ELECTRICITY INDUSTRY PARTICIPATION CODE
DISTRIBUTED UNMETERED LOAD AUDIT REPORT

VERITEK

For

WAKA KOTAHI GREATER WELLINGTON REPORT (FORMERLY NZTA PORIRUA)

FOR

GENESIS ENERGY LIMITED

Prepared by: Rebecca Elliot

Date audit commenced: 7 January 2022

Date audit report completed: 21 June 2022

Audit report due date: 31 January 2022

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EXECUTIVE SUMMARY

This audit of the **NZTA Greater Wellington area** DUML database and processes was conducted at the request of **Genesis Energy Limited (Genesis)** in accordance with clause 15.37B.

Previously the NZTA Porirua DUML load was created by taking the items of load out of several District and City Council databases. NZTA have been working to use their own RAMM database for the unmetered streetlight loads across the country. An extract from the NZTA RAMM database was provided for the audit. This was analysed and identified six unmetered DUML ICPs to be included in this audit. In June 2022, NZTA advised that the unmetered NZTA lights on the Electra network are to be included in the next audit of this database. Two new ICPs have been created for this and Genesis is expected to make these active from 1 July 2022. The three existing ICPs where this lighting load is being reconciled are expected to be decommissioned from 30 June 2022 (these are with other traders). This is detailed in **section 1.6**.

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 171 items of load, and this found that the database was outside of the +/-5% allowable threshold resulting in an estimated under submission of 29,500 kWh per annum.

Examination of the database found:

- 65 items of load on SH58 missing from the NZTA database report provided to Genesis for submission resulting in an estimated under submission of 54,712 kWh per annum,
- 51 items of load with no ICP recorded resulting in a possible under submission of 27,680 kWh per annum,
- 30 items of load have no lamp make, model, lamp or ballast wattage recorded resulting in an estimated under submission of 19,988 kWh per annum, and
- 171 items of load with the incorrect ballast recorded resulting in an estimated under submission of 35,389 kWh per annum.

Six non-compliances were identified, and two recommendations were raised. The future risk rating of 42 indicates that the next audit be completed in three months. I have considered this in conjunction with Genesis's response and the delay in getting this report completed and agree with the recommendation.

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	1.10	16A.26 and 17.295F	Audit not completed by the due date.	Weak	Low	3	Identified
Deriving submission information	2.1	11(1) of Schedule 15.3	Over submission of 8,479.90 kWh for the month of December 2021 due to no wattage report being received. 65 items of load on SH58 missing from the NZTA database report provided to Genesis for submission resulting in an estimated under submission of 54,712 kWh per annum. In absolute terms, total annual consumption is estimated to be 29,500 kWh higher than the DUML database indicates. The database is outside of the allowable +/-5% threshold. There is a 95% level of confidence that the annual consumption is between 46,900 kWh p.a. lower to 115,100 kWh p.a. higher than the database indicates. 51 items of load with no ICP recorded resulting in a possible under submission of 27,680 kWh per annum. 30 items of load with a blank or unknown lamp model and no lamp wattage or ballast wattage recorded resulting in an estimated under submission of 19,988 kWh per annum. 171 items of load with the incorrect ballast assigned resulting in an estimated under submission of 35,389 per annum.	Weak	High	9	Investigating

Subject	Section	Clause	Non-Compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
			Some LED lights recorded in the database at the maximum wattage but are burning at a lower wattage resulting in some over submission. Database reporting is a monthly snapshot and does not record historic changes.				
ICP identifier and items of load	2.2	11(2)(a) and (aa) of Schedule 15.3	51 items of load with no ICP recorded resulting in a possible under submission of 27,680 kWh per annum.	Weak	Medium	6	Investigating
Description and capacity of load	2.4	11(4) of Schedule 15.3	30 items of load with a blank or unknown lamp model and no lamp wattage or ballast wattage recorded resulting in an estimated under submission of 19,988 kWh per annum.	Weak	Medium	6	Investigating
Database accuracy	3.1	15.2 and 15.37B(b)	In absolute terms, total annual consumption is estimated to be 29,500 kWh higher than the DUML database indicates. The database is outside of the allowable +/-5% threshold. There is a 95% level of confidence that the annual consumption is between 46,900 kWh p.a. lower to 115,100 kWh p.a. higher than the database indicates. 30 items of load with a blank or unknown lamp model and no lamp wattage or ballast wattage recorded resulting in an estimated under submission of 19,988 kWh per annum. 171 items of load with the incorrect ballast assigned resulting in an estimated under submission of 35,389 per annum.	Weak	High	9	Investigating

