DISTRIBUTED UNMETERED LOAD AUDIT REPORT

VERITEK

For

WAIROA DISTRICT COUNCIL AND GENESIS ENERGY

Prepared by: Steve Woods

Date audit commenced: 19 May 2022

Date audit report completed: 26 May 2022

Audit report due date: 31-May-22

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EXECUTIVE SUMMARY

This audit of the **Wairoa District Council (WDC)** Unmetered Streetlights DUML database and processes was conducted at the request of **Genesis Energy Limited** (**Genesis**), 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 used for reporting this DUML load is RAMM from 1 June 2021. This is remotely hosted by Thinkproject NZ Ltd. The specific module used for DUML is called "SLIMM" which stands for "Streetlighting Inventory Maintenance Management".

The NZTA lights previously associated with these lights are now reconciled by NZTA and will be subject to a separate audit with a different trader.

Three main issues were identified, as follows:

- Discrepancies were found with 69 of the 203 (34%) items of load checked in the field. In absolute terms, total annual consumption is estimated to be 46,000 kWh lower than the DUML database indicates. A full field audit is recommended to ensure database accuracy.
- 5x 125W MV lights with the incorrect ballast applied resulting in a very minor estimated over submission of 299kWh per annum.
- There are 41 LED items of load with the ballast wattage still recorded in the database. This has resulted in over submission of 2,387 kWh per annum.

The audit found three non-compliances and one recommendation is made. The future risk rating of 18 indicates that the next audit be completed in six months. I have considered this in conjunction with a discussion between Genesis and Wairoa DC. Wairoa DC indicated their intention to conduct a full field audit and have the database accurate and processes strengthened by the end of 2022, I therefore recommend that the next audit is conducted by the end of February 2023.

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 outside of the allowable +/-5% threshold. In absolute terms, total annual consumption is estimated to be 46,000 kWh lower than the DUML database indicates. 5x 125W MV lights with the incorrect ballast applied resulting in a very minor estimated over submission of 299kWh per annum. There are 41 LED items of load with the ballast wattage still recorded in the database. This has resulted in over submission of 2,387 kWh per annum.	Weak	Medium	6	Identified
Database accuracy	3.1	15.2 and 15.37B(b)	The database is outside of the allowable +/-5% threshold. In absolute terms, total annual consumption is estimated to be 46,000 kWh lower than the DUML database indicates. 5x 125W MV lights with the incorrect ballast applied resulting in a very minor estimated over submission of 299kWh per annum. There are 41 LED items of load with the ballast wattage still recorded in the database. This has resulted in over submission of 2,387 kWh per annum.	Weak	Medium	6	Identified

Subject	Section	Clause	Non-Compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
Volume information accuracy	3.2	15.2 and 15.37Bc	The database is outside of the allowable +/-5% threshold. In absolute terms, total annual consumption is estimated to be 46,000 kWh lower than the DUML database indicates. 5x 125W MV lights with the incorrect ballast applied resulting in a very minor estimated over submission of 299kWh per annum. There are 41 LED items of load with the ballast wattage still recorded in the database. This has resulted in over submission of 2,387 kWh per annum.	Weak	Medium	6	Identified
					Future Risk Rating	**18**	

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

RECOMMENDATIONS

Subject	Section	Description
Database Accuracy	3.1	100% field audit is undertaken to correct historic errors.

