ELECTRICITY INDUSTRY PARTICIPATION CODE
DISTRIBUTED UNMETERED LOAD AUDIT REPORT

Provera

For

PALMERSTON NORTH CITY COUNCIL AND MERCURY ENERGY LIMITED

Prepared by: Tara Gannon

Date audit commenced: 29 February 2024

Date audit report completed: 18 March 2024

Audit report due date: 26 March 2024

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EXECUTIVE SUMMARY

This audit of the **Palmerston North City Council (PNCC)** 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.

A RAMM database is managed by **Fulton Hogan**. Field work, asset data capture and database population is conducted by Fulton Hogan, **Alf Downs** and **Max Tarr Electrical Limited (Max Tarr)**. Where work is completed by Fulton Hogan, Alf Downs or Max Tarr the database is updated from the field using Pocket RAMM. Where work is completed by another party as a part of a project or connection of a new subdivision, the installer is required to liaise with Fulton Hogan, Alf Downs or Max Tarr to arrange for RAMM to be updated.

Mercury reconciles this DUML load using the HHR profile. Mercury were granted exemption No. 233, which allowed them to provide HHR submission information instead of NHH submission information for DUML. Clause 8(g) of Schedule 15.3 of the Code, which the exemption related to was removed from the Code in 2018, and the exemption is no longer valid. Mercury is planning to apply for a new profile which will allow them to continue to submit the DUML load as HHR, and to apply dimming.

Submission information is based on monthly DUML database extracts provided by Fulton Hogan, and data logger on hours, metered values for a sample of dimmable lights, and a full load factor. I checked the calculations for January 2024 and confirmed that they were correct, and consistent with the data logger files and data provided by PNCC.

The audit found some accuracy issues including that:

- some items of load recorded in the database with a DUML ICP number were excluded from the monthly database extracts provided to Mercury for submission; PNCC intends to investigate to confirm whether these items of load are validly excluded and will update the process to include any missing lights,
- some items of load do not have an ICP number recorded; PNCC intends to investigate to confirm whether these items of load are validly excluded from the DUML load and will update the ICP numbers for any missing lights,
- 37 LED items of load have a blank gear wattage and LED lights expected to have a gear wattage of zero,
- a small number of items of load had incorrect descriptions, lamp or gear wattages, and lamp and gear wattages which could not be confirmed by reviewing specifications,
- seven disconnected items of load which have wattages recorded in the database against DUML ICPs, resulting in over submission of 2,992 kWh per annum, and
- 14 items of load had gear wattages inconsistent with the lamp make and model which could result in over submission of 68 kWh per annum.

A field audit was conducted of a statistical sample of 430 items of load on 3 March 2024, which found that the database was not accurate within ±5%. In absolute terms, total annual consumption is estimated to be 157,300 kWh lower than the DUML database indicates.

The future risk rating of 20 indicates that the next audit be completed in three months. This is a similar rating to the previous audit, and PNCC is continuing to investigate and resolve discrepancies. I recommend the Authority considers an audit period of at least ten months to 26 January 2025.

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	328 items of load and 46,092.6 W recorded against DUML ICPs in the database are excluded from submissions. Some of the load may be validly excluded and PNCC intends to investigate. The DUML load is submitted using HHR profile, without an exemption in place. The field audit found the database was found not accurate within ±5%, resulting in potential under submission of 157,300 kWh per annum. The lamp description for "Terraled Mini 34W AP2 4000k" is incorrect and should be "Terraled Mini 24W AP2 4000k". The lamp and gear wattages for the 83 affected lamps are correct, and there is no impact on submission. 37 LED items of load connected to DUML ICPs have a blank gear wattage but should have a gear wattage of zero. There is no impact on submission. Two lamp models have wattages which differ from the expected value based on the lamp specifications, resulting in potential under submission 17 kWh per annum. Seven disconnected lamps have wattages recorded in the database against DUML ICPs, resulting in over submission of 2,992 kWh per annum. 14 items of load had gear wattages inconsistent with the lamp make and model which could result in over submission of 68 kWh per annum. The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot.	Moderate	High	6	Investigating

Subject	Section	Clause	Non-Compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
Location of each item of load	2.3	11(2)(b) of Schedule 15.3	There is insufficient location information to allow pole ID 64681 to be readily located.	Strong	Low	1	Identified
Description and capacity of load	2.4	11(2)(c) and (d) of Schedule 15.3	37 LED items of load connected to DUML ICPs have a blank gear wattage but should have a gear wattage of zero.	Strong	Low	1	Investigating
Database accuracy	3.1	15.2 and 15.37B(b)	The field audit found the database was found not accurate within ±5%, resulting in potential under submission of 157,300 kWh per annum. The lamp description for "Terraled Mini 34W AP2 4000k" is incorrect and should be "Terraled Mini 24W AP2 4000k". The lamp and gear wattages for the 83 affected lamps are correct, and there is no impact on submission. Two lamp models have wattages which differ from the expected value based on the lamp specifications, resulting in potential under submission 17 kWh per annum. Seven disconnected lamps have wattages recorded in the database against DUML ICPs, resulting in over submission of 2,992 kWh per annum. 14 items of load had gear wattages inconsistent with the lamp make and model which could result in over submission of 68 kWh per annum. Pole ID 64681 has insufficient address information recorded to enable it to be readily located.	Moderate	High	6	Investigating
Volume information accuracy	3.2	15.2 and 15.37B(c)	328 items of load and 46,092.6 W recorded against DUML ICPs in the database are excluded from submissions. Some of the load may be validly excluded and PNCC intends to investigate. The DUML load is submitted using HHR profile, without an exemption in place. The field audit found the database was found not accurate within ±5%, resulting in potential under	Moderate	High	6	Investigating

Subject	Section	Clause	Non-Compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
			submission of 157,300 kWh per annum. The lamp description for "Terraled Mini 34W AP2 4000k" is incorrect and should be "Terraled Mini 24W AP2 4000k". The lamp and gear wattages for the 83 affected lamps are correct, and there is no impact on submission. 37 LED items of load connected to DUML ICPs have a blank gear wattage but should have a gear wattage of zero. There is no impact on submission. Two lamp models have wattages which differ from the expected value based on the lamp specifications, resulting in potential under submission 17 kWh per annum. Seven disconnected lamps have wattages recorded in the database against DUML ICPs, resulting in over submission of 2,992 kWh per annum. 14 items of load had gear wattages inconsistent with the lamp make and model which could result in over submission of 68 kWh per annum. The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot.				
Future Risk Rating						20	

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	Remedial action
Investigate lights with DUML ICPs excluded from submissions	2.1	Determine why some lights with DUML ICPs are excluded from submissions. If they should not be included in the DUML load, update the ICP group to clarify this.	PNCC are aware of this and are investigating, Mercury will follow up.

Subject	Section	Recommendation	Remedial action
		If they should be included in the DUML load, update the ICP group to the correct DUML ICP.	
Investigate lights with blank ICP numbers	2.2	Confirm whether the 77 lights with blank ICP numbers are connected, unmetered and the responsibility of PNCC, and update the ICP number and lamp information in RAMM.	PNCC are aware of this and are investigating, Mercury will follow up.
Confirm light wattages	3.1	Confirm the correct lamp wattages for lamp models where wattages applied differ from expected values or could not be confirmed and update the wattages in RAMM as necessary.	PNCC are aware of this and are investigating, Mercury will follow up.

