

ELECTRICITY INDUSTRY PARTICIPATION CODE
DISTRIBUTED UNMETERED LOAD AUDIT REPORT



For

WAKA KOTAHI NZ TRANSPORT AGENCY
NORTHLAND DISTRIBUTED UNMETERED
LOAD

GENESIS ENERGY

NZBN:9429037706609

Supervising Auditor: Tara Gannon

Supporting Auditor: Brett Piskulic

Date audit commenced: 7 June 2023

Date audit report completed: 28 September 2023

Audit report due date: 1 June 2023

TABLE OF CONTENTS

Executive summary	3
Audit summary	4
Non-compliances	4
Recommendations	5
Issues	5
1. Administrative	6
1.1. Exemptions from Obligations to Comply with Code	6
1.2. Structure of Organisation	6
1.3. Persons involved in this audit.....	7
1.4. Hardware and Software	7
1.5. Breaches or Breach Allegations.....	7
1.6. ICP Data	8
1.7. Authorisation Received	8
1.8. Scope of Audit	8
1.9. Summary of previous audit	9
Table of Non-Compliance.....	9
Table of Recommendations	11
1.10. Distributed unmetered load audits (Clause 16A.26 and 17.295F).....	11
2. DUML database requirements.....	13
2.1. Deriving submission information (Clause 11(1) of Schedule 15.3)	13
2.2. ICP identifier and items of load (Clause 11(2)(a) and (aa) of Schedule 15.3)	14
2.3. Location of each item of load (Clause 11(2)(b) of Schedule 15.3)	15
2.4. Description and capacity of load (Clause 11(2)(c) and (d) of Schedule 15.3)	15
2.5. All load recorded in database (Clause 11(2A) of Schedule 15.3)	15
2.6. Tracking of load changes (Clause 11(3) of Schedule 15.3)	18
2.7. Audit trail (Clause 11(4) of Schedule 15.3).....	19
3. Accuracy of DUML database	20
3.1. Database accuracy (Clause 15.2 and 15.37B(b))	20
3.2. Volume information accuracy (Clause 15.2 and 15.37B(c))	23
Conclusion	26
Participant response.....	27

EXECUTIVE SUMMARY

This audit of the **Waka Kotahi NZ Transport Agency (NZTA)** Northland Streetlight 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.

This is the first audit since all the NZTA streetlights in the Northland region were combined into one DUML database. In previous audits the lights were split into two regions with ICPs on the Top Energy and Northpower networks, managed separately and under two retailers. The Top Energy ICPs were consolidated into one ICP and the Northpower ICPs were switched to Genesis on 1 July 2023.

A project was completed prior to this audit to update the NZTA RAMM database and it is now used for reconciliation. Updating of the database is managed by NZ Streetlighting on behalf of NZTA. Details of changes made in the field by contractors are returned to NZ Streetlighting. Whilst the current processes accurately capture alterations and additions, as identified by the field audit findings there are a significant number of incorrect records in the database due to previous processes not capturing changes made in the field.

The field audit was undertaken of a statistical sample of 272 items of load between 9th and 17th June 2023. A high number of inaccuracies were identified, and the results of the field audit concluded that in absolute terms, total annual consumption is estimated to be 60,400 kWh lower than the DUML database indicates.

The future risk rating of 31 indicates that the next audit be completed in three months. I have considered this in conjunction with Genesis' responses which indicate that the database inaccuracies found during this audit have been investigated and resolved, and that new contractor maintenance forms have been implemented to ensure that changes are accurately recorded and updated in the database. Database cleansing has commenced with an initial focus on ensuring that the quantity and location of items of load are correct, which will help to ensure consistency between the database and lights installed. Genesis acknowledges that there are likely to be historic lamp and wattage discrepancies present in the database, and work to improve the accuracy of lamp and wattage information should be completed. I recommend that the next audit is conducted in a minimum of eight months to allow time for the database validation process to continue so that improvement can be demonstrated, and the matters raised can be resolved.