Subject	Section	Clause	Non-Compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
			Some LED lights recorded in the database at the maximum wattage but are burning at a lower wattage resulting in some over submission. 51 items of load with no ICP recorded resulting in a possible under submission of 27,680 kWh per annum.				
Volume information accuracy	3.2	15.2 and 15.37B(c)	Over submission of 8,479.90 kWh for the month of December 2021 due to no wattage report being received. 65 items of load on SH58 missing from the NZTA database report provided to Genesis for submission resulting in an estimated under submission of 54,712 kWh per annum. In absolute terms, total annual consumption is estimated to be 29,500 kWh higher than the DUML database indicates. The database is outside of the allowable +/-5% threshold. There is a 95% level of confidence that the annual consumption is between 46,900 kWh p.a. lower to 115,100 kWh p.a. higher than the database indicates. 51 items of load with no ICP recorded resulting in a possible under submission of 27,680 kWh per annum. 30 items of load with a blank or unknown lamp model and no lamp wattage or ballast wattage recorded resulting in an estimated under submission of 19,988 kWh per annum.	Weak	High	9	Investigating

Subject	Section	Clause	Non-Compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
			171 items of load with the incorrect ballast assigned resulting in an estimated under submission of 35,389 per annum. Some LED lights recorded in the database at the maximum wattage but are burning at a lower wattage resulting in some over submission. Database reporting is a monthly snapshot and does not record historic changes.				
Future Risk Rating						42	

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 the ten items of load with no GPS co-ordinates.
Database accuracy	3.1	Review the change management process to ensure that all changes are recorded in RAMM for the correct date.

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

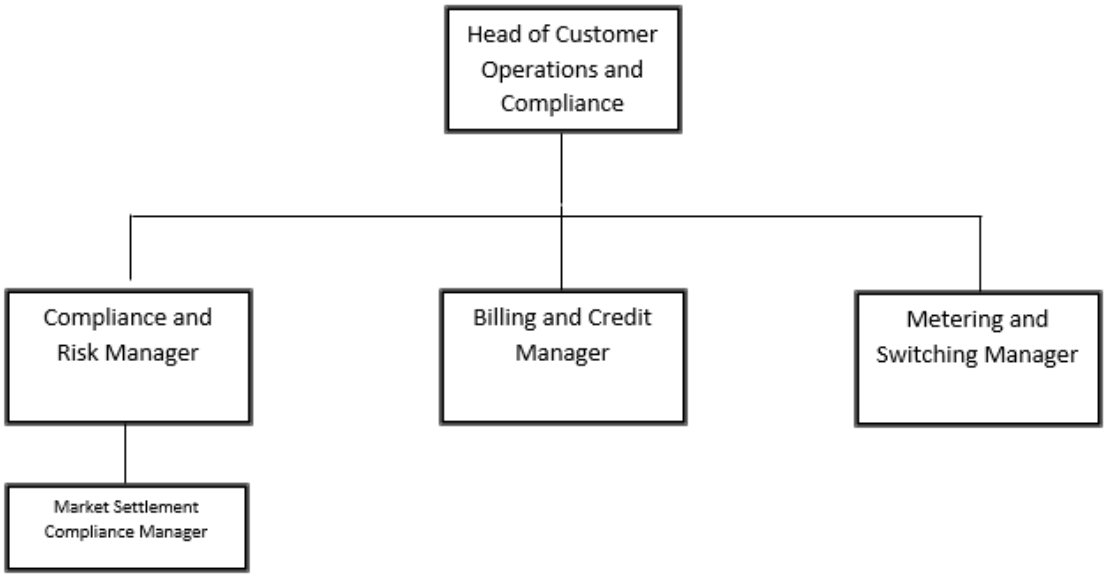
Current code exemptions were reviewed on the Electricity Authority website.

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
Rebecca Elliot	Veritek Limited	Auditor

Other personnel assisting in this audit were:

Name	Title	Company
Julia Jones	DUML Data & Stakeholder Lead - Market Settlement Compliance	Genesis Energy
Mark Poole	Compliance and Risk Manager	Genesis Energy
Martin Holmes	Relationship Manager	Genesis Energy
Ryan Zheng	Network Manager – Asset Information	NZTA

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 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.

1.5. Breaches or Breach Allegations

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

1.6. ICP Data

The NZTA greater Wellington area DUML database contains the following unmetered load ICPs traded by Genesis Energy in the table below.

