ELECTRICITY INDUSTRY PARTICIPATION CODE
DISTRIBUTED UNMETERED LOAD AUDIT REPORT

VERITEK

For

WAIPA DISTRICT COUNCIL AND MERIDIAN ENERGY

Prepared by: Steve Woods

Date audit commenced: 7 December 2021

Date audit report completed: 16 December 2021

Audit report due date: 30-Nov-21

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EXECUTIVE SUMMARY

This audit of the **Waipa District Council Unmetered Streetlights (WDC)** DUML database and processes was conducted at the request of **Meridian Energy Ltd (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 Ltd and is managed by Waipa DC. McKay Electrical conducts the installation fieldwork and maintenance. They provide information on all work carried out back to Waipa DC and this is then loaded into RAMM. Waipa DC provides reporting to Meridian on a monthly basis.

The main findings are as follows:

- the field audit indicated that in absolute terms, total annual consumption is estimated to be 28,100 kWh lower than the DUML database indicates, and
- the lamp description is recorded in the database but as noted in previous audits, the LED lamp descriptions are not adequate to identify whether the wattages are correct.

This audit found five non-compliances. The future risk rating of 16 indicates that the next audit be completed in six months. I recommend the next audit is conducted in nine months, to allow sufficient time to resolve the matters identified.

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 field audit indicated that in absolute terms, total annual consumption is estimated to be 28,100 kWh lower than the DUML database indicates. Submission is based on a snapshot and does not consider historic adjustments.	Moderate	Medium	4	Identified
Description and capacity of load	2.4	11(2)(d) of Schedule 15.3	LED lamp descriptions are not adequate to identify whether the wattages are correct.	Moderate	Low	2	Identified
All load recorded in database	2.5	11(2A) of Schedule 15.3	One additional item of load was found in the field.	Moderate	Low	2	Identified
Database accuracy	3.1	15.2 and 15.37B(b)	The field audit identified over submission of 28,100 kWh per annum. Two items of load had incorrect GPS coordinates. LED descriptions are not sufficient to confirm wattages are correct. Electrical connection dates may be incorrect for new subdivisions.	Moderate	Medium	4	Identified

Subject	Section	Clause	Non-Compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
Volume information accuracy	3.2	15.2 and 15.37B(c)	The field audit indicated that in absolute terms, total annual consumption is estimated to be 28,100 kWh lower than the DUML database indicates. Submission is based on a snapshot and does not consider historic adjustments.	Moderate	Medium	4	Identified
Future Risk Rating						16	

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

RECOMMENDATIONS

Subject	Section	Recommendation
		Nil

ISSUES

Subject	Section	Description	Issue
		Nil	

1. ADMINISTRATIVE

1.1. Exemptions from Obligations to Comply with Code

Code reference

Section 11 of Electricity Industry Act 2010.