This audit found five non-compliances and makes no recommendations. The matters raised are detailed in the table below:

AUDIT SUMMARY

NON-COMPLIANCES

Subject	Section	Clause	Non-Compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
DUML Audit	1.10	17.295F of part 17	Audit not completed within the required timeframe.	Strong	Low	1	Cleared
Deriving submission information	2.1	11(1) of Schedule 15.3	<p>The field audit found that the database is not confirmed as accurate within +/- 5%. In absolute terms, total annual consumption is estimated to be 60,400 kWh lower than the DUML database indicates.</p> <p>Nine items of load have the incorrect wattage applied in the DUML database which would result in over submission of 247.72kWh per annum.</p>	Weak	High	9	Identified
All load recorded in database	2.5	11(2)(b) of Schedule 15.3	16 additional lights were found in the field.	Weak	Low	3	Cleared
Database accuracy	3.1	15.2 and 15.37B(b)	<p>The field audit found that the database is not confirmed as accurate within +/- 5%. In absolute terms, total annual consumption is estimated to be 60,400 kWh lower than the DUML database indicates.</p> <p>Nine items of load have the incorrect wattage applied in the DUML database which would result in over submission of 247.72kWh per annum.</p>	Weak	High	9	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)	<p>The field audit found that the database is not confirmed as accurate within +/- 5%. In absolute terms, total annual consumption is estimated to be 60,400 kWh lower than the DUML database indicates.</p> <p>Nine items of load have the incorrect wattage applied in the DUML database which would result in over submission of 247.72kWh per annum.</p>	Weak	High	9	Identified
Future Risk Rating						31	

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	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

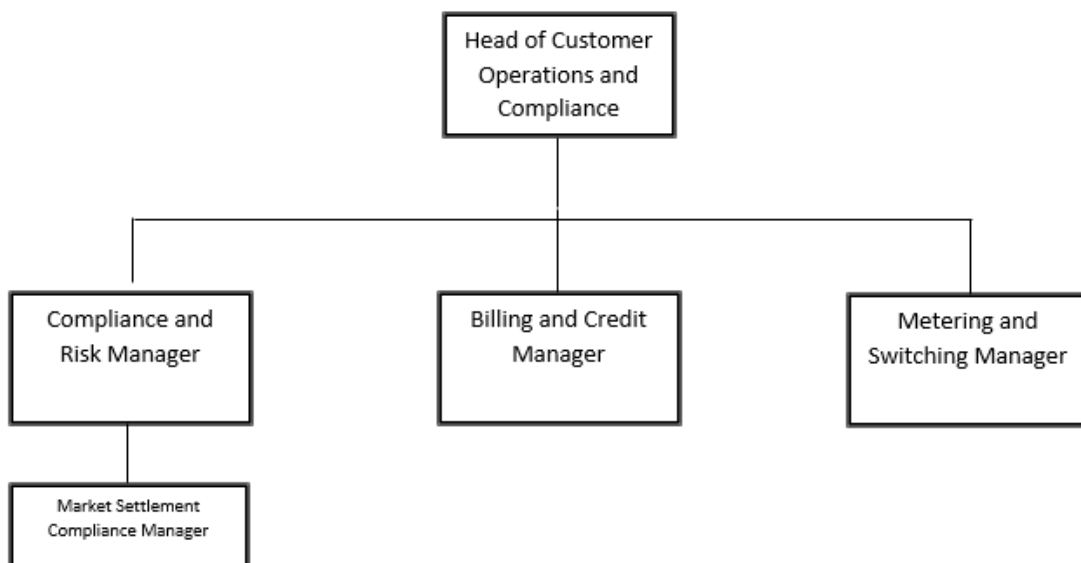
The Electricity Authority's website was reviewed to identify any exemptions relevant to the scope of this audit.

Audit commentary

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

1.2. Structure of Organisation

Genesis provided the relevant organisational structure:



1.3. Persons involved in this audit

Supervising Auditor:

Tara Gannon

Provera

Electricity Authority Approved Auditor

Supporting Auditor:

Brett Piskulic

Provera

Electricity Authority Approved Auditor

Other personnel assisting in this audit were:

Name	Title	Company
Kara Atkinson	Consultant	NZ Streetlighting and Specialist Energy Services
Shantelle Comer	Customer Operations Data and Systems Specialist	Genesis Energy

1.4. Hardware and Software

The SQL database used for the management of DUML is remotely hosted by thinkproject New Zealand Limited. The database is commonly known as “RAMM” which stands for “Road Assessment and Maintenance Management”. The specific data used for DUML is held in the Streetlight tables. thinkproject New Zealand Limited backs up the database and assists with disaster recovery as part of their hosting service.

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

ICP Number	Description	NSP	Profile	Number of items of load	Database wattage (watts)
0000500015NRA63	Streetlights; Transit NZ; BRB0331	BRB0331	NST	35	5,808
0000500236NR1F1	STREETLIGHTS; TRANSIT NZ; MPE1101	MPE1101	NST	722	12,9260.5
0000545297NR91E	Streetlights; Transit NZ; MTO0331	MTO0331	NST	132	21,856
0000913800TE1B9	UNMETERED STREETLIGHTS	KOE1101	NST	656	92,419
TOTAL				1,545	249,343.5

The ballast values are included in the wattage totals.