ISSUES

Subject	Section	Description	Issue
		Nil	

1. ADMINISTRATIVE

1.1. Exemptions from Obligations to Comply with Code

Code reference

Section 11 of Electricity Industry Act 2010.

Code related audit information

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

Audit observation

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

Audit commentary

Mercury were granted exemption No. 233, which allowed them to provide half-hour ("HHR") submission information instead of non-half-hour ("NHH") submission information for distributed unmetered load ("DUML"). Clause 8(g) of Schedule 15.3 of the Code, which the exemption related to was removed from the Code in 2018, therefore the exemption is no longer valid.

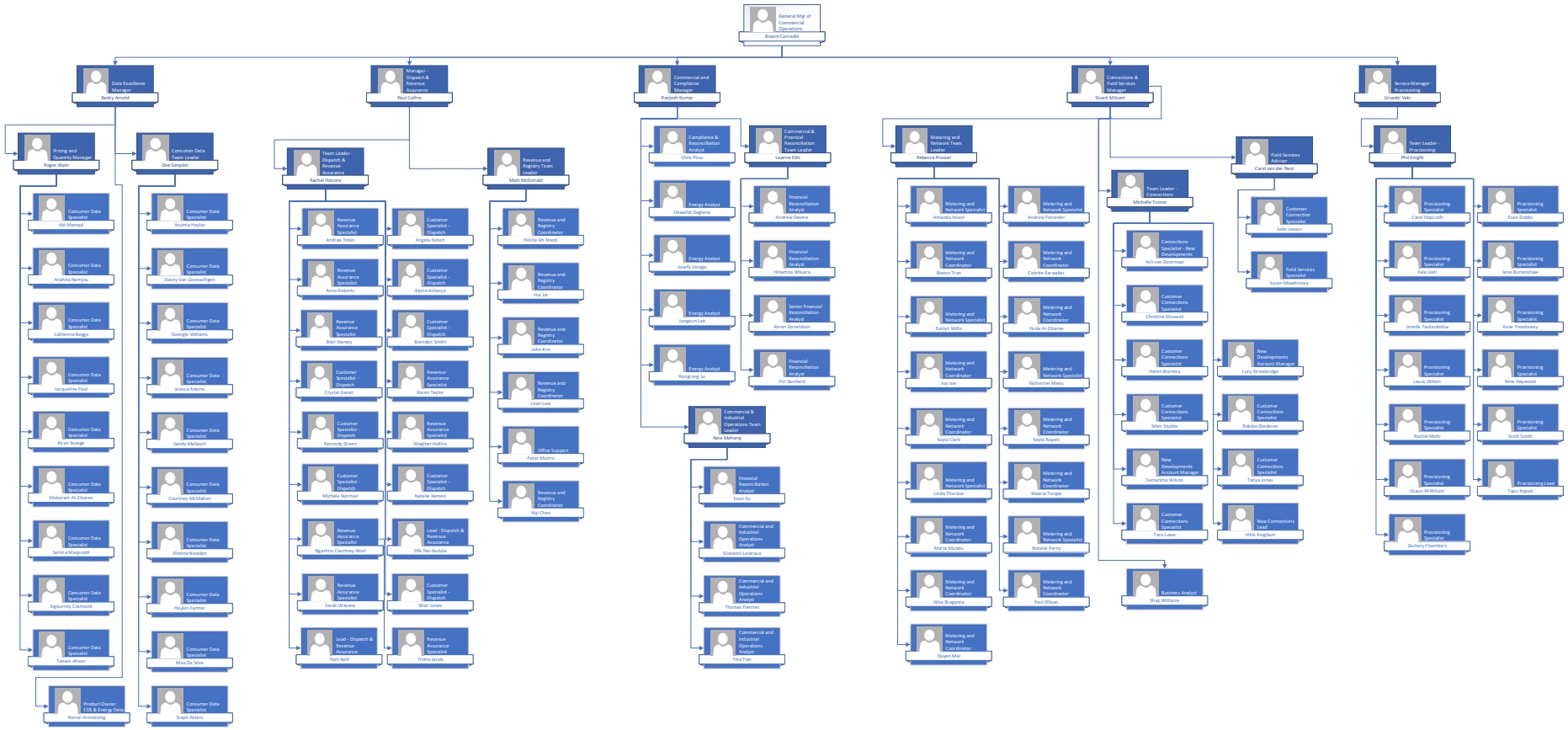
Mercury currently submits the DUML load as HHR, which is non-compliant with Clause 8(5) of Schedule 15.3 of the Code, because the DUML load does not meet the requirements for use of the HHR profile:

> *For any unmetered load at an ICP for which it is responsible, regardless of the category of any metering installation at the ICP, a reconciliation participant must provide non-half-hour submission information to the reconciliation manager unless—*
>
> *(a) the Authority has approved a profile for the unmetered load that allows the reconciliation participant to provide half hour submission information to the reconciliation manager for the unmetered load; and*
>
> *(b) the reconciliation participant provides half hour submission information in accordance with the profile.*

Mercury is planning to apply for a new profile which will allow them to continue to submit the DUML load as HHR.

1.2. Structure of Organisation

Mercury provided a copy of their organisational structure:



1.3. Persons involved in this audit

Auditor:

Name	Title	Company
Tara Gannon	Auditor	Provera

Other personnel assisting in this audit were:

Name	Title	Company
Chris Posa	Compliance Reconciliation Analyst	Mercury
Sarah Dark	Business Development Manager - Large Commercial	Mercury
Ankit Verma	Asset Management	PNCC
Hamish Larsen	Resource Recovery Analyst	PNCC
Henry Borowicz	Senior Contract Manager	PNCC
Joshua Kohunui	Asset Management	PNCC
La'sasha McCutcheon	Senior Contract Manager	PNCC
Natasha Hickmott	Activities Manager - Resource Recovery and Sustainability	PNCC
Rakesh Koyi	Capital Projects Officer	PNCC

1.4. Hardware and Software

RAMM

The SQL database used for the management of DUML is remotely hosted by thinkproject New Zealand Limited. The database is commonly known as “RAMM” which stands for “Road Assessment and Maintenance Management”. The specific data used for DUML is held in the Streetlight tables. thinkproject New Zealand Limited backs up the database and assists with disaster recovery as part of their hosting service.

Backup and restoration procedures are in place, and access to the database is restricted using logins and passwords.

Mercury systems

Systems used by Mercury to calculate submissions are assessed as part of their reconciliation participant audit.

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)
0000031152CPB70	PNCC Streetlights LTN0331	LTN0331	DST	4,109	262,011.9
1000581347PCFF5	PNCC Streetlights BPE0331	BPE0331	DST	5,687	393,049
Total				**9,796**	**655,060.9**

There are five other ICP groups recorded in the database:

ICP group	Comment
State Highway	There are 88 NZTA rural lights with the ICP group recorded as "state highway" totalling 16,094 W. These lights are not PNCC's responsibility and are included in the lower North Island NZTA database, which has been audited separately.
Horizons	Four lights in a bus shelter on Main East, Hokowhitu are recorded in the database against ICP group "Horizon" totalling 1,112 W. These metered lights are the responsibility of Horizons, and are recorded in the database so that the correct owner can be identified if a fault is raised.
Private	There are 90 lights with the ICP group recorded as "private" totalling 7,440 W. These lights are not PNCC's responsibility and are included in the database so that the correct owner can be determined if a fault is raised. Powerco was working through contacting the relevant retailers for these private lights to arrange for the unmetered load to be recorded against the customer's existing ICP, or for a new unmetered ICP to be created. No progress updates have been received by PNCC during the audit period.
Solar no ICP	This is a 90W solar powered LED ribbon light connected to outdoor seating. It is not connected to the network and does not require an ICP number or to be reported for reconciliation.
Blank	There are 77 lights totalling 3,748 W with a blank ICP number. 27 lights had no lamp information recorded and 50 lights had lamp and wattage information recorded. PNCC is investigating these lights to confirm whether they are connected, unmetered and the responsibility of PNCC, and then which ICP number should be recorded.

