ELECTRICITY INDUSTRY PARTICIPATION CODE
DISTRIBUTED UNMETERED LOAD AUDIT REPORT

For

QUEENSTOWN LAKES DISTRICT COUNCIL AND GENESIS ENERGY

Prepared by: Rebecca Elliot

Date audit commenced: 3 December 2018

Date audit report completed: 27 March 2020

Audit report due date: 01-Apr-20

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EXECUTIVE SUMMARY

This audit of the Queenstown Lakes District Council (**QLDC**) streetlight DUML database and processes was conducted at the request of Genesis Energy Limited (**Genesis**), in accordance with clause 15.37B. The purpose of this audit is to verify that the volume information is being calculated accurately, and that profiles have been correctly applied.

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

QLDC switched into Genesis from 1/10/19.

QLDC have largely finished the LED roll out. McKay Electrical commenced being the field contractor from 1/05/2019. They were expected to undertake a 100% field audit as part of this but due to resource constraints within McKay electrical this has yet to be completed. QLDC are working with them to expedite this. As this hasn't been done, I found a similar level of error in the field audit. Once the field audit is completed, I expect overall database accuracy to improve. However, some streets in new subdivisions were selected and found a high number of lights missing from the streets checked. This has resulted in the DUML tool indicating under submission in this audit rather than over submission as was found in the last audit. I have recommended that Genesis work with the networks and QLDC to improve the new connection processes to ensure new lights get added to RAMM in a timely manner.

ICP 0000990001LN819 burn hours are currently calculated using the astronomical sunset/sunrise hour which when compared to the data logger used in the surrounding area lights for December 2019, was overstated by 5.2%. This will be resulting in a minor amount of over submission. Genesis have identified a data logger for this ICP and intend to use this from revision three onwards and back date the burn hours to the point of switch in.

The audit found five non-compliances and makes one recommendation. The future risk rating of 25 indicates that the next audit be completed in three months. I have considered this in conjunction with the comments provided by Genesis Energy and recommend that the next audit be in nine months.

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	Potential over submission of 448 kWh p.a. due to incorrect on/off times. The database accuracy is assessed to be 111.9% of the database for the sample checked indicating a potential under submission of approximately 133,500 kWh per annum. 18 x 25W fluorescent lights should a 7.8W ballast applied but have a 5W ballast applied resulting in a minor estimated annual under submission of 215 kWh. 1x 103W LED has a ballast of 14W applied when this should be zero resulting in a minor estimated annual over submission of 60 kWh. The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot.	Moderate	High	6	Identified
Location of each item of load	2.3	11(2)(b) of Schedule 15.3	Two items of load not readily locatable.	Strong	Low	1	Investigating

Subject	Section	Clause	Non-Compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
All load recorded in database	2.5	11(2A) and (d) of Schedule 15.3	25 additional items of load found.	Moderate	High	6	Investigating
Database accuracy	3.1	15.2 and 15.37B(b)	The database accuracy is assessed to be 111.9% of the database for the sample checked indicating a potential under submission of approximately 133,500 kWh per annum. 18 x 25W fluorescent lights should a 7.8W ballast applied but have a 5W ballast applied resulting in a minor estimated annual under submission of 215 kWh. 1x 103W LED has a ballast of 14W applied when this should be zero resulting in a minor estimated annual over submission of 60 kWh.	Moderate	High	6	Investigating

Subject	Section	Clause	Non-Compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
Volume information accuracy	3.2	15.2 and 15.37B(c)	Potential over submission of 448 kWh p.a. due to incorrect on/off times. The database accuracy is assessed to be 111.9% of the database for the sample checked indicating a potential under submission of approximately 133,500 kWh per annum. 18 x 25W fluorescent lights should a 7.8W ballast applied but have a 5W ballast applied resulting in a minor estimated annual under submission of 215 kWh. 1x 103W LED has a ballast of 14W applied when this should be zero resulting in a minor estimated annual over submission of 60 kWh. The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot.	Moderate	High	6	Investigating
Future Risk Rating						25	

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

RECOMMENDATIONS

Subject	Section	Recommendation
Tracking of load change	2.6	Genesis to liaise with QLDC, Aurora and PowerNet to review the electrical connection of streetlights.

ISSUES

Subject	Section	Description	Issue

1. ADMINISTRATIVE

1.1. Exemptions from Obligations to Comply with Code

Code reference

Section 11 of Electricity Industry Act 2010.