1.7. Authorisation Received

All information was provided directly by Genesis and NZ Streetlighting.

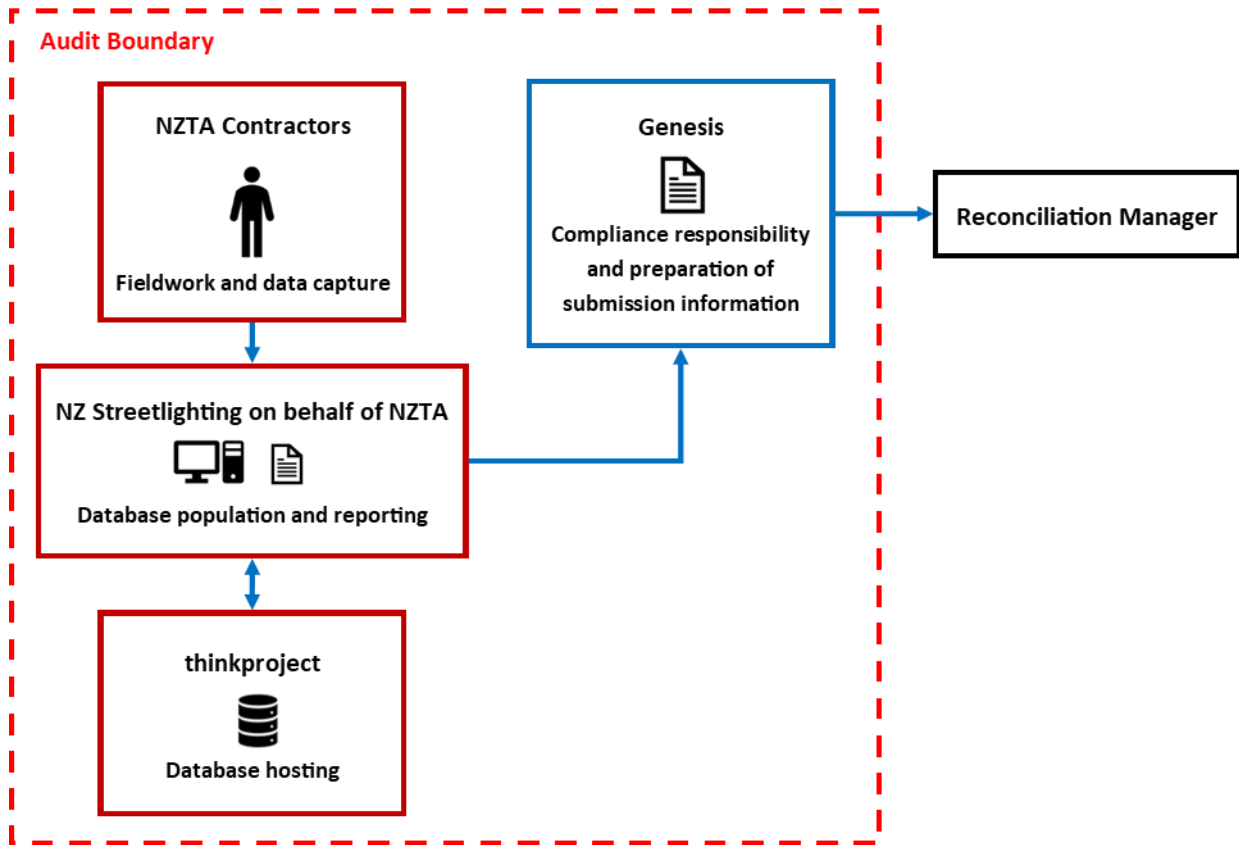
1.8. Scope of Audit

This audit of the NZTA Northland Streetlight DUMML database and processes was conducted at the request of Genesis Energy (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 DUMML audits version 1.1.

NZTA Northland Unmetered Streetlights are located on the Northpower and Top Energy networks. Genesis reconciles this load using the NZTA RAMM streetlight database.

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 272 items of load between 9th and 17th June 2023.

