ELECTRICITY INDUSTRY PARTICIPATION CODE
DISTRIBUTED UNMETERED LOAD AUDIT REPORT

VERITEK

For

WAIROA DISTRICT COUNCIL
AND GENESIS ENERGY

Prepared by: Steve Woods

Date audit commenced: 13 November 2020

Date audit report completed: 16 December 2020

Audit report due date: 01-Dec-20

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EXECUTIVE SUMMARY

This audit of the **Wairoa District Council (WDC)** Unmetered Streetlights 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.

An Access database is hosted and managed by Eastland and monthly reporting is provided to Genesis.

The audit found five non-compliances. No recommendations are made.

The field audit found the database accuracy is getting progressively worse as each audit occurs. 33% of the 252 items of load checked were incorrect. The field audit quantity was 29% of the database.

There is no formal updating of field changes in place between Eastland and the Wairoa District Council.

The future risk rating of 31 indicates that the next audit be completed in three months. Given the large quantity of errors, I recommend a 6-month audit period to allow sufficient time for remedial actions.

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	The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot. In absolute terms, the total annual consumption is estimated to be 64,500 kWh lower than the DUML database indicates. Under submission of approx. 2,118 kWh per annum has occurred due to incorrect wattage applied.	Weak	High	9	Investigating
Description and capacity	2.4	11(2)c of Schedule 15.3	Gear wattage is not recorded in the database.	Strong	Low	1	Identified
All load recorded in database	2.5	11(2A) of Schedule 15.3	Two additional lights found in the field.	Weak	Low	3	Investigating
Database accuracy	3.1	15.2 and 15.37B(b)	In absolute terms, total annual consumption is estimated to be 64,500 kWh lower than the DUML database indicates. Ballast wattage is added outside the database. There are several lamp wattage errors.	Weak	High	9	Investigating

Subject	Section	Clause	Non-Compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
Volume information accuracy	3.2	15.2 and 15.37Bc	The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot. In absolute terms, the total annual consumption is estimated to be 64,500 kWh lower than the DUML database indicates. Under submission of approx. 2,118 kWh per annum has occurred due to incorrect wattage applied.	Weak	High	9	Investigating
					Future Risk Rating	**31**	

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

RECOMMENDATIONS

Subject	Section	Description	Action
		Nil	

ISSUES

Subject	Section	Description	Issue
		Nil	

1. ADMINISTRATIVE

1.1. Exemptions from Obligations to Comply with Code

Code reference

Section 11 of Electricity Industry Act 2010.

