

ELECTRICITY INDUSTRY PARTICIPATION CODE  
DISTRIBUTED UNMETERED LOAD AUDIT REPORT



For

WAKA KOTAHI LOWER NORTH ISLAND  
AND GENESIS ENERGY LIMITED

Prepared by: Steve Woods

Date audit commenced: 4 August 2022

Date audit report completed: 13 December 2022

Audit report due date: 1 September 2022

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## TABLE OF CONTENTS

Executive summary .....	3
Audit summary .....	4
Non-compliances .....	4
Recommendations .....	5
Issues 6	
1. Administrative .....	7
1.1. Exemptions from Obligations to Comply with Code .....	7
1.2. Structure of Organisation .....	7
1.3. Persons involved in this audit .....	8
Hardware and Software .....	8
1.4. Breaches or Breach Allegations .....	8
1.5. ICP Data .....	8
1.6. Authorisation Received .....	9
1.7. Scope of Audit .....	10
1.8. Summary of previous audit .....	11
1.9. Distributed unmetered load audits (Clause 16A.26 and 17.295F) .....	12
2. DUML database requirements .....	13
2.1. Deriving submission information (Clause 11(1) of Schedule 15.3) .....	13
2.2. ICP identifier and items of load (Clause 11(2)(a) and (aa) of Schedule 15.3) .....	15
2.3. Location of each item of load (Clause 11(2)(b) of Schedule 15.3) .....	16
2.4. Description and capacity of load (Clause 11(2)(c) and (d) of Schedule 15.3) .....	16
2.5. All load recorded in database (Clause 11(2A) of Schedule 15.3) .....	18
2.6. Tracking of load changes (Clause 11(3) of Schedule 15.3) .....	20
2.7. Audit trail (Clause 11(4) of Schedule 15.3) .....	20
3. Accuracy of DUML database .....	21
3.1. Database accuracy (Clause 15.2 and 15.37B(b)) .....	21
3.2. Volume information accuracy (Clause 15.2 and 15.37B(c)) .....	24
Conclusion .....	27
Participant response .....	28

## EXECUTIVE SUMMARY

This audit of the **Waka Kotahi Lower North Island** DUMML 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.

This database was created by taking the items of load out of several District and City Council databases.

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 DUMML audits version 1.1.

A field audit was undertaken of 536 items of load and the database accuracy is described as follows:

Result	Percentage	Comments
The point estimate of R	98.6	Wattage from survey is higher than the database wattage by 1.4%
R <sub>L</sub>	91.7	With a 95% level of confidence, it can be concluded that the error could be between -8.3% and + 4.6%
R <sub>H</sub>	104.6	

In absolute terms, total annual consumption is estimated to be 35,600 kWh lower than the DUMML database indicates.

As was found in the last audit, a large number of database accuracy issues were identified, and I repeat the recommendation that a 100% field audit is conducted to address these and to ensure the database is accurate and that submission information is accurate. The other workstream that could assist with database accuracy is if Waka Kotahi could accelerate their LED rollout, because as long as the database update processes are robust, this should result in an accurate database.

The discrepancies found in this audit are as follows:

- 13 incorrect gear wattages,
- 4 items have invalid combinations of lamp and gear wattages where either could be incorrect, and
- 90 incorrect or missing light model descriptions.

This audit found five non-compliances were identified, and three recommendations were raised. The future risk rating of 24 indicates that the next audit be completed in three months. I have considered this in conjunction with Genesis's response and the progress that NZ Streetlighting has made in updating the database from the field audit results. However the number of differences identified from this audits field sample and ongoing delay in conducting a full field audit by Waka Kotahi until an accelerated renewal program is implemented is continuing to show that the database continues to have accuracy issues. I believe this sort of an audit could be conducted efficiently and in a timely manner and I therefore recommend the next audit is in six 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	<p>Under submission of 9,262 kWh for June 2022 due to the incorrect burn hours being used.</p> <p>Database assessed as having poor precision therefore the potential error is greater than 5.0% resulting in an estimated over submission of 35,600 kWh per annum.</p> <p>Database discrepancies are as follows:</p> <ul style="list-style-type: none"> <li>• 13 incorrect gear wattages,</li> <li>• Four items have invalid combinations of lamp and gear wattages where either could be incorrect, and</li> <li>• 90 incorrect or missing light model descriptions.</li> </ul>	Weak	Medium	6	Identified
Description and capacity of load	2.4	11(4) of Schedule 15.3	<p>84 items of load have a blank or unknown light model description.</p> <p>Six items have incorrect light make and model</p> <p>Four items have invalid combinations of lamp and gear wattages where either could be incorrect</p> <p>Nine items of load have incorrect gear wattages</p>	Weak	Low	3	Identified
All load recorded in database	2.5	11(2A) of Schedule 15.3	<p>40 items of load in the field not recorded in the database. This discrepancy is included in the total field audit discrepancy recorded in <b>section 3.1</b>.</p>	Weak	Low	3	Identified
Database accuracy	3.1	15.2 and 15.37B(b)	<p>Database assessed as having poor precision therefore the potential error is greater than 5.0% resulting in an</p>	Weak	Medium	6	Identified

