ELECTRICITY INDUSTRY PARTICIPATION CODE
DISTRIBUTED UNMETERED LOAD AUDIT REPORT

For

WELLINGTON CITY COUNCIL AND GENESIS ENERGY

Prepared by: Rebecca Elliot

Date audit commenced: 4 March 2020

Date audit report completed: 30 March 2019

Audit report due date: 1 April 2020

TABLE OF CONTENTS

EXECUTIVE SUMMARY

This audit of the **Wellington City Council (WCC)** DUML 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 DUML audits version 1.1.

The RAMM database used for submission is managed by WCC. New connection, fault and maintenance work is completed by Downer, and the LED upgrade work is being completed by Downer, Fulton Hogan, City Electricians and Higgins. All contractors update the database using Pocket RAMM.

WCC provides a monthly report to Genesis from the RAMM database, which is used to create submission information. WCC also uses the PLANet CMS to manage their LED lights.

The roading LED upgrade project is largely complete and the walkway lights are in the process of being upgraded, with a target completion date of 2021. The field audit found a large volume of wattage discrepancies including LED wattages. There have been some issues with getting field updates flowing into RAMM causing delays in getting lights updated and also the data accuracy of these updates is variable. WCC are working with their contractors to improve this.

The overall database accuracy has improved since the last audit.

Database accuracy is described as follows:

Result	Percentage	Comments
The point estimate of R	95.1	Wattage from survey is lower than the database wattage by 4.9%
R_L	90.3	With a 95% level of confidence it can be concluded that the error could be between -9.7% and-2.3%
R_H	97.7	

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 9.7% and 2.3% 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 2 kW lower than the database indicates.

There is a 95% level of confidence that the installed capacity is between 40 kW and 9 kW lower than the database.

In absolute terms, total annual consumption is estimated to be 85,900 kWh lower than the DUML database indicates.

There is a 95% level of confidence that the annual consumption is between 170,500kWh and 40,100 kWh p.a. lower than the database indicates.

The audit found six non-compliances and two recommendations were raised. The future risk rating of 32 indicates that the next audit be completed in three months. I have considered this in conjunction with Genesis's responses and the impact of the pandemic and recommend the next audit be due in nine months' time. The matters raised are detailed below:

AUDIT SUMMARY

NON-COMPLIANCES

Subject	Section	Clause	Non-Compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
Deriving submission information	2.1	11(1) of Schedule 15.3	The database used to prepare submissions contains some inaccurate information. • The field data was 95.1% of the database data for the sample checked. This will result in potential over submission of 85,900 kWh per annum (based on annual burn hours of 4,271 as detailed in the DUML database auditing tool). • 347 items of load have lamp and/or gear wattages recorded which differed from the published standardised wattage table and manufacturer's specifications available. The impact of these differences is estimated to approximately 19,583 kWh per annum of under submission (based on annual burn hours of 4,271 as detailed in the DUML database auditing tool). • Nine items of load have missing, incomplete or unknown lamp wattages and descriptions, and 78 items of load have missing, incomplete or unknown gear wattages and descriptions. The combined impact is estimated to be approximately 6,494 kWh of under submission (based on annual burn hours of 4,271 as detailed in the DUML database auditing tool).	Weak	High	9	Identified

Subject	Section	Clause	Non-Compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
			• Dynamic dimming is sometimes used, and the full lamp wattage is recorded in RAMM for the dynamically dimmed lights. The impact varies but is expected to be low. • Static dimming was not correctly applied for 202 of the 9,312 statically dimmed lamps. The impact is expected to be approximately 20,642 kWh per annum under submission (based on annual burn hours of 4,271 as detailed in the DUML database auditing tool). • The wattage for dimmed lights is rounded and this will be resulting in an estimated over submission of 6,520kWh annually. • 65 Christmas lights do not have ICP numbers recorded.				
ICP identifier	2.2	11(2)(a) and (aa) of Schedule 15.3	ICP number is not recorded for 65 Christmas lights.	Strong	Low	1	Identified
Description and capacity of load	2.4	11(2)(c) and (d) of Schedule 15.3	Some description and capacity information is incomplete or unknown, including: • 148 lamps with unknown or blank lamp descriptions • nine items of load with zero wattage recorded, and • 78 blank gear wattages.	Moderate	Low	2	Identified
All load recorded in database	2.5	11(2A) of Schedule 15.3	Two additional items of load found in the field audit.	Moderate	Low	2	Investigating
Database accuracy	3.1	15.2 and 15.37B(b)	The database contains some inaccurate data.	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)	The database used to prepare submissions contains some inaccurate information.	Weak	High	9	Identified
Future Risk Rating						32	

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
Deriving submission accuracy	2.5	Check that all decorative lights are assigned to the correct ICP.
Database Accuracy	3.1	Check and correct light wattages provided.

