

ELECTRICITY INDUSTRY PARTICIPATION CODE
DISTRIBUTED UNMETERED LOAD AUDIT REPORT



For

PALMERSTON NORTH CITY COUNCIL
AND MERCURY ENERGY LIMITED

Prepared by: Tara Gannon

Date audit commenced: 11 March 2023

Date audit report completed: 30 March 2023

Audit report due date: 26 March 2023

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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.

PNCC DUML ICPs 0000031152CPB70 and 1000581347PCFF5 switched to Mercury effective from 1 October 2023.

A RAMM database is managed by **Fulton Hogan**. Field work, asset data capture and database population is conducted by Fulton Hogan, **Alf Downs**, **Electrix** and **Max Tarr Electrical Limited (Max Tarr)**. In all cases field staff update the database from the field using Pocket RAMM, and database information is validated by Fulton Hogan.

Mercury settles the DUML load as HHR under exemption 233. 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. I checked the calculations for December 2022 and confirmed that they were correct, and consistent with the data logger files and data provided by PNCC.

The Authority has confirmed that HHR profile may be used for dimmed streetlights under exemption 233. Total load is reported as the sum of dimmable and standard load at trading period level.

The last audit found 3,932 of the 9,714 lights recorded in the database at the time had reduced wattages recorded to account for dimming. Now that dimming is accounted for in the submission calculation process, most lamp wattages have been corrected to match the expected values.

A small number of wattage discrepancies 7/503 (1%) were identified during the field audit. The results were categorised in accordance with the "Distributed Unmetered Load Statistical Sampling Audit Guideline", effective from 1 February 2019. 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 3 kW lower than the database indicates.
- There is a 95% level of confidence that the installed capacity is between 8 and 44 kW lower than the database.
- In absolute terms, total annual consumption is estimated to be 14,900 kWh lower than the DUML database indicates.
- There is a 95% level of confidence that the annual consumption is between 32,500 and 188,700 kWh p.a. lower than the database indicates.

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

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

The monthly report is provided as a snapshot. 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 and produces revision submissions where required.

The future risk rating of 18 indicates that the next audit be completed in six months. This is a significant decrease from 25 during the last audit. Very good progress is being made with improving accuracy and PNCC have indicated that they will correct the discrepancies identified during this audit. I recommend the Authority considers an audit period of at least ten months from now.

The matters raised are detailed below:

AUDIT SUMMARY

NON-COMPLIANCES

Subject	Section	Clause	Non-Compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
Distributed unmetered load audits	1.11	16A.26 and 17.295F	The audit was not completed by the due date.	Moderate	Low	2	Identified
Deriving submission information	2.1	11(1) of Schedule 15.3	<p>The best available estimate is not precise enough to conclude that the database is accurate within $\pm 5\%$. There is a 95% level of confidence that the annual consumption is between 32,500 and 188,700 kWh p.a. lower than the database indicates.</p> <p>34 LED items of connected to DUMML ICs have a blank lamp wattage but are expected to have a gear wattage of zero. There is no impact on submission.</p> <p>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.</p> <p>Seven disconnected lamps have wattages recorded against DUMML ICs. The estimated impact is 2,992 kWh of over submission per annum.</p> <p>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.</p> <p>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.</p>	Moderate	Medium	4	Identified

Subject	Section	Clause	Non-Compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
			The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot.				
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	34 LED items of load connected to DUML ICPs have a blank gear wattage but should have a gear wattage of zero.	Strong	Low	1	Identified
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.	Moderate	Low	2	Identified
Database accuracy	3.1	15.2 and 15.37B(b)	<p>The best available estimate is not precise enough to conclude that the database is accurate within $\pm 5\%$. There is a 95% level of confidence that the annual consumption is between 32,500 and 188,700 kWh p.a. lower than the database indicates.</p> <p>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.</p> <p>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.</p> <p>Seven disconnected lamps have wattages recorded against DUML ICPs. The estimated impact is 2,992 kWh of over submission per annum.</p> <p>Correct wattages were unable to be confirmed for 63 lamps.</p>	Moderate	Medium	4	Identified

Subject	Section	Clause	Non-Compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
			<p>A list of the affected lamps was provided to PNCC for investigation and correction if necessary.</p> <p>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.</p> <p>The lamp description for "Terraed Mini 34W AP2 4000k" is incorrect, and should be "Terraed Mini 24W AP2 4000k". The lamp and gear wattages for the 83 affected lamps are correct, and there is no impact on submission.</p> <p>Pole ID 64681 has insufficient address information recorded to enable it to be readily located.</p>				
Volume information accuracy	3.2	15.2 and 15.37B(c)	<p>The best available estimate is not precise enough to conclude that the database is accurate within $\pm 5\%$. There is a 95% level of confidence that the annual consumption is between 32,500 and 188,700 kWh p.a. lower than the database indicates.</p> <p>34 LED items of connected to DUMML ICPS have a blank lamp wattage but are expected to have a gear wattage of zero. There is no impact on submission.</p> <p>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.</p> <p>Seven disconnected lamps have wattages recorded</p>	Moderate	Medium	4	Identified

Subject	Section	Clause	Non-Compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
			<p>against DUML ICPs. The estimated impact is 2,992 kWh of over submission per annum.</p> <p>Correct wattages were unable to be confirmed for 63 lamps. A list of the affected lamps has been provided to PNCC for investigation and correction if necessary.</p> <p>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.</p> <p>The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot.</p>				
Future Risk Rating						18	

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	
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.
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.