Code related audit information

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

Audit observation

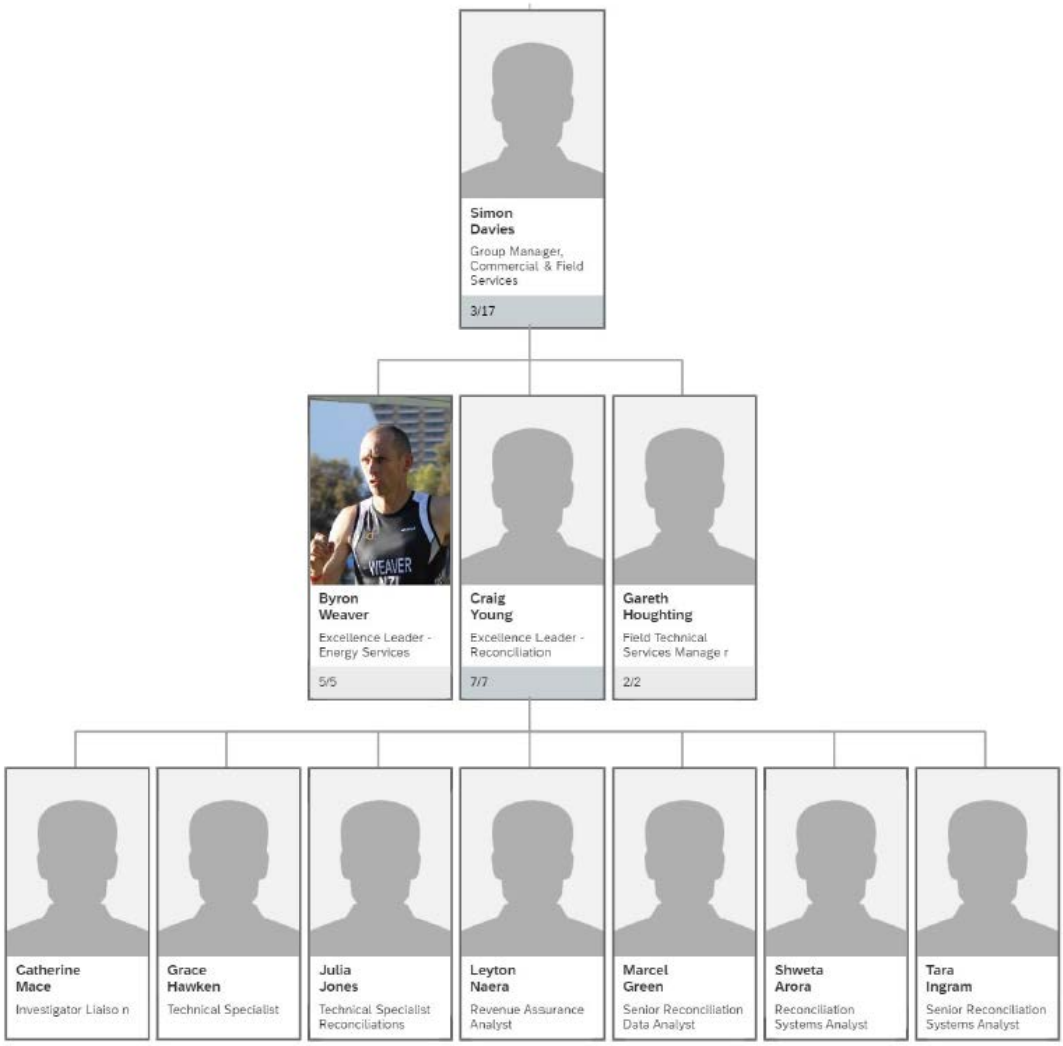
Section 11 of the Electricity Industry Act provides for the Electricity Authority to exempt any participant from compliance with all or any of the clauses.

Audit 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:

Name	Title
Steve Woods	Auditor

Other personnel assisting in this audit were:

Name	Title	Company
Craig Young	Excellence Leader- Reconciliation	Genesis Energy
Grace Hawken	Technical Specialist – Reconciliations Team	Genesis Energy
Aroha Arago-Kemp	Network GIS and Data Manager	Eastland

1.4. Hardware and Software

The database used for reporting is an Access database hosted and managed by Eastland. Eastland performs a nightly server backup, and on a fortnightly basis a tape backup is performed which is stored off-site. These are periodically restored to check readability. A mirrored server also exists in a separate building.

1.5. Breaches or Breach Allegations

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

1.6. ICP Data

WDC has a large number of ICPs associated with it, as there is an ICP per circuit.

ICP Number	Description	NSP	Profile	Database wattage (watts) Nov	No of items of load Oct 20
0000009006WWF3C	Wairoa DC	TUI1101	NST	246	3
0000090126WW009	Wairoa DC	TUI1101	NST	82	1
0000090257WWA12	Wairoa DC	TUI1101	NST	27	1
0000090481WW0D9	Wairoa DC	TUI1101	NST	110	4
0000090778WWD9C	Wairoa DC	TUI1101	NST	310	3
0000090788WWD8B	Wairoa DC	TUI1101	NST	27	1
0000091017WW310	Wairoa DC	TUI1101	NST	670	3
0000092085WWE92	Wairoa DC	TUI1101	NST	82	1
0000093406WWAB9	Wairoa DC	TUI1101	NST	1397	9
0000901502WW92E	Wairoa DC	TUI1101	NST	143	2
0000901641WW448	Wairoa DC	TUI1101	NST	223	3
0000902361WWEF8	Wairoa DC	TUI1101	NST	82	1