1.9. Summary of previous audit

The previous audit of the lights on the Top Energy network was completed in October 2022 by Steve Woods of Veritek Limited for Genesis. The previous audit of the lights on the Northpower network was completed in May 2022 by Rebecca Elliot of Veritek Limited for Meridian Energy. The current statuses of these audit's findings are detailed below:

Table of Non-Compliance

Subject	Section	Clause	Non-compliance	Status
DUML Audit	1.10	17.295F of part 17	Top Energy and Northpower network lights. Audits not completed within the required timeframe.	Cleared

Subject	Section	Clause	Non-compliance	Status
Deriving submission information	2.1	11(1) of Schedule 15.3	<p>Top Energy network lights</p> <p>Database is not confirmed as accurate with a 95% level of confidence as recorded in section 3.1.</p> <p>The data used for submission does not track changes at a daily basis and is provided as a snapshot.</p> <p>Northpower network lights</p> <p>Database is not confirmed as accurate with a 95% level of confidence resulting in an estimated over submission of 44,000 kWh per annum.</p> <p>761 items of load have the incorrect wattage applied in the DUMML database resulting in an estimated over submission of 40,770.5kWh per annum.</p> <p>Four items of load with no lamp description or wattage recorded.</p> <p>The data used for submission does not track changes at a daily basis and is provided as a snapshot.</p>	<p>Still existing</p> <p>Cleared</p> <p>Still existing</p> <p>Still existing for nine lights and 247.72 kWh</p> <p>Cleared</p> <p>Cleared</p>
Description and capacity of load	2.4	11(2)(c) and (d) of Schedule 15.3	<p>Northpower network lights</p> <p>Four items of load with no input wattage and no lamp description recorded.</p> <p>69 LED lights had no make and model recorded.</p>	Cleared
All load recorded in database	2.5	11(2)(b) of Schedule 15.3	<p>Top Energy network lights</p> <p>Nine additional lights were found in the field.</p> <p>Northpower network lights</p> <p>One item of load not recorded in the database.</p>	<p>Still existing</p> <p>Cleared</p>
Database accuracy	3.1	15.2 and 15.37B(b)	<p>Top Energy network lights</p> <p>Database is not confirmed as accurate with a 95% level of confidence.</p> <p>Northpower network lights</p> <p>Database is not confirmed as accurate with a 95% level of confidence resulting in an estimated over submission of 44,000 kWh per annum.</p> <p>761 items of load have the incorrect wattage applied in the DUMML database which would result in over submission of 40,770.5kWh per annum.</p> <p>Four items of load with no lamp description or wattage recorded.</p> <p>69 LED lights with no make or model recorded.</p>	<p>Still existing</p> <p>Still existing</p> <p>Still existing for nine lights and 247.72 kWh</p> <p>Cleared</p> <p>Cleared</p>

Subject	Section	Clause	Non-compliance	Status
Volume information accuracy	3.2	15.2 and 15.37B(c)	Top Energy network lights	
			Database is not confirmed as accurate with a 95% level of confidence as recorded in section 3.1.	Still existing
			The data used for submission does not track changes at a daily basis and is provided as a snapshot.	Cleared
			Northpower network lights	
			Database is not confirmed as accurate with a 95% level of confidence resulting in an estimated over submission of 44,000 kWh per annum.	Still existing
761 items of load have the incorrect wattage applied in the DUMML database resulting in an estimated over submission of 40,770.5kWh per annum.	Still existing for nine lights and 247.72 kWh			
Four items of load with no lamp description or wattage recorded.	Cleared			
The data used for submission does not track changes at a daily basis and is provided as a snapshot.	Cleared			

Table of Recommendations

Subject	Section	Recommendation for Improvement	Status
Tracking of load changes	2.6	Work with NZTA to bring their RAMM database up to date so that it can be used for reconciliation.	Cleared

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 DUMML database audits are completed:

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

Audit observation

Genesis have requested Provera to undertake this streetlight audit.

Audit commentary

This audit report confirms that the requirement to conduct an audit has been met for this database. Genesis was unable to complete this audit by the required timeframe as an accurate database extract

was not able to be obtained from NZTA in time to complete the audit by the due date. The audit was also delayed until after all the ICPs had transferred to Genesis and submission data was available.

Audit outcome

Non-compliant

Non-compliance	Description		
Audit Ref: 1.10 Clause 17.295F of part 17 From: 01-Jun-23 To: 28-Sep-23	Audit not completed within the required timeframe. Potential impact: Low Actual impact: Low Audit history: Multiple times Controls: Strong Breach risk rating: 1		
Audit risk rating	Rationale for audit risk rating		
Low	The controls are rated as strong, as Genesis are reliant on the database provider to supply the data and in this case the delay caused this report to be late. The impact is assessed to be low, as this has no direct impact on reconciliation.		
Actions taken to resolve the issue		Completion date	Remedial action status
Significant improvement has been made in the database over the past 18 months. For this audit to worthwhile Genesis and the client have delayed ensuring the database was worth auditing.		21/9/2023	Cleared
Preventative actions taken to ensure no further issues will occur		Completion date	
The database is now with one retailer, Genesis. Future audits will be completed by the due date providing that a sufficient audit period is granted.		21/9/2023	

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.

