ELECTRICITY INDUSTRY PARTICIPATION CODE
DISTRIBUTED UNMETERED LOAD AUDIT REPORT

For

WELLINGTON CITY COUNCIL AND GENESIS ENERGY

Prepared by: Tara Gannon

Date audit commenced: 19 February 2019

Date audit report completed: 4 March 2019

Audit report due date: 15 March 2019

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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 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 nearing completion with 14,000 lights replaced, and less than 1,500 lights still to be upgraded. Once the roading project is complete walkway lights will be upgraded, with a target completion date of 2021.

Five non-compliances were identified, and no recommendations were raised. The future risk rating of 30 indicates that the next audit be completed in three months, I recommend the next audit be due in 9 months to allow time to resolve the issues before the next audit. 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	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.	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
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.	Moderate	Low	2	Investigating
Database accuracy	3.1	15.2 and 15.37B(b)	The database contains some inaccurate data.	Weak	High	9	Investigating
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.	Weak	High	9	Investigating

Subject	Section	Clause	Non-Compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
			The database used to prepare submissions contains some inaccurate information.				
Future Risk Rating						30	

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

RECOMMENDATIONS

Subject	Section	Description	Recommendation
		Nil	

ISSUES

Subject	Section	Description	Issue
		Nil	

1. ADMINISTRATIVE

1.1. Exemptions from Obligations to Comply with Code

Code reference

Section 11 of Electricity Industry Act 2010.

