ELECTRICITY INDUSTRY PARTICIPATION CODE
DISTRIBUTED UNMETERED LOAD AUDIT REPORT

VERITEK

For

HAMILTON CITY COUNCIL AND GENESIS ENERGY

Prepared by: Rebecca Elliot

Date audit commenced: 12 December 2018

Date audit report completed: 24 January 2019

Audit report due date: 01-Feb-19

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EXECUTIVE SUMMARY

This audit of the Hamilton City Council Unmetered Streetlights (**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 database is remotely hosted by RAMM Software Ltd and is managed by Infrastructure Alliance, on behalf of HCC, HCC being Genesis's customer. Infrastructure Alliance is a joint venture between HCC and Downer which provides infrastructure management across all of HCC assets. They provide reporting to Genesis on a monthly basis.

HCC have completed the standard lamp streetlight upgrade to LED. This was completed in late January. The next stage of the project is upgrading all of under verandah lighting and decorative lighting i.e. bespoke lamp heads where a standard LED lamp head cannot be installed is about to commence. The under verandah portion is expected to be completed by June 2019. The remaining decorative LED light replacement will commence in July 2019 and is expected to be completed by December 2019. The field audit was undertaken in December 2018 whilst the LED roll out was still in progress. Despite this the overall database accuracy has improved as expected and fell within the acceptable +/- 2.5%.

This audit found variances between the monthly wattage report and the database extract values. I examined this and found two main causes:

- NZTA lights are no longer included in the monthly wattage report as the long-standing arrangement between the council and NZTA to be recompensed for the power usage has ended, Genesis are working with NZTA to ensure that these lights are being recorded and paid for by NZTA directly
- 323 lights were incorrectly recorded as metered lights. HCC are fixing this and corrections will flow the revision process.

The incorrect ballasts have reduced greatly during the audit period and will continue to once the LED roll out is complete. HCC are working hard to provide accurate data for reconciliation.

The audit found five non-compliance issues and makes one recommendation. The future risk rating of 22 indicates that the next audit be completed in three months, but I recommend that the next audit be in 12 months as:

- HCC have already commenced addressing the majority of the issues found in this audit
- the LED rollout will be completed by this time
- the overall database accuracy falls well within the 5% accuracy rate that comes into effect 1st February.

The matters raised are detailed below:

AUDIT SUMMARY

NON-COMPLIANCES

Subject	Section	Clause	Non-Compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
Deriving submission information	2.1	11(1) of Schedule 15.3	1,021 items of load with the incorrect ICP or light owner allocated. 323 items of load excluded from the monthly wattage report due to being incorrectly recorded as metered lights resulting in an estimated annual under submission of 115,372 kWh. Analysis of the ballasts applied indicate an under submission of 28,825 kWh. Ballast is being averaged in the monthly wattage report to Genesis. Christmas light volumes included for the whole year and not the electrically connected period.	Moderate	High	6	Investigating
ICP Identifier	2.2	11(2)(a) & (aa) of Schedule 15.3	Five items of load with no ICP recorded.	Moderate	Low	2	Identified
All load recorded in the database	2.5	11(2A) of Schedule 15.3	Items of load are missing from the database.	Moderate	Low	2	Identified

Subject	Section	Clause	Non-Compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
Database accuracy	3.1	15.2 and 15.37B(b)	1,021 items of load with the incorrect ICP or light owner allocated. 323 items of load incorrectly recorded as a metered light but are unmetered. Analysis of the database identified 930 items of load with an invalid light description. Analysis of the ballasts applied indicate an under submission of 28,825 kWh per annum. Ballast is being averaged in the monthly wattage report to Genesis. Christmas light volumes included for the whole year and not the electrically connected period.	Moderate	High	6	Identified
Volume information accuracy	3.2	15.2 and 15.37B(c)	1,021 items of load with the incorrect ICP or light owner allocated. 323 items of load excluded from the monthly wattage report due to being incorrectly recorded as metered lights resulting in an estimated annual under submission of 115,372 kWh. Analysis of the ballasts applied indicate an under submission of 28,825 kWh. Ballast is being averaged in the monthly wattage report to Genesis. Christmas light volumes included for the whole year and not the electrically connected period.	Moderate	High	6	Identified

Subject	Section	Clause	Non-Compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
Future Risk Rating						22	

