ELECTRICITY INDUSTRY PARTICIPATION CODE
DISTRIBUTED UNMETERED LOAD AUDIT REPORT

For

WELLINGTON CITY COUNCIL AND GENESIS ENERGY

Prepared by: Steve Woods

Date audit commenced: 10 August 2021

Date audit report completed: 19 January 2022

Audit report due date: 1 September 2021

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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 Fulton Hogan. 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 database still contains many discrepancies, most of which were present during the last audit. Field updates do not always appear to be accurate and updates for new connections are not always timely.

Database accuracy is described as follows:

Result	Percentage	Comments
The point estimate of R	97.3	Wattage from survey is lower than the database wattage by 2.7%
R_L	93.9	With a 95% level of confidence, it can be concluded that the error could be between -6.1% and -0.4%
R_H	99.6	

These results were categorised in accordance with the "Distributed Unmetered Load Statistical Sampling Audit Guideline", effective from 1 February 2019 and the table below shows that Scenario 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 0.4% lower and 6.1% 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 26 kW lower than the database indicates.

There is a 95% level of confidence that the installed capacity is between 4 kW lower and 58 kW lower than the database.

In absolute terms, total annual consumption is estimated to be 109,200 kWh lower than the DUML database indicates.

There is a 95% level of confidence that the annual consumption is between 17,500kWh lower and 249,800 kWh p.a. lower than the database indicates.

The audit found seven non-compliances and two recommendations were raised. Genesis intends to begin using the output from WCC's CMS, which will improve compliance in many areas. This won't however improve the database accuracy compared to the field, which can only be improved through field audit.

The future risk rating of 34 indicates that the next audit be completed in three months. I have considered this in conjunction with Genesis's responses and recommend the next audit be due in nine months to allow enough time to start using WCC's CMS.

The matters raised are shown in the tables 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: • 109,200 kWh per annum over submission from field audit, • 18,572 per annum under submission due to incorrect lamp or gear wattages, • 2,776 kWh per annum under submission due to missing lamp or gear wattages, • 8,862 kWh per annum under submission due to static dimming applied to incorrect lamp types, and • 65 Christmas lights do not have ICP numbers recorded.	Weak	High	9	Investigating
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	Investigating
Location of each item of load	2.3	11(2)(b) of Schedule 15.3	62 items of load do not have GPS coordinates or street numbers.	Moderate	Low	2	Investigating
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: • 131 lamps with unknown or blank lamp descriptions, • 13 items of load with zero wattage recorded, and • 13 blank gear wattages.	Moderate	Low	2	Unknown
All load recorded in database	2.5	11(2A) of Schedule 15.3	Nine additional items of load found in the March 2021 field audit.	Moderate	Low	2	Unknown

Subject	Section	Clause	Non-Compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
Database accuracy	3.1	15.2 and 15.37B(b)	The database accuracy is assessed to be 97.3% of the database for the sample checked indicating a potential over submission of approximately 109,200 kWh per annum. 262 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 18,572 kWh of under submission (based on annual burn hours of 4,271 as detailed in the DUML database auditing tool). 13 items of load have incorrect wattages, leading to under submission by 2,776 kWh per annum. 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 49 HPS lamps. The impact is expected to be at least approximately 8,862 kWh under submission (based on annual burn hours of 4,271 as detailed in the DUML database auditing tool). 65 Christmas lights do not have ICP numbers recorded.	Weak	High	9	Investigating
Volume information accuracy	3.2	15.2 and 15.37B(c)	The database used to prepare submissions contains some inaccurate information: • 109,200 kWh per annum over submission from field audit,	Weak	High	9	Investigating

Subject	Section	Clause	Non-Compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
			• 18,572 per annum under submission due to incorrect lamp or gear wattages, • 2,776 kWh per annum under submission due to missing lamp or gear wattages, • 8,862 kWh per annum under submission due to static dimming applied to incorrect lamp types, and • 65 Christmas lights do not have ICP numbers recorded.				
Future Risk Rating						34	