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.
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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

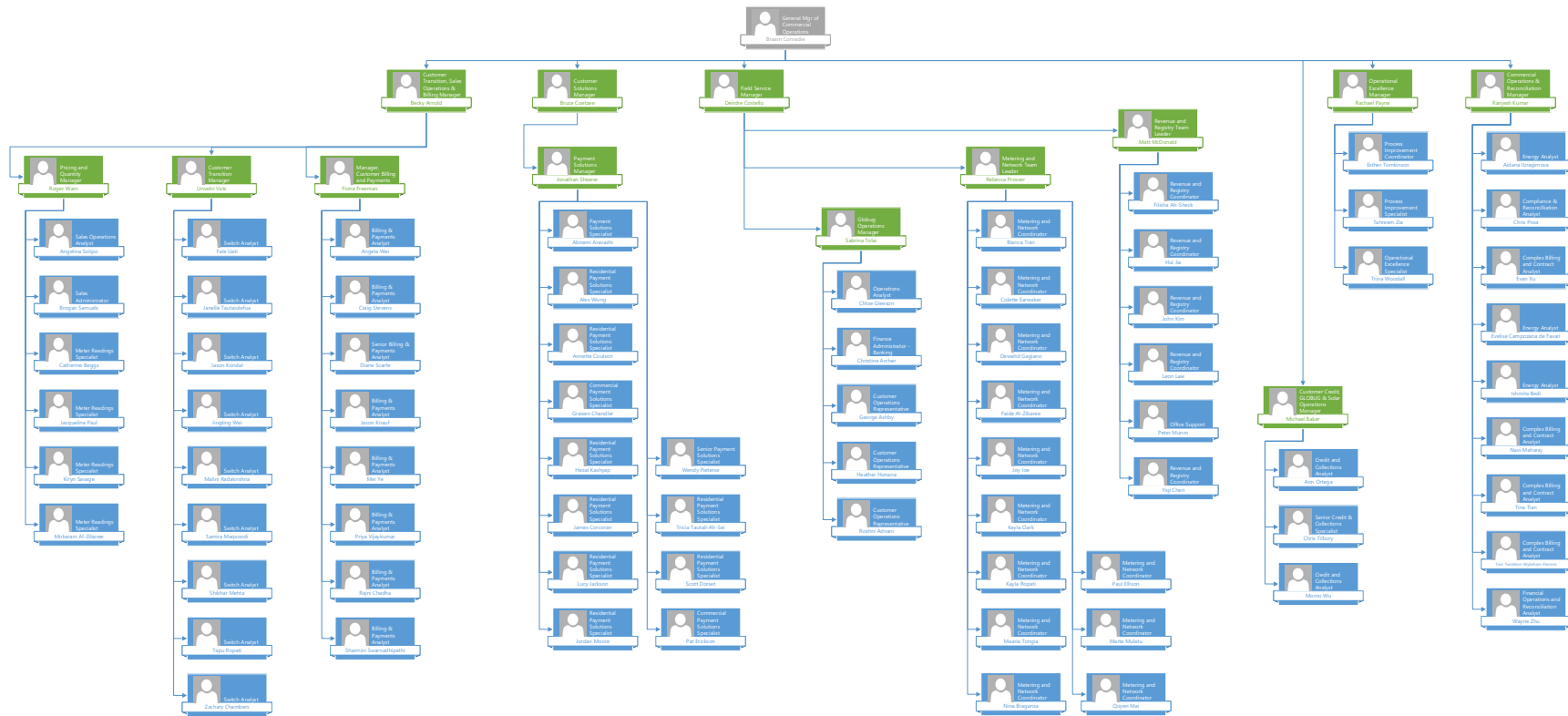
The Electricity Authority's website was reviewed to identify any exemptions relevant to the scope of this audit.

Audit commentary

Under Exemption 233, Mercury is exempted from complying with the obligation in clause 8(g) of Schedule 15.3 of the Electricity Industry Participation Code 2010 ("Code") to provide non-half-hour ("NHH") submission information, instead providing half-hour ("HHR") submission information for distributed unmetered load ("DUML"). This exemption expires on 31 October 2023.

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	Veritek

Other personnel assisting in this audit were:

Name	Title	Company
Chris Posa	Compliance Reconciliation Analyst	Mercury
Evelise Campozana de Favari	Energy Analyst	Mercury
Sarah Dark	Business Development Manager - Large Commercial	Mercury
Henry Borowicz	Senior Contract Manager	PNCC
La'sasha McCutcheon	Senior Contract Manager	PNCC
Natasha Hickmott	Activities Manager - Resource Recovery and Sustainability	PNCC
Rob Cuff	Senior Contract Manager	PNCC
Anne Herrington	Director	Smart Power Ltd

1.4. Hardware and Software

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

Mercury's systems used in the process are discussed in their reconciliation participant and agent audit reports respectively.

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	4,092	262,095
1000581347PCFF5	PNCC Streetlights BPE0331	BPE0331	DST	5,675	395,359
Total				9,767	657,454

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 16,360 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.
Private	<p>There are 90 lights with the ICP group recorded as “private” totalling 7,440 W. All unmetered load is required to be recorded against an ICP. If the private lights are not confirmed to be metered through the customer’s installation it is required to be recorded against an existing ICP as standard or shared unmetered load, or have a new standard or shared unmetered load ICP created to account for the unmetered load. An ICP should be considered standard unmetered load if there is one point of connection and the connected load benefits only that point of connection. An ICP should be considered to be shared unmetered load if the benefit of a single point of connection are shared across more than one ICP.</p> <p>Progress with investigating private lights in the Palmerston North City Council region was checked during Powerco’s February 2023 distributor audit. Powerco arranged for their approved contractors to visit the light locations to confirm who is responsible and how the lights are supplied. Through this process Powerco confirmed that some of the lights are the Council’s responsibility, and these have been assigned to DUMML ICPs. Powerco also found that some of the lights are metered through the customer’s existing meter installation. The lights remain in RAMM as private lights, so that faults staff are aware that PNCC is not responsible for the lights if a fault is recorded.</p> <p>Powerco has contacted the relevant retailer for the remaining lights and asked them to contact their customers to obtain acceptance of the unmetered load as part of their connection. If acceptance is obtained Powerco will create a new ICP for the private lights, otherwise they will be disconnected.</p>
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	<p>There are 46 lights totalling 2,345 W with a blank ICP number.</p> <ul style="list-style-type: none"> 17 are Waka Kotahi lights where Waka Kotahi requested the PNCC DUMML ICP number be removed. Three were timing differences where poles were replaced following being damaged in a car accident and correct ICP numbers are recorded now that poles have been reinstated.

	<ul style="list-style-type: none"> The other 26 lights were new connections in subdivisions which have not been lived in yet. The ICP number, lamp description, lamp wattage and gear wattage will be updated when the lamps are lived in.
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1.7. Authorisation Received

All information was provided directly by Mercury and PNCC.

