ELECTRICITY INDUSTRY PARTICIPATION CODE
DISTRIBUTED UNMETERED LOAD AUDIT REPORT

For

PALMERSTON NORTH CITY COUNCIL AND MERIDIAN ENERGY LIMITED

Prepared by: Tara Gannon

Date audit commenced: 22 April 2020

Date audit report completed: 22 May 2020

Audit report due date: 26 May 2020

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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 **Meridian Energy Limited (Meridian)** 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 **Alf Downs Streetlighting Limited (Alf Downs)** on behalf of PNCC. The field work, asset data capture and database population is conducted by Alf Downs. Alf Downs staff update the database from the field using Pocket RAMM.

Meridian reconciles this DUML load using the DST profile. Wattages are derived from a RAMM extract provided by Alf Downs each month. On and off times are derived from a data logger read by EMS and are used to create a shape file. Meridian supplies EMS with the capacity information, and EMS calculates the kWh figures for the ICPs and includes them in the relevant AV080 file. This process was audited during Meridian's reconciliation participant audit and EMS' agent audit.

Database accuracy is described as follows:

Result	Percentage	Comments
The point estimate of R	101.1	Wattage from survey is higher than the database wattage by 1.1%
R_L	90.8	With a 95% level of confidence it can be concluded that the error could be between -8.2% and +8.2%
R_H	108.2	

The variability of the sample results across the strata means that the true wattage (installed in the field) could be between 8.2% lower and 8.2% 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 01/02/19. The best available estimate is not precise enough to conclude that the database is accurate within ±5.0%.

- In absolute terms the installed capacity is estimated to be 7 kW higher than the database indicates.
- There is a 95% level of confidence that the installed capacity is between 57 kW lower and 51 kW higher than the database.
- In absolute terms, total annual consumption is estimated to be 28,800 kWh higher than the DUML database indicates.
- There is a 95% level of confidence that the annual consumption is between 243,800 kWh p.a. lower and 219,300 kWh p.a. higher than the database indicates.

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

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

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

The future risk rating of 19 indicates that the next audit be completed in three months. This may not be sufficient time to resolve the matters raised and work through Meridian's upcoming profile application, which discussed in the participant comments. I recommend the Authority considers an audit period of at least nine months.

The matters raised are detailed below:

AUDIT SUMMARY

NON-COMPLIANCES

Subject	Section	Clause	Non-Compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
Deriving submission information	2.1	11(1) of Schedule 15.3	The database is not confirmed as accurate with a 95% level of confidence. Two lights had missing gear wattages, which were expected to be recorded as zero. Some LED light wattages have been adjusted down to account for dimming. Meridian reports the load for ICP 0000031152CPB70 against profile DST, and the profiles used by PNCC to adjust wattages have not been approved by the Electricity Authority. Meridian processes some wattage corrections prior to submission, which reduces the impact of the non-compliance. Four lights have incorrect gear wattages, which Alf Downs intends to correct. The impact of the incorrect gear wattages is 28W, which could lead to under submission of 120 kWh per annum. There is potential over submission of 4,382 kWh p.a. for metered load. The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot. The installation and change dates recorded in the database reflect the data collection date, which is not always consistent with the date that the change occurred.	Weak	Medium	6	Identified
Description and capacity of load	2.4	11(2)(c) and (d) of Schedule 15.3	Pole IDs 96 and 1697 had missing gear wattages, when zero was expected.	Strong	Low	1	Identified
Database accuracy	3.1	15.2 and 15.37B(b)	The database is not confirmed as accurate with a 95% level of confidence. Two lights had missing gear wattages, which were expected to be recorded as zero. Some LED light wattages have been adjusted down to account for dimming. Meridian reports the load for ICP 0000031152CPB70 against profile DST, and the profiles used by PNCC to adjust wattages have not been approved by the Electricity Authority. Meridian processes some wattage corrections prior to	Weak	Medium	6	Identified

Subject	Section	Clause	Non-Compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
			submission, which reduces the impact of the non-compliance. Four lights have incorrect gear wattages, which Alf Downs intends to correct. The impact of the incorrect gear wattages is 28W, which could lead to under submission of 120 kWh per annum. There is potential over submission of 4,382 kWh p.a. for metered load. The road name recorded for Slim Pole IDs 9284 and 9285 is COLYTON RD_A, but is expected to be Oxford Street. The installation and change dates recorded in the database reflect the data collection date, which is not always consistent with the date that the change occurred.				
Volume information accuracy	3.2	15.2 and 15.37B(c)	The database is not confirmed as accurate with a 95% level of confidence. Two lights had missing gear wattages, which were expected to be recorded as zero. Some LED light wattages have been adjusted down to account for dimming. Meridian reports the load for ICP 0000031152CPB70 against profile DST, and the profiles used by PNCC to adjust wattages have not been approved by the Electricity Authority. Meridian processes some wattage corrections prior to submission, which reduces the impact of the non-compliance. Four lights have incorrect gear wattages, which Alf Downs intends to correct. The impact of the incorrect gear wattages is 28W, which could lead to under submission of 120 kWh per annum. There is potential over submission of 4,382 kWh p.a. for metered load. The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot. The installation and change dates recorded in the database reflect the data collection date, which is not always consistent with the date that the change occurred.	Weak	Medium	6	Identified
Future Risk Rating						19	

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
Metered lights recorded against DUML ICPs	2.1	Check the lights which are recorded against DUML ICPs and indicated to be metered, then update the database to indicate the correct metering status and ICP number.
Confirm light wattages	3.1	Confirm the correct wattages for the five lamp models which did not match the specifications I located, and 31 models which I could not locate specifications for. Update the wattages in RAMM as necessary.

ISSUES

Subject	Section	Description	Issue
		Nil	

1. ADMINISTRATIVE

1.1. Exemptions from Obligations to Comply with Code

Code reference

Section 11 of Electricity Industry Act 2010.