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

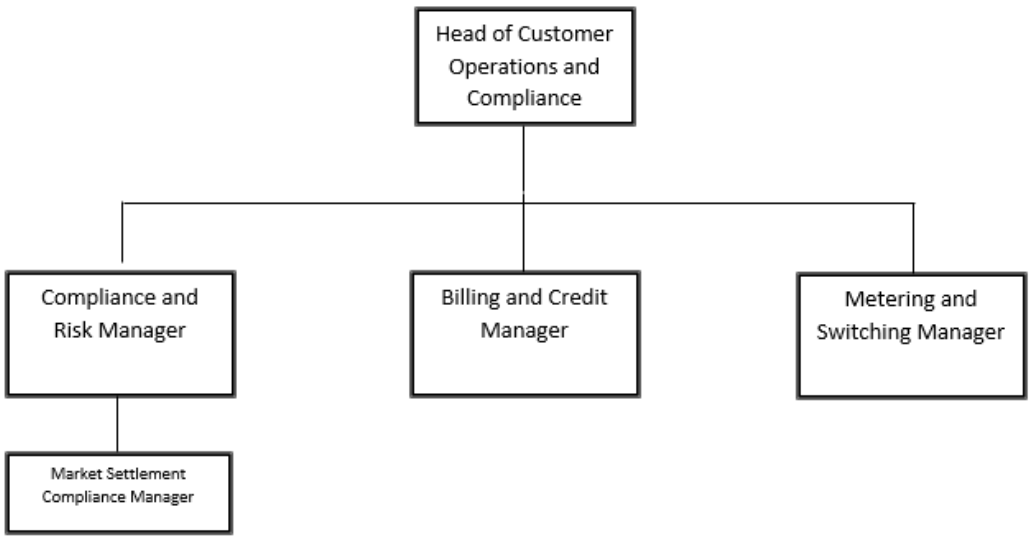
The Electricity Authority's website was reviewed to identify any exemptions relevant to the scope of this audit.

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:

Steve Woods

Veritek Limited

Electricity Authority Approved Auditor

Other personnel assisting in this audit were:

Name	Title	Company
Steve Wright	Team Leader, Resurfacing and Contracts	Wellington City Council
Lionel Kea	T/L Pedestrian Network Maintenance	Wellington City Council
Craig Young	Market Settlement Compliance Manager	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 also uses the PLANet CMS to manage their LED lights.

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	7,443	556,218
0001256880UN374	MSTR ICP WCC CPK0111	CPK0111	532	40,844
0001256885UNE3B	MASTER ICP WIL0331	WIL0331	4,328	32,7525
0001256890UN9D9	AOTEA QUAY	TKR0331	4,035	227,403
0001256892UN95C	MSTR ICP WCC KWA0111	KWA0111	1,028	82,288
1001102041UNDDC	MASTER ICP AIRPORT	CPK0331	296	55,409
1001152333CKC0E	AMENITY LIGHTING	CPK0331	1,079	49,528
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			**19,031**	**1,374,782**

1.7. Authorisation Received

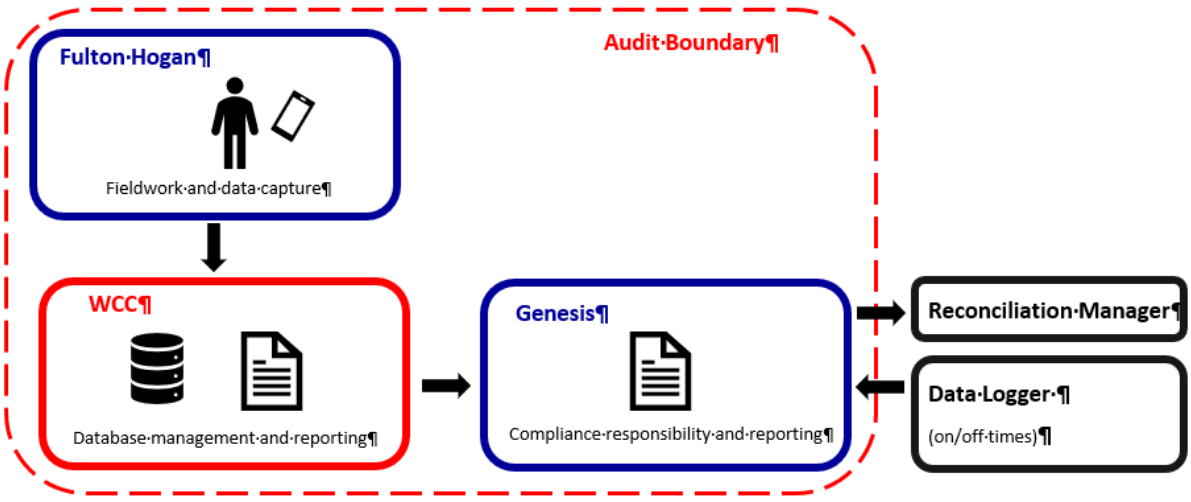
All information was provided directly by Genesis and WCC.