Audit commentary

Submission process and accuracy

Genesis reconciles this DUML load using the NST profile. The on and off times are derived from a data logger.

Since the previous audits the NZTA RAMM database has been updated and is now used for submission. NZ Streetlighting provided Genesis with an extract from the NZTA database, and this was used for submission. Genesis expects to receive a monthly extract from NZ Streetlighting in future. On-off times are determined by a data logger, Genesis provided the datalogger files for July 2023. I compared the database extract provided to the submission information provided by Genesis for July 2023 and confirmed that the database total matches the submission total.

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 monthly report from NZTA to Genesis includes the dates of any changes or additions made and Genesis accounts for the changes which have happened in each month on a daily basis.

Database accuracy

Examination of the database found:

Issue	Estimated volume information impact (annual kWh)
The database is not confirmed as accurate with a 95% level of confidence as recorded in section 3.1.	Over submission of 60,400 kWh p.a.
Nine items of load had the incorrect wattage applied in the database. This is detailed in section 3.1.	Over submission of 247.72kWh p.a.

Audit outcome

Non-compliant

Non-compliance	Description		
Audit Ref: 2.1 With: Clause 11(1) of Schedule 15.3 From: unknown To: 31-Jul-23	The field audit found that the database is not confirmed as accurate within +/- 5%. In absolute terms, total annual consumption is estimated to be 60,400 kWh lower than the DUML database indicates. Nine items of load have the incorrect wattage applied in the DUML database which would result in over submission of 247.72kWh per annum. Potential impact: High Actual impact: High Audit history: Multiple times Controls: Weak Breach risk rating: 9		
Audit risk rating	Rationale for audit risk rating		
High	Controls are rated as weak as the database has a high level of inaccuracy. The impact is assessed to be high due to the kWh volumes.		
Actions taken to resolve the issue		Completion date	Remedial action status
Significant improvement has been made in the accuracy of the database. 6 databases maintained by different parties have been consolidated for this database to exist. With the previous state of this data there was significant negligence by all contracted parties, partially due to confusion of data ownership. The customer has focused on quantity and location of load to clean this data, wattage has not been the point of concern. Both distributors have accepted this database accuracy and the approach by the customer.		21/9/2023	Identified
Preventative actions taken to ensure no further issues will occur		Completion date	
All non-compliances found in the field audit have been resolved. Contractor forms have been provided for any light changes in the field, to protect the integrity of the database for future changes.		21/09/2023	

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 had an ICP recorded in the database.

Audit outcome

Compliant

2.3. Location of each item of load (Clause 11(2)(b) of Schedule 15.3)

Code reference

Clause 11(2)(b) of Schedule 15.3

Code related audit information

The DUMML database must contain the location of each DUMML item.

Audit observation

The database was checked to confirm the location is recorded for all items of load.

Audit commentary

The database has the road name, location, carriageway number, offset side, and GPS location for all items of load.

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 DUMML 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.

Audit commentary

The database contains fields to record the lamp make, model, wattage and gear wattage. All items of load have a lamp model and lamp wattage populated.

The accuracy of lamp descriptions, wattages and ballasts is recorded 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 a statistical sample of 272 items of load between 9th and 17th June 2023.

Audit commentary

The field audit discrepancies found are detailed in the table below.

Road Name	Database count	Field count	Light count differences	Wattage recorded incorrectly	Comments
01N-0266 (SH14 to Kendon Pl)	14	13	-1	-	1 x 150W HPS recorded in database was found to be a 19.9W LED which is managed by the Whangarei DC.
012-0169	31	32	+1	-	1 x additional 150W HPS found in field.
01N-0303	22	22	-	2	2 x incorrect wattage – 104W LED found in the field recorded as 150W HPS in database.
014-0000 (SH1 to Silverstream Rd)	48	45	-4, +1	5	5 x incorrect wattage – 1 x 150W HPS found in the field recorded as 1 x 250W HPS in database, 4 x 116W LED found in the field recorded as 1 x 150W HPS in database. 4 x lights not found in field – 3 x 150W HPS and 1 x 116W LED. 1 x additional 116W LED found in field.
01N-0258/02.90-D	13	13	-	12	12 x incorrect wattage – 150W HPS found in the field recorded as 107W LED in database.
01N-0258/07.25-D	15	14	-1	3	1 x 250W HPS not found in field. 3 x incorrect wattage - 150W HPS found in the field recorded as 250W HPS in database.
01N-0258/06.40	40	40	-5, +5	26	26 x incorrect wattage – 3 x 146W LED found in the field recorded as 250W HPS in database, 23 x 146W LED found in the field recorded as 250W HPS in database. 5 x 150W HPS lights not found in field.