Subject	Section	Clause	Non-Compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
			<p>estimated over submission of 35,600 kWh per annum.</p> <p>Database discrepancies are as follows:</p> <ul style="list-style-type: none"> <li>• 13 incorrect gear wattages,</li> <li>• Four items have invalid combinations of lamp and gear wattages where either could be incorrect, and</li> <li>• 90 incorrect or missing light model descriptions</li> </ul>				
Volume information accuracy	3.2	15.2 and 15.37B(c)	<p>Under submission of 9,262 kWh for June 2022 due to the incorrect burn hours being used.</p> <p>Database assessed as having poor precision therefore the potential error is greater than 5.0% resulting in an estimated over submission of 35,600 kWh per annum.</p> <p>Database discrepancies are as follows:</p> <ul style="list-style-type: none"> <li>• 13 incorrect gear wattages,</li> <li>• Four items have invalid combinations of lamp and gear wattages where either could be incorrect, and</li> <li>• 90 incorrect or missing light model descriptions.</li> </ul>	Weak	Medium	6	Identified
Future Risk Rating						24	

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

## RECOMMENDATIONS

Subject	Section	Recommendation
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GPS coordinates	2.3	Populate GPS coordinates for Pole IDs 53584, 53481 and 66710
Consolidate all Waka Kotahi unmetered streetlights	2.5	Genesis identifies all Standard UML ICPs related to Waka Kotahi Lower North Island and working with both Waka Kotahi and the respective distributor to transition these lights into the DUML database to ensure all Kotahi Lower North Island unmetered lights are accounted for and can be appropriately audited
Database accuracy	3.1	Prioritise LED roll out that would enable the database to be updated at the earliest opportunity or conduct a full field audit of all items of load to ensure database accuracy.

## 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

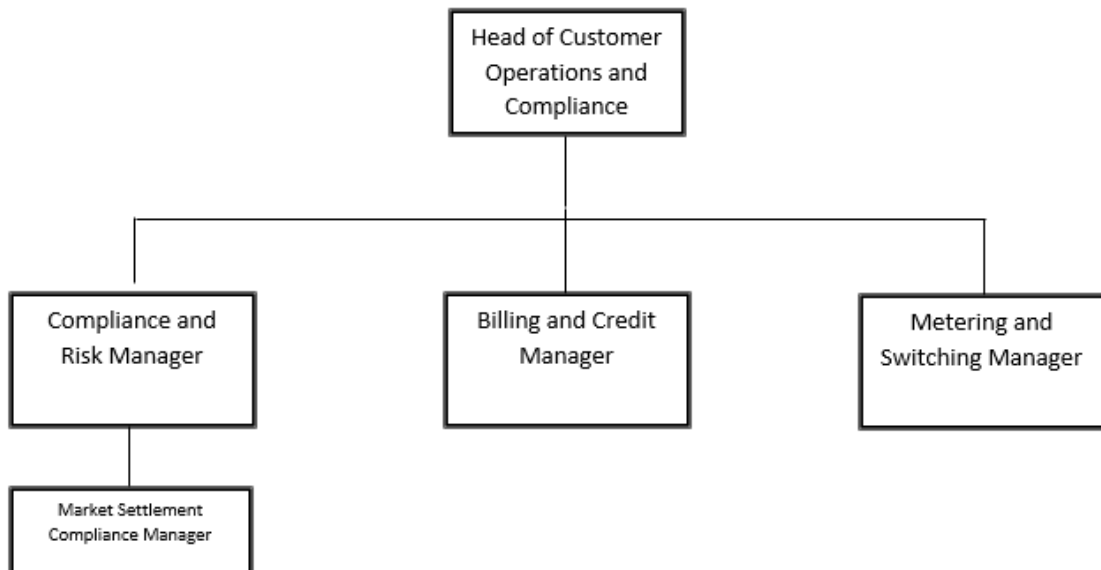
Current code exemptions were reviewed on the Electricity Authority website.

#### Audit commentary

There are no exemptions 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:

Name	Company	Role
Steve Woods	Veritek Limited	Auditor
Bernie Cross	Veritek Limited	Supporting Auditor

Other personnel assisting in this audit were:

Name	Title	Company
Nirav Teli	DUML Data & Stakeholder Lead	Genesis Energy
Kara Atkinson	Director	NZ Streetlighting

### 1.4. Hardware and Software

The SQL database used for the management of DUML is remotely hosted by thinkproject New Zealand Limited. The database is commonly known as “RAMM” which stands for “Road Assessment and Maintenance Management”. The specific module used for DUML is called RAMM Contractor.

Stantec has previously 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

The Waka Kotahi Lower North Island DUML database contains the ICPs in the table below. ICP 0666002555PC35F has been added to this database since the last audit. This was omitted from the last audit, as at that time it was thought to have been included in the Waka Kotahi Greater Wellington audit but at the time of that audit (completed July 2022), Waka Kotahi confirmed it be included in this audit.