1.8. Scope of Audit

The RAMM database used for submission is managed by WCC. New connection, fault and maintenance work is completed by Fulton Hogan, and LED upgrade work is completed by Fulton Hogan. 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 487 items of load on 10 - 11 August 2021.

1.9. Summary of previous audit

The previous audit was completed in March 2021 by Steve Woods of Veritek Limited. Six non-compliances were identified which are all still existing.

Table of Non-compliance

Subject	Section	Clause	Non-compliance	Status
Deriving submission information	2.1	11(1) of Schedule 15.3	The database used to prepare submissions contains some inaccurate information: • 9,400 kWh per annum under submission from field audit, • 33,866 per annum under submission due to incorrect lamp or gear wattages, • 3,203 kWh per annum under submission due to missing lamp or gear wattages, • 5,749 kWh per annum under submission due to static dimming applied to incorrect lamp types, • the wattage for dimmed lights is rounded and this will be resulting in an estimated over submission of 6,520kWh annually, and • 65 Christmas lights do not have ICP numbers recorded.	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

Subject	Section	Clause	Non-compliance	Status
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: • 135 lamps with unknown or blank lamp descriptions, • 15 items of load with zero wattage recorded, and • 14 blank gear wattages.	Still existing
All load recorded in database	2.5	11(2A) of Schedule 15.3	Nine additional items of load found in the field audit.	Still existing
Database accuracy	3.1	15.2 and 15.37B(b)	The database accuracy is assessed to be 100.2% of the database for the sample checked indicating a potential under submission of approximately 9,400 kWh per annum. 391 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 33,866 kWh of under submission (based on annual burn hours of 4,271 as detailed in the DUML database auditing tool). 15 items of load have incorrect wattages, leading to under submission by 3,203 kWh per annum. 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 310 statically dimmed lamps. The impact is expected to be at least approximately 5,749 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.	Still existing

Subject	Section	Clause	Non-compliance	Status
Volume information accuracy	3.2	15.2 and 15.37B(c)	The database used to prepare submissions contains some inaccurate information: • 9,400 kWh per annum under submission from field audit, • 33,866 per annum under submission due to incorrect lamp or gear wattages, • 3,203 kWh per annum under submission due to missing lamp or gear wattages, • 5,749 kWh per annum under submission due to static dimming applied to incorrect lamp types, • the wattage for dimmed lights is rounded and this will be resulting in an estimated over submission of 6,520kWh annually, and • 65 Christmas lights do not have ICP numbers recorded.	Still existing

Subject	Section	Description	Status
Deriving submission accuracy	2.5	Check that all decorative lights are assigned to the correct ICP.	Still existing
Database Accuracy	3.1	Check and correct light wattages provided.	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 June 2021 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:

March 2021 Audit Findings:	August 2021 Audit Findings:
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	The same issue is present as was recorded in earlier reports.

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	109,200 kWh over submission
Lamp and/or gear wattages which differ from the published standardised wattage table and manufacturer's specifications available.	18,572 kWh under submission
Items of load with invalid zero lamp or gear wattages	2,776 kWh of under submission (wattage assumed to be 50, which is the database average)
Unapproved dynamic dimming	Unknown, but expected to result in low over submission
Static dimming applied to the incorrect lamp types	8,862 kWh under submission

Rounding of statically dimmed lights was recorded as non-compliance during the last audit. This issue is not present now because Genesis uses the unrounded field for submission purposes.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.1 With: Clause 11(1) of Schedule 15.3 From: 01-Mar-21 To: 17-Aug-21	The database used to prepare submissions contains some inaccurate information: • 109,200 kWh per annum over submission from field audit, • 18,572 per annum under submission due to incorrect lamp or gear wattages, • 2,776 kWh per annum under submission due to missing lamp or gear wattages, • 8,862 kWh per annum under submission due to static dimming applied to incorrect lamp types, and • 65 Christmas lights do not have ICP numbers recorded. Potential impact: High Actual impact: High Audit history: Three times 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.