Code related audit information

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

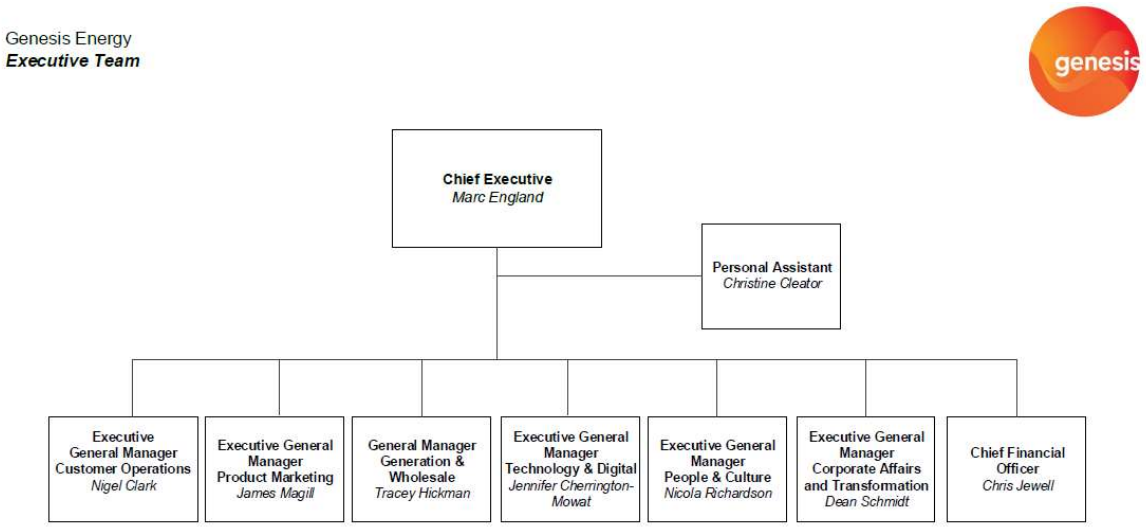
Audit observation

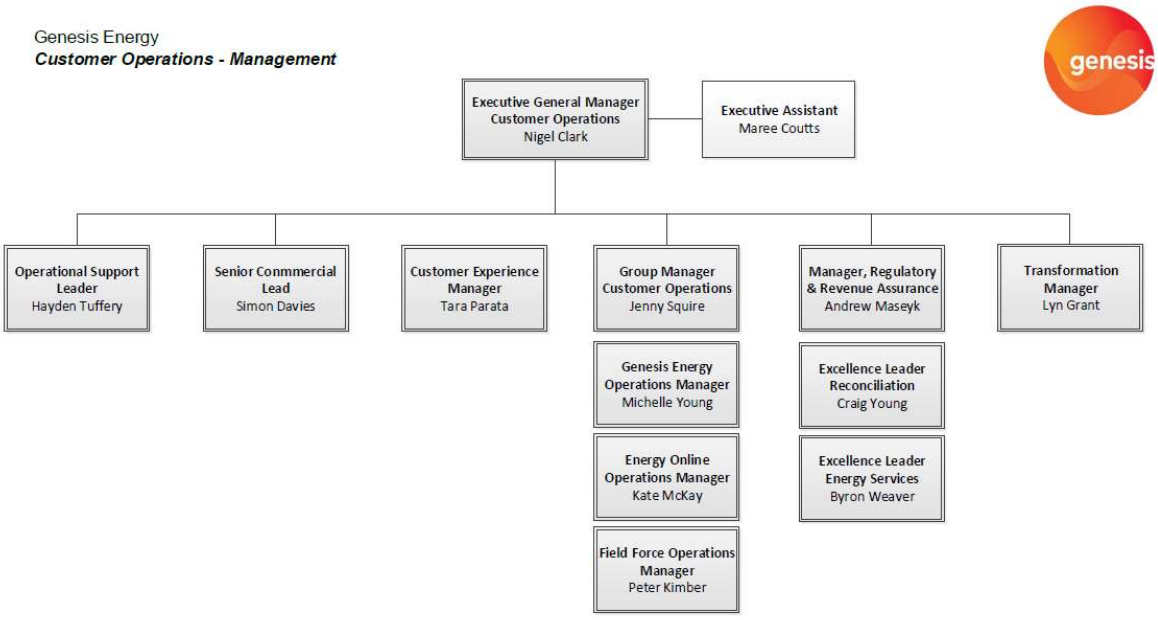
The Electricity Authority's website was reviewed to identify any exemptions relevant to the scope of this audit.

Audit commentary

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

1.2. Structure of Organisation





1.3. Persons involved in this audit

Auditor:

Tara Gannon

Veritek Limited

Electricity Authority Approved Auditor

Other personnel assisting in this audit were:

Name	Title	Company
Adam Comrie	Data Analyst	Wellington City Council
Kirsten Brown	Data Analyst	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.

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	7,300	767,143
0001256880UN374	MSTR ICP WCC CPK0111	CPK0111	529	53,937
0001256885UNE3B	MASTER ICP WIL0331	WIL0331	7329	577,046
0001256890UN9D9	AOTEA QUAY	TKR0331	492	40,917
0001256892UN95C	MSTR ICP WCC KWA0111	KWA0111	4236	339,787
1001102041UNDDC	MASTER ICP AIRPORT	CPK0331	3910	232,777
1001152333CKC0E	AMENITY LIGHTING	CPK0331	973	88,383
1001152334CK1C4	DECORATIVE LIGHTING	CPK0331	321	60,252
1001152335CKD81	24/7 (1) LIGHTING	CPK0331	979	48,391
1001152336CK141	24/7 (2) LIGHTING	WIL0331	245	10,551
1001152339CKE9F	4 HOUR LIGHTING	CPK0331	49	6,740
Total			**18,880**	**1,435,226**