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

RECOMMENDATIONS

Subject	Section	Description	Action
Tracking of load change	2.6	Review electrical connection process to ensure new items of load are recorded in RAMM for the correct electrical connection date.	Investigating

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

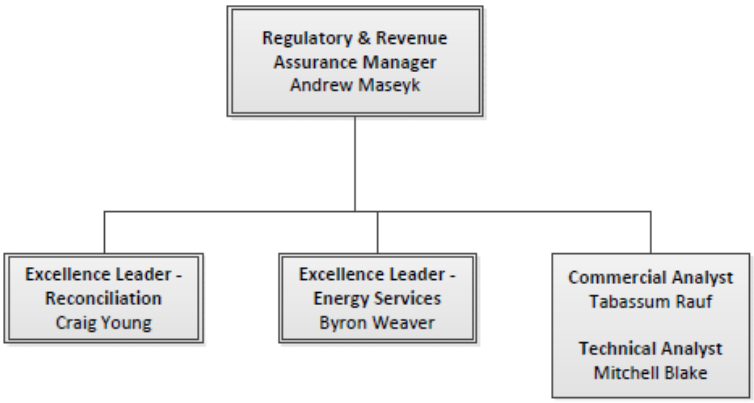
Section 11 of the Electricity Industry Act provides for the Electricity Authority to exempt any participant from compliance with all or any of the clauses.

Audit commentary

Genesis confirms that there are no exemptions in place relevant to the scope of this audit.

1.2. Structure of Organisation

Genesis provided the relevant organisational structure:



1.3. Persons involved in this audit

Auditor:

Rebecca Elliot

Veritek Limited

Electricity Authority Approved Auditor

Other personnel assisting in this audit were:

Name	Title	Company
Craig Young	Excellence Leader - Reconciliation	Genesis Energy
Grace Hawken	Technical Specialist - Reconciliations Team	Genesis Energy
Gerald Wen	Asset Information Manager	Infrastructure Alliance
Paul Griffiths	Project Manager	Infrastructure Alliance
Shaun Peterson	Operations Manager	Infrastructure Alliance
Sione Tu-akoi	Data Operator	Infrastructure Alliance
Martin Lynch	Energy Consultant	HCC

1.4. Hardware and Software

Section 1.8 records that Roading Asset and Maintenance Management database, commonly known as RAMM continues to be used the management of DUML. This is remotely hosted by RAMM Software Ltd. The specific module used for DUML is called "SLIMM" which stands for "Streetlighting Inventory Maintenance Management".

Infrastructure Alliance confirmed that the database back-up is in accordance with standard industry procedures. Access to the database is secure by way of password protection.

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)
0000011087WE366	HCC Streetlights, Hamilton	HAM0331	NST	17,622	1,348,522
0000025004WED40	HCC Under Veranda Streetlights, Hamilton	HAM0331	NST	1,415	113,106
TOTAL				19,037	1,461,628

1.7. Authorisation Received

All information was provided directly by Genesis or Infrastructure Alliance.

