ELECTRICITY INDUSTRY PARTICIPATION CODE
DISTRIBUTED UNMETERED LOAD AUDIT REPORT

VERITEK

For

THAMES COROMANDEL DISTRICT COUNCIL AND MERIDIAN ENERGY

Prepared by: Rebecca Elliot

Date audit commenced: 3 May 2022

Date audit report completed: 18 May 2022

Audit report due date: 01-Jun-22

TABLE OF CONTENTS

Executive summary 3
Audit summary 4

Non-compliances 4
Recommendations 4
Issues 4

1. Administrative 5

1.1. Exemptions from Obligations to Comply with Code 5
1.2. Structure of Organisation 5
1.3. Persons involved in this audit 6
1.4. Hardware and Software 6
1.5. Breaches or Breach Allegations 6
1.6. ICP Data 6
1.7. Authorisation Received 6
1.8. Scope of Audit 7
1.9. Summary of previous audit 8
1.10. Distributed unmetered load audits (Clause 16A.26 and 17.295F) 9

2. DUML database requirements 10

2.1. Deriving submission information (Clause 11(1) of Schedule 15.3) 10
2.2. ICP identifier and items of load (Clause 11(2)(a) and (aa) of Schedule 15.3) 11
2.3. Location of each item of load (Clause 11(2)(b) of Schedule 15.3) 12
2.4. Description and capacity of load (Clause 11(2)(c) and (d) of Schedule 15.3) 12
2.5. All load recorded in database (Clause 11(2A) of Schedule 15.3) 13
2.6. Tracking of load changes (Clause 11(3) of Schedule 15.3) 14
2.7. Audit trail (Clause 11(4) of Schedule 15.3) 14

3. Accuracy of DUML database 16

3.1. Database accuracy (Clause 15.2 and 15.37B(b)) 16
3.2. Volume information accuracy (Clause 15.2 and 15.37B(c)) 18

Conclusion 20

Participant response 21

EXECUTIVE SUMMARY

This audit of the **Thames Coromandel District Council Unmetered Streetlights (TCDC)** DUML database and processes was conducted at the request of **Meridian Energy** (**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 statistical field audit undertaken as part of this audit confirmed that the database is within the acceptable accuracy threshold of +/- 5%.

Power Solutions continue to manage the database on behalf of the TCDC. McKay Electrical are the field contractor.

The previous audit found that the TCDC ICP was recorded against the NZTA lights. This has been corrected. The NZTA lights are reconciled by another trader and are outside of the scope of this audit.

The audit found the database management processes to be robust and this is reflected in the high level of accuracy found in the field.

This audit found three non-compliances and makes one recommendation. The future risk rating of five indicates that the next audit be completed in 18 months. I have considered this in conjunction with Meridian's comments and the high level of accuracy found and recommend that the next audit be in 24 months time.

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	Submission is based on a snapshot and does not consider historic adjustments.	Moderate	Low	2	Investigating
Description and capacity of load	2.4	11(2)(c) of Schedule 15.3	21 items of load with an "unknown" light description.	Strong	Low	1	Cleared
Volume information accuracy	3.2	15.2 and 15.37B(c)	The data used for submission does not track changes at a daily basis and is provided as a snapshot.	Moderate	Low	2	Investigating
Future Risk Rating						5	

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	Description
Location of each item of load	2.3	Record GPS co-ordinates for the 20% of historic lights missing this information.