Actions taken to resolve the issue	Completion date	Remedial action status
Genesis are working on improving settlement compliance, with the intent to initiate profile applications once the supporting data has been obtained. Genesis are to continue utilising the customers database extractions whilst we continue to work through both LED and non-LED asset processes/validation for the Wellington City Council. It has been iterated by the Council that it does not intend to complete a field audit.	Continuous improvement	Investigating
Preventative actions taken to ensure no further issues will occur	**Completion date**	
Genesis are aware that there are many field discrepancies, however the council have iterated they will not be doing a completed field audit and can only report energy volumes that have been calculated off the customers datasets provided. Where exceptions have been found and corrected, the historic volumes are corrected through the revision process. Genesis will be looking into the decorative lighting and the assets icp allocation, although the NSP's in this area, are all within the same balancing area.	Continuous improvement	

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

Code reference

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

Code related audit information

The DUML database must contain:

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

Audit observation

The database was checked to confirm an ICP 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. Shared unmetered load ICPs have not been created for these lights and this issue has been present for several years. The subdivision at Saddleback Grove was never vested and is unlikely to be vested. It has 1.4kW of lighting (17x70 watt HPS). There will need to be shared unmetered load ICPs created for this subdivision. Tiketike Way is also not in the database and probably needs to have shared unmetered created as well.
- 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 be looking into the decorative lighting and the assets icp allocation, although the NSP's in this area, are all within 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: 17-Aug-21	ICP number is not recorded for 65 Christmas lights. Potential impact: Low Actual impact: Low Audit history: Three times 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 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
Genesis will be looking into the decorative lighting and the assets icp allocation, although the NSP's in this area, are all within the same balancing area.	Continuous improvement	Investigating
Preventative actions taken to ensure no further issues will occur	**Completion date**	
Genesis to action new ICP/s for the Christmas light NSP allocation		

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

62 items of load do not have GPS coordinates or street number recorded.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.3 With: Clause 11(2)(b) of Schedule 15.3 From: 01-Mar-21 To: 17-Aug-21	62 items of load do not have GPS coordinates or street numbers Potential impact: Low Actual impact: Low Audit history: None Controls: Moderate Breach risk rating: 2
Audit risk rating	**Rationale for audit risk rating**
Low	The controls are recorded as moderate because they mitigate risk most of the time but there is room for improvement. The impact on settlement and participants is minor; therefore, the audit risk rating is low.

Actions taken to resolve the issue	Completion date	Remedial action status
Genesis continues to provide exception reporting to enable the customer to manage database discrepancies	Continuous improvement	Investigating
Preventative actions taken to ensure no further issues will occur	**Completion date**	
A field audit would identify all database discrepancies, but the council has iterated it does not plan to conduct a complete field audit.		

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.

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.

- 131 items of load had an unknown lamp description recorded.
- 13 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.
- 13 items of load[2] had missing, incomplete or unknown gear descriptions and zero gear wattages recorded.

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: 17-Aug-21	Some description and capacity information is incomplete or unknown, including: • 131 lamps with unknown or blank lamp descriptions, • 13 items of load with zero wattage recorded, and • 13 blank gear wattages. Potential impact: Low Actual impact: Low Audit history: Three times Controls: Moderate Breach risk rating: 2

[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 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**
Genesis met with WCC and discussed the continuation of issues within the database. The council has iterated that they continue to have it and resource constraints meaning they have not been able to complete the corrections in their database. This is a reiteration of the last audit and the council continues to struggle to meet the requirements for completeness. These exceptional are known to the council however to date have not been able to populate the details required.		unknown	Unknown
Preventative actions taken to ensure no further issues will occur		**Completion date**	
Genesis continues to review the data and raises any exceptions with the council where identified.		unknown	

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 487 items of load on 10 - 11 August 2021.

