

ELECTRICITY INDUSTRY PARTICIPATION CODE
DISTRIBUTED UNMETERED LOAD AUDIT REPORT



For

HUTT CITY COUNCIL
AND
GENESIS ENERGY LIMITED

Prepared by: Tara Gannon

Date audit commenced: 23 July 2023

Date audit report completed: 8 August 2023

Audit report due date: 20 September 2023

TABLE OF CONTENTS

Executive summary	3
Audit summary	5
Non-compliances	5
Recommendations	7
Issues	8
1. Administrative.....	9
1.1. Exemptions from Obligations to Comply with Code	9
1.2. Structure of Organisation.....	9
1.3. Persons involved in this audit.....	10
1.4. Hardware and Software	10
1.5. Breaches or Breach Allegations.....	10
1.6. ICP Data	10
1.7. Authorisation Received	11
1.8. Scope of Audit	11
1.9. Summary of previous audit	12
1.10. Distributed unmetered load audits (Clause 16A.26 and 17.295F).....	15
2. DUML database requirements.....	16
2.1. Deriving submission information (Clause 11(1) of Schedule 15.3)	16
2.2. ICP identifier and items of load (Clause 11(2)(a) and (aa) of Schedule 15.3)	18
2.3. Location of each item of load (Clause 11(2)(b) of Schedule 15.3)	19
2.4. Description and capacity of load (Clause 11(2)(c) and (d) of Schedule 15.3)	19
2.5. All load recorded in database (Clause 11(2A) of Schedule 15.3)	22
2.6. Tracking of load changes (Clause 11(3) of Schedule 15.3).....	25
2.7. Audit trail (Clause 11(4) of Schedule 15.3).....	25
3. Accuracy of DUML database	26
3.1. Database accuracy (Clause 15.2 and 15.37B(b))	26
3.2. Volume information accuracy (Clause 15.2 and 15.37B(c))	30
Conclusion	34
Participant response	34
4. Appendix	35
4.1. Light models missing from the wattage table	35
4.2. Unexpected zero gear wattages in the wattage table	35
4.3. Unexpected non-zero gear wattages in the wattage table.....	36

EXECUTIVE SUMMARY

This audit of the **Hutt City Council (HCC)** DUML database and processes was conducted at the request of **Genesis Energy Limited (Genesis)** in accordance with clause 15.37B. The purpose of this audit is to verify that the volume information is being calculated accurately, and that profiles have been correctly applied.

The audit was conducted in accordance with the audit guidelines for DUML audits version 1.1. The scope of the audit encompasses the collection, security, and accuracy of the data, including the preparation of submission information.

Streetlight information is recorded in an ArcGIS database managed by HCC. A summarised extract from this database is provided to Genesis monthly, and used to determine the wattage for their submission calculations. Genesis settles the DUML load as NHH using the CST profile, and on hours are determined from data logger information.

The ArcGIS database contains one record per pole, with six text string light model fields to record each light model connected to the pole. There are no numerical fields in the database to record the lamp wattage, gear wattage, or total wattage. Wattage values are held in a separate wattage table. An excel template is used to aggregate the database information by light model and ICP, and to look up the wattage values to determine the total wattage to multiply by the number of lights. This aggregated data is used to determine the snapshot of the wattage for submission. As described in previous audits, there are some issues with the completeness and accuracy of the ArcGIS database information and aggregated information produced using the excel template, which are estimated to result in under submission of over 100,000 kWh per annum.

There is a separate RAMM database and HCC intends to migrate from ArcGIS to RAMM for streetlight data management. The project remains in the planning stage. The streetlight data in RAMM has not been updated since 2016; current streetlight data will need to be validated and migrated to RAMM before the data can be used for submission. In the meantime, HCC intends to investigate and correct the potentially inaccurate database records found during this audit, and the excel template issues.

New connection, fault and maintenance work is largely completed by Fulton Hogan, or their subcontractor City Electricians. Commercial Signals are responsible for festive lights, outage patrols, some complex work, and confirming new streetlight connections match the "as-builts". Fulton Hogan and Commercial Signals have access to ArcGIS and update the database directly.

A field audit was undertaken of a statistical sample of 401 items of load on 23 to 25 July 2023. I found five lights recorded in the database were not present in the street, and two lights on the street that were not present in the database. 44 (11%) of the lights did not match the description recorded in the database. Despite this, because the wattage differences were relatively small, the best available estimate based on the field audit indicates that the database is accurate within $\pm 5.0\%$.

The field audit findings indicates the database update process is not consistently working as expected. HCC have found missed updates through the independent audit of the whole database which they have initiated, and spot checks of new connections and changes. Missing new connection updates appear to be most common where a developer's electrician has completed the connection. In addition, some private lights which should have their own ICP have been recorded against HCC DUML ICPs. This is because records could only initially be saved in the ArcGIS if they were allocated to one of the four HCC DUML ICPs, and the user needed to re-access the record to modify the ICP number and re-save. ArcGIS has now been updated to allow users to apply other ICPs when the record is created.

HCC is continuing their database validation, and are cleansing information to ensure consistent addressing and owner details are applied. As part of the validation they are seeking information from Wellington Electricity and consents for new connections in the past three years which will be validated against the database.

Conclusion

The audit found five non-compliances and four recommendations were made. The future risk rating of 39 indicates that the next audit be completed in three months. HCC intends to investigate and correct data inaccuracies in the ArcGIS and Excel template in the short term, and plan to migrate RAMM to manage streetlight information and produce wattage reports for submission. I recommend that the next audit is completed in six months on 20 March 2024 to allow time for data cleansing and the migration to RAMM to be completed before the next audit.

The matters raised are detailed in the table below:

AUDIT SUMMARY

NON-COMPLIANCES

Subject	Section	Clause	Non-Compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
Deriving submission information	2.1	11(1) of Schedule 15.3	<p>LED light descriptions do not contain lamp make and model so correct wattage cannot be verified.</p> <p>398 of the 14,126 poles in the database did not have any light model information populated in any of the six fields resulting in potential under submission of 47,596 kWh p.a.</p> <p>Light models for 576 items of load were missing from the wattage table which is used to populate the wattages in the aggregated database extract resulting in potential under submission of 54,732 kWh p.a.</p> <p>Missing or unexpected zero gear wattages were recorded on the table of wattages for 161 items of load resulting in potential under submission of 8,020.9 kWh p.a.</p> <p>Unexpected non-zero gear wattages were recorded on the table of wattages for 341 items of load resulting in potential over submission of 19,877.2 kWh p.a.</p> <p>The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot. Change dates may not reflect the date the change is made and reflect the latest change for the pole rather than the light where more than one light is connected.</p>	Weak	High	9	Identified
Description and capacity of load	2.4	11(2)(c) and (d) of Schedule 15.3	<p>398 of the 14,126 poles in the database did not have any light model information populated in any of the six fields resulting in potential under submission of 47,596 kWh p.a.</p> <p>Light models for 576 items of load were missing from the wattage table which is used to populate the wattages in the summary database extract resulting in potential under submission of 54,732 kWh p.a.</p> <p>Missing or unexpected zero gear wattages were recorded on the table of wattages for 161 items of load</p>	Weak	High	9	Identified