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

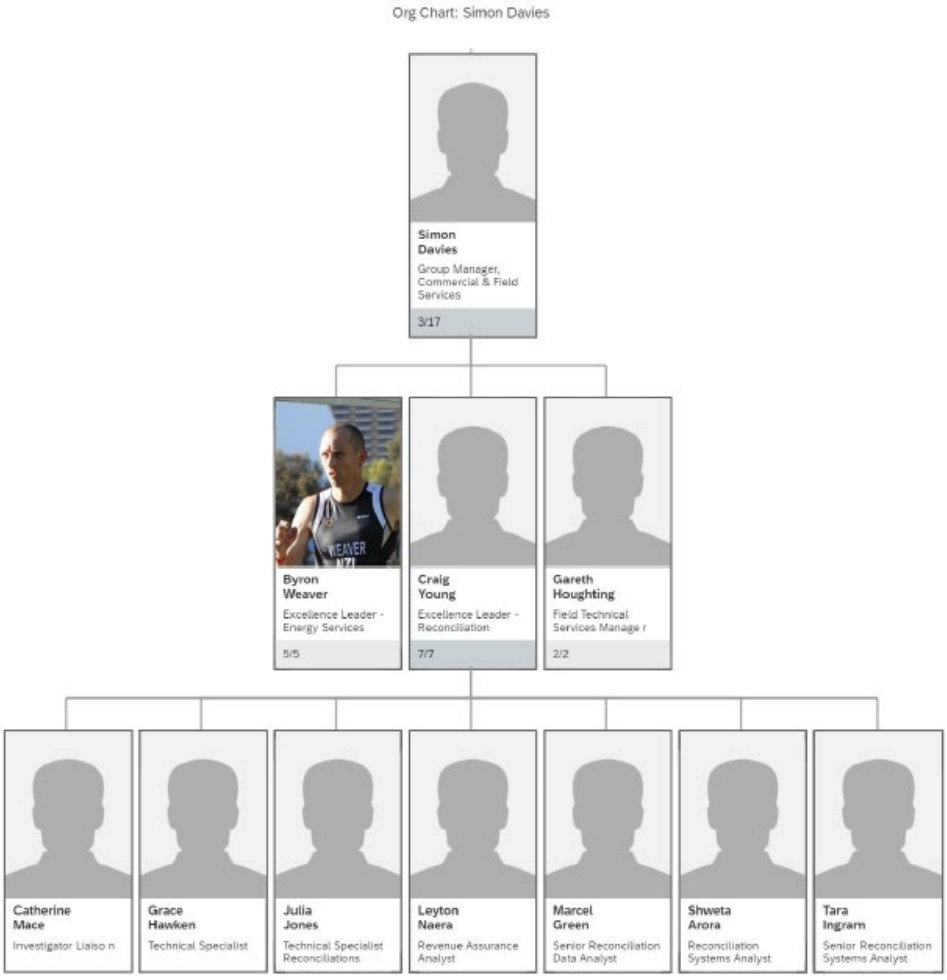
The Electricity Authority's website was reviewed to identify any exemptions relevant to the scope of this audit.

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

Auditor:

Rebecca Elliot

Veritek Limited

Electricity Authority Approved Auditor

Other personnel assisting in this audit were:

Name	Title	Company
Kevin Turner	Team Leader Transport Infrastructure	Wellington City Council
Savaram Rengarajan	Engineer, Streetlighting	Wellington City Council
Steve Wright	Team Leader, Resurfacing and Contracts	Wellington City Council
Craig Young	Excellence Leader - Reconciliation	Genesis Energy
Grace Hawken	Technical Specialist - 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.

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

Systems used by the trader to calculate submissions were 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	Number of items of load	Database wattage (watts)
0001255309UN981	MSTR ICP WCC CPK0331	CPK0331	7,378	570,048
0001256880UN374	MSTR ICP WCC CPK0111	CPK0111	532	42,133
0001256885UNE3B	MASTER ICP WIL0331	WIL0331	4,325	337,218
0001256890UN9D9	AOTEA QUAY	TKR0331	3,976	235,406
0001256892UN95C	MSTR ICP WCC KWA0111	KWA0111	1,025	84,387
1001102041UNDDC	MASTER ICP AIRPORT	CPK0331	310	58,473
1001152333CKC0E	AMENITY LIGHTING	CPK0331	1,066	51,066
1001152334CK1C4	DECORATIVE LIGHTING	CPK0331	245	10,367
1001152335CKD81	24/7 (1) LIGHTING	CPK0331	49	6,815
1001152336CK141	24/7 (2) LIGHTING	WIL0331	14	956
1001152339CKE9F	4 HOUR LIGHTING	CPK0331	33	12,476
Total			**18,935**	**1,409,345**

1.7. Authorisation Received

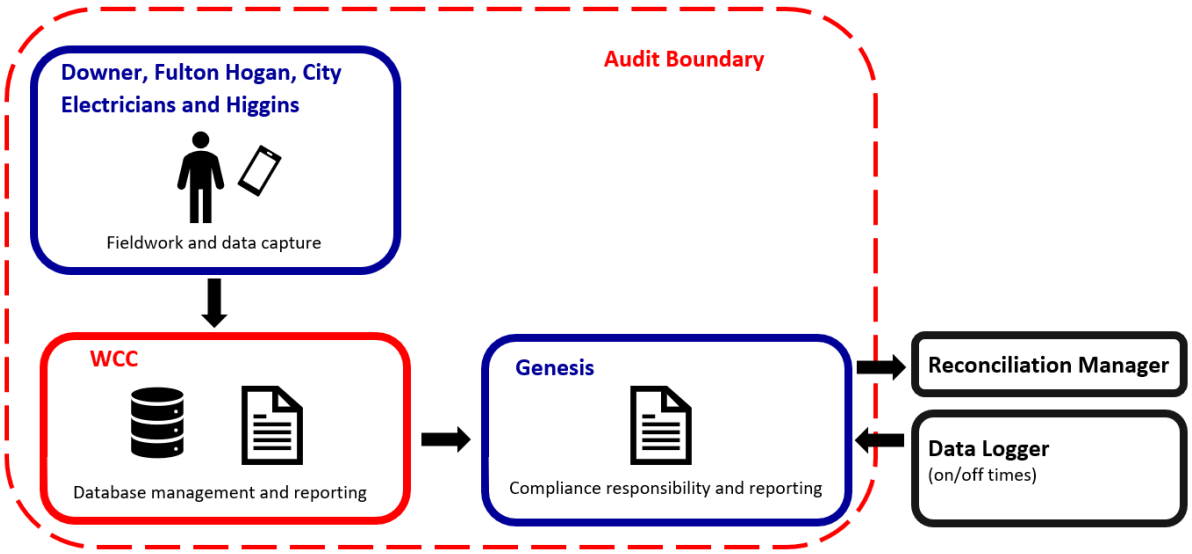
All information was provided directly by Genesis and WCC.