ICP Number	Description	NSP	Profile	Number of items of load	Database wattage (watts)
1001102038UN6D0	MASTER ICP NZTA STREETLIGHT TKR0331	TKR0331	CST	415	108,732
1001102039UNA95	MASTER ICP NZTA STREETLIGHT PNI0331 (INCL. SH58)	PNI0331	CST	154	39,627
1001102046UN016	MASTER ICP NZTA/NGAURANGA TO TCE TUNNEL	CPK0331	CST	381	102,145
1001102047UNC53	MASTER ICP NZTA STREETLIGHT UHT0331	UHT0331	CST	530	129,552
1001102049UNFC8	MASTER ICP NZTA PETONE-NGAURANGA MLG0331	MLG0331	CST	175	45,410
1001105788UNF00	PUKERUA BAY TO NGAURANGA	PNI0331	CST	292	73,502
			Total	**1,947**	**498,968**

The database extract provided included ICP 1001102041UNDDC. This ICP is reconciled against the Wellington CC DUML database so has not been included in this audit. It is expected that in time this will be reconciled within this database, but the date of this change is unknown at this time.

NZTA have advised that the unmetered NZTA lights on the Electra network are to be included in the next audit of this database:

ICP Number	Description	NSP	Status
0110013115EL2CA	NZTA Streetlights - PRM	PRM0331	Ready
0110013116ELE0A	NZTA Streetlights - PRM	PRM0331	Ready

Genesis is expected to claim these ICPs from 1 July 2022. These ICPs will replace the three ICPs below that are reconciled by another trader, and these ICPs are expected to be decommissioned for the day prior to ensure that no submission is missed by the relevant trader:

ICP Number	Description	NSP	Trader
0110004920EL4F1	SH1 Otaki Otaki	PRM0331	CTCS
0016099060EL730	66 State Highway 1 Hwy	PRM0331	MERI
0110007670EL116	SH1 Paekakariki	PRM0331	CTCS

1.7. Authorisation Received

All information was provided directly by Genesis and NZTA Wellington NOC.

1.8. Scope of Audit

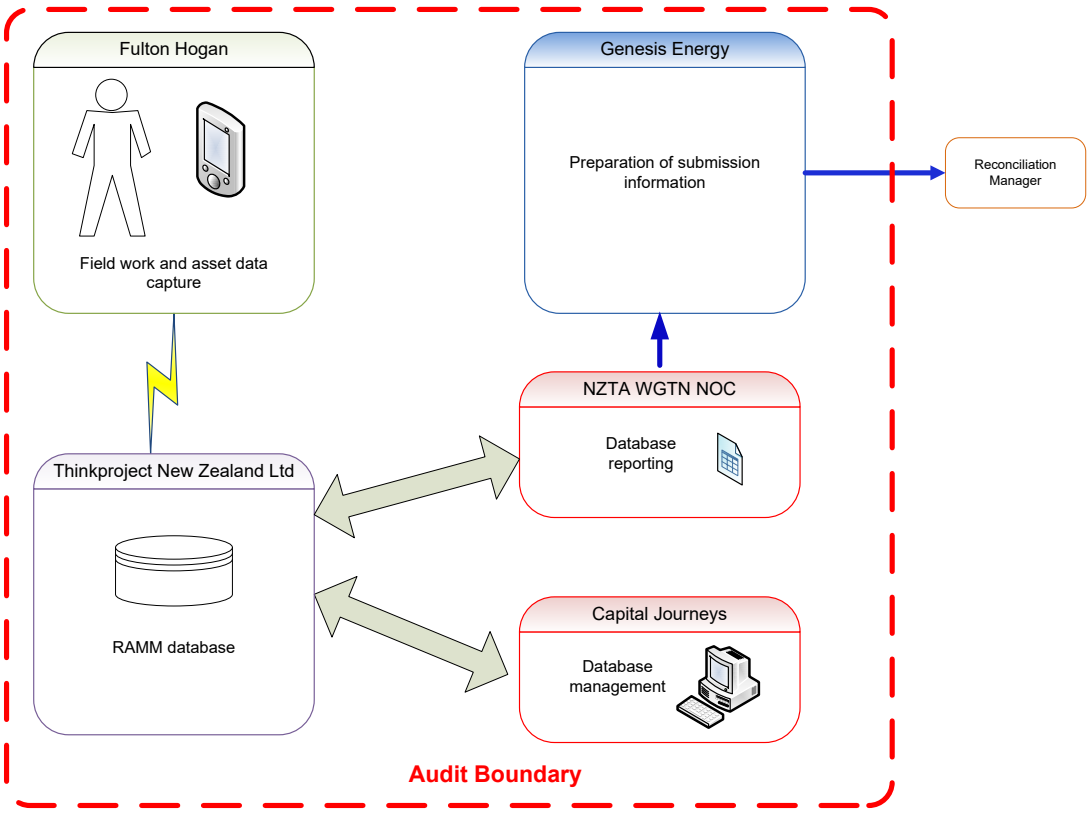
This audit of the NZTA greater Wellington area DUML database and processes was conducted at the request of Genesis Energy Limited (Genesis) in accordance with clause 15.37B. Previously the NZTA Porirua DUML load was created by taking the items of load out of several District and City Council databases. NZTA have been working to use their own RAMM database for the unmetered streetlight loads across the country. An extract from the NZTA RAMM database was provided for the audit. This was analysed and identified six unmetered DUML ICPs to be included in this audit.

