ELECTRICITY INDUSTRY PARTICIPATION CODE
DISTRIBUTED UNMETERED LOAD AUDIT REPORT

VERITEK

For

HASTINGS DISTRICT COUNCIL AND GENESIS ENERGY

NZBN: 9429037706609

Prepared by: Rebecca Elliot

Date audit commenced: 8 June 2023

Date audit report completed: 26 July 2023

Audit report due date: 01-Sep-23

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EXECUTIVE SUMMARY

This audit of the by **Hastings District Council (HDC)**, 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 database is remotely hosted by thinkproject New Zealand Ltd. For streetlights, the database population, field work and asset data capture are conducted by Pope Electrical. Database management is undertaken by Beca. Parks and Amenity lights are also recorded in the database. Changes made in the field are expected to be advised to the Transport team, but this process is not working as expected as was evident with field audit discrepancies and I recommend that this process is reviewed.

As recorded in the last audit, HDC has implemented a CMS system. This will interface with RAMM but is currently used to turn the street lights on and off and report faults. 60% of the lights managed this way. The on and off times are pre-programmed based on sunset and sunrise times. This is likely to vary slightly from the Unison controlled ripple relays which is what Genesis are currently calculating the burn hours from. HDC have identified some data issues that are in the process of being resolved before the CMS system can be used to derive streetlight volumes. Once this is resolved, Genesis will work with HDC to progress a profile before dimming is deployed.

Analysis of the database found a small number of lights with:

- no ICP,
- no lamp wattage, and
- Waka Kotahi lights with a HDC ICP assigned.

The analysis has been passed to Genesis to work with HDC to resolve. It appears that that the monthly report is being manipulated before being sent to Genesis as the Waka Kotahi lights are being manually removed and I have recommended that the data be corrected so that the monthly extract doesn't require manipulation before being sent.

The database accuracy has declined since the last audit. I believe this is largely due to the errors found with the Parks and Amenity lighting sampled. Database accuracy is described as follows:

Result	Percentage	Comments
The point estimate of R	104.3	Wattage from survey is higher than the database wattage by 4.3%
R_L	98.7	With a 95% level of confidence, it can be concluded that the error could be between -1.3% and +13%
R_H	113.0	

In absolute terms, total annual consumption is estimated to be 85,600 kWh higher than the DUML database indicates.

There is a 95% level of confidence that the annual consumption is between 26,700 kWh lower to 257,900 kWh p.a. higher than the database indicates.

The audit found six non-compliances and five recommendations are made. The future risk rating of 24 indicates that the next audit be completed in three months. The decline is compliance is due to the data discrepancies found but affects a relatively small number of items of load. Therefore, I recommend that the next audit period be in nine months. This should allow sufficient time for Genesis to work with HDC to:

- correct the data discrepancies and review processes to ensure data entered is accurate,
- review the change management processes for the Parks and Amenity lighting, and
- progress getting the CMS profile in place.

The matters raised are detailed in the tables 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	Database assessed as having poor precision therefore the potential error is greater than 5.0% resulting in an estimated under submission of 85,600 kWh per annum. 36 items of load with no wattage recorded resulting in an under submission of 2,998 kWh per annum based on the most common lamp wattage of 19.5W. 12 items of load with the incorrect ballast applied resulting in a very minor under submission of 64.9kWh per annum. 57 items of load with no ICP associated resulting in an estimated under submission of 6,750 kWh additional lights identified in the field count. Inaccurate on and off times as the logger times will vary slightly from the CMS on and off times.	Moderate	High	6	Investigating
ICP identifier	2.2	11(2)(a) and (aa) of Schedule 15.3	57 items of load with no ICP associated resulting in an estimated under submission of 6,750 kWh additional lights identified in the field count.	Moderate	Low	2	Investigating

Subject	Section	Clause	Non-Compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
Description and capacity of load	2.4	11(2)(c) and (d) of Schedule 15.3	36 items of load with no wattage recorded resulting in an estimated under submission of 2,998 kWh per annum based on the most common lamp wattage of 19.5W.	Moderate	Low	2	Investigating
All load recorded in the database	2.5	11(2A) of Schedule 15.3	Four additional lights identified in the field count.	Moderate	Low	2	Investigating
Database accuracy	3.1	15.2 and 15.37B(b)	Database assessed as having poor precision therefore the potential error is greater than 5.0% resulting in an estimated under submission of 85,600 kWh per annum. 36 items of load with no wattage recorded resulting in an under submission of 2,998 kWh per annum based on the most common lamp wattage of 19.5W. 12 items of load with the incorrect ballast applied resulting in a very minor under submission of 64.9kWh per annum. 57 items of load with no ICP associated resulting in an estimated under submission of 6,750 kWh additional lights identified in the field count.	Moderate	High	6	Investigating