Audit commentary

The discrepancies are summarised in the table below. A spreadsheet of all discrepancies was provided to WCC and Genesis.

Discrepancy	Quantity
Items of load in the database not found in the field	12
Incorrect wattages recorded	31
Total	**43**

I did not find any additional lights in the field during this audit.

I checked the discrepancies recorded in the previous audit, and it appears the database has not been updated for the additional lights identified.

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-Mar-20 To: 17-Aug-21	Nine additional items of load found in the March 2021 field audit. Potential impact: Low Actual impact: Low Audit history: Twice 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
Genesis will request the inclusion of the assets into the database, the completion date of this is unknown as the council cannot advise when this would be completed.	Unknown	Unknown
Preventative actions taken to ensure no further issues will occur	**Completion date**	
Genesis are unable to monitor assets that are missing from the database as it's just not possible, a field audit would locate any further assets, however the council will not be completing a full field audit.	unknown	

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 road names, because this gave good coverage of owners, install dates, and ICPs.
Area units	I created a pivot table of the roads in each of the five strata and I used a random number generator in a spreadsheet to select a total of 80 sub-units.
Total items of load	487 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 487 items of load. The "database auditing tool" was used to analyse the results, which are shown in the table below.

Result	Percentage	Comments
The point estimate of R	97.3	Wattage from survey is lower than the database wattage by 2.7%
R_L	93.9	With a 95% level of confidence, it can be concluded that the error could be between -6.1% and -0.4%
R_H	99.6	

These results were categorised in accordance with the "Distributed Unmetered Load Statistical Sampling Audit Guideline", effective from 1 February 2019 and the table below shows that Scenario 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 0.4% lower and 6.1% 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 26 kW lower than the database indicates.

There is a 95% level of confidence that the installed capacity is between 4 kW lower and 58 kW lower than the database.

In absolute terms, total annual consumption is estimated to be 109,200 kWh lower than the DUML database indicates.

There is a 95% level of confidence that the annual consumption is between 17,500kWh lower and 249,800 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 change management process appears to have a poor level of accuracy.

Wattage accuracy

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

A check of the database extract found the same discrepancies as recorded in the last audit for 38 lamp models (262 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.

Recommendation	Description	Audited party comment	Remedial action
Database Accuracy	Check and correct light wattages provided	Genesis reviews and makes corrections to lamp/gear wattages as required, and provides exception report back to the council	Identified

As discussed in **section 2.4**, some items of load had missing, incomplete or unknown lamp and/or gear wattages and descriptions. 13 have blank or zero lamp wattages and 13 have blank or zero gear wattages.

Dynamic dimming is used for 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. Genesis intends to use a profile that allows dimming. Check meters have been installed and it's likely these will need to be changed to certified meters. Dimming details are as follows:

- 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 9,943 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. 293 lamps should not be showing as dimmed, including 49 sodium lamps. Discrepancies between PLANet lamp types and RAMM lamp model information may be contributing to the invalidly applied dimming.

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 10 lamps were dimmed to 35% or 55%. WCC are checking these records to see if they are incorrect.

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.

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 Fulton Hogan, and LED upgrade work is completed by Fulton Hogan. All contractors update the database using Pocket RAMM.

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.

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.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 3.1 With: Clause 15.2 and 15.37B(b) From: unknown To: 26-Feb-21	The database accuracy is assessed to be 97.3% of the database for the sample checked indicating a potential over submission of approximately 109,200 kWh per annum. 262 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 18,572 kWh of under submission (based on annual burn hours of 4,271 as detailed in the DUML database auditing tool). 13 items of load have incorrect wattages, leading to under submission by 2,776 kWh per annum. 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 49 HPS lamps. The impact is expected to be at least approximately 8,862 kWh under submission (based on annual burn hours of 4,271 as detailed in the DUML database auditing tool). 65 Christmas lights do not have ICP numbers recorded. Potential impact: High Actual impact: High Audit history: Three times 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. 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 will be engaging with the council to enabling Genesis to administer a new ICP for billing and settlement of these assets. Genesis will continue engaging with the Council to establish compliance improvements.	unknown	Investigating
Preventative actions taken to ensure no further issues will occur	**Completion date**	

Continue to work with the council to manage database discrepancies • Introduce a new ICP to cater for locations of decorative Christmas lighting • Continue to manage the dimming of asset that are non-led • Continue to provide exception reporting to the council on the identified gear/lamp wattage and description anomalies	unknown	

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 June 2021 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:

March 2021 Audit Findings:	August 2021 Audit Findings:
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	The same issue is present as was recorded in earlier reports.