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

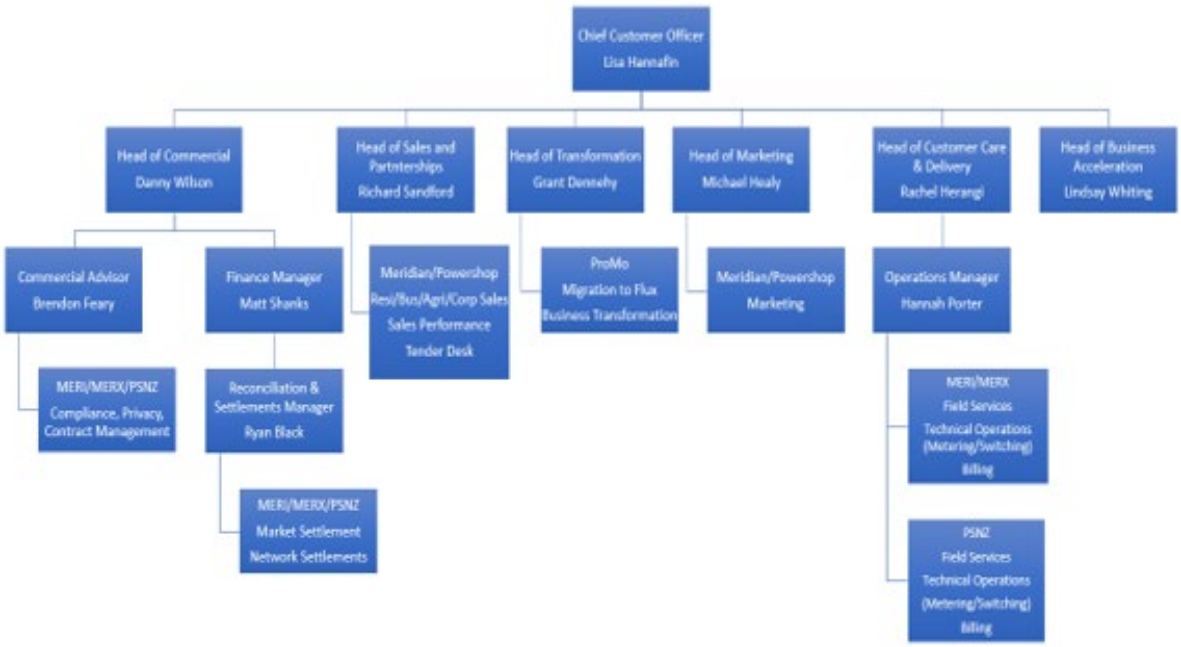
Section 11 of the Electricity Industry Act provides for the Electricity Authority to exempt any participant from compliance with all or any of the clauses.

Audit 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:

Name	Company	Role
Rebecca Elliot	Veritek Limited	Auditor

Other personnel assisting in this audit were:

Name	Title	Company
Melanie Matthews	Quality and Compliance Advisor	Meridian Energy
Amy Cooper	Compliance Officer	Meridian Energy
Jon Stevens	Projects Engineer	Power Solutions

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".

Power Solutions confirmed that the database back-up is in accordance with standard industry procedures. Access to the database is secure by way of password protection.

Systems used by the trader and their agent to calculate submissions are assessed as part of their reconciliation participant audits.

1.5. Breaches or Breach Allegations

There are no breach allegations relevant to the scope of this audit.

1.6. ICP Data

ICP Number	Description	NSP	Profile	Number of items of load	Database wattage (watts)
0001425630UNEF3	Thames Coromandel District Council	KPU0661	DST	3,269	113,971

1.7. Authorisation Received

All information was provided directly by Meridian or Power Solutions.