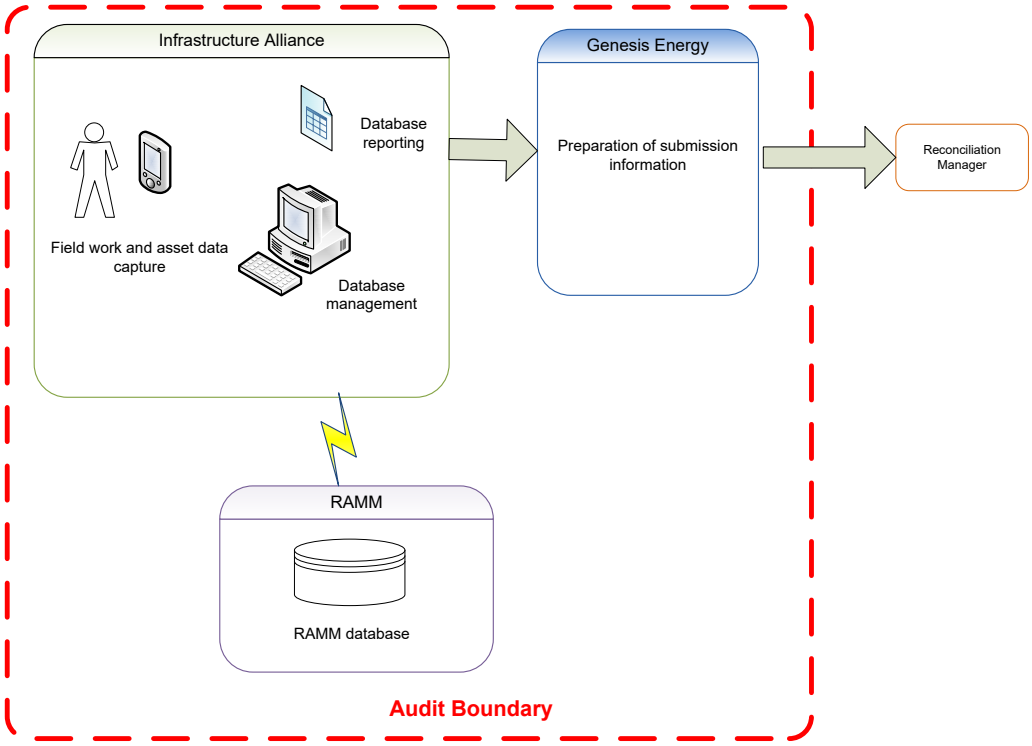
1.8. Scope of Audit

This audit of the Hamilton City Council Unmetered Streetlights (**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 database is remotely hosted by RAMM Software Ltd and is managed by Infrastructure Alliance, on behalf of HCC, HCC being Genesis's customer. Infrastructure Alliance is a joint venture between HCC and Downer which provides infrastructure management across all of HCC assets. They provide reporting to Genesis on a monthly basis.

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 the current arrangements for clarity.



The field audit was undertaken of a statistical sample of 515 items of load on 15 & 16 December 2018.

1.9. Summary of previous audit

Genesis provided a copy of the last audit report undertaken by Rebecca Elliot of Veritek Limited in March 2018. The current status of that audit's findings is detailed below:

Table of Non-Compliance

Subject	Section	Clause	Non-compliance	Status
Deriving submission information	2.1	11(1) of Schedule 15.3	The database accuracy is assessed to be 95.3% indicating an estimated over submission of 376,600 kWh per annum. Analysis of the ballasts applied indicate an under submission of 96,802.64 kWh.	Cleared Still existing
All load recorded in the database	2.5	11(2A) of Schedule 15.3	Items of load are missing from the database.	Still existing
Tracking of load change	2.6	11(3) of Schedule 15.3	Christmas lights not recorded in RAMM.	Now recorded as non-compliance in **section 3.1**
Database accuracy	3.1	15.2 and 15.37B(b)	The database accuracy is assessed to be 95.3% indicating an estimated over submission of 376,600 kWh per annum. Analysis of the ballasts applied indicate an under submission of 96,802.64 kWh.	Cleared Still existing
Volume information accuracy	3.2	15.2 and 15.37B(c)	The database accuracy is assessed to be 95.3% indicating an estimated over submission of 376,600 kWh per annum. Analysis of the ballasts applied indicate an under submission of 96,802.64 kWh.	Cleared Still existing

Table of Recommendations

Subject	Section	Description	Status
Tracking of load change	2.6	Review electrical connection process to ensure new items of load are recorded in RAMM for the correct electrical connection date.	Still existing

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

Code reference

Clause 16A.26 and 17.295F

Code related audit information

Retailers must ensure that DUML database audits are completed:

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

Audit observation

Genesis have requested Veritek to undertake this streetlight audit.

Audit commentary

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

2. DUML DATABASE REQUIREMENTS

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

Code reference

Clause 11(1) of Schedule 15.3

Code related audit information

The retailer must ensure the:

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

Audit observation

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

Audit commentary

Genesis reconciles this DUML load using the NST profile. The total volume submitted to the Reconciliation Manager is based on a monthly database report from RAMM and the "burn time" which is sourced from a data logger installed on the WEL network. I checked the accuracy of the submission information by multiplying the total kW from the wattage report and the total "on" time from the data logger file and confirmed the calculation matched. I checked the wattage report values to the database values and found variances as detailed in the table below:

ICP	Lamp count			kW value			Nov kWh Diff
	Dec wattage report	Dec RAMM Database extract	Difference	Dec wattage report	Dec RAMM Database extract	Difference	
0000011087WE366	16,590	17,622	1,032	1,230.143	1349	118.857	35,013
0000025004WED40	1087	1451	364	83.622	113.106	29.484	8,685
TOTAL	17,677	19,073	1,396	1,313.765	1,462.106	148.341	43,698