1.8. Scope of Audit

The RAMM database used for submission is managed by WCC. New connection, fault and maintenance work is completed by Downer, and LED upgrade work is completed by Downer, Fulton Hogan, City Electricians and Higgins. All contractors update the database using Pocket RAMM.

WCC provides a monthly report to Genesis from the RAMM database, which is used to create submission information. WCC also uses the PLANet to manage their LED lights.

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

The field audit was undertaken of a statistical sample of 433 items of load on 20-21 March 2020.

1.9. Summary of previous audit

The previous audit was completed in March 2019 by Tara Gannon of Veritek Limited. Five non-compliances were identified, and no recommendations were made. The statuses of the non-compliances and recommendations are described below.

Table of Non-compliance

Subject	Section	Clause	Non-compliance	Status
Deriving submission information	2.1	11(1) of Schedule 15.3	Some submission data was incorrect in December 2018 and January 2019: • Christmas lights (1,037W) were not included in the submission data; and • volumes were under reported by 711 kWh in December 2018 and 567 kWh in January 2019 for ICP 1001152336CK14. The database used to prepare submissions contains some inaccurate information.	Cleared Still existing
ICP identifier	2.2	11(2)(a) and (aa) of Schedule 15.3	ICP number is not recorded for 65 Christmas lights.	Still existing
Description and capacity of load	2.4	11(2)(c) and (d) of Schedule 15.3	Some description and capacity information is incomplete or unknown, including: • 23 lamp wattages and descriptions; and • 17 gear wattages and descriptions.	Still existing

Subject	Section	Clause	Non-compliance	Status
Database accuracy	3.1	15.2 and 15.37B(b)	The database contains some inaccurate data.	Still existing
Volume information accuracy	3.2	15.2 and 15.37B(c)	Some submission data was incorrect in December 2018 and January 2019: • Christmas lights (1,037W) were not included in the submission data; and • volumes were under reported by 711 kWh in December 2018 and 567 kWh in January 2019 for ICP 1001152336CK14. The database used to prepare submissions contains some inaccurate information.	Cleared Still existing

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 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.

Audit commentary

Genesis reconciles this DUML load using the CST profile and a data logger is used to derive the burn hours for eight of the ICPs. The burn hours for the remaining three ICPs are derived using set hours per day as detailed in the table below:

ICP	Profile	ICP description	Burn hours
1001152335CKD81	UNM	24/7 (1) LIGHTING	24 hours x days in period
1001152336CK141	UNM	24/7 (2) LIGHTING	24 hours x days in period
1001152339CKE9F	CST	4 HOUR LIGHTING	4 hours x days in period

I recalculated the expected submission volumes for each ICP for February 2020 based on the database wattages and burn hours provided and confirmed all values to be correct.

The last audit reported two issues with submission. The findings for this audit are set out in the table below:

2019 Audit Findings:	2020 Audit Findings:
Christmas lights, which do not have an ICP number assigned and were excluded from the submission data, the 65 Christmas lights have a combined wattage of 1,037W according to the January 2019 database extract	I checked the Christmas lights and found they still do not have an ICP assigned but a check of the submission files confirmed that the volumes have been submitted against ICP 1001152336CK141 which is connected to NSP CPK0331. However, these lights are likely to be connected across more than one NSP. I recommend in **section 2.2**, that all decorative lights are reviewed to confirm they are being reconciled to the correct ICP.
ICP 1001152336CK141, which Genesis advised had not been correctly set up in their system, which resulted in under reporting of 711 kWh in December 2018 and 567 kWh in January 2019, the ICP data has now been corrected, and revised consumption will be submitted.	I confirmed revisions have been submitted.

Volume inaccuracy is present in the database as follows:

Issue	Estimated volume information impact (annual kWh)
Potential over submission due to database inaccuracy identified during the field audit	85,900 kWh over submission
Lamp and/or gear wattages which differ from the published standardised wattage table and manufacturer's specifications available.	19,583 kWh under submission
Items of load with invalid zero lamp or gear wattages	1,259 kWh of under submission
Unapproved dynamic dimming	Unknown, but expected to result in low over submission
Static dimming applied to the incorrect lamp types	20,642 kWh under submission
Rounding of statically dimmed lights	6,520 kWh over submission