Code related audit information

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

Audit observation

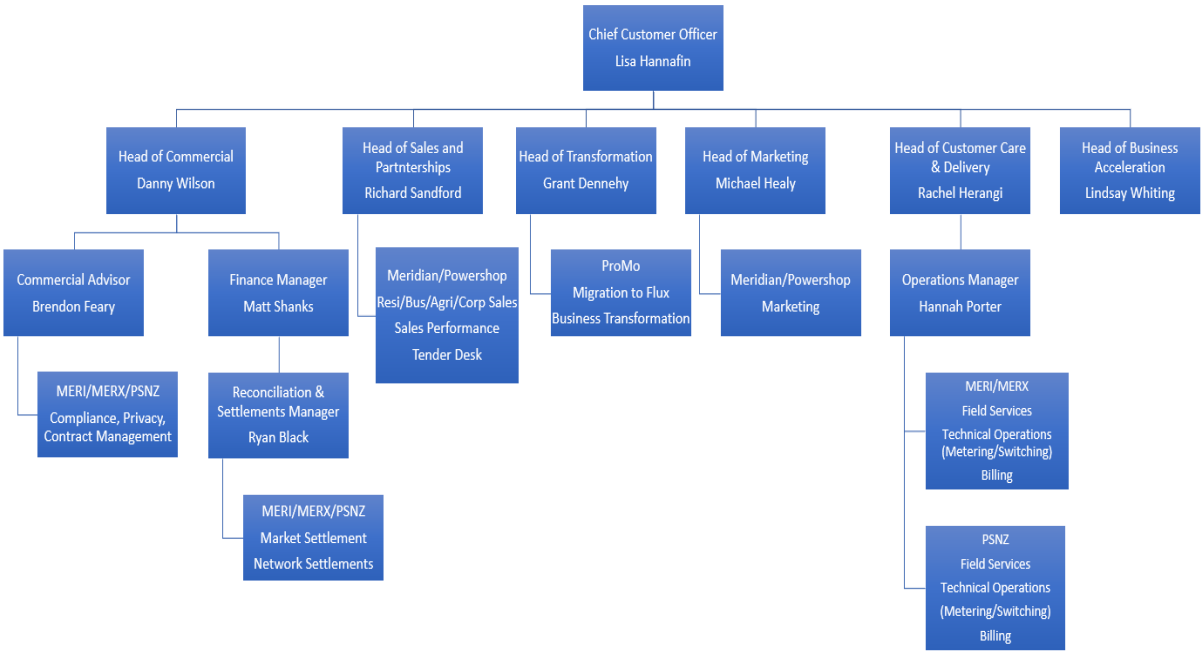
Section 11 of the Electricity Industry Act provides for the Electricity Authority to exempt any participant from compliance with all or any of the clauses.

Audit commentary

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

1.2. Structure of Organisation

Meridian provided the relevant organisational structure:



1.3. Persons involved in this audit

Auditors:

Name	Company	Role
Steve Woods	Veritek Limited	Auditor

Other personnel assisting in this audit were:

Name	Title	Company
Kim Wright	Asset Information Officer - Transportation	Waipa District Council
Amy Cooper	Compliance Officer	Meridian Energy

1.4. Hardware and Software

Section 1.8 shows that the SQL database used for the management of DUML is remotely hosted by thinkproject 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.

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)
0000400319WA4CA	Waipa DC TMU0111 S/L	TMU0111	DST	2,252	83,385
0000806500WA13E	Waipa DC CBG0111 S/L	CBG0111	DST	2,736	124,821
0000041292WEDF7	Waipa District Council - Tamahere	HAM0331	DST	92	6,455
0000041294WEC78	Oaklands Drive	OAK0111	DST	50	2,970
Total				5,130	217,631

1.7. Authorisation Received

All information was provided directly by Meridian or WDC.