I have examined the differences found between the database extract and the monthly wattage report sent to Genesis and found two causes. HCC have indicated that they are only responsible for lights where the asset owner is recorded as "*Local Authority or Local Authority – Metered light*". This excludes 1,021 lights with the DUML ICP recorded against them. The other light owners are detailed in the table below:

Light owner by ICP	Light count
0000011087WE366	**870**
NZTA	820
Other	1
Parks and Gardens	7
Power Board	1
Private	8
Unknown	33

Light owner by ICP	Light count
0000025004WED40	**151**
NZTA	67
Parks and Gardens	35
Private	39
Unknown	9
WEL Networks	1
Grand Total	**1021**

Of these 877 have NZTA recorded as the light owner. This was discussed and determined that the historic arrangement for the council to pay for the NZTA lights and then claim cost of these back from NZTA is no longer in place therefore HCC are excluding these lights from the monthly wattage report. Genesis are working with NZTA to determine if these lights are recorded in an NZTA database.

The remaining items with various light owners have all been reviewed and either the light owner are being corrected and these lights will now be included in the monthly wattage report or the correct ICP has been allocated with the exception of private lights. The DUML ICPs are expected to be removed from these lights and "private" used instead. HCC does not pay for private lights and these are only maintained in the database to ensure that HCC does not undertake any field maintenance in relation to these if calls are received from the public. I recommend that these items of load be passed to WEL Network who can then determine if they are already being accounted for as either standard or shared unmetered load, or whether these need further action to ensure that the load associated with these lights is being reconciled.

Recommendation	Description	Audited party comment	Remedial action
Regarding: Clause 11(1) of Schedule 15.3	Provide private light details to WEL Network to confirm how the load for these is being captured.	Genesis has requested the information pertaining with these lights to assist Wel with any enquiries. Although the load associated with these lights could potentially not be the responsibility of Genesis as Private lighting will be associated with the private owner's current energy supplier.	Identified

There are a further 323 lights with "*Local Authority- Metered light*" recorded against them but that have the UML ICP recorded against them. These too are being excluded leaving 52 items of load difference which will be due to timing between the database extract and the monthly wattage report. HCC have reviewed these items and confirmed they are unmetered load and have corrected these in the database so they will be included in the monthly wattage report. These lights equate to 27,013 kW of the load detailed above or 115,372 kWh of potential annual under submission. This error occurred due to one operator entering data incorrectly. They are no longer working for Infrastructure Alliance. Genesis will carry out revisions to correct this. The items with the incorrect ICP recorded are recorded as non-compliance below.

100 Christmas lights have been added to the database but rather than record the actual light values and include them for the period they are burning the total wattage x total hours have been averaged across the whole year. This is recorded as non-compliance. Genesis are working with HCC to ensure that Christmas lights are included in the wattage report for the correct period.

The monthly wattage report sent to Genesis each month indicates that the ballasts are being averaged across light types rather than being added as a whole value to the lamp wattage as it is recorded in the database. e.g. 70W HPS light has an average ballast of 9.034988. This is being investigated and is expected to be corrected by HCC. Due to the low and diminishing volume of these lights in the HCC area the impact of this is expected to be minimal.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.1 With: Clause 11(1) of Schedule 15.3 From: 01-Apr-18 To: 30-Nov-18	1,021 items of load with the incorrect ICP or light owner allocated. 323 items of load excluded from the monthly wattage report due to being incorrectly recorded as metered lights resulting in an estimated annual under submission of 115,372 kWh. Analysis of the ballasts applied indicate an under submission of 28,825 kWh. Ballast is being averaged in the monthly wattage report to Genesis. Christmas light volumes included for the whole year and not the electrically connected period. Potential impact: Low Actual impact: High Audit history: Twice Controls: Moderate Breach risk rating: 6
Audit risk rating	**Rationale for audit risk rating**
High	The controls are rated as moderate, because they are sufficient to ensure that lamp information is correctly recorded most of the time. 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 brought this to the HC attention, it was agreed that the HCC will investigate as it could be a RAMM reporting error.	01/03/2019	Investigating
Preventative actions taken to ensure no further issues will occur	**Completion date**	
Genesis will feed back any ballast averaging issues to HCC in order to ensure accuracy is upheld.	01/03/2019	

2.2. ICP identifier and items of load (Clause 11(2)(a) and (aa) of Schedule 15.3)

Code reference

Clause 11(2)(a) and (aa) of Schedule 15.3

Code related audit information

The DUML database must contain:

- *each ICP identifier for which the retailer is responsible for the DUML*
- *the items of load associated with the ICP identifier.*

Audit observation

The database was checked to confirm the correct ICP was recorded against each item of load.