ICP Number	Description	NSP	Profile	Number of items of load	Database wattage (watts)
0001113593WM404	Streetlights (Central Taranaki UM - ONG0331)	ONG0331	CST	100	17,153
0001113594WM9CE	Streetlights (Western Taranaki UM - HTI0331)	HTI0331	NST	5	832
0009104000CAB5C	Transit - SH2 & SH3 Flag Lighting	DVK0111	CST	141	19,277



ICP Number	Description	NSP	Profile	Number of items of load	Database wattage (watts)
0009109000CA17C	NZTA Highway Lighting Woodville	WDV0111	CST	151	28,342
0036810007PCADE	Streetlights - cnr of SH54 (Vinegar Hill) &	MTN0331	CST	2	556
0110012428ELECC	NZTA Streetlights	MHO0331	CST	279	43,553
0110012429EL289	NZTA Streetlights	MHO0331	CST	10	1,213
1000592735PCC2D	NZTA Streetlights BPE0331	BPE0331	CST	633	107,718
1000592736PC0ED	NZTA Streetlights CST0331	CST0331	NST	844	129,665
1000592737PCCA8	NZTA Streetlights HWA0331	HWA0331	NST	299	31,826
1000592738PC376	NZTA Streetlights HUI0331	HUI0331	NST	170	27,152
1000592739PCF33	NZTA Streetlights LTN0331	LTN0331	CST	149	23,837
1000592741PC87A	NZTA Streetlights OPK0331	OPK0331	NST	120	14,858
1000592743PC8FF	NZTA Streetlights SFD0331	SFD0331	NST	215	29,824
1000592782PC355	NZTA Streetlights WVY0111	WVY0111	NST	29	3,720
1000592858PC389	NZTA Streetlights MST0331	MST0331	CST	408	62,735
0666002555PC35F	NZTA Streetlights GYT0331	GYT0331	CST	181	28,659
<b>Total</b>				<b>3,736</b>	<b>570,920</b>

### 1.7. Authorisation Received

All information was provided directly by Genesis and NZ Streetlighting.

## 1.8. Scope of Audit

This audit of the **Waka Kotahi Lower North Island** DUMML 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.

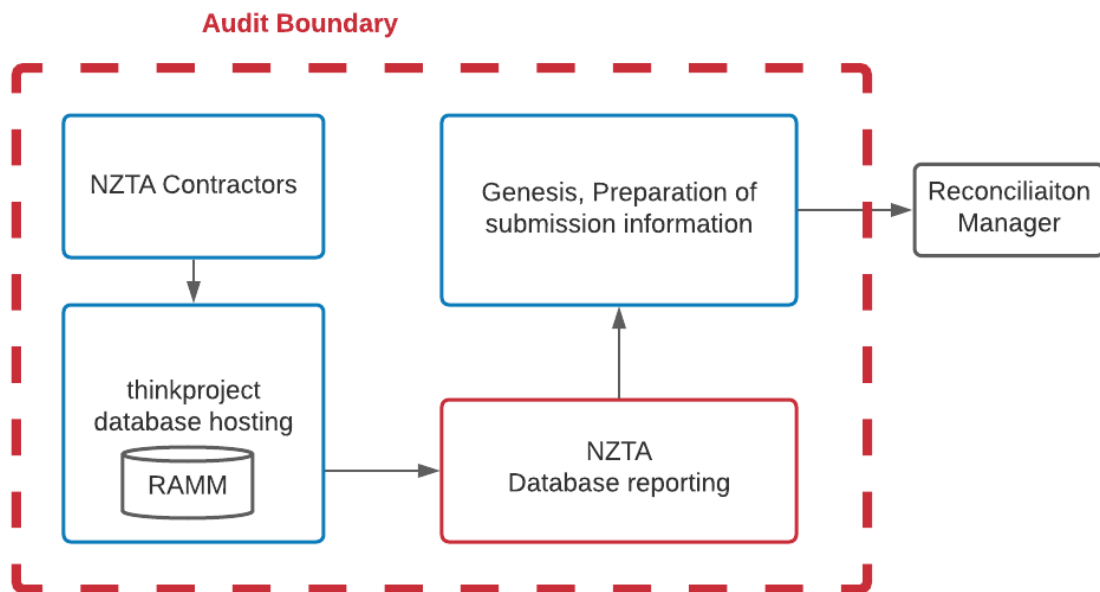
This database was created by taking the items of load out of several District and City Council databases.

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 DUMML audits version 1.1.

The RAMM database is maintained by the relevant contractor depending on the region. The contracts between WAKA KOTAHI and the contractors requires the database to be updated prior to payment being made, which provides motivation to ensure the database is accurate.

Genesis reconciles the DUMML load using the NST and CST profiles. The kW figures are derived from the database and the on/off times are derived from three loggers within the overall region.

