ELECTRICITY INDUSTRY PARTICIPATION CODE
DISTRIBUTED UNMETERED LOAD AUDIT REPORT

VERITEK

For

HOROWHENUA DISTRICT COUNCIL AND GENESIS ENERGY LIMITED

Prepared by: Rebecca Elliot

Date audit commenced: 31 July 2020

Date audit report completed: 21 December 2020

Audit report due date: 18 September 2020

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 7
1.7. Authorisation Received 7
1.8. Scope of Audit 8
1.9. Summary of previous audit 9
1.10. Distributed unmetered load audits (Clause 16A.26 and 17.295F) 12

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) 16
2.6. Tracking of load changes (Clause 11(3) of Schedule 15.3) 17
2.7. Audit trail (Clause 11(4) of Schedule 15.3) 17

3. Accuracy of DUML database 19

3.1. Database accuracy (Clause 15.2 and 15.37B(b)) 19
3.2. Volume information accuracy (Clause 15.2 and 15.37B(c)) 22

Conclusion 25

Participant response 26

EXECUTIVE SUMMARY

This audit of the **Horowhenua District Council (HDC)** 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 scope of the audit encompasses the collection, security and accuracy of the data, including the preparation of submission information.

Streetlight load is determined by wattages held within HDC's RAMM database, and a monthly extract is provided to Genesis. New connection, fault, maintenance and upgrade work is completed by Fulton Hogan. All contractors completing work on HDC's streetlights have access to RAMM, and update the database using Pocket RAMM from the field.

Database accuracy is described as follows:

Result	Percentage	Comments
The point estimate of R	102.8	Wattage from survey is higher than the database wattage by 2.8%
R_L	100.1	With a 95% level of confidence, it can be concluded that the error could be between 0.1% and 6.9%
R_H	106.9	

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 B (detailed below) is the best fit.

The variability of the sample results across the strata means that the true wattage (installed in the field) could be between 0.1% lower and 6.9% 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 2 kW higher than the database indicates.
- There is a 95% level of confidence that the installed capacity is up to 6 kW higher than the database.
- In absolute terms, total annual consumption is estimated to be 10,300 kWh higher than the DUML database indicates.
- There is a 95% level of confidence that the annual consumption is between 300 kWh p.a. and 25,300 kWh p.a. higher than the database indicates.

Genesis reconciles this DUML load as follows:

ICP	Profile	On hours	Wattage
0016099004EL9CA	CST	Data logger	Monthly extract from the RAMM database

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

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

The current monthly report is provided as a snapshot and is non-compliant, and Genesis completes revision submissions where corrections are required. Genesis is working to develop event-based calculations, which will enable accurate volume calculations where lamps change part way through a month.

The audit found four non-compliances and makes no recommendations. The future risk rating of seven indicates that the next audit be completed in 18 months and I agree with this recommendation.

The matters raised are detailed below:

AUDIT SUMMARY

NON-COMPLIANCES

Subject	Section	Clause	Non-Compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
DUML Audit	1.10	16A.26	Audit not completed within the required timeframe.	Strong	Low	1	Cleared
Deriving submission information	2.1	11(1) of Schedule 15.3	The database is not confirmed as accurate with a 95% level of confidence resulting in an estimated 10,300 kWh of under submission per annum. The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot. 17 items of load had invalid gear wattages for their lamp model description, resulting in an estimated under submission of 111 kWh p.a.	Moderate	Low	2	Investigating
Database accuracy	3.1	15.2 and 15.37B(b)	The database is not confirmed as accurate with a 95% level of confidence resulting in an estimated 10,300 kWh of under submission per annum. The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot. 17 items of load had invalid gear wattages for their lamp model description, resulting in an estimated under submission of 111 kWh p.a.	Moderate	Low	2	Investigating
Volume information accuracy	3.2	15.2 and 15.37B(c)	The database is not confirmed as accurate with a 95% level of confidence resulting in an estimated 10,300 kWh of under submission per annum.	Moderate	Low	2	Investigating

Subject	Section	Clause	Non-Compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
			The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot. 17 items of load had invalid gear wattages for their lamp model description, resulting in an estimated under submission of 111 kWh p.a.				
Future Risk Rating						7	

