ELECTRICITY INDUSTRY PARTICIPATION CODE
DISTRIBUTED UNMETERED LOAD AUDIT REPORT

VERITEK

For

NZTA LOWER NORTH ISLAND AND GENESIS ENERGY LIMITED

Prepared by: Steve Woods

Date audit commenced: 20 September 2021

Date audit report completed: 15 October 2021

Audit report due date: 1 September 2021

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EXECUTIVE SUMMARY

This audit of the NZTA Lower North Island DUML database and processes was conducted at the request of Genesis Energy Limited (Genesis) in accordance with clause 15.37B. This is a new database; therefore, the audit is required to be conducted within three months of submission occurring based on the database contents. The database was used for submission from 1 June 2021; therefore, the audit was due by 1 September 2021.

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 DUML audits version 1.1.

A field audit was undertaken of 474 items of load. Over submission has occurred and the total annual over submission if the database is not corrected will be 35,400 kWh and could potentially be between 249,800 kWh p.a. over submission to 220,400 kWh p.a. under submission.

A large number of database accuracy issues were identified, and I recommend 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 NZTA could accelerate their LED rollout, because as long as the database update processes are robust, this should result in an accurate database. The discrepancies are as follows:

- 99 items of load have a blank or unknown light model description,
- two items of load have zero recorded in the lamp wattage field,
- 13 incorrect gear wattages,
- 657 incorrect light model descriptions,
- 17 items of load in the field not in the database,
- 13 items of load in the database but not in the field, and
- 125 incorrect wattages.

Seven non-compliances were identified, and two recommendations were raised. The future risk rating of 25 indicates that the next audit be completed in three months. I have considered this in conjunction with Genesis's response and the response from NZ Streetlighting. NZ Streetlighting advised that all of the discrepancies identified by this audit have been resolved, but the field audit only covered 14% of the database, leaving 86% of the database with an error rate of 33% (based on the findings in this audit). I don't agree that traffic management is the only solution to do a 100% field audit, in nearly all cases, it's possible to identify the wattage from the ground and where the wattage cannot be seen it's possible to derive the wattage using strong assumptions, such as the enclosure type or the wattage of surrounding lights. I believe this sort of an audit could be conducted within a six-month period 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
Distributed unmetered load audits	1.9	16A.26 and 17.295F	Audit conducted late.	Strong	Low	1	Cleared
Deriving submission information	2.1	11(1) of Schedule 15.3	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. In absolute terms, total annual consumption is estimated to be 35,300 kWh lower than the DUML database indicates. ICPs 0001113593WM404 & 0001113594WM9CE had the "night hours" from the profile used for submission for June 2021 instead of the data logger hours. Incorrect gear wattage for 13 items of load.	Weak	Medium	6	Identified
Description and capacity of load	2.4	11(4) of Schedule 15.3	99 items of load have a blank or unknown light model description. Two items of load have zero recorded in the lamp wattage field. 13 items of load have incorrect gear wattages.	Weak	Low	3	Identified
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 **section 3.1.**	Weak	Low	3	Identified
Database accuracy	3.1	15.2 and 15.37B(b)	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.	Weak	Medium	6	Identified

Subject	Section	Clause	Non-Compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
			In absolute terms, total annual consumption is estimated to be 35,300 kWh lower than the DUML database indicates. Database discrepancies are as follows: • 13 incorrect gear wattages, • 657 incorrect light model descriptions, • 17 items of load in the field not in the database, • 13 items of load in the database but not in the field, and • 125 incorrect wattages.				
Volume information accuracy	3.2	15.2 and 15.37B(c)	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. In absolute terms, total annual consumption is estimated to be 35,300 kWh lower than the DUML database indicates. ICPs 0001113593WM404 & 0001113594WM9CE had the "night hours" from the profile used for submission for June 2021 instead of the data logger hours. Incorrect gear wattage for 13 items of load.	Weak	Medium	6	Identified
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
GPS coordinates	2.3	Populate GPS coordinates for Pole IDs 53584 and 55611.
Database accuracy	3.1	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