Road Name	Database count	Field count	Light count differences	Wattage recorded incorrectly	Comments
					5 x additional lights found in the field – 3 x 146W LED and 2 x 150W HPS.
015-0009	14	14	-	4	4 x incorrect wattage - 36W LED found in the field recorded as 150W HPS in database.
01N-0185	6	6	-	3	3 x incorrect wattage – 2 x 71W LED found in the field recorded as 150W HPS in database, 1 x 71W LED found in the field recorded as 104W LED in database.
012-0061 (Waiotemarama Gorge Rd to Fairlie Cres)	21	21	-	1	1 x incorrect wattage - 71W LED found in the field recorded as 104W LED in database.
01N-0215	6	9	+3	2	2 x incorrect wattage - 71W LED found in the field recorded as 150W HPS in database. 3 x additional lights found in the field – 2 x 71W LED and 1 x 150W HPS.
01N-0233 (ICP 0000500236NR1F1)	3	4	+1	-	1 x additional 150W HPS found in field.
010-0063	12	16	+4	-	2 x additional 150W HPS and 2 x additional 107W LED found in field.
010-0007	4	5	+1	-	1 x additional 150W HPS found in field.
01N-0104	16	15	-1	7	1 x 150W HPS not found in field. 3 x incorrect wattage - 71W LED found in the field recorded as 150W HPS in database. 4 x incorrect wattage - 80W LED found in the field recorded as 150W HPS in database.
Grand Total	272		28 (-12, +16)	65	

This clause relates to lights in the field that are not recorded in the database. As recorded in the table above there were 16 lights found in the field that were not recorded in the database.

The database accuracy 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: unknown To: 17-Jun-23	16 additional lights were found in the field. Potential impact: High Actual impact: Low Audit history: Once Controls: Weak Breach risk rating: 3		
Audit risk rating	Rationale for audit risk rating		
Low	The controls are rated as weak as the database has not been updated to reflect changes made in the field. The impact is assessed to be low due to the kWh volumes.		
Actions taken to resolve the issue		Completion date	Remedial action status
All non-compliances identified in the field audit have been resolved by updating the database.		21/09/2023	Cleared
Preventative actions taken to ensure no further issues will occur		Completion date	
With the implementation of the contractor forms, this will ensure that any changes made in the field will be captured in the database. This will correct previous inaccuracies when changes are made in the field.		21/09/2023	

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.

In the last audit a recommendation was made that the NZTA RAMM database be updated so it can be used for reconciliation, I have recorded this recommendation as cleared as the NZTA RAMM database is now being used.

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

Audit outcome

Compliant

2.7. Audit trail (Clause 11(4) of Schedule 15.3)

Code reference

Clause 11(4) of Schedule 15.3

Code related audit information

The DUMML database must incorporate an audit trail of all additions and changes that identify:

- *the before and after values for changes*
- *the date and time of the change or addition*
- *the person who made the addition or change to the database.*

Audit observation

The spreadsheet was checked for audit trails.

Audit commentary

RAMM records audit trail information of changes made.

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

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	NZTA Northland Streetlights
Strata	The database contains items of load on the Northland state highway network. The processes for the management of all NZTA items of load are the same, but I decided to place the items of load into three strata as follows: <ol style="list-style-type: none"> 1. ICPs 0000500236NR1F1, 0000545297NR91E and 0000500015NRA63 – Kaipara and Whangarei South, 2. ICP 0000500236NR1F1 - Whangarei North, and 3. ICP 0000913800TE1B9.
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 17 sub-units.
Total items of load	272 items of load were checked.

Wattages were checked for alignment with the published standardised wattage table produced by the Electricity Authority against the database.

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

Audit commentary

Field audit findings

A field audit was conducted of a statistical sample of 272 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	87.3%	Wattage from survey is lower than the database wattage by 22.7%
R _L	79.4%	With a 95% level of confidence, it can be concluded that the error could be between -20.6% and 3.8%.
R _H	96.2%	

These results were categorised in accordance with the “Distributed Unmetered Load Statistical Sampling Audit Guideline”, effective from 1 February 2019 and the table below shows that Scenario B (detailed below) applies.