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

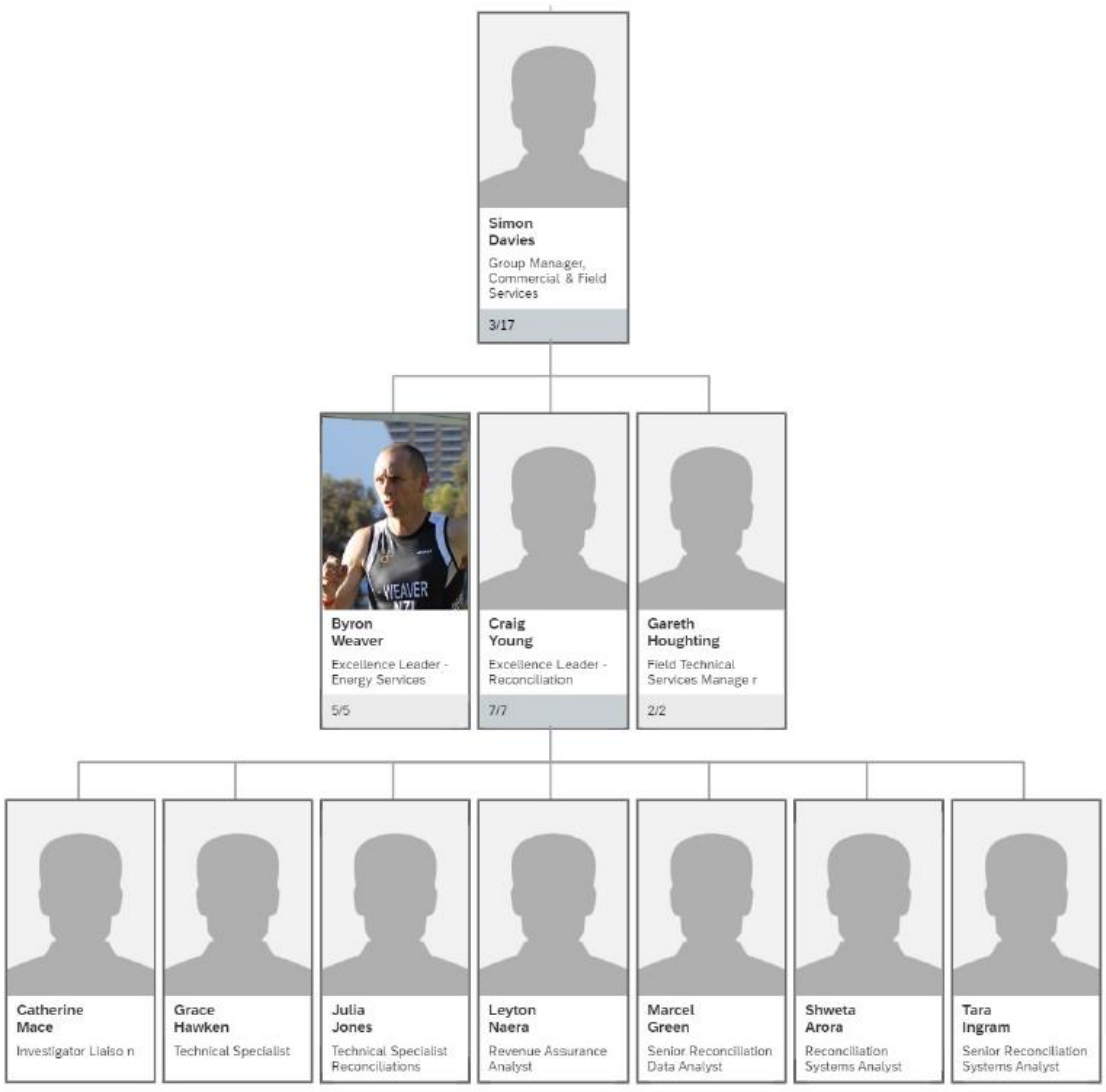
The Electricity Authority's website was reviewed to identify any exemptions relevant to the scope of this audit.

Audit commentary

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

1.2. Structure of Organisation

Genesis provided a copy of their organisational structure:



1.3. Persons involved in this audit

Auditors:

Name	Title
Rebecca Elliot	Lead Auditor
Brett Piskulic	Supporting Auditor

Other personnel assisting in this audit were:

Name	Title	Company
Brent Tucker	Roading Operations Team Leader	Horowhenua District Council
Craig Young	Reconciliation Manager - Reconciliation Team	Genesis Energy

1.4. Hardware and Software

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

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

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)
0016099004EL9CA	HDC - STREETLIGHTS	MHO0331	CST	2,603	85,243

1.7. Authorisation Received

All information was provided directly by Genesis or HDC.