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 boundaries for clarity.



A field audit was conducted of 536 items of load on August 4 & 9, 2022.

## 1.9. Summary of previous audit

Subject	Section	Clause	Non-Compliance	Status
Distributed unmetered load audits	1.9	16A.26 and 17.295F	Audit conducted late.	Cleared
Deriving submission information	2.1	11(1) of Schedule 15.3	<p>The database is outside of the allowable +/- 5% threshold. There is a 95% level of confidence that the annual consumption is between 249,800 kWh p.a. lower to 220,400 kWh p.a. higher than the database indicates.</p> <p>In absolute terms, total annual consumption is estimated to be 35,300 kWh lower than the DUML database indicates.</p> <p>ICPs 0001113593WM404 &amp; 0001113594WM9CE had the "night hours" from the profile used for submission for June 2021 instead of the data logger hours.</p> <p>Incorrect gear wattage for 13 items of load.</p>	<p>Still existing</p> <p>Still existing</p> <p>Cleared</p>
Description and capacity of load	2.4	11(4) of Schedule 15.3	<p>99 items of load have a blank or unknown light model description.</p> <p>Two items of load have zero recorded in the lamp wattage field.</p> <p>13 items of load have incorrect gear wattages.</p>	<p>Still existing</p> <p>Cleared</p> <p>Still existing</p>
All load recorded in database	2.5	11(2A) of Schedule 15.3	17 items of load in the field not recorded in the database, resulting in annual under submission of 9,174 kWh per annum. This discrepancy is included in the total field audit discrepancy recorded in <b>section 3.1</b> .	Still existing
Database accuracy	3.1	15.2 and 15.37B(b)	<p>The database is outside of the allowable +/- 5% threshold. There is a 95% level of confidence that the annual consumption is between 249,800 kWh p.a. lower to 220,400 kWh p.a. higher than the database indicates.</p> <p>In absolute terms, total annual consumption is estimated to be 35,300 kWh lower than the DUML database indicates.</p> <p>Database discrepancies are as follows:</p> <ul style="list-style-type: none"> <li>• 13 incorrect gear wattages,</li> <li>• 657 incorrect light model descriptions,</li> <li>• 17 items of load in the field not in the database,</li> <li>• 13 items of load in the database but not in the field, and</li> <li>• 125 incorrect wattages.</li> </ul>	<p>Still existing</p> <p>Still existing</p> <p>Still existing</p>

Subject	Section	Clause	Non-Compliance	Status
Volume information accuracy	3.2	15.2 and 15.37B(c)	<p>The database is outside of the allowable +/- 5% threshold. There is a 95% level of confidence that the annual consumption is between 249,800 kWh p.a. lower to 220,400 kWh p.a. higher than the database indicates.</p> <p>In absolute terms, total annual consumption is estimated to be 35,300 kWh lower than the DUML database indicates.</p> <p>ICPs 0001113593WM404 &amp; 0001113594WM9CE had the "night hours" from the profile used for submission for June 2021 instead of the data logger hours.</p> <p>Incorrect gear wattage for 13 items of load.</p>	<p>Still existing</p> <p>Still existing</p> <p>Cleared</p>

#### 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.

##### 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 application of profiles was checked. The database was checked for accuracy.

#### Audit commentary

The NST and CST profiles are used for submission depending on the location of the GXP. On/off times are derived from three data loggers recording on and off signals from ripple control systems.

I compared the submitted volume for June 2022 to a manual calculation of the watt of connected load from the June 2022 database extract and the operation hours of the streetlights from the respective streetlight logger for June 2022 and found some differences as detailed in the table below:

ICP	June 2022 kW	Burn hours	Calculated kWh	June 2022 kWh submitted	Difference
0001113593WM404	17.14	441.10	7,558.20	17.14	314.65
0001113594WM9CE	0.83	441.10	366.99	0.83	15.70
0009104000CAB5C	19.28	442.46	8,529.35	19.28	327.74
0009109000CA17C	28.34	442.46	12,540.28	28.34	482.22
0036810007PCADE	0.56	440.80	245.08	0.56	11.85
0110012428ELECC	43.55	440.80	19,198.04	43.55	933.85
0110012429EL289	1.23	440.80	542.62	1.23	25.85
1000592735PCC2D	107.72	440.80	47,481.80	107.72	2310.51
1000592736PC0ED	129.67	426.20	55,263.15	129.67	1632.83
1000592737PCCA8	31.83	426.20	13,564.22	31.83	400.99
1000592738PC376	27.15	426.20	11,572.17	27.15	341.52
1000592739PCF33	23.84	440.80	10,507.28	23.84	510.51
1000592741PC87A	14.86	426.20	6,332.47	14.86	187.31
1000592743PC8FF	29.82	426.20	12,710.97	29.82	375.16

ICP	June 2022 kW	Burn hours	Calculated kWh	June 2022 kWh submitted	Difference
1000592782PC355	3.72	426.20	1,585.46	3.72	46.75
1000592858PC389	62.74	440.80	2,7653.41	62.74	1344.38
TOTAL					9,261.84

It appears that the incorrect burn hours were applied resulting in an inaccuracy of between 2.9% and 4.9% across 16 ICPs and an under submission of 9,262 kWh for the month of June 2022. This is recorded as non-compliance below and in **section 3.2**.