Code related audit information

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

Audit observation

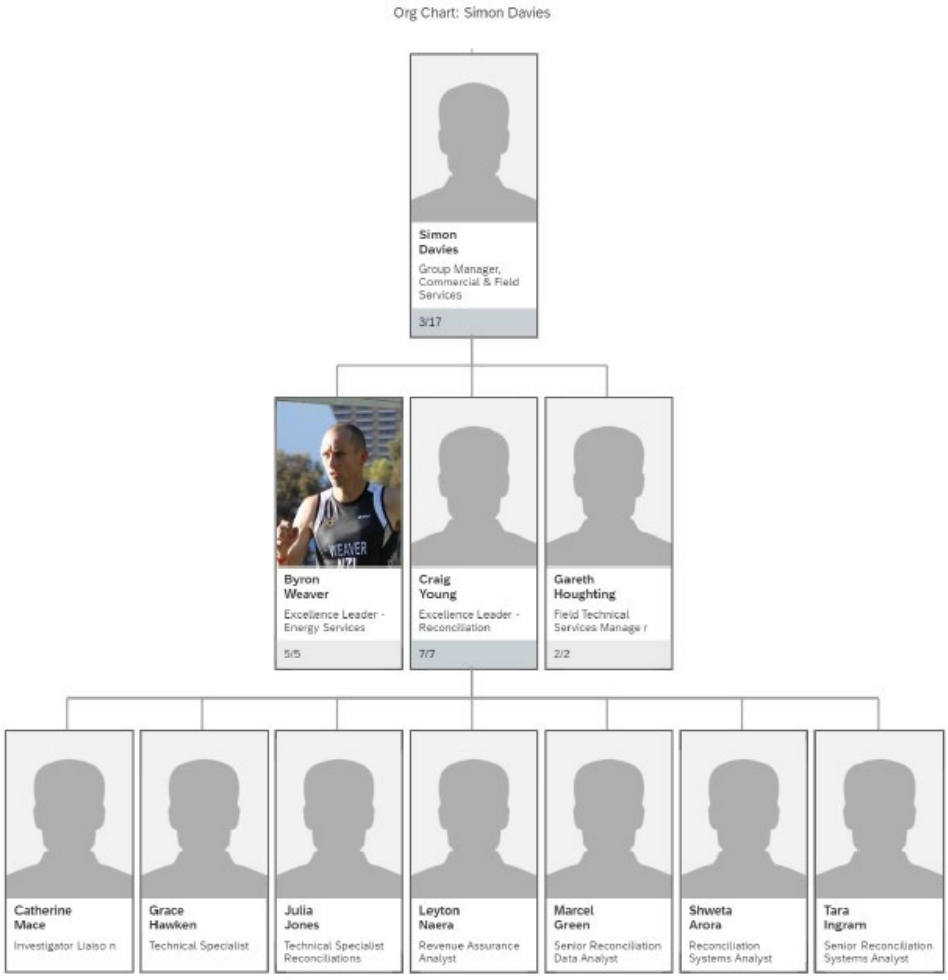
The Electricity Authority's website was reviewed to identify any exemptions relevant to the scope of this audit.

Audit commentary

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

1.2. Structure of Organisation

Genesis provided the relevant organisational structure:



1.3. Persons involved in this audit

Auditor:

Rebecca Elliot

Veritek Limited

Electricity Authority Approved Auditor

Name	Title	Organisation
Roger Hughes	Contract Data Engineer	QLDC
Alison Tomlinson	Senior Asset Engineer (Transportation)	QLDC
Craig Young	Excellence Leader - Reconciliation	Genesis Energy
Grace Hawken	Technical Specialist - Reconciliations 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".

QLDC 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 are assessed as part of their reconciliation participant audits.

1.5. Breaches or Breach Allegations

There are no breach allegations relevant to the scope of this audit.

1.6. ICP Data

ICP Number	Description	NSP	Number of items of load	Database wattage (watts)
0000027637CE36B	Franklin	FKN0331	2228	127,401
0000480064CEA92	QLDC lights Lakeview subdivision	NLK0111	1979	104,035
0000950000LN0EC	KINGSTON	NMA0331	687	38,525
0000990001LN819	CROMWELL GXP	CML0331	114	2,687.5
0008801006TP2A7	FRANKTON GXP	FKN0331	56	1,300
Not QLDC Light			389	48,649
		TOTAL QLDC:	5,064	273,948.5

The 389 lights recorded as “Not QLDC lights” are made up of 383 NZTA lights that are reconciled under NZTA ICPs with another trader. There are six private lights recorded in Jones Avenue. QLDC record these in their database so they know that these are not council assets. These will be checked during the next Aurora Distributor audit to confirm they are being reconciled as either standard or shared unmetered load.

1.7. Authorisation Received

All information was provided directly by Genesis and QLDC.