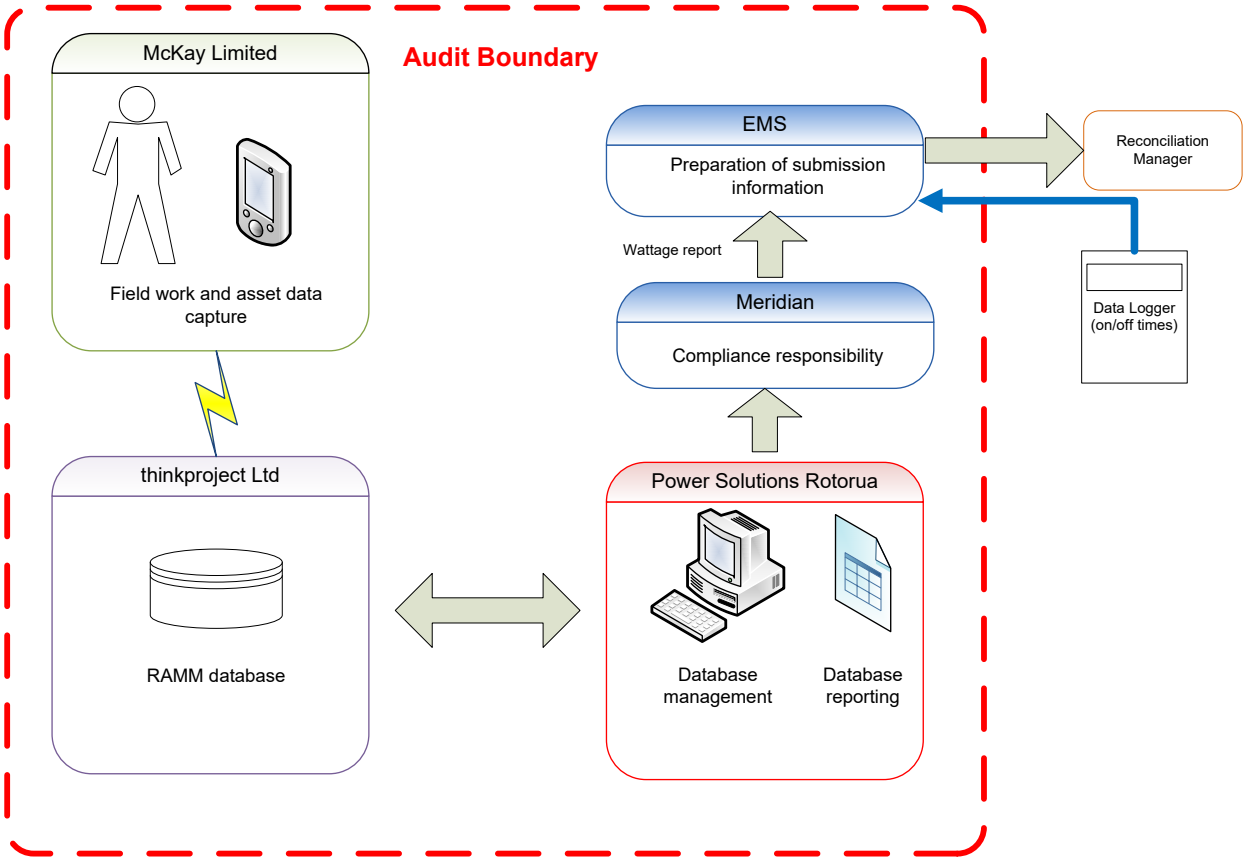
1.8. Scope of Audit

This audit of the **Thames Coromandel District Council Unmetered Streetlights (TCDC**) DUML database and processes was conducted at the request of **Meridian Energy (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 database is remotely hosted by thinkproject New Zealand Ltd and is managed by PSL, on behalf of TCDC, who is Meridian's customer. The fieldwork and asset data capture are conducted by McKay Electrical.

The scope of the audit encompasses the collection, security and accuracy of the data, including the preparation of submission information based on the database reporting. The diagram below shows the audit boundary for clarity.



The field audit was undertaken of a statistical sample of 257 items of load on 16th May 2022.

1.9. Summary of previous audit

The last audit report was undertaken by Steve Woods of Veritek Limited in November 2020. The current status of those audit's findings is detailed below:

Table of Non-Compliance

Subject	Section	Clause	Non-compliance	Status
Deriving submission information	2.1	11(1) of Schedule 15.3	61 incorrect ballasts are recorded in the RAMM database resulting in a minor under submission of 355 kWh per annum. Submission is based on a snapshot and does not consider historic adjustments.	Cleared Still existing
All load recorded in the database	2.5	11(2A) of Schedule 15.3	Six items of load are missing from the database.	Cleared
Database accuracy	3.1	15.2 and 15.37B(b)	61 incorrect ballasts are recorded in the RAMM database resulting in a minor under submission of 355 kWh per annum. 394 NZTA items of load with the incorrect ICP identifier applied.	Cleared
Volume information accuracy	3.2	15.2 and 15.37B(c)	61 incorrect ballasts are recorded in the RAMM database resulting in a minor under submission of 355 kWh per annum. The data used for submission does not track changes at a daily basis and is provided as a snapshot.	Cleared Still existing

Table of Recommendations

Subject	Section	Recommendation for Improvement	Status
		Nil	

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

Meridian reconciles this DUML load using the DST profile. The total volume submitted to the Reconciliation Manager is based on a monthly database report derived from RAMM and the "burn time" which is sourced from data loggers installed on the Powerco networks. Meridian supplies EMS with the capacity information and EMS calculates the kWh figure for the ICP and includes this in the relevant AV080 file. This process was audited during Meridian's reconciliation participant audit and EMS' agent audit.

The field audit indicated that the database was within the allowable +/-5% variance threshold and is therefore deemed to be accurate.

I checked the submission values for May 2022 and confirmed the values matched.

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.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.1 With: Clause 11(1) of Schedule 15.3 From: 09-Sep-20 To: 05-May-22	Submission is based on a snapshot and does not consider historic adjustments. Potential impact: Low Actual impact: Low Audit history: Multiple times Controls: Moderate Breach risk rating: 2
Audit risk rating	**Rationale for audit risk rating**
Low	The controls are rated as moderate, because they are sufficient to ensure that changes to the database are correctly recorded most of the time. The impact is assessed to be low as the light changes will be captured in the month that they are made but not for the specific date of change resulting in a small amount of over and under submission inaccuracies.