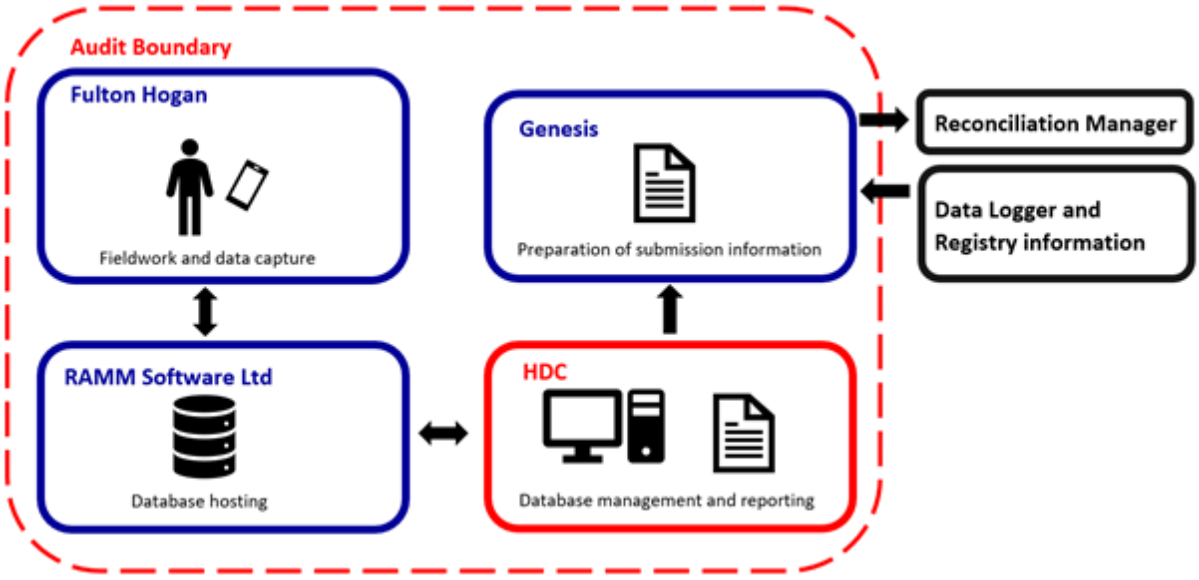
1.8. Scope of Audit

This audit of the HDC 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.

Streetlight load is determined by wattages held within HDC's RAMM database, and a monthly extract is provided to Genesis. New connection, fault, maintenance and upgrade work is completed by Fulton Hogan. All contractors completing work on HDC's streetlights have access to RAMM, and update the database using Pocket RAMM from the field.

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 252 items of load on 26 and 27 November 2020.

1.9. Summary of previous audit

The previous audit of this database was undertaken by Tara Gannon of Veritek Limited in December 2019. Four non-compliances were identified, and one recommendation was made. The current statuses of the non-compliances are detailed below.

Table of non-compliances

Subject	Section	Clause	Non-compliance	Status
Deriving submission information	2.1	11(1) of Schedule 15.3	The database is not confirmed as accurate with a 95% level of confidence. The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot. Livening dates are recorded as the vesting date for new connections, and change dates may not reflect the date of the change if they are not processed in RAMM at the time that the change occurs. 39 items of load had invalid gear wattages for their lamp model description, resulting in an estimated under submission of 179 kWh p.a. The incorrect records were updated during the audit. 91 items of load do not have ICP numbers recorded, including: • one 22W LED council parks light resulting in estimated under submission of 94 kWh p.a. • 87 private lights resulting in estimated under submission of 31,823 kWh p.a., and • three festive lights, which have no impact on submission because volumes are recorded against ICP 0016099004EL9CA when the lights are connected. Levin Mall lights are submitted against ICP 0016099004EL9CA based on database information, and also ICP 0016097099EL1B6 based on registry information, resulting in estimated over submission of 28,652 kWh p.a.	Still existing