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

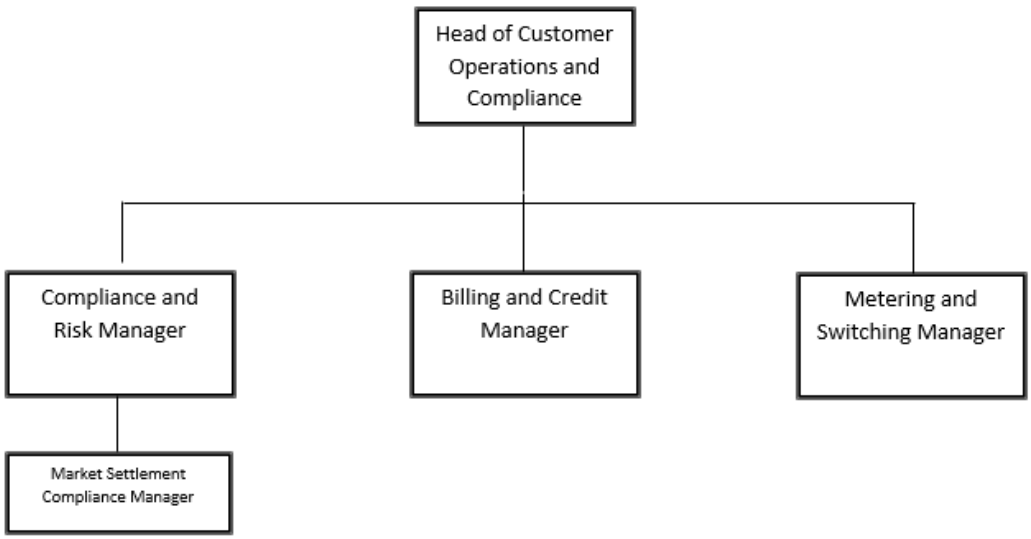
Section 11 of the Electricity Industry Act provides for the Electricity Authority to exempt any participant from compliance with all or any of the clauses.

Audit commentary

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

1.2. Structure of Organisation

Genesis provided the relevant organisational structure:



1.3. Persons involved in this audit

Auditor:

Name	Title
Steve Woods	Auditor

Other personnel assisting in this audit were:

Name	Title	Company
Julia Jones	DUML Data & Stakeholder Lead - Market Settlement Compliance	Genesis
Stephen Zeilstra		Wairoa DC
Michael Hardie		Wairoa DC

1.4. Hardware and Software

The database used for reporting this DUML load is RAMM from 1 June 2021. This is remotely hosted by Thinkproject NZ Ltd. The specific module used for DUML is called "SLIMM" which stands for "Streetlighting Inventory Maintenance Management".

The database is cloud based and is 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 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

There is now only one ICP for the Wairoa DC streetlights, which is 0009157081WWB0B and is shown in the table below.

ICP Number	Description	NSP	Profile	Database wattage (watts)	No of items of load
0009157081WWB0B	Wairoa DC	TUI1101	NST	41,935	801

NZTA lighting is recorded in the database, but this is being reconciled by NZTA in a separate RAMM database so is outside of the scope of this audit.

1.7. Authorisation Received

All information was provided directly by Genesis or WDC.

1.8. Scope of Audit

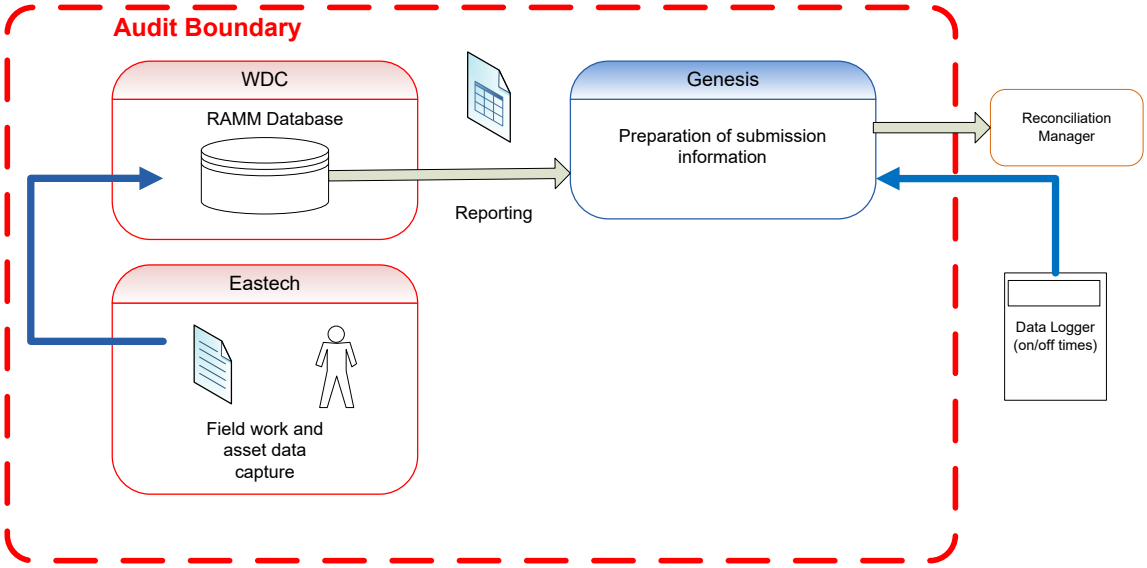
This audit of the WDC DUML database and processes was conducted at the request of Genesis, in accordance with clause 15.37B. The purpose of this audit is to verify that the volume information is being calculated accurately, and that profiles have been correctly applied