ICP Number	Description	NSP	Profile	Database wattage (watts) Nov	No of items of load Oct 20
0000902851WWA0E	Wairoa DC	TUI1101	NST	275	5
0000903712WWAC4	Wairoa DC	TUI1101	NST	534	6
0000903861WWC56	Wairoa DC	TUI1101	NST	790	9
0000904511WW863	Wairoa DC	TUI1101	NST	708	8
0000905471WWF37	Wairoa DC	TUI1101	NST	220	4
0000906083WW144	Wairoa DC	TUI1101	NST	27	1
0000907601WW32D	Wairoa DC	TUI1101	NST	360	4
0000908111WWFE2	Wairoa DC	TUI1101	NST	446	4
0000908702WWF89	Wairoa DC	TUI1101	NST	421	5
0000908991WWAA5	Wairoa DC	TUI1101	NST	2564	18
0000911581WW845	Wairoa DC	TUI1101	NST	359	4
0000911731WW0F0	Wairoa DC	TUI1101	NST	168	1
0000912961WWC13	Wairoa DC	TUI1101	NST	1008	6
0000918181WW8E4	Wairoa DC	TUI1101	NST	93	1
0000921782WWFAE	Wairoa DC	TUI1101	NST	114	1
0000924841WWCAE	Wairoa DC	TUI1101	NST	1221	14
0000925762WW394	Wairoa DC	TUI1101	NST	168	1
0000926782WWBCE	Wairoa DC	TUI1101	NST	1626	10
0000927432WWBDF	Wairoa DC	TUI1101	NST	82	1
0000928081WW0CC	Wairoa DC	TUI1101	NST	338	6
0000928661WWC70	Wairoa DC	TUI1101	NST	421	5
0000928691WWC67	Wairoa DC	TUI1101	NST	82	1
0000928921WW1DA	Wairoa DC	TUI1101	NST	275	4
0000929521WWC76	Wairoa DC	TUI1101	NST	776	7
0000932781WW96F	Wairoa DC	TUI1101	NST	82	1
0000934950WWBA3	Wairoa DC	TUI1101	NST	168	1
0009073201WWF67	Wairoa DC	TUI1101	NST	366	5
0009157081WWB0B	Wairoa DC	TUI1101	NST	5059	65
0009801013WWDC0	Wairoa DC	TUI1101	NST	10631	87
0009808027WW792	Wairoa DC	TUI1101	NST	5386	68
0009808075WWF1F	Wairoa DC	TUI1101	NST	4381	39
0009823003WWDE0	Wairoa DC	TUI1101	NST	1904	24
0009902090WW2C6	Wairoa DC	TUI1101	NST	914	8
0009902111WW2CD	Wairoa DC	TUI1101	NST	315	5
0009903047WW3EE	Wairoa DC	TUI1101	NST	172	3
0009904020WW5B4	Wairoa DC	TUI1101	NST	339	4
0009912999WWD7F	Wairoa DC	TUI1101	NST	2379	32
0009921062WW979	Wairoa DC	TUI1101	NST	2738	27
0009926066WWC13	Wairoa DC	TUI1101	NST	164	2
0009927025WW3D6	Wairoa DC	TUI1101	NST	3258	36

ICP Number	Description	NSP	Profile	Database wattage (watts) Nov	No of items of load Oct 20
0009928081WW3A3	Wairoa DC	TUI1101	NST	355	5
0009930036WW93A	Wairoa DC	TUI1101	NST	175	2
0090632461WW070	Wairoa DC	TUI1101	NST	397	6
0098080213WWA56	Wairoa DC	TUI1101	NST	7055	41
0099070331WWDA7	Wairoa DC	TUI1101	NST	574	7
0099070831WWEA9	Wairoa DC	TUI1101	NST	1522	17
0099081281WW22D	Wairoa DC	TUI1101	NST	1609	20
0099090101WWD25	Wairoa DC	TUI1101	NST	715	9
0099180751WWFA6	Wairoa DC	TUI1101	NST	895	15
0099180971WW4F8	Wairoa DC	TUI1101	NST	2496	45
0099191182WW163	Wairoa DC	TUI1101	NST	1225	15
0099200151WWA31	Wairoa DC	TUI1101	NST	518	7
0099200271WW467	Wairoa DC	TUI1101	NST	1926	25
0099200991WWDD3	Wairoa DC	TUI1101	NST	3926	52
0099201301WW99E	Wairoa DC	TUI1101	NST	437	6
0099210911WW078	Wairoa DC	TUI1101	NST	1385	19
0099230201WW016	Wairoa DC	TUI1101	NST	859	12

I note that the total wattage recorded in the database excludes ballast but as detailed in **section 2.1**, this is added to the monthly wattage report sent by Eastland.

1.7. Authorisation Received

All information was provided directly by Genesis or Eastland.