ICP identifier and items of load	2.2	11(2)(a) and (aa) of Schedule 15.3	One 22W LED does not have an ICP number recorded against it, resulting in estimated under submission of 94 kWh p.a. Three festive lights do not have an ICP number recorded against them. There is no impact on submission because the load is reported against the correct ICP number when connected. 87 private lights do not have an ICP number recorded against them, resulting in estimated under submission of 31,823 kWh p.a.	Cleared
Database accuracy	3.1	15.2 and 15.37B(b)	The database is not confirmed as accurate with a 95% level of confidence. The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot. Livening dates are recorded as the vesting date for new connections, and change dates may not reflect the date of the change if they are not processed in RAMM at the time that the change occurs. 39 items of load had invalid gear wattages for their lamp model description, resulting in an estimated under submission of 179 kWh p.a. The incorrect records were updated during the audit. Four items of load have some inaccurate address information. 91 items of load do not have ICP numbers recorded, including: • one 22W LED council parks light resulting in estimated under submission of 94 kWh p.a., • 87 private lights resulting in estimated under submission of 31,823 kWh p.a., and • three festive lights, which have no impact on submission because volumes are recorded against ICP 0016099004EL9CA when the lights are connected. Levin Mall lights are submitted against ICP 0016099004EL9CA based on database information, and also ICP 0016097099EL1B6 based on registry information, resulting in estimated over submission of 28,652 kWh p.a.	Still existing

Volume information accuracy	3.2	15.2 and 15.37B(c)	The database is not confirmed as accurate with a 95% level of confidence. The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot. Livening dates are recorded as the vesting date for new connections, and change dates may not reflect the date of the change if they are not processed in RAMM at the time that the change occurs. 39 items of load had invalid gear wattages for their lamp model description, resulting in an estimated under submission of 179 kWh p.a. The incorrect records were updated during the audit. 91 items of load do not have ICP numbers recorded, including: • one 22W LED council parks light resulting in estimated under submission of 94 kWh p.a., • 87 private lights resulting in estimated under submission of 31,823 kWh p.a., and • three festive lights, which have no impact on submission because volumes are recorded against ICP 0016099004EL9CA when the lights are connected. Levin Mall lights are submitted against ICP 0016099004EL9CA based on database information, and also ICP 0016097099EL1B6 based on registry information, resulting in estimated over submission of 28,652 kWh p.a.	Still existing

Table of recommendations

Subject	Section	Recommendation	Status
Database Accuracy	3.1	Confirm the correct lamp and gear wattages for the unknown lights on Muhunoa West Road (467).	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 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 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. However, the audit was not completed within the required timeframe as a database extract was not able to be obtained within time to complete the audit by the due date.

Audit outcome

Compliant

Non-compliance	Description
Audit Ref: 1.10 With: Clause 16A.26 From: 18-Sep-20 To: 17-Dec-20	Audit not completed within the required timeframe. Potential impact: Low Actual impact: Low Audit history: None Controls: Strong Breach risk rating: 1
Audit risk rating	**Rationale for audit risk rating**
Low	The controls are rated as strong, as 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
Genesis will engage the auditor earlier to ensure the audit revision time frames are met.		Cleared
Preventative actions taken to ensure no further issues will occur	**Completion date**	

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 as follows:

ICP	Profile	On hours	Wattage
0016099004EL9CA	CST	Data logger	Monthly extract from the RAMM database. The database is not confirmed as accurate with a 95% level of confidence as recorded in **section 3.1**.

I checked the submission data for September 2020 and found the load for 0016099004EL9CA had been correctly calculated based on the data logger and monthly extract information.

Sources of inaccuracy are as follows:

Issue	Estimated volume information impact (annual kWh)
The database is not confirmed to be accurate within a 95% level of confidence.	Under submission of 10,300 kWh p.a.
17 items of load had invalid gear wattages for their lamp model description.	Under submission of 111 kWh p.a.

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

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

The current monthly report is provided as a snapshot and this practice is non-compliant. When a wattage is changed in the database due to a physical change or a correction, only the record present at the time the report is run is recorded, not the historical information showing dates of changes. Genesis is working to develop event-based calculations, which will enable accurate volume calculations where lamps change part way through a month.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.1 With: Clause 11(1) of Schedule 15.3 From: 01-Dec-19 To: 20-Oct-20	The database is not confirmed as accurate with a 95% level of confidence resulting in an estimated 10,300 kWh of under submission per annum. The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot. 17 items of load had invalid gear wattages for their lamp model description, resulting in an estimated under submission of 111 kWh p.a. Potential impact: Low Actual impact: Low Audit history: Three times previously Controls: Moderate Breach risk rating: 2
Audit risk rating	**Rationale for audit risk rating**
Low	Controls are rated as moderate, as they are sufficient to mitigate the risk most of the time but there is room for improvement. The impact is assessed to be low, based on the kWh difference described above.