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

The database used for reporting this DUML load is RAMM from 1 June 2021. This is remotely hosted by Thinkproject NZ Ltd. The specific module used for DUML is called "SLIMM" which stands for "Streetlighting Inventory Maintenance Management".

The NZTA lights previously associated with these lights are now reconciled by NZTA and will be subject to a separate audit with a different trader.

The diagram below shows the audit boundary for clarity.



The field audit of 203 items of load was carried out in Wairoa on 24 May 2022.

1.9. Summary of previous audit

The last audit report undertaken by Rebecca Elliot of Veritek Limited in May 2021 was reviewed. The table below indicates the current status of that audit's findings.

Table of Non-Compliance

Subject	Section	Clause	Non-compliance	Status
Deriving submission information	2.1	11(1) of Schedule 15.3	The database is outside of the allowable +/-5% threshold. In absolute terms, total annual consumption is estimated to be 25,200 kWh lower than the DUML database indicates. 5x 125W MV lights with the incorrect ballast applied resulting in a very minor estimated over submission of 299kWh per annum. The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot.	Still existing Still existing Cleared
ICP Identifier	2.2	11(2)(a) and (aa) of Schedule 15.3	ICP not yet recorded in the database.	Cleared
Database accuracy	3.1	15.2 and 15.37B(b)	The database is outside of the allowable +/-5% threshold. In absolute terms, total annual consumption is estimated to be 25,200 kWh lower than the DUML database indicates. 246 LED lights with no make or model recorded. 5x 125W MV lights with the incorrect ballast applied resulting in a very minor estimated over submission of 299kWh per annum. ICP still to be populated to the RAMM database.	Still existing Cleared Still existing Cleared
Volume information accuracy	3.2	15.2 and 15.37Bc	The database is outside of the allowable +/-5% threshold. In absolute terms, total annual consumption is estimated to be 25,200 kWh lower than the DUML database indicates. 5x 125W MV lights with the incorrect ballast applied resulting in a very minor estimated over submission of 299kWh per annum. The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot.	Still existing Still existing Cleared

Table of Recommendations

Subject	Section	Clause	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

Genesis has 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

Genesis reconciles this DUML load using the NST profile. The total volume submitted to the Reconciliation Manager is based on a monthly database report. The "burn time" is sourced from data loggers installed on the Eastland network.

I checked the submission calculations for April 2022 and confirmed they were correct. Reporting is provided in a manner which enables identification of changes within the month, so compliance is achieved with the requirement to track changes at a daily level.

The database is outside of the allowable +/-5% threshold. In absolute terms, total annual consumption is estimated to be 46,000 kWh lower than the DUML database indicates.

Analysis of the RAMM database identified five 125W Mercury Vapour lights with the incorrect ballast applied. This will be resulting in a very minor estimated over submission of 299 kWh per annum.

There are 41 LED items of load with the ballast wattage still recorded in the database. This has resulted in over submission of 2,387 kWh per annum.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.1 With: Clause 11(1) of Schedule 15.3 From: 01-Jun-21 To: 26-May-22	The database is outside of the allowable +/-5% threshold. In absolute terms, total annual consumption is estimated to be 46,000 kWh lower than the DUML database indicates. 5x 125W MV lights with the incorrect ballast applied resulting in a very minor estimated over submission of 299kWh per annum. There are 41 LED items of load with the ballast wattage still recorded in the database. This has resulted in over submission of 2,387 kWh per annum. Potential impact: Medium Actual impact: Medium Audit history: Multiple times Controls: Weak Breach risk rating: 6
Audit risk rating	**Rationale for audit risk rating**
Medium	The controls are rated as weak because they are insufficient to ensure database accuracy. 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
Genesis has advised Wairoa DC of the audit findings with the intent that the District Council will ensure that corrections are made to the RAMM data base within a timely manner.	01/09/2022	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
Genesis will continue to work with the District Council in order to improve the data base accuracy.	Continuous improvement.	