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 Capital Journey's and field work is carried out by Fulton Hogan.

Genesis reconciles the DUML load using the CST profile. The kW figures are derived from a wattage report provided by NZTA and the on/off times are derived from a logger.

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 171 items of load on January 14h and 15th 2022.

1.9. Summary of previous audit

The previous audit of this database covered only the NZTA Porirua lights. This audit was conducted by Steve Woods of Veritek Limited in February 2020. This found six non-compliances and made no recommendations. The status of these is detailed in the table below:

Subject	Section	Clause	Non-Compliance	Status
Audit requirement	1.10	16A.26 and 17.295F	Database not audited within 3 months.	Still existing
Deriving submission information	2.1	11(1) of Schedule 15.3	Under submission of 206,454 kWh per annum due to the use of an inaccurate database.	Still existing
ICP identifier and items of load	2.2	11(2)(a) and (aa) of Schedule 15.3	Nine items of load with a blank ICP.	Still existing

Subject	Section	Clause	Non-Compliance	Status
Description and capacity of load	2.4	11(2)(b) of Schedule 15.3	14 records do not have a lamp make and model. 340 records have an unknown make and model but have sufficient information to determine wattage. 221 lamp wattages are blank. 348 gear wattages are blank. 8 gear wattages are incorrect.	Still existing
Database accuracy	3.1	15.2 and 15.37B(b)	A large number of discrepancies exist in the database.	Still existing
Volume information accuracy	3.2	15.2 and 15.37B(c)	Under submission of 206,454 kWh per annum due to the use of an inaccurate database.	Still existing

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 requested Veritek to undertake this streetlight audit.

Audit commentary

The audit has been delayed in being completed due to information being slow to be provided and being unable to arrange a meeting with NZTA.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 1.9 With: Clause 16A.26 From: 01-Jan-22 To: 22-Jun-22	Audit not completed by the due date. Potential impact: None Actual impact: Low Audit history: Once previously Controls: Weak Breach risk rating: 3
Audit risk rating	**Rationale for audit risk rating**
Low	The controls are rated as weak as Genesis are in the process of a staff change resulting in there being insufficient resource to manage these. 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 now filled the position of a DUML Data & Stakeholder Lead and therefore in future audits will be conducted in a timely manner.	25/07/2022	Identified
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

Genesis no longer reconciles this load using the PCC database. NZTA have provided a wattage report intermittently but have agreed to provide this on a monthly basis going forward. The load is submitted using the CST profile and datalogger on/off times are used to calculate the burn hours.

I checked the calculations for R1 December 2021 submission and found that values were incorrect as detailed below:

ICP Number	kW value	Burn hours	Calculated volume	Submitted R1 kWh	Difference
1001102038UN6D0	97.443	277.547	27,045.03	28,743.2	-1,698.17
1001102039UNA95	39.627	277.547	10,998.36	11,689.07	-690.71
1001102046UN016	102.145	277.547	28,350.06	30,128.9	-1,778.84
1001102047UNC53	129.552	277.547	35,956.80	38,212.67	-2,255.87
1001102049UNFC8	45.41	277.547	12,603.42	13,395.1	-791.68
1001105788UNF00	72.653	277.547	20,164.64	21,429.27	-1,264.63
				TOTAL	-8,479.90

This was due to no monthly report being received so the November 2021 values were used. This is recorded as non-compliance below. This has been corrected in the R3 revision.

I checked the wattage report provided to Genesis for submission against the NZTA extract provided and found 65 lights on SH58 missing in the RAMM database. These details have been passed to Genesis to investigate. This will be resulting in an estimated under submission of 54,712 kWh per annum.