1.8. Scope of Audit

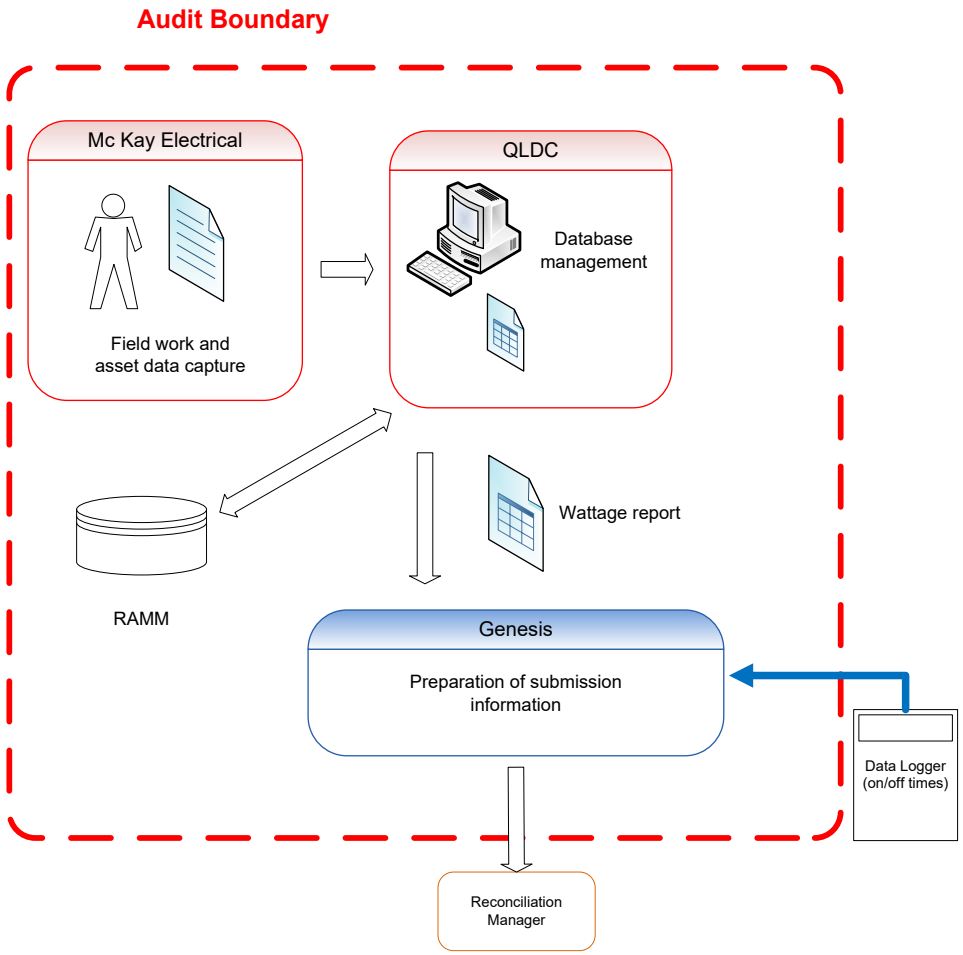
This audit of the Queenstown Lakes District Council (**QLDC**) streetlight DUML database and processes was conducted at the request of Genesis Energy Limited (**Genesis**), in accordance with clause 15.37B. The purpose of this audit is to verify that the volume information is being calculated accurately, and that profiles have been correctly applied.

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

Genesis gained QLDC from 1/10/19.

McKay Electrical are the field contractor for QLDC.

The scope of the audit encompasses the collection, security and accuracy of the data, including the preparation of submission information based on the monthly reporting. The diagram below shows the flow of information and the audit boundary for clarity.



The audit was carried out at QLDC's offices in Wanaka on 20th February, 2020. The field audit was undertaken of 264 lights using the statistical sampling methodology.

1.9. Summary of previous audit

The previous audit report conducted for Contact Energy in April 2019 by Rebecca Elliot of Veritek Limited was reviewed. Six non-compliances and one recommendation was made. The current status of these are detailed below:

NON-COMPLIANCES

Subject	Section	Clause	Non-compliance	Status
Deriving submission information	2.1	11(1) of Schedule 15.3	The field data was 93.7% of the database data for the sample checked. This will result in potential over submission of 86,400 kWh per annum (based on annual burn hours of 4,271 as detailed in the DUML database auditing tool). 151 items of load with incomplete lamp descriptions and zero wattage recorded indicating a potential estimated under submission of 53,528 kWh per annum. Nine items of load with and incorrect lamp and wattage combination. 80 items of load with the incorrect ballast recorded resulting in a minor estimated annual under submission of 2,773 kWh (based on annual burn hours of 4,271 as detailed in the DUML database auditing tool). Queenstown winter festival lights are not recorded in RAMM.	Still existing
Location of each item of load	2.3	11(2)(b) of Schedule 15.3	103 items of load not readily locatable.	Still existing but largely cleared
Description and capacity of each item of load	2.4	11(2)(c) of Schedule 15.3	151 items of load with incomplete lamp descriptions and zero wattage recorded indicating a potential estimated under submission of 53,528 kWh per annum.	Cleared
All load recorded in database	2.5	11(2A) and (d) of Schedule 15.3	24 additional items of load found. Queenstown winter festival lights are not recorded in RAMM.	Still existing Cleared

Subject	Section	Clause	Non-compliance	Status
Database accuracy	3.1	15.2 and 15.37B(b)	The database contains some inaccurate data. The field data was 93.7% of the database data for the sample checked. This will result in potential over submission of 86,400 kWh per annum (based on annual burn hours of 4,271 as detailed in the DUML database auditing tool). 151 items of load with incomplete lamp descriptions and zero wattage recorded indicating a potential estimated under submission of 53,528 kWh per annum. Nine items of load with and incorrect lamp and wattage combination. 80 items of load with the incorrect ballast recorded resulting in a minor estimated annual under submission of 2,773 kWh (based on annual burn hours of 4,271 as detailed in the DUML database auditing tool). Queenstown winter festival lights are not recorded in RAMM.	Still existing Cleared
Volume information accuracy	3.2	15.2 and 15.37B(c)	The database contains some inaccurate data. The field data was 93.7% of the database data for the sample checked. This will result in potential over submission of 86,400 kWh per annum (based on annual burn hours of 4,271 as detailed in the DUML database auditing tool). 151 items of load with incomplete lamp descriptions and zero wattage recorded indicating a potential estimated under submission of 53,528 kWh per annum. Nine items of load with and incorrect lamp and wattage combination. 80 items of load with the incorrect ballast recorded resulting in a minor estimated annual under submission of 2,773 kWh (based on annual burn hours of 4,271 as detailed in the DUML database auditing tool). Queenstown winter festival lights are not recorded in RAMM.	Still existing Cleared

RECOMMENDATIONS

Subject	Section	Recommendation	Status
Tracking of load change	2.6	Contact to liaise with QLDC, Aurora and PowerNet to review the electrical connection of streetlights.	Change of trader but repeated to maintain visibility

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 has 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 and the database was checked for accuracy.

Audit commentary

Genesis reconciles this DUML load using the SST profile. Submissions are based on the database information and data logger hours. I recalculated the submissions for December 2019 and confirmed the calculation method was correct with the exception of ICP 0000990001LN819. The hours have been calculated using of "Profile night hours" which leads to inaccurate consumption information. "Profile night hours" are the SST profile hours, which are sunset and sunrise hours published by NIWA rounded to the nearest half hour. The SST profile rules do not allow these on/off times to be used to calculate consumption information. The SST profile on/off times can be used to apportion consumption, but the times are too inaccurate to be used for any other purpose. The reason for this is that if the "on" time is 18.20 and the off time is 07.13, the "Profile night hours" will have values from 18.00 to 07.30. The on/off times used may vary from the actual on/off times by up to 29 minutes at each end of the period.

Consumption from the datalogger for the surrounding area (Cromwell GXP datalogger 21002255) was used to compare against the astronomical hours for ICP 0000990001LN819. The total data logger hours for December 2019 are 265, but the SST astronomical hours are overstated as 279 hours, which is 5.2% too high. A data logger has been identified for this ICP and the data from this will be used to correct the burn hours from revision 3 onwards from the date of switch in. This is recorded as non-compliance.

Analysis of the database indicated that there are volume inaccuracies present as follows:

Issue	Estimated volume information impact (annual kWh)
Potential over submission due to incorrect on/off times being used.	Potential over submission 448 kWh (kWh difference for December annualised)
Potential under submission due to database inaccuracy identified during the field audit	Potential under submission of 133,500 kWh per annum (based on annual burn hours of 4,271 as detailed in the DUML database auditing tool).
19 items of load with an incorrect ballast applied	Potential very minor overall under submission of 155 kWh per annum (based on annual burn hours of 4,271 as detailed in the DUML database auditing tool.

This is also recorded as non-compliance and discussed in **sections 2.4, 3.1** and **3.2**.