Subject	Section	Clause	Non-Compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
Volume information accuracy	3.2	15.2 and 15.37B(c)	Database assessed as having poor precision therefore the potential error is greater than 5.0% resulting in an estimated under submission of 85,600 kWh per annum. 36 items of load with no wattage recorded resulting in an under submission of 2,998 kWh per annum based on the most common lamp wattage of 19.5W. 12 items of load with the incorrect ballast applied resulting in a very minor under submission of 64.9kWh per annum. 57 items of load with no ICP associated resulting in an estimated under submission of 6,750 kWh additional lights identified in the field count. Inaccurate on and off times as the logger times will vary slightly from the CMS on and off times.	Moderate	High	6	Investigating
					Future Risk Rating	**24**	

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
Deriving submission information	2.1	Review database extract provided with the equivalent monthly report to identify why there are discrepancies and that the monthly wattage report is not manipulated.
Location of each item of load	2.3	HDC populate the GPS co-ordinates for the items of load where it is missing and ensure that this is populated in RAMM.
Database accuracy	3.1	Review LED light descriptions to ensure that the wattage can be confirmed as correctly applied.
		Remove Waka Kotahi items of load from the HDC database.
		Review change management process for Parks and Amenity lighting to ensure changes made in the field are updated in the database.

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

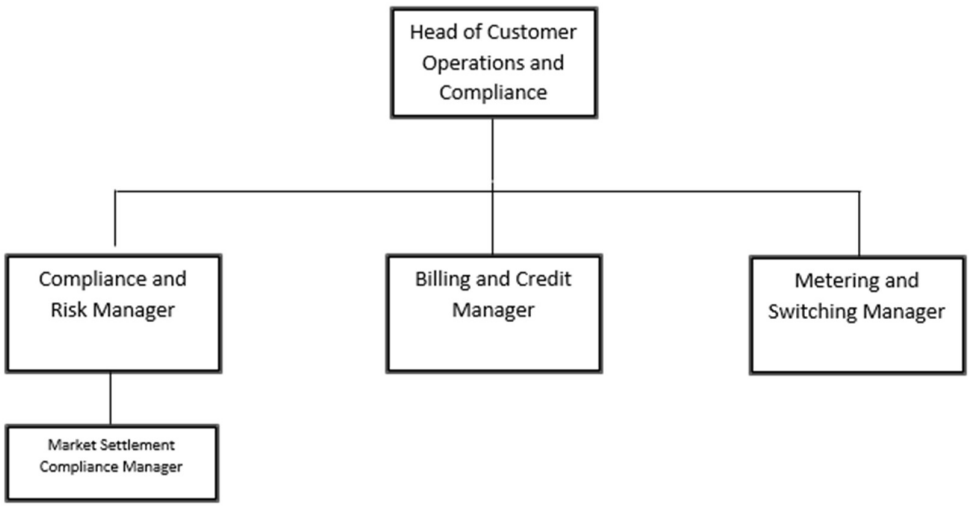
Section 11 of the Electricity Industry Act provides for the Electricity Authority to exempt any participant from compliance with all or any of the clauses.

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

Auditors:

Name	Title
Rebecca Elliot	Auditor

Other personnel assisting in this audit were:

Name	Title	Company
Shantelle Comer	Customer Operations Data and Systems Specialist	Genesis Energy
Johan van Staden	Risk and Compliance Specialist	Genesis Energy
Marius Van Niekerk	Transportation Asset Manager	Hastings DC
Hassan Salapour	RAMM support	Beca

1.4. Hardware and Software

The RAMM database used for the management of DUML is remotely hosted by thinkproject New Zealand Ltd.

HDC have deployed a CMS system called Bright City CMS from Telematics Wireless. This is used to turn the streetlights on and off. The Parks and Amenity lighting is not in the CMS. It is expected that the CMS system will be used to dim the streetlights in the future. This system is supported locally by Techlight.

HDC confirmed that the RAMM database and the Bright City CMS system are backed up is in accordance with standard industry procedures. Access to the systems is secure by way of password protection.

Systems used by the trader to calculate submissions are assessed as part of their reconciliation participant audits.