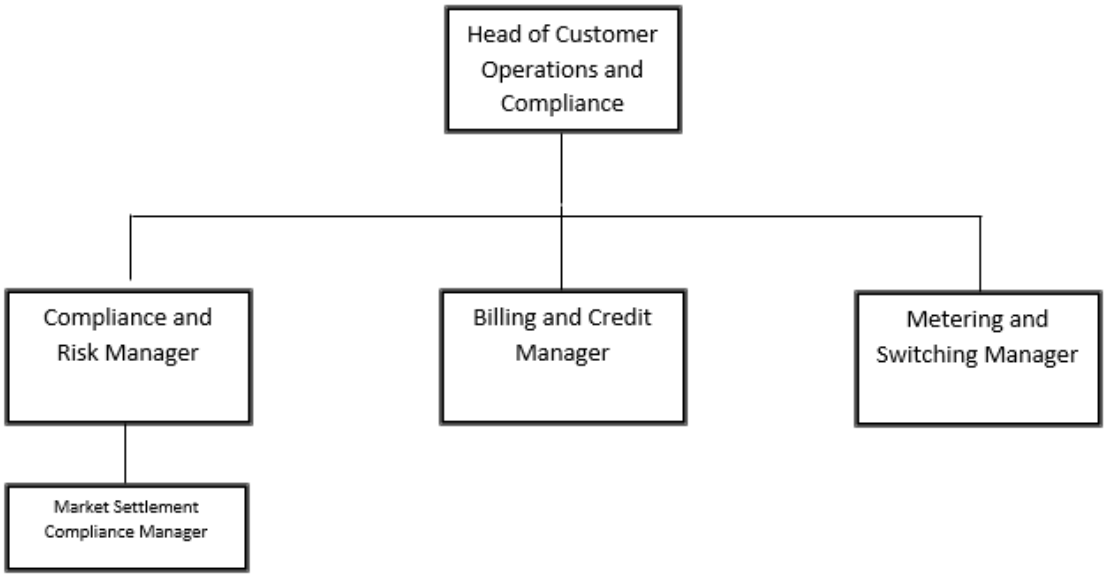
Current code exemptions were reviewed on the Electricity Authority website.

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

Other personnel assisting in this audit were:

Name	Title	Company
Craig Young	Rubiks Business Service Owner – Market Settlements and interactions	Genesis Energy
Julia Jones	Technical Specialist	Genesis Energy
Kara Atkinson	Director	NZ Streetlighting

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 data used for DUML is held in the Streetlight tables. thinkproject New Zealand Limited backs up the database and assists with disaster recovery as part of their hosting service.

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.

1.4. Breaches or Breach Allegations

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

1.5. ICP Data

The NZTA Lower North Island DUML database contains the ICPs in the table below.

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	701
0009104000CAB5C	Transit - SH2 & SH3 Flag Lighting	DVK0111	CST	141	19,341

ICP Number	Description	NSP	Profile	Number of items of load	Database wattage (watts)
0009109000CA17C	NZTA Highway Lighting Woodville	WDV0111	CST	151	28,288
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	107,846
1000592736PC0ED	NZTA Streetlights CST0331	CST0331	NST	845	132,216
1000592737PCCA8	NZTA Streetlights HWA0331	HWA0331	NST	299	31,826
1000592738PC376	NZTA Streetlights HUI0331	HUI0331	NST	174	27,876
1000592739PCF33	NZTA Streetlights LTN0331	LTN0331	CST	160	25,548
1000592741PC87A	NZTA Streetlights OPK0331	OPK0331	NST	120	14,858
1000592743PC8FF	NZTA Streetlights SFD0331	SFD0331	NST	215	29,484
1000592782PC355	NZTA Streetlights WVY0111	WVY0111	NST	29	3,720
1000592858PC389	NZTA Streetlights MST0331	MST0331	CST	314	46,476
			Total	**3,477**	**530,655**

1.6. Authorisation Received

All information was provided directly by Genesis and NZ Streetlighting.

1.7. Scope of Audit

This audit of the NZTA Lower North Island DUML database and processes was conducted at the request of Genesis in accordance with clause 15.37B. This is a new database; therefore, the audit is required to be conducted within three months of submission occurring based on the database contents. The database was used for submission from 1 June 2021; therefore, the audit was due by 1 September 2021.