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.1 With: Clause 11(1) of Schedule 15.3 From: 01-Dec-18 To: 29-Feb-20	The database used to prepare submissions contains some inaccurate information. • The field data was 95.1% of the database data for the sample checked. This will result in potential over submission of 85,900 kWh per annum (based on annual burn hours of 4,271 as detailed in the DUML database auditing tool). • 347 items of load have lamp and/or gear wattages recorded which differed from the published standardised wattage table and manufacturer's specifications available. The impact of these differences is estimated to approximately 19,583 kWh per annum of under submission (based on annual burn hours of 4,271 as detailed in the DUML database auditing tool). • Nine items of load have missing, incomplete or unknown lamp wattages and descriptions, and 78 items of load have missing, incomplete or unknown gear wattages and descriptions. The combined impact is estimated to be approximately 6,494 kWh of under submission (based on annual burn hours of 4,271 as detailed in the DUML database auditing tool). • Dynamic dimming is sometimes used, and the full lamp wattage is recorded in RAMM for the dynamically dimmed lights. The impact varies but is expected to be low. • Static dimming was not correctly applied for 202 of the 9,312 statically dimmed lamps. The impact is expected to be approximately 20,642 kWh per annum under submission (based on annual burn hours of 4,271 as detailed in the DUML database auditing tool). • The wattage for dimmed lights is rounded and this will be resulting in an estimated over submission of 6,520kWh annually. • 65 Christmas lights do not have ICP numbers recorded. Potential impact: High Actual impact: High Audit history: Once Controls: Weak Breach risk rating: 6
Audit risk rating	**Rationale for audit risk rating**
High	Overall, the controls are rated as weak, primarily due to the database accuracy issues discussed further in **section 3.1**. The impact is assessed to be high, based on the kWh differences described above.

Actions taken to resolve the issue	Completion date	Remedial action status
The provision of monthly exception management reporting outlines any erroneous information within the customers data.	current	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
Genesis continues to provide exception management reporting to WCC.	current	

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 is recorded for each item of load.

Audit commentary

As reported in the last audit, ICP numbers are recorded for each item of load in the database except solar, private, and Christmas lights.

- Solar lights are not connected to the streetlight circuits, and an ICP number is not required.
- Private lights are connected to the streetlight circuits but are not WCC's responsibility. They are recorded in the database for completeness only. Each month, a database extract is provided to Wellington Electricity which includes these private lights. It is understood that Wellington Electricity intends to create ICPs for this load. Progress on this will be checked in the next Wellington Electricity distributor audit.
- There are 65 Christmas lights (1,037W), which do not have ICP numbers recorded. The lights are located at Kelburn, Pipitea, Tawa, Te Aro, and Wellington Central and are likely to be connected to different NSPs. I plotted all of the decorative lights and found some in Miramar and Wadestown suggesting a small number of these may also be connected to a different NSP. I recommend that all decorative lights are checked to confirm that they are assigned to the correct ICP. This is recorded as non-compliance below.

Recommendation	Description	Audited party comment	Remedial action
Deriving submission accuracy	Check that all decorative lights are assigned to the correct ICP.	Genesis will advise the customer of the potential correct ICP for each asset. Genesis also believes that the market impact is minimal due the NSP's having the same balancing area.	Investigating

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.2 With: Clause 11(2)(a) and (aa) of Schedule 15.3 From: unknown To: 29-Feb-20	ICP number is not recorded for 65 Christmas lights. Potential impact: Low Actual impact: Low Audit history: Once Controls: Strong Breach risk rating: 1
Audit risk rating	**Rationale for audit risk rating**
Low	Controls are rated as strong as the bulk of the lights have an ICP assigned and are recorded against the correct ICP. The impact is low/ none as this volume has now been submitted and the number of lights potentially assigned to the incorrect ICP are minor.

Actions taken to resolve the issue	Completion date	Remedial action status
Provide WCC with the indicative ICP associated with each asset. Genesis will need to ensure that the assets are distinguishable due to the seasonality of the activeness of these lamps.	01/08/2020	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
Genesis continues to provide exception management reporting to WCC.	current	

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

All items of load have GPS coordinates recorded. 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.

Audit commentary

Lamp make and model, gear model, lamp wattage, gear wattage and total wattage are included in the database. WCC has worked to improve the completeness and accuracy of description and wattage information following the previous audit.

Most items of load have lamp and gear make and model information recorded. All items of load have a gear wattage and lamp wattage recorded, but some were invalidly recorded as zero.

- 148 items of load had an unknown lamp description recorded. 105 of these were assumed to be HPS lights with the lamp wattage recorded.
- Nine items of load[1] had no lamp wattage recorded. There was insufficient lamp description information to confirm the type of light likely to be installed.
- 78 items of load[2] had missing, incomplete or unknown gear descriptions and zero gear wattages recorded. At least four of those have lamp models indicating they may be 70W sodium lights, and the combined gear wattage is expected to be 52W (or 222 kWh of under submission based on 4,271 annual burn hours). The other lights with missing or unknown gear descriptions appear to be LEDs.

[1] Excluding solar, private lights, and fuse boxes with no draw which are included in the database for completeness.
[2] Excluding solar, private lights, and fuse boxes with no draw which are included in the database for completeness.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.4 With: Clauses 11(2)(c) and (d) of Schedule 15.3 From: unknown To: 29-Feb-20	Some description and capacity information is incomplete or unknown, including: • 148 lamps with unknown or blank lamp descriptions, • nine items of load with zero wattage recorded, and • 78 blank gear wattages. Potential impact: Low Actual impact: Low Audit history: Once 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 ensure that almost all items of load have wattage and description information recorded. The impact is estimated to be low, based on the information available.