Actions taken to resolve the issue	Completion date	Remedial action status
We are considering how we can redesign our processes to incorporate the calculation of volumes at a daily level rather than a monthly snapshot.	Ongoing	Investigating
Preventative actions taken to ensure no further issues will occur	**Completion date**	
We are considering how we can redesign our processes to incorporate the calculation of volumes at a daily level rather than a monthly snapshot.	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 items of load in RAMM have an ICP number recorded. The accuracy of the ICP applied is discussed in **section 3.1**.

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 the nearest street address or the metres from the end of the road for all items of load. 80% have a GPS location recorded. The 20% that don't are historic, and I recommend that the GPS location is mapped for these.

Recommendation	Description	Audited party comment	Remedial action
Location of each item of load	Record GPS co-ordinates for the 20% of historic lights missing this information.	Meridian has advised Power Solutions. Power Solutions will discuss and advise Thames Coromandel District Council to see if this can be actioned.	Investigating

All new lighting has the GPS co-ordinates recorded as part of the data capture.

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 lamp type and wattage capacity and included any ballast or gear wattage and that each item of load had a value recorded in these fields.

Audit commentary

The database contains two records for wattage, firstly the lamp wattage and secondly the gear wattage, which represents ballast losses. The lamp description is recorded in the database for all but 21 items of load there is no lamp description. All have a wattage recorded of 21 watts so it should be easy to add in the light description details. The accuracy of the recorded wattage information is discussed in **section 3.1**.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.4 With: Clause 11(2)(c) of Schedule 15.3 From: 09-Sep-20 To: 05-May-22	21 items of load with an "unknown" light description. 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 as the light descriptions are required to be provided by the contractor and the process will mitigate risk to an acceptable level. The impact is assessed to be low as the number of lights with no light description recorded to confirm their wattage is small. All have a wattage recorded.

Actions taken to resolve the issue	Completion date	Remedial action status
Meridian has advised of the inaccuracies. Power Solutions advise that these lights are old or obsolete models and do not know the light model details. The lamp type, gear type and wattage for the records however are known and are accurately recorded in the database. The "unknown" light model does not affect the wattage report.	23/5/2022	Cleared
Preventative actions taken to ensure no further issues will occur	**Completion date**	
No further action	23/5/2022	

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 257 items of load on 16th May 2022.

Audit commentary

The field audit findings are detailed in the table below:

Street	Database count	Field count	Light count differences	Wattage recorded incorrectly	Comments
MANAIA RD	21	19	-2		2x light heads removed
PAUANUI BEACH RD	10	10	-	1	19.9W LED found in the field recorded as 19W LED in the database
Grand Total	**257**	**255**	**-2**	**1**	

The field audit found no additional lights in the field than were recorded in the database.

The database accuracy is discussed in **section 3.1**.

Audit outcome

Compliant

2.6. Tracking of load changes (Clause 11(3) of Schedule 15.3)

Code reference

Clause 11(3) of Schedule 15.3

Code related audit information

The DUML database must track additions and removals in a manner that allows the total load (in kW) to be retrospectively derived for any given day.

Audit observation

The process for tracking of changes in the database was examined.

Audit commentary

The RAMM database functionality achieves compliance with the code.

The change management process and the compliance of the database reporting provided to 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 RAMM database has a complete audit trail of all additions and changes to the database information.

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

The DUML Statistical Sampling Guideline was used to determine the database accuracy. The table below shows the survey plan.

Plan Item	Comments
Area of interest	Thames Coromandel region
Strata	The database contains items of load in Thames Coromandel peninsular. The area has two distinct sub-groups. Urban and Rural. The processes for the management of TCDC items of load are the same, but I decided to place the items of load into three strata, as follows: 1. A-H, 2. I-O, and 3. P-Y.
Area units	I created a pivot table of the roads in each area, and I used a random number generator in a spreadsheet to select a total of 53 sub-units.
Total items of load	257 items of 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.

Audit commentary

Field audit findings

A statistical sample of 257 items of load found that the field data was 104.8% of the database data for the sample checked.

Result	Percentage	Comments
The point estimate of R	99.3%	Wattage from survey is lower than the database wattage by 0.7%
R_L	98.0%	With a 95% level of confidence, it can be concluded that the error could be between -2.0% to the same as the database has recorded.
R_H	100.0%	

These results were categorised in accordance with the "Distributed Unmetered Load Statistical Sampling Audit Guideline", effective from 1 February 2019. The table below shows that Scenario A (detailed below) applies, and the best available estimate indicates that the database is accurate within ± 5.0%.