1.5. Breaches or Breach Allegations

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

1.6. ICP Data

ICP Number	Description	NSP	Profile	Number of items of load	Database wattage (Watts)
0000939902HBFF4	STREETLIGHTING MASTER ICP - FHL0331	FHL0331	NST	2,762	162,242
0000939904HBE7B	STREETLIGHTS - RURAL MASTER ICP - FHL0331	FHL0331	NST	110	11,137
0000045106HB0D7	STREETLIGHTING MASTER ICP - RDF0331	RDF0331	NST	17	1,800
0000045104HB052	STREETLIGHTING MASTER ICP - WTU0331	WTU0331	NST	4,564	291,736
0000045107HBC92	STREETLIGHTS - RURAL MASTER ICP - RDF0331	RDF0331	NST	79	4,557
0000045105HBC17	STREETLIGHTS - RURAL MASTER ICP - WTU0331	WTU0331	NST	54	2,415
TOTAL				**7,668**	**478,387**

1.7. Authorisation Received

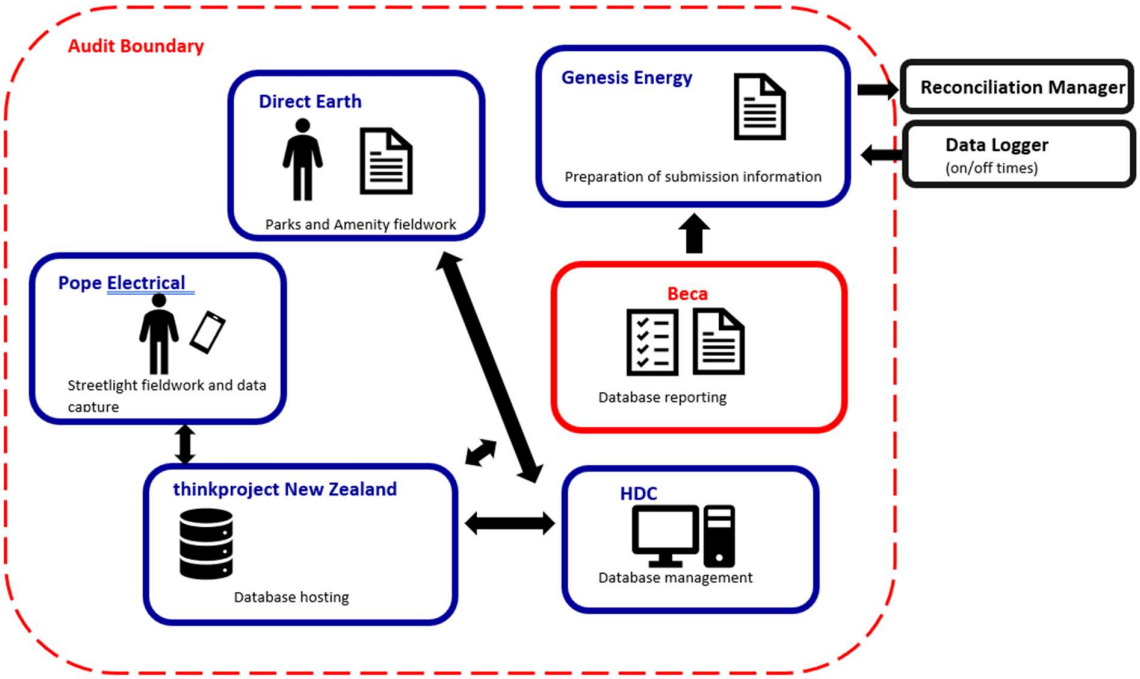
All information was provided directly by Genesis, HDC or Beca Limited.

1.8. Scope of Audit

This audit of the HDC 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.

The database is remotely hosted by thinkproject New Zealand Ltd. The database population, field work and asset data capture are conducted by Pope Electrical for streetlights. The database is managed by Beca Limited on behalf of HDC. Parks and Amenity lights are also recorded in the database. Changes made in the field are expected to be advised to the Transport Department. 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 boundary for clarity.



The field audit was undertaken of 365 items of load on 3rd July 2023.

1.9. Summary of previous audit

I reviewed the last audit report undertaken by Steve Woods of Veritek Limited in May 2022. The table below records the current status of the relevant clauses:

Table of Non-Compliance

Subject	Section	Clause	Non-compliance	Status
Deriving submission information	2.1	11(1) of Schedule 15.3	Database assessed as having poor precision therefore the potential error is greater than 5.0% resulting in an estimated over submission of 24,900 kWh per annum.	Still existing
			Incorrect ballasts applied resulting in an estimated very minor over submission of 22.2 kWh per annum.	Still existing
			Inaccurate on and off times as the logger times will vary slightly from the CMS on and off times.	Still existing
			The current monthly report is provided as a snapshot and is non-compliant. The report contains a lamp install date, but this is not used to re-calculate historic submissions.	Cleared
All load recorded in the database	2.5	11(2A) of Schedule 15.3	Seven additional lights identified in the field count.	Still existing