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.	

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	109,200 kWh over submission
Lamp and/or gear wattages which differ from the published standardised wattage table and manufacturer's specifications available.	18,572 kWh under submission
Items of load with invalid zero lamp or gear wattages	2,776 kWh of under submission (wattage assumed to be 50, which is the database average)
Unapproved dynamic dimming	Unknown, but expected to result in low over submission
Static dimming applied to the incorrect lamp types	8,862 kWh under submission

Rounding of statically dimmed lights was recorded as non-compliance during the last audit. This issue is not present now because Genesis uses the unrounded field for submission purposes.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 3.2 With: Clause 15.2 and 15.37B(c) From: 01-Mar-21 To: 17-Aug-21	The database used to prepare submissions contains some inaccurate information: • 109,200 kWh per annum over submission from field audit, • 18,572 per annum under submission due to incorrect lamp or gear wattages, • 2,776 kWh per annum under submission due to missing lamp or gear wattages, • 8,862 kWh per annum under submission due to static dimming applied to incorrect lamp types, and • 65 Christmas lights do not have ICP numbers recorded. Potential impact: High Actual impact: High Audit history: Three times 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.

Actions taken to resolve the issue	**Completion date**	**Remedial action status**
Genesis are working on improving settlement compliance, with the intent to initiate profile applications once the supporting data has been obtained. Genesis will continue to engage the council in investing in database accuracy to mitigate the compliance risk and the frequency of audits.	unknown	Investigating
Preventative actions taken to ensure no further issues will occur	**Completion date**	
Genesis has been unable to gain access to PLANet to date to review asset information. Genesis are aware that there are many field discrepancies, however the council have iterated they will not be doing a completed field audit. Genesis will be looking into the decorative lighting and the assets icp allocation, although the NSP's in this area, are all within the same balancing area. Check meters have been installed as @ April 2021 and we have had the data provided by WCC. Genesis are just requiring some asset information and what assets have been connected to the two check meters to validate the accuracy of check meter volumes verse PLANet kWh & the manual calculation.	unknown	

CONCLUSION

The database still contains many discrepancies, most of which were present during the last audit. Field updates do not always appear to be accurate and updates for new connections are not always timely.

Database accuracy is described as follows:

Result	Percentage	Comments
The point estimate of R	97.3	Wattage from survey is lower than the database wattage by 2.7%
R_L	93.9	With a 95% level of confidence, it can be concluded that the error could be between -6.1% and -0.4%
R_H	99.6	

These results were categorised in accordance with the "Distributed Unmetered Load Statistical Sampling Audit Guideline", effective from 1 February 2019 and the table below shows that Scenario 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 0.4% lower and 6.1% 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 26 kW lower than the database indicates.

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In absolute terms, total annual consumption is estimated to be 109,200 kWh lower than the DUML database indicates.

There is a 95% level of confidence that the annual consumption is between 17,500kWh lower and 249,800 kWh p.a. lower than the database indicates.

The audit found seven non-compliances and two recommendations were raised. Genesis intends to begin using the output from WCC's CMS, which will improve compliance in many areas. This won't however improve the database accuracy compared to the field, which can only be improved through field audit.

The future risk rating of 34 indicates that the next audit be completed in three months. I have considered this in conjunction with Genesis's responses and recommend the next audit be due in nine months to allow enough time to start using WCC's CMS.

PARTICIPANT RESPONSE

Genesis has recently established and filled a stakeholder manager role to assist Genesis Energy in maintaining the relationship and data provisions for Genesis Energy's DUML customer base. Genesis will be continuing to raise the audit findings to assist the council in increasing database accuracy and compliance levels.

Genesis can report that check meters are installed and data is being provided. Genesis and the council still have a little work to do prior to deriving an application for a new profile shape for the WCC as we work to validate the check meter outputs verse the CMS and manual calculations