1.7. Authorisation Received

All information was provided directly by Mercury and PNCC.

1.8. Scope of Audit

This audit of the PNCC 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.

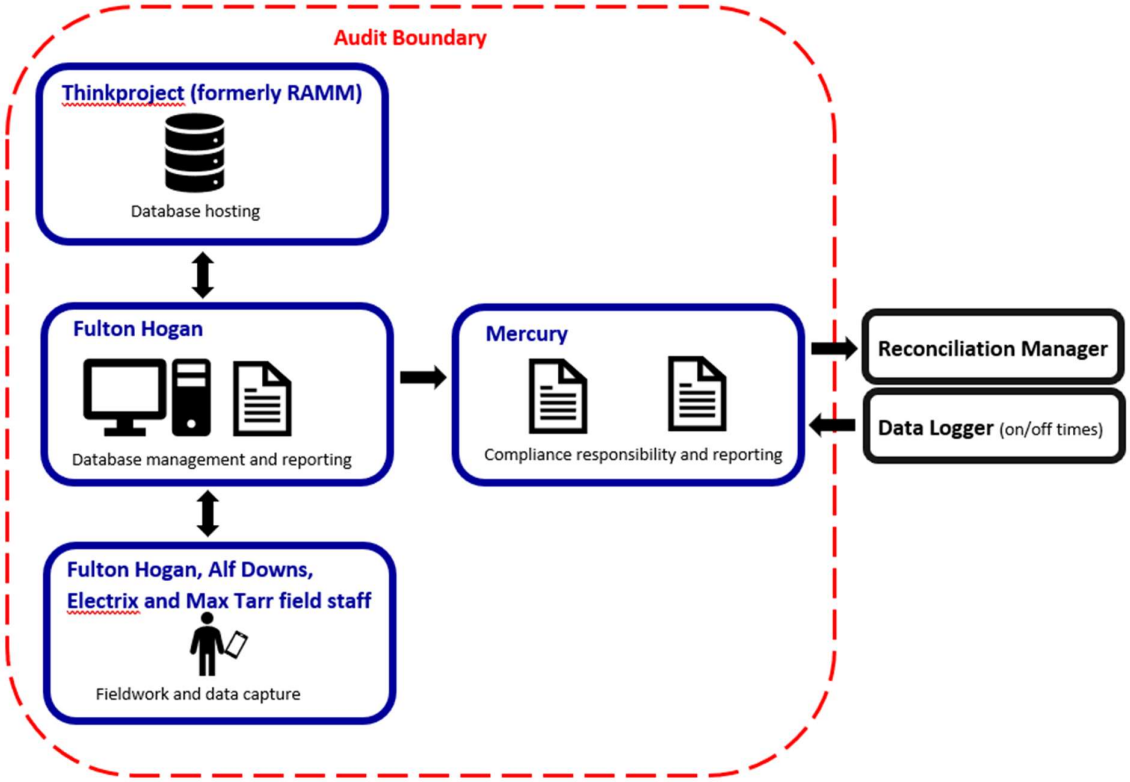
A RAMM database is managed by Fulton Hogan. Field work, asset data capture and database population is conducted by Fulton Hogan, Alf Downs and Max Tarr. Where work is completed by Fulton Hogan, Alf Downs or Max Tarr the database is updated from the field using Pocket RAMM. Where work is completed

by another party as a part of a project or connection of a new subdivision, the installer is required to liaise with Fulton Hogan, Alf Downs or Max Tarr to arrange for RAMM to be updated.

HHR submission information is based on monthly DUML database extracts provided by Fulton Hogan and data logger on hours for undimmed streetlights, database extracts, data logger on hours and metered values for a sample of lights, and a full load factor for dimmable lights. The monthly database extract contains all lights, and denotes whether they are dimmable, so that the total kW for undimmed lights and dimmed lights can be calculated by ICP. Each dimmable luminaire has the same five stage dimming profile programmed into its driver by the supplier.

Mercury were granted exemption No. 233, which allowed them to provide HHR submission information instead of NHH submission information for DUML. Clause 8(g) of Schedule 15.3 of the Code, which the exemption related to was removed from the Code in 2018, and the exemption is no longer valid. Mercury is planning to apply for a new profile which will allow them to continue to submit the DUML load as HHR, and to apply dimming.

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.



A field audit was undertaken of a statistical sample of 430 items of load on 3 March 2024.

1.9. Summary of previous audit

The previous audit of this database was undertaken by Tara Gannon of Veritek Limited in March 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
Distributed unmetered load audits	1.11	16A.26 and 17.295F	The audit was not completed by the due date.	Cleared
Deriving submission information	2.1	11(1) of Schedule 15.3	The best available estimate is not precise enough to conclude that the database is accurate within ±5 %. There is a 95% level of confidence that the annual consumption is between 32,500 and 188,700 kWh per annum lower than the database indicates.	Still existing
			34 LED items of connected to DUML ICPs have a blank lamp wattage but are expected to have a gear wattage of zero. There is no impact on submission.	Still existing
			71 lamps have lamp wattages which differ from the expected value based on the lamp specifications. PNCC intends to update the wattages to reflect the expected values. The estimated impact is 5,018 kWh of under submission per annum.	Some still existing
			Seven disconnected lamps have wattages recorded against DUML ICPs. The estimated impact is 2,992 kWh of over submission per annum.	Still existing
			Correct wattages were unable to be confirmed for 63 lamps. A list of the affected lamps was to PNCC for investigation and correction if necessary.	Determined wattages wherever possible, some exceptions are still existing
			14 lamps have gear wattages which differ from the expected value based on the gear specifications. PNCC intends to update the wattages to reflect the expected values. The estimated impact is 290 kWh of over submission per annum.	Still existing
			The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot.	Still existing
Location of each item of load	2.3	11(2)(b) of Schedule 15.3	There is insufficient location information to allow pole ID 64681 to be readily located.	Still existing
Description and capacity of load	2.4	11(2)(c) and (d) of Schedule 15.3	34 LED items of load connected to DUML ICPs have a blank gear wattage but should have a gear wattage of zero.	Still existing
All load recorded in database	2.5	11(2A) of Schedule 15.3	One CCTV camera was missing from pole ID L10008 outside One School Global on Johnstone Drive.	Cleared
Database accuracy	3.1	15.2 and 15.37B(b)	The best available estimate is not precise enough to conclude that the database is accurate within ±5 %. There is a 95% level of confidence that the annual consumption is between 32,500 and 188,700 kWh per annum lower than the database indicates.	Still existing
			34 LED items of connected to DUML ICPs have a blank lamp wattage but are expected to have a gear wattage of zero. There is no impact on submission.	Still existing