Subject	Section	Clause	Non-Compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
			resulting in potential under submission of 8,020.9 kWh p.a.				
All load recorded in database	2.5	11(2A) of Schedule 15.3	Two additional lights found in the field.	Weak	Low	3	Identified
Database accuracy	3.1	15.2 and 15.37B(b)	<p>LED light descriptions do not contain lamp make and model so correct wattage cannot be verified.</p> <p>398 of the 14,126 poles in the database did not have any light model information populated in any of the six fields resulting in potential under submission of 47,596 kWh p.a.</p> <p>Light models for 576 items of load were missing from the wattage table which is used to populate the wattages in the summary database extract resulting in potential under submission of 54,732 kWh p.a.</p> <p>Missing or unexpected zero gear wattages were recorded on the table of wattages for 161 items of load resulting in potential under submission of 8,020.9 kWh p.a.</p> <p>Unexpected non-zero gear wattages were recorded on the table of wattages for 341 items of load resulting in potential over submission of 19,877.2 kWh p.a.</p> <p>The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot. Change dates may not reflect the date the change is made and reflect the latest change for the pole rather than the light where more than one light is connected.</p>	Weak	High	9	Identified
Volume information accuracy	3.2	15.2 and 15.37B(c)	<p>LED light descriptions do not contain lamp make and model so correct wattage cannot be verified.</p> <p>398 of the 14,126 poles in the database did not have any light model information populated in any of the six fields resulting in potential under submission of 47,596 kWh p.a.</p> <p>Light models for 576 items of load were missing from the wattage table which is used to populate the wattages in the aggregated database</p>	Weak	High	9	Identified

Subject	Section	Clause	Non-Compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
			<p>extract resulting in potential under submission of 54,732 kWh p.a.</p> <p>Missing or unexpected zero gear wattages were recorded on the table of wattages for 161 items of load resulting in potential under submission of 8,020.9 kWh p.a.</p> <p>Unexpected non-zero gear wattages were recorded on the table of wattages for 341 items of load resulting in potential over submission of 19,877.2 kWh p.a.</p> <p>The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot. Change dates may not reflect the date the change is made and reflect the latest change for the pole rather than the light where more than one light is connected.</p>				
Future Risk Rating						39	

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	Audited party comment
Check and update poles with no light model information recorded	2.4	Check the 398 poles in the database where no light model information is recorded to determine whether any lights are connected and update the database accordingly.	These light poles will be checked, also checking the snapshot is sent to Genesis monthly and this is accurately pulled from the database.
Check and update light models missing from the wattage table	2.4	Add the missing light models to the wattage table to ensure that a look up wattage value is found for each light model type when the data is aggregated in the excel template. The affected models are listed in appendix 4.1 .	Additional field added for numeric field value of the wattage, and this will be checked against the model information.
Check and update unexpected gear wattages in the wattage table	2.4	Check and update the missing and unexpected gear wattages in the wattage table. The affected models are listed in appendix 4.2 and 4.3 .	The missing and unexpected gear wattages will be investigated and corrected as part of the data cleanse before migrating to RAMM.
Review the excel template calculations	2.4	Check and update the excel template calculations to ensure that all lights are correctly captured, with correct wattages applied.	This is currently being assessed as part of the data cleanse in preparation for the move to RAMM.

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

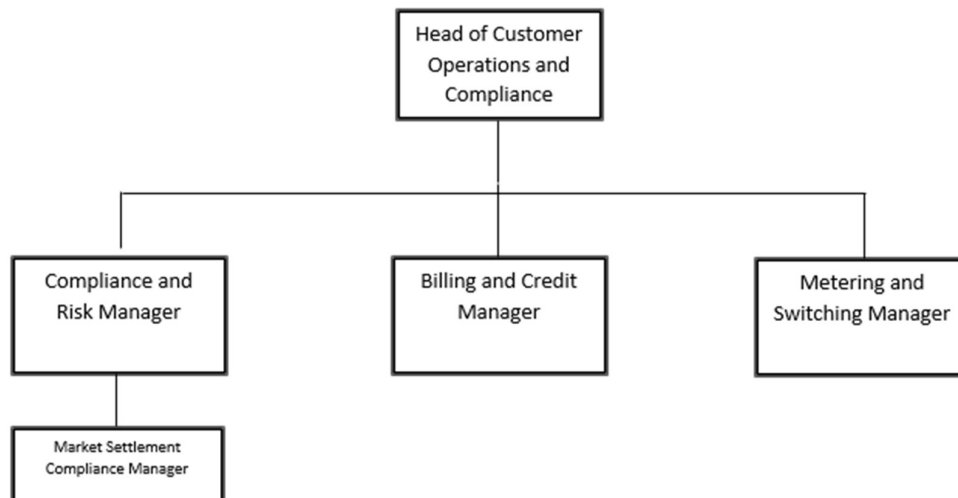
The Electricity Authority's website was reviewed to identify any exemptions relevant to the scope of this audit.

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

Auditors:

Name	Title	Company
Tara Gannon	Auditor	Provera

Other personnel assisting in this audit were:

Name	Title	Company
Andrew Rowe	Transport Engineer	Hutt City Council
Murray Thessman	Contracts Officer	Hutt City Council
Shantelle Comer	Customer Operations Data and Systems Specialist	Genesis Energy
Johan van Staden	Risk & Compliance Specialist	Genesis Energy

1.4. Hardware and Software

ArcGIS

HCC's ArcGIS is used to record streetlight information. The database is backed up, and access is secure by way of password protection.

Genesis Energy Systems

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	Participant code	Profile	Number of items of load	Database wattage (watts)
0001255305UNA9F	MASTER ICP HCC STREETLIGHT MLG0111	MLG0111	GENE	CST	2,803	217,422.5
0001256863UN50E	MASTER ICP HCC STREETLIGHT MLG0331	MLG0331	GENE	CST	5,089	353,421
0001256864UN8C4	MASTER ICP HCC STREETLIGHT GFD0331	GFD0331	GENE	CST	5,084	394,397

ICP Number	Description	NSP	Participant code	Profile	Number of items of load	Database wattage (watts)
0001256868UNBDA	MASTER ICP HCC STREETLIGHT HAY0111	HAY0111	GENE	CST	1,605	96,288
Total					14,581	1,061,528.5

1.7. Authorisation Received

All information was provided directly by Genesis or HCC.