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

Each item of load has the correct ICP 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, displacement value and pole numbers and Global Positioning System (GPS) coordinates for majority of items of load and users in the office and field can view these locations on a mapping system.

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. Analysis of the database found no blank records. The accuracy of lamp description, wattage and gear wattage is discussed in **section 3.1**.

Audit outcome

Compliant

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 203 items of load using the statistical sampling methodology.

Audit commentary

The field audit findings where discrepancies were found are detailed below.

Discrepancy	Quantity
Additional items of load	0
Items of load not found in the field	7
Incorrect wattage	62

This clause relates to lights in the field not recorded in the database. No additional items of load were found in the field. The accuracy of the database is detailed 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 ability of the database to track changes was assessed and the process for tracking of changes in the database was examined.

Audit commentary

The RAMM database functionality achieves compliance with the code.

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	Wairoa District Council
Strata	The database contains 801 items of load in the Wairoa District Council area and excludes NZTA lighting and any metered lights. The processes for the management of items of load are the same, but I decided to place the items of load into four strata, as follows: 1. Road name A-C, 2. Road name D-L, 3. Road name M-O, 4. Road name P-Z
Area units	I created a pivot table of the ICP in each area and I used a random number generator in a spreadsheet to select a total of 36 sub-units.
Total items of load	203 items of load were checked.

Wattages were checked for alignment with the published standardised wattage table produced by the Electricity Authority or the LED specifications.

The process to manage changes made in the field being updated in the database was examined.

Audit commentary

Database accuracy based on the field audit

A field audit was conducted of a statistical sample of 182 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	74.3	Wattage from survey is lower than the database wattage by 25.7%
R_L	59.3	With a 95% level of confidence, it can be concluded that the error could be between -40.7% and -22.0%
R_H	88.0	

These results were categorised in accordance with the "Distributed Unmetered Load Statistical Sampling Audit Guideline", effective from 01/02/19 and the table below shows that Scenario C (detailed below) applies.

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 22.0% lower and 40.7% 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 11.0 kW lower than the database indicates.

There is a 95% level of confidence that the installed capacity is between 5 kW and 17 kW lower than the database.

In absolute terms, total annual consumption is estimated to be 46,000 kWh lower than the DUML database indicates.

There is a 95% level of confidence that the annual consumption is between 21,500 kWh p.a. to 73,000 kWh p.a. lower than the database indicates.

34% of the field sample had discrepancies. This is a high error rate and the only way to resolve this is to conduct a 100% field audit, which was also recommended in the last audit.

Description	Recommendation	Audited party comment	Remedial action
Database Accuracy	100% field audit is undertaken to correct database errors.	Genesis has advised the Wairoa DC of the audit finding.	Identified

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 %

Wattage and ballast accuracy findings

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

The accuracy of the lamp description and the wattage was examined.

Examination of the ballasts applied found that there are 41 LED items of load with the ballast wattage still recorded in the database. This has resulted in over submission of 2,387 kWh per annum.

Five 125W Mercury Vapor lights were found to have a ballast of 25W applied instead of 11W. This will be resulting in a very minor estimated over submission of 299 kWh per annum.

NZTA lighting

NZTA lighting is recorded in the database, but this is being reconciled by NZTA in a separate RAMM database so is outside of the scope of this audit.

ICP accuracy

All items of load have the correct ICP recorded.

Location accuracy

The database contains fields for the street address and also GPS coordinates. All items of load were locatable.