As recorded in **section 3.1**, under submission has occurred and the estimated total annual under submission if the database is not corrected will be 29,500 kWh and could potentially be between 46,900 kWh p.a. under submission to 115,100 kWh p.a. over submission.

Examination of the database found the following inaccuracies as detailed in **sections 2.4** and **3.1**:

ISSUE	**Annualised kWh impact** **+= under submission** **-=over submission**
51 items of load with no ICP recorded	+27,680
30 items of load with a blank or unknown lamp model and no lamp wattage or ballast wattage recorded	+19,988
171 items of load with the incorrect ballast assigned	+35,389
Some LED lights recorded at the maximum wattage but are burning at a lower wattage	Over submission of an unknown volume
TOTAL	83,057

Database reporting is a snapshot and does not detail historic changes.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.1 With: Clause 11(1) of Schedule 15.3 From: 20-Feb-20 To: 31-Jan-22	Over submission of 8,479.90 kWh for the month of December 2021 due to no wattage report being received. 65 items of load on SH58 missing from the NZTA database report provided to Genesis for submission resulting in an estimated under submission of 54,712 kWh per annum. In absolute terms, total annual consumption is estimated to be 29,500 kWh higher than the DUML database indicates. The database is outside of the allowable +/-5% threshold. There is a 95% level of confidence that the annual consumption is between 46,900 kWh p.a. lower to 115,100 kWh p.a. higher than the database indicates. 51 items of load with no ICP recorded resulting in a possible under submission of 27,680 kWh per annum. 30 items of load with a blank or unknown lamp model and no lamp wattage or ballast wattage recorded resulting in an estimated under submission of 19,988 kWh per annum. 171 items of load with the incorrect ballast assigned resulting in an estimated under submission of 35,389 per annum. Some LED lights recorded in the database at the maximum wattage but are burning at a lower wattage resulting in some over submission. Database reporting is a monthly snapshot and does not record historic changes. Potential impact: High Actual impact: High Audit history: Once previously Controls: Weak Breach risk rating: 9
Audit risk rating	**Rationale for audit risk rating**
High	The controls are recorded as weak because the database accuracy indicates the current processes in place do not mitigate risk to an acceptable level. The impact on settlement and participants is high based on the cumulative kWh error; therefore, the audit risk rating is high.

Actions taken to resolve the issue	Completion date	Remedial action status
Genesis has been in contact with NZTA Wellington regarding providing monthly data extract to meet the accuracy and tracking of changes. Genesis has advised NZTA Wellington of the audit findings with regard to the discrepancy found between the field audit and the RAMM data base with the intent that NZTA will ensure all corrections are made within a timely manner.	Continuous improvement	Investigating

Preventative actions taken to ensure no further issues will occur	Completion date	
Genesis continues to work with NZTA in order to improve accuracy within the NZTA RAMM data base.		

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

The database extract provided had an ICP recorded for all but 51 items of load. 49 of these have "TG-NO ICP" recorded in the ICP field and the remaining two items of load the field is blank and could be resulting in a possible under submission of 27,680 kWh per annum. This is recorded as non-compliance.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.2 With: Clause 11(2)(a) and (aa) of Schedule 15.3 From: 20-Feb-20 To: 31-Jan-22	51 items of load with no ICP recorded resulting in a possible under submission of 27,680 kWh per annum. Potential impact: Medium Actual impact: Medium Audit history: Once previously Controls: Weak Breach risk rating: 6
Audit risk rating	**Rationale for audit risk rating**
Medium	The controls are recorded as weak as discrepancies such as this are not being checked for and therefore not corrected. The audit risk rating is medium based on the estimated kWh impact on submission.

Actions taken to resolve the issue	Completion date	Remedial action status
Genesis has advised NZTA Wellington of the audit findings with regards to the discrepancy found within RAMM data base with the intent that NZTA will ensure all corrections are made within a timely manner.	Continuous improvement	Investigating
Preventative actions taken to ensure no further issues will occur	**Completion date**	
Genesis continues to work with NZTA to improve accuracy within the NZTA RAMM data base.	Continuous improvement	

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 ten items of load have GPS coordinates populated. The ten 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 the ten items of load with no GPS co-ordinates.	Genesis has advised NZTA Wellington of the audit findings with regards to the discrepancy found within RAMM data base with the intent that NZTA will ensure all corrections are made within a timely manner.	Investigating

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.

30 items of load with an NZTA unmetered ICP recorded have a blank or unknown light model description and no wattage or ballast recorded. Assuming these are the most common light type of 150W HPS, this will be resulting in an estimated under submission of 19,988 kWh per annum.