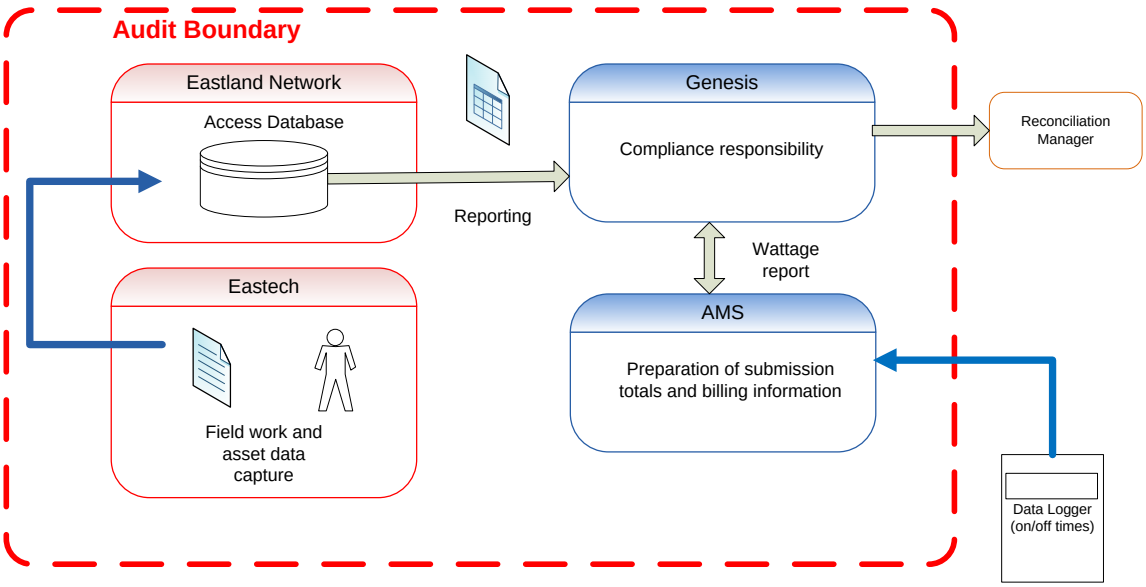
1.8. Scope of Audit

This audit of the WDC DUML database and processes was conducted at the request of 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.

Eastland data is contained in an Access database and Eastland provides reporting to Genesis on a monthly basis, detailing the total kW per ICP, and the on/off times are derived by a data logger interrogated by AMS. Lamp ballast information is not stored in the database, instead it is calculated at the time of billing.

The diagram below shows the audit boundary for clarity.



The field audit of 252 items of load was carried out in Wairoa on 14/11/20.

1.9. Summary of previous audit

Genesis provided a copy of the last audit report undertaken by Rebecca Elliot of Veritek Limited in November 2019. The table below records the findings.

Table of Non-Compliance

Subject	Section	Clause	Non-compliance	Status
Deriving submission information	2.1	11(1) of Schedule 15.3	Incorrect use of NST profile. The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot. In absolute terms, the total annual consumption is estimated to be 17,000 kWh lower than the DUML database indicates. Under submission of approx. 115 kWh per annum has occurred due to incorrect wattage and ballasts applied.	Still existing
Description and capacity	2.4	11(2)c of Schedule 15.3	Gear wattage is not recorded in the database.	Still existing
Database accuracy	3.1	15.2 and 15.37B(b)	In absolute terms, total annual consumption is estimated to be 17,000 kWh lower than the DUML database indicates. Ballast wattage is added outside the database.	Still existing

Subject	Section	Clause	Non-compliance	Status
Volume information accuracy	3.2	15.2 and 15.37Bc	Incorrect use of NST profile. The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot. In absolute terms, the total annual consumption is estimated to be 17,000 kWh lower than the DUML database indicates. Under submission of approx. 115 kWh per annum has occurred due to incorrect wattage and ballasts applied.	Still existing

Table of Recommendations

Subject	Section	Clause	Recommendation for Improvement	Status
			Nil	

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. Compliance is confirmed

2. DUML DATABASE REQUIREMENTS

2.1. Deriving submission information (Clause 11(1) of Schedule 15.3)

Code reference

Clause 11(1) of Schedule 15.3

Code related audit information

The retailer must ensure the:

- *DUML database is up to date*
- *methodology for deriving submission information complies with Schedule 15.5.*

Audit observation

The process for calculation of consumption was examined and the application of profiles was checked. The database was checked for accuracy.