Code related audit information

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

Audit observation

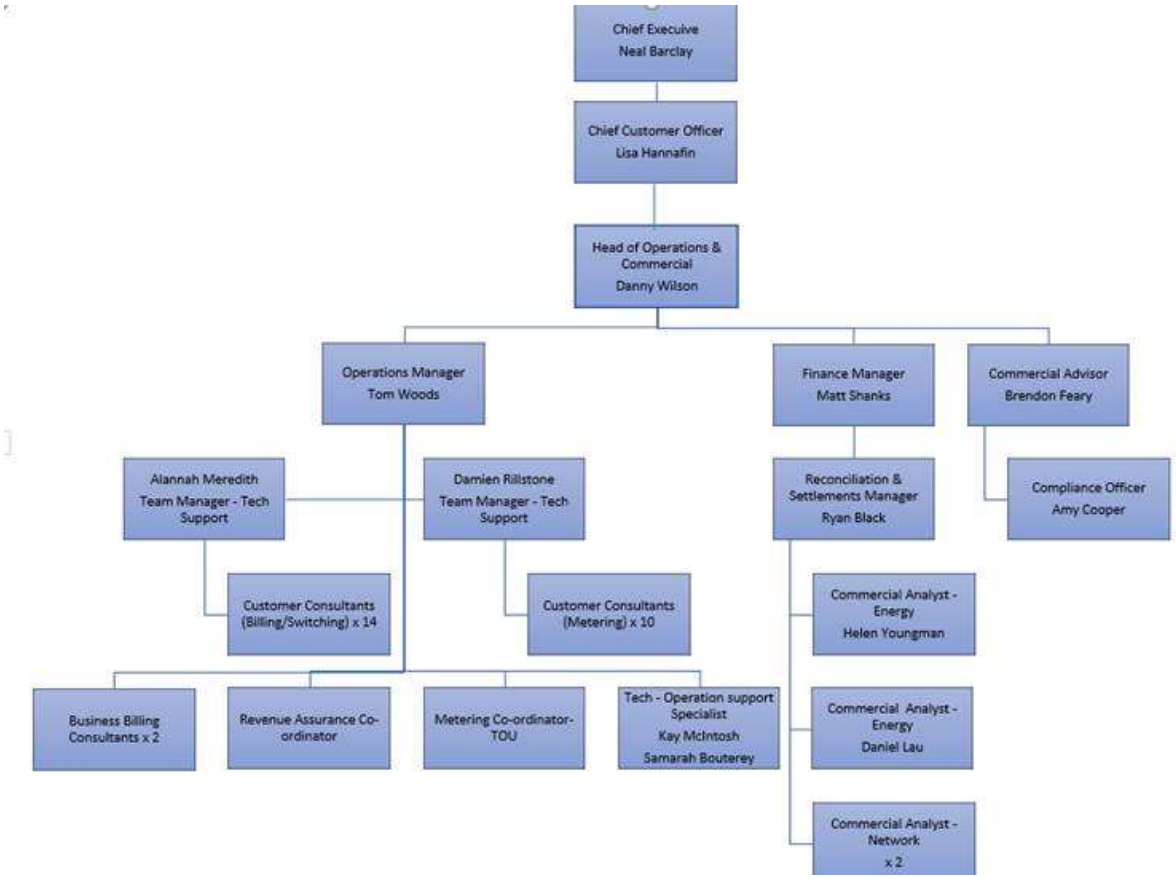
The Electricity Authority's website was reviewed to identify any exemptions relevant to the scope of this audit.

Audit commentary

There are no exemptions in place relevant to the scope of this audit.

1.2. Structure of Organisation

Meridian provided a copy of their organisational structure.



1.3. Persons involved in this audit

Auditor:

Tara Gannon

Veritek Limited

Electricity Authority Approved Auditor

Other personnel assisting in this audit were:

Name	Title	Company
Phil Harris	Street Lighting Contract Administration	Alf Downs Streetlighting Limited
Rob Cuff	Senior Contracts Engineer	Palmerston North City Council
Daniel Lau	Energy Data Analyst	Meridian Energy

1.4. Hardware and Software

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

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

Meridian and EMS' 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	Streetlights, 32 The Square, Palmerston North	DST	LTN0331	3,892	247,352.8
1000581347PCFF5	PNCC Streetlights, 28A Redmayne St, Bunnythorpe	DST	BPE0331	5,539	375,235
Total				**9,431**	**622,587.8**

NZTA lights

NZTA lights are recorded in the database.

NZTA urban lights are the responsibility of PNCC and are recorded in the database against ICP 0000031152CPB70 or 1000581347PCFF5.

NZTA rural lights are not PNCC's responsibility. They do not have an ICP number recorded and are excluded from the database extracts provided to Meridian. NZTA is intending to develop a database for these lights, which will require a separate audit once complete.

Private lights

129 private lights are recorded in the database but excluded from the extracts provided to Meridian for submission. As discussed in Powerco's audit, Powerco is investigating these lights, and intends to arrange for standard or shared unmetered load to be created.

Potentially metered lights

1,026 W of load which is indicated to be metered is recorded against the DUML ICPs, and is discussed further in **section 2.1**. Alf Downs believes that some of this load is genuinely metered, and intends to investigate and update the database.

1.7. Authorisation Received

All information was provided directly by Meridian, PNCC, or Alf Downs.

1.8. Scope of Audit

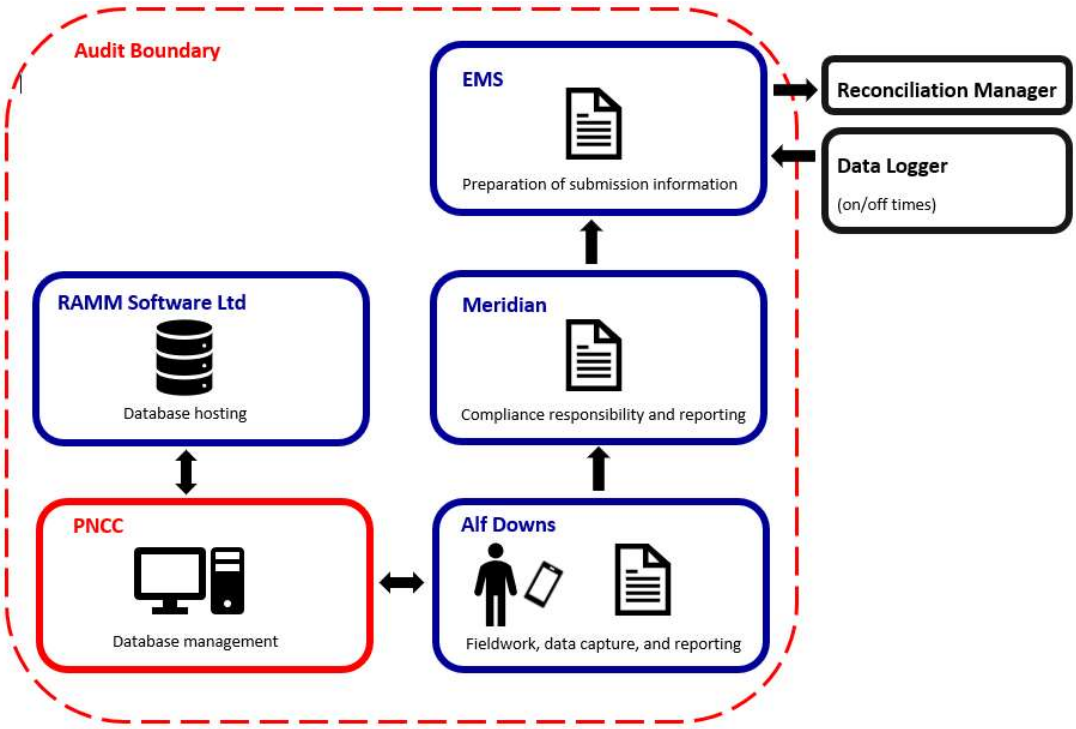
This audit of the PNCC DUML database and processes was conducted at the request of Meridian in accordance with clause 15.37B. The purpose of this audit is to verify that the volume information is being calculated accurately, and that profiles have been correctly applied.