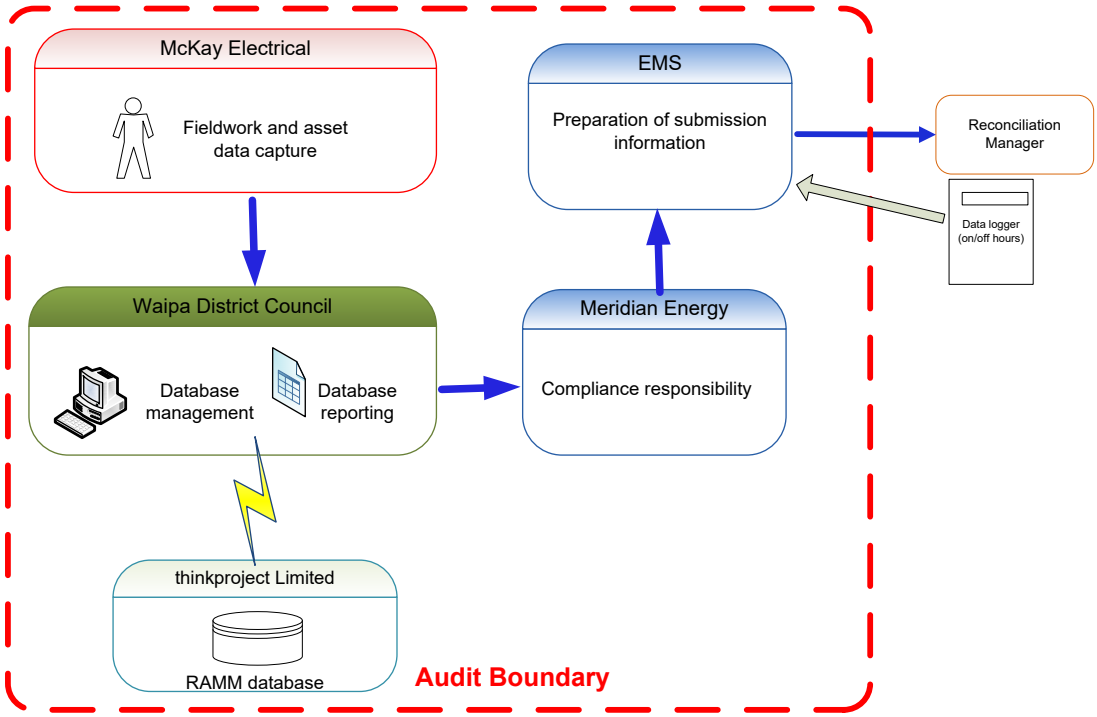
1.8. Scope of Audit

This audit of the **Waipa District Council Unmetered Streetlights (WDC)** 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 database is remotely hosted by thinkproject Ltd and is managed by Waipa DC. McKay Electrical conducts the installation fieldwork and maintenance. They provide information on all work carried out back to Waipa DC and this is then loaded into RAMM. Waipa DC provides reporting to Meridian on a monthly basis.

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



The field audit was undertaken of a statistical sample of 261 items of load on December 8th, 2021.

1.9. Summary of previous audit

The previous audit was conducted in August 2020 by Steve Woods of Veritek Limited. The findings are shown in the table below.

Table of Non-Compliance

Subject	Section	Clause	Non-compliance	Status
Deriving submission information	2.1	11(1) of Schedule 15.3	Submission is based on a snapshot and does not consider historic adjustments. 263 items of load with an incorrect lamp description, or wattage and ballast combination, resulting in an estimated annual under submission of 1,123 kWh per annum. One item of load with no lamp wattage or sufficient lamp description recorded.	Still existing
Description and capacity of load	2.4	11(2)(d) of Schedule 15.3	One item of load with no lamp wattage or sufficient lamp description recorded.	Still existing
All load recorded in database	2.5	11(2A) of Schedule 15.3	Eight additional items of load were found in the field.	Still existing
Database accuracy	3.1	15.2 and 15.37B(b)	263 items of load with an incorrect lamp description, or wattage and ballast combination, resulting in an estimated annual under submission of 1,123 kWh per annum. One item of load with no lamp wattage or sufficient lamp description recorded.	Still existing
Volume information accuracy	3.2	15.2 and 15.37B(c)	Submission is based on a snapshot and does not consider historic adjustments. 263 items of load with an incorrect lamp description, or wattage and ballast combination, resulting in an estimated annual under submission of 1,123 kWh per annum. One item of load with no lamp wattage or sufficient lamp description recorded.	Still existing

Table of Recommendations

Subject	Section	Recommendation for Improvement	Status
Database accuracy	3.1	Review LED light descriptions to include make, model & milliamp figure.	Recorded as non-compliance

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. Covid-19 restrictions delayed the completion of the field audit, which was outside Meridian's control.

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 WEL and Waipa networks. Meridian supplies EMS with the capacity information and EMS calculates the kWh figure for each ICP and includes this in the relevant AV080 file. This process was audited during Meridian's reconciliation participant audit and EMS' agent audit.

The capacities supplied to EMS for October 2021 were checked and confirmed to be the same as the database.

Submission is based on a snapshot of the database at the end of the month and does not consider historic adjustments, or the fact that lights can be livened before they are entered into the database.

The field audit indicated that in absolute terms, total annual consumption is estimated to be 28,100 kWh lower than the DUML database indicates.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.1 With: Clause 11(1) of schedule 15.3 From: 01-Sep-20 To: 15-Dec-21	The field audit indicated that in absolute terms, total annual consumption is estimated to be 28,100 kWh lower than the DUML database indicates. Submission is based on a snapshot and does not consider historic adjustments. Potential impact: Low Actual impact: Low Audit history: Three times Controls: Moderate Breach risk rating: 4
Audit risk rating	**Rationale for audit risk rating**
Medium	The controls are rated as moderate, because they are sufficient to mitigate risk most of the time. The impact is assessed to be medium, based on the kWh differences described above.