The conclusion from Scenario B is that the inaccuracy is statistically significant at the 95% level. The sample results across the strata means that the true wattage (installed in the field) could be between 13.8% lower and 4.5% higher 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 14 kW lower than the database indicates.

There is a 95% level of confidence that the installed capacity is between 34 kW lower and 11 kW higher than the database.

In absolute terms, total annual consumption is estimated to be 60,400 kWh lower than the DUML database indicates.

There is a 95% level of confidence that the annual consumption is between 147,200 kWh p.a. lower to 47,800 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 wattage being applied in the database and found that nine lamps had a discrepancy when compared to the standardised wattage table. This is detailed in the table below:

Lamp Type	Database Total Lamp Wattage	EA Standardised Total Wattage	Variance	Database Quantity	Estimated Annual kWh effect on consumption
100 High Pressure Sodium	118	114	4	1	17.08
70 HPS SON/T	88	83	5	2	42.71
Incandescent 100W	100	114	14	2	119.59
Sodium Vapour SON 100W	118	114	4	1	17.08
Sodium Vapour SON 100W, tubular	118	114	4	3	51.25
Total estimated annual effect on submission					247.72

The incorrect capacities will be resulting in a nett estimated over submission of 247.72kWh per annum (based on annual burn hours of 4,271 as is detailed in the DUMML database auditing tool).

Change management process findings

Maintenance and fault work is completed NZTA's contractor Fulton Hogan and its subcontractors. Outage patrols are required to be conducted quarterly. Changes are recorded in a spreadsheet form which is returned to NZ Streetlighting who update the NZTA RAMM database. The contractors are required to return the information to support the payment of invoices. New connections require the details of new lights to be returned to NZ Streetlighting using the same form used for faults and maintenance along with copies of the Certificate of Compliance (COC) and Record of Inspection (ROI). The database is updated using the liveness date from the ROI.

Whilst the current processes accurately capture alterations and additions, as identified by the field audit findings there are a significant number of incorrect records in the database due to previous processes not capturing changes made in the field.

Festive and private lights

No private lights are recorded in the database.

No festive lights are added to the NZTA DUMML ICPs in the Northland region.

Audit outcome

Non-compliant

Non-compliance	Description		
Audit Ref: 3.1 With: Clause 15.2 and 15.37B(b) From: unknown To: 17-Jun-23	The field audit found that the database is not confirmed as accurate within +/- 5%. In absolute terms, total annual consumption is estimated to be 60,400 kWh lower than the DUMML database indicates. Nine items of load have the incorrect wattage applied in the DUMML database which would result in over submission of 247.72kWh per annum. Potential impact: High Actual impact: High Audit history: Multiple times Controls: Weak Breach risk rating: 9		
Audit risk rating	Rationale for audit risk rating		
High	Controls are rated as weak as the database has a high level of inaccuracy. The impact is assessed to be high due to the kWh volumes.		
Actions taken to resolve the issue		Completion date	Remedial action status
Significant improvement has been made in the accuracy of the database. 6 databases maintained by different parties have been consolidated for this database to exist. With the previous state of this data there was significant negligence by all contracted parties, partially due to confusion of data ownership. The customer has focused on quantity and location of load to clean this data, wattage has not been the point of concern. Both distributors have accepted this database accuracy and the approach by the customer.		21/9/2023	Identified
Preventative actions taken to ensure no further issues will occur		Completion date	
All non-compliances found in the field audit have been resolved. Contractor forms have been provided for any light changes in the field, to protect the integrity of the database for future changes.		21/09/2023	

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 DUMML is being calculated accurately
- profiles for DUMML 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 all ICPs have 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

Submission process and accuracy

Genesis reconciles this DUML load using the NST profile. The on and off times are derived from a data logger.

Since the previous audits the NZTA RAMM database has been updated and is now used for submission. NZ Streetlighting provided Genesis with an extract from the NZTA database, and this was used for submission. Genesis expects to receive a monthly extract from NZ Streetlighting in future. On-off times are determined by a data logger, Genesis provided the datalogger files for July 2023. I compared the database extract provided to the submission information provided by Genesis for July 2023 and confirmed that the database total matches the submission total.

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 monthly report from NZTA to Genesis includes the dates of any changes or additions made and Genesis accounts for the changes which have happened in each month on a daily basis.