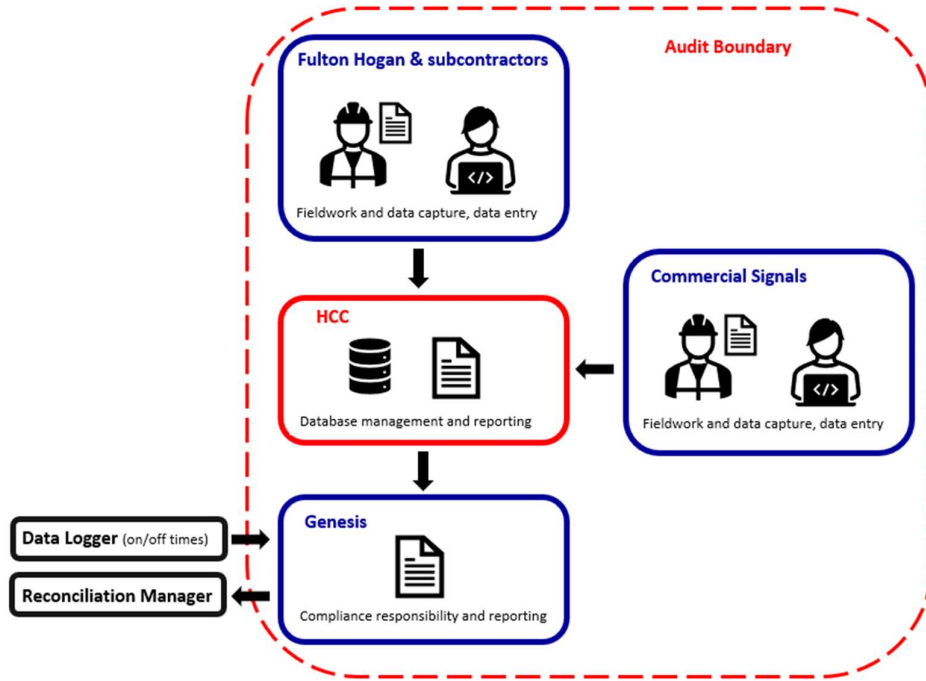
1.8. Scope of Audit

This audit of the HCC DUMML 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 DUMML audits version 1.1.

Streetlight information is recorded in an ArcGIS database managed by HCC. A summarised extract from this database is provided to Genesis monthly, and used to determine the wattage for their submission calculations. Genesis settles the DUMML load as NHH using the CST profile, and on hours are determined from data logger information.

New connection, fault and maintenance work is largely completed by Fulton Hogan, or their subcontractor City Electricians. Commercial Signals are responsible for festive lights, outage patrols, some complex work, and confirming new streetlight connections match the “as-builts”. Fulton Hogan and Commercial Signals have access to ArcGIS and update the database directly.

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 a statistical sample of 401 items of load on 23 to 25 July 2023.

1.9. Summary of previous audit

The previous audit of this database was undertaken by Bernie Cross of Veritek Limited in March 2023. The summary table below shows the statuses of the non-compliances and recommendations raised in the previous audit. Further comment is made in the relevant sections of this report.

Table of Non-compliance

Subject	Section	Clause	Non-compliance	Status
Deriving submission information	2.1	11(1) of Schedule 15.3	<p>The database is not accurate within $\pm 5\%$. There is a 95% level of confidence that the annual consumption is between 513,000 kwh p.a. lower to 445,100 kWh p.a. higher than the database indicates.</p> <p>The power summary monthly report provided to Genesis Energy was missing mappings for 15 lamp models resulting in 577 lights being excluded from submission as these lights were not found in the wattage look up resulting in an under submission of 56,683 kWh p.a.</p> <p>LED light descriptions do not contain lamp make and model so correct wattage cannot be verified.</p> <p>Where more than one light model field was populated, the lamp, gear and total wattage in most cases reflected the values for only one of the recorded light models and in some cases were inconsistent with the expected values for any of the models.</p> <p>Where only one light model field was populated, the recorded lamp and gear wattage did not always reflect the expected wattage for all lights connected to the listed pole.</p>	<p>Cleared</p> <p>The non-compliances relating to database accuracy are still existing</p>

Subject	Section	Clause	Non-compliance	Status
			<p>85 items of load do not have information populated in the light model fields. 53 of these had some information populated in the "If Other Light Type Pls Specify" field, and I confirmed that 42 had a wattage consistent with that description. 35 had insufficient information to confirm the correct wattages, and eight had wattages inconsistent with the description.</p> <p>29 poles had a zero-value wattage value when a non-zero value was expected.</p> <p>There is not a clear process to communicate festive light wattages and on and off dates to Genesis. Under submission is expected as festive lights wattages were not included in the January 2023 database extract provided to Genesis.</p> <p>The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot. Change dates may not reflect the date the change is made and reflect the latest change for the pole rather than the light where more than one light is connected.</p>	Cleared
Description and capacity of load	2.4	11(2)(c) and (d) of Schedule 15.3	<p>LED make and model details are not recorded in the database.</p> <p>85 items of load do not have information populated in the light model fields, and 32 of these also have no information populated in the "If Other Light Type Pls Specify" field.</p> <p>29 poles had a zero-value wattage value when a non-zero value was expected.</p>	The non-compliances relating to database accuracy are still existing
All load recorded in database	2.5	11(2A) of Schedule 15.3	Three additional lights found in the field.	Still existing
Database accuracy	3.1	15.2 and 15.37B(b)	<p>The database is not accurate within $\pm 5\%$. There is a 95% level of confidence that the annual consumption is between 513,000 kWh p.a. lower to 445,100 kWh p.a. higher than the database indicates.</p> <p>The power summary monthly report provided to Genesis Energy was missing mappings for 15 lamp models resulting in 577 lights being excluded from submission as these lights were not found in the wattage look up resulting in an under submission of 56,683 kWh p.a.</p> <p>LED light descriptions do not contain lamp make and model so correct wattage cannot be verified.</p> <p>Where more than one light model field was populated, the lamp, gear and total wattage in most cases reflected the values for only one of the recorded light models and in some cases were inconsistent with the expected values for any of the models.</p> <p>Where only one light model field was populated, the recorded lamp and gear wattage did not always reflect the expected wattage.</p> <p>85 items of load do not have information populated in the light model fields. 53 of these had some information populated in the "If Other Light Type Pls Specify" field, and I</p>	Cleared The non-compliances relating to database accuracy are still existing