Smart Power Limited assists PNCC with energy requirements, and observed the audit meeting.

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.

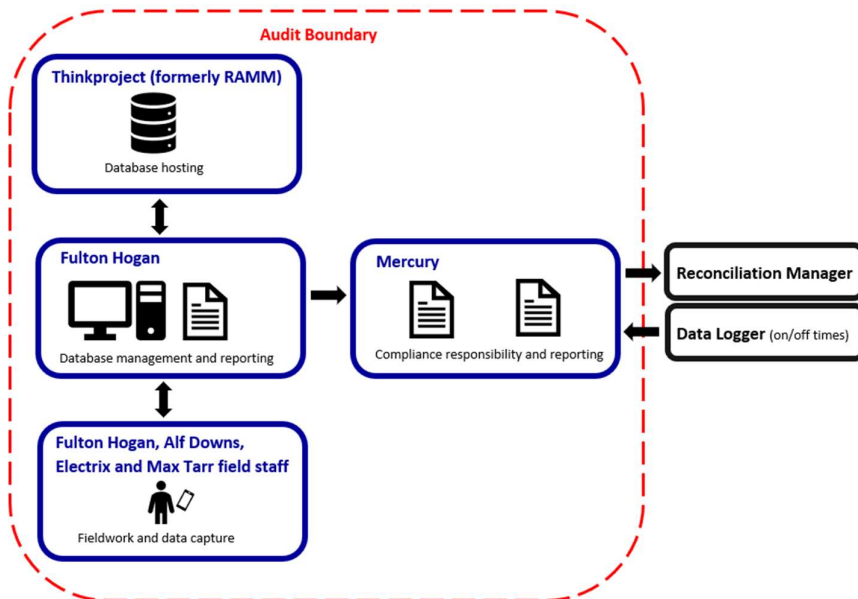
A RAMM database is managed by Fulton Hogan. Field work, asset data capture and database population is conducted by Fulton Hogan, Alf Downs, Electrix and Max Tarr. In all cases field staff update the database from the field using Pocket RAMM, and database information is validated by Fulton Hogan.

Mercury settles the DUML load as HHR under exemption 233. 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.

The Authority has confirmed that HHR profile may be used for dimmed streetlights under exemption 233. Total load is reported as the sum of dimmable and standard load at trading period level.

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 503 items of load on 11 March 2023.

1.9. Summary of previous audit

The previous audit of this database was undertaken by Steve Woods of Veritek Limited in May 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	1.10	16A.26 and 17.295F	The audit was not completed by the due date.	Still existing.
Deriving submission information	2.1	11(1) of Schedule 15.3	<ol style="list-style-type: none"> The database information used to calculate submissions is not accurate within $\pm 5\%$. Six lights in North St, Ashhurst (Slim pole IDs 12657-12662) have a blank ICP group and total 600W. The lights have been connected since May 2022. Lamp wattages have been adjusted down to account for dimming for 3,932 lights, which could result in under submission of 22,244W or 95,004 kWh per annum. Lamp wattages differed from expected values for a further 883 lights, which could result in over submission of 5,135W or 21,934 kWh per annum. 17 lights have incorrect gear wattages, which PNCC intends to correct. The impact of the incorrect gear wattages is 18.8W, which could lead to over submission of 80 kWh per annum. The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot. 	<ol style="list-style-type: none"> The best available estimate is not precise enough to conclude that the database is accurate within $\pm 5\%$. Cleared. Cleared. Improved but some non-compliance still exists. Improved but some non-compliance still exists. Still existing.
ICP identifier and items of load	2.2	11(2)(a) and (aa) of Schedule 15.3	Six lights in North St, Ashhurst (Slim pole IDs 12657-12662) have a blank ICP group and total 600W. The lights have been connected since May 2022.	Cleared for the lights on North St, Ashhurst. No new non-compliance identified.
All load recorded in database	2.5	11(2A) of Schedule 15.3	<ol style="list-style-type: none"> Two lights on Ruamahanga Crescent which were not recorded in the database: L46 lights outside street numbers 17 (pole L13490) and 111 (pole L13493). Six lights in North St, Ashhurst (Slim pole IDs 12657-12662) have a blank ICP group and total 600W. The lights have been connected since May 2022. 	<p>Cleared for Ruamahanga Crescent and North St, Ashhurst.</p> <p>One new non-compliance was identified relating to a CCTV camera on Johnstone Drive.</p>
Database accuracy	3.1	15.2 and 15.37B(b)	<ol style="list-style-type: none"> The database information used to calculate submissions is not accurate within $\pm 5\%$. Lamp wattages have been adjusted down to account for dimming for 3,932 lights, 	<ol style="list-style-type: none"> The best available estimate is not precise enough to conclude that the database is accurate within $\pm 5\%$.

Subject	Section	Clause	Non-compliance	Status
			<p>which could result in under submission of 22,244W or 95,004 kWh per annum.</p> <ol style="list-style-type: none"> 3. Lamp wattages differed from expected values for a further 883 lights, which could result in over submission of 5,135W or 21,934 kWh per annum. 4. 17 lights have incorrect gear wattages, which PNCC intends to correct. The impact of the incorrect gear wattages is 18.8W, which could lead to over submission of 80 kWh per annum. 5. The road name recorded for Slim Pole IDs 9284 and 9285 is COLYTON RD_A but is expected to be Oxford Street. 6. Six lights in North St, Ashhurst (Slim pole IDs 12657-12662) have a blank ICP group and total 600W. The lights have been connected since May 2022. 	<ol style="list-style-type: none"> 2. Cleared. 3. Improved but some non-compliance still exists. 4. Improved but some non-compliance still exists. 5. Cleared. 6. Cleared.
Volume information accuracy	3.2	15.2 and 15.37B(c)	<ol style="list-style-type: none"> 1. The database information used to calculate submissions is not accurate within $\pm 5\%$. 2. Six lights in North St, Ashhurst (Slim pole IDs 12657-12662) have a blank ICP group and total 600W. The lights have been connected since May 2022. 3. Lamp wattages have been adjusted down to account for dimming for 3,932 lights, which could result in under submission of 22,244W or 95,004 kWh per annum. 4. Lamp wattages differed from expected values for a further 883 lights, which could result in over submission of 5,135W or 21,934 kWh per annum. 5. 17 lights have incorrect gear wattages, which PNCC intends to correct. The impact of the incorrect gear wattages is 18.8W, which could lead to over submission of 80 kWh per annum. 6. The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot. 	<ol style="list-style-type: none"> 1. The best available estimate is not precise enough to conclude that the database is accurate within $\pm 5\%$. 2. Cleared. 3. Cleared. 4. Improved but some non-compliance still exists. 5. Improved but some non-compliance still exists. 6. Still existing.