Actions taken to resolve the issue	Completion date	Remedial action status
Genesis will be working with the council to revise the asset information over the coming months. Genesis will also engage with the council around meeting the tracking of change requirement.	01/06/2021	Investigating
Preventative actions taken to ensure no further issues will occur	**Completion date**	

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

Code reference

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

Code related audit information

The DUML database must contain:

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

Audit observation

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

Audit commentary

All items of load have an ICP assigned.

Audit outcome

Compliant

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

Code reference

Clause 11(2)(b) of Schedule 15.3

Code related audit information

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

Audit observation

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

Audit commentary

The database contains fields for the road name, location number, pole number, and GPS coordinates.

GPS coordinates are populated for all except six items of load. The six items of load without GPS coordinates are located in a pedestrian underpass at Tokomaru and are mapped to the nearest road which allows them to be located.

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

Audit outcome

Compliant

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

Code reference

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

Code related audit information

The DUML database must contain:

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

Audit observation

The database was checked to confirm that:

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

Audit commentary

The database contains the lamp make and model, lamp wattage and gear wattage.

All items of load have a lamp model, lamp wattage, and gear wattage populated. No lamp or gear wattages were invalidly recorded as zero.

The accuracy of the recorded wattages 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 completed of a statistical sample of 252 items of load on 27 November 2020. The sample was selected from four strata as follows:

1. Road names A-E,
2. Road names F-Mb,
3. Road names Mc-R, and
4. Road names S-Z.

Audit commentary

The field audit discrepancies are detailed in the table below:

Street	Database count	Field count	Light count difference	Wattage recorded incorrectly	Comments
Road names A-E					
DAWICK STREET (302)	7	7	-	1	One 70W SON recorded in the database as a 22W LED.
DERBY STREET (48)	4	4	-	1	One 26W LED recorded in the database as 70W SON.
Road names F-Mb					
JOBLINS ROAD (418)	1	1	-	1	One 27W LED recorded in the database 22W LED.
KARAKA STREET (421)	1	1	-	1	One 70W SON recorded in the database as a 22W LED.
LANCASTER STREET (116)	7	7	-	1	One 70W SON recorded in the database as a 22W LED.
Road names Mc-R					
PARSONS AVENUE (150)	8	8	-	1	One 70W SON recorded in the database as a 22W LED.
Road names S-Z					

Street	Database count	Field count	Light count difference	Wattage recorded incorrectly	Comments
SHEFFIELD STREET (181)	9	9	-	1	One 27W LED recorded in the database 22W LED.
STIRLING STREET (187)	3	3	-	2	Two 35W LED were recorded in the database as 22W LED.
Grand Total	**252**	**252**	-	**9**	

All lights checked during the field survey were present in the database. Wattage differences are recorded as non-compliance in **section 3.1**.

Audit outcome

Compliant

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

Code reference

Clause 11(3) of Schedule 15.3

Code related audit information

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

Audit observation

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

Audit commentary

The RAMM database functionality achieves compliance with the code.

The change management process and the compliance of the database reporting provided to Genesis is detailed in **sections 3.1** and **3.2**.

Audit outcome

Compliant

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

Code reference

Clause 11(4) of Schedule 15.3

Code related audit information

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

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

Audit observation

The database was checked for audit trails.

Audit commentary

The database has a complete audit trail.

Audit outcome

Compliant

3. ACCURACY OF DUML DATABASE

3.1. Database accuracy (Clause 15.2 and 15.37B(b))

Code reference

Clause 15.2 and 15.37B(b)

Code related audit information

Audit must verify that the information recorded in the retailer's DUML database is complete and accurate.

Audit observation

Genesis' submissions are based on a monthly extract from the RAMM database. A RAMM database extract was provided in October 2020 and I assessed the accuracy of this by using the DUML Statistical Sampling Guideline. The table below shows the survey plan.

Plan Item	Comments
Area of interest	Horowhenua District Council streetlights
Strata	The database contains the HDC items of load DUML in the Horowhenua region. The processes for the management of all HDC items of load are the same, but I decided to place the items of load into four strata: 1. Road names A-E, 2. Road names F-Mb, 3. Road names Mc-R, and 4. Road names S-Z.
Area units	I created a pivot table of the roads and I used a random number generator in a spreadsheet to select a total of 50 sub-units.
Total items of load	252 items of load were checked, making up 7.5% of the database load.