On 18 June 2019, the Electricity Authority issued a memo confirming that the code requirement to calculate the correct monthly load must:

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

The current monthly report is provided as a snapshot and this practice is non-compliant. The database contains a "light install date" and a "lamp install date" but there is not a field for "livening date" for newly connected lights. When a wattage is changed in the database due to a physical change or a correction, only the record present at the time the report is run is recorded, not the historical information showing dates of changes. Genesis completes revision submissions where corrections are required and has not yet updated their processes to be compliant with the Authority's memo.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.1 With: 11(1) of Schedule 15.3 From: 01-Mar-19 To: 31-Dec-19	Potential over submission of 448 kWh p.a. due to incorrect on/off times. The database accuracy is assessed to be 111.9% of the database for the sample checked indicating a potential under submission of approximately 133,500 kWh per annum. 18 x 25W fluorescent lights should a 7.8W ballast applied but have a 5W ballast applied resulting in a minor estimated annual under submission of 215 kWh. 1x 103W LED has a ballast of 14W applied when this should be zero resulting in a minor estimated annual over submission of 60 kWh. The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot. Potential impact: High Actual impact: High Audit history: Twice previously Controls: Moderate Breach risk rating: 6
Audit risk rating	**Rationale for audit risk rating**
High	The controls are rated as moderate as processes to manage change capture most changes, but the new connection process needs review to ensure new connections are updated in the database in a timely manner. The impact is assessed to be high due to volume of additional lights found in the field.

Actions taken to resolve the issue	Completion date	Remedial action status
Genesis has contacted QLDC (Rodger Hughes) who has implemented monthly reporting. And Genesis has addressed the issue with night hours	01/05/2020	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
Genesis has addressed the night hours issue as this was a set up error by a user. Genesis will review the onboarding processes in due course to limit any further potential errors.	01/05/2020	

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

Code reference

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

Code related audit information

The DUML database must contain:

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

Audit observation

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

Audit commentary

All items of load have an ICP recorded against them.

Audit outcome

Compliant

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

Code reference

Clause 11(2)(b) of Schedule 15.3

Code related audit information

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

Audit observation

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

Audit commentary

The database contains fields for the street address and also GPS coordinates. Two items of load were not locatable. This is an improvement from the 103 items of load found in the last audit.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.3 With: 11(2)(b) of Schedule 15.3 From: 28-Feb-19 To: 31-Dec-19	Two items of load not readily locatable. Potential impact: Low Actual impact: Low Audit history: Once Controls: Strong Breach risk rating: 1
Audit risk rating	**Rationale for audit risk rating**
Low	The controls are rated as strong. QLDC have robust processes in place to ensure all items of load are locatable. The audit risk rating is low as only two items of load were not locatable.

Actions taken to resolve the issue	Completion date	Remedial action status
Genesis have requested the council investigate the missing assets and make the necessary updates.	01/07/2020	Investigating
Preventative actions taken to ensure no further issues will occur	**Completion date**	

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

The database contains the manufacturers rated wattage and the ballast wattage. The extract provided has fields for lamp and gear make and model. Analysis found all had details populated. The accuracy of these is discussed in **section 3.1**.

Audit outcome

Compliant

2.5. All load recorded in database (Clause 11(2A) of Schedule 15.3)

Code reference

Clause 11(2A) of Schedule 15.3

Code related audit information

The retailer must ensure that each item of DUML for which it is responsible is recorded in this database.

Audit observation

The field audit was undertaken of a statistical sample of 264 items of load. The field audit was undertaken on 19th - 20th February 2020.

Audit commentary

The table below details the roads where discrepancies were found:

Street	Database count	Field count	Light count differences	Wattage recorded incorrectly	Comments
REED PARK	5	2	-2		2x 70W HPS not found in the field
ASHENHURST WAY	8	8		2	2x LED incorrect wattages
BELLAMORE STREET	4	4		1	1x LED incorrect wattage
EDINBURGH DRIVE	10	10		1	1x LED incorrect wattage
LUCAS PLACE	25	25		15	15x 150W HPS found in the field recorded as 70W HPS in the database
PARK STREET	28	26	-3 +1	3	3x lights not found in the field 1x additional 29W LED found in the field 3x incorrect wattages- recorded as HPS but LED in the field
TUCKER BEACH ROAD RESERVE 1 H1	3	5	+2	3	2x additional 51W LED found in the field 3x LED incorrect wattages
KINGAN ROAD	1	1		1	1x 70W HPS recorded in the database but 22W LED found in the field
MUSTER ROAD	3	14	+11		11x additional lights found in the field- new subdivision
PLOUGH STREET	2	1	-1	1	1x 58W LED not found in the field 1x incorrect LED wattage