1.7. Authorisation Received

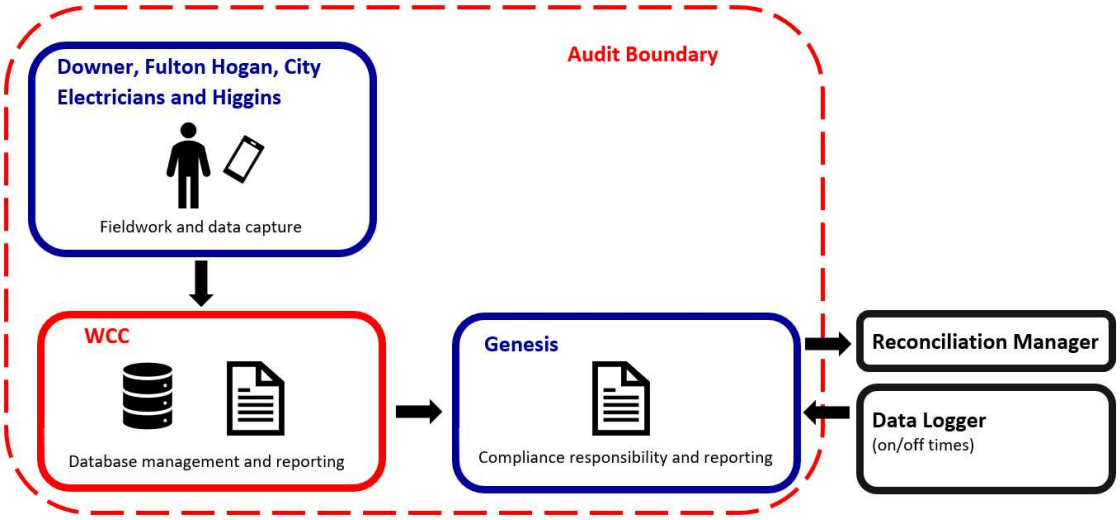
All information was provided directly by Genesis and WCC.

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 519 items of load on 19 - 20 February 2019.

1.9. Summary of previous audit

This is the first audit of the WCC DUML database for Genesis.

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. Compliance is confirmed.

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 RPS profile and NHH submission type. The correct profiles and submission types are recorded on the registry.

Submissions are based on the database information, with on and off times derived as follows:

ICP	ICP description	Burn hours
0001255309UN981	MSTR ICP WCC CPK0331	Data logger 206562018
0001256880UN374	MSTR ICP WCC CPK0111	Data logger 206562018
0001256885UNE3B	MASTER ICP WIL0331	Data logger 206562018
0001256890UN9D9	AOTEA QUAY	Data logger 206562018
0001256892UN95C	MSTR ICP WCC KWA0111	Data logger 206562018
1001102041UNDDC	MASTER ICP AIRPORT	Data logger 206562018
1001152333CKC0E	AMENITY LIGHTING	Data logger 206562018
1001152334CK1C4	DECORATIVE LIGHTING	Data logger 206562018
1001152335CKD81	24/7 (1) LIGHTING	24 hours x days in period
1001152336CK141	24/7 (2) LIGHTING	24 hours x days in period
1001152339CKE9F	4 HOUR LIGHTING	4 hours x days in period

I recalculated the expected submission volumes for each ICP for December 2018 and January 2019 based on the database wattages and burn hours provided. All values were correct with the exception of:

- 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; and

- 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.

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	906,800 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	6,261 kWh of under submission
Unapproved dynamic dimming	Unknown, but expected to result in low over submission
Incorrectly applied static dimming	14,384 kWh under submission

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.1 With: Clause 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 1001152336CK141. The database used to prepare submissions contains some inaccurate information: • The field data was 85.2% of the database data for the sample checked. This will result in potential over submission of 906,800 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 be 4,585W or approximately 19,583 kWh per annum under submission (based on annual burn hours of 4,271 as detailed in the DUML database auditing tool). • 24 items of load have missing, incomplete or unknown lamp wattages and descriptions, and 17 items of load have missing, incomplete or unknown gear wattages and descriptions. The

From: 01-Dec-18 To: 31-Jan-19	impact is estimated to be 1,521W or 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 193 of the 8,011 statically dimmed lamps. The impact is expected to be at least 3,368W or approximately 14,384 kWh per annum 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: Unknown Audit history: None 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**. Controls over the submission process itself are moderate, as some errors and omission of Christmas lights has occurred. 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 that all Christmas lighting will need to be addressed. The ICP will need to be assigned and Genesis will require to supply corrected revision data to the market for the Dec-18/Jan-19 periods. Genesis has also requested the assets to be reviewed and the necessary data corrections made to lamp information that has not been updated in the dataset but upgraded in the field. This is to restore dataset integrity and alleviate the annual estimated over submission being reported. Genesis have requested all non-LED lamps in the dataset to be reconfirmed.	01/09/2019	Investigating

Preventative actions taken to ensure no further issues will occur	Completion date	
• When Christmas lighting is supplied, it is Genesis process to include them in the volume calculation process. This has not been met and Genesis will review this process. Being that the ICP was missing would have contributed to the miss calculation of the volume in the volume calc procedures. The Volumes for ICP 1001152336CK141, have already been addressed and revisions will correct submitted volumes. • Genesis energy relies on the internal processes of WCC to ensure asset information is true and accurate. Genesis will request these processes to be reviewed.	01/03/2019	

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

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, as discussed in Wellington Electricity's 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. This is recorded as non-compliance below.