Subject	Section	Clause	Recommendation	Status
Update ICP for airport owned ICP	2.1	11(1) of Schedule 15.3	The light connected to slim Pole ID 12347 is the responsibility of Palmerston North Airport, but it is recorded under PNCC ICP 1000581347PCFF5. I recommend liaising with Palmerston North Airport to ensure that they have the correct ICP recorded for this load.	Resolved. Responsibility for this ICP has now transferred to PNCC and the ICP number is correct. The ICP was correctly excluded from submission information until it was vested.

Subject	Section	Clause	Recommendation	Status
ICP group for privately owned lights listed against DUML ICPs	2.1	11(1) of Schedule 15.3	Consider changing the ICP group to private for clarity, until the correct ICP is confirmed.	Not adopted. Mercury will work with Powerco to ensure that load associated with private lights is correctly accounted for.
Transit NZ lights recorded against DUML ICPs	2.1	11(1) of Schedule 15.3	Liaise with NZTA to ensure that the 17 lights not currently included in the NZTA lower north island database are added. The affected pole IDs are: 1132, 1134, 1135, 1139, 1252, 1352, 1779, 1782, 1907, 4098, 4101, 4119, 4611, 4628, 9637, 10280 and 12628. Update the ICP numbers for the other lights with owner = Transit NZ which are currently recorded against PNCC DUML ICPs when they are in the NZTA lower north island database.	Waka Kotahi instructed PNCC to remove their DUML ICP numbers from Waka Kotahi lights in the area as they wished to have their own DUML database with Waka Kotahi ICP numbers. I confirmed that the DUML ICP numbers have been removed for the affected Waka Kotahi lights.
Confirm light wattages	3.1	15.2 and 15.37B(b)	Confirm the correct wattages and update the wattages in RAMM as necessary.	In progress. The list lamps where wattages were incorrect or unable to be confirmed has decreased this audit period. A small number are still to be checked.

1.10. Participants to give access (Clause 16A.4)

Code reference

Clause 16A.4

Code related audit information

A participant must give the Authority or an auditor full access to all information that may be required for the purposes of carrying out an audit.

The participant must provide the information—

(a) at no charge; and

(b) no later than 15 business days after receiving a request for the information from the Authority or an auditor, as the case may be.

Audit observation

A DUML database extract was not provided within 15 business days of my initial request to PNCC, but was provided 15 business days after I escalated my request to Mercury.

Audit commentary

I initially requested a DUML database extract from PNCC on 6 December 2022, but did not receive an extract until 28 February 2023. I escalated to Mercury on 7 February 2023 who assisted by also contacting PNCC to request the database extract.

I have recorded compliance in this section because the data was provided 15 business days after I escalated the request for data to Mercury.

Audit outcome

Compliant

1.11. 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

The audit was due to be completed by 26 March 2023 but was not completed until 28 March 2023. The delay was caused by

- not receiving a copy of the database extract for 12 weeks after my initial request, which prevented me from commencing the audit, and
- delays in being able to schedule an agreeable meeting time to discuss DUML processes and audit findings with PNCC and Mercury.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 1.11 With: Clause 16A.26 and 17.295F From: 26-Mar-23 To: 28-Mar-23	The audit was not completed by the due date. Potential impact: High Actual impact: Unknown Audit history: None Controls: Moderate Breach risk rating: 2
Audit risk rating	Rationale for audit risk rating
Low	Controls are assessed to be moderate because the audit was completed close to the due date. The impact is assessed to be low, because completing the audit earlier was unlikely to impact on compliance.

Actions taken to resolve the issue	Completion date	Remedial action status
Palmerston North City Council switched to Mercury in October 2022 and there were some teething issues in terms of establishing contact with the appropriate people and receiving responses to our queries.	April 2023	Identified
Preventative actions taken to ensure no further issues will occur	Completion date	
There have been learnings from this instance and we aim to mitigate delays in the future.	Ongoing	

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

Mercury settles the DUML load as HHR under exemption 233. 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.

The Authority has confirmed that HHR profile may be used for dimmed streetlights under exemption 233. Total load is reported as the sum of dimmable and standard load at trading period level.

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 December 2022 and confirmed that they were correct, and consistent with the data logger files and data provided by PNCC.

Lights excluded from submission

Some lights recorded against DUML ICPs are excluded from submission because PNCC was not the pole owner. I confirmed that the affected lights were validly excluded from submission data because PNCC is not responsible for them.

Recorded owner	Findings
Airport	The 103W light connected to slim Pole ID 12347 is situated at Palmerston North Airport and is recorded under PNCC ICP 1000581347PCFF5. I confirmed that responsibility for this ICP has now transferred to PNCC and the ICP number is correct. The ICP was correctly excluded from submission information until it was vested.
Private	28 lights recorded against DUML ICPs with a private owner (2,199W) 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.
Transit NZ (Waka Kotahi) urban lights	<p>Waka Kotahi instructed PNCC to remove their DUML ICP numbers from Waka Kotahi lights in the area as they wished to have their own DUML database with Waka Kotahi ICP numbers. I confirmed that the DUML ICP numbers have been removed for the affected Waka Kotahi lights.</p> <p>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.</p>

I recommend that the correct ICP is confirmed for pole ID 10280, and that private lights are checked to ensure that the load is recorded against an ICP.

Recommendation	Description	Audited party comment	Remedial action
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.	Palmerston North City Council has been advised to investigate with Waka Kotahi, have diarised to follow up.	Identified
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	We contacted Powerco 03 April 2023 and our intention is to work with them to have these lights tidied up once and for all.	Identified

Recommendation	Description	Audited party comment	Remedial action
	needed to account for the unmetered load.		