Street	Database count	Field count	Light count differences	Wattage recorded incorrectly	Comments
SHEPHERD ROAD	7	7		1	1x incorrect LED wattage
CHALMERS STREET	3	3		1	1x 22W LED found in the field recorded as 70W HPS in the database
KINGSTON STREET	1	4	+3		3x additional 29W LED lights found in the field
MEADOWSTONE DRIVE	26	27	+1		1x 70W HPS found in the field
WANAKA COMMUNITY POOL	2	1	-1		1x 22W LED not found in the field
MONCRIEFF PLACE	1	2	+1		1x additional 70W HPS found in the field
ST OMER PARK 1 F1	16	22	+6		6x additional 70W HPS found in the field
Grand Total	264	282	32	29	

The field audit found a similar level of accuracy as was found in the last audit. QLDC had expected McKay Electrical to have completed the full field audit of the assets to address this but due to McKay Electrical resource constraints this is still to be undertaken. QLDC are working with McKay Electrical to expedite this. The overall database accuracy is detailed in **section 3.1**.

The field audit found 25 additional lamps in the field. This is recorded as non-compliance below.

In the last audit the festive lights for the Queenstown winter festival were thought to be connected to an unmetered streetlight circuit. This has since been confirmed as being connected to a metered supply.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.5 With: Clause 11(2A) and (d) of Schedule 15.3 From: 01-Mar-19 To: 31-Dec-19	25 additional items of load found. Potential impact: High Actual impact: High Audit history: Twice previously Controls: Moderate Breach risk rating: 6
Audit risk rating	**Rationale for audit risk rating**
High	The controls are rated as moderate as processes to manage change capture most changes, but the new connection process needs review to ensure new connections are updated in the database in a timely manner. The impact is assessed to be high due to volume of additional lights found in the field.

Actions taken to resolve the issue	Completion date	Remedial action status
Genesis has requested QLDC to have McKay electrical confirm field audit findings.	01/09/2020	Investigating
Preventative actions taken to ensure no further issues will occur	**Completion date**	
Genesis relies on the KPI's between the council and its maintenance provider to maintain asset information accuracies.		

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

Code reference

Clause 11(3) of Schedule 15.3

Code related audit information

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

Audit observation

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

Audit commentary

The RAMM database functionality achieves compliance with the code. The change management process and the compliance of the database reporting provided to Genesis is detailed in **sections 2.1, 3.1** and **3.2**.

Audit outcome

Compliant

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

Code reference

Clause 11(4) of Schedule 15.3

Code related audit information

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

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

Audit observation

The RAMM database was checked for audit trails.

Audit commentary

The RAMM database contain a complete audit trail of all additions and changes including the identifier of person who makes any changes.

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	Queenstown Lakes District Council Area
Strata	The database contains items of load in Queenstown Lakes District Area. The processes for the management of all QLDC items of load are the same, the population was across four strata: • Arrowtown, • Queenstown, • Wanaka, and • Rural.
Area units	I created a pivot table of the roads in each area and I used a random number generator in a spreadsheet to select a total of 50 sub-units.
Total items of load	264 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

Field audit findings

A statistical sample of 264 items of load undertaken in anticipation of this database being used for reconciliation found that the field data was 111.9% of the database data for the sample checked.

Result	Percentage	Comments
The point estimate of R	111.9%	Wattage from survey is higher than the database wattage by 11.9%
R_L	95.3%	With a 95% level of confidence it can be concluded that the error could be between -4.7% and +30.6%
R_H	130.6%	

These results were categorised in accordance with the "Distributed Unmetered Load Statistical Sampling Audit Guideline", effective from 01/02/19 and the table below shows that Scenario C (detailed below) applies.

The conclusion from Scenario C is that the variability of the sample results across the strata means that the true wattage (installed in the field) could be between 4.7% lower to 30.6% higher than the wattage recorded in the DUML database. Non-compliance is recorded because the potential error is greater than 5.0%.

In absolute terms the installed capacity is estimated to be 31.0 kW lower than the database indicates.

There is a 95% level of confidence that the installed capacity is between 12 kW lower to 80 kW higher than the database.

In absolute terms, total annual consumption is estimated to be 133,500 kWh lower than the DUML database indicates.

There is a 95% level of confidence that the annual consumption is between 52,800 kWh lower to 342,600 kWh higher p.a. higher than the database indicates.

The apparent decline in the database accuracy since the last audit is due to the large number of lights found in new subdivisions selected as part of the statistical sample being missing from the database. The 100% field audit still to be undertaken is expected to improve the database accuracy. I have recommended that the new connection process is reviewed with the two networks below.