Subject	Section	Clause	Non-compliance	Status
Database accuracy	3.1	15.2 and 15.37B(b)	Database assessed as having poor precision therefore the potential error is greater than 5.0% resulting in an estimated over submission of 24,900 kWh per annum. Incorrect ballasts applied resulting in an estimated very minor over submission of 22.2 kWh per annum. The current monthly report is provided as a snapshot and is non-compliant. The report contains a lamp install date, but this is not used to re-calculate historic submissions.	Still existing Still existing Cleared
Volume information accuracy	3.2	15.2 and 15.37B(c)	Database assessed as having poor precision therefore the potential error is greater than 5.0% resulting in an estimated over submission of 24,900 kWh per annum. Incorrect ballasts applied resulting in an estimated very minor over submission of 22.2 kWh per annum. Inaccurate on and off times as the logger times will vary slightly from the CMS on and off times. The current monthly report is provided as a snapshot and is non-compliant. The report contains a lamp install date, but this is not used to re-calculate historic submissions.	Still existing Still existing Still existing Cleared

1.10. Distributed unmetered load audits (Clause 16A.26 and 17.295F)

Code reference

Clause 16A.26 and 17.295F

Code related audit information

Retailers must ensure that DUML database audits are completed:

1) *by 1 June 2018 (for DUML that existed prior to 1 June 2017)*
2) *within three months of submission to the reconciliation manager (for new DUML)*
3) *within the timeframe specified by the Authority for DUML that has been audited since 1 June 2017.*

Audit observation

Genesis has requested Veritek to undertake this streetlight audit.

Audit commentary

This audit report confirms that the requirement to conduct an audit has been met for this database within the required timeframe.

Audit outcome

Compliant

2. DUML DATABASE REQUIREMENTS

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

Code reference

Clause 11(1) of Schedule 15.3

Code related audit information

The retailer must ensure the:

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

Audit observation

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

Audit commentary

Genesis reconciles this DUML load using the NST profile.

I checked the submission calculation provided by Genesis and found the calculation was correct from the information provided by HDC. I checked this against the database extract provided and found light count and volume difference between the monthly report provided to Genesis for all but one ICP:

ICP	Genesis light fittings	HDC database extract light fittings	Net light count difference	Calculated kWh volume difference for May 2023
0000939902HBFF4	2,675	2,762	87	3,050
0000939904HBE7B	90	110	20	959
0000045104HB052	4,527	4,564	37	2,826
0000045107HBC92	74	79	5	236
0000045105HBC17	57	54	-3	-26
Total			146	7,046

This was discussed and found the differences could be related to:

- the Waka Kotahi lights are being reconciled by Waka Kotahi but 72 of these are still recorded against HDC ICPs and are being manually excluded from the monthly report, which is discussed further in **section 3.1**, and
- there were 57 items of load with no ICP recorded in the extract provided but the ICP may have been present in the database extract provided to Genesis.

This could be resulting in incorrect submissions. I recommend that the differences are reviewed, and that the monthly wattage report provided to Genesis is not manipulated.

Recommendation	Description	Audited party comment	Remedial action
Deriving submission information	Review database extract provided with the equivalent monthly report to identify why there are discrepancies and that the monthly wattage report is not manipulated.	HDC and Genesis will work together to review the database extract to identify the exceptions and discrepancies.	Identified

The potential impact due to these database discrepancies is detailed below.

Genesis advised that ICP 0000939902HBFF4 was submitted under the RPS profile as well as under the NST profile resulting in an over submission of 775 kWh due to human error. This will be corrected in the R3 revision.

As noted in the last audit, Hastings DC has implemented a CMS system. This will interface with RAMM. 60% of the lights on and off times are controlled by the CMS. The on and off times are pre-programmed based on sunset and sunrise times. This is likely to vary slightly from the Unison controlled ripple relays. Dimming is planned for the future. HDC have identified some data issues that are in the process of being resolved before the CMS system can be used to derive streetlight volumes. Once this is resolved, Genesis will work with HDC to progress a profile before dimming is deployed. The inaccurate on and off times are recorded as non-compliance.

As detailed in **section 3.1**, in absolute terms, total annual consumption is estimated to be 85,600 kWh higher than the DUML database indicates. This is outside the allowable +/- 5% variance threshold and is recorded as non-compliance below.

Analysis of the database identified some inaccuracies:

Findings	Estimated impact on submission per annum -= under submission +=over submission
36 items of load with no wattage recorded	-2,998
12 items of load with the incorrect ballast	-64.9
57 items of load with no ICP associated	-6,750

These discrepancies are recorded as non-compliance below.