WCC confirmed that they can update the database to include ICP numbers for the Christmas lights, and will work with Genesis to resolve this issue.

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: 31-Jan-19	ICP number is not recorded for 65 Christmas lights. Potential impact: Low Actual impact: Low Audit history: None Controls: Strong Breach risk rating: 1
Audit risk rating	**Rationale for audit risk rating**
Low	Controls are rated as strong because 18,815 (99.7%) of the 18,880 items of load are compliant. The impact is low, because the total wattage is 1,037W and Christmas lights are only connected for a small portion of the year.

Actions taken to resolve the issue	Completion date	Remedial action status
Genesis have advised that all Christmas lighting will need to be addressed. The ICP will need to be assigned and Genesis will supply corrected revision data to the market for the Dec-18/Jan-19 periods.	01/07/2019	Investigating
Preventative actions taken to ensure no further issues will occur	**Completion date**	
• When Christmas lighting is supplied, it is Genesis process to include them in the volume calculation process. This has not been met and Genesis will review this process. Being that the ICP was missing would have contributed to the miss calculation of the volume in the volume calc procedures. Genesis confirms this lighting has been included in revisions and internal procedure is in effect.	01/03/2019	

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

18,878 (99.99%) of the 18,880 items of load have GPS coordinates recorded. Users in the office and field can view these locations on a mapping system.

The two items of load without GPS coordinates have other location information to enable them to be located. WCC intends to check and update the GPS coordinates for these items of load.

Road name	Suburb	Light ID	Pole notes
NEWLANDS RD	NEWLANDS	238496	Community LED Sign
CLUNY AVE	KELBURN	242546	Crnr. Cluny Ave

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.

- 23 items of load[1] had missing, incomplete, or unknown lamp descriptions and zero lamp wattages recorded. In most cases there was insufficient lamp description information to confirm the type of light likely to be installed. Based on the average wattage for lights with the same gear model description in the database, the combined estimated lamp wattage for the 23 items is 1,414W or (6,039 kWh of under submission based on 4,271 annual burn hours).
- 17 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

[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.

on 4,271 annual burn hours). The other lights with missing or unknown gear descriptions appear to be LEDs.

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: 31-Jan-19	Some description and capacity information is incomplete or unknown, including: • 23 lamp wattages and descriptions; and • 17 gear wattages and descriptions. 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 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 has requested the exceptions to be addressed in the dataset.	01/07/2019	Investigating
Preventative actions taken to ensure no further issues will occur	**Completion date**	
Genesis will be defaulting consumption if missing attributes are found. Genesis will also send exception reporting back to the customer to rectify.	01/05/2019	

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 519 items of load on 19 - 20 February 2019.

Audit commentary

All streets with discrepancies are shown in the table below.

Address	Database Count	Field Count	Count differences	Wattage differences	Comments
ABILENE CRES	16	16	-	2	Two L27 are recorded as 70W in database.
APU CRES	15	15	-	2	Two 26L are recorded as 70W and 20W in database.
BRODERICK RD	39	37	2	6	Two 150W in the database were not located on the street or walkway. Four LEDs are recorded as sodium or metal halide lamps in the database. Two 117L are recorded as 27L in the database.
DEE ST	9	9	-	3	Three L27 are recorded as 70W or 35W in the database.
DERWENT ST	22	22	-	1	One L158 is recorded as 150W in database.
DONALD ST	27	27	-	3	Three L27 are recorded as 70W in database.
ELPHINSTONE AVE	12	10	2	1	Two 70W in the database were not located on the street or walkway. One L27 is recorded as 70W in database.
FORRES ST	8	8		2	Two L27 are recorded as 70W in the database.
HATTON ST	16	14	2	-	One 70W and one 23W in the database were not located on the street or walkway.
KANO ST	9	9	-	1	One 35 LED is recorded as 28W in the database.
KAURI ST	14	14	-	2	Two LED pedestrian crossing lights are recorded as 150W in the database.
MELBOURNE RD	21	21	-	2	One L27 is recorded as 70W in the database. One 70W is