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: 20-Feb-20 To: 31-Jan-22	30 items of load with a blank or unknown lamp model and no lamp wattage or ballast wattage recorded resulting in an estimated under submission of 19,988 kWh per annum. Potential impact: Medium Actual impact: Medium Audit history: Once previously Controls: Weak Breach risk rating: 6
Audit risk rating	**Rationale for audit risk rating**
Medium	The controls are recorded as weak as discrepancies such as this are not being checked for and therefore not corrected. The impact is assessed to be low based on the kWh impact.

Actions taken to resolve the issue	Completion date	Remedial action status
Genesis has advised NZTA Wellington of the audit findings with regards to the discrepancy found within RAMM data base with the intent that NZTA will ensure all corrections are made within a timely manner.	Continuous improvement	Investigating
Preventative actions taken to ensure no further issues will occur	**Completion date**	
Genesis continues to work with NZTA to improve accuracy within the NZTA RAMM data base.	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 171 items of load.

Audit commentary

The field audit the following discrepancies:

Street	Database count	Field count	Light count differences	Wattage recorded incorrectly	Comments
002-0946	7	7	-	5	5x 150W HPS in the field but no ballast applied in the database.
002-0962/12.86-D	10	10	-	2	2x 250W HPS but recorded with zero wattage in the database.
002-0962-D	16	16	-	5	2x 250W HPS but recorded with zero wattage in the database. 3x 250W HPS with the incorrect wattage recorded in the database.
002-0962-I	21	21	-	4	1x 250W HPS but recorded with zero wattage in the database. 3x 250W HPS with the incorrect wattage recorded in the database.
01N-1060-D	23	23	-	7	5x 149W LED in the field recorded as 250W HPS in the database. 2x 250W HPS in the field but no ballast applied in the database.
01N-1060-I	8	8	-	2	2x 149W LED in the field recorded as 250W HPS in the database.
01N-1068-D	16	16	-	5	5x 250W HPS in the field but no ballast applied in the database.
01N-1068-I	17	16	-1	5	1x 250W HPS not found in the field. 5x 250W HPS in the field but no ballast applied in the database.
059-0000/12.79-D	6	6	-	2	2x 149W LED found in the field recorded as 293W LED and 250W HPS.
059-0000/12.79-I	9	9	-	2	2x 149W LED found in the field recorded as 293W LED and 250W HPS.
059-0024-W	10	10	-	1	2x 149W LED found in the field recorded as 150W HPS.
Grand Total	**171**	**170**	**-1**	**40**	

The field audit found no additional lights but find a high error rate due to the incorrect wattages being applied. This is detailed in **section 3.1**.

Audit outcome

Compliant

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

Code reference

Clause 11(3) of Schedule 15.3

Code related audit information

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

Audit observation

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

Audit commentary

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 171 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	Greater Wellington area NZTA lighting
Strata	The database contains NZTA lighting in the greater Wellington area including Porirua, Hutt Valley and Wellington but excludes all lights in central Wellington associated with ICP 1001102041UNDDC which is reconciled in the Wellington CC DUML database. 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 geographical area: 1. Porirua, 2. Wellington, and 3. Hutt Valley.
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 15 sub-units.
Total items of load	171 items of load were checked, making up 7% 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 171 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	101.4	Wattage from survey is higher than the database wattage by 1.4%
R_L	97.8	With a 95% level of confidence, it can be concluded that the error could be between -2.2% and + 5.4%
R_H	105.4	

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 2.2% lower and 5.4% 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 7kW higher than the database indicates.
- There is a 95% level of confidence that the installed capacity is between 11 kW lower and 27 kW higher than the database.
- In absolute terms, total annual consumption is estimated to be 29,500 kWh higher than the DUML database indicates.
- There is a 95% level of confidence that the annual consumption is between 46,900 kWh p.a. lower to 115,100 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**, 30 items of load with an NZTA unmetered ICP recorded have a blank or unknown light model description and no wattage or ballast recorded. Assuming these are the most common light type of 150W HPS, this will be resulting in an estimated under submission of 19,988 kWh per annum.

Examination of the database found the following ballast discrepancies:

Lamp Type	Ballast recorded	Expected ballast	Number of items of load affected	Estimated Annualised submission impact
1000W MH	0	40	6	1,025
150W SON	0	18	42	19,373
250W HPS	0	28	125	14,948
400W HPS	28	38	1	43
TOTAL			**171**	**35,389**

This will be resulting in an estimated under submission of 35,389 kWh per annum.