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

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

Audit commentary

Field audit findings

A field audit was conducted of a statistical sample of 252 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	102.8	Wattage from survey is higher than the database wattage by 2.8%
R_L	100.1	With a 95% level of confidence, it can be concluded that the error could be between 0.1% and 6.9%
R_H	106.9	

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 B (detailed below) is the best fit.

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 0.1% lower and 6.9% 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 2 kW higher than the database indicates.
- There is a 95% level of confidence that the installed capacity is up to 6 kW higher than the database.
- In absolute terms, total annual consumption is estimated to be 10,300 kWh higher than the DUML database indicates.
- There is a 95% level of confidence that the annual consumption is between 300 kWh p.a. and 25,300 kWh p.a. higher than the database indicates.

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

Light description and capacity accuracy

As discussed in **section 2.4**, all lights have a lamp and gear wattage recorded.

Lamp and gear wattages were compared to the expected values. No lamp wattage discrepancies were identified. 17 gear wattage discrepancies were identified. The differences are expected to result in under submission of 26W or 111kWh p.a. based on 4,271 burn hours p.a. The incorrect records were updated during the audit.

Lamp make model	Description	Recorded gear wattage	Expected gear wattage	Count	Total difference (W)
PHIL (M80, 80 watts)	80W Mercury Vapour	8	10	9	+18
PHIL (MH70, 70 watts)	70W Metal Halide	12	13	8	+8
			Total	**17**	**+26**

Address accuracy

As discussed in **section 2.3**, all items of load have address information recorded.

Change management process findings

New connection, fault, maintenance and upgrade work is completed by Fulton Hogan. All contractors completing work on HDC's streetlights have access to RAMM, and update the database using Pocket RAMM from the field.

I walked through the new connection process. New connections are initially recorded in the database as private lights (without an ICP number) and are updated to a valid HDC ICP once they are vested in council. Each new connection application to the Network includes an "as built" plan, and a site check is performed prior to approval. Livening is normally conducted by the developer or the Distributor, with updates to the database performed within two weeks.

Weekly and monthly movement analysis is undertaken on the database by HDC and recent changes made are checked against field invoices.

Outage patrols are completed periodically with the latest completed recently. There is no set schedule for outage patrols. HDC relies on the public to advise of lights which need to be maintained.

The RAMM database records an installation date, which is used to record the date the light is vested in council once this occurs. There is no separate livening date.

Change dates are automatically generated by RAMM when records change but cannot be selected by the user. Changes normally entered using Pocket RAMM on the date of the change.

Festive lights

The database contains Christmas lighting, which is connected in late November/early December and disconnected in mid-January. These items of load have "Festive Lighting" recorded as the ICP group and are excluded from submissions when they are disconnected. Genesis include these lights for submissions during the period in which they are switched on.

Private lights

Private lights are recorded in the database with "Private" as the ICP group. They are recorded in the database for completeness only. HDC does not have responsibility for maintaining private lights and does not expect to be billed for them. End users are not billed for electricity consumption for private lights by HDC. These are expected to be billed either as standard unmetered load or shared unmetered load. The

details for these lights were provided to Powerco some years ago and have been addressed within the Powerco Distributor audit.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 3.1 With: Clause 15.2 and 15.37B(b) From: 01-Dec-19 To: 20-Oct-20	The database is not confirmed as accurate with a 95% level of confidence resulting in an estimated 10,300 kWh of under submission per annum. 17 items of load had invalid gear wattages for their lamp model description, resulting in estimated under submission of 111 kWh p.a. Potential impact: Low Actual impact: Low Audit history: Three times previously Controls: Moderate Breach risk rating: 2
Audit risk rating	**Rationale for audit risk rating**
Low	Controls are rated as moderate, as they are sufficient to mitigate the risk most of the time but there is room for improvement. The impact is assessed to be low, based on the kWh difference described above.