The field audit found that the database is not confirmed as accurate with a 95% level of confidence resulting in an estimated over submission of 29,100 kWh per annum and could potentially be between 119,100 kWh p.a. over submission to 186,400 kWh p.a. under submission. This is recorded as non-compliance below and in **sections 3.1** and **3.2**.

Analysis of the database found the following discrepancies:

- 13 incorrect gear wattages which have now been updated within the database,
- Four items had invalid combinations of lamp and gear wattages where either could be incorrect, these have also been updated within the database, and
- 90 incorrect or missing light model descriptions.

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

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

Genesis imports the data into a database and uses asset install dates to calculate active days for each item of load.

### Audit outcome

Non-compliant

Non-compliance	Description		
<p>Audit Ref: 2.1 With: Clause 11(1) of Schedule 15.3</p> <p>From: 01-Oct-21 To: 30-Jun-22</p>	<p>Under submission of 9,262 kWh for June 2022 due to the incorrect burn hours being used.</p> <p>Database assessed as having poor precision therefore the potential error is greater than 5.0% resulting in an estimated over submission of 29,100 kWh per annum.</p> <p>Database discrepancies are as follows:</p> <ul style="list-style-type: none"> <li>• 13 incorrect gear wattages,</li> <li>• Four items have invalid combinations of lamp and gear wattages where either could be incorrect, and</li> <li>• 90 incorrect or missing light model descriptions.</li> </ul> <p>Potential impact: High Actual impact: Medium Audit history: Once previously Controls: Weak Breach risk rating: 6</p>		
Audit risk rating	Rationale for audit risk rating		
<b>Medium</b>	<p>The controls are recorded as weak because the database requires a 100% field audit in order to ensure accuracy.</p> <p>The impact on settlement and participants is moderate based on the kWh error; therefore, the audit risk rating is medium.</p>		
Actions taken to resolve the issue		Completion date	Remedial action status
<p>Genesis has reviewed auditor's findings with regards to incorrect bur hours and have revised submission and attached a copy of the latest volumes submitted.</p> <p>Genesis has been working with NZTA and resolved the discrepancies regarding incorrect gear, invalid combinations of lamp and gear wattages &amp; incorrect or missing light model descriptions. NZTA have updated majority of the highlighted discrepancies. The latest dataset has been attached for you reference. NZTA have confirmed they do look for any blanks in the light model descriptions and update it as the earliest.</p>		15/11/2022	Identified
Preventative actions taken to ensure no further issues will occur		Completion date	
Genesis will continue to work with NZTA and keep improving data accuracy as and when possible		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 was recorded against each item of load.

### Audit commentary

Each item of load has the ICP recorded.

### Audit outcome

Compliant

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

### Code reference

Clause 11(2)(b) of Schedule 15.3

### Code related audit information

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

### Audit observation

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

### Audit commentary

The database contains fields for the road name, location number, and GPS coordinates. All items of load apart from three have GPS coordinates populated. The three items of load without GPS coordinates have a road name, location and a pole number and are locatable, however I recommend the GPS coordinates are populated.

Recommendation	Description	Audited party comment	Remedial action
GPS coordinates	Populate GPS coordinates for Pole IDs 53584, 53481 and 66710.	Genesis has been working with NZTA and have confirmation from NZTA that GPS coordinates have been updated. (Please see attached email for your reference)	Cleared

### Audit outcome

Compliant

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

### Code reference

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

### Code related audit information

The DUML database must contain:



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

#### Audit observation

The database was checked to confirm that:

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

#### Audit commentary

The database contains fields for lamp make model description, lamp wattage and gear wattage.

Analysis of the database found:

- 84 items of load have a blank or unknown light model description,
- six items have incorrect light make and model,
- four items have invalid combinations of lamp and gear wattages where either could be incorrect, and
- nine items of load have incorrect gear wattages.

The accuracy of the lamp and gear wattages is discussed in **section 3.1**.