Subject	Section	Clause	Non-compliance	Status
			<p>confirmed that 42 had a wattage consistent with that description. 35 had insufficient information to confirm the correct wattages, and eight had wattages inconsistent with the description.</p> <p>29 poles had a zero-value wattage value when a non-zero value was expected.</p> <p>Change dates may not reflect the date the change is made and reflect the latest change for the pole rather than the light where more than one light is connected.</p> <p>There is not a clear process to communicate festive light wattages and on and off dates to Genesis. Under submission is expected as festive lights wattages were not included in the January 2023 database extract provided to Genesis.</p>	Cleared
Volume information accuracy	3.2	15.2 and 15.37B(c)	<p>The database is not accurate within $\pm 5\%$. There is a 95% level of confidence that the annual consumption is between 513,000 kWh p.a. lower to 445,100 kWh p.a. higher than the database indicates.</p> <p>The power summary monthly report provided to Genesis Energy was missing mappings for 15 lamp models resulting in 577 lights being excluded from submission as these lights were not found in the wattage look up resulting in an under submission of 56,683 kWh p.a.</p> <p>LED light descriptions do not contain lamp make and model so correct wattage cannot be verified.</p> <p>Where more than one light model field was populated, the lamp, gear and total wattage in most cases reflected the values for only one of the recorded light models and in some cases were inconsistent with the expected values for any of the models.</p> <p>Where only one light model field was populated, the recorded lamp and gear wattage did not always reflect the expected wattage.</p> <p>85 items of load do not have information populated in the light model fields. 53 of these had some information populated in the "If Other Light Type Pls Specify" field, and I confirmed that 42 had a wattage consistent with that description. 35 had insufficient information to confirm the correct wattages, and eight had wattages inconsistent with the description.</p> <p>29 poles had a zero-value wattage value when a non-zero value was expected.</p> <p>Change dates may not reflect the date the change is made and reflect the latest change for the pole rather than the light where more than one light is connected.</p> <p>There is not a clear process to communicate festive light wattages and on and off dates to Genesis. Under submission is expected as festive lights wattages were not included in the January 2023 database extract provided to Genesis.</p>	<p>Cleared</p> <p>The non-compliances relating to database accuracy are still existing</p> <p>Cleared</p>

Table of Recommendations

Subject	Section	Recommendation	Status
ICP identifier and items of load	2.2	Liaise with Wellington Electricity to create separate ICPs for any private lights prior to these being excluded from HCC DUML Database.	Adopted. Where new private lights are connected, developers are advised to arrange the connection with their own retailer and Wellington Electricity to ensure that an ICP number is created. Existing private lights will not be removed from the database unless the load is recorded against a non-DUML ICP.
DUML database for Properties UrbanPlus.	2.2	Create a separate DUML database and ICPs to reconcile this load.	Under investigation. These lights have been investigated and appear not to be connected to the streetlight circuit because they are on at times the streetlight circuit is off. HCC's Contracts Officer is working with the Properties UrbanPlus team to identify all the affected lights and determine whether new ICP numbers are required.
Review new connection process.	3.1	Genesis Energy and Hutt City Council to review the new connection/livening request process to ensure any private lights are not livened until a responsible party is identified for these lights.	Adopted. The connection process has now been reviewed and HCC will only advise Genesis of lights which are HCC's responsibility. Where new private lights are connected, developers are advised to arrange the connection with their own retailer and Wellington Electricity to ensure that an ICP number is created.
Festive Lights	3.1	Complete a full stocktake of installed festive lights and confirm processes to communicate festive light wattages and on and off dates to Genesis so that they can be included in submission data when connected.	In progress. The light wattages and number of lights per string have been checked. HCC plans to check these details against the database and make any corrections required.

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

Code reference

Clause 16A.26 and 17.295F

Code related audit information

Retailers must ensure that DUML database audits are completed:

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

Audit observation

Genesis have requested Provera to undertake this streetlight audit.

Audit commentary

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

Audit outcome

Compliant

2. DUMML 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:

- DUMML 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

Submission process

Genesis reconciles the DUMML load as NHH using the CST profile.

- Wattages are derived from a snapshot extract from the ArcGIS database, which is provided by HCC monthly.
- On and off times are derived from data logger information.

I reviewed the submission information for April 2023 and confirmed that the calculation was correct, with wattages based on database extract totals and on hours based on data logger information.

As recorded in previous audits, a monthly snapshot is not sufficient to calculate submission from. The code requires that submissions must account for when each item of load was physically installed or removed, and wash up volumes must account for historical corrections.

Database extract accuracy

The ArcGIS database contains one record per pole, with six text string light model fields to record each light model connected to the pole. There are no numerical fields in the database to record the lamp wattage, gear wattage, or total wattage. Wattage values are held in a separate wattage table. An excel template is used to aggregate the database information by light model and ICP, and to look up the wattage values to determine the total wattage to multiply by the number of lights. This aggregated data is used to determine the snapshot of the wattage for submission.

There are several issues with the accuracy of the raw database extract and aggregated extract:

Issue	Estimated volume information impact (annual kWh)
LED light descriptions do not contain lamp make and model so correct wattage cannot be verified.	Unknown impact
398 of the 14,126 poles in the database did not have any light model information populated in any of the six fields. 17 of these lights were selected as part of the random audit sample checked in the field. All had lights installed and the average wattage was 21.8W.	Under submission of 47,596 kWh p.a.

Issue	Estimated volume information impact (annual kWh)
Light models for 576 items of load were missing from the wattage table which is used to populate the wattages in the summary database extract (appendix 4.1).	Under submission of 54,732 kWh p.a.
Missing or unexpected zero gear wattages were recorded on the table of wattages for 161 items of load (appendix 4.2).	Under submission of 8,020.9 kWh p.a.
Unexpected non-zero gear wattages were recorded on the table of wattages for 341 items of load (appendix 4.3).	Over submission of 19,877.2 kWh p.a.

A field audit was undertaken of a statistical sample of 401 items of load on 23 to 25 July 2023. I found five lights recorded in the database were not present in the street, and two lights on the street that were not present in the database. 44 (11%) of the lights did not match the description recorded in the database. Despite this, because the wattage differences were relatively small, the best available estimate based on the field audit indicates that the database is accurate within $\pm 5.0\%$.

Created date, installed date, end date and last edited date are all consistently populated for each pole but the lamp installation date is only populated for a small number of lamps. The “edited date” is automatically populated with the date the change occurred, and the “last serviced date” indicates when the work was completed. Where there is a delay in entering a change, the change date may be incorrect. Because only one set of dates is recorded for each pole, where there is more than one light connected it may not reflect the correct dates for each light.

Submission accuracy

Although the database accuracy falls within the $\pm 5.0\%$ accuracy threshold based on the sample reviewed, the summarised database extract is not accurately aggregating the database information and consistently applying the correct wattages for all lights. The error relating to the inaccuracies listed in the table above is expected to have a high impact at over 100,000 kWh per annum.

The previous audit recorded that incorrect submission volumes were reported for November 2022, because the aggregated database extract provided by HCC contained errors such as excluded light models which did not map to a wattage on the wattage table, and incorrect gear wattages. No correction has been processed because the database extract accuracy issues are ongoing.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.1 With: Clause 11(1) of Schedule 15.3	LED light descriptions do not contain lamp make and model so correct wattage cannot be verified. 398 of the 14,126 poles in the database did not have any light model information populated in any of the six fields resulting in potential under submission of 47,596 kWh p.a. Light models for 576 items of load were missing from the wattage table which is used to populate the wattages in the aggregated database extract resulting in potential under submission of 54,732 kWh p.a. Missing or unexpected zero gear wattages were recorded on the table of wattages for 161 items of load resulting in potential under submission of 8,020.9 kWh p.a.