Subject	Section	Clause	Non-compliance	Status
			71 lamps have lamp wattages which differ from the expected value based on the lamp specifications. PNCC intends to update the wattages to reflect the expected values. The estimated impact is 5,018 kWh of under submission per annum.	Some still existing
			Seven disconnected lamps have wattages recorded against DUML ICPs. The estimated impact is 2,992 kWh of over submission per annum.	Still existing
			Correct wattages were unable to be confirmed for 63 lamps. A list of the affected lamps was to PNCC for investigation and correction if necessary.	Determined wattages wherever possible, some exceptions are still existing
			14 lamps have gear wattages which differ from the expected value based on the gear specifications. PNCC intends to update the wattages to reflect the expected values. The estimated impact is 290 kWh of over submission per annum.	Still existing
			The lamp description for "Terraled Mini 34W AP2 4000k" is incorrect and should be "Terraled Mini 24W AP2 4000k". The lamp and gear wattages for the 83 affected lamps are correct, and there is no impact on submission.	Still existing
			Pole ID 64681 has insufficient address information recorded to enable it to be readily located.	Still existing
Volume information accuracy	3.2	15.2 and 15.37B(c)	The best available estimate is not precise enough to conclude that the database is accurate within ±5 %. There is a 95% level of confidence that the annual consumption is between 32,500 and 188,700 kWh per annum lower than the database indicates.	Still existing
			34 LED items of connected to DUML ICPs have a blank lamp wattage but are expected to have a gear wattage of zero. There is no impact on submission.	Still existing
			71 lamps have lamp wattages which differ from the expected value based on the lamp specifications. PNCC intends to update the wattages to reflect the expected values. The estimated impact is 5,018 kWh of under submission per annum.	Some still existing
			Seven disconnected lamps have wattages recorded against DUML ICPs. The estimated impact is 2,992 kWh of over submission per annum.	Still existing
			Correct wattages were unable to be confirmed for 63 lamps. A list of the affected lamps was to PNCC for investigation and correction if necessary.	Determined wattages wherever possible, some exceptions are still existing
			14 lamps have gear wattages which differ from the expected value based on the gear specifications. PNCC intends to update the wattages to reflect the expected values. The estimated impact is 290 kWh of over submission per annum.	Still existing
			The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot.	Still existing

Subject	Section	Clause	Recommendation	Status
Deriving submission information	2.1	Confirm the correct owner for pole ID 10280 and update the database as necessary	Two lights connected to pole ID 10280 were identified in previous audits as Waka Kotahi lights, but have a pole owner of "Parks & Reserves" and are connected to ICP 1000581347PCFF5. I recommend checking to confirm the correct pole owner. If it is Parks & Reserves no action is required, and if it is Waka Kotahi the PNCC DUML ICP number is expected to be removed.	Adopted. PNCC is still investigating these lights to confirm the correct ICP.
Deriving submission information	2.1	Investigate private lights connected to DUML ICPs	28 lights recorded against DUML ICPs with a private owner (2,249W) are excluded from the database extracts and submission. A list of the affected lights has been provided to Mercury Energy. I recommend Mercury liaises with Powerco to investigate the lights and determine whether they are metered, or if standard or shared unmetered load is needed to account for the unmetered load.	Adopted. Powerco is investigating these lights.
Database accuracy	3.1	Confirm light wattages	Confirm the correct lamp wattages for lamp models where wattages applied differ from expected values or could not be confirmed, and update the wattages in RAMM as necessary.	Not adopted, and re-raised.

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 Provera 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

Submission calculation

Mercury reconciles this DUML load using the HHR profile. Mercury were granted exemption No. 233, which allowed them to provide HHR submission information instead of NHH submission information for DUML. Clause 8(g) of Schedule 15.3 of the Code, which the exemption related to was removed from the Code in 2018, and the exemption is no longer valid. Mercury is planning to apply for a new profile which will allow them to continue to submit the DUML load as HHR.

Submission information is based on monthly DUML database extracts provided by Fulton Hogan, and data logger on hours, metered values for a sample of dimmable lights, and a full load factor.

The monthly database extract contains all lights, and denotes whether they are dimmable, so that the total kW for undimmed lights and dimmed lights can be calculated by ICP. Each dimmable luminaire has the same five stage dimming profile programmed into its driver by the supplier.

Standard streetlights	The load for the standard streetlights is calculated at trading period level as: *(Trading period seconds on/constant factor/2) x kW* Where: Constant factor = 1800
Dimmable streetlights	The load for dimmable streetlights is calculated at trading period level as: *(Trading period seconds on/constant factor/2) x kW for dimmed meters x (golden meter usage/full load factor)* Where: Constant factor = 1800 Golden meter usage = measured usage for the 11 "golden" metered dimmable streetlights Full load factor = provided by PNCC from their CMS

I checked the calculations for January 2024 and confirmed that they were correct, and consistent with the data logger for the golden meter and on hours, and wattage data provided by PNCC.

PNCC intends to start trialling a new lighting system for dimming by 30 June 2024. The trial of 400 fittings will be able to be dimmed to different levels depending on traffic flows. PNCC will work with Mercury to ensure that the dimming levels are able to be validated for submission.

Items connected to DUML ICPs but excluded from submission

I compared the January 2024 database extract provided to Mercury for calculation of submission and the raw database extract provided for the audit. 328 items of load (46,092.6 W) recorded in the database against DUML ICPs were included in the extract provided for the audit, but excluded from the extract provided for submission:

- 243 items of load (39,110 W) have Transit NZ Urban Lights or Waka Kotahi as the owner, and are expected not to be the responsibility of PNCC,
- 27 items of load (2,031 W) have a private owner, and are expected not to be the responsibility of PNCC,
- 17 items of load (1,415 W) have parks and reserves as the (these lights include the Regent Arcade festive strings and Berrymans Lane lights believed to be disconnected); excluding these, the total is ten lights (714.4 W), and
- the other 41 items of load (3,536.6 W) have Powerco, roading and accessways or unknown as the owner.

Recommendation	Description	Audited party comment	Remedial action
Investigate lights with DUML ICPs excluded from submissions	Determine why some lights with DUML ICPs are excluded from submissions. If they should not be included in the DUML load, update the ICP group to clarify this. If they should be included in the DUML load, update the ICP group to the correct DUML ICP.	PNCC are aware of this and are investigating, Mercury will follow up.	Investigating

Sources of database inaccuracy are as follows:

Issue	Estimated volume information impact (annual kWh)
The field audit found the database was found not accurate within ±5%	157,300 kWh of over submission.
The lamp description for "Terraled Mini 34W AP2 4000k" is incorrect and should be "Terraled Mini 24W AP2 4000k". The lamp and gear wattages for the 83 affected lamps are correct, and there is no impact on submission.	-
37 LED items of load connected to DUML ICPs have a blank gear wattage but should have a gear wattage of zero.	-
Two lamp models have wattages which differ from the expected value based on the lamp specifications.	17 kWh of under submission per annum.
Seven disconnected lamps have wattages recorded in the database against DUML ICPs.	2,992 kWh of over submission per annum.

Issue	Estimated volume information impact (annual kWh)
14 items of load had gear wattages inconsistent with the lamp make and model.	68 kWh of over submission per annum.
There are 77 lights totalling 3,748 W with a blank ICP number. 27 lights had no lamp information recorded and 50 lights had lamp and wattage information recorded. PNCC is investigating these lights to confirm whether they are connected, unmetered and the responsibility of PNCC, and then which ICP number should be recorded.	Unknown.