Submission calculations take into account changes made at a daily level.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.1 With: Clause 11(1) of Schedule 15.3 From: 01-Aug-22 To: 03-Jul-23	Database assessed as having poor precision therefore the potential error is greater than 5.0% resulting in an estimated under submission of 85,600 kWh per annum. 36 items of load with no wattage recorded resulting in an under submission of 2,998 kWh per annum based on the most common lamp wattage of 19.5W. 12 items of load with the incorrect ballast applied resulting in a very minor under submission of 64.9kWh per annum. 57 items of load with no ICP associated resulting in an estimated under submission of 6,750 kWh additional lights identified in the field count. Inaccurate on and off times as the logger times will vary slightly from the CMS on and off times. Potential impact: High Actual impact: High Audit history: Multiple times Controls: Moderate Breach risk rating: 6
Audit risk rating	**Rationale for audit risk rating**
High	The controls are rated as moderate overall but there is room for improvement. 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 work with HDC to improve database accuracy by reviewing the database extract to identify the exceptions and discrepancies.	1/2/2024	Investigating
Preventative actions taken to ensure no further issues will occur	**Completion date**	
Scripting for exceptions reports with HDC will be reviewed to better identify these issues and resolve them. This exceptions report will be run routinely to identify and resolve these issues on a continuous basis.	1/11/2023	

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

82 items of load have no ICP recorded against them. 25 of these have Waka Kotahi as the light owner. These lights are expected to be being reconciled by Waka Kotahi, so I have excluded these from my analysis. Of the remaining 57 items of load all have a light install date and of these:

- 29 items of load have no lamp wattage recorded. Of these eight have no light description. The remaining 21 items of load have a light description. I have assumed a common light wattage of 14.5W to estimate the missing consumption of 1,796 kWh per annum.
- 28 items of load with wattages recorded but no ICP recorded will be resulting in an estimated under submission of 4,954 kWh per annum.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.2 With: Clause 11(2)(a) and (aa) of Schedule 15.3 From: 01-Aug-22 To: 03-Jul-23	57 items of load with no ICP associated resulting in an estimated under submission of 6,750 kWh additional lights identified in the field count. Potential impact: Low Actual impact: Low Audit history: None Controls: Moderate Breach risk rating: 2
Audit risk rating	**Rationale for audit risk rating**
Low	The controls are rated as moderate overall but there is room for improvement. The impact is assessed to be low based on the estimated missing submission volume.

Actions taken to resolve the issue	Completion date	Remedial action status
Genesis will work with HDC to identify and resolve these inaccuracies by removing the Waka Kotahi lights if appropriate, loading wattage and ensuring proper ICP recordings.	1/12/2023	Investigating
Preventative actions taken to ensure no further issues will occur	**Completion date**	
Scripting for exceptions reports with HDC will be reviewed to better identify these issues and resolve them. This exceptions report will be run routinely to identify and resolve these issues on a continuous basis	1/11/2023	

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

Code reference

Clause 11(2)(b) of Schedule 15.3

Code related audit information

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

Audit observation

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

Audit commentary

The database contains fields for the street address and also GPS coordinates. There are 155 records that do not have GPS coordinates. All have a displacement value recorded so they are locatable. Of these, 22 have no ICP recorded. I recommend that the missing GPS co-ordinates are populated and that this is a required field for all updates to RAMM.

Recommendation	Description	Audited party comment	Remedial action
Location of each item of load	HDC populate the GPS co-ordinates for the items of load where it is missing and ensure that this is populated in RAMM.	HDC hold GPS information against poles and will use this information to properly update the database.	Identified

However, in all cases the items of load can be located by the 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, 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

Fields exist in RAMM for lamp make and model. I analysed the database and found 65 blank records. 29 of these had no ICP number and the impact of these on reconciliation is detailed in **section 2.2**. The remaining 36 items of load are estimated to be resulting in an under submission of 2,998 kWh per annum based on the most common lamp wattage of 19.5W.

The accuracy of the light wattage and ballasts is discussed further 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-Aug-22 To: 03-Jul-23	36 items of load with no wattage recorded resulting in an estimated under submission of 2,998 kWh per annum based on the most common lamp wattage of 19.5W. Potential impact: Low Actual impact: Low Audit history: None Controls: Moderate Breach risk rating: 2
Audit risk rating	**Rationale for audit risk rating**
Low	The controls are rated as moderate overall but there is room for improvement. The impact is assessed to be low based on the estimated missing submission volume.

Actions taken to resolve the issue	Completion date	Remedial action status
Genesis will work with HDC to identify and resolve these inaccuracies by loading correct wattage against these items of load.	1/12/2023	Investigating
Preventative actions taken to ensure no further issues will occur	**Completion date**	
Scripting for exceptions reports with HDC will be reviewed to better identify these issues and resolve them. This exceptions report will be run routinely to identify and resolve these issues on a continuous basis	1/11/2023	

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 365 lights using the statistical sampling methodology.

Audit commentary

The field audit findings are detailed in the table below and show some discrepancies.