Audit commentary

Genesis reconciles this DUML load using the NST profile. The on/off times used to be based on "Profile night hours", which led to inaccurate consumption information. "Profile night hours" are the NST profile hours, which are sunset and sunrise hours published by NIWA rounded to the nearest half hour. The NST profile rules do not allow these on/off times to be used to calculate consumption information. The NST 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.

Genesis now uses a logger connected to a ripple receiver programmed to identify streetlight channel on/off signals.

There is some inaccurate data within the database used to calculate submissions as detailed in the table below. This is recorded as non-compliance and discussed in **sections 3.1** and **3.2**.

Issue	Volume information impact (annual kWh)
496 x 70W HPS have a ballast added of 12W and not the recommended 13W	2,118 kWh under submission
TOTAL	2,118 kWh under submission

As detailed in **section 2.4**, the ballast capacities are not recorded in the database but are added in the monthly report. This is recorded as non-compliance.

I checked the September 2020 extract provided by Eastland against the submission totals supplied by Genesis and found that the kW figures used for submission were the same as the figures provided by Eastland.

There is some inaccurate data within the database used to calculate submissions. This is recorded as non-compliance and discussed in **section 3.1** and **3.2**.

Submission is based on a snapshot of the database at the end of the month and does not consider historic adjustments or the fact that lights can be livened before they are entered into the database.

In absolute terms, the total annual consumption is estimated to be 64,500 kWh lower than the DUML database indicates.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.1 With: Clause 11(1) of Schedule 15.3 From: 01-Dec-19 To: 16-Nov-20	The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot. In absolute terms, the total annual consumption is estimated to be 64,500 kWh lower than the DUML database indicates. Under submission of approx. 2,118 kWh per annum has occurred due to incorrect wattage applied. Potential impact: High Actual impact: High Audit history: Three times Controls: Weak Breach risk rating: 9
Audit risk rating	**Rationale for audit risk rating**
High	The controls are rated as weak, because updates to the database are not occurring on a regular basis. The impact is assessed to be high, based on the kWh differences described above.

Actions taken to resolve the issue	Completion date	Remedial action status
Genesis has raised the issues with the council. Genesis have been requesting the information reporting from the council to alleviate the issues that are being experienced by having to use the network supplied data. By receiving monthly reporting from the council asset management Genesis should be able to achieve better outcomes.	01/03/2021	Investigating
Preventative actions taken to ensure no further issues will occur	**Completion date**	
Requested monthly reporting from the council and to stop utilising the data summary supplied by the network.	ASAP	

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

The database has the ICP identifier recorded against all items of load.

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

Every record in the database has GPS coordinates and the nearest street address.

Audit outcome

Compliant

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

Code reference

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

Code related audit information

The DUML database must contain:

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

Audit observation

The database was checked to confirm that it contained a field for lamp type and wattage capacity and included any ballast or gear wattage. Wattages were checked for alignment with the published standardised wattage table produced by the Electricity Authority.

Audit commentary

A field exists in the database for lamp model. I analysed the database, and I found the lamp model field is populated for all items of load.

All items of load also have a lamp wattage populated but gear wattage is added during the billing process and not held in the database. Some lamp wattages are incorrect in the database but are correct in the monthly report to Genesis. The errors are as follows.

Luminaire type	Quantity	Comments
20 W LED	7	Recorded as 26 watts
23 W LED	7	Recorded as 26 watts
25 W LED	1	Recorded as 27 watts
26 W LED	34	Recorded as 27 watts
29 W LED	1	Recorded as 27 watts
150 W HPS	10	Recorded as 250 watts

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

Audit outcome

Non-compliant

Non-compliance	Description		
Audit Ref: 2.4 With: Clause 11(2)(c) of Schedule 15.3 From: 01-Dec-19 To: 16-Nov-20	Gear wattage is not recorded in the database. Some lamp wattage errors Potential impact: Medium Actual impact: Low Audit history: Three times Controls: Strong Breach risk rating: 1		
Audit risk rating	**Rationale for audit risk rating**		
Low	The controls are recorded as strong because the monthly report contains correct information. The impact on settlement is low because submission has not been affected by gear wattages not being held in the database.		
Actions taken to resolve the issue		**Completion date**	**Remedial action status**
Genesis were aware of the issues with the gear wattage as the network uses a round down function in its calculation of the ratio to determine the gear wattage value. This was raised with the network who has ignored our findings.		01/03/2021	Identified
Preventative actions taken to ensure no further issues will occur		**Completion date**	
Genesis are discussing the reporting opportunities with the council to mitigate these exceptions.			