NZTA has no present plans to roll out any LED upgrades, but failed lights are replaced with LED lights. Some LED lights are recorded in the database at the maximum wattage e.g., 203W LED light but is actually burning at 100W. Genesis is working with NZTA to get this corrected in the database. I am unable to calculate the impact on submission as the lights affected and actual burn wattage are still being compiled but there are 498 Items of LED load recorded in the database.

ICP number accuracy

As detailed in **section 2.2**, 51 items of load have no ICP recorded. 49 of these have "TG-NO ICP" recorded in the ICP field and the remaining two items of load the field is blank and could be resulting in a possible under submission of 27,680 kWh per annum.

Location information

The database contains fields for the road name, location number, and GPS coordinates. All items of load apart from ten have GPS coordinates populated. The ten 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

Fulton Hogan are the field contractor. All changes made in the field are lodged in Pocket RAMM. The database is managed by Capital Journeys. NZTA maintain an overview of the database and produce the wattage report. The field audit indicates that not all changes made in the field are being updated in RAMM. I recommend these processes are reviewed.

Description	Recommendation	Audited party comment	Remedial action
Database Accuracy	Review the change management process to ensure that all changes are recorded in RAMM for the correct date.	Genesis is currently working with NZTA Wellington to improve this process.	Investigating

Festive and private lights

There are no private or festive lights connected to the NZTA greater Wellington lighting load.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 3.1 With: Clause 15.2 and 15.37B(b) From: 20-Feb-20 To: 31-Jan-22	In absolute terms, total annual consumption is estimated to be 29,500 kWh higher than the DUML database indicates. The database is outside of the allowable +/-5% threshold. There is a 95% level of confidence that the annual consumption is between 46,900 kWh p.a. lower to 115,100 kWh p.a. higher than the database indicates. 30 items of load with a blank or unknown lamp model and no lamp wattage or ballast wattage recorded resulting in an estimated under submission of 19,988 kWh per annum. 171 items of load with the incorrect ballast assigned resulting in an estimated under submission of 35,389 per annum. Some LED lights recorded in the database at the maximum wattage but are burning at a lower wattage resulting in some over submission. 51 items of load with no ICP recorded resulting in a possible under submission of 27,680 kWh per annum. Potential impact: High Actual impact: High Audit history: None Controls: Weak Breach risk rating: 9
Audit risk rating	**Rationale for audit risk rating**
High	The controls are recorded as weak because the database accuracy indicates the current processes in place do not mitigate risk to an acceptable level. The impact on settlement and participants is high based on the cumulative kWh error; therefore, the audit risk rating is high.

Actions taken to resolve the issue	Completion date	Remedial action status
Genesis has advised NZTA Wellington of the audit findings with regards to the discrepancy found within RAMM data base with the intent that NZTA will ensure all corrections are made within a timely manner.	Continuous improvement	Investigating
Preventative actions taken to ensure no further issues will occur	**Completion date**	
Genesis continues to work with NZTA to improve accuracy within the NZTA RAMM data base.	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

Genesis no longer reconciles this load using the PCC database. NZTA have provided a wattage report intermittently but have agreed to provide this on a monthly basis going forward. The load is submitted using the CST profile and datalogger on/off times are used to calculate the burn hours.

I checked the calculations for R1 December 2021 submission and confirmed found that values were incorrect as detailed below:

ICP Number	kW value	Burn hours	Calculated volume	Submitted R1 kWh	Difference
1001102038UN6D0	97.443	277.547	27,045.03	28,743.2	-1,698.17
1001102039UNA95	39.627	277.547	10,998.36	11,689.07	-690.71
1001102046UN016	102.145	277.547	28,350.06	30,128.9	-1,778.84
1001102047UNC53	129.552	277.547	35,956.80	38,212.67	-2,255.87
1001102049UNFC8	45.41	277.547	12,603.42	13,395.1	-791.68
1001105788UNF00	72.653	277.547	20,164.64	21,429.27	-1,264.63
				TOTAL	-8,479.90

This was due to no monthly report being received so the November 2021 values were used. This is recorded as non-compliance below. This has been corrected in the R3 revision.

I checked the wattage report provided to Genesis for submission against the NZTA extract provided and found 65 lights on SH58 missing in the RAMM database. These details have been passed to Genesis to investigate. This will be resulting in an estimated under submission of 54,712 kWh per annum.

As recorded in **section 3.1**, under submission has occurred and the estimated total annual under submission if the database is not corrected will be 29,500 kWh and could potentially be between 46,900 kWh p.a. under submission to 115,100 kWh p.a. over submission.