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

Lamp description and capacity accuracy

Wattages for all items of load were checked against the published standardised wattage table produced by the Electricity Authority or LED light specifications and found:

- 18 x 25W fluorescent lights should a 7.8W ballast applied but have a 5W ballast applied resulting in a minor estimated annual under submission of 215 kWh, and
- 1x 103W LED has a ballast of 14W applied when this should be zero resulting in a minor estimated annual over submission of 60 kWh.

There were an additional 88 items of load with a fluorescent wattage that is not represented on the Electricity Authority's standard wattage table therefore I am unable to confirm the correct ballasts to be applied to these:

Fluorescent wattage	Ballast Applied	Volume of lights
9	5	3
12	5	2
13	5	2
18	5	5
23	5	74
50	5	2

QLDC are working to resolve the remaining items above.

The accuracy of the lamp ballasts has improved during the audit period. The few incorrect ballasts applied are recorded as non-compliance below.

Change Management

The processes were reviewed for new lamp connections and the tracking of load changes due to faults and maintenance. Genesis use the RAMM database for submission.

Any new streetlight connections on the PowerNet sections of the network are notified to QLDC. This gives QLDC notification of new assets being connected. These assets are not added to the RAMM database until the 254C notification has been received. This is often after electrical connection has occurred. In addition to this, notification from other parts of council can be slow to be provided, causing the database to be updated late. This is evident in the field audit findings from this audit which included streetlights in the new Jack Hanley subdivision that are yet to be added to the database.

As reported in the last audit, no notifications are received for new connections on the Aurora network. I recommend that Genesis liaise with QLDC, Aurora and PowerNet to review the electrical connection of streetlight circuits.

Recommendation	Description	Audited party comment	Remedial action
Tracking of load change	Genesis to liaise with QLDC, Aurora and PowerNet to review the electrical connection of streetlights	Genesis will raise the audit findings and discuss if there is a potential solution.	Investigating

McKay Electrical became the field contractor from May 1st, 2019. As part of this contract they were expected to undertake a 100% field audit. This was expected to be completed within the first three months of the contract but due to resourcing issues this is still to be completed. QLDC are working with MacKay to expedite this.

Outage and condition patrols are included in the contract. The frequency of these is based on the lamp type.

The QLDC LED rollout is largely complete with the exception of some of the V category and decorative lights. McKay Electrical are the contractor engaged to complete this work.

The festive lighting used in Queenstown for the winter festival, have been confirmed as connected to metered supplies.

There are a small number of private lights identified in the QLDC database. These are marked as private in the database. As detailed in **section 1.6**, These will be checked during the next Aurora Distributor audit to confirm they are being reconciled as either standard or shared unmetered load.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 3.1 With: Clause 15.2 and 15.37B(b) From: 01-Mar-19 To: 31-Dec-19	The database accuracy is assessed to be 111.9% of the database for the sample checked indicating a potential under submission of approximately 133,500 kWh per annum. 18 x 25W fluorescent lights should a 7.8W ballast applied but have a 5W ballast applied resulting in a minor estimated annual under submission of 215 kWh. 1x 103W LED has a ballast of 14W applied when this should be zero resulting in a minor estimated annual over submission of 60 kWh. Potential impact: High Actual impact: High Audit history: Twice previously Controls: Moderate Breach risk rating: 6
Audit risk rating	**Rationale for audit risk rating**
High	The controls are rated as moderate as processes to manage change capture most changes, but the new connection process needs review to ensure new connections are updated in the database in a timely manner. The impact is assessed to be high due to volume of additional lights found in the field.

Actions taken to resolve the issue	Completion date	Remedial action status
Genesis will be working through the audit findings and will make the necessary ballast corrections upon review. The private lighting will need to be assessed as the distributor(s) may need to be involved in the potential solution.	01/09/2020	Investigating
Preventative actions taken to ensure no further issues will occur	**Completion date**	
Genesis will discuss their contractual KPI's with QLDC.	01/09/2020	

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

Code reference

Clause 15.2 and 15.37B(c)

Code related audit information

The audit must verify that:

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

Audit observation

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

- checking the registry to confirm that all ICPs have the correct profile and submission flag
- 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 SST profile. Submissions are based on the database information and data logger hours. I recalculated the submissions for December 2019 and confirmed the calculation method was correct with the exception of ICP 0000990001LN819. The hours have been calculated using of "Profile night hours" which leads to inaccurate consumption information. "Profile night hours" are the SST profile hours, which are sunset and sunrise hours published by NIWA rounded to the nearest half hour. The SST profile rules do not allow these on/off times to be used to calculate consumption information. The SST profile on/off times can be used to apportion consumption, but the times are too inaccurate to be used for any other purpose. The reason for this is that if the "on" time is 18.20 and the off time is 07.13, the "Profile night hours" will have values from 18.00 to 07.30. The on/off times used may vary from the actual on/off times by up to 29 minutes at each end of the period.