Sources of database inaccuracy are as follows:

Issue	Estimated volume information impact (annual kWh)
The best available estimate is not precise enough to conclude that the database is accurate within $\pm 5\%$.	There is a 95% level of confidence that the annual consumption is between 32,500 and 188,700 kWh p.a. lower than the database indicates.
34 LED items of load connected to DUMML ICPS have a blank lamp wattage but are expected to have a gear wattage of zero.	0 kWh of under or over submission per annum.
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.	5,018 kWh of under submission per annum.
Seven disconnected lamps have wattages recorded against DUMML ICPS.	2,992 kWh of over submission per annum.
Correct wattages were unable to be confirmed for 63 lamps. A list of the affected lamps has been provided to PNCC for investigation and correction if necessary.	Unknown under or over submission per annum.
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.	290 kWh of over submission per annum.

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 DUMML 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. Field work, asset data capture and database population is conducted by Fulton Hogan, Alf Downs, Electrix and Max Tarr. In all cases field staff update the database from the field using Pocket RAMM when work is completed.

Audit outcome

Non-compliant

Non-compliance	Description		
<p>Audit Ref: 2.1 With: Clause 11(1) of Schedule 15.3</p> <p>From: 01-Dec-22 To: 11-Mar-23</p>	<p>The best available estimate is not precise enough to conclude that the database is accurate within $\pm 5\%$. There is a 95% level of confidence that the annual consumption is between 32,500 and 188,700 kWh p.a. lower than the database indicates.</p> <p>34 LED items of connected to DUMML ICPs have a blank lamp wattage but are expected to have a gear wattage of zero. There is no impact on submission.</p> <p>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.</p> <p>Seven disconnected lamps have wattages recorded against DUMML ICPs. The estimated impact is 2,992 kWh of over submission per annum.</p> <p>Correct wattages were unable to be confirmed for 63 lamps. A list of the affected lamps was provided to PNCC for investigation and correction if necessary.</p> <p>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.</p> <p>The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot.</p> <p>Potential impact: High Actual impact: Unknown Audit history: Multiple times</p> <p>Controls: Moderate Breach risk rating: 4</p>		
Audit risk rating	Rationale for audit risk rating		
<p>Medium</p>	<p>The controls over the database are moderate; there has been a significant reduction in the quantity of incorrect wattages and PNCC has indicated that they intend to correct the discrepancies.</p> <p>The impact is assessed to be medium, based on the kW differences identified during the wattage accuracy checks for the whole database and that a small number of wattage discrepancies 7/503 (1%) were identified during the field audit. Database accuracy could not be confirmed to be within $\pm 5\%$ due to these discrepancies although both point of estimate R and R_H were both within the threshold.</p>		
Actions taken to resolve the issue	Completion date	Remedial action status	
<p>Palmerston North CC have been made aware of the discrepancies and have advised that they will be making the appropriate corrections.</p>	<p>April 2023</p>	<p>Identified</p>	

Preventative actions taken to ensure no further issues will occur	Completion date
Palmerston North City Council 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

All connected lamps that PNCC is responsible for have a valid ICP number recorded.

The lights in the table below do not have a DUML ICP recorded because they are not PNCC's responsibility, they are metered, they are solar powered, and/or they are not yet connected.

Recorded ICP	Count	Findings
Blank	46	<p>There are 46 lights totalling 2,345 W with a blank ICP number.</p> <ul style="list-style-type: none"> • 17 are Waka Kotahi lights where Waka Kotahi requested the PNCC DUML ICP number be removed. • Three were timing differences where poles were replaced following being damaged in a car accident and correct ICP numbers are recorded now that poles have been reinstated. • The other 26 lights were new connections in subdivisions which have not been lived in yet. The ICP number, lamp description, lamp wattage and gear wattage will be updated when the lamps are lived in. <p>The previous audit found six new lights on North Street, Ashhurst (Slim pole IDs 12657-12662) had a blank ICP group. I confirmed that the affected lights are now correctly recorded with ICP 0000031152CPB70.</p>
State Highway	88	<p>There are 88 NZTA rural lights with the ICP group recorded as "state highway" totalling 16,360 W. These lights are not PNCC's responsibility and are included in the lower North Island NZTA database, which has been audited separately.</p>
Horizons	4	<p>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.</p>
Private	90	<p>There are 90 lights with the ICP group recorded as "private" totalling 7,440 W. All unmetered load is required to be recorded against an ICP. If the private lights are not confirmed to be metered through the customer's installation it is required to be</p>

Recorded ICP	Count	Findings
		<p>recorded against an existing ICP as standard or shared unmetered load, or have a new standard or shared unmetered load ICP created to account for the unmetered load. An ICP should be considered standard unmetered load if there is one point of connection and the connected load benefits only that point of connection. An ICP should be considered to be shared unmetered load if the benefit of a single point of connection are shared across more than one ICP.</p> <p>Progress with investigating private lights in the Palmerston North City Council region was checked during Powerco's February 2023 distributor audit. Powerco arranged for their approved contractors to visit the light locations to confirm who is responsible and how the lights are supplied. Through this process Powerco confirmed that some of the lights are the Council's responsibility, and these have been assigned to DUMML ICPs. Powerco also found that some of the lights are metered through the customer's existing meter installation.</p> <p>Powerco has contacted the relevant retailer for the remaining lights and asked them to contact their customers to obtain acceptance of the unmetered load as part of their connection. If acceptance is obtained Powerco will create a new ICP for the private lights, otherwise they will be disconnected.</p>
Solar no ICP	1	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 DUMML database must contain the location of each DUMML 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.

9,721 of the 9,767 items of load (99.73%) connected to the DUMML 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. PNCC holds further location information for the lamp and will 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

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: 28-Feb-23	There is insufficient location information to allow pole ID 64681 to be readily located. Potential impact: Low Actual impact: Low Audit history: None 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
Palmerston North City Council have advised that they will update the database for this pole.		April 2023	Identified
Preventative actions taken to ensure no further issues will occur		Completion date	
Palmerston North City Council 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 000031152CPB70 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.