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

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

The 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. PNCC supplies dates that festive lights are connected, so that they can be correctly included in submission data. 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 RAMM database records light installation and replacement dates, which default to the date which the data is collected. Where work is completed by Fulton Hogan, Alf Downs or Max Tarr the database is updated from the field using Pocket RAMM. Where work is completed by another party as a part of a project or connection of a new subdivision, the installer is required to liaise with Fulton Hogan, Alf Downs or Max Tarr to arrange for RAMM to be updated.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.1 With: Clause 11(1) of Schedule 15.3	328 items of load and 46,092.6 W recorded against DUML ICPs in the database are excluded from submissions. Some of the load may be validly excluded and PNCC intends to investigate. The DUML load is submitted using HHR profile, without an exemption in place. The field audit found the database was found not accurate within ±5%, resulting in potential under submission of 157,300 kWh per annum. The lamp description for "Terraled Mini 34W AP2 4000k" is incorrect and should be "Terraled Mini 24W AP2 4000k". The lamp and gear wattages for the 83 affected lamps are correct, and there is no impact on submission. 37 LED items of load connected to DUML ICPs have a blank gear wattage but should have a gear wattage of zero. There is no impact on submission.

From: 15-Jan-24 To: 07-Mar-24	Two lamp models have wattages which differ from the expected value based on the lamp specifications, resulting in potential under submission 17 kWh per annum. Seven disconnected lamps have wattages recorded in the database against DUML ICPs, resulting in over submission of 2,992 kWh per annum. 14 items of load had gear wattages inconsistent with the lamp make and model which could result in over submission of 68 kWh per annum. 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: Multiple times Controls: Moderate Breach risk rating: 6
Audit risk rating	**Rationale for audit risk rating**
High	The controls over the database are moderate, and PNCC has indicated that they intend to check and correct the discrepancies. The impact is assessed to be high, based on the kW differences identified.

Actions taken to resolve the issue	Completion date	Remedial action status
PNCC are aware of the discrepancies and are investigating with the intention to correct any issues, we will follow up. Regarding the DUML load being submitted using the HHR profile, Mercury is working on a profile application which will allow HH submission for DUML.	July 2024	Investigating
Preventative actions taken to ensure no further issues will occur	**Completion date**	
PNCC are aware of the importance of having an accurate database and we will continue to liaise with them on this.	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

There are 77 lights totalling 3,748 W with a blank ICP number. 27 lights had no lamp information recorded and 50 lights had lamp and wattage information recorded. PNCC is investigating these lights to confirm whether they are connected, unmetered and the responsibility of PNCC, and then which ICP number should be recorded. Compliance is recorded in this section because I was unable to confirm whether the lights were connected, unmetered, and the responsibility of PNCC.

Recommendation	Description	Audited party comment	Remedial action
Investigate lights with blank ICP numbers	Confirm whether the 77 lights with blank ICP numbers are connected, unmetered and the responsibility of PNCC, and update the ICP number and lamp information in RAMM.	PNCC are aware of this and are investigating, Mercury will follow up.	Investigating

All other lights recorded in the database have a valid DUML ICP number recorded, or were confirmed not to be PNCC's responsibility as shown in the table below:

ICP group	Comment
State Highway	There are 88 NZTA rural lights with the ICP group recorded as "state highway" totalling 16,094 W. These lights are not PNCC's responsibility and are included in the lower North Island NZTA database, which has been audited separately.
Horizons	Four lights in a bus shelter on Main East, Hokowhitu are recorded in the database against ICP group "Horizon" totalling 1,112 W. These metered lights are the responsibility of Horizons and are recorded in the database so that the correct owner can be identified if a fault is raised.
Private	There are 90 lights with the ICP group recorded as "private" totalling 7,440 W. These lights are not PNCC's responsibility and are included in the database so that the correct owner can be determined if a fault is raised. Powerco was working through contacting the relevant retailers for these private lights to arrange for the unmetered load to be recorded against the customer's existing ICP, or for a new unmetered ICP to be created. No progress updates have been received by PNCC during the audit period.
Solar no ICP	This is a 90W solar powered LED ribbon light connected to outdoor seating. It is not connected to the network and does not require an ICP number or to be reported for reconciliation.

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 contains fields for carriageway area, road name, displacement, GPS coordinates, and pole numbers.

9,750 of the 9,796 items of load (99.5%) connected to the DUML ICPs have GPS coordinates. 45 of the other 46 items have sufficient location information to be readily located.

One item of load has insufficient location information to allow it to be located. The only location information available in RAMM is the road name and pole ID.

Pole ID	ICP Group	Road	Lamp install date	Pole install date
64681	1000581347PCFF5	ELM TREE CT	31 August 2022	31 August 2022

The accuracy of locations is discussed in **section 3.1**.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.3 With: Clause 11(2)(b) of Schedule 15.3 From: 28-Feb-23 To: 15-Jan-24	There is insufficient location information to allow pole ID 64681 to be readily located. Potential impact: Low Actual impact: Low Audit history: Once Controls: Strong Breach risk rating: 1
Audit risk rating	**Rationale for audit risk rating**
Low	The controls are strong, as almost all lights had sufficient address information recorded. The audit risk rating is low because only one light had insufficient address information recorded and it was connected recently.

Actions taken to resolve the issue	Completion date	Remedial action status
PNCC have advised that this has now been updated.	20.03.2024	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
PNCC are aware of the importance of having an accurate database and we will continue to liaise with them on this.	Ongoing	

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 make and lamp model fields, and wattages are recorded in the lamp wattage and gear wattage fields.

DUML ICPs 0000031152CPB70 and 1000581347PCFF5

One item of load on Ashford Ave (pole ID 12698) on ICP 1000581347PCFF5 has an unknown lamp model and zero gear wattage and lamp wattage. This is a new connection in a subdivision which has not been livened yet. The lamp description, lamp wattage and gear wattage will be updated when the lamps are livened.

37 LED items of load have a blank gear wattage and are LED lights expected to have a gear wattage of zero. All other items of load have valid gear wattages recorded.

	Count of lights with a blank gear wattage by road name			
Lamp Model	**MAXWELLS LINE**	**NAPIER RD N**	**PIONEER HWY**	**Total**
Road Grace BRP711 30LED26W	1			1
Terraled Mini 12LED 4000K N219		2		2
Terraled Mini 34W AP2 4000k		30		30
Thorn Julie 40W LED 4K			4	4
Grand Total	1	32	4	37

Blank ICP number

27 of the lights with a blank ICP number had an unknown lamp make and model and zero lamp and gear wattage. PNCC is investigating these lights to confirm whether they are connected, unmetered, and the responsibility of PNCC. Compliance is recorded in this section because I was unable to confirm whether the lights were connected, unmetered and the responsibility of PNCC and a recommendation to check and update the database records is made in **section 2.2**.

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: 28-Feb-23 To: 15-Jan-24	37 LED items of load connected to DUML ICPs have a blank gear wattage but should have a gear wattage of zero. Potential impact: Low Actual impact: Low Audit history: Once Controls: Strong Breach risk rating: 1
Audit risk rating	**Rationale for audit risk rating**
Low	The controls are strong, as almost all connected lights have valid gear wattages recorded. There is no impact because all the missing wattages should be zero.