Address	Database Count	Field Count	Count differences	Wattage differences	Comments
					recorded as 23W in the database.
MONAGHAN AVE	14	14	-	1	One L27 is recorded as L158 in the database.
NOTTINGHAM ST	14	12	2	1	Two 70W in the database were not located on the street or walkway. One L158 is recorded as 150W LED in the database.
RESOLUTION ST	9	8	1	-	One 70W in the database is not located on the street.
REX ST	11	10	1	-	One 70W in the database is not located on the street.
ROTHERHAM TCE	13	12	1	-	One 110W in the database is not located on the street.
SEATOUN HEIGHTS RD	34	33	1	3	One 70W in the database is not located on the street. Two L27 are recorded as 70W in the database. One 26L is recorded as 20W in the database.
SILVERSTREAM RD	33	31	2	2	Two 70W in the database were not located on the street. One L27 is recorded as 70W. One L158 is recorded as 150W in the database.
SUNSHINE AVE	21	21	-	2	One L27 and one L26 are recorded as 70W in the database.
TOWNSEND RD	37	37	-	5	Four L27 are recorded as 70W or 100W in the database. One L36 is recorded as 20W in the database.
WILBERFORCE ST	6	6	-	1	One L27 is recorded as 70W in the database.
Grand total for whole sample	**519**	**505**	**14**	**40**	

I found 14 less lamps in the field than were recorded in the database, and 40 wattage differences. These differences are recorded as non-compliance in **section 3.1**.

Audit outcome

Compliant

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

Code reference

Clause 11(3) of Schedule 15.3

Code related audit information

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

Audit observation

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

Audit commentary

Any changes that are made during any given month take effect from the beginning of that month. The information is available which would allow for the total load in kW to be retrospectively derived for any day. On 20 September 2012, the Authority sent a memo to retailers and auditors advising that tracking of load changes at a daily level was not required if the database contained an audit trail. I have interpreted this to mean that the provision of a copy of the report to Genesis each month is sufficient to achieve compliance.

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 nearing completion with 14,000 lights replaced, and less than 1,500 lights still to be upgraded. Once the roading project is complete walkway lights will be upgraded, with a target completion date of 2021.

PLANet is used to manage the LED lamps and apply static and dynamic dimming as discussed in **section 3.1**. 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 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.
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 confirmed that this can cause delays in updating the database. I

did not see any evidence of inaccuracy caused by late database updates for new connections during the field audit.

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 the exclusion of the lights from submission data is recorded as non-compliance in **sections 2.1** and **3.2**.

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

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 37 sub-units.
Total items of load	519 items of load were checked.

Wattages for all items of load were checked against the published standardised wattage tables produced by the Electricity Authority and Veritek, or the manufacturer's specifications.

Audit commentary

Database accuracy based on the field audit

The database was found to contain some inaccuracies and missing data. The field audit of 519 items of load found:

- 14 (2.6%) less lamps in the field than was recorded in the database; and
- 40 lamps (7.7%) which had a different model and wattage to what was recorded in the database, including one lamp which had blank model and wattage information in the database.

The field data was 85.2% of the database data for the sample checked. The statistical sampling tool reported with 95% confidence the precision of the sample was 8.9%, and the true load in the field will be between 81.0% to 89.9% of the load recorded in the database. The sample is not sufficiently precise to be able to determine the database accuracy but indicates that the database is likely to be over submitting.

The total wattage recorded in the database for the sample was 20,132W. The total wattage found in the field for the sample checked was 17,154W, a difference of 2,978W. This will result in potential over submission of 906,800 kWh per annum (based on annual burn hours of 4,271 as detailed in the DUML

database auditing tool). The statistical sampling tool reported with 95% confidence the possible impact will be between 621,600 and 1,161,600 kWh per annum under submission.