#### Audit outcome

Non-compliant

Non-compliance	Description	
Audit Ref: 2.4 With: Clause 11(2)(c) and (d) of Schedule 15.3  From: 01-Oct-21 To: 30-Jun-22	84 items of load have a blank or unknown light model description.  Six items have incorrect light make and model  Four items have invalid combinations of lamp and gear wattages where either could be incorrect  Nine items of load have incorrect gear wattages  Potential impact: Low  Actual impact: Low  Audit history: Once previously  Controls: Weak  Breach risk rating: 3	
Audit risk rating	Rationale for audit risk rating	
<b>Low</b>	The controls are recorded as weak because the database requires a 100% field audit in order to ensure accuracy.  The impact is assessed to be low based on the kWh impact.	
Actions taken to resolve the issue	Completion date	Remedial action status

<p>NZTA have confirmed they do look for any blanks and unknown in the light model descriptions and update it as soon as information is available.</p> <p>2 out of 6 lamps incorrect light make and model have been corrected. NZTA are waiting for the as built to be provided and have the lamp make corrected.</p> <p>Genesis has been working with NZTA and resolved the highlighted discrepancies regarding invalid combinations of lamp and gear wattages &amp; incorrect gear wattages.</p> <p>NZTA have confirmed they do look for any blanks and unknown in the light model descriptions and update it as soon as information is available.</p>	15/02/2022	Identified
<b>Preventative actions taken to ensure no further issues will occur</b>	<b>Completion date</b>	
Genesis will continue to work with NZTA and keep improving data accuracy as and when possible	Continuous Improvement	

## 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

A field audit was conducted of 536 items of load.

### Audit commentary

The field audit found:

The field audit identified the following:

- 40 items of load in the field not in the database,
- 6 items of load in the database but not in the field, and
- 113 incorrect wattages.

The detailed results have been provided to Genesis and NZ Streetlighting. For 15 of the lights identified by this field audit, NZ Streetlighting were able to identify a Standard UML ICP associated with the respective intersection between the State highway and a local road. The Standard UML Retailer UNM details and Daily average kWh values related to only five of the 15 lights identified.

Genesis believes that the lights associated with these standard UML ICPs have not been transitioned to the DUML database due to the operation of these lights being via photocell and the relevant distributor requires only relay controlled lights to be within the DUML database.

I reviewed the lights within the DUML database associated with this network and found a mix of both relay and photocell operated lights. Given that most relay operated streetlight circuits are operated by a photocell at the local zone substation, there is little difference between a relay operated light and a photocell operated light. I recommend that Genesis identifies all Standard UML ICPs related to Waka

Kotahi Lower North Island and working with both Waka Kotahi and the respective distributor to transition these lights into the DUML database to ensure all Kotahi Lower North Island unmetered lights are accounted for and can be appropriately audited.

Recommendation	Description	Audited party comment	Remedial action
Consolidate all Waka Kotahi unmetered streetlights	Genesis identifies all Standard UML ICPs related to Waka Kotahi Lower North Island and working with both Waka Kotahi and the respective distributor to transition these lights into the DUML database to ensure all Kotahi Lower North Island unmetered lights are accounted for and can be appropriately audited.	Genesis will discuss with NZTA if there are any other asset's they would like to transfer to DUML based on the distributor's requirements	Identified

The accuracy of the database is discussed in **section 3.1**.

### Audit outcome

Non-compliant

Non-compliance	Description		
Audit Ref: 2.5 With: Clause 11(2A) of Schedule 15.3  From: 01-Oct-21 To: 30-Jun-22	40 items of load in the field not recorded in the database. This discrepancy is included in the total field audit discrepancy recorded in <b>section 3.1</b> .  Potential impact: Medium  Actual impact: Low  Audit history: Once previously  Controls: Weak  Breach risk rating: 3		
Audit risk rating	Rationale for audit risk rating		
<b>Low</b>	The controls are recorded as weak because the database requires a 100% field audit in order to ensure accuracy.  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 has reviewed the auditors finding and have advised NZTA of the discrepancy. NZTA have made updates on RAMM as and where required. Out of the 40 items NZTA have identified 14 which are STD UML metered. Genesis has updated UNM details on the registry to reflect the same		13/12/2022	Cleared
Preventative actions taken to ensure no further issues will occur		Completion date	

Genesis continues to work with the council to increase accuracy levels in their database.	Continuous improvement	
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## 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 database functionality achieves compliance with the code.

### 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 RAMM database contains a compliant 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

A field audit was undertaken of 536 items of load. I assessed the accuracy of this by using the DUML Statistical Sampling Guideline. The table below shows the survey plan.

Plan Item	Comments
Area of interest	Lower North Island WAKA KOTAHI lighting
Strata	The database contains WAKA KOTAHI lighting in the Manawatu, Taranaki and Wairarapa regions. The processes for the management of all WAKA KOTAHI items of load are the same, but I decided to place the items of load into six strata based on regions: <ol style="list-style-type: none"> <li>1. Taranaki Strata 1</li> <li>2. Taranaki Strata 2</li> <li>3. Manawatu &amp; Whanganui SH1 &amp; MISC</li> <li>4. Manawatu &amp; Whanganui SH2</li> <li>5. Manawatu &amp; Whanganui SH3</li> <li>6. Wairarapa</li> </ol>
Area units	I created a pivot table of the roads, and I used a random number generator in a spreadsheet to select a total of 24 sub-units.
Total items of load	536 items of load were checked, making up 14% of the database load.