Street	Database count	Field count	Light count differences	Wattage recorded incorrectly	Comments
HAVELOCK NORTH LIBRARY & COMMUNITY CENTRE	8	8	+3	3	6x LED spotlights found in the field but recorded as 3x 70W HPS in the database
KUKU STREET	7	7	-	1	1 x 70W HPS found in the field but recorded as 19.5W LED in the database.
MONA STREET	3	4	+1		1 x 19.5W LED found in the field.
WARREN STREET NORTH CARPARK	2	-	-2		2x 150W HPS not found in the field. There are multiple lights present but some were on during the day, so these are likely to be metered and not connected to the streetlight circuit.
TOTARA STREET	5	5	-	4	4x ITALO1 STA 4.5-1M recorded as 13.5W but are 21W.
Grand Total	**7,668**	**7,888**	**6 (+4, -2)**	**8**	

The field audit found four additional lights. This is recorded as non-compliance below.

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

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.5 With: Clause 11(2A) of Schedule 15.3 From: 01-Aug-22 To: 03-Jul-23	Four additional lights identified in the field count. Potential impact: Low Actual impact: Low Audit history: Three times previously Controls: Moderate Breach risk rating: 2
Audit risk rating	**Rationale for audit risk rating**
Low	The controls are rated as moderate as processes in place to update the database are generally robust. The impact is assessed to be low based on small number of additional lights found in the field.

Actions taken to resolve the issue	Completion date	Remedial action status
HDC will investigate these asset locations to ensure they are properly recorded in the database if found to be belonging to HDC.	1/12/2023	Investigating
Preventative actions taken to ensure no further issues will occur	**Completion date**	
Genesis will rely on HDC to accurately maintain its database, with the strengthening of processes with it's field workers / contractors.	1/12/2023	

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

The database has a complete 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

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	Hastings District Council streetlights
Strata	The database contains items of load in the Hastings 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 five strata, as follows: • roads A-F, • roads G-K, • roads L-O, • roads P-Sta, and • roads Ste-Y.
Area units	I created a pivot table of the roads in each area, and I used a random number generator in a spreadsheet to select a total of 80 sub-units.
Total items of load	365 items of load were checked.

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

Audit commentary

Database accuracy based on the field audit

A field audit was conducted of a statistical sample of 365 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	104.3	Wattage from survey is higher than the database wattage by 4.3%
R_L	98.7	With a 95% level of confidence, it can be concluded that the error could be between -1.3% and +13%
R_H	113.0	

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 B (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 1.3% lower and 13% 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 2 kW higher than the database indicates.

There is a 95% level of confidence that the installed capacity is between 6 kW lower and 60 kW higher than the database.

In absolute terms, total annual consumption is estimated to be 85,600 kWh higher than the DUML database indicates.

There is a 95% level of confidence that the annual consumption is between 26,700 kWh lower to 257,900 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 %

Lamp description and capacity accuracy

The database was analysed and found:

- as detailed in **section 2.4**, 36 items of load with no wattage recorded are estimated to be resulting in an under submission of 2,998 kWh per annum based on the most common lamp wattage of 19.5W,
- 2,075 items of load where the light description details were insufficient to confirm the correct wattage had been applied so I recommend that the light descriptions are reviewed to ensure that the wattage can be confirmed as correct.
- analysis found a small handful of incorrect ballasts applied:

Light type	Database ballast	Expected ballast	Quantity	Total difference	Annualised kWh impact
23W Fluro Compact	0	2.6W	2	5.2	+22.2
23W Fluro Compact	9	2.6	8	-48.8	-196.5
250W Mercury Vapour	0	28	2	56	+239.2
Overall impact					+64.9

The overs and unders balance each other out so the impact on reconciliation is minor and has no material impact.

Recommendation	Description	Audited party comment	Remedial action
Database accuracy	Review LED light descriptions to ensure that the wattage can be confirmed as correctly applied.	HDC will review these descriptions to ensure all information is properly recorded.	Investigating

ICP allocation

As detailed in **section 2.2**, 57 items of load all have a light install date and of these:

- 29 items of load have no lamp wattage recorded; of these eight have no light description and the remaining 21 items of load have a light description - I have assumed a common light wattage of 14.5W to estimate the missing consumption of 1,796 kWh per annum.
- 28 items of load with wattages recorded but no ICP recorded will be resulting in an estimated under submission of 4,954 kWh per annum.

This is recorded as non-compliance below and in **sections 2.1, 2.2 a**nd **3.2**.

Waka Kotahi Lights

The Waka Kotahi lights are no longer part of the Hastings DC streetlight database, but I identified 98 items of load where the light owner is recorded as "Transit New Zealand". 28 if these lights have no ICP recorded against them. A HDC ICP is recorded against 72 of these items of load. These are excluded from the monthly wattage report so there is no impact on reconciliation, but I recommend that these are removed from the HDC database.

