300 kWh lower than the DUML database indicates.	Over submission of 7,300 kWh per annum
Seven 160W Mercury Vapour lights had a zero-gear wattage recorded when 15W is expected.	Under submission of 448.5 kWh per annum
55 19W LED lights had a blank gear wattage when zero is expected.	No impact, because the expected wattage is zero
Seven LED 4000k (120W) lights are recorded with a 102W lamp wattage when 120W is expected.	Under submission of 538.1 kWh per annum
Five Teceo 1 32LEDS Pedestrian lights are recorded with a lamp wattage of 71W when 51W is expected based on the label found on a sample of these lamps during the previous audit.	Over submission of 427.1 kWh per annum

The previous audit found that festive lights connected to Waka Kotahi street light poles along State Highway 2 (Chapel Street, Queen Street and Dixon Street) were removed from the MDC database when the Waka Kotahi streetlights were added to the Waka Kotahi Lower North Island database in 2021. MDC confirmed that when Waka Kotahi upgraded the lights to LEDs the streetlight circuit was changed, and MDC was no longer able to turn on the lights. The festive lights have not been used since and were not connected at all during the 2022-2023 festive period. These unused festive lights will be removed as work crews have time; the work is not considered urgent as it is not a safety issue.

On 18 June 2019, the Electricity Authority issued a memo confirming that the code requirement to calculate the correct monthly load must:

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

Mercury is able to produce submissions with different kW values for different days (including to account for festive lights when connected) and produces revision submissions where required. The monthly report is provided as a snapshot reflecting the current details for each light on the day the report is generated, but MDC supplies dates that festive lights are connected, so that they can be correctly included in submission data for the days they are connected.

The RAMM database records light installation and replacement dates, which default to the date which the data is collected. Field work is conducted by Alf Downs and PSW with data collection by Alf Downs. Alf Downs staff update the database from the field using Pocket RAMM when work is completed. For new subdivisions data is entered into RAMM by MDC once the lights are vested, which may not reflect the date of livening.

Audit outcome

Non-compliant

CONCLUSION

Based on the field audit of 224 items of load, the best available estimate is not precise enough to conclude that the database is accurate within $\pm 5\%$. The field audit concluded that in absolute terms, total annual consumption is estimated to be 7,300 kWh lower than the DUML database indicates. A small number of other discrepancies were identified during review of the database information and are assessed to have a low impact on submission.

Mercury's submission processes are compliant, although the audit identified an error made in the February 2023 submission which will be corrected through the revision process. Mercury reconciles this DUML load using the HHR profile in accordance with exemption 233. This exemption expires on 31 October 2023, and Mercury is planning to request an extension and if that is unsuccessful will apply for a new profile. MDC provides a monthly report from the database to Mercury, which is used to determine wattages. On hours are derived using data logger information.

The four non-compliances identified all have a low impact, and the future risk rating of eight indicates that the next audit be completed in 18 months. I have considered this in conjunction with information provided by MDC which indicates that they intend to resolve all issues identified promptly, and I agree with this recommendation.

PARTICIPANT RESPONSE

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