Change management process findings

Eastland Network is the streetlight contractor. A monthly claim is provided which includes the details of lights changed, added or removed, and these are updated manually. Some of the discrepancies identified by the field audit occurred during the audit period, so Wairoa DC intends to check that the updating process is working as it should be. Wairoa DC also intends to develop a validation process for the monthly claim.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 3.1 With: Clause 15.2 and 15.37B(b) From: 01-Jun-21 To: 26-May-22	The database is outside of the allowable +/-5% threshold. In absolute terms, total annual consumption is estimated to be 46,000 kWh lower than the DUML database indicates. 5x 125W MV lights with the incorrect ballast applied resulting in a very minor estimated over submission of 299kWh per annum. There are 41 LED items of load with the ballast wattage still recorded in the database. This has resulted in over submission of 2,387 kWh per annum Potential impact: Medium Actual impact: Medium Audit history: Multiple times Controls: Weak Breach risk rating: 6
Audit risk rating	**Rationale for audit risk rating**
Medium	The controls are rated as weak because they are insufficient to ensure database accuracy. 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
Genesis has advised Wairoa DC of the audit findings with the intent that the District Council will ensure that corrections are made to the RAMM data base within a timely manner.	01/09/2022	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
Genesis will continue to work with the District Council in order to improve the data base accuracy.	Continuous improvement.	

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

Genesis reconciles this DUML load using the NST profile. The total volume submitted to the Reconciliation Manager is based on a monthly database report. The "burn time" is sourced from data loggers installed on the Eastland network.

I checked the submission calculations for April 2022 and confirmed they were correct. Reporting is provided in a manner which enables identification of changes within the month, so compliance is achieved with the requirement to track changes at a daily level.

The database is outside of the allowable +/-5% threshold. In absolute terms, total annual consumption is estimated to be 46,000 kWh lower than the DUML database indicates.

Analysis of the RAMM database identified five 125W Mercury Vapour lights with the incorrect ballast applied. This will be resulting in a very minor estimated over submission of 299 kWh per annum.

There are 41 LED items of load with the ballast wattage still recorded in the database. This has resulted in over submission of 2,387 kWh per annum.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 3.2 With: Clause 15.2 and 15.37B(c) From: 01-Jun-21 To: 26-May-22	The database is outside of the allowable +/-5% threshold. In absolute terms, total annual consumption is estimated to be 46,000 kWh lower than the DUML database indicates. 5x 125W MV lights with the incorrect ballast applied resulting in a very minor estimated over submission of 299kWh per annum. There are 41 LED items of load with the ballast wattage still recorded in the database. This has resulted in over submission of 2,387 kWh per annum. Potential impact: Medium Actual impact: Medium Audit history: Multiple times Controls: Weak Breach risk rating: 6
Audit risk rating	**Rationale for audit risk rating**
Medium	The controls are rated as weak because they are insufficient to ensure database accuracy. 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
Genesis has advised Wairoa DC of the audit findings with the intent that the District Council will ensure that corrections are made to the RAMM data base within a timely manner.	01/09/2022	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
Genesis will continue to work with the District Council in order to improve the data base accuracy.	Continuous improvement.	

CONCLUSION

The database used for reporting this DUML load is RAMM from 1 June 2021. This is remotely hosted by Thinkproject NZ Ltd. The specific module used for DUML is called "SLIMM" which stands for "Streetlighting Inventory Maintenance Management".

The NZTA lights previously associated with these lights are now reconciled by NZTA and will be subject to a separate audit with a different trader.

Three main issues were identified, as follows:

- Discrepancies were found with 69 of the 203 (34%) items of load checked in the field. In absolute terms, total annual consumption is estimated to be 46,000 kWh lower than the DUML database indicates. A full field audit is recommended to ensure database accuracy.
- 5x 125W MV lights with the incorrect ballast applied resulting in a very minor estimated over submission of 299kWh per annum.
- There are 41 LED items of load with the ballast wattage still recorded in the database. This has resulted in over submission of 2,387 kWh per annum.

The audit found three non-compliances and one recommendation is made. The future risk rating of 18 indicates that the next audit be completed in six months. I have considered this in conjunction with a discussion between Genesis and Wairoa DC. Wairoa DC indicated their intention to conduct a full field audit and have the database accurate and processes strengthened by the end of 2022, I therefore recommend that the next audit is conducted by the end of February 2023.

PARTICIPANT RESPONSE

Genesis has advised Wairoa DC of the audit findings with the intent that the District Council will ensure that corrections are made to the RAMM data base within a timely manner.