34 LED items of load have a blank gear wattage but are expected to have a gear wattage of zero. Two have Property Glenmary CI as the pole owner and are on Glenmary CI (pole IDs 1692 and 1696). 32 have Parks & Reserves as the pole owner and are located on Napier Rd N at the cemetery (pole IDs 7028, 7029, 7030, 7031, 7032, 7033, 7034, 7035, 7093, 7094, 7095, 7096, 7097, 7098, 7099, 7100, 9989, 9990). PNCC confirmed that all should have zero gear wattage.

All other items of load have valid gear wattages recorded.

Blank ICP number

29 of the lights with a blank ICP number had an unknown lamp make and model and zero lamp and gear wattage. These were all new connections in subdivisions which have not been livened yet. The ICP number, lamp description, lamp wattage and gear wattage will be updated when the lamps are livened.

Private ICP number

Two lights with a private ICP number at Church St East (pole ID 11762) have an unknown lamp model and zero gear wattage and lamp wattage. During the previous audit PNCC confirmed that they are twin globe lights on the same pole and have been referred to Powerco for investigation and confirmation of where the load should be reconciled.

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: 28-Feb-23	34 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: None 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
Palmerston North City Council will be populating the relevant blank gear wattage cells with zeroes.	April 2023	Identified
Preventative actions taken to ensure no further issues will occur	Completion date	
Palmerston North City Council 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 503 items of load on 11 March 2023. 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
1000581347PCFF5 road names A to Fitzherbert					
ANAKIWA ST	9	9	-	1	One Road Grace BRP711 23LED20W light (pole ID 11864) was recorded in the database as 70watt SON-T (HPS).
ELMIRA AVE	9	9	-	1	One light labelled L99 LED (pole ID 1031) was recorded in the database as 115NX4 (115W).
1000581347PCFF5 road names A to Fitzherbert					
JOHNSTONE DR	25	26	1	4	One CCTV camera was missing from pole ID L10008 outside One School Global.

Street	Database count	Field count	Light count difference	Wattage recorded incorrectly	Comments
					One L113 (pole ID 11764) was recorded in the database as XSP2 T2 IPD A (SW 101). One L74 (pole ID 11769) was recorded in the database as XSP2 T2 IPD A (SW 101). One L53 (pole ID 11894) was recorded in the database as XSP2 T2 IPD E (SW 65). One L74 (pole ID 11896) was recorded in the database as XSP2 T2 IPD E (SW 65).
1000581347PCFF5 road names Fitzroy to Parnell Heights					
MANAPOURI CRES	11	11	-	1	One 76A (pole ID 974) was recorded in the database as ITALO2 STA S2 64W.
Total	503	504	1	7	

One CCTV camera was missing from pole ID L10008 outside One School Global on Johnstone Drive. The accuracy of recorded wattages is discussed in **section 3.1**.

Audit outcome

Non-compliant

Non-compliance	Description		
Audit Ref: 2.5 With: Clause 11(2A) of Schedule 15.3 From: 11-Mar-23 To: 11-Mar-23	One CCTV camera was missing from pole ID L10008 outside One School Global on Johnstone Drive. Potential impact: Medium Actual impact: Low Audit history: None Controls: Moderate Breach risk rating: 2		
Audit risk rating	Rationale for audit risk rating		
Low	The controls over the completeness of database information are assessed to be moderate because the differences are recent changes and are expected to be timing differences. The impact is low, based on the expected wattage.		
Actions taken to resolve the issue		Completion date	Remedial action status
Palmerston North City Council are updating the database.		April 2023	Identified

Preventative actions taken to ensure no further issues will occur	Completion date	
Palmerston North City Council are aware of the importance of having an accurate database and we will continue to liaise with them on this.	Ongoing	

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 DUMML 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 DUMML 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	<p>The database contains the PNCC items of load for the DUML ICPs in the Palmerston North region.</p> <p>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:</p> <ol style="list-style-type: none"> 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 42 sub-units.
Total items of load	503 items of load making up 2.3% 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 503 items of load on 11 March 2023. 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	99.5	Wattage from survey is lower than the database wattage by 0.5%
R _L	93.3	With a 95% level of confidence it can be concluded that the error could be between -6.7% and -1.2%.
R _H	98.8	

The variability of the sample results across the strata means that the true wattage (installed in the field) could be between 1.2% and 6.7% lower 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 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 3 kW lower than the database indicates.
- There is a 95% level of confidence that the installed capacity is between 8 and 44 kW lower than the database.
- In absolute terms, total annual consumption is estimated to be 14,900 kWh lower than the DUML database indicates.
- There is a 95% level of confidence that the annual consumption is between 32,500 and 188,700 kWh p.a. 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 $\pm 5\%$; 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>

Light description and capacity accuracy

Missing and invalid zero wattages

As discussed in **section 2.4**, 34 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.

Lamp wattages

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.

The last audit found 3,932 of the 9,714 lights recorded in the database at the time had reduced wattages recorded to account for dimming. Dimming is now accounted for in the submission calculation process. Review of the database during this audit found that most light wattages have been updated to reflect the full wattage for each lamp.

The lamp models below have wattages which differ from the expected value based on the lamp specifications. PNCC intends to update the wattages to reflect the expected values.

Lamp Model	Recorded lamp wattage (per lamp)	Expected lamp wattage (per lamp)	Count of lamps	Wattage difference (all affected lamps)
Teceo 1 24 LED (27)	24	27	19	57 W
Cree XSP LED 15W 4000k	11	15	3	12 W
Piano 1 32 Leds	41	53	3	36 W
Teceo 32 LED (38)	32	51	26	494 W
Teceo 80 LED (122)	80	122	14	588 W
4000K CoB LED 6W/220÷240V	8	6	6	-12 W
Total			71	1,175 W or 5,018 kWh p.a.

Seven disconnected lamps have wattages recorded in the database against DUMIL ICPs, resulting in over submission of 700.6 W or 2,992 kWh p.a.

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
Prolicht 750	27.6	disconnected	1	-27.6
RGB Sign	100	disconnected	2	-200
Total			7	-700.6 W or -2,992 kWh p.a.