Recommendation	Description	Audited party comment	Remedial action
Database accuracy	Remove Waka Kotahi items of load from the HDC database.	HDC will review these items of load to ensure proper database management.	Investigating

Change Management

The processes were reviewed for new lamp connections and the tracking of load changes due to faults and maintenance.

Streetlights

All fault and maintenance work is conducted by Pope Electrical through "RAMM Contractor" and once each job is completed the database is updated via field PDAs. There is an invoice checking process conducted by HDC which helps to ensure database accuracy. Lamp outages are predominately notified to HDC by residents from which work requests are made to Pope Electrical.

Hastings DC has implemented a CMS system. This includes fault reporting so that future lighting faults will be reported by the CMS system.

When lighting in new subdivisions is connected, "as built" plans are supplied to HDC and then Pope Electrical checks the lights in the field prior to populating the database.

Parks and Amenity lighting

The updating of these changes into RAMM is not well mapped. The field audit identified changes made in the field that have not been updated in RAMM. I recommend that this process is reviewed.

Recommendation	Description	Audited party comment	Remedial action
Database accuracy	Review change management process for Parks and Amenity lighting to ensure changes made in the field are updated in the database.	HDC will review its processes to ensure that Park and Amenity lighting is properly recorded in the database by ensuring all data and information from staff in the field is transferred to the database.	Investigating

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 3.1 With: Clause 15.2 and 15.37B(b) From: 01-May-21 To: 31-Jul-22	Database assessed as having poor precision therefore the potential error is greater than 5.0% resulting in an estimated under submission of 85,600 kWh per annum. 36 items of load with no wattage recorded resulting in an under submission of 2,998 kWh per annum based on the most common lamp wattage of 19.5W. 12 items of load with the incorrect ballast applied resulting in a very minor under submission of 64.9kWh per annum. 57 items of load with no ICP associated resulting in an estimated under submission of 6,750 kWh additional lights identified in the field count. Potential impact: High Actual impact: High Audit history: Multiple times Controls: Moderate Breach risk rating: 6
Audit risk rating	**Rationale for audit risk rating**
High	The controls are rated as moderate overall but there is room for improvement. 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 work with HDC to improve database accuracy by reviewing the database extract to identify the exceptions and discrepancies.	1/2/2024	Investigating
Preventative actions taken to ensure no further issues will occur	**Completion date**	
Scripting for exceptions reports with HDC will be reviewed to better identify these issues and resolve them. This exceptions report will be run routinely to identify and resolve these issues on a continuous basis	1/11/2023	

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.

I checked the submission calculation provided by Genesis and found the calculation was correct from the information provided by HDC. I checked this against the database extract provided and found light count and volume difference between the monthly report provided to Genesis for all but one ICP:

ICP	Genesis light fittings	HDC database extract light fittings	Net light count difference	Calculated kWh volume difference for May 2023
0000939902HBFF4	2,675	2,762	87	3,050
0000939904HBE7B	90	110	20	959
0000045104HB052	4,527	4,564	37	2,826
0000045107HBC92	74	79	5	236
0000045105HBC17	57	54	-3	-26
Total			146	7,046

This was discussed and found the differences could be related to:

- the Waka Kotahi lights are being reconciled by Waka Kotahi but 56 of these are still recorded against HDC ICPs and are being manually excluded from the monthly report, which is discussed further in **section 3.1**, and
- there were 56 items of load with no ICP recorded in the extract provided but the ICP may have been present in the database extract provided to Genesis.

This could be resulting in incorrect submissions. I recommend in **section 2.1**, that the differences are reviewed.

The potential impact due to these database discrepancies is detailed below.

Genesis advised that ICP 0000939902HBFF4 was submitted under the RPS profile as well as under the NST profile resulting in an over submission of 775 kWh due to human error. This will be corrected in the R3 revision.

As noted in the last audit, Hastings DC has implemented a CMS system. This will interface with RAMM. 60% of the lights on and off times are controlled by the CMS. The on and off times are pre-programmed based on sunset and sunrise times. This is likely to vary slightly from the Unison controlled ripple relays. Dimming is planned for the future. HDC have identified some data issues that are in the process of being resolved before the CMS system can be used to derive streetlight volumes. Once this is resolved, Genesis will work with HDC to progress a profile before dimming is deployed. The inaccurate on and off times are recorded as non-compliance.

As detailed in **section 3.1**, in absolute terms, total annual consumption is estimated to be 85,600 kWh higher than the DUML database indicates. This is outside the allowable +/- 5% variance threshold and is recorded as non-compliance below.

Analysis of the database identified some inaccuracies:

Findings	**Estimated impact on submission per annum** **-= under submission** **+=over submission**
36 items of load with no wattage recorded	-2,998
12 items of load with the incorrect ballast	-64.9
57 items of load with no ICP associated	-6,750

These discrepancies are recorded as non-compliance below.