From: 01-Nov-22 To: 31-Jul-23	<p>Unexpected non-zero gear wattages were recorded on the table of wattages for 341 items of load resulting in potential over submission of 19,877.2 kWh p.a.</p> <p>The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot. Change dates may not reflect the date the change is made and reflect the latest change for the pole rather than the light where more than one light is connected.</p> <p>Potential impact: High</p> <p>Actual impact: High</p> <p>Audit history: Multiple times</p> <p>Controls: Weak</p> <p>Breach risk rating: 9</p>	
Audit risk rating	Rationale for audit risk rating	
High	The controls are rated as weak overall, due to the issues with the accuracy of the summarised database extract, missing light information, and missing wattages for some light models. The audit risk rating is high based on kWh variances identified.	
Actions taken to resolve the issue	Completion date	Remedial action status
The GIS database is being cleaned for migration to RAMM, discrepancies and exceptions are to be investigated where possible. This will be through field investigations and use of the database to cross reference and match up data.	1/12/2023	Identified
Preventative actions taken to ensure no further issues will occur	Completion date	
With the migration to RAMM, reporting on the database will be improved to identify, manage and clear inconsistencies and exceptions on a routine bases.	1/12/2023	

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 DUMML database must contain:

- each ICP identifier for which the retailer is responsible for the DUMML,
- 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

All items of load have a valid ICP number recorded. I re-checked the recommendations made in the previous audit:

Recommendation	Comment
A separate DUML database should be created for lights with an owner of "Properties UrbanPlus".	These lights have been investigated and appear not to be connected to the streetlight circuit because they are on at times the streetlight circuit is off. HCC's Contracts Officer is working with the Properties UrbanPlus team to identify all the affected lights and determine whether new ICP numbers are required.
HCC liaise with Wellington Electricity to create separate ICPs for any private lights prior to these being excluded from HCC DUML Database.	<p>HCC have adopted this recommendation. Where new private lights are connected, developers are advised to arrange the connection with their own retailer and Wellington Electricity to ensure that an ICP number is created. Existing private lights will not be removed from the database unless the load is recorded against a non-DUML ICP.</p> <p>Records could only be initially saved in the ArcGIS if they were allocated to one of the four HCC DUML ICPs. Where a light should have a different ICP, the user needed to re-access the record to modify the ICP number and re-save. In some cases, this resulted in private lights which should have their own ICP number being incorrectly recorded against DUML ICPs. ArcGIS has now been updated to allow users to apply other ICPs when the record is created.</p>

Audit outcome

Compliant

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

Code reference

Clause 11(2)(b) of Schedule 15.3

Code related audit information

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

Audit observation

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

Audit commentary

Global Positioning System (GPS) coordinates and location IDs are recorded for all items of load and users in the office and field can view these locations on a mapping system. The database also contains the nearest property address for 14,124 of the 14,126 poles in the database.

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 ArcGIS database contains one record per pole, with six text string light model fields to record each light model connected to the pole. There are no numerical fields in the database to record the lamp wattage, gear wattage, or total wattage. Wattage values are held in a separate wattage table. An excel template is used to aggregate the database information by light model and ICP, and to look up the wattage values to determine the total wattage to multiply by the number of lights. This aggregated data is used to determine the snapshot of the wattage for submission.

I reviewed the database extract for missing light models. 398 of the 14,126 poles in the database did not have any light model information populated in any of the six fields. 17 of these lights were selected as part of the random audit sample checked in the field. All had lights installed and the average wattage was 21.8W, indicating that there could be potential under submission of 11,144 W or 47,596 kWh per annum. HCC intends to investigate and update the records for these lights.

I compared the light model information in the database extract to the wattage table and found the following missing or invalid zero wattage information, in addition to the lights above with no models recorded:

- light models for 576 items of load were missing from the wattage table which is used to populate the wattages in the aggregated database extract, resulting in potential under submission of 12,814.9 or 54,732 kWh per annum (**appendix 4.1**), and
- unexpected zero gear wattages were recorded on the table of wattages for 161 items of load, resulting in potential under submission of 1,878 W or 8,020.9 kWh per annum (**appendix 4.2**).

These issues are expected to be resolved with the migration to RAMM, because wattages will be validated and recorded as a numeric field against each item of load.

LED light models are generally recorded with a light model of “LED XXXW – LED”, and no lamp make, or model is recorded. This makes it difficult to determine whether the correct wattage is being applied.

Four recommendations are made to improve the accuracy of light model and wattage information:

Recommendation	Description	Audited party comment	Remedial action
Check and update poles with no light model information recorded	Check the 398 poles in the database where no light model information is recorded to determine whether any lights are connected and update the database accordingly.	These light poles will be checked, also checking the snapshot is sent to Genesis monthly and this is accurately pulled from the database.	Investigating

Recommendation	Description	Audited party comment	Remedial action
Check and update light models missing from the wattage table	Add the missing light models to the wattage table to ensure that a look up wattage value is found for each light model type when the data is aggregated in the excel template. The affected models are listed in appendix 4.1 .	Additional field added for numeric field value of the wattage, and this will be checked against the model information.	Identified
Check and update unexpected gear wattages in the wattage table	Check and update the missing and unexpected gear wattages in the wattage table. The affected models are listed in appendix 4.2 and 4.3 .	The missing and unexpected gear wattages will be investigated and corrected as part of the data cleanse before migrating to RAMM.	Investigating
Review the excel template calculations	Check and update the Excel template calculations to ensure that all lights are correctly captured, with correct wattages applied.	This is currently being assessed as part of the data cleanse in preparation for the move to RAMM.	Investigating

The accuracy of the recorded wattages is discussed in **section 3.1**.

Audit outcome

Non-compliant

Non-compliance	Description
<p>Audit Ref: 2.4</p> <p>With: Clause 11(2)(c) and (d) of Schedule 15.3</p> <p>From: 30-May-23</p> <p>To: 30-May-23</p>	<p>398 of the 14,126 poles in the database did not have any light model information populated in any of the six fields resulting in potential under submission of 47,596 kWh p.a.</p> <p>Light models for 576 items of load were missing from the wattage table which is used to populate the wattages in the summary database extract resulting in potential under submission of 54,732 kWh p.a.</p> <p>Missing or unexpected zero gear wattages were recorded on the table of wattages for 161 items of load resulting in potential under submission of 8,020.9 kWh p.a.</p> <p>Potential impact: Unknown</p> <p>Actual impact: Medium</p> <p>Audit history: Multiple times</p> <p>Controls: Weak</p> <p>Breach risk rating: 9</p>
Audit risk rating	Rationale for audit risk rating
High	The controls are rated as weak overall, due to the issues with the accuracy of the summarised database extract (which adds the wattages), missing light information, and missing wattages for some light models. The audit risk rating is high based on kWh variances identified.