Actions taken to resolve the issue	Completion date	Remedial action status
PNCC are aware of this issue and are investigating with the intention to update so that the database has zero for the gear wattage where appropriate rather than blank, we will follow up.	July 2024	Investigating
Preventative actions taken to ensure no further issues will occur	**Completion date**	
PNCC are aware of the importance of having an accurate database and we will continue to liaise with them on this.	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 430 items of load on 3 March 2024. The sample was selected from five strata, as follows:

1. 0000031152CPB70 street names A to Main West,
2. 0000031152CPB70 street names Main West North to Z,
3. 1000581347PCFF5 road names A to Fitzherbert,
4. 1000581347PCFF5 road names Fitzroy to Parnell Heights, and
5. 1000581347PCFF5 road names Pastoral to Z.

Audit commentary

The field audit discrepancies are detailed in the table below.

Street	Database count	Field count	Light count difference	Wattage recorded incorrectly	Comments
ALFRED ST	8	8	-	2	Pole IDs 2113 and 9037 had 18W LEDs connected but were recorded in the database as 12W LEDs.
CLYDE CRES	26	25	-1	-	Pole ID 65082 by Avon St had no light connected but was recorded in the database as a 20W LED.
DAHLIA ST	11	11	-	1	Pole ID 4844 had a L76A connected which was recorded in the database as a 64W LED.
DUTTON STREET_B	3	2	-1	-	Pole ID 10682 had no light connected but was expected to have a 100W SON.
HAMMOND 8 / COLLEGE 206	1	1	-	1	Pole ID 7831 on the walkway had an L34 connected which was recorded in the database as a 24W LED.
HAVILL ST	14	14	-	4	Pole ID 5666 had an L115 (NX4) connected which was recorded in the database as a 14W LED. Pole IDs 12375, 12376 and 12378 had L26 lights connected which were recorded in the database as 20W LEDs.
KOROMIKO AVE	6	6	-	1	Pole ID 5023 had a L115 connected which was recorded in the database as a 99W LED.
LESLIE AVE	3	3	-	1	Pole ID 12315 had an 18W LED connected which was recorded in the database as 20W LED.
LOMBARD ST	15	14	-1	4	Pole IDs 1580, 1585, 6374 and 6610 had L100A lights connected which were recorded in the database as 104W. No light was located for pole ID 11803 which was recorded in the database as a 31W LED.
MANAWAROA ST	13	13	-	9	The carpark contained nine L18 lights which were recorded in the database as six 100W SON and three 70W SON.
REDMAYNE STREET_B	6	6	-	2	Two lights inside the inaccessible locked Transpower Bunnythorpe Warehouse yard were recorded as TLD 30W/33 x 2 tubes (60W) but appear to be LEDs.

Street	Database count	Field count	Light count difference	Wattage recorded incorrectly	Comments
ROSALIE TCE	1	1	-	1	Pole ID 12201 had a L38 connected but was recorded in the database as a 32W LED.
YORK PL	2	1	-1	-	There was no light connected to pole ID 5494 but a 70W SON was expected.
Total	**430**	**426**	**-4**	**26**	

No additional items of load were identified during the field audit. Database accuracy is discussed 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.

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 RAMM 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	Palmerston North City Council streetlights
Strata	The database contains the PNCC items of load for the DUML ICPs in the Palmerston North region. The processes for the management of all PNCC items of load are the same, but I decided to place the items of load into five strata: 1. 0000031152CPB70 street names A to Main West, 2. 0000031152CPB70 street names Main West North to Z, 3. 1000581347PCFF5 road names A to Fitzherbert, 4. 1000581347PCFF5 road names Fitzroy to Parnell Heights, and 5. 1000581347PCFF5 road names Pastoral 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 44 sub-units.
Total items of load	430 items of load making up 2.5% of the total load were checked.

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

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

Audit commentary

Field audit findings

A field audit was conducted of a statistical sample of 430 items of load on 3 March 2024. 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	94.4	Wattage from survey is lower than the database wattage by 5.6%
R_L	85.5	With a 95% level of confidence it can be concluded that the error could be between -14.4% and -+0.7%.
R_H	100.7	

The variability of the sample results across the strata means that the true wattage (installed in the field) could be between 14.4% lower and 0.7% higher than the wattage recorded in the DUML database.

These results were categorised in accordance with the "Distributed Unmetered Load Statistical Sampling Audit Guideline", effective from 1 February 2019. The database was found not to be accurate within ±5%.

- In absolute terms the installed capacity is estimated to be 37 kW lower than the database indicates.
- There is a 95% level of confidence that the installed capacity is between 95 kW lower and 5 kW than the database.
- In absolute terms, total annual consumption is estimated to be 157,300 kWh lower than the DUML database indicates.
- There is a 95% level of confidence that the annual consumption is between 405,300 per annum lower and 19,600 kWh per annum 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 %

PNCC indicated that some of the discrepancies may have occurred following replacement of lights after a city-wide outage patrol in late 2023. To resolve faults as quickly as possible, if they could not replace like with like, they replaced with the closest option available, intending to go back and replace with the original light type when one was available, but the database was not consistently updated where a different light type was installed.

Light description and capacity accuracy

Lamp description

The lamp description for "Terraled Mini 34W AP2 4000k" is incorrect and should be "Terraled Mini 24W AP2 4000k". The lamp and gear wattages for the 83 affected lamps are correct, and there is no impact on submission.

Lamp wattages

One item of load on Ashford Ave (pole ID 12698) on ICP 1000581347PCFF5 has an unknown lamp model and zero gear wattage and lamp wattage. This is a new connection in a subdivision which has not been livened yet. The lamp description, lamp wattage and gear wattage will be updated when the lamps are livened.

Where lamp wattages were not zero or blank, they were checked for alignment with the published standardised wattage table produced by the Electricity Authority or in the case of LED lights against the LED light specification. Two lamp models have wattages which differ from the expected value based on the lamp specifications, resulting in potential under submission of 4 W or 17 kWh per annum.

Lamp Model	Recorded lamp wattage (per lamp)	Expected lamp wattage (per lamp)	Count of lamps	Wattage difference (all affected lamps)
Cree XSP LED 15W 4000k	11	15	4	16 W
4000K CoB LED 6W/220÷240V	8	6	6	-12 W
Total			**10**	**4 W**

Seven disconnected lamps have wattages recorded in the database against DUML ICPs, resulting in over submission of 700.6 W or 2,992 kWh per annum.

Lamp Model	Recorded lamp wattage (per lamp)	Expected lamp wattage (per lamp)	Count of lamps	Wattage difference (all affected lamps)
Festive String 20 LED	47	disconnected	1	-47 W
Festive String 60 LED	142	disconnected	3	-426 W
Prolicht 750	27.6	disconnected	1	-27.6 W
RGB Sign	100	disconnected	2	-200 W
Total			**7**	**-700.6 W**

The RAMM extract provided contained insufficient information to confirm the correct wattages for the lamp models below. Full information on the affected lamps has been provided to PNCC, who intend to confirm the correct wattages and update RAMM as necessary. I have not calculated potential over or under submission as I have not been able to confirm the correct wattage.