Actions taken to resolve the issue	Completion date	Remedial action status
Genesis will be working with the council to revise the asset information over the coming months. Genesis will also engage with the council around meeting the tracking of change requirement.	01/06/2021	Investigating
Preventative actions taken to ensure no further issues will occur	**Completion date**	

3.2. Volume information accuracy (Clause 15.2 and 15.37B(c))

Code reference

Clause 15.2 and 15.37B(c)

Code related audit information

The audit must verify that:

- *volume information for the DUML is being calculated accurately*
- *profiles for DUML have been correctly applied.*

Audit observation

The submission was checked for accuracy for the month the database extract was supplied. This included:

- checking the registry to confirm that the ICP has the correct profile and submission flag, and
- checking the database extract combined with the on hours against the submitted figure to confirm accuracy.

Audit commentary

Genesis reconciles this DUML load using the CST profile for 0016099004EL9CA. The correct profile and submission type is recorded on the registry.

Genesis reconciles this DUML load as follows:

ICP	Profile	On hours	Wattage
0016099004EL9CA	CST	Data logger	Monthly extract from the RAMM database. The database is not confirmed as accurate with a 95% level of confidence as recorded in **section 3.1**.

I checked the submission data for September 2020 and found the load for 0016099004EL9CA had been correctly calculated based on the data logger and monthly extract information.

Sources of inaccuracy are as follows:

Issue	Estimated volume information impact (annual kWh)
The database is not confirmed to be accurate within a 95% level of confidence.	Under submission of 10,300 kWh p.a.
17 items of load had invalid gear wattages for their lamp model description.	Under submission of 111 kWh p.a.

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

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

The current monthly report is provided as a snapshot and this practice is non-compliant. When a wattage is changed in the database due to a physical change or a correction, only the record present at the time the report is run is recorded, not the historical information showing dates of changes.

Audit outcome

Non-compliant

Non-compliance	Description

Audit Ref: 3.2 With: Clause 15.2 and 15.37B(c) From: 01-Dec-19 To: 20-Oct-20	The database is not confirmed as accurate with a 95% level of confidence resulting in an estimated 10,300 kWh of under submission per annum. 17 items of load had invalid gear wattages for their lamp model description, resulting in an estimated under submission of 111 kWh p.a. The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot. Potential impact: Low Actual impact: Low Audit history: Three times previously Controls: Moderate Breach risk rating: 2
Audit risk rating	**Rationale for audit risk rating**
Low	Controls are rated as moderate, as they are sufficient to mitigate the risk most of the time but there is room for improvement. The impact is assessed to be low, based on the kWh difference described above.

Actions taken to resolve the issue	**Completion date**	**Remedial action status**
Genesis will be working with the council to revise the asset information over the coming months. Genesis will also engage with the council around meeting the tracking of change requirement.	01/06/2021	Investigating
Preventative actions taken to ensure no further issues will occur	**Completion date**	

CONCLUSION

Streetlight load is determined by wattages held within HDC's RAMM database, and a monthly extract is provided to Genesis. New connection, fault, maintenance and upgrade work is completed by Fulton Hogan. All contractors completing work on HDC's streetlights have access to RAMM, and update the database using Pocket RAMM from the field.

Database accuracy is described as follows:

Result	Percentage	Comments
The point estimate of R	102.8	Wattage from survey is higher than the database wattage by 2.8%
R_L	100.1	With a 95% level of confidence, it can be concluded that the error could be between 0.1% and 6.9%
R_H	106.9	

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 B (detailed below) is the best fit.

The variability of the sample results across the strata means that the true wattage (installed in the field) could be between 0.1% lower and 6.9% 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 2 kW higher than the database indicates.
- There is a 95% level of confidence that the installed capacity is up to 6 kW higher than the database.
- In absolute terms, total annual consumption is estimated to be 10,300 kWh higher than the DUML database indicates.
- There is a 95% level of confidence that the annual consumption is between 300 kWh p.a. and 25,300 kWh p.a. higher than the database indicates.

Genesis reconciles this DUML load as follows:

ICP	Profile	On hours	Wattage
0016099004EL9CA	CST	Data logger	Monthly extract from the RAMM database

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

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

The current monthly report is provided as a snapshot and is non-compliant, and Genesis completes revision submissions where corrections are required. Genesis is working to develop event-based calculations, which will enable accurate volume calculations where lamps change part way through a month.

The audit found four non-compliances and makes no recommendations. The future risk rating of seven indicates that the next audit be completed in 18 months and I agree with this recommendation.

PARTICIPANT RESPONSE

Genesis Energy will continue to work with the council to rectify any anomalies that currently exist in the database. Genesis will be revising the information provided over the last 12 months to engage with the council around tracking of changes.