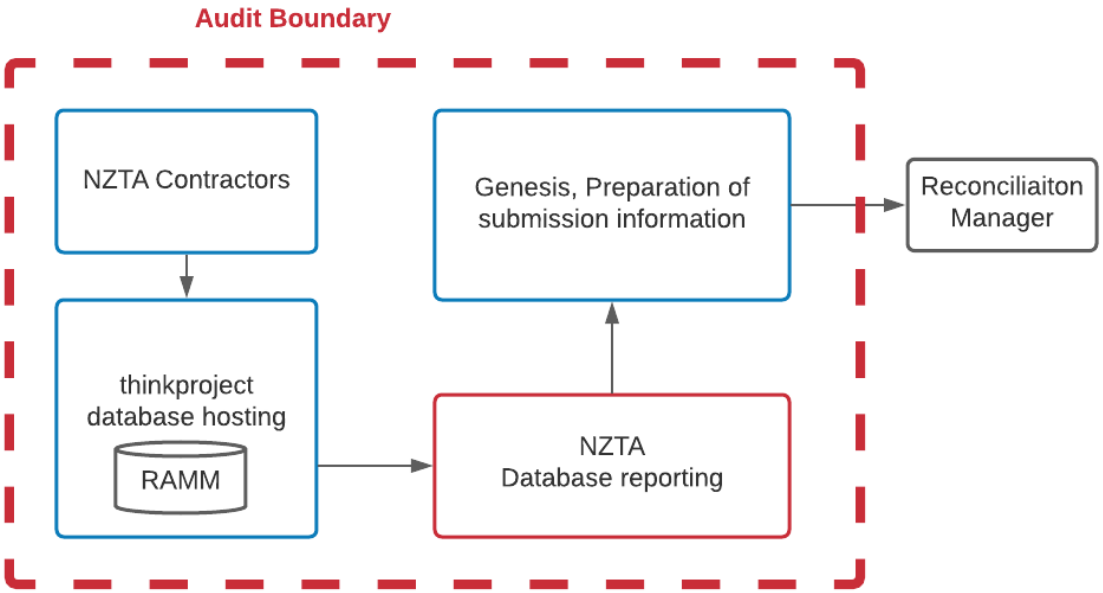
This database was created by taking the items of load out of several District and City Council databases.

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 DUML audits version 1.1.

The RAMM database is maintained by the relevant contractor depending on the region. The contracts between NZTA 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 DUML 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 474 items of load on September 20th to 23rd.

1.8. Summary of previous audit

This is the first audit of NZTA Lower North Island.

1.9. 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

The audit was planned to be conducted within the allowable timeframe, however COVID-19 restrictions delayed the field audit, and I deemed the field audit to be a critical part of this audit because it was the first audit. Whilst non-compliance is recorded, the late audit was outside the control of Genesis.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 1.9 With: Clause 16A.26 and 17.295F From: 01-Sep-21 To: 03-Oct-21	Audit conducted late. Potential impact: None Actual impact: None Audit history: None Controls: Strong Breach risk rating: 1
Audit risk rating	**Rationale for audit risk rating**
Low	The controls are recorded as strong because the audit was planned but had to be delayed due to COVID-19 travel restrictions. 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 been engaged with NZTA for some time as their program of work progressed to remove nzta assets from council ownership.	Proposed or actual date	Cleared

Preventative actions taken to ensure no further issues will occur	Completion date	

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. ICPs 0001113593WM404 & 0001113594WM9CE had the "night hours" from the profile used for submission for June 2021 instead of the data logger hours, but this has now been corrected and revisions have been conducted to correct the submission kWh.

For all other ICPs the submission was in accordance with the rules of the profiles.

As recorded in **section 3.1**, over submission has occurred and the total annual over submission if the database is not corrected will be 35,400 kWh and could potentially be between 249,800 kWh p.a. over submission to 220,400 kWh p.a. under submission.

The other issue having an impact on submission accuracy is that there are 13 incorrect gear wattages.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.1 With: Clause 11(1) of Schedule 15.3	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. In absolute terms, total annual consumption is estimated to be 35,300 kWh lower than the DUML database indicates. ICPs 0001113593WM404 & 0001113594WM9CE had the "night hours" from the profile used for submission for June 2021 instead of the data logger hours. Incorrect gear wattage for 13 items of load.
From: 01-Jun-21 To: 03-Oct-21	Potential impact: High Actual impact: Medium Audit history: None Controls: Weak Breach risk rating: 6

Audit risk rating	Rationale for audit risk rating		
Medium	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 moderate based on the kWh error; therefore, the audit risk rating is medium.		
Actions taken to resolve the issue		**Completion date**	**Remedial action status**
NZTA have rolled out a program of work to create a national database of assets. The database will be maintained by regions. The mid-lower north island has been the focus of the initial program but will be extending to other regions. The NZTA has advised that there is a desire to replace the assets with LED and that the cost to execute a full field audit will delay any potential LED roll out, therefore no field audit will be conducted.		Continuous improvement	Identified
Preventative actions taken to ensure no further issues will occur		**Completion date**	
Genesis will continue to work alongside the NZTA contractor to raise the accuracy level of the newly formed database. Genesis has corrected the profiling from the legacy night hours to its appropriate streetlighting profile, and revise settlement processes.		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 two have GPS coordinates populated. The two 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 and 55611.	Genesis has raised this with the NZTA, with NZTA agreeing to populate the assets locational details.	Identified

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.