Lamp Model	Recorded lamp wattage (per lamp)	Expected lamp wattage (per lamp)	Count of lamps
Apollo RL2P 056	120	Unknown	6
Cree LED 3000K CRI ≥83 120lm	2	Unknown	3
GE_LED	165	Unknown	4
LED 4000k, 1600lm 25000hrs	20	Unknown	4

Lamp Model	Recorded lamp wattage (per lamp)	Expected lamp wattage (per lamp)	Count of lamps
Cree LEDway 20 LED AT 525mA	27	35 (120-277V) or 39 (347-480V)	7
Cree LEDway 20 LED AT 700mA	37	47 (120-277V) or 51 (347-480V)	3
Cree LEDway 30 LED AT 525mA	37	53 (120-277V) or 55 (347-480V)	10
Cree LEDway 30 LED AT 525mA	39	53 (120-277V) or 55 (347-480V)	19
Cree LEDway 30 LED AT 700mA	53	70 (120-277V) or 73 (347-480V)	7
Piano 1 32 Leds	41	34.9 (300 mA) 49.5 (500 mA) 70 (700 mA)	3
Teceo 1 24 LED (27)	24	27/26.8 (350 mA) 38/38.1 (500 mA) 55/53.5 (700 mA)	19
Teceo 32 LED (38)	32	36/34.8 (350 mA) 51/49.5 (500 mA) 71/70 (700 mA)	26
Teceo 80 LED (122)	80	84 (350 mA) 121 (500 mA) 175 (700 mA)	14
Total			**125**

I recommend that the lamp wattages which could not be confirmed are checked and updated if necessary.

Description	Recommendation	Audited party comment	Remedial action
Confirm light wattages	Confirm the correct lamp wattages for lamp models where wattages applied differ from expected values or could not be confirmed and update the wattages in RAMM as necessary.	PNCC are aware of this and are investigating, Mercury will follow up.	Investigating

Gear wattages

37 LED items of load have a blank lamp wattage but are expected to have a gear wattage of zero. All other items of load connected to DUML ICPs have valid lamp and gear wattages.

Where gear wattages were not blank, they were checked for alignment with the published standardised wattage table produced by the Electricity Authority and expected values for LED lights. 14 items of load had gear wattages inconsistent with the lamp make and model which could result in over submission of 16 W or 68 kWh per annum.

Lamp Model	Count of lamps	Recorded gear wattage (per lamp)	Expected gear wattage (per lamp)	Wattage difference (all affected lamps)
TLD' 30w/33 x 2 tubes	6	7	6	6 W
TLD 40Watt Tube x 1	2	2	3	-2 W

Lamp Model	Count of lamps	Recorded gear wattage (per lamp)	Expected gear wattage (per lamp)	Wattage difference (all affected lamps)
100watt SON-I (HPS)	1	11	14	-3 W
100watt SON-T (HPS)	1	13	14	-1 W
13W PL	1	4	0	4 W
14W LED Lamp	3	4	0	12 W
Total	**14**			**16 W**

Address accuracy

One item of load has insufficient location information to allow it to be located. The only location information available in RAMM is the road name and pole ID. PNCC intends to confirm the location and update the database.

Pole ID	ICP Group	Road	Lamp install date	Pole install date
64681	1000581347PCFF5	ELM TREE CT	31/08/2022	31/08/2022

ICP number and owner accuracy

There are 77 lights totalling 3,748 W with a blank ICP number. 27 lights had no lamp information recorded and 50 lights had lamp and wattage information recorded. PNCC is investigating these lights to confirm whether they are connected, unmetered, and the responsibility of PNCC, and then which ICP number should be recorded. Compliance is recorded in this section because I was unable to confirm whether the lights were connected, unmetered, and the responsibility of PNCC. A recommendation to check these lights and update RAMM is made in **section 2.2**.

Change management process findings

A RAMM database is managed by Fulton Hogan. Field work, asset data capture and database population is conducted by Fulton Hogan, Alf Downs and Max Tarr. Where work is completed by Fulton Hogan, Alf Downs or Max Tarr the database is updated from the field using Pocket RAMM. Where work is completed by another party as a part of a project or connection of a new subdivision, the installer is required to liaise with Fulton Hogan, Alf Downs or Max Tarr to arrange for RAMM to be updated.

I walked through the new connections process. For subdivisions the developer is responsible for arranging for an approved contractor (Fulton Hogan, Alf Downs or Max Tarr) to update RAMM when the lights are connected. PNCC checks that lights have been added to RAMM as part of the subdivision approval process and the ICP group is added once the lights are connected. Other new connections are completed by Alf Downs or Fulton Hogan and RAMM is updated at the time work is completed.

Data is verified when claims are generated by matching requested and completed work, and as part of the claims approval process which includes site visits for a random sample of 10% of contractor work. The random sample is across all job types, including non-streetlight work.

A full outage patrol was completed in late 2023, and 400 lights have been or are to be replaced as a result of that review. Monthly streetlight condition checks are completed, and each light is scheduled to be checked every four years.

Festive lights

Regent Arcade

The festive strings at Regent Arcade were disconnected in 2022 because they became faulty. The lights are not expected to be reconnected in the future but are still recorded against ICP 1000581347PCFF5 and included in submission data. They are counted as part of the seven disconnected lamps which are not expected to have a wattage recorded in the database against DUML ICPs discussed above.

Lamp Model	Recorded lamp wattage (per lamp)	Expected lamp wattage (per lamp)	Count of lamps	Wattage difference (all affected lamps)
Festive String 20 LED	47	disconnected	1	-47
Festive String 60 LED	142	disconnected	3	-426

Ashhurst Festive Shapes and Palmerston North Festive Lights

The festive shapes and lights are recorded in the database extracts with connection dates when connected and are included in submission data when connected.

Private lights

There are 90 lights with the ICP group recorded as "private" totalling 7,440 W. These lights are not PNCC's responsibility and are included in the database so that the correct owner can be determined if a fault is raised. Powerco was working through contacting the relevant retailers for these private lights to arrange for the unmetered load to be recorded against the customer's existing ICP, or for a new unmetered ICP to be created. No progress updates have been received by PNCC during the audit period.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 3.1 With: Clause 15.2 and 15.37B(b)	The field audit found the database was found not accurate within ±5%, resulting in potential under submission of 157,300 kWh per annum. The lamp description for "Terraled Mini 34W AP2 4000k" is incorrect and should be "Terraled Mini 24W AP2 4000k". The lamp and gear wattages for the 83 affected lamps are correct, and there is no impact on submission. Two lamp models have wattages which differ from the expected value based on the lamp specifications, resulting in potential under submission 17 kWh per annum. Seven disconnected lamps have wattages recorded in the database against DUML ICPs, resulting in over submission of 2,992 kWh per annum. 14 items of load had gear wattages inconsistent with the lamp make and model which could result in over submission of 68 kWh per annum. Pole ID 64681 has insufficient address information recorded to enable it to be readily located. Potential impact: High Actual impact: Unknown Audit history: Multiple times

From: 15-Jan-24 To: 07-Mar-24	Controls: Moderate Breach risk rating: 6

Audit risk rating	Rationale for audit risk rating
High	The controls over the database are moderate, and PNCC has indicated that they intend to check and correct the discrepancies. The impact is assessed to be high, based on the kW differences identified.

Actions taken to resolve the issue	Completion date	Remedial action status
PNCC have advised that The lamp description for "Terraled Mini 34W AP2 4000k" has been updated to "Terraled Mini 24W AP2 4000k" as of 20.03.2024. They are investigating the other issues with the intention to correct, we will follow up.	July 2024	Investigating
Preventative actions taken to ensure no further issues will occur	**Completion date**	
PNCC are aware of the importance of having an accurate database and we will continue to liaise with them on this.	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

Profiles

HHR profile and submission type are correctly recorded for the DUML ICPs.