Actions taken to resolve the issue	Completion date	Remedial action status
All the issues identified in this audit have been shared with Waipa DC for resolution. We are considering the impact provision and use of database changes at a daily level will have on our processes and tools.	Complete June 2022	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
We will follow up with Waipa regarding the inaccuracies, corrections, and improvement of maintenance processes	31 March 2022	

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.

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 for all items of load and most have a GPS location recorded. No blanks were identified. There are two items of load with incorrect GPS coordinates and this 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 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 but as noted in previous audits, the LED lamp descriptions are not adequate to identify whether the wattages are correct.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.4 With: Clause 11(2)(d) of Schedule 15.3 From: 01-Sep-20 To: 15-Dec-21	LED lamp descriptions are not adequate to identify whether the wattages are correct. Potential impact: Low Actual impact: Low Audit history: Twice Controls: Moderate Breach risk rating: 2
Audit risk rating	**Rationale for audit risk rating**
Low	The controls are recorded as moderate because they mitigate risk most of the time but there is room for improvement. There's no evidence the wattages are incorrect, so the impact is considered low.

Actions taken to resolve the issue	Completion date	Remedial action status
This issue has been raised with Waipa DC and a resolution requested.	Complete	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
We will follow up to ensure descriptions are updated.	31 March 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 261 items of load.

Audit commentary

The field audit discrepancies are detailed in the table below.

Discrepancy	Quantity
Items of load in the field not in the database	1
Items of load in the database not in the field	3
Incorrect wattages	16

The discrepancies from the last audit have been corrected.

The field audit found one additional lamp in the field.

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

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.5 With: Clause 11(2A) of Schedule 15.3 From: 01-Sep-20 To: 15-Dec-21	One additional item of load was found in the field. Potential impact: Low Actual impact: Low Audit history: Once Controls: Moderate Breach risk rating: 2
Audit risk rating	**Rationale for audit risk rating**
Low	The controls are recorded as moderate because they mitigate risk most of the time but there is room for improvement. The impact on settlement and participants is minor; therefore, the audit risk rating is low.

Actions taken to resolve the issue	Completion date	Remedial action status
This issue has been raised with Waipa DC and a resolution requested.	Complete	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
We will follow up to ensure the database is corrected	31 March 2022	

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	Te Awamutu and surrounds
Strata	The database contains items of load in Waipa District Council area. The processes for the management of WDC items of load are the same, but I decided to place the items of load into four strata, as follows: 1. Waipa A-G, 2. Waipa H-O, 3. Waipa P-Z, and 4. UVL.
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 41 sub-units.
Total items of load	261 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.

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

Audit commentary

Database accuracy based on the field audit

A field audit was conducted of a statistical sample of 261 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	97.1	Wattage from survey is lower than the database wattage by 2.9%
R_L	92.2	With a 95% level of confidence, it can be concluded that the error could be between -7.8% and -0.2%
R_H	99.8	

These results were categorised in accordance with the "Distributed Unmetered Load Statistical Sampling Audit Guideline", effective from 1 February 2019. The conclusion from Scenario C is that the variability of the sample results across the strata means that the true wattage (installed in the field) could be between 0.2% lower and 7.8% lower than the wattage recorded in the DUML database. Non-compliance is recorded because the potential error is greater than 5.0%.

- In absolute terms the installed capacity is estimated to be 7.0 kW lower than the database indicates.
- There is a 95% level of confidence that the installed capacity is between 0 kW lower to 17 kW lower than the database.
- In absolute terms, total annual consumption is estimated to be 28,100 kWh lower than the DUML database indicates.
- There is a 95% level of confidence that the annual consumption is between 1,900 kWh p.a. lower to 74,500 kWh p.a. lower 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

Wattage accuracy

The database contains two records for wattage, firstly the lamp wattage and secondly the gear wattage, which represents ballast losses.