Audit commentary

An ICP is recorded for all but five items of load. These have been provided to HCC to correct the ICP and these will be addressed through the revision process. The accuracy of the ICPs recorded is discussed in **sections 2.1, 3.1** and **3.2**.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.2 With: Clause 11(2) (a) & (aa) of Schedule 15.3 From: 01-Apr-18 To: 30-Nov-18	Five items of load with no ICP recorded. 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 there are regular checks undertaken of the database accuracy. The impact is assessed to be low due to the small number of items without an ICP allocated.

Actions taken to resolve the issue	Completion date	Remedial action status
HCC and Genesis believe this to be a timing issue, with the project ending, Genesis will work with HCC to validate and correct any outstanding data issues.	01/03/2019	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
Genesis will be requesting a RAMM extraction quarterly to ascertain any potential database inaccuracies.	01/03/2019	

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 the nearest street address, pole numbers and Global Positioning System (GPS) coordinates for each item of load, and users in the office and field can view these locations on a mapping system.

Audit outcome

Compliant

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

Code reference

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

Code related audit information

The DUML database must contain:

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

Audit observation

The database was checked to confirm that it contained a field for lamp type and wattage capacity and included any ballast or gear wattage and that each item of load had a value recorded in these fields.

Audit commentary

The database contains two records for wattage, firstly the lamp wattage and secondly the gear wattage, which represents ballast losses. The gear wattage is recorded in the database which meets the requirements of this clause. I found no blank records. The accuracy of the description and wattages recorded is discussed in **section 3.1.**

Audit outcome

Compliant

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 515 items of load on 15 & 16 December 2018.

Audit commentary

The field audit findings are detailed in the table below:

Street	Database count	Field count	Light count differences	Wattage recorded incorrectly	Comments
Strata A-F					
ABERFOYLE STREET (11)	11	11			
ACTON VALE (5280)	2	2			
AKORANGA RD/GILCHRIST ST ROTARY (5590)	3	3			
ASHURST AVENUE (48)	18	18			
AUGUSTA STREET (50)	6	6			
BEAUFORT PLACE (5661)	4	4			
BENSON ROAD (5040)	3	3			
BIRCH HILL PLACE (93)	3	3			
BISHOPSWORTH WAY (5350)	3	3			
BROOKVIEW COURT SERVICE LANE 3 (5456)	2	2			
BRYCE LANE (RP67 RHS) (5211)	3	3			
BURNS COURT (134)	3	3			
BURWOOD PLACE (137)	1	1			
BUTLER PLACE (138)	2	2			
CASHMERE PLACE (1445)	8	8			
CASTLEWOLD PLACE (1478)	3	3			
CHARLOTTE CRESCENT (5613)	4	4			
CHERRYWOOD STREET (173)	9	9		1	1x HPS recorded in the database. LED found in the field.
CHESTNUT PLACE (174)	2	2			
CORDELIA COURT (5662)	2	2			
DARLEY STREET EXTENSION (1114)	1	1			
EASTRIDGE TERRACE (5471)	6	6			
EBONY COURT (5405)	3	3			
ECLIPSE RISE (1465)	6	6			
EDINBURGH ROAD (278)	15	15			
ELLERSLIE AVENUE (284)	10	10			
EMPIRE STREET (292)	7	7			
FENDALTON DRIVE (1483)	6	6			
FLEMING PLACE (319)	2	2			
Strata G-M					