99 items of load have a blank or unknown light model description.

Two items of load have zero recorded in the lamp wattage field.

13 items of load have incorrect gear wattages.

The accuracy of the non-zero recorded 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-Jun-21 To: 03-Oct-21	99 items of load have a blank or unknown light model description. Two items of load have zero recorded in the lamp wattage field. 13 items of load have incorrect gear wattages. Potential impact: Medium Actual impact: Low Audit history: None Controls: Weak Breach risk rating: 3
Audit risk rating	**Rationale for audit risk rating**
Low	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
NZTA has agreed to populate this information and will advise Genesis when this has been completed	01/12/2021	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
NZTA has created the database and will actively populate any missing information as they become aware of it. Genesis continues to review duml datasets to provide exception management reporting back to the customer.	Continuous improvements	

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 474 items of load.

Audit commentary

The field audit found 17 items of load in the field not recorded in the database. The detailed results have been provided to Genesis and NZ Streetlighting. Under submission of 9,174 kWh per annum will result based on annual on hours of 4,271.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.5 With: Clause 11(2A) of Schedule 15.3 From: 01-Jun-21 To: 03-Oct-21	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 **section 3.1**. Potential impact: Medium Actual impact: Low Audit history: None Controls: Weak Breach risk rating: 3
Audit risk rating	**Rationale for audit risk rating**
Low	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
NZTA has agreed to populate this information and will advise Genesis when this has been completed.	01/12/2021	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
NZTA has created the database and will actively populate any missing information as they become aware of it. Genesis continues to review duml datasets to provide exception management reporting back to the customer.	Continuous improvements	

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 474 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 NZTA lighting
Strata	The database contains NZTA lighting in the Manawatu, Taranaki and Wairarapa regions. The processes for the management of all NZTA items of load are the same, but I decided to place the items of load into four strata based on GXP: 1. BPE-LTN-ONG 2. CST 3. DVK-HTI-HUI-HWA-MHO-MTN 4. MST-OPK-SFD-WDV-WVY
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 25 sub-units.
Total items of load	474 items of load were checked, making up 11% 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	98.5	Wattage from survey is higher than the database wattage by 1.5%
R_L	89.2	With a 95% level of confidence, it can be concluded that the error could be between -10.8% and + 9.5%
R_H	109.5	

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 10.8% lower and 9.5% 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 8kW lower than the database indicates.
- There is a 95% level of confidence that the installed capacity is between 58 kW lower and 52 kW higher than the database.
- In absolute terms, total annual consumption is estimated to be 35,300 kWh lower than the DUML database indicates.
- 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.

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 %

Light description and capacity accuracy

As discussed in **section 2.4**, 99 items of load have a blank or unknown light model description and two items of load have zero recorded in the lamp wattage field. There are also 13 incorrect gear wattages and 657 incorrect light model descriptions.

The field audit identified the following:

- 17 items of load in the field not in the database,
- 13 items of load in the database but not in the field, and
- 125 incorrect wattages.

The represents an error rate of 33%, 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. I strongly recommend the best option is to conduct a full field audit of all items of load to ensure the database is accurate.

Recommendation	Description	Audited party comment	Remedial action
Database accuracy	Conduct a full field audit of all items of load to ensure database accuracy.	Genesis has been advised by the NZTA that a full field audit will not be conducted due to the excessive costs to implement traffic management and resource to complete along with the excessive disruption it will impose on road users. It is NZTA's intent to roll out LED's over time.	Not planned

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 two have GPS coordinates populated. The two 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 or festive lights for NZTA Lower North Island.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 3.1 With: Clause 15.2 and 15.37B(b) From: 01-Jun-21 To: 03-Oct-21	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. In absolute terms, total annual consumption is estimated to be 35,300 kWh lower than the DUML database indicates. Database discrepancies are as follows: • 13 incorrect gear wattages, • 657 incorrect light model descriptions, • 17 items of load in the field not in the database, • 13 items of load in the database but not in the field, and • 125 incorrect wattages. Potential impact: High Actual impact: Medium Audit history: None Controls: Weak Breach risk rating: 6
Audit risk rating	**Rationale for audit risk rating**
Medium	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 moderate based on the kWh error; therefore, the audit risk rating is medium.