The audit was conducted in accordance with the audit guidelines for DUML audits version 1.1.

A RAMM database is managed by Alf Downs on behalf of PNCC. The field work, asset data capture and database population is conducted by Alf Downs. Alf Downs staff update the database from the field using Pocket RAMM.

Meridian reconciles this DUML load using the DST profile. Wattages are derived from a RAMM extract provided by Alf Downs each month. On and off times are derived from a data logger read by EMS and are used to create a shape file. Meridian supplies EMS with the capacity information, and EMS calculates the kWh figures for the ICPs and includes them in the relevant AV080 file. This process was audited during Meridian's reconciliation participant audit and EMS' agent audit.

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 300 items of load on 20 May 2020.

1.9. Summary of previous audit

The previous audit of this database was undertaken by Tara Gannon of Veritek Limited in September 2019. The summary table below shows the statuses of the non-compliances raised in the previous audit. Further comment is made in the relevant sections of this report.

Subject	Section	Clause	Non-compliance	Status
Deriving submission information	2.1	11(1) of Schedule 15.3	The database is not confirmed as accurate with a 95% level of confidence as recorded in **section 3.1**. Potential under submission of 61,056 kWh p.a. due to wattages adjusted for dimming. Potential over submission of 4,382 kWh p.a. for metered load. The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot. Livening dates are not recorded for new connections.	Still existing
Database accuracy	3.1	15.2 and 15.37B(b)	The database is not confirmed as accurate with a 95% level of confidence. 4,552 LED light wattages have been adjusted to account for dimming.	Still existing

Subject	Section	Clause	Non-compliance	Status
			The impact of the adjustment is 14,295.5 W estimated under submission. Meridian reports the load for ICP 0000031152CPB70 against profile DST, and the profiles used by PNCC to adjust wattages have not been approved by the Electricity Authority. The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot. Livening dates are not recorded for new connections. Six lights with incorrect road name or GPS information. Some lights are likely to have incorrect ICPs recorded.	
Volume information accuracy	3.2	15.2 and 15.37B(c)	The database is not confirmed as accurate with a 95% level of confidence as recorded in **section 3.1**. Potential under submission of 61,056 kWh p.a. due to wattages adjusted for dimming. Potential over submission of 4,382 kWh p.a. for metered load. The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot. Livening dates are not recorded for new connections.	Still existing

Subject	Section	Clause	Non-compliance	Status
ICP identifier and items of load	2.2		Confirm that ICPs are recorded correctly for roads with lights connected to more than one ICP.	Still existing
Database accuracy	3.1		Where possible confirm the wattages are correct for the 63 light models where the wattages did not match the expected values or there was insufficient information to confirm the correct wattages.	Still existing

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

Code reference

Clause 16A.26 and 17.295F

Code related audit information

Retailers must ensure that DUML database audits are completed:

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

Audit observation

Meridian have requested Veritek to undertake this streetlight audit.

Audit commentary

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

Audit outcome

Compliant

2. DUML DATABASE REQUIREMENTS

2.1. Deriving submission information (Clause 11(1) of Schedule 15.3)

Code reference

Clause 11(1) of Schedule 15.3

Code related audit information

The retailer must ensure the:

- *DUML database is up to date*
- *methodology for deriving submission information complies with Schedule 15.5.*

Audit observation

The process for calculation of consumption was examined and the application of profiles was checked. The database was checked for accuracy.

Audit commentary

Submission

Meridian reconciles this DUML load using the DST profile.

- Wattages are derived from a RAMM extract provided by Alf Downs each month. The field survey found that the best available estimate of field wattage is not precise enough to conclude that the database is accurate within ±5.0% as recorded in **section 3.1**.
- On and off times are derived from a data logger read by EMS and are used to create a shape file.

Meridian supplies EMS with the capacity information from Alf Downs, which is adjusted to correct wattages for lamp types which Meridian knows are recorded incorrectly in the database. EMS calculates the kWh figures for ICP 0000031152CPB70 and 1000581347PCFF5 and includes them in the relevant AV080 file. This process was audited during Meridian's reconciliation participant audit and EMS' agent audit.

I checked the data provided to EMS for February and March 2020. I found that the capacity information provided to EMS matched the database extract for February with the wattage corrections applied. Where wattage corrections were carried out the wattages reflected the expected wattage for the lamp, or the average value for the lamp type if the exact wattage was unknown.

Festive lights are provided in the database extract when they are connected, and I confirmed that connected festive lights were included in the wattages provided to EMS. Festive light processes are discussed further in **section 3.1**.

The February 2020 values were applied for March 2020 on instruction from Alf Downs, who were closed during the COVID-19 level 4 lockdown. Alf Downs confirmed that they did not make any database changes during the lockdown.

The 2019 audit found that the RAMM extract included 1,026 W of metered load which was expected to be excluded from submissions. Alf Downs intended to ensure that this metered load was excluded from extracts from September 2019 onwards, but it was still present in February 2020 and was included in the submissions for February and March 2020.

ICP	Slim Pole ID	Road name	Pole Control	Lamp Model	Total wattage
1000581347PCFF5	12040	TENNENT DR SHARED PATHWAY (AWAY FROM TOWN)	Metered supply	Scala Midi 32LED	51

ICP	Slim Pole ID	Road name	Pole Control	Lamp Model	Total wattage
0000031152CPB70	12041	MANAWATU SHARED PATH ACCESS (FITZHERBERT TO DOWNSTREAM)	Metered supply	Scala Midi 32LED	51
0000031152CPB70	12042	MANAWATU SHARED PATH ACCESS (FITZHERBERT TO DOWNSTREAM)	Metered supply	Scala Midi 32LED	51
0000031152CPB70	12043	MANAWATU SHARED PATH ACCESS (FITZHERBERT TO DOWNSTREAM)	Metered supply	Scala Midi 32LED	51
0000031152CPB70	12044	MANAWATU SHARED PATH ACCESS (FITZHERBERT TO DOWNSTREAM)	Metered supply	Scala Midi 32LED	51
0000031152CPB70	12045	MANAWATU SHARED PATH ACCESS (FITZHERBERT TO DOWNSTREAM)	Metered supply	Scala Midi 32LED	51
0000031152CPB70	7629	CHURCH ST	Metered supply	Apollo RL2P 056	120
0000031152CPB70	7627	CHURCH ST	Metered supply	Apollo RL2P 056	120
0000031152CPB70	7628	CHURCH ST	Metered supply	Apollo RL2P 056	120
0000031152CPB70	7630	MAIN WEST S	Metered supply	Apollo RL2P 056	120
0000031152CPB70	7631	MAIN WEST S	Metered supply	Apollo RL2P 056	120
0000031152CPB70	7632	COOK ST EAST	Metered supply	Apollo RL2P 056	120

Alf Downs confirmed that the shared pathway lights are metered, and intends to update the database to reflect this and the correct ICP numbers. Alf Downs is uncertain whether the Church St, Main St and Cook St lights are metered, and these should be checked and updated if necessary.