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

Lamp Model	Recorded lamp wattage (per lamp)	Expected lamp wattage (per lamp)	Count of lamps
Cree LED 3000K CRI ≥83 120lm	2	Unknown	2
GE_LED	165	Unknown	4
LED 4000k, 1600lm 25000hrs	20	Unknown	4
20 LED AT 525mA	27	35 (120-277V) or 39 (347-480V)	7
20 LED AT 700mA	37	47 (120-277V) or 51 (347-480V)	3
30 LED AT 525mA	37	53 (120-277V) or 55 (347-480V)	10
30 LED AT 525mA	39	53 (120-277V) or 55 (347-480V)	20
30 LED AT 700mA	53	70 (120-277V) or 73 (347-480V)	7
Total			63

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.	Palmerston North City Council are aware and will be working to update the database.	Identified

Lamp description

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

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 discrepancies for lamps connected to DUMI ICPs were identified which could result in over submission of 68 W or 290 kWh per annum, and PNCC intends to update the wattages to reflect the expected values.

Lamp Model	Count of lamps	Recorded gear wattage (per lamp)	Expected gear wattage (per lamp)
TLD' 30w/33 x 2 tubes	6	7	6
TLD 40Watt Tube x 1	2	2	3
Thorn Julie 40W LED 4K	4	17	0
100watt SON-I (HPS)	1	11	14

Lamp Model	Count of lamps	Recorded gear wattage (per lamp)	Expected gear wattage (per lamp)
100watt SON-T (HPS)	1	13	14
Total	14		

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 holds further location information for the lamp and will 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

All address discrepancies identified during previous audits have been cleared.

ICP number and owner accuracy

There are 46 lights totalling 2,345 W with a blank ICP number:

- 17 are Waka Kotahi lights where Waka Kotahi requested the PNCC DUML ICP number be removed,
- three were timing differences where poles were replaced following being damaged in a car accident and correct ICP numbers are recorded now that poles have been reinstated, and
- the other 26 lights were new connections in subdivisions which have not been livened yet; the ICP number, lamp description, lamp wattage and gear wattage will be updated when the lamps are livened.

The previous audit found six new lights on North Street, Ashhurst (Slim pole IDs 12657-12662) had a blank ICP group. I confirmed that the affected lights are now correctly recorded with ICP 0000031152CPB70.

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, Electrix and Max Tarr. In all cases field staff update the database from the field using Pocket RAMM, and database information is validated by Fulton Hogan.

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, and
- other new connections are completed by approved contractors and RAMM is updated at the time work is completed; lights are added to the database with a blank ICP before connection, and the ICP is updated once they are connected.

The RAMM database records light installation and replacement dates, which default to the date which the data is collected. In all cases field staff update the database from the field using Pocket RAMM when 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 10% of the work.

Night patrols for outages are no longer completed, and daytime patrols are completed in response to complaints.

Festive lights

Regent Arcade

The festive strings at Regent Arcade are normally connected year round, but were disconnected last year 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

The festive shapes on Cambridge Street are connected in December and January. The lights have connection dates recorded in the extracts provided to Mercury, and are included in submission data when connected.

Palmerston North Festive Lights

Palmerston North festive lights are recorded in the database extracts when connected. The lights have connection dates recorded in the extracts provided to Mercury, 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. All unmetered load is required to be recorded against an ICP. If the private lights are not confirmed to be metered through the customer’s installation it is required to be recorded against an existing ICP as standard or shared unmetered load, or have a new standard or shared unmetered load ICP created to account for the unmetered load. An ICP should be considered standard unmetered load if there is one point of connection and the connected load benefits only that point of connection. An ICP should be considered to be shared unmetered load if the benefit of a single point of connection are shared across more than one ICP.

Progress with investigating private lights in the Palmerston North City Council region was checked during Powerco’s February 2023 distributor audit. Powerco arranged for their approved contractors to visit the light locations to confirm who is responsible and how the lights are supplied. Through this process Powerco confirmed that some of the lights are the Council’s responsibility, and these have been assigned to DUML ICPs. Powerco also found that some of the lights are metered through the customer’s existing meter installation.

Powerco has contacted the relevant retailer for the remaining lights and asked them to contact their customers to obtain acceptance of the unmetered load as part of their connection. If acceptance is obtained Powerco will create a new ICP for the private lights, otherwise they will be disconnected.

Audit outcome

Non-compliant

Non-compliance	Description		
<p>Audit Ref: 3.1 With: Clause 15.2 and 15.37B(b)</p> <p>From: 28-Feb-23 To: 11-Mar-23</p>	<p>The best available estimate is not precise enough to conclude that the database is accurate within $\pm 5\%$. There is a 95% level of confidence that the annual consumption is between 32,500 and 188,700 kWh p.a. lower than the database indicates.</p> <p>34 LED items of connected to DUML ICs have a blank lamp wattage but are expected to have a gear wattage of zero. There is no impact on submission.</p> <p>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.</p> <p>Seven disconnected lamps have wattages recorded against DUML ICs. The estimated impact is 2,992 kWh of over submission per annum.</p> <p>Correct wattages were unable to be confirmed for 63 lamps. A list of the affected lamps has been provided to PNCC for investigation and correction if necessary.</p> <p>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.</p> <p>The lamp description for "Terraed Mini 34W AP2 4000k" is incorrect, and should be "Terraed Mini 24W AP2 4000k". The lamp and gear wattages for the 83 affected lamps are correct, and there is no impact on submission.</p> <p>Pole ID 64681 has insufficient address information recorded to enable it to be readily located.</p> <p>Potential impact: High Actual impact: High Audit history: Multiple times Controls: Moderate Breach risk rating: 4</p>		
Audit risk rating	Rationale for audit risk rating		
<p>Medium</p>	<p>The controls over the database are moderate; there has been a significant reduction in the quantity of incorrect wattage and PNCC has indicated that they intend to correct the discrepancies.</p> <p>The impact is assessed to be medium, based on the kW differences identified during the wattage accuracy checks for the whole database and that a small number of wattage discrepancies 7/503 (1%) were identified during the field audit. Database accuracy could not be confirmed to be within $\pm 5\%$ due to these discrepancies although both point of estimate R and R_H were both within the threshold.</p>		
Actions taken to resolve the issue		Completion date	Remedial action status
<p>Palmerston North CC have been made aware of the discrepancies and have advised that they will be making the appropriate corrections.</p>		<p>April 2023</p>	<p>Identified</p>

Preventative actions taken to ensure no further issues will occur	Completion date	
Palmerston North City Council 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

Mercury settles the DUML load as HHR under exemption 233. 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.