- In absolute terms the installed capacity is estimated to be 1 kW lower than the database indicates.
- There is a 95% level of confidence that the installed capacity is between 2 kW lower and the same as the database.
- In absolute terms, total annual consumption is estimated to be 3,300 kWh lower than the DUML database indicates.
- There is a 95% level of confidence that the annual consumption is between 9,800 kWh lower to 100 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 %

Lamp description and capacity accuracy

I checked the wattages being applied in the database and confirmed these to be accurate.

The LED light specifications requested in the previous audit have been provided and confirmed that the correct wattage has been applied. There are a very small number of LED lights (21) with no lamp description so the accuracy of these wattages cannot be confirmed. This is recorded as non-compliance in **section 2.4**.

ICP accuracy

The previous report found that the NZTA lighting was recorded against the TCDC ICP. This has been corrected and the lights are now recorded against the NZTA ICP 0001425637UN339. This is reconciled by another trader and is therefore outside of the scope of this audit.

Change management process findings

McKay Electrical enters all field data via "Pocket RAMM" directly into RAMM Contractor. "As built" plans are also provided and PSL then conduct a field check to ensure the database has been populated accurately. The high level of accuracy found in the field audit confirms the process has robust controls.

A small number of festive lights are added and then removed for the festive period for Thames township.

Audit outcome

Compliant

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 burn hours against the submitted figure to confirm accuracy.

Audit commentary

Meridian reconciles this DUML load using the DST profile. The total volume submitted to the Reconciliation Manager is based on a monthly database report derived from RAMM and the "burn time" which is sourced from data loggers installed on the Powerco networks. Meridian supplies EMS with the capacity information and EMS calculates the kWh figure for the ICP and includes this in the relevant AV080 file. This process was audited during Meridian's reconciliation participant audit and EMS' agent audit.

The field audit indicated that the database was within the allowable +/-5% variance threshold and is therefore deemed to be accurate.

I checked the submission values for May 2022 and confirmed the values matched.

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.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 3.2 With: Clause 15.2 and 15.37B(c) From: 09-Sep-20 To: 05-May-22	The data used for submission does not track changes at a daily basis and is provided as a snapshot. Potential impact: Low Actual impact: Low Audit history: Three times previously Controls: Moderate Breach risk rating: 2
Audit risk rating	**Rationale for audit risk rating**
Low	The controls are rated as moderate, because they are sufficient to ensure that changes to the database are correctly recorded most of the time. The impact is assessed to be low as the light changes will be captured in the month that they are made but not for the specific date of change resulting in a small amount of over and under submission inaccuracies.

Actions taken to resolve the issue	Completion date	Remedial action status
We are considering how we can redesign our processes to incorporate the calculation of volumes at a daily level rather than a monthly snapshot.	Ongoing	Investigating
Preventative actions taken to ensure no further issues will occur	**Completion date**	
We are considering how we can redesign our processes to incorporate the calculation of volumes at a daily level rather than a monthly snapshot.	Ongoing	

CONCLUSION

The statistical field audit undertaken as part of this audit confirmed that the database is within the acceptable accuracy threshold of +/- 5%.

Power Solutions continue to manage the database on behalf of the TCDC. McKay Electrical are the field contractor.

The previous audit found that the TCDC ICP was recorded against the NZTA lights. This has been corrected. The NZTA lights are reconciled by another trader and are outside of the scope of this audit.

The audit found the database management processes to be robust and this is reflected in the high level of accuracy found in the field.

This audit found four non-compliances and makes one recommendation. The future risk rating of six indicates that the next audit be completed in 18 months. I have considered this in conjunction with Meridian's comments and the high level of accuracy found and recommend that the next audit be in 24 months time.

PARTICIPANT RESPONSE

Regarding section 2.5 All load recorded in database (Clause 11(2A) of Schedule 15.3)

Power Solutions advise:

The two light heads are missing; however, we do not know who removed them or why. Council have not requested or authorised their removal.

The TCDC lighting contractor is unaware of who removed them, so the only other culprits are PowerCo or their network contractor, as the lights were mounted on PowerCo power poles.

I will investigate this further. In the meantime, I have amended the status of the 2 lights to “not connected to network” which means they will not be included in future wattage reconciliations until the lights are reinstated.

The light on Pauanui Beach Road had the incorrect lamp recorded in the database. This was changed recently but the contractor failed to update the data. I have corrected the record and will take this up with the maintenance contractor.