Wattage accuracy

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

As part of the LED upgrade, lamp and gear wattages have been updated for the majority of lamps in the database. WCC has also undertaken some work to check and update lamp and gear wattages where discrepancies were identified in the previous audits. I reviewed wattage accuracy for all database records and found that although there has been some improvement, discrepancies are still present.

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 was provided to Wellington City Council for review, and I recommend 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 17 lamp models (643 items of load), I could not locate wattage specifications. A full list was 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
463	23,053	Unknown	Unknown

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	23	0	1,414	1,414W or approximately 6,039 kWh under submission (based on annual burn hours of 4,271 as detailed in the DUML database auditing tool).

Item	Lamps with invalid zero wattage	RAMM wattage	Expected wattage	Estimated difference
Missing, incomplete or unknown gear wattages and descriptions	17	0	52	52W or approximately 222 kWh under submission (based on annual burn hours of 4,271 as detailed in the DUML database auditing tool).
Total			1,466	1,466W or approximately 6,261 kWh of under submission.

Dynamic dimming is sometimes used, and the full lamp wattage is recorded in RAMM for the dynamically dimmed lights. WCC hopes 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 street lights. 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.

WCC began to apply static dimming percentages in December 2018. Static dimming is applied for 8,011 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 the 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. 7,818 (97.5%) of the 8,011 dimmed lamps have one of these lamp types. WCC advised that the other 193 lamps should not be dimmed, including four 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	RAMM total wattage	Expected wattage	Difference
193	3,581	6,949	3,368W or approximately 14,384 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 one lamp was set to be dimmed to 40%, and WCC corrected the affected record to 50% in RAMM and PLANet during the audit. The impact of the error was 15.8W.
- I checked application of dimming for a diverse sample of 16 lamps, including one of each lamp make model and dimming percentage combination. For four of the 16 lamps, the dimming

percentage was applied to an incorrect lamp wattage. In all cases these lamps were lamp models that were not expected to be dimmed, and the issue appears to be caused by discrepancies between the PLANet and RAMM lamp types.

RAMM lamp model	PLANet lamp type	Expected lamp wattage	Applied Lamp wattage	Expected dimmed wattage	Applied dimmed wattage
NXT-12S 350mA 2ES	LRL 14W (27W x Default 50% ALO)	27	14	14	7
NXT-12S 450mA 4AH	LRL 9W (17W x 50%)	27	17	14	9
NXT-12S 600mA 4AH	LRL 12W (23W x 50%)	27	23	14	12
NXT-36S 350mA 3HB	LRL 21W (42W x 50%)	27 or 36	42	14 or 18	21

WCC is investigating how these discrepancies occurred, and intends to update the affected lights and put procedures in place to prevent recurrence.

Some items of load included in the database are not street lights, 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. This is likely to result in some over submission, but WCC are using their best endeavours to provide accurate data in these cases. 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	2300
HTS DFBS 100mA/12v 15w	24	360
Parking Sensor Gateway	74	5920
Total	116	8635

ICP accuracy

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

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 3.1 With: Clause 15.2 and 15.37B(b) From: unknown To: 31-Jan-19	The database contains some inaccurate data. The field data was 85.2% of the database data for the sample checked. This will result in potential over submission of 906,800 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 be 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). 24 items of load have missing, incomplete or unknown lamp wattages and descriptions, and 17 items of load have missing, incomplete or unknown gear wattages and descriptions. The impact is estimated to be 1,521W or 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 193 of the 8,011 statically dimmed lamps. The impact is expected to be at least 3,368W or approximately 14,384 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: Unknown Audit history: None 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
As per sections 2.1, 2.2, 2.4 Genesis has raised these issues with WCC. Genesis is expecting WCC to be proactive in providing solutions for the exceptions within expected time frames.	01/09/2019	Investigating
Preventative actions taken to ensure no further issues will occur	**Completion date**	
Genesis continues to work with Wellington Electricity to assist in the database accuracy. Genesis does rely on the customer and its multiple 3rd party contractors to ensure information is populated accurately within RAMM. Genesis Energy's only means of preventative maintenance is to continuously work with the council when exceptions are identified.	01/03/2019	

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 RPS profile and NHH submission type. The correct profiles and submission types are recorded on the registry.