Recommendation	Description	Audited party comment	Remedial action
Metered lights recorded against DUML ICPs	Check the lights which are recorded against DUML ICPs and indicated to be metered, then update the database to indicate the correct metering status and ICP number.	Meridian will follow up PNCC and Alf Downs to ensure status of these lights is confirmed.	Identified

Sources of inaccuracy are as follows:

Issue	Estimated volume information impact (annual kWh)
Up to 1,026 W of metered load is included in the database extracts	Up to 4,382 kWh of over submission.
Two lights had missing gear wattages, which were expected to be recorded as zero.	No impact on submission, there is a zero difference.
A profiled lamp wattage lower than the expected wattage is applied in RAMM and Meridian is processing a pre submission wattage correction.	No impact on submission, Meridian is processing corrections.
A profiled lamp wattage lower than the expected wattage is applied in RAMM and Meridian is not processing a pre submission wattage correction, resulting in a difference of an estimated 1,768 W.	7,551 kWh of under submission.
Four lights have incorrect gear wattages, which Alf Downs intends to correct.	120 kWh of under submission.

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. Meridian has not updated their processes to be consistent with the Authority's memo.

The RAMM database records light installation and replacement dates, which default to the date which the data is collected. Alf Downs does not adjust the installation and replacement dates when records are added or changed, so the date the data is collected is applied as the installation or change date. For maintenance work, RAMM is updated at the time the work is completed and the date is expected to be correct. For upgrades and new connections, data is collected after the work in the area is completed but usually within the month it was completed. There have been some recent delays in collecting data due to COVID-19 restrictions.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.1 With: Clause 11(1) of Schedule 15.3 From: 01-Feb-20 To: 31-Mar-20	The database is not confirmed as accurate with a 95% level of confidence. Two lights had missing gear wattages, which were expected to be recorded as zero. Some LED light wattages have been adjusted down to account for dimming. Meridian reports the load for ICP 0000031152CPB70 against profile DST, and the profiles used by PNCC to adjust wattages have not been approved by the Electricity Authority. Meridian processes some wattage corrections prior to submission, which reduces the impact of the non-compliance. Four lights have incorrect gear wattages, which Alf Downs intends to correct. The impact of the incorrect gear wattages is 28W, which could lead to under submission of 120 kWh per annum. There is potential over submission of 4,382 kWh p.a. for metered load. The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot. The installation and change dates recorded in the database reflect the data collection date, which is not always consistent with the date that the change occurred. Potential impact: High Actual impact: Unknown Audit history: Three times Controls: Weak Breach risk rating: 6
Audit risk rating	**Rationale for audit risk rating**
Medium	The controls over the database are rated as weak, due to the large number of discrepancies identified during the field count and analysis of the RAMM database extract. The audit risk rating is technically high, and I was unable to calculate the wattage differences for all discrepancies identified because some specifications could not be located. The impact has been reduced to medium because the wattage corrections made by Meridian prior to producing reconciliation submissions minimise the impact on submission.

Actions taken to resolve the issue	Completion date	Remedial action status
Up to 1,026 W of metered load is included in the database extracts - Alf Downs confirmed that the shared pathway lights are metered and intends to update the database to reflect this and the correct ICP numbers. Meridian will process corrections for these lights.	31 July 2020	Identified
Church St, Main Street and Cook Street lights recorded as metered are to be checked and updated if necessary. Meridian will follow up PNCC and Alf Downs to ensure status of these lights is confirmed.	31 July 2020	
Two lights had missing gear wattages, which were expected to be recorded as zero – Meridian will follow up PNCC and Alf Downs to have missing gear wattages of 0 added.	31 July 2020	
A profiled lamp wattage lower than the expected wattage is applied in RAMM and Meridian is processing a pre submission wattage correction – This process will continue until we have a profile solution for the dimming lights	Ongoing	
A profiled lamp wattage lower than the expected wattage is applied in RAMM and Meridian is not processing a pre submission wattage correction, resulting in a difference of an estimated 1,768 W – these lamps will be reviewed and adjustments processed as above until we have a profile solution for the dimming lights	31 July 2020	
Four lights have incorrect gear wattages, which Alf Downs intends to correct. - Meridian will follow up PNCC and Alf Downs to have these incorrect gear wattages of updated.	31 July 2020	
Preventative actions taken to ensure no further issues will occur	**Completion date**	
We have had engagement from PNCC and will be drafting a profile application for the dimming LED lights.	31 August 2020	

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

Code reference

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

Code related audit information

The DUML database must contain:

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

Audit observation

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

Audit commentary

Each item of load that PNCC is responsible for has an ICP number recorded against it.

Prior to the 2019 audit the lights were split between ICP 0000031152CPB70 (LTN0331) and 1000581347PCFF5 (BPE0331) in consultation with Powerco. The accuracy of the assigned ICP numbers is assessed in **section 3.1**.

Private lights are recorded in the database with "private" as the ICP group. Alf Downs provided a list of 129 private lights totalling 10,623 W. Powerco is investigating these lights, and intends to arrange for standard or shared unmetered load to be created. I checked the locations of 11 of these lights on the registry, and confirmed that Powerco had added shared unmetered load. Progress with adding standard or shared unmetered load for private lights will be checked during Powerco's upcoming distributor audit.

NZTA urban lights are the responsibility of PNCC and are recorded in the database against ICP 0000031152CPB70 or 1000581347PCFF5. NZTA rural lights are not PNCC's responsibility, and do not have an ICP number recorded. NZTA is intending to develop a database for these lights, which will require a separate audit once complete.

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.

All items of load are locatable. 9,413 (99.81%) items of load have GPS coordinates, and the other 18 items have sufficient road name and displacement information to allow them to be readily located.

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

Audit outcome

Compliant

2.4. Description and capacity of load (Clause 11(2)(c) and (d) of Schedule 15.3)

Code reference

Clause 11(2)(c) and (d) of Schedule 15.3

Code related audit information

The DUML database must contain:

- *a description of load type for each item of load and any assumptions regarding the capacity*
- *the capacity of each item in watts.*

Audit observation

The database was checked to confirm that:

- it contained a field for light type and wattage capacity,
- wattage capacities include any ballast or gear wattage, and
- each item of load has a light type, light wattage, and gear wattage recorded.