The Authority has confirmed that HHR profile may be used for dimmed streetlights under exemption 233. Total load is reported as the sum of dimmable and standard load at trading period level.

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 December 2022 and confirmed that they were correct, and consistent with the data logger files and data provided by PNCC.

Lights excluded from submission

Some lights recorded against DUML ICPs are excluded from submission because PNCC was not the pole owner. I confirmed that the affected lights were validly excluded from submission data because PNCC is not responsible for them.

Recorded owner	Findings
Airport	The 103W light connected to slim Pole ID 12347 is situated at Palmerston North Airport and is recorded under PNCC ICP 1000581347PCFF5. I confirmed that responsibility for this ICP has now transferred to PNCC and the ICP number is correct. The ICP was correctly excluded from submission information until it was vested.
Private	28 lights recorded against DUML ICPs with a private owner (2,199W) 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.
Transit NZ (Waka Kotahi) urban lights	Waka Kotahi instructed PNCC to remove their DUML ICP numbers from Waka Kotahi lights in the area as they wished to have their own DUML database with Waka Kotahi ICP numbers. I confirmed that the DUML ICP numbers have been removed for the affected Waka Kotahi lights. 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.

I recommended in **section 2.1** that the correct ICP is confirmed for pole ID 10280, and that private lights are checked to ensure that the load is recorded against an ICP.

Sources of database inaccuracy are as follows:

Issue	Estimated volume information impact (annual kWh)
The best available estimate is not precise enough to conclude that the database is accurate within $\pm 5\%$.	There is a 95% level of confidence that the annual consumption is between 32,500 and 188,700 kWh p.a. lower than the database indicates.
34 LED items of load connected to DUML ICPs have a blank lamp wattage but are expected to have a gear wattage of zero.	0 kWh of under or over submission per annum.
71 lamps have lamp wattages which differ from the expected value based on the lamp specifications.	5,018 kWh of under submission per annum.

Issue	Estimated volume information impact (annual kWh)
PNCC intends to update the wattages to reflect the expected values.	
Seven disconnected lamps have wattages recorded against DUML ICPs.	2,992 kWh of over submission per annum.
Correct wattages were unable to be confirmed for 63 lamps. A list of the affected lamps has been provided to PNCC for investigation and correction if necessary.	Unknown under or over submission per annum.
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.	290 kWh of over submission per annum.

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. Field work, asset data capture and database population is conducted by Fulton Hogan, Alf Downs, Electrix and Max Tarr. In all cases field staff update the database from the field using Pocket RAMM when work is completed.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 3.2 With: Clause 15.2 and 15.37B(c)	<p>The best available estimate is not precise enough to conclude that the database is accurate within $\pm 5\%$. There is a 95% level of confidence that the annual consumption is between 32,500 and 188,700 kWh p.a. lower than the database indicates.</p> <p>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.</p> <p>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.</p> <p>Seven disconnected lamps have wattages recorded against DUML ICPs. The estimated impact is 2,992 kWh of over submission per annum.</p>

<p>From: 01-Dec-22 To: 11-Mar-23</p>	<p>Correct wattages were unable to be confirmed for 63 lamps. A list of the affected lamps has been provided to PNCC for investigation and correction if necessary.</p> <p>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.</p> <p>The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot.</p> <p>Potential impact: High</p> <p>Actual impact: Unknown</p> <p>Audit history: Multiple times</p> <p>Controls: Moderate</p> <p>Breach risk rating: 4</p>	
<p>Audit risk rating</p>	<p>Rationale for audit risk rating</p>	
<p>Medium</p>	<p>The controls over the database are moderate; there has been a significant reduction in the quantity of incorrect wattages and PNCC has indicated that they intend to correct the discrepancies.</p> <p>The impact is assessed to be medium, based on the kW differences identified during the wattage accuracy checks for the whole database and that a small number of wattage discrepancies 7/503 (1%) were identified during the field audit. Database accuracy could not be confirmed to be within $\pm 5\%$ due to these discrepancies although both point of estimate R and R_H were both within the threshold.</p>	
<p>Actions taken to resolve the issue</p>	<p>Completion date</p>	<p>Remedial action status</p>
<p>Palmerston North CC have been made aware of the discrepancies and have advised that they will be making the appropriate corrections.</p>	<p>April 2023</p>	<p>Identified</p>
<p>Preventative actions taken to ensure no further issues will occur</p>	<p>Completion date</p>	
<p>Palmerston North City Council are aware of the importance of having an accurate database and we will continue to liaise with them on this.</p>	<p>Ongoing</p>	

CONCLUSION

PNCC DUML ICPs 0000031152CPB70 and 1000581347PCFF5 switched to Mercury effective from 1 October 2023.

Mercury settles the DUML load as HHR under exemption 233. 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. I checked the calculations for December 2022 and confirmed that they were correct, and consistent with the data logger files and data provided by PNCC.

The Authority has confirmed that HHR profile may be used for dimmed streetlights under exemption 233. Total load is reported as the sum of dimmable and standard load at trading period level.

The last audit found 3,932 of the 9,714 lights recorded in the database at the time had reduced wattages recorded to account for dimming. Now that dimming is accounted for in the submission calculation process, most lamp wattages have been corrected to match the expected values.

A small number of wattage discrepancies 7/503 (1%) were identified during the field audit. The results were categorised in accordance with the "Distributed Unmetered Load Statistical Sampling Audit Guideline", effective from 1 February 2019 which found that the best available estimate is not precise enough to conclude that the database is accurate within $\pm 5\%$.

Mercury is able to produce submissions with different kW values for different days, and produces revision submissions where required.

The future risk rating of 18 indicates that the next audit be completed in six months. This is a significant decrease from 25 during the last audit. Very good progress is being made with improving accuracy and PNCC have indicated that they will correct the discrepancies identified during this audit. I recommend the Authority considers an audit period of at least ten months from now.

PARTICIPANT RESPONSE

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