Examination of the database found the following inaccuracies as detailed in **sections 2.4** and **3.1**:

ISSUE	**Annualised kWh impact** **+= under submission** **-=over submission**
51 items of load with no ICP recorded	+27,680
30 items of load with a blank or unknown lamp model and no lamp wattage or ballast wattage recorded	+19,988
171 items of load with the incorrect ballast assigned	+35,389
Some LED lights recorded at the maximum wattage but are burning at a lower wattage	Over submission of an unknown volume
TOTAL	83,057

Database reporting is a snapshot and does not detail historic changes.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 3.2 With: Clause 15.2 and 15.37B(c) From: 20-Feb-20 To: 31-Jan-22	Over submission of 8,479.90 kWh for the month of December 2021 due to no wattage report being received. 65 items of load on SH58 missing from the NZTA database report provided to Genesis for submission resulting in an estimated under submission of 54,712 kWh per annum. In absolute terms, total annual consumption is estimated to be 29,500 kWh higher than the DUML database indicates. The database is outside of the allowable +/-5% threshold. There is a 95% level of confidence that the annual consumption is between 46,900 kWh p.a. lower to 115,100 kWh p.a. higher than the database indicates. 51 items of load with no ICP recorded resulting in a possible under submission of 27,680 kWh per annum. 30 items of load with a blank of unknown lamp model and no lamp wattage or ballast wattage recorded resulting in an estimated under submission of 19,988 kWh per annum. 171 items of load with the incorrect ballast assigned resulting in an estimated under submission of 35,389 per annum. Some LED lights recorded in the database at the maximum wattage but are burning at a lower wattage resulting in some over submission. Database reporting is a monthly snapshot and does not record historic changes. Potential impact: High Actual impact: High Audit history: Once previously Controls: Weak Breach risk rating: 9
Audit risk rating	**Rationale for audit risk rating**
High	The controls are recorded as weak because the database accuracy indicates the current processes in place do not mitigate risk to an acceptable level. The impact on settlement and participants is high based on the cumulative kWh error; therefore, the audit risk rating is high.

Actions taken to resolve the issue	Completion date	Remedial action status
Genesis has been in contact with NZTA Wellington regarding providing monthly data extract to meet the accuracy and tracking of changes. Genesis has advised NZTA Wellington of the audit findings with regard to the discrepancy found between the field audit and the RAMM data base with the intent that NZTA will ensure all corrections are made within a timely manner.	Continuous improvement	Investigating

Preventative actions taken to ensure no further issues will occur	Completion date	
Genesis continues to work with NZTA to improve accuracy within the NZTA RAMM data base.		

CONCLUSION

Previously the NZTA Porirua DUML load was created by taking the items of load out of several District and City Council databases. NZTA have been working to use their own RAMM database for the unmetered streetlight loads across the country. An extract from the NZTA RAMM database was provided for the audit. This was analysed and identified six unmetered DUML ICPs to be included in this audit. In June 2022, NZTA advised that the unmetered NZTA lights on the Electra network are to be included in the next audit of this database. Two new ICPs have been created for this and Genesis is expected to make these active from 1 July 2022. The three existing ICPs where this lighting load is being reconciled are expected to be decommissioned from 30 June 2022 (these are with other traders). This is detailed in **section 1.6**.

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 171 items of load, and this found that the database was outside of the +/-5% allowable threshold resulting in an estimated under submission of 29,500 kWh per annum.

Examination of the database found:

- 65 items of load on SH58 missing from the NZTA database report provided to Genesis for submission resulting in an estimated under submission of 54,712 kWh per annum,
- 51 items of load with no ICP recorded resulting in a possible under submission of 27,680 kWh per annum,
- 30 items of load have no lamp make, model, lamp or ballast wattage recorded resulting in an estimated under submission of 19,988 kWh per annum, and
- 171 items of load with the incorrect ballast recorded resulting in an estimated under submission of 35,389 kWh per annum.

Six non-compliances were identified, and two recommendations were raised. The future risk rating of 42 indicates that the next audit be completed in three months. I have considered this in conjunction with Genesis's response and the delay in getting this report completed and agree with the recommendation.

PARTICIPANT RESPONSE

Genesis has now filled the position of a DUML Data & Stakeholder Lead and therefore in future audits will be conducted in a timely manner.

Genesis has been in contact with NZTA Wellington regarding providing monthly data extract to meet the accuracy and tracking of changes.

Genesis has advised NZTA Wellington of the audit findings with regard to the discrepancy found between the field audit and the RAMM data base with the intent that NZTA will ensure all corrections are made within a timely manner.