Audit commentary

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

All items of load have a lamp model and lamp wattage populated, and no invalid zero lamp wattages were identified.

Two items of load had blank gear wattages; both were expected to have a gear wattage of zero. Alf Downs confirmed that they will check and update the gear wattages.

Slim Pole ID	Road Name	Lamp Model	Gear model	Gear Wattage	Lamp Wattage
96	WAIHEKE CT	150watt incandescant			150
1697	GLENMARY CL	PL 13watt			13

One 160 watt Mercury Vapour lamp was recorded with a zero gear wattage, and Alf Downs confirmed that there was no gear and the gear wattage was valid.

Slim Pole ID	Road Name	Lamp Model	Gear model	Gear Wattage	Lamp Wattage
10213	WORSFOLD LANE	160watt Mercury Vapour ML	No Gear	0	160

The accuracy of the recorded wattages is discussed in **section 3.1**.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.4 With: Clause 11(2)(c) and (d) of Schedule 15.3 From: 01-Feb-20 To: 29-Feb-20	Pole IDs 96 and 1697 had missing gear wattages, when zero was expected. 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 rated as strong. Almost all lights had gear model and wattage recorded. There is no impact, the missing gear wattages were expected to be zero.

Actions taken to resolve the issue	Completion date	Remedial action status
Meridian will follow up PNCC and Alf Downs to have missing gear wattages of 0 added.	31 July 2020	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
Strong controls are in place to ensure gear wattage is recorded		

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 300 items of load on 20 May 2020. The sample was selected from five strata, as follows:

1. NZTA & other
2. Roading 0000031152CPB70 street names A-MAI
3. Roading 0000031152CPB70 street names MAR-Z
4. Roading 1000581347PCFF5 street names A-KEN, and
5. Roading 1000581347PCFF5 street names KIN-Z.

Audit commentary

The field audit discrepancies are detailed in the table below. Most of the differences relate to lamps which had a correct lamp description recorded in the database, but a lower profiled wattage had been applied. There were only two lamps where information other than the wattage was incorrectly recorded: one lamp on Gemini Ave had an incorrect description as well as an incorrect wattage, and one lamp in CP_CIVIC CENTRE had duplicate redundant records in the database.

Street	Database count	Field count	Light count difference	Wattage recorded incorrectly	Comments
NZTA & other					
CP_CIVIC CENTRE	3	1	-2	-	The database recorded three 250W SON lamps connected to council pole L6616. The cover is opaque, but it appears only one lamp is present and other similar poles nearby record only one lamp.

Street	Database count	Field count	Light count difference	Wattage recorded incorrectly	Comments
Roading 0000031152CPB70 street names A-MAI					
CAMPBELL ST	13	13	-	11	11 lights labelled L20 were recorded in the database with a correct description, but had an incorrect lamp wattage (14W).
CHELWOOD ST	17	17	-	1	One light labelled L20 (council pole L5701) was recorded in the database with a correct description, but had an incorrect lamp wattage (14W).
GEMINI AVE	4	4	-	4	Council pole L13231 recorded a Road Grace BRP711 23LED20W (14W) but a L26 (26W) was present. Three lights labelled L20 were recorded in the database with a correct description, but an incorrect wattage (14W).
KATENE ST	4	4	-	4	Four lights labelled L20 were recorded in the database with a correct description, but had an incorrect lamp wattage (14W).
Roading 1000581347PCFF5 street names A-KEN					
BOND ST	5	5	-	5	Five lights labelled L18 were recorded in the database with a correct description, but had an incorrect lamp wattage (15W).
BOSTON PARADE	15	15	-	15	15 lights labelled L20 were recorded in the database with a correct description, but had an incorrect lamp wattage (14W).
FORTH TCE	3	3	-	3	Three lights labelled L18 were recorded in the database with a correct description, but had an incorrect lamp wattage (15W).
GEMINI AVE	8	8	-	8	One L26 light (council pole ID L1161) was recorded in the database with a correct description, but had an incorrect lamp wattage (18W). Seven lights labelled L20 were recorded in the database with a correct description, but an incorrect wattage (14W).

Street	Database count	Field count	Light count difference	Wattage recorded incorrectly	Comments
HILLCREST DR	17	17	-	17	17 lights labelled L20 were recorded in the database with a correct description, but had an incorrect lamp wattage (14W).
Roading 1000581347PCFF5 street names KIN-Z					
LYDIA PL	4	4	-	4	Four lights labelled L18 were recorded in the database with a correct description, but had an incorrect lamp wattage (15W).
MARNE ST	20	20	-	20	20 lights labelled L20 were recorded in the database with a correct description, but had an incorrect lamp wattage (14W).
MILLAR ST	9	9	-	9	Nine lights labelled L20 were recorded in the database with a correct description, but had an incorrect lamp wattage (14W).
PARADISE PL	5	5	-	5	Five lights labelled L20 were recorded in the database with a correct description, but had an incorrect lamp wattage (14W).
VIRGINIA GR	3	3	-	3	Three lights labelled L18 were recorded in the database with a correct description, but had an incorrect lamp wattage (15W).
Roading 0000031152CPB70 street names MAR-Z					
SUTHERLAND CRES	13	13	-	13	13 lights labelled L20 were recorded in the database with a correct description, but had an incorrect lamp wattage (14W).
WILLIS ST	5	5	-	5	Five lights labelled L20 were recorded in the database with a correct description, but had an incorrect lamp wattage (14W).
Grand total	300	298	-2	127	

This clause relates to lights in the field that are not recorded in the database. The audit did not find any additional lights in the field. Wattage differences are 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 Meridian 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

Meridian's submissions are based on a monthly extract from the RAMM database.

A RAMM database extract was provided in March 2020 and I assessed the accuracy of this by using the DUML Statistical Sampling Guideline. The table below shows the survey plan.

Plan Item	Comments
Area of interest	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. NZTA & other 2. Roading 0000031152CPB70 street names A-MAI 3. Roading 0000031152CPB70 street names MAR-Z 4. Roading 1000581347PCFF5 street names A-KEN, and 5. Roading 1000581347PCFF5 street names KIN-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 29 sub-units.
Total items of load	300 items of load making up 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 300 items of load. The "database auditing tool" was used to analyse the results, which are shown in the table below.

Result	Percentage	Comments
The point estimate of R	101.1	Wattage from survey is higher than the database wattage by 1.1%
R_L	90.8	

Result	Percentage	Comments
R_H	108.2	With a 95% level of confidence it can be concluded that the error could be between -8.2% and +8.2%

The variability of the sample results across the strata means that the true wattage (installed in the field) could be between 8.2% lower and 8.2% 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 01/02/19. The best available estimate is not precise enough to conclude that the database is accurate within ±5.0%.