Street	Database count	Field count	Light count differences	Wattage recorded incorrectly	Comments
HALL STREET (393)	9	9			
HOLCROFT PLACE (5434)	3	3			
HOLLY PLACE (5410)	6	6			
JULIE COURT (5553)	1	1			
KIWI AVENUE (498)	5	5			
KOURA DRIVE (EASTBOUND) (5592)	6	6			
LACHLAN DRIVE (508)	9	10	1		1x extra LED found in the field
LADEIRA PLACE (5649)	5	10	5		5x extra LED found in the field
LAFFERTY STREET (509)	2	2			
LAURENCE STREET (520)	10	10			
LAVENHAM PLACE (5137)	6	6			
MAAHANGA DRIVE (SOUTH BOUND) (5464)	1	1			
MAHANA ROAD (563)	20	20			
MANOR PLACE (572)	5	5			
MARLOWE PLACE (582)	3	6	3	1	3x extra LED found in the field 1x HPS recorded in the database. LED found in the field.
MCCORQUINDALE DRIVE (5565)	7	7			
MCKENZIE PLACE (5230)	3	3			
MEARS ROAD (609)	25	25			
MOA CRESCENT (NORTH) (5162)	1	1			
MOULE PLACE (635)	2	2			
Strata N-S					
NEWCASTLE ROAD LLA (#78-#108) (5013)	5	5			
NOTTINGHAM DRIVE (SOUTHBOUND) (5244)	3	5	2		2x extra 70 HPS found in the field
OAKFIELD CRESCENT (671)	18	18			
OAKMONT PLACE (5073)	2	2			
OLWYN TERRACE (679)	5	5			
PAGE PLACE (689)	2	2			
PAUL CRESCENT (701)	12	12			
PICKERING CRESCENT (715)	5	5			
PROSPECT PLACE (1378)	5	5			
RAMSAY STREET (763)	7	7			
RAWLINGS STREET (769)	12	12			

Street	Database count	Field count	Light count differences	Wattage recorded incorrectly	Comments
RESOLUTION ROTARY (THOMAS) (5239)	2	2			
RIDGEDALE CRESCENT (5673)	8	8			
RIVERCOVE LANE (5658)	4	4			
ROSE STREET (798)	3	3			
ROSSITER PLACE (802)	12	12			
RUMNEY STREET (815)	3	3			
SADLER STREET (820)	8	8			
SMYTH PLACE (1418)	2	2			
SOMERSET STREET (860)	11	10	-1		1x pole with no lamp head found in the field
SOUTHSEA CRESCENT (863)	9	8	-1		1x LED not found in the field
SPRINGFIELD CRESCENT (867)	7	7		1	1x LED recorded in the database 150W HPS found in the field
SUNNYHILLS AVENUE HAMMERHEAD (1333)	5	5			
Strata S-Z					
THE ESPLANADE (5299)	10	10			
THISTLEWOOD AVENUE (5254)	4	4			
TOI TOI PLACE (5071)	3	3			
TRISTRAM STREET ROTARY (PEMBROKE) (1437)	3	3			
VERMONT COURT (5300)	4	4			
VIVIAN STREET (967)	3	3			
WAIKAKA PLACE (5667)	5	13	8		8x additional LED found in the field
WANAKA PLACE (976)	2	2			
WARD LANE (977)	10	10			
WARWICK AVENUE (980)	3	3			
WATFORD PLACE (5496)	3	3			
WENTWORTH DRIVE (5127)	38	38	1		1x LED recorded in the database 70W HPS found in the field
Grand Total	**515**	**532**	**22**	**3**	

I found 20 lamp count errors (over and under) in the field audit resulting in 20 lamps missing from the database. As discussed in **section 2.6**, HCC have just completed the road based lights LED light rollout in late January. The field audit was undertaken whilst the roll out was still in progress hence the variances found. HCC's dedicated resource continues to review the data coming in from the field before it is uploaded to the database. The database accuracy is discussed in **section 3.1**. The 20 items of load missing from the RAMM database are recorded as non-compliance.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.5 With: Clause 11(2A) of Schedule 15.3 From: 01-Apr-18 To: 30-Nov-18	Items of load are missing from the database. Potential impact: Low Actual impact: Low Audit history: Once Controls: Moderate Breach risk rating: 2
Audit risk rating	**Rationale for audit risk rating**
Low	The controls are rated as moderate, because they are sufficient to ensure that lamp information is correctly recorded most of the time. The impact is rated as low as overall the database accuracy fell within the required +/- 2.5 % variance.