Database accuracy

Examination of the database found:

Issue	Estimated volume information impact (annual kWh)
The database is not confirmed as accurate with a 95% level of confidence as recorded in section 3.1	Over submission of 60,400 kWh p.a.
Nine items of load had the incorrect wattage applied in the database. This is detailed in section 3.1	Over submission of 247.72kWh p.a.

Audit outcome

Non-compliant

Non-compliance	Description
----------------	-------------

<p>Audit Ref: 3.2 With: Clause 15.2 and 15.37B(c)</p> <p>From: unknown To: 31-Jul-23</p>	<p>The field audit found that the database is not confirmed as accurate within +/- 5%. In absolute terms, total annual consumption is estimated to be 60,400 kWh lower than the DUML database indicates.</p> <p>Nine items of load have the incorrect wattage applied in the DUML database which would result in over submission of 247.72kWh per annum.</p> <p>Potential impact: High Actual impact: High Audit history: Multiple times Controls: Weak Breach risk rating: 9</p>		
Audit risk rating	Rationale for audit risk rating		
High	<p>Controls are rated as weak as the database has a high level of inaccuracy. The impact is assessed to be high due to the kWh volumes.</p>		
Actions taken to resolve the issue		Completion date	Remedial action status
<p>Significant improvement has been made in the accuracy of the database. 6 databases maintained by different parties have been consolidated for this database to exist. With the previous state of this data there was significant negligence by all contracted parties, partially due to confusion of data ownership. The customer has focused on quantity and location of load to clean this data, wattage has not been the point of concern. Both distributors have accepted this database accuracy and the approach by the customer.</p>		21/9/2023	Identified
Preventative actions taken to ensure no further issues will occur		Completion date	
<p>All non-compliances found in the field audit have been resolved. Contractor forms have been provided for any light changes in the field, to protect the integrity of the database for future changes.</p>		21/09/2023	

CONCLUSION

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

This is the first audit since all the NZTA streetlights in the Northland region were combined into one DUML database. In previous audits the lights were split into two regions with ICPs on the Top Energy and Northpower networks, managed separately and under two retailers. The Top Energy ICPs were consolidated into one ICP and the Northpower ICPs were switched to Genesis on 1 July 2023.

A project was completed prior to this audit to update the NZTA RAMM database and it is now used for reconciliation. Updating of the database is managed by NZ Streetlighting on behalf of NZTA. Details of changes made in the field by contractors are returned to NZ Streetlighting. Whilst the current processes accurately capture alterations and additions, as identified by the field audit findings there are a significant number of incorrect records in the database due to previous processes not capturing changes made in the field.

The field audit was undertaken of a statistical sample of 272 items of load between 9th and 17th June 2023. A high number of inaccuracies were identified, and the results of the field audit concluded that in absolute terms, total annual consumption is estimated to be 60,400 kWh lower than the DUML database indicates.

The future risk rating of 31 indicates that the next audit be completed in three months. I have considered this in conjunction with Genesis' responses which indicate that the database inaccuracies found during this audit have been investigated and resolved, and that new contractor maintenance forms have been implemented to ensure that changes are accurately recorded and updated in the database. Database cleansing has commenced with an initial focus on ensuring that the quantity and location of items of load are correct, which will help to ensure consistency between the database and lights installed. Genesis acknowledges that there are likely to be historic lamp and wattage discrepancies present in the database, and work to improve the accuracy of lamp and wattage information should be completed. I recommend that the next audit is conducted in a minimum of eight months to allow time for the database validation process to continue so that improvement can be demonstrated, and the matters raised can be resolved.

PARTICIPANT RESPONSE

Significant improvement has been made on the accuracy of the database over the past 18 months. Prior to this project there were 6 databases which were maintained by different parties, these have been consolidated for this database to exist. With the prior state of the data being split to that degree, there was significant negligence by all contracted parties. This was for several reasons, and it has been a large task to improve this over the past 18 months.

A focus over this time has been placed on quantity and location of load. This audit has focused on inaccuracies of wattage which was not the focus of this data project, as identifying items and location of load serve better to prepare the database for a future state with the proposed deployment of LED lighting. Alongside processes established for the input of information based on any changes made in the field, this will ensure further improvements are made in the following months.

These changes made and controls put in place will ensure when the mass deployment of LED lighting takes place, this database will be within the prescribed threshold requirements. Genesis strongly propose that the next audit should take place in 12 months to ensure that further improvement can be made on this database. The past 18 months have been used to improve it to its current state and further time will be needed to ensure the next audit is worthwhile and able to review the controls that have been put in place.