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 252 items of load using the statistical sampling methodology.

Audit commentary

Discrepancies were found with 82 items of load (33%). The field audit findings are detailed in the table below.

Error type	Quantity
Additional lights found	2
Lights not found	8
Incorrect wattage	72

This clause relates to lights in the field not recorded in the database. Two additional items of load were discovered.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.5 With: Clause 11(2A) of Schedule 15.3 From: 01-Dec-19 To: 16-Nov-20	Two additional lights found in the field. Potential impact: Low Actual impact: Low Audit history: None Controls: Weak Breach risk rating: 3
Audit risk rating	**Rationale for audit risk rating**
Low	The controls are rated as weak, because updates to the database are not occurring on a regular basis. 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 will be requesting the missing assets to be added to the database.	01/02/2021	Investigating

Preventative actions taken to ensure no further issues will occur	Completion date	
Genesis will be raising the field exceptions with the council with the expectation that a revision of assets is conducted to ensure database accuracy.	TBA	

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 ability of the database to track changes was assessed and 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

Eastland has previously demonstrated a complete audit trail of all additions and changes to the database information.

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	Wairoa District Council
Strata	The database contains 868 items of load in the Wairoa District Council area. The processes for the management of items of load are the same, but I decided to place the items of load into four strata, as follows: 1. Road name A-F, 2. Road name G-L, 3. Road name M-Q, 4. Road name R-Z, and 5. NZTA
Area units	I created a pivot table of the ICP in each area and I used a random number generator in a spreadsheet to select a total of 37 sub-units.
Total items of load	252 items of load were checked.

Wattages were checked for alignment with the published standardised wattage table produced by the Electricity Authority.

Audit commentary

Database accuracy based on the field audit

A field audit was conducted of a statistical sample of 252 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	81.3	Wattage from survey is lower than the database wattage by 18.7%
R_L	73.6	With a 95% level of confidence it can be concluded that the error could be between -11.4% and -26.4%
R_H	88.6	

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 11.4% lower and 26.4% lower than the wattage recorded in the DUML database. Non-compliance is recorded because the potential error is greater than 5.0%.

In absolute terms the installed capacity is estimated to be 15.0 kW lower than the database indicates.

There is a 95% level of confidence that the installed capacity is between 9 kW and 21 kW lower than the database.

In absolute terms, total annual consumption is estimated to be 64,500 kWh lower than the DUML database indicates.

There is a 95% level of confidence that the annual consumption is between 39,400 kWh p.a. lower to 91,000 kWh p.a. lower than the database indicates.

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

Lamp description and capacity accuracy

The following errors were found in the database.

Luminaire type	Quantity	Comments
20 W LED	7	Recorded as 26 watts
23 W LED	7	Recorded as 26 watts
25 W LED	1	Recorded as 27 watts
26 W LED	34	Recorded as 27 watts
29 W LED	1	Recorded as 27 watts
150 W HPS	10	Recorded as 250 watts
70 W HPS	496	Ballast recorded as 12 watts not 13 watts

Ballast wattage is not recorded in the database, it is added to the report prior to it being sent to the retailer.

NZTA lighting

NZTA lighting is included in the database and was checked as part of the field audit.

ICP accuracy

ICPs were confirmed as recorded in the database and are accurate.

Location accuracy

The database contains fields for the street address and also GPS coordinates.

Change management process findings

All new streetlight circuits are required to be metered; therefore, the tracking of load changes is only relevant to the existing unmetered circuits. Eastland becomes aware of changes occurring due to local knowledge which leads to database updates, but as this happens on a discovery basis this can be sometime after the change has occurred. This is evident in the incorrect lamp count and wattage differences noted in **section 2.5**.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 3.1 With: Clause 15.2 and 15.37B(b) From: 01-Oct-18 To: 21-Nov-19	In absolute terms, total annual consumption is estimated to be 64,500 kWh lower than the DUML database indicates. Ballast wattage is added outside the database. There are several lamp wattage errors. Potential impact: High Actual impact: High Audit history: Three times Controls: Weak Breach risk rating: 9
Audit risk rating	**Rationale for audit risk rating**
High	The controls are rated as weak, because updates to the database are not occurring on a regular basis. The impact is assessed to be high, based on the kWh differences described above.