Actions taken to resolve the issue	Completion date	Remedial action status
The GIS database is being cleaned for migration to RAMM, discrepancies and exceptions are to be investigated where possible. This will be through field investigations and use of the database to cross reference and match up data.	1/12/2023	Identified
Preventative actions taken to ensure no further issues will occur	Completion date	
With the migration to RAMM, reporting on the database will be improved to identify, manage and clear inconsistencies and exceptions on a routine bases.	1/12/2023	

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 a statistical sample of 401 items of load on 23 to 25 July 2023. The sample was selected from three strata, as follows:

- 0001255305UNA9F and 0001256868UNBDA,
- 0001256863UN50E, and
- 0001256864UN8C4.

Audit commentary

The field audit discrepancies are detailed in the table below:

Street	Field count	Database count	Light count difference	Wattage recorded incorrectly	Comments
ATHLONE CRESCENT BOULCOTT	8	8	-	8	Seven L23 and one L22 were recorded as 50W SON.
BELL ROAD SOUTH GRACEFIELD	16	17	-1	-	One 150W SON asset 9401 was not present on the street.
BELL ROAD WAIWHETU	51	51	-	9	Three L22 lights (object IDs 3210, 3623 and 2734) were recorded in the database as LED 27W. One L22 light (object ID 3448) was recorded in the database as 50W SON.

Street	Field count	Database count	Light count difference	Wattage recorded incorrectly	Comments
					Two L22 lights between Waikare Ave and Riverside Dr were recorded in the database as LED 23W. One L27 light (object ID 4096) was recorded in the database as LED 22W. Two L22 lights at the corner of Meadows Ave were recorded in the database as LED 33W.
DAVIS GROVE WAINUIOMATA	9	9	-	3	Two L23 lights (object IDs 12004 and 12715) were recorded in the database as 50W SON. One L22 light (object ID 11972) was recorded in the database as LED 23W.
FARMER CRES TO PECK ST WALKWAY TAITA	4	4 Including 4 poles with no light models	-	4	Three L22 and one L23 lights were recorded in the database with no model or wattage.
FARMER CRESCENT TAITA	37	38	-1	1	One L27 (object ID 5223) is recorded as 50W SON in the database. One L22 (object ID 12227) was not present in the field.
FRASER STREET WAINUIOMATA	32	32	-1	-	One 50W SON (object ID 11980) was not present on the street.
HAY STREET WAINUIOMATA	15	15 Including 3 poles with no light models	-	3	Three L23 lights had no model or wattage recorded in the database (object IDs 11861-11863).
MATTHEWS ROAD WAINUIOMATA	4	4	-	1	One L23 (object ID 6532) was recorded in the database as LED 22W.
MOSSBURN GROVE KELSON	8	8	-	1	One L23 (object ID 10960) was recorded in the database as a 27W LED.
NATUSCH ROAD BELMONT	12	11	+1	-	One L27 LED outside no 27 which was missing from the database.
OXFORD TERRACE EPUNI	9	8	+1	1	One L33 at the corner of Oxford and Waterloo was missing from the database.

Street	Field count	Database count	Light count difference	Wattage recorded incorrectly	Comments
TAIERI CRESCENT KELSON	7	7	-	2	Two L22s (object IDs 10946 and 9558) were recorded in the database as 150W SON and 50W SON.
WITAKO STREET EPUNI	15	15 Including ten poles with no light models	-2	11	Two 100W SON were not present on the street (object IDs 1119 and 1225). One L23 light (object ID 1002) was recorded as 22W LED in the database. The area with ten unknown lights with no wattage had 11 lights which were seven bollard lights and four L23 LEDs.
Grand Total	399	401	7 (-5,+2)	44	

This clause relates to lights in the field that are not recorded in the database. The audit found two additional lights in the field. Database accuracy is discussed in **section 3.1**.

Audit outcome

Non-compliant

Non-compliance	Description		
Audit Ref: 2.5 With: Clause 11(2)(c) and (d) of Schedule 15.3 From: 30-May-23 To: 25-Jul-23	Two additional lights found in the field. Potential impact: Low Actual impact: Low Audit history: Twice Controls: Weak Breach risk rating: 3		
Audit risk rating	Rationale for audit risk rating		
Low	The controls are rated as weak as process to track changes is not capturing all changes made in the field. The impact is assessed to be low as there were only two additional lamps found in the sample checked, leading to potential under submission of 30 W or 256 kWh per annum.		
Actions taken to resolve the issue		Completion date	Remedial action status
Site investigations will take place at the locations listed above to ensure information is correct and then capture these in the database to improve accuracy.		1/10/2023	Identified

Preventative actions taken to ensure no further issues will occur	Completion date	
Move to RAMM is to take place once database cleanse is complete, changes in the database are being logged to ensure no data is lost. Once moved to RAMM field workers will have access to pocket RAMM to improve the flow of information from the field.	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 process for tracking of changes in the database was examined.

Audit commentary

The database functionality achieves compliance with the code. The change management process and the compliance of the database reporting provided to Genesis is detailed in **sections 3.1** and **3.2**.

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, which was viewed during the audit.

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 Genesis submissions are based on a monthly extract from the database. A database extract was provided for 30 May 2023, and 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	Hutt City Council Street Lights
Strata	<p>The database contains the HCC items of load for DUML ICPs in the Hutt region.</p> <p>The processes for the management of all HCC items of load are the same, but I decided to place the items of load into three similar sized strata based on ICP:</p> <ul style="list-style-type: none"> • 0001255305UNA9F and 0001256868UNBDA, • 0001256863UN50E, and • 0001256864UN8C4.
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 46 sub-units.
Total items of load	401 items of load were checked, making up approximately 2.1% of the load recorded in the database.

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 401 items of load. The “database auditing tool” was used to analyse the results, which are shown in the table below.

I found five lights recorded in the database were not present in the street, and two lights on the street that were not present in the database. 44 (11%) of the lights did not match the description recorded in the database. Despite this, because the wattage differences were relatively small, the best available estimate based on the field audit indicates that the database is accurate within $\pm 5.0\%$.

Result	Percentage	Comments
The point estimate of R	100.8	Wattage from survey is higher than the database wattage by 0.8%

Result	Percentage	Comments
R _L	96.6	With a 95% level of confidence, it can be concluded that the error could be between -3.4% and +5.0%
R _H	105.0	

- In absolute terms the installed capacity is estimated to be 9 kW higher than the database indicates.
- There is a 95% level of confidence that the installed capacity is between 36 kW lower to 53 kW higher than the database.
- In absolute terms, total annual consumption is estimated to be 37,200 kWh higher than the DUML database indicates.
- There is a 95% level of confidence that the annual consumption is between 153,400 kWh p.a. lower to 228,100 kWh p.a. higher than the database indicates.