Submission calculations take into account changes made at a daily level.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 3.2 With: Clause 15.2 and 15.37B(c) From: 01-Aug-22 To: 03-Jul-23	Database assessed as having poor precision therefore the potential error is greater than 5.0% resulting in an estimated under submission of 85,600 kWh per annum. 36 items of load with no wattage recorded resulting in an under submission of 2,998 kWh per annum based on the most common lamp wattage of 19.5W. 12 items of load with the incorrect ballast applied resulting in a very minor under submission of 64.9kWh per annum. 57 items of load with no ICP associated resulting in an estimated under submission of 6,750 kWh additional lights identified in the field count. Inaccurate on and off times as the logger times will vary slightly from the CMS on and off times. Potential impact: High Actual impact: High Audit history: Multiple times Controls: Moderate Breach risk rating: 6
Audit risk rating	**Rationale for audit risk rating**
High	The controls are rated as moderate overall but there is room for improvement. 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 work with HDC to improve database accuracy by reviewing the database extract to identify the exceptions and discrepancies.	1/2/2024	Investigating
Preventative actions taken to ensure no further issues will occur	**Completion date**	
Scripting for exceptions reports with HDC will be reviewed to better identify these issues and resolve them. This exceptions report will be run routinely to identify and resolve these issues on a continuous basis	1/11/2023	

CONCLUSION

The database is remotely hosted by thinkproject New Zealand Ltd. For streetlights, the database population, field work and asset data capture are conducted by Pope Electrical. Database management is undertaken by Beca. Parks and Amenity lights are also recorded in the database. Changes made in the field are expected to be advised to the Transport team, but this process is not working as expected as was evident with field audit discrepancies and I recommend that this process is reviewed.

As recorded in the last audit, HDC has implemented a CMS system. This will interface with RAMM but is currently used to turn the street lights on and off and report faults. 60% of the lights managed this way. The on and off times are pre-programmed based on sunset and sunrise times. This is likely to vary slightly from the Unison controlled ripple relays which is what Genesis are currently calculating the burn hours from. HDC have identified some data issues that are in the process of being resolved before the CMS system can be used to derive streetlight volumes. Once this is resolved, Genesis will work with HDC to progress a profile before dimming is deployed.

Analysis of the database found a small number of lights with:

- no ICP,
- no lamp wattage, and
- Waka Kotahi lights with a HDC ICP assigned.

The analysis has been passed to Genesis to work with HDC to resolve. It appears that that the monthly report is being manipulated before being sent to Genesis as the Waka Kotahi lights are being manually removed and I have recommended that the data be corrected so that the monthly extract doesn't require manipulation before being sent.

The database accuracy has declined since the last audit. I believe this is largely due to the errors found with the Parks and Amenity lighting sampled. Database accuracy is described as follows:

Result	Percentage	Comments
The point estimate of R	104.3	Wattage from survey is higher than the database wattage by 4.3%
R_L	98.7	With a 95% level of confidence, it can be concluded that the error could be between -1.3% and +13%
R_H	113.0	

In absolute terms, total annual consumption is estimated to be 85,600 kWh higher than the DUML database indicates.

There is a 95% level of confidence that the annual consumption is between 26,700 kWh lower to 257,900 kWh p.a. higher than the database indicates.

The audit found six non-compliances and five recommendations are made. The future risk rating of 24 indicates that the next audit be completed in three months. The decline is compliance is due to the data discrepancies found but affects a relatively small number of items of load. Therefore, I recommend that the next audit period be in nine months. This should allow sufficient time for Genesis to work with HDC to:

- correct the data discrepancies and review processes to ensure data entered is accurate,
- review the change management processes for the Parks and Amenity lighting, and
- progress getting the CMS profile in place.

PARTICIPANT RESPONSE

The previous audit in August of 2022 found that ''In absolute terms, total annual consumption is estimated to be 24,900 kWh higher than the DUML database indicates.'' The same estimation logic was used to derive the finding this year that ''total annual consumption is estimated to be 85,600 kWh higher than the DUML database indicated.''

This implies that the database has lost accuracy by 60,700 kWh in the past 12 months, based on an estimate. Hastings District Council submit that the changes made to the database and installation of assets in the field during the past year could not equate to this large of an increase in database discrepancies.

Due to the significant weather event, Cyclone Gabrielle in early 2023 the Hastings DC will focus much of its attention and budget in the coming years to rebuilding the district. This will have an effect on the timeliness of the remedial actions found in this audit.

Due to this, Genesis submits on behalf of Hastings DC that the following audit should take place in 12 months to ensure remedial actions have been completed and actionable change can be assessed in the following audit.