- In absolute terms the installed capacity is estimated to be 7 kW higher than the database indicates.
- There is a 95% level of confidence that the installed capacity is between 57 kW lower and 51 kW higher than the database.
- In absolute terms, total annual consumption is estimated to be 28,800 kWh higher than the DUML database indicates.
- There is a 95% level of confidence that the annual consumption is between 243,800 kWh p.a. lower and 219,300 kWh p.a. higher than the database indicates.

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

Light description and capacity accuracy

Missing and invalid zero wattages

As discussed in **section 2.4**, all lights had a valid lamp model and lamp wattage recorded, and no invalid zero gear wattages were identified.

Two lamps had missing gear wattages, which were expected to be recorded as zero. Alf Downs confirmed that they will check and update the gear wattages for the affected lamps.

Lamp wattages

Lamp 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 following discrepancies were identified:

<table>
<tr><th>Issue</th><th>Lamp model count</th><th>Lamp count</th><th>Expected – applied wattage</th><th>Comment</th></tr>
<tr><td>The wattage appears incorrect based on the specifications I located.</td><td>5</td><td>781</td><td>-4,544.7</td><td>The affected lamp models have been provided to Alf Downs, who will check the specifications and update RAMM as necessary.</td></tr>
<tr><td>The correct wattage could not be confirmed based on the model information available.</td><td>31</td><td>439</td><td>unknown</td><td>The affected lamp models have been provided to Alf Downs, who will check the specifications and update RAMM as necessary.</td></tr>
<tr><td>A profiled lamp wattage lower than the expected wattage is applied and Meridian is processing a pre submission wattage correction.</td><td>16</td><td>3,666</td><td>19,834.5</td><td>There is no impact on submission, Meridian is applying a wattage correction prior to providing the capacities to EMS.</td></tr>
<tr><td>A profiled lamp wattage lower than the expected wattage is applied and Meridian is not processing a pre submission wattage correction.</td><td>10</td><td>194</td><td>1,768</td><td>These wattages appear to be profiled, but Meridian is not currently processing pre submission wattage corrections. The affected lamp types are:
<table>
<tr><th>Model</th><th>Applied Lamp W</th></tr>
<tr><td>XSP (29W)</td><td>21 W</td></tr>
<tr><td>XSP2 T210 IPD 1 (SW 74W)</td><td>53 W</td></tr>
<tr><td>T210 IPD H 29W</td><td>21 W</td></tr>
<tr><td>T3 IPD E 34W</td><td>24 W</td></tr>
<tr><td>T3ME 22W</td><td>16 W</td></tr>
<tr><td>T3ME IPD H 29W</td><td>21 W</td></tr>
<tr><td>T3ME IPD H 45W</td><td>32 W</td></tr>
</table></td></tr>
</table>

Issue	Lamp model count	Lamp count	Expected – applied wattage	Comment
				Windsor Ely C 27W LED 19 W Windsor Trafalgar 33W LED 24 W Winsor Ely C 33W LED 24 W

I have not attempted to calculate the exact impact of these discrepancies, due to difficulty in confirming the correct values where I could not find matching lamp specifications.

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 wattages for the five lamp models which did not match the specifications I located, and 31 models which I could not locate specifications for. Update the wattages in RAMM as necessary.	Meridian will follow this up with PNCC and Alf Downs to confirm specified wattages for these light models.	Identified

Gear wattages

As recorded in the 2019 audit, I identified five lights with gear wattages which differed from the expected values. Alf Downs intends to process corrections where they are required.

Slim Pole ID	Road Name	Lamp Model	Gear Wattage	Lamp Wattage	Comment
10213	WORSFOLD LANE	160watt Mercury Vapour ML	0	160	Compliant, Alf Downs confirmed this light does not have separate ballast.
10216	CONIFER CRT	36watt TLD Fluorecent	17	36	Alf Downs confirmed that a 10W ballast is expected, and RAMM will be updated.
4343	TENNENT OFF LANE 'EAST`	TLD 20watt	5	20	Alf Downs confirmed that a 10W ballast is expected, and RAMM will be updated.
10413	TENNENT DR 'WEST`	TLD 20watts/33x 2 tubes	5	40	Alf Downs confirmed that a 10W ballast is expected per 20W tube, and RAMM will be updated.
9733	CLIFF RD	TLD 20watts/33x 2 tubes	5	40	Alf Downs confirmed that a 10W ballast is expected per 20W tube, and RAMM will be updated.

The impact of the incorrect gear wattages is 28W, which could lead to under submission of 120 kWh per annum.

Address accuracy

During the 2019 field audit I found some lights with inaccurate road name or GPS information, which I rechecked on the February 2020 extract.

All discrepancies were cleared except Slim Pole IDs 9284 and 9285 which were located at the upper end of Oxford Street before the road name changes to Colyton Rd, but are still recorded with a road name of COLYTON RD_A. Alf Downs will confirm the correct address and work with PNCC to update RAMM if necessary.

ICP number and owner accuracy

Prior to the 2019 audit the lights were split between ICP 0000031152CPB70 (LTN0331) and 1000581347PCFF5 (BPE0331) in consultation with Powerco.

Analysis of the RAMM extract found 45 roads with lights connected to different ICPs, including all 43 roads with lights connected to more than one NSP identified during the 2019 audit. PNCC advised that NSPs had been assigned in consultation with Powerco, and they were confident that NSPs were correct. Because both NSPs are within the BA4WESTPOCOG balancing area, there is no impact on reconciliation.

1,026 W of load which is indicated to be metered is recorded against the DUML ICPs, and is discussed further in **section 2.1**. Alf Downs believes that some of this load is genuinely metered, and intends to investigate and update the database.

Change management process findings

The RAMM database is managed by Alf Downs on behalf of PNCC. The field work, asset data capture and database population is conducted by Alf Downs. Staff update the database from the field using Pocket RAMM.

I walked through the new connection process. New connections may be completed by the distributor, the developer, or Alf Downs with PNCC's approval.

- For subdivisions, once livening has occurred an "as built" plan is provided to PNCC, who then takes responsibility for the lights. PNCC advises the installer of the lights that they must arrange for Alf Downs to check the lights and add them to RAMM via email, and copies in Alf Downs. Alf Downs collects the information as soon as they are able and adds the lights to RAMM. They follow up with the installer if they do not make contact to arrange the RAMM update.
- Other new connections are typically completed by Alf Downs and the details are loaded into Pocket RAMM once installation is complete.

The RAMM database records light installation and replacement dates, which default to the date which the data is collected. Alf Downs does not adjust the installation and replacement dates when records are added or changed, so the date the data is collected is applied as the installation or change date. For maintenance work, RAMM is updated at the time the work is completed and the date is expected to be correct. For upgrades and new connections, data is collected after the work in the area is completed but usually within the month it was completed. There have been some recent delays in collecting data due to COVID-19 restrictions.