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

Light description and capacity accuracy

The ArcGIS database contains one record per pole, with six text string light model fields to record each light model connected to the pole. There are no numerical fields in the database to record the lamp wattage, gear wattage, or total wattage. Wattage values are held in a separate wattage table. An excel template is used to aggregate the database information by light model and ICP, and to look up the wattage values to determine the total wattage to multiply by the number of lights. This aggregated data is used to determine the snapshot of the wattage for submission.

I reviewed the database extract for missing or invalid zero light models, and found 398 of the 14,126 poles in the database poles did not have any light model information populated in any of the six fields. 17 of these lights were selected as part of the random audit sample checked in the field. All had lights

installed and the average wattage was 21.8W, indicating that there could be potential under submission of 11,144 W or 47,596 kWh per annum. HCC intends to investigate and update the records for these lights.

I compared the light model information in the database extract to the wattage table and found the following exceptions:

- light models for 576 items of load were missing from the wattage table which is used to populate the wattages in the aggregated database extract, resulting in potential under submission of 12,814.9 or 54,732 kWh per annum (**appendix 4.1**),
- missing or unexpected zero gear wattages were recorded on the table of wattages for 161 items of load, resulting in potential under submission of 1,878 W or 8,020.9 kWh per annum (**appendix 4.2**), and
- unexpected non-zero gear wattages were recorded on the table of wattages for 341 items of load resulting in potential over submission of 4,654 W or 19,877.2 kWh per annum (**appendix 4.3**).

These issues are expected to be resolved with the migration to RAMM, because wattages will be validated and recorded as a numeric field against each item of load.

LED light models are generally recorded with a light model of “LED XXXW – LED”, and no lamp make, or model is recorded. This makes it difficult to determine whether the correct wattage is being applied.

Change management process findings

New connection, fault and maintenance work is largely completed by Fulton Hogan, or their subcontractor City Electricians. Commercial Signals are responsible for festive lights, outage patrols, some complex work, and confirming new streetlight connections match to the as-builts. Fulton Hogan and Commercial Signals have access to ArcGIS and update the database directly.

The new connection process was reviewed:

- a plan is prepared by the developer and approved by HCC,
- the installation is completed,
- the developer or their electrician provides information on the installations including records of inspection and certificates of compliance, and the database is updated,
- HCC completes a form and notifies Genesis that livening is required using the “as-built” information that has been checked in the field,
- Genesis requests livening from Wellington Electricity, and
- the database is updated.

The previous audit found that private lights could be added to livening requests issued by Genesis to Wellington Electricity although the lights will not be vested unless HCC takes responsibility for them at a future date. The connection process has now been reviewed and HCC will only advise Genesis of lights which are HCC’s responsibility. Where new private lights are connected, developers are advised to arrange the connection with their own retailer and Wellington Electricity to ensure that an ICP number is created.

The accuracy of the field audit indicates the database update process is not consistently working as expected. HCC have found missed updates through the independent audit of the whole database which they have initiated, and spot checks of new connections and changes. Missing new connection updates appear to be most common where a developer’s electrician has completed the connection. In addition, some private lights which should have their own ICP have been recorded against HCC DUMML ICPs. This is because records could only be initially saved in the ArcGIS if they were allocated to one of the four HCC DUMML ICPs, and the user needed to re-access the record to modify the ICP number and re-save. ArcGIS has now been updated to allow users to apply other ICPs when the record is created.

To: 25-Jul-23	Breach risk rating: 9		
Audit risk rating	Rationale for audit risk rating		
High	The controls are rated as weak overall, due to the issues with the accuracy of the summarised database extract, missing light information, and missing wattages for some light models. The audit risk rating is high based on kWh variances identified.		
Actions taken to resolve the issue		Completion date	Remedial action status
The GIS database is being cleaned for migration to RAMM, discrepancies and exceptions are to be investigated where possible. This will be through field investigations and use of the database to cross reference and match up data.		1/12/2023	Identified
Preventative actions taken to ensure no further issues will occur		Completion date	
With the migration to RAMM, reporting on the database will be improved to identify, manage and clear inconsistencies and exceptions on a routine bases.		1/12/2023	

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 on hours against the submitted figure to confirm accuracy.

Audit commentary

Submission process

Genesis reconciles the DUML load as NHH using the CST profile. The correct submission types and profiles are recorded on the registry.

- Wattages are derived from a snapshot extract from the ArcGIS database, which is provided by HCC monthly.
- On and off times are derived from data logger information.

I reviewed the submission information for April 2023 and confirmed that it the calculation was correct, with wattages based on database extract totals and on hours based on data logger information.

As recorded in previous audits, a monthly snapshot is not sufficient to calculate submission from. The code requires that submissions must account for when each item of load was physically installed or removed, and wash up volumes must account for historical corrections.

Database extract accuracy

The ArcGIS database contains one record per pole, with six text string light model fields to record each light model connected to the pole. There are no numerical fields in the database to record the lamp wattage, gear wattage, or total wattage. Wattage values are held in a separate wattage table. An excel template is used to aggregate the database information by light model and ICP, and to look up the wattage values to determine the total wattage to multiply by the number of lights. This aggregated data is used to determine the snapshot of the wattage for submission.

There are several issues with the accuracy of the raw database extract and aggregated extract:

Issue	Estimated volume information impact (annual kWh)
LED light descriptions do not contain lamp make and model so correct wattage cannot be verified.	Unknown impact
398 of the 14,126 poles in the database did not have any light model information populated in any of the six fields. 17 of these lights were selected as part of the random audit sample checked in the field. All had lights installed and the average wattage was 21.8W.	Under submission of 47,596 kWh p.a.
Light models for 576 items of load were missing from the wattage table which is used to populate the wattages in the summary database extract (appendix 4.1).	Under submission of 54,732 kWh p.a.
Missing or unexpected zero gear wattages were recorded on the table of wattages for 161 items of load (appendix 4.2).	Under submission of 8,020.9 kWh p.a.
Unexpected non-zero gear wattages were recorded on the table of wattages for 341 items of load (appendix 4.3).	Over submission of 19,877.2 kWh p.a.

A field audit was undertaken of a statistical sample of 401 items of load on 23 to 25 July 2023. I found five lights recorded in the database were not present in the street, and two lights on the street that were not present in the database. 44 (11%) of the lights did not match the description recorded in the database. Despite this, because the wattage differences were relatively small, the best available estimate based on the field audit indicates that the database is accurate within $\pm 5.0\%$.

Created date, installed date, end date and last edited date are all consistently populated for each pole but the lamp installation date is only populated for a small number of lamps. The “edited date” is automatically populated with the date the change occurred, and the “last serviced date” indicates when the work was completed. Where there is a delay in entering a change, the change date may be incorrect. Because only one set of dates is recorded for each pole, where there is more than one light connected it may not reflect the correct dates for each light.