Submission calculation

Mercury reconciles this DUML load using the HHR profile. Mercury were granted exemption No. 233, which allowed them to provide HHR submission information instead of NHH submission information for DUML. Clause 8(g) of Schedule 15.3 of the Code, which the exemption related to was removed from the

Code in 2018, and the exemption is no longer valid. Mercury is planning to apply for a new profile which will allow them to continue to submit the DUML load as HHR.

Submission information is based on monthly DUML database extracts provided by Fulton Hogan, and data logger on hours, metered values for a sample of dimmable lights, and a full load factor.

The monthly database extract contains all lights, and denotes whether they are dimmable, so that the total kW for undimmed lights and dimmed lights can be calculated by ICP. Each dimmable luminaire has the same five stage dimming profile programmed into its driver by the supplier.

Standard streetlights	The load for the standard streetlights is calculated at trading period level as: *(Trading period seconds on/constant factor/2) x kW* Where: Constant factor = 1800
Dimmable streetlights	The load for dimmable streetlights is calculated at trading period level as: *(Trading period seconds on/constant factor/2) x kW for dimmed meters x (golden meter usage/full load factor)* Where: Constant factor = 1800 Golden meter usage = measured usage for the 11 "golden" metered dimmable streetlights Full load factor = provided by PNCC from their CMS

I checked the calculations for January 2024 and confirmed that they were correct, and consistent with the data logger for the golden meter and on hours, and wattage data provided by PNCC.

PNCC intends to start trialling a new lighting system for dimming by 30 June 2024. The trial of 400 fittings will be able to be dimmed to different levels depending on traffic flows. PNCC will work with Mercury to ensure that the dimming levels are able to be validated for submission.

Items connected to DUML ICPs but excluded from submission

I compared the January 2024 database extract provided to Mercury for calculation of submission and the raw database extract provided for the audit. 328 items of load (46,092.6 W) recorded in the database against DUML ICPs were included in the extract provided for the audit, but excluded from the extract provided for submission:

- 243 items of load (39,110 W) have Transit NZ Urban Lights or Waka Kotahi has the owner, and are expected not to be the responsibility of PNCC,
- 27 items of load (2,031 W) have a private owner, and are expected not to be the responsibility of PNCC,
- 17 items of load (1,415 W) have parks and reserves as the owner (these lights include the Regent Arcade festive strings and Berrymans Lane lights believed to be disconnected); excluding these, the total is ten lights (714.4 W), and
- the other 41 items of load (3,536.6 W) have Powerco, roading and accessways or unknown as the owner.

A recommendation to investigate these lights is made in **section 2.1**.

Sources of database inaccuracy are as follows:

Issue	Estimated volume information impact (annual kWh)
The field audit found the database was found not accurate within ±5%	157,300 kWh of over submission.

Issue	Estimated volume information impact (annual kWh)
The lamp description for "Terraled Mini 34W AP2 4000k" is incorrect and should be "Terraled Mini 24W AP2 4000k". The lamp and gear wattages for the 83 affected lamps are correct, and there is no impact on submission.	-
37 LED items of load connected to DUML ICPs have a blank gear wattage but should have a gear wattage of zero.	-
Two lamp models have wattages which differ from the expected value based on the lamp specifications.	17 kWh of under submission per annum.
Seven disconnected lamps have wattages recorded in the database against DUML ICPs.	2,992 kWh of over submission per annum.
14 items of load had gear wattages inconsistent with the lamp make and model.	68 kWh of over submission per annum.
There are 77 lights totalling 3,748 W with a blank ICP number. 27 lights had no lamp information recorded and 50 lights had lamp and wattage information recorded. PNCC is investigating these lights to confirm whether they are connected, unmetered and the responsibility of PNCC, and then which ICP number should be recorded.	Unknown.

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

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

The 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. PNCC supplies dates that festive lights are connected, so that they can be correctly included in submission data. 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 RAMM database records light installation and replacement dates, which default to the date which the data is collected. Where work is completed by Fulton Hogan, Alf Downs or Max Tarr the database is updated from the field using Pocket RAMM. Where work is completed by another party as a part of a project or connection of a new subdivision, the installer is required to liaise with Fulton Hogan, Alf Downs or Max Tarr to arrange for RAMM to be updated.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 3.2 With: Clause 15.2 and 15.37B(c) From: 15-Jan-24 To: 07-Mar-24	328 items of load and 46,092.6 W recorded against DUML ICPs in the database are excluded from submissions. Some of the load may be validly excluded and PNCC intends to investigate. The DUML load is submitted using HHR profile, without an exemption in place. The field audit found the database was found not accurate within ±5%, resulting in potential under submission of 157,300 kWh per annum. The lamp description for "Terraled Mini 34W AP2 4000k" is incorrect and should be "Terraled Mini 24W AP2 4000k". The lamp and gear wattages for the 83 affected lamps are correct, and there is no impact on submission. 37 LED items of load connected to DUML ICPs have a blank gear wattage but should have a gear wattage of zero. There is no impact on submission. Two lamp models have wattages which differ from the expected value based on the lamp specifications, resulting in potential under submission 17 kWh per annum. Seven disconnected lamps have wattages recorded in the database against DUML ICPs, resulting in over submission of 2,992 kWh per annum. 14 items of load had gear wattages inconsistent with the lamp make and model which could result in over submission of 68 kWh per annum. 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: Multiple times Controls: Moderate Breach risk rating: 6
Audit risk rating	**Rationale for audit risk rating**
High	The controls over the database are moderate, and PNCC has indicated that they intend to check and correct the discrepancies. The impact is assessed to be high, based on the kW differences identified.

Actions taken to resolve the issue	Completion date	Remedial action status
PNCC are aware of the discrepancies and are investigating with the intention to correct any issues, we will follow up. Regarding the DUML load being submitted using the HHR profile, Mercury is working on a profile application which will allow HH submission for DUML.	July 2024	Investigating
Preventative actions taken to ensure no further issues will occur	**Completion date**	
PNCC are aware of the importance of having an accurate database and we will continue to liaise with them on this.	Ongoing	

CONCLUSION

The audit found some accuracy issues including that:

- some items of load recorded in the database with a DUML ICP number were excluded from the monthly database extracts provided to Mercury for submission; PNCC intends to investigate to confirm whether these items of load are validly excluded and will update the process to include any missing lights,
- some items of load do not have an ICP number recorded; PNCC intends to investigate to confirm whether these items of load are validly excluded from the DUML load and will update the ICP numbers for any missing lights,
- 37 LED items of load have a blank gear wattage and LED lights expected to have a gear wattage of zero,
- a small number of items of load had incorrect descriptions, lamp or gear wattages, and lamp and gear wattages which could not be confirmed by reviewing specifications,
- seven disconnected items of load which have wattages recorded in the database against DUML ICPs, resulting in over submission of 2,992 kWh per annum, and
- 14 items of load had gear wattages inconsistent with the lamp make and model which could result in over submission of 68 kWh per annum.

A field audit was conducted of a statistical sample of 430 items of load on 3 March 2024, which found that the database was not accurate within ±5%. In absolute terms, total annual consumption is estimated to be 157,300 kWh lower than the DUML database indicates.

The future risk rating of 20 indicates that the next audit be completed in three months. This is a similar rating to the previous audit, and PNCC is continuing to investigate and resolve discrepancies. I recommend the Authority considers an audit period of at least ten months to 26 January 2025.

PARTICIPANT RESPONSE

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