Actions taken to resolve the issue	Completion date	Remedial action status
The provision of monthly exception management reporting outlines any erroneous information within the customers data.	current	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
Genesis continues to provide exception management reporting to WCC.	Current	

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 433 items of load on 20-21 March 2020.

Audit commentary

All streets with discrepancies are shown in the table below.

Address	Database Count	Field Count	Count differences	Wattage differences	Comments
ABBOTT ST	12	12		2	1x 30W Fluorescent found in the field recorded as 50W HPS 1x 20W LED recorded as 25W LED
ALBANY AVE	1	1		1	1x 27W LED found in the field recorded as 70W HPS
ARA TAWA CYCLEWAY	8	9	+1	3	1x extra 158W LED found by the Tawa Community Pool 2x 158W LED & 27W LED found in the field recorded as 140W Phillips Cosmos in the databases
BENTINCK AVE	5	5		1	1x 27W LED found in the field recorded as 70W HPS
CALCUTTA ST	23	23		2	1x 27W LED found in the field recorded as 54W LED 1x 28W LED found in the field recorded as 27W LED
GRASS ST	11	11		1	1x 27W LED found in the field recorded as 70W HPS
IMLAY CRES	14	14		2	1x 36W LED found in the field recorded as 30W LED 1x 27W LED found in the field recorded as 20W LED
KARORI RD-#123 SLIP	11	11		1	1x 158W LED found in the field recorded as 150W HPS
LUCKIE ST	2	3	+1		1x extra 27W LED found in the field
NGATOTO ST	7	7		3	1x 70W HPS found in the field recorded as 54W LED 1x 28W LED found in the field recorded as 27W LED 1x 27W LED found in the field recorded as 28W LED

Address	Database Count	Field Count	Count differences	Wattage differences	Comments
PAT LAWLOR CL	1	0	-1		1x 100W HPS not found in the field
PIPITEA ST	10	10		2	1x 158W LED found in the field recorded as 400W HPS 1x 26W LED found in the field recorded as 20W LED
RANUI TCE	13	13		1	1x 158W LED found in the field recorded as 110W HPS
RAROA TCE	11	11		1	1x 27W LED found in the field recorded as 70W HPS
RAUMATI TCE	6	6		1	1x 27W LED found in the field recorded as 70W HPS
RAWHITI TCE	12	11	-1	2	1x 27W LED not found in the field 1x 30W LED found in the field recorded as 20W LED 1x 36W LED found in the field recorded as 70W HPS
ROBIESON ST	8	8		2	2x 27W LEDs found in the field recorded as 70W HPS
ROSSITER ST	4	4		4	3x 28W LEDS found in the field recorded as 2x 27W LED & 1 x 30W LED 1x 70W HPS found in the field recorded as 27W LED
ROTHSAY RD	6	6		1	1x 27W LED found in the field recorded as 20W LED
Grand total for whole sample	**433**	**433**	**4**	**30**	

I found two additional lights in the field. This is recorded as non-compliance below. The database accuracy is discussed in **section 3.1**.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.5 With: Clauses 11(2A) of Schedule 15.3 From: 01-Feb-19 To: 29-Feb-20	Two additional items of load found in the field audit. Potential impact: Low Actual impact: Low Audit history: None 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 ensure that the majority of items of load are recorded in the database. The impact is estimated to be low, based on the information available.

Actions taken to resolve the issue	Completion date	Remedial action status
The provision of monthly exception management reporting outlines any erroneous information within the customers data. In this instance Genesis would not be able to ascertain, and would reply on the accuracy of the exception management processes of WCC and any 3rd party contractor.	01/10/2020	Investigating
Preventative actions taken to ensure no further issues will occur	**Completion date**	
Genesis provided exceptions found in the report to enable WCC to investigate the field v asset database.	01/10/2020	

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 contains a complete audit trail. Reporting provided to Genesis is from the RAMM database.

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

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	WCC streetlights in the Wellington region.
Strata	The database contains items of load in WCC area. The processes for the management of all WCC items of load are the same. Strata were created based on suburb, because this gave good coverage of owners, install dates, and ICPs. Ten suburbs which made up more than 1% of the total wattage in the database were selected at random.
Area units	I created a pivot table of the roads in each stratum and I used a random number generator in a spreadsheet to select a total of 81 sub-units.
Total items of load	433 items of load were checked.

Wattages were checked for alignment with the published standardised wattage table produced by the Electricity Authority against the database or in the case of LED lights against the LED light specification.

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

Audit commentary

Database accuracy based on the field audit

A field audit was conducted of a statistical sample of 433 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	95.1	Wattage from survey is lower than the database wattage by 4.9%
R_L	90.3	With a 95% level of confidence it can be concluded that the error could be between -9.7% and-2.3%
R_H	97.7	

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 9.7% and 2.3% 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 2 kW lower than the database indicates.

There is a 95% level of confidence that the installed capacity is between 40 kW and 9 kW lower than the database.

In absolute terms, total annual consumption is estimated to be 85,900 kWh lower than the DUML database indicates.

There is a 95% level of confidence that the annual consumption is between 170,500kWh and 40,100 kWh p.a. lower than the database indicates.

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

The inaccuracy is due largely to incorrect wattage or light types, and not missing or additional load. The change management process appears to have a poor level of accuracy. WCC are working with their contractors to improve this.

Wattage accuracy

The database wattages were checked against the published standardised wattage table and manufacturer's specifications, where available.