Actions taken to resolve the issue	Completion date	Remedial action status
NZTA has agreed to populate this information and will advise Genesis when this has been completed.	Continuous improvement	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
NZTA has created the database and will actively populate any missing information as they become aware of it. Genesis continues to review duml datasets to provide exception management reporting back to the customer.	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 three data loggers recording on and off signals from ripple control systems. ICPs 0001113593WM404 & 0001113594WM9CE had the "night hours" from the profile used for submission for June 2021 instead of the data logger hours, but this has now been corrected and revisions have been conducted to correct the submission kWh.

For all other ICPs the submission was in accordance with the rules of the profiles.

As recorded in **section 3.1**, over submission has occurred and the total annual over submission if the database is not corrected will be 35,400 kWh and could potentially be between 249,800 kWh p.a. over submission to 220,400 kWh p.a. under submission.

The other issue having an impact on submission accuracy is that there are 13 incorrect gear wattages.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 3.2 With: Clause 15.2 and 15.37B(c) From: 01-Jun-21 To: 03-Oct-21	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. In absolute terms, total annual consumption is estimated to be 35,300 kWh lower than the DUML database indicates. ICPs 0001113593WM404 & 0001113594WM9CE had the "night hours" from the profile used for submission for June 2021 instead of the data logger hours Incorrect gear wattage for 13 items of load. Potential impact: High Actual impact: Medium Audit history: None Controls: Weak Breach risk rating: 6
Audit risk rating	**Rationale for audit risk rating**
Medium	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 moderate based on the kWh error; therefore, the audit risk rating is medium.

Actions taken to resolve the issue	Completion date	Remedial action status
NZTA has agreed to populate this information and will advise Genesis when this has been completed.	01/12/2021	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
NZTA has created the database and will actively populate any missing information as they become aware of it. Genesis continues to review duml datasets to provide exception management reporting back to the customer.	Continuous improvements	

CONCLUSION

This audit of the NZTA Lower North Island DUML database and processes was conducted at the request of Genesis in accordance with clause 15.37B. This is a new database; therefore, the audit is required to be conducted within three months of submission occurring based on the database contents. The database was used for submission from 1 June 2021; therefore, the audit was due by 1 September 2021

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 DUML audits version 1.1.

A field audit was undertaken of 474 items of load. Over submission has occurred and the total annual over submission if the database is not corrected will be 35,400 kWh and could potentially be between 249,800 kWh p.a. over submission to 220,400 kWh p.a. under submission.

A large number of database accuracy issues were identified, and I recommend 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 NZTA could accelerate their LED rollout, because as long as the database update processes are robust, this should result in an accurate database. The discrepancies are as follows:

- 99 items of load have a blank or unknown light model description,
- two items of load have zero recorded in the lamp wattage field,
- 13 incorrect gear wattages,
- 657 incorrect light model descriptions,
- 17 items of load in the field not in the database,
- 13 items of load in the database but not in the field, and
- 125 incorrect wattages.
- Seven non-compliances were identified, and two recommendations were raised. The future risk rating of 25 indicates that the next audit be completed in three months. I have considered this in conjunction with Genesis's response and the response from NZ Streetlighting. NZ Streetlighting advised that all of the discrepancies identified by this audit have been resolved, but the field audit only covered 14% of the database, leaving 86% of the database with an error rate of 33% (based on the findings in this audit). I don't agree that traffic management is the only solution to do a 100% field audit, in nearly all cases, it's possible to identify the wattage from the ground and where the wattage cannot be seen it's possible to derive the wattage using strong assumptions, such as the enclosure type or the wattage of surrounding lights. I believe this sort of an audit could be conducted within a six-month period and I therefore recommend the next audit is in six months.

PARTICIPANT RESPONSE

Genesis and the NZTA contractor have been in discussion for some time as they created this database, due to not being able to ascertain what assets pertained to the “Manawatu NZTA”. The councils were approached and asked to remove the NZTA assets from their datasets with the intent NZTA take back this ownership, whilst creating the lower north island database for NZTA. Genesis and NZTA understood that there may or may not be data errors that may be found upon the audit being completed. NZTA has been proactive since being made aware of these error as outlined, and already taken action to have these corrected.

Due to costs associated with traffic management and the disruption to road users, the likelihood of any field audit across this vast region is just not possible, however it has been iterated that it is the intent of NZTA to replace these assets with LEDs in the future.