The gear wattage discrepancies from the previous audit have been resolved.

As noted in previous audits, the LED lamp descriptions are not adequate to identify whether the wattages are correct.

NZTA lighting

NZTA lights are not included in the load recorded by WDC. These are managed by NZTA directly.

Private lights

No private lights are recorded in the database.

ICP accuracy

All items of load have the correct ICP recorded.

Location accuracy

Two items of load had incorrect GPS coordinates. The details have been provided to Waipa DC.

Change management process findings

Processes to track changes to the database were reviewed.

McKay Electrical enters details of changes directly into the database using pocket RAMM. Subdivision information comes from developers via "as built" plans. Waipa DC enters these details, using the install date from the plans, which may differ to the electrical connection date.

There are no festive lights connected to the streetlight circuits.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 3.1 With: Clause 15.2 and 15.37B(b) From: 01-Sep-20 To: 15-Dec-21	The field audit identified over submission of 28,100 kWh per annum. Two items of load had incorrect GPS coordinates. LED descriptions are not sufficient to confirm wattages are correct. Electrical connection dates may be incorrect for new subdivisions. Potential impact: Medium Actual impact: Medium Audit history: Once Controls: Moderate Breach risk rating: 4
Audit risk rating	**Rationale for audit risk rating**
Medium	The controls are rated as moderate and checks in place will find most errors. The impact is assessed to be medium, based on the kWh differences described above.

Actions taken to resolve the issue	Completion date	Remedial action status
All the issues identified in this audit have been shared with Waipa DC for resolution. We are considering the impact provision and use of database changes at a daily level will have on our processes and tools.	Complete June 2022	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
We will follow up with Waipa regarding the inaccuracies, corrections, and improvement of maintenance processes	31 March 2022	

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 WEL and Waipa networks. Meridian supplies EMS with the capacity information and EMS calculates the kWh figure for each ICP and includes this in the relevant AV080 file. This process was audited during Meridian's reconciliation participant audit and EMS' agent audit.

The capacities supplied to EMS for October 2021 were checked and confirmed to be the same as the database.

Submission is based on a snapshot of the database at the end of the month and does not consider historic adjustments or the fact that lights can be livened before they are entered into the database.

The field audit indicated that in absolute terms, total annual consumption is estimated to be 28,100 kWh lower than the DUML database indicates.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 3.2 With: Clause 15.2 and 15.37B(c) From: 01-Sep-20 To: 15-Dec-21	The field audit indicated that in absolute terms, total annual consumption is estimated to be 28,100 kWh lower than the DUML database indicates. Submission is based on a snapshot and does not consider historic adjustments. Potential impact: Low Actual impact: Low Audit history: Three times Controls: Moderate Breach risk rating: 4
Audit risk rating	**Rationale for audit risk rating**
Medium	The controls are rated as moderate, because they are sufficient to mitigate risk most of the time. The impact is assessed to be medium, based on the kWh differences described above.

Actions taken to resolve the issue	Completion date	Remedial action status
All the issues identified in this audit have been shared with Waipa DC for resolution.	Complete	Identified
We are considering the impact provision and use of database changes at a daily level will have on our processes and tools.	June 2022	
Preventative actions taken to ensure no further issues will occur	**Completion date**	
We will follow up with Waipa regarding the inaccuracies, corrections, and improvement of maintenance processes	31 March 2022	

CONCLUSION

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

The database is remotely hosted by thinkproject Ltd and is managed by Waipa DC. McKay Electrical conducts the installation fieldwork and maintenance. They provide information on all work carried out back to Waipa DC and this is then loaded into RAMM. Waipa DC provides reporting to Meridian on a monthly basis.

The main findings are as follows:

- the field audit indicated that in absolute terms, total annual consumption is estimated to be 28,100 kWh lower than the DUML database indicates, and
- the lamp description is recorded in the database but as noted in previous audits, the LED lamp descriptions are not adequate to identify whether the wattages are correct.

This audit found five non-compliances. The future risk rating of 16 indicates that the next audit be completed in six months. I recommend the next audit is conducted in nine months, to allow sufficient time to resolve the matters identified.

PARTICIPANT RESPONSE