Submission accuracy

Although the database accuracy falls within the $\pm 5.0\%$ accuracy threshold based on the sample reviewed, the summarised database extract is not accurately aggregating the database information and consistently applying the correct wattages for all lights. The error relating to the inaccuracies listed in the table above is expected to have a high impact at over 100,000 kWh per annum.

The previous audit recorded that incorrect submission volumes were reported for November 2022, because the aggregated database extract provided by HCC contained errors such as excluded light models which did not map to a wattage on the wattage table, and incorrect gear wattages. No correction has been processed because the database extract accuracy issues are ongoing.

Audit outcome

Non-compliant

Non-compliance	Description		
<p>Audit Ref: 3.2 With: Clause 15.2 and 15.37B(c) From: 01-Nov-22 To: 31-Jul-23</p>	<p>LED light descriptions do not contain lamp make and model so correct wattage cannot be verified.</p> <p>398 of the 14,126 poles in the database did not have any light model information populated in any of the six fields resulting in potential under submission of 47,596 kWh p.a.</p> <p>Light models for 576 items of load were missing from the wattage table which is used to populate the wattages in the aggregated database extract resulting in potential under submission of 54,732 kWh p.a.</p> <p>Missing or unexpected zero gear wattages were recorded on the table of wattages for 161 items of load resulting in potential under submission of 8,020.9 kWh p.a.</p> <p>Unexpected non-zero gear wattages were recorded on the table of wattages for 341 items of load resulting in potential over submission of 19,877.2 kWh p.a.</p> <p>The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot. Change dates may not reflect the date the change is made and reflect the latest change for the pole rather than the light where more than one light is connected.</p> <p>Potential impact: High Actual impact: High Audit history: Multiple times Controls: Weak Breach risk rating: 9</p>		
Audit risk rating	Rationale for audit risk rating		
<p>High</p>	<p>The controls are rated as weak overall, due to the issues with the accuracy of the summarised database extract, missing light information, and missing wattages for some light models. The audit risk rating is high based on kWh variances identified.</p>		
Actions taken to resolve the issue	Completion date	Remedial action status	
<p>The GIS database is being cleaned for migration to RAMM, discrepancies and exceptions are to be investigated where possible. This will be through field investigations and use of the database to cross reference and match up data.</p>	<p>1/12/2023</p>	<p>Identified</p>	

Preventative actions taken to ensure no further issues will occur	Completion date	
With the migration to RAMM, reporting on the database will be improved to identify, manage and clear inconsistencies and exceptions on a routine bases.	1/12/2023	

CONCLUSION

Streetlight information is recorded in an ArcGIS database managed by HCC. As described in previous audits, there are some issues with the completeness and accuracy of the ArcGIS database information and aggregated information produced using the excel template, which are estimated to result in under submission of over 100,000 kWh per annum.

There is a separate RAMM database and HCC intends to migrate from ArcGIS to RAMM for streetlight data management. The project remains in the planning stage. The streetlight data in RAMM has not been updated since 2016; current streetlight data will need to be validated and migrated to RAMM before the data can be used for submission. In the meantime, HCC intends to investigate and correct the potentially inaccurate database records found during this audit, and the excel template issues.

The field audit findings indicates the database update process is not consistently working as expected. HCC is continuing their database validation, and are cleansing information to ensure consistent addressing and owner details are applied.

The audit found five non-compliances and four recommendations were made. The future risk rating of 39 indicates that the next audit be completed in three months. HCC intends to investigate and correct data inaccuracies in the ArcGIS and Excel template in the short term, and plan to migrate RAMM to manage streetlight information and produce wattage reports for submission. I recommend that the next audit is completed in six months on 20 March 2024 to allow time for data cleansing and the migration to RAMM to be completed before the next audit.

PARTICIPANT RESPONSE

Hutt City Council has increased its attention of the street lighting database in the past few months and will continue to do so for months to come. The database is currently in the process of being moved to RAMM and this will take place before the end of the 2023 calendar year. Before this migration is to take place the current database is being cleansed, to identify and resolve all missing fields and where possible, investigate locations of interest in the field.

With the move to RAMM, field services will be more accurately captured with the use of pocket RAMM, ensuring future installations and replacements will be captured.

Due to the large amount of work that is needing to take place, Genesis and Hut CC request a period of 6 months until the next audit. This time is necessary to ensure the needed changes can be made to the database and that the migration to RAMM has taken place.

4. APPENDIX

4.1. Light models missing from the wattage table

Light models for 576 items of load were missing from the wattage table which is used to populate the wattages.

Light model	Expected lamp wattage	Expected total wattage	Quantity	Estimated wattage difference
Razo 23W LED	23	23	498	11454
LED 102W – LED	102	102	3	306
13W Wifi Sniffer	-	13	1	13
Other (Specify) - 17 Watt led Betacom	17	17	1	17
Other (Specify) - 36W LED	36	36	4	144
Other (Specify) - 6.3W pathway light	6.3	6.3	14	88.2
Other (Specify) - 78w LED	78	78	1	78
Other (Specify) - 9.5W LED	9.5	9.5	1	9.5
Other (Specify) - disconnected "unsafe"	0	0	2	0
Other (Specify) - LED 12W - LED	12	12	7	84
Other (Specify) - LED 16W - LED	16	16	19	304
Other (Specify) - LED 17W - LED	17	17	6	102
Other (Specify) - LED 21W - LED	21	21	2	42
Other (Specify) - LED 29W - LED	29	29	5	145
LED installed August 2020. Italo1 OF2 STA 4.3-1M/D	14.1-22	14.1-22	2	28.2
Unknown Wattage LED	Unknown	Unknown	7	Unknown
(blank)	Unknown	Unknown	3	Unknown
Total			576	12,814.9

*There is a “MISC - 13W Wifi Sniffer” on the summary sheet but the count is zero, so appears not to be matching to the 13W WIFI Sniffer record.

4.2. Unexpected zero gear wattages in the wattage table

Unexpected zero gear wattages were recorded on the table of wattages for 161 items of load.

Light model	Total – lamp wattage	Expected gear wattage	Quantity	Estimated wattage difference
18W FLURO	0	1.5	32	48
24W FLURO	0	2	6	12
COSMO - 45W	0	5	4	20
36W FLURO	0	10	29	290
COSMO - 140W	0	13	65	845
58W FLURO	0	14	2	28
COSMO - 315W	0	19	1	19
2x58W FLURO	0	28	22	616
Total			161	1,878

4.3. Unexpected non-zero gear wattages in the wattage table

Unexpected non-zero gear wattages were recorded on the table of wattages for 341 items of load.

Light model	Total – lamp wattage	Expected gear wattage	Quantity	Estimated wattage difference
100W LED	14	0	210	-2,940
LED 110W - LED	11	0	29	-319
LED 120W - LED	24	0	18	-432
LED 60W - LED	14	0	21	-294
LED 70W - LED	13	0	33	-429
COSMO - 60W	14	6	30	-240
Total			341	-4,654