As reported in the last audit, part of the LED upgrade, lamp and gear wattages have been updated for the majority of lamps in the database. There have been some issues getting the field updates into RAMM. WCC are working to resolve these. This will have been the cause of some of the discrepancies found in the field audit as detailed in the table in **section 2.5**. I reviewed wattage accuracy for all LED database records and found that although there has been some improvement, discrepancies are still present.

A check of the database extract found the same discrepancies as recorded in the last audit for 28 lamp models (347 items of load). The lamp and/or gear wattages recorded differed from the published standardised wattage table and manufacturer's specifications available. A full list has been provided to Wellington City Council for review, and I repeat the recommendation that wattages should be updated if found to be incorrect.

Lamps with wattage differences	RAMM total wattage	Expected wattage	Estimated difference
347	19,916	24,501	4,585W or approximately 19,583 kWh under submission (based on annual burn hours of 4,271 as detailed in the DUML database auditing tool).

For three lamp models (95 items of load), I could not locate wattage specifications that matched the driver recorded. This has been provided to Wellington City Council for review, and I recommend that wattages should be updated if found to be incorrect.

Lamps where specifications could not be located	RAMM total wattage	Expected wattage	Difference
95	5,130	Unknown	Unknown

Recommendation	Description	Audited party comment	Remedial action
Database Accuracy	Check and correct light wattages provided	Genesis can advise the customer that it is expected the wattage discrepancies are to be rectified.	Identified

As discussed in **section 2.4**, some items of load had missing, incomplete or unknown lamp and/or gear wattages and descriptions:

Item	Lamps with invalid zero wattage	RAMM wattage	Expected wattage	Estimated difference
Missing, incomplete or unknown lamp wattages and descriptions	9	0	Unknown	Assuming these are all 27W LED (the most common light recorded in WCC database) this will be resulting in an estimated minor under submission of approximately 1,037 kWh per annum (based on annual burn hours of 4,271 as detailed in the DUML database auditing tool).
Missing, incomplete or unknown gear wattages and descriptions	78	0	52	52W for the four assumed 70W HPS unknown lights resulting in an estimated minor under submission of approximately 222 kWh under submission (based on annual burn hours of 4,271 as detailed in the DUML database auditing tool). The rest of the lights are LEDs and the correct figure for these is zero.

Dynamic dimming is used a small number of lights. The full lamp wattage is recorded in RAMM for the dynamically dimmed lights therefore a minor amount of over submission will be occurring. WCC is working with Genesis and the EA to gain approval from the EA to use data from PLANet for submission, which will prevent non-compliance where dynamic dimming is applied.

- Two programs allow lights to be dimmed to different levels at certain times during the night. There are 85 items of load connected to these two programs, which are applied at the request of Wellington residents affected by the streetlights. The full wattage for the lights is recorded in the database, which will result in over submission. Most of the affected lights are 158W LEDs, and they are dimmed by 40% to 60% for part of the night.
- Occasionally organisers of events request streetlights be dimmed for one night. This occurs rarely, and no adjustment is made to the database. This practice is expected to result in a small amount of over submission from time to time.

PLANet also records when lights are not burning and when outages occur. If this were able to be used for submission it is expected to provide a higher level of submission accuracy than the current process.

WCC began to apply static dimming percentages in December 2018. Static dimming is applied for 9,312 lamps. The dimmed wattages are calculated based on the manufacturer's wattage multiplied by the static dimming percentage to give an effective wattage. The dimming percentages are transferred to PLANet to ensure that RAMM is consistent with how the lamps are programmed to be dimmed.

WCC confirmed that only LED Roadway NXT-12S (27W), Teceo (55W), and LED Roadway NXT 72m (158W) are expected to be statically dimmed. 9,110 (97.8%) of the 9,312 dimmed lamps have one of these lamp types. The other 202 lamps should not be dimmed, including 28 sodium lamps.

Discrepancies between PLANet lamp types and RAMM lamp model information may be contributing to the invalidly applied dimming.

Lamps where dimming is applied by not expected	Dimmed total wattage	Expected wattage	Difference
202	6,520	11,311	4,791W or approximately 20,462 kWh under submission (based on annual burn hours of 4,271 as detailed in the DUML database auditing tool)

There were also some errors in the application of the dimming percentages:

- Lamps are approved to be dimmed to 50%, 65%, 75% or 85%. I found seven lamps were dimmed to 32% & 35%. WCC are correcting these records to 50% in RAMM. This equates to 192W or an estimated minor under submission of 820 kWh per annum.
- I checked application of dimming against the information provided in the monthly report to Genesis for March 2020 and found that the dimmed wattage is recorded as a whole number e.g. 27W light dimmed by 50% is recorded as 14W rather than 13.5W. This will be resulting in an estimated over submission of 6,520 kWh annually (based on annual burn hours of 4,271 as detailed in the DUML database auditing tool).

As reported in the last audit, there are some items of load included in the database that are not streetlights, including driver feedback signs, parking space information, and parking sensors. All of these items of load have a battery attached so that they can continue to operate when the streetlight circuit is turned off. Wattage is recorded as the full wattage to charge the battery as it is not possible to determine the actual load being used. This will result in a very minor amount of over submission but is the most accurate figure available. WCC confirmed that the base stations and fuse boxes correctly show zero wattage.