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 field audit was conducted of a statistical sample of 474 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	98.6	Wattage from survey is higher than the database wattage by 1.4%
R <sub>L</sub>	91.7	

Result	Percentage	Comments
R <sub>H</sub>	104.6	With a 95% level of confidence, it can be concluded that the error could be between -8.3% and + 4.6%

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 8.3% lower and 4.6% 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 8 kW lower than the database indicates.
- There is a 95% level of confidence that the installed capacity is between 48 kW lower and 27 kW higher than the database.
- In absolute terms, total annual consumption is estimated to be 35,600 kWh lower than the DUML database indicates.
- There is a 95% level of confidence that the annual consumption is between 206,900 kWh p.a. lower to 114,800 kWh p.a. higher than the database indicates.

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

### Light description and capacity accuracy

As discussed in **section 2.4**, 84 items of load have a blank or unknown light model description. There are also nine incorrect gear wattages, four items have invalid combinations of lamp and gear wattages where either could be incorrect, and six incorrect light model descriptions.

The quantity of errors identified in the field audit represents an error rate of 30%, and whilst the “overs” and “unders” cancel themselves out to a certain extent, it’s possible the database could be approximately 10% too high or 10% too low.

It was recommended in the previous audit to conduct a full field audit of all items of load to ensure the database is accurate and I again recommend that either the roll out of LED lights be prioritised that would then enable the database to be updated at the earliest opportunity or a full field audit be undertaken.

Recommendation	Description	Audited party comment	Remedial action
Database accuracy	Prioritise LED roll out that would enable the database to be updated at the earliest opportunity or conduct a full field audit of all items of load to ensure database accuracy.	Genesis has discussed this with NZTA and have been advised there is no funding available for a LED accelerated renewal. Desktop audit was done when the database was created. Field audit will be conducted when accelerated renewal is implemented.	Identified

### ICP number accuracy

All ICPs are correctly recorded.

### Location information

The database contains fields for the road name, location number, and GPS coordinates. All items of load apart from three have GPS coordinates populated. The three items of load without GPS coordinates have a road name, location and a pole number and are locatable, however I recommend in **section 2.3** that the GPS coordinates are populated.

### Change management process findings

The relevant contractors in each region are required by their contract to update the database of any changes. The database updates are required to support the payment of contractors’ invoices.

### Festive and private lights

There are no private lights identified however I did identify some festive lights in Masterton fitted on Waka Kotahi poles along SH2. These festive lights are not currently included in the local council DUMML database. These festive lights have been escalated to the local council as part of their recent DUMML audit.

### Audit outcome

Non-compliant

Non-compliance	Description
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<p>Audit Ref: 3.1 With: Clause 15.2 and 15.37B(b)</p> <p>From: 01-Oct-21 To: 30-Jun-22</p>	<p>Database assessed as having poor precision therefore the potential error is greater than 5.0% resulting in an estimated over submission of 35,600 kWh per annum.</p> <p>Database discrepancies are as follows:</p> <ul style="list-style-type: none"> <li>• 13 incorrect gear wattages,</li> <li>• Four items have invalid combinations of lamp and gear wattages where either could be incorrect, and</li> <li>• 90 incorrect or missing light model descriptions.</li> </ul> <p>Potential impact: High Actual impact: Medium Audit history: Once previously Controls: Weak Breach risk rating: 6</p>		
<b>Audit risk rating</b>	<b>Rationale for audit risk rating</b>		
<b>Medium</b>	<p>The controls are recorded as weak because the database requires a 100% field audit in order to ensure accuracy.</p> <p>The impact on settlement and participants is moderate based on the kWh error; therefore, the audit risk rating is medium.</p>		
<b>Actions taken to resolve the issue</b>	<b>Completion date</b>	<b>Remedial action status</b>	
<p>Genesis has been working with NZTA and resolved the highlighted discrepancies regarding incorrect gear wattages &amp; items having invalid combinations of lamp and gear wattages.</p> <p>NZTA have confirmed they do look for any blanks and unknown in the light model descriptions and update it as soon as information is available.</p>	28/11/2022	Identified	
<b>Preventative actions taken to ensure no further issues will occur</b>	<b>Completion date</b>		
<p>Genesis continues to work with the council to increase accuracy levels in their database.</p>	Continuous Improvement		

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

#### Code reference

Clause 15.2 and 15.37B(c)

#### Code related audit information

The audit must verify that:

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

#### Audit observation



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

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

**Audit commentary**

The NST and CST profiles are used for submission depending on the location of the GXP. On/off times are derived from four data loggers recording on and off signals from ripple control systems.

As detailed in **section 2.1**, I compared the submitted volume for June 2022 to a manual calculation of the watt of connected load from the June 2022 database extract and the operation hours of the streetlights from the respective streetlight logger for June 2022. It appears that the incorrect burn hours were applied resulting in an inaccuracy of between 2.9% and 4.9% across 16 ICPs and an under submission of 9,262 kWh for the month of June 2022.