Each month PNCC reviews Alf Down's invoice and checks that the work requested has been completed, including field checks. Any discrepancies are sent to Alf Downs for investigation and correction.

Monthly outage patrols also identify database discrepancies.

Festive lights

There are two sets of festive lights recorded in the database:

1. Festive strings located on Regent Arcade, which are decorative lights which are connected year round and included in all database extracts and reconciliation submissions.

2. Festive shapes located in Ashhurst (ICP 1000581347PCFF5) are connected during December and January. These lights are only included in the RAMM database extracts when they are connected, and are appropriately included in submission information when they are provided. I reviewed the extracts for December 2019 and confirmed that these lights were included because they were connected, and February 2020 and confirmed that these lights were excluded because they were not connected.

Private lights

Private lights are recorded in the database but excluded from submission. Alf Downs provided a list of 129 private lights totalling 10,623 W. Powerco is investigating these lights, and intends to arrange for standard or shared unmetered load to be created.

I checked the locations of 11 of these lights on the registry, and confirmed that Powerco had added shared unmetered load. In some cases the kW differed from the expected values. The kW differences and progress with updating shared unmetered load values will be checked during Powerco's distributor audit.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 3.1 With: Clause 15.2 and 15.37B(b) From: 01-Feb-20 To: 29-Feb-20	The database is not confirmed as accurate with a 95% level of confidence. Two lights had missing gear wattages, which were expected to be recorded as zero. Some LED light wattages have been adjusted down to account for dimming. Meridian reports the load for ICP 0000031152CPB70 against profile DST, and the profiles used by PNCC to adjust wattages have not been approved by the Electricity Authority. Meridian processes some wattage corrections prior to submission, which reduces the impact of the non-compliance. Four lights have incorrect gear wattages, which Alf Downs intends to correct. The impact of the incorrect gear wattages is 28W, which could lead to under submission of 120 kWh per annum. There is potential over submission of 4,382 kWh p.a. for metered load. The road name recorded for Slim Pole IDs 9284 and 9285 is COLYTON RD_A, but is expected to be Oxford Street. The installation and change dates recorded in the database reflect the data collection date, which is not always consistent with the date that the change occurred. Potential impact: High Actual impact: Medium Audit history: Twice Controls: Weak Breach risk rating: 6

Audit risk rating	Rationale for audit risk rating
Medium	The controls over the database are rated as weak, due to the large number of discrepancies identified during the field count and analysis of the RAMM database extract. The audit risk rating is technically high, and I was unable to calculate the wattage differences for all discrepancies identified because some specifications could not be located. The impact has been reduced to medium because the wattage corrections made by Meridian prior to producing reconciliation submissions minimise the impact on submission.

Actions taken to resolve the issue	Completion date	Remedial action status
Up to 1,026 W of metered load is included in the database extracts - Alf Downs confirmed that the shared pathway lights are metered and intends to update the database to reflect this and the correct ICP numbers. Meridian will process corrections for these lights.	31 July 2020	Identified
Church St, Main Street and Cook Street lights recorded as metered are to be checked and updated if necessary. Meridian will follow up PNCC and Alf Downs to ensure status of these lights is confirmed.	31 July 2020	
Two lights had missing gear wattages, which were expected to be recorded as zero – Meridian will follow up PNCC and Alf Downs to have missing gear wattages of 0 added.	31 July 2020	
A profiled lamp wattage lower than the expected wattage is applied in RAMM and Meridian is processing a pre submission wattage correction – This process will continue until we have a profile solution for the dimming lights	Ongoing	
A profiled lamp wattage lower than the expected wattage is applied in RAMM and Meridian is not processing a pre submission wattage correction, resulting in a difference of an estimated 1,768 W – these lamps will be reviewed and adjustments processed as above until we have a profile solution for the dimming lights	31 July 2020	
Four lights have incorrect gear wattages, which Alf Downs intends to correct. - Meridian will follow up PNCC and Alf Downs to have these incorrect gear wattages of updated.	31 July 2020	
The installation and change dates recorded in the database reflect the data collection date, which is not always consistent with the date that the change occurred. – We will clarify the requirements with regard to dates recorded for additions and changes to the database.	31 July 2020	
The road name recorded for Slim Pole IDs 9284 and 9285 is COLYTON RD_A, but is expected to be Oxford Street. – to be followed up with Alf Downs and corrected	31 July 2020	

Preventative actions taken to ensure no further issues will occur	Completion date	
We have had engagement from PNCC and will be drafting a profile application for wattages applied for the dimming LED lights.	31 Aug 2020	

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

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

- Wattages are derived from a RAMM extract provided by Alf Downs each month. The field survey found that the best available estimate of field wattage is not precise enough to conclude that the database is accurate within ±5.0% as recorded in **section 3.1**.
- On and off times are derived from a data logger read by EMS and are used to create a shape file.

Meridian supplies EMS with the capacity information from Alf Downs, which is adjusted to correct wattages for lamp types which Meridian knows are recorded incorrectly in the database. EMS calculates the kWh figures for ICP 0000031152CPB70 and 1000581347PCFF5 and includes them in the relevant AV080 file. This process was audited during Meridian's reconciliation participant audit and EMS' agent audit.

I checked the data provided to EMS for February and March 2020. I found that the capacity information provided to EMS matched the database extract for February with the wattage corrections applied. Where wattage corrections were carried out the wattages reflected the expected wattage for the lamp, or the average value for the lamp type if the exact wattage was unknown.

Festive lights are provided in the database extract when they are connected, and I confirmed that connected festive lights were included in the wattages provided to EMS. Festive light processes are discussed further in **section 3.1**.

The February 2020 values were applied for March 2020 on instruction from Alf Downs, who were closed during the COVID-19 level 4 lockdown. Alf Downs confirmed that they did not make any database changes during the lockdown.

The 2019 audit found that the RAMM extract included 1,026 W of metered load which was expected to be excluded from submissions. Alf Downs intended to ensure that this metered load was excluded from extracts from September 2019 onwards, but it was still present in February 2020 and was included in the submissions for February and March 2020.