Submissions are based on the database information, with on and off times derived as follows:

ICP	ICP description	Burn hours
0001255309UN981	MSTR ICP WCC CPK0331	Data logger 206562018
0001256880UN374	MSTR ICP WCC CPK0111	Data logger 206562018
0001256885UNE3B	MASTER ICP WIL0331	Data logger 206562018
0001256890UN9D9	AOTEA QUAY	Data logger 206562018
0001256892UN95C	MSTR ICP WCC KWA0111	Data logger 206562018
1001102041UNDDC	MASTER ICP AIRPORT	Data logger 206562018
1001152333CKC0E	AMENITY LIGHTING	Data logger 206562018
1001152334CK1C4	DECORATIVE LIGHTING	Data logger 206562018
1001152335CKD81	24/7 (1) LIGHTING	24 hours x days in period
1001152336CK141	24/7 (2) LIGHTING	24 hours x days in period
1001152339CKE9F	4 HOUR LIGHTING	4 hours x days in period

I recalculated the expected submission volumes for each ICP for December 2018 and January 2019 based on the database wattages and burn hours provided. All values were correct with the exception of:

- 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; and
- 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.

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	906,800 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	6,261 kWh of under submission
Unapproved dynamic dimming	Unknown, but expected to result in low over submission

Issue	Estimated volume information impact (annual kWh)
Incorrectly applied static dimming	14,384 kWh under 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: 31-Jan-19	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 1001152336CK141. The database used to prepare submissions contains some inaccurate information: • The field data was 85.2% of the database data for the sample checked. This will result in potential over submission of 906,800 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 be 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). • 24 items of load have missing, incomplete or unknown lamp wattages and descriptions, and 17 items of load have missing, incomplete or unknown gear wattages and descriptions. The impact is estimated to be 1,521W or 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 193 of the 8,011 statically dimmed lamps. The impact is expected to be at least 3,368W or approximately 14,384 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: Unknown Audit history: None 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**. Controls over the submission process itself are moderate, as some errors and omission of Christmas lights has occurred. 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
As per sections 2.1, 2.2, 2.4, 3.1 Genesis has raised these issues with WCC. Genesis is expecting WCC to be proactive in providing solutions for the exceptions within expected time frames.	01/09/2019	Investigating
Preventative actions taken to ensure no further issues will occur	**Completion date**	
Genesis continues to work with Wellington Electricity to assist in the database accuracy. Genesis does rely on the customer and its multiple 3rd party contractors to ensure information is populated accurately within RAMM. Genesis Energy's only means of preventative maintenance is to continuously work with the council when exceptions are identified.	01/03/2019	

CONCLUSION

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 PLANet to manage their LED lights.

The roading LED upgrade project is nearing completion with 14,000 lights replaced, and less than 1,500 lights still to be upgraded. Once the roading project is complete walkway lights will be upgraded, with a target completion date of 2021.

Five non-compliances were identified, and no recommendations were raised. The future risk rating of 30 indicates that the next audit be completed in three months, I recommend the next audit be due in 9 months to allow time to resolve the issues before the next audit.

PARTICIPANT RESPONSE

As per sections 2.1, 2.2, 2.4, 3.1 Genesis has raised these issues with WCC. Genesis is expecting WCC to be proactive in providing solutions for the exceptions within expected time frames. Genesis relies on the accuracy of data provided, which currently has a negative impact on the customer, Genesis is expecting this to drive expected outcomes from WCC investigation into the audit findings.

Genesis has taken measures to include the Christmas lighting and have located and corrected the setup error of the 24 hr ICP. The revision process has been adjusted for these.

In relation to the missing lamps, missing wattages and lamp attribute exceptions. WCC will need to address these and advise once the investigation is complete.

Genesis Energy realises that the submission of this audit is overdue, however also wishes to state that without customer input, Genesis Energy is unable to accurately comment on potential solutions or proactive measures.

Genesis would be seeking a 6-9 month review period to allow enough time for the council investigate.