Consumption from the datalogger for the surrounding area (Cromwell GXP datalogger 21002255) was used to compare against the astronomical hours for ICP 0000990001LN819. The total data logger hours for December 2019 are 265, but the SST astronomical hours are overstated as 279 hours, which is 5.2% too high. A data logger has been identified for this ICP and the data from this will be used to correct the burn hours from revision 3 onwards from the date of switch in. This is recorded as non-compliance.

Analysis of the database indicated that there are volume inaccuracies present as follows:

Issue	Estimated volume information impact (annual kWh)
Potential over submission due to incorrect on/off times being used.	Potential over submission 448 kWh (kWh difference for December annualised)
Potential under submission due to database inaccuracy identified during the field audit	Potential under submission of 133,500 kWh per annum (based on annual burn hours of 4,271 as detailed in the DUML database auditing tool).
19 items of load with an incorrect ballast applied	Potential very minor overall under submission of 155 kWh per annum (based on annual burn hours of 4,271 as detailed in the DUML database auditing tool.

This is also recorded as non-compliance and discussed in **sections 2.4, 3.1** and **3.2**.

On 18 June 2019, the Electricity Authority issued a memo confirming that the code requirement to calculate the correct monthly load must:

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

The current monthly report is provided as a snapshot and this practice is non-compliant. The database contains a "light install date" and a "lamp install date" but there is not a field for "livening date" for newly connected lights. When a wattage is changed in the database due to a physical change or a correction, only the record present at the time the report is run is recorded, not the historical information showing dates of changes. Genesis completes revision submissions where corrections are required and has not yet updated their processes to be compliant with the Authority's memo.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 3.2 With: Clause 15.2 and 15.37B(c) From: 01-Mar-19 To: 31-Dec-19	Potential over submission of 448 kWh p.a. due to incorrect on/off times. The database accuracy is assessed to be 111.9% of the database for the sample checked indicating a potential under submission of approximately 133,500 kWh per annum. 18 x 25W fluorescent lights should a 7.8W ballast applied but have a 5W ballast applied resulting in a minor estimated annual under submission of 215 kWh. 1x 103W LED has a ballast of 14W applied when this should be zero resulting in a minor estimated annual over submission of 60 kWh. The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot. Potential impact: High Actual impact: High Audit history: Twice previously Controls: Moderate Breach risk rating: 6
Audit risk rating	**Rationale for audit risk rating**
Medium	The controls are rated as moderate as processes to manage change capture most changes, but the new connection process needs review to ensure new connections are updated in the database in a timely manner. The impact is assessed to be high due to volume of additional lights found in the field.

Actions taken to resolve the issue	Completion date	Remedial action status
Genesis has contacted QLDC (Rodger Hughes) who has implemented monthly reporting. And Genesis has addressed the issue with night hours	01/05/2020	Investigating
Preventative actions taken to ensure no further issues will occur	**Completion date**	
Genesis has addressed the night hours issue as this was a set up error by a user. Genesis will review the onboarding processes in due course to help avoid further occurrences.	01/05/2020	

CONCLUSION

QLDC switched into Genesis from 1/10/19.

QLDC have largely finished the LED roll out. McKay Electrical commenced being the field contractor from 1/05/2019. They were expected to undertake a 100% field audit as part of this but due to resource constraints within McKay electrical this has yet to be completed. QLDC are working with them to expedite this. As this hasn't been done, I found a similar level of error in the field audit. Once the field audit is completed, I expect overall database accuracy to improve. However, some streets in new subdivisions were selected and found a high number of lights missing from the streets checked. This has resulted in the DUML tool indicating under submission in this audit rather than over submission as was found in the last audit. I have recommended that Genesis work with the networks and QLDC to improve the new connection processes to ensure new lights get added to RAMM in a timely manner.

ICP 0000990001LN819 burn hours are currently calculated using the astronomical sunset/sunrise hour which when compared to the data logger used in the surrounding area lights for December 2019, was overstated by 5.2%. This will be resulting in a minor amount of over submission. Genesis have identified a data logger for this ICP and intend to use this from revision three onwards and back date the burn hours to the point of switch in.

The audit found five non-compliances and makes one recommendation. The future risk rating of 25 indicates that the next audit be completed in three months. I have considered this in conjunction with the comments provided by Genesis Energy and recommend recommend that the next audit be in nine months

PARTICIPANT RESPONSE

Genesis has established reporting from the council and are currently reviewing the information supplied.

Genesis will feed back any exceptions found with the datasets provided.