Actions taken to resolve the issue	Completion date	Remedial action status
Genesis will be requesting the wattages be confirmed for these assets and the database updated as necessary.	01/02/2021	Investigating
Preventative actions taken to ensure no further issues will occur	**Completion date**	
Genesis will be raising the field exceptions with the council with the expectation that a revision of assets is conducted to ensure database accuracy. Genesis will be raising the tracking of change requirements with the council	TBA	

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 burn hours against the submitted figure to confirm accuracy.

Audit commentary

Genesis reconciles this DUML load using the NST profile. The on/off times used to be based on "Profile night hours", which led to inaccurate consumption information. "Profile night hours" are the NST profile hours, which are sunset and sunrise hours published by NIWA rounded to the nearest half hour. The NST profile rules do not allow these on/off times to be used to calculate consumption information. The NST 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.

Genesis now uses a logger connected to a ripple receiver programmed to identify streetlight channel on/off signals.

There is some inaccurate data within the database used to calculate submissions as detailed in the table below. This is recorded as non-compliance and discussed in **sections 3.1** and **3.2**.

Issue	Volume information impact (annual kWh)
496 x 70W HPS have a ballast added of 12W and not the recommended 13W	2,118 kWh under submission
TOTAL	2,118 kWh under submission

As detailed in **section 2.4**, the ballast capacities are not recorded in the database but are added in the monthly report. This is recorded as non-compliance.

I checked the September 2020 extract provided by Eastland against the submission totals supplied by Genesis and found that the kW figures used for submission were the same as the figures provided by Eastland.

Submission is based on a snapshot of the database at the end of the month and does not consider historic adjustments or the fact that lights can be livened before they are entered into the database.

In absolute terms, the total annual consumption is estimated to be 64,500 kWh lower than the DUML database indicates.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 3.2 With: Clause 15.2 and 15.37B(c) From: 01-Dec-19 To: 16-Nov-20	The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot. In absolute terms, the total annual consumption is estimated to be 64,500 kWh lower than the DUML database indicates. Under submission of approx. 2,118 kWh per annum has occurred due to incorrect wattage applied. Potential impact: High Actual impact: High Audit history: Three times Controls: Weak Breach risk rating: 9

Audit risk rating	Rationale for audit risk rating		
High	The controls are rated as weak, because updates to the database are not occurring on a regular basis. The impact is assessed to be high, based on the kWh differences described above.		
Actions taken to resolve the issue		**Completion date**	**Remedial action status**
Genesis will be requesting the wattages be confirmed for these assets and the database updated as necessary.		01/02/2021	Investigating
Preventative actions taken to ensure no further issues will occur		**Completion date**	
Genesis will be raising the field exceptions with the council with the expectation that a revision of assets is conducted to ensure database accuracy. Genesis will be raising the tracking of change requirements with the council		TBA	

CONCLUSION

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

An Access database is hosted and managed by Eastland and monthly reporting is provided to Genesis.

The audit found five non-compliances. No recommendations are made.

The field audit found the database accuracy is getting progressively worse as each audit occurs. 33% of the 252 items of load checked were incorrect. The field audit quantity was 29% of the database.

There is no formal updating of field changes in place between Eastland and the Wairoa District Council.

The future risk rating of 31 indicates that the next audit be completed in three months. Given the large quantity of errors, I recommend a 6-month audit period to allow sufficient time for remedial actions.

PARTICIPANT RESPONSE

Genesis Energy will be discussing the database and the duml responsibilities with the council. Genesis understands that there is a programme of work where the NZTA are removing their asset from the council's database. Genesis are also aware that the summary reporting from the network has errors and has raised this with the network but has been unable to influence that change.

Genesis will be discussing the database reporting to be provided by the council @ asset level to assist with meeting DUML compliance requirements. Genesis has already corrected the night hours issue back in March 2020 where logger information is being utilised to calculate burn times.

Wairoa DC has also advised that they wish to consolidate the assets ICPs to remove the complexity of having an excessive amount of ICPs for their assets. Genesis will advise the EA off the ICP changes when they happen.