ICP	Slim Pole ID	Road name	Pole Control	Lamp Model	Total wattage
1000581347PCFF5	12040	TENNENT DR SHARED PATHWAY (AWAY FROM TOWN)	Metered supply	Scala Midi 32LED	51
0000031152CPB70	12041	MANAWATU SHARED PATH ACCESS (FITZHERBERT TO DOWNSTREAM)	Metered supply	Scala Midi 32LED	51
0000031152CPB70	12042	MANAWATU SHARED PATH ACCESS (FITZHERBERT TO DOWNSTREAM)	Metered supply	Scala Midi 32LED	51
0000031152CPB70	12043	MANAWATU SHARED PATH ACCESS (FITZHERBERT TO DOWNSTREAM)	Metered supply	Scala Midi 32LED	51
0000031152CPB70	12044	MANAWATU SHARED PATH ACCESS (FITZHERBERT TO DOWNSTREAM)	Metered supply	Scala Midi 32LED	51
0000031152CPB70	12045	MANAWATU SHARED PATH ACCESS (FITZHERBERT TO DOWNSTREAM)	Metered supply	Scala Midi 32LED	51
0000031152CPB70	7629	CHURCH ST	Metered supply	Apollo RL2P 056	120
0000031152CPB70	7627	CHURCH ST	Metered supply	Apollo RL2P 056	120
0000031152CPB70	7628	CHURCH ST	Metered supply	Apollo RL2P 056	120
0000031152CPB70	7630	MAIN WEST S	Metered supply	Apollo RL2P 056	120
0000031152CPB70	7631	MAIN WEST S	Metered supply	Apollo RL2P 056	120
0000031152CPB70	7632	COOK ST EAST	Metered supply	Apollo RL2P 056	120

Alf Downs confirmed that the shared pathway lights are metered, and intends to update the database to reflect this and the correct ICP numbers. Alf Downs is uncertain whether the Church St, Main St and Cook St lights are metered, and these should be checked and updated if necessary as recommended in **section 2.1**.

Sources of inaccuracy are as follows:

Issue	Estimated volume information impact (annual kWh)
Up to 1,026 W of metered load is included in the database extracts	Up to 4,382 kWh of over submission.
Two lights had missing gear wattages, which were expected to be recorded as zero.	No impact on submission, there is a zero difference.
A profiled lamp wattage lower than the expected wattage is applied in RAMM and Meridian is processing a pre submission wattage correction.	No impact on submission, Meridian is processing corrections.
A profiled lamp wattage lower than the expected wattage is applied in RAMM and Meridian is not processing a pre submission wattage correction, resulting in a difference of an estimated 1,768 W.	7,551 kWh of under submission.
Four lights have incorrect gear wattages, which Alf Downs intends to correct.	120 kWh of under submission.

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. Meridian has not updated their processes to be consistent with the Authority's memo.

The RAMM database records light installation and replacement dates, which default to the date which the data is collected. Alf Downs does not adjust the installation and replacement dates when records are added or changed, so the date the data is collected is applied as the installation or change date. For maintenance work, RAMM is updated at the time the work is completed and the date is expected to be correct. For upgrades and new connections, data is collected after the work in the area is completed but usually within the month it was completed. There have been some recent delays in collecting data due to COVID-19 restrictions.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 3.2 With: Clause 15.2 and 15.37B(c) From: 01-Feb-20 To: 31-Mar-20	The database is not confirmed as accurate with a 95% level of confidence. Two lights had missing gear wattages, which were expected to be recorded as zero. Some LED light wattages have been adjusted down to account for dimming. Meridian reports the load for ICP 0000031152CPB70 against profile DST, and the profiles used by PNCC to adjust wattages have not been approved by the Electricity Authority. Meridian processes some wattage corrections prior to submission, which reduces the impact of the non-compliance. Four lights have incorrect gear wattages, which Alf Downs intends to correct. The impact of the incorrect gear wattages is 28W, which could lead to under submission of 120 kWh per annum. There is potential over submission of 4,382 kWh p.a. for metered load. The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot. The installation and change dates recorded in the database reflect the data collection date, which is not always consistent with the date that the change occurred. Potential impact: High Actual impact: Unknown Audit history: Three times Controls: Weak Breach risk rating: 6
Audit risk rating	**Rationale for audit risk rating**
Medium	The controls over the database are rated as weak, due to the large number of discrepancies identified during the field count and analysis of the RAMM database extract. The audit risk rating is technically high, and I was unable to calculate the wattage differences for all discrepancies identified because some specifications could not be located. The impact has been reduced to medium because the wattage corrections made by Meridian prior to producing reconciliation submissions minimise the impact on submission.

Actions taken to resolve the issue	Completion date	Remedial action status
See comments provided in previous sections		Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
See comments provided in previous sections		

CONCLUSION

A RAMM database is managed by Alf Downs on behalf of PNCC. The field work, asset data capture and database population is conducted by Alf Downs. Alf Downs staff update the database from the field using Pocket RAMM.

Meridian reconciles this DUML load using the DST profile. Wattages are derived from a RAMM extract provided by Alf Downs each month. On and off times are derived from a data logger read by EMS and are used to create a shape file. Meridian supplies EMS with the capacity information, and EMS calculates the kWh figures for the ICPs and includes them in the relevant AV080 file. This process was audited during Meridian's reconciliation participant audit and EMS' agent audit.

Database accuracy is described as follows:

Result	Percentage	Comments
The point estimate of R	101.1	Wattage from survey is higher than the database wattage by 1.1%
R_L	90.8	With a 95% level of confidence it can be concluded that the error could be between -8.2% and +8.2%
R_H	108.2	

The variability of the sample results across the strata means that the true wattage (installed in the field) could be between 8.2% lower and 8.2% 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 01/02/19. The best available estimate is not precise enough to conclude that the database is accurate within ±5.0%.

- In absolute terms the installed capacity is estimated to be 7 kW higher than the database indicates.
- There is a 95% level of confidence that the installed capacity is between 57 kW lower and 51 kW higher than the database.
- In absolute terms, total annual consumption is estimated to be 28,800 kWh higher than the DUML database indicates.
- There is a 95% level of confidence that the annual consumption is between 243,800 kWh p.a. lower and 219,300 kWh p.a. higher than the database indicates.

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

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

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

The future risk rating of 19 indicates that the next audit be completed in three months. This may not be sufficient time to resolve the matters raised and work through Meridian's upcoming profile application, which discussed in the participant comments. I recommend the Authority considers an audit period of at least nine months.

PARTICIPANT RESPONSE

We have recently had some engagement with Palmerston North CC regarding resolution of the most significant ongoing issue with their DUML database – adjusted wattages for dimming LED lights.

A previous profile application they had engaged Smartpower to complete for them for these lights was abandoned due the what they felt were overly onerous requirements and increasing costs.

PNCC are adamant their calculation of adjusted wattages for dimming bulbs results in calculation of consumption that is materially accurate.

Regarding other ongoing minor inaccuracies – we had attempted on multiple occasions to engage with Alf Downs to have these corrected as outlined in our comments in previous audit reports however we have learned that Alf Downs had been instructed by the Council not to spend further time or resource on these issues.

Meridian are now working with PNCC to agree a way forward to have these issues addressed, including submission of a profile application for dimming LED lights. Provided they remain engaged we have noted a date of 31 August for submission of this application.