Lamp model	Count	Total effective wattage
Base Station	2	0
Decorative lighting fuse box	3	0
Fuse Box only	6	0
HMI Cycle Aware Sign	1	25
HMI Driver Feed Back Sign	1	30
HTS - Parking Space Info	5	2,300
HTS DFBS 100mA/12v 15w	22	330
Parking Sensor Gateway	94	7,520
Total	134	10,205

ICP accuracy

As discussed in **section 2.2,** 65 Christmas lights (1,037W) do not have an ICP number recorded.

Change Management

The RAMM database used for submission is managed by WCC. New connection, fault and maintenance work is completed by Downer, and LED upgrade work is completed by Downer, Fulton Hogan, City Electricians and Higgins. All contractors update the database using Pocket RAMM.

The roading LED upgrade project is largely complete and the rollout of walkway lights is now underway. There have been some issues with getting changes in the field to load to RAMM and the accuracy of these updates appears to be variable. WCC are working to resolve this. This will have contributed to the errors found in the field, although I note the majority of incorrect wattages were due to incorrect LED wattages. The target completion is 2021 but this could extend dependant on the impact of Covid-19.

PLANet is used to manage the LED lamps and apply static and dynamic dimming as discussed above. Most LED lamps have telecells which allow communication with PLANet. Eventually almost all LED lights will have telecells, apart from some walkway lights and lights located in Makara. WCC continues to maintain its streetlight records in RAMM as well as PLANet. At the end of the LED upgrade project, WCC intends to complete a data cleanse to ensure that the PLANet and RAMM data is consistent and accurate.

The new connections process was discussed and for subdivisions has the following steps:

1. a plan is prepared by the developer and approved by WCC,
2. the installation is completed,
3. WCC notifies Genesis that livening is required, Northpower and Wellington Electricity are notified at the same time, and a certificate of compliance is provided,
4. Genesis requests livening from Wellington Electricity,
5. an “as built” plan is provided to WCC, and
6. the database is updated.

Steps 5 and 6 can be delayed and the items of load do not have a “start date” in the database, the date they are entered is the start date. WCC intend to work with the planning department to get better cohesion between them so the onboarding of streetlights can be quicker and the date of lights becoming council property is correctly recorded. Genesis have begun discussions with Wellington Electricity to review the electrical connection of streetlights for councils where Genesis is the trader.

Private lights are connected to the streetlight circuits but are not WCC’s responsibility. They are recorded in the database for completeness only. Each month, a database extract is provided to Wellington Electricity which includes these private lights. It is understood that Wellington Electricity intends to create ICPs for this load.

There are 65 Christmas lights (1,037W), which do not have an ICP number recorded. The lights are located at Kelburn, Pipitea, Tawa, Te Aro, and Wellington Central and are likely to be connected to different NSPs. The missing ICP numbers are recorded as non-compliance in **section 2.2** and I have recommended that these lights are checked to ensure they are being reconciled to the correct ICP.

Downer completes monthly outage patrols for main roads and bus routes, and outage information is also available from PLANet.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 3.1 With: Clause 15.2 and 15.37B(b) From: unknown To: 29-Feb-20	The database accuracy is assessed to be 95.1% of the database for the sample checked indicating a potential over submission of approximately 85,900 kWh per annum. 347 items of load have lamp and/or gear wattages recorded which differed from the published standardised wattage table and manufacturer's specifications available. The impact of these differences is estimated to be approximately 19,583 kWh of under submission (based on annual burn hours of 4,271 as detailed in the DUML database auditing tool). Nine items of load have missing, incomplete or unknown lamp wattages and descriptions, and 78 items of load have missing, incomplete or unknown gear wattages and descriptions. The combined impact is estimated to be approximately 1,259 kWh under submission (based on annual burn hours of 4,271 as detailed in the DUML database auditing tool). Dynamic dimming is sometimes used, and the full lamp wattage is recorded in RAMM for the dynamically dimmed lights. The impact varies but is expected to be low. Static dimming was not correctly applied for 202 of the 9,312 statically dimmed lamps. The impact is expected to be at least approximately 20,642 kWh under submission (based on annual burn hours of 4,271 as detailed in the DUML database auditing tool). The wattage for dimmed lights is rounded and this will be resulting in an estimated over submission of 6,520kWh annually. 65 Christmas lights do not have ICP numbers recorded. Potential impact: High Actual impact: High Audit history: Once Controls: Weak Breach risk rating: 9
Audit risk rating	**Rationale for audit risk rating**
High	The controls are rated as weak, because they are not sufficient to ensure that database wattage is consistently accurate. WCC intends to take action to resolve the issues. The impact is assessed to be high based on the wattage differences described above.

Actions taken to resolve the issue	Completion date	Remedial action status
Genesis have advised the customer that it is expected the wattage discrepancies will be rectified.	01/10/2020	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
Genesis continue to work with our customer and 3rd party contractors to remind them of their responsibilities in maintaining or changing items of load associated DUML.	01/07/2020	

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 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

Genesis reconciles this DUML load using the CST profile and a data logger is used to derive the burn hours for eight of the ICPs. The burn hours for the remaining three ICPs are derived using set hours per day as detailed in the table below:

ICP	Profile	ICP description	Burn hours
1001152335CKD81	UNM	24/7 (1) LIGHTING	24 hours x days in period
1001152336CK141	UNM	24/7 (2) LIGHTING	24 hours x days in period
1001152339CKE9F	CST	4 HOUR LIGHTING	4 hours x days in period

I recalculated the expected submission volumes for each ICP for February 2020 based on the database wattages and burn hours provided and confirmed all values to be correct.