As recorded in **section 3.1**, the field audit found that the database is not confirmed as accurate with a 95% level of confidence resulting in an estimated over submission of 35,600 kWh per annum and could potentially be between 114,800 kWh p.a. over submission to 206,900 kWh p.a. under submission. This is recorded as non-compliance below and in **sections 2.1** and **3.1**.

Analysis of the database found the following discrepancies:

- 13 incorrect gear wattages which have now been updated within the database,
- Four items have invalid combinations of lamp and gear wattages where either could be incorrect, these have also been updated within the database, and
- 90 incorrect or missing light model descriptions.

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

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

Genesis imports the data into a database and uses asset install dates to calculate active days for each item of load.

**Audit outcome**

Non-compliant

Non-compliance	Description
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<p>Audit Ref: 3.2 With: Clause 15.2 and 15.37B(c)</p> <p>From: 01-Oct-21 To: 30-Jun-22</p>	<p>Under submission of 9,262 kWh for June 2022 due to the incorrect burn hours being used.</p> <p>Database assessed as having poor precision therefore the potential error is greater than 5.0% resulting in an estimated over submission of 35,600 kWh per annum.</p> <p>Database discrepancies are as follows:</p> <ul style="list-style-type: none"> <li>• 13 incorrect gear wattages,</li> <li>• Four items have invalid combinations of lamp and gear wattages where either could be incorrect, and</li> <li>• 90 incorrect or missing light model descriptions.</li> </ul> <p>Potential impact: High Actual impact: Medium Audit history: Once previously Controls: Weak Breach risk rating: 6</p>		
<b>Audit risk rating</b>	<b>Rationale for audit risk rating</b>		
<b>Medium</b>	<p>The controls are recorded as weak because the database requires a 100% field audit in order to ensure accuracy.</p> <p>The impact on settlement and participants is moderate based on the kWh error; therefore, the audit risk rating is medium.</p>		
<b>Actions taken to resolve the issue</b>		<b>Completion date</b>	<b>Remedial action status</b>
<p>Genesis has revised submission and attached a copy of the latest volumes submitted.</p> <p>Genesis has been working with NZTA and resolved the highlighted discrepancies regarding incorrect gear wattages &amp; items having invalid combinations of lamp and gear wattages.</p> <p>NZTA have confirmed they do look for any blanks and unknown in the light model descriptions and update it as soon as information is available.</p>		28/11/2022	Identified
<b>Preventative actions taken to ensure no further issues will occur</b>		<b>Completion date</b>	
<p>Genesis continues to work with the council to increase accuracy levels in their database.</p>		Continuous Improvement	

## CONCLUSION

This audit of the **Waka Kotahi Lower North Island** DUMML 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.

This database was created by taking the items of load out of several District and City Council databases.

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 DUMML audits version 1.1.

A field audit was undertaken of 536 items of load and the database accuracy is described as follows:

Result	Percentage	Comments
The point estimate of R	98.6	Wattage from survey is higher than the database wattage by 1.4%
R <sub>L</sub>	91.7	With a 95% level of confidence, it can be concluded that the error could be between -8.3% and + 4.6%
R <sub>H</sub>	104.6	

In absolute terms, total annual consumption is estimated to be 35,600 kWh lower than the DUMML database indicates.

As was found in the last audit, a large number of database accuracy issues were identified, and I repeat the recommendation that a 100% field audit is conducted to address these and to ensure the database is accurate and that submission information is accurate. The other workstream that could assist with database accuracy is if Waka Kotahi could accelerate their LED rollout, because as long as the database update processes are robust, this should result in an accurate database.

The discrepancies found in this audit are as follows:

- 13 incorrect gear wattages,
- 4 items have invalid combinations of lamp and gear wattages where either could be incorrect, and
- 90 incorrect or missing light model descriptions.

This audit found five non-compliances were identified, and three recommendations were raised. The future risk rating of 24 indicates that the next audit be completed in three months. I have considered this in conjunction with Genesis's response and the progress that NZ Streetlighting has made in updating the database from the field audit results. However the number of differences identified from this audits field sample and ongoing delay in conducting a full field audit by Waka Kotahi until an accelerated renewal program is implemented is continuing to show that the database continues to have accuracy issues. I believe this sort of an audit could be conducted efficiently and in a timely manner and I therefore recommend the next audit is in six months.

## PARTICIPANT RESPONSE

Genesis has been working with NZTA and have made substantial updates in RAMM

- 1) All 13 incorrect gear wattages have been corrected and latest RAMM extract sent for reference.
- 2) Updated incorrect or missing light model descriptions. NZTA keep reviewing any blanks in the light model descriptions and update it as the earliest
- 3) 2 out of 6 lamps incorrect light make and model have been corrected. NZTA are waiting for the as built to be provided and they will have the lamp make corrected.
- 4) Genesis has updated registry for 14 out of 40 items identified by the auditor as not recorded in database. Also NZTA have updated RAMM as and where required.
- 5) Genesis has revised submissions and sent a copy of latest volumes submitted.

Genesis has been able to build good relations with NZTA Lower North Island and will continue to work with them to improve database accuracy.