The last audit reported two issues with submission. The findings for this audit are set out in the table below:

2019 Audit Findings:	2020 Audit Findings:
Christmas lights, which do not have an ICP number assigned and were excluded from the submission data, the 65 Christmas lights have a combined wattage of 1,037W according to the January 2019 database extract	I checked the Christmas lights and found they still do not have an ICP assigned but a check of the submission files confirmed that the volumes have been submitted against ICP 1001152336CK141 which is connected to NSP CPK0331. However, these lights are likely to be connected across more than one NSP. I recommend in **section 2.2**, that all decorative lights are reviewed to confirm they are being reconciled to the correct ICP.
ICP 1001152336CK141, which Genesis advised had not been correctly set up in their system, which resulted in under reporting of 711 kWh in December 2018 and 567 kWh in January 2019, the ICP data has now been corrected, and revised consumption will be submitted.	I confirmed revisions have been submitted.

Volume inaccuracy is present in the database as follows:

Issue	Estimated volume information impact (annual kWh)
Potential over submission due to database inaccuracy identified during the field audit.	85,900 kWh over submission
Lamp and/or gear wattages which differ from the published standardised wattage table and manufacturer's specifications available.	19,583 kWh under submission
Items of load with invalid zero lamp or gear wattages.	1,259 kWh of under submission
Unapproved dynamic dimming.	Unknown, but expected to result in low over submission
Static dimming applied to the incorrect lamp types.	20,642 kWh under submission
Rounding of statically dimmed lights.	6,520 kWh over submission

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 3.2 With: Clause 15.2 and 15.37B(c) From: 01-Dec-18 To: 29-Feb-20	The database used to prepare submissions contains some inaccurate information: • The field data was 95.1% of the database data for the sample checked. This will result in potential over submission of 85,900 kWh per annum (based on annual burn hours of 4,271 as detailed in the DUML database auditing tool). • 347 items of load have lamp and/or gear wattages recorded which differed from the published standardised wattage table and manufacturer's specifications available. The impact of these differences is estimated to approximately 19,583 kWh per annum of under submission (based on annual burn hours of 4,271 as detailed in the DUML database auditing tool). • Nine items of load have missing, incomplete or unknown lamp wattages and descriptions, and 78 items of load have missing, incomplete or unknown gear wattages and descriptions. The combined impact is estimated to be approximately 6,494 kWh of under submission (based on annual burn hours of 4,271 as detailed in the DUML database auditing tool). • Dynamic dimming is sometimes used, and the full lamp wattage is recorded in RAMM for the dynamically dimmed lights. The impact varies but is expected to be low. • Static dimming was not correctly applied for 202 of the 9,312 statically dimmed lamps. The impact is expected to be approximately 20,642 kWh per annum under submission (based on annual burn hours of 4,271 as detailed in the DUML database auditing tool). • The wattage for dimmed lights is rounded and this will be resulting in an estimated over submission of 6,520kWh annually. • 65 Christmas lights do not have ICP numbers recorded. Potential impact: High Actual impact: High Audit history: Once Controls: Weak Breach risk rating: 9
Audit risk rating	**Rationale for audit risk rating**
High	Overall, the controls are rated as weak, primarily due to the database accuracy issues discussed further in **section 3.1**. The impact is assessed to be high, based on the kWh differences described above. Revised submission data will be provided to resolve the submission issues.

Actions taken to resolve the issue	Completion date	Remedial action status
Genesis have advised the customer that it is expected the wattage discrepancies will be rectified. The remedial action has been identified through the audit, Which provides Genesis with the insight of the current state of the customers dataset.	01/10/2020	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
Genesis continue to work with our customer and 3rd party contractors to remind them of their responsibilities in maintaining or changing items of load associated DUML.	01/07/2020	

CONCLUSION

The roading LED upgrade project is largely complete and the walkway lights are in the process of being upgraded, with a target completion date of 2021. The field audit found a large volume of wattage discrepancies including LED wattages. There have been some issues with getting field updates flowing into RAMM causing delays in getting lights updated and also the data accuracy of these updates is variable. WCC are working with their contractors to improve this.

The overall database accuracy has improved since the last audit.

Database accuracy is described as follows:

Result	Percentage	Comments
The point estimate of R	95.1	Wattage from survey is lower than the database wattage by 4.9%
R_L	90.3	With a 95% level of confidence it can be concluded that the error could be between -9.7% and-2.3%
R_H	97.7	

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 9.7% and 2.3% 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 2 kW lower than the database indicates.

There is a 95% level of confidence that the installed capacity is between 40 kW and 9 kW lower than the database.

In absolute terms, total annual consumption is estimated to be 85,900 kWh lower than the DUML database indicates.

There is a 95% level of confidence that the annual consumption is between 170,500kWh and 40,100 kWh p.a. lower than the database indicates.

The audit found six non-compliances and two recommendations were raised. The future risk rating of 32 indicates that the next audit be completed in three months. I have considered this in conjunction with Genesis's responses and the impact of the pandemic and recommend the next audit be due in nine months' time.

The matters raised are detailed below:

PARTICIPANT RESPONSE

Genesis agrees with the auditor's findings and has provided the relative feedback to the customer requesting the exceptions be addressed.

Genesis will be providing the council with the "potential" correct ICP for each asset based on locational details, and will request the council to indicate dates of activeness for the Christmas Lighting to avoid annual settlement of seasonal data.