Actions taken to resolve the issue	Completion date	Remedial action status
HCC and Genesis believe this to be a timing issue, with the project ending, Genesis will work with HCC to validate and correct any outstanding data issues.	01/03/2019	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
Genesis will be requesting a RAMM extraction quarterly to ascertain any potential database inaccuracies.	01/03/2019	

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

Any changes that are made during any given month take effect from the beginning of that month. The information is available which would allow for the total load in kW to be retrospectively derived for any day. On 20th September 2012, the Authority sent a memo to Retailers and auditors advising that tracking of load changes at a daily level was not required as long as the database contained an audit trail. I have interpreted this to mean that the production of a monthly "snapshot" report is sufficient to achieve compliance.

The database tracks additions and removals as required by this clause.

The processes were reviewed for ensuring that changes in the field are notified through to Infrastructure Alliance. All maintenance work in the field is entered directly into "Pocket RAMM". There is an annual audit process in place which checks both quality of workmanship and accuracy of asset capture. Any errors found are corrected.

HCC haver finished the standard road lighting LED rollout in late January 2019. The next stage of the project upgrading all of under verandah lighting and decorative lighting i.e. bespoke lamp heads where a standard LED lamp head cannot be installed is about to commence. The under verandah portion is expected to be completed by June 2019. The remaining decorative LED light replacement will commence in July 2019 and is expected to be completed by December 2019. HCC's dedicated resource continues to upload all of these changes but due to the volume occurring there can be delays from the date of the light being installed and it being updated in the database, hence the volume of lamp discrepancies found in this audit.

Outage patrols are no longer being carried out due to the LED rollout having only just been completed. The new outage patrol regime is still being determined in consultation with industry experts.

Christmas lights are now recorded in the database. The accuracy of this is recorded in **section 3.1**.

There have been no changes to the new connection process. WEL Networks liven the streetlights. Lights in new subdivisions are added to RAMM once the "as-builts" are received. The HCC Operations team have a fortnightly meeting with the Council development team to discuss what work is coming through, but the electrical connection date is not always known. This can be slow in some instances and in others the lights are being added to RAMM before they are electrically connected. I repeat the last audit's recommendation that the new connection process be reviewed in consultation with WEL Network to better capture the correct livening date.

Recommendation	Description	Audited party comment	Remedial action
Regarding: Clause 11(3) of Schedule 15.3	Review electrical connection process to ensure new items of load are recorded in RAMM for the correct electrical connection date.	This process is maintained by the HCC & the distributor. Genesis can only influence the review, however as this is mainly driven by the Distributor, they need to be open to change.	Investigating

Audit outcome

Compliant

2.7. Audit trail (Clause 11(4) of Schedule 15.3)

Code reference

Clause 11(4) of Schedule 15.3

Code related audit information

The DUML database must incorporate an audit trail of all additions and changes that identify:

- *the before and after values for changes*
- *the date and time of the change or addition*
- *the person who made the addition or change to the database.*

Audit observation

The database was checked for audit trails.

Audit commentary

The RAMM database has a complete audit trail of all additions and changes to the database information.

Audit outcome

Compliant

3. ACCURACY OF DUML DATABASE

3.1. Database accuracy (Clause 15.2 and 15.37B(b))

Code reference

Clause 15.2 and 15.37B(b)

Code related audit information

Audit must verify that the information recorded in the retailer's DUML database is complete and accurate.

Audit observation

The DUML Statistical Sampling Guideline was used to determine the database accuracy. The table below shows the survey plan.

Plan Item	Comments
Area of interest	Hamilton City area
Strata	The database contains items of load in Hamilton City Council area. The area has three distinct sub groups. Urban, under verandah and central city. The processes for the management of HCC items of load are the same, but I decided to place the items of load into four strata by road name, as follows: 1. A-F 2. G-M 3. N-S 4. S-Z
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 84 sub-units.
Total items of load	515 items of load were checked.

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

The accuracy of the ICP assignment was examined. This is also discussed in **sections 2.1** & **3.2**.

Audit commentary

A statistical sample of 515 items of load found that the field data was 102.1% of the database data for the sample checked. This is within the required database accuracy of 2.5%+/-. The statistical sampling tool reported with 95% confidence the precision of the sample was 6.3% and the true load in the field will be between 99.9% to 106.2% of the load recorded in the database. The sample is not sufficiently precise to be able to determine the database accuracy but indicates that the database falls within the acceptable accuracy range.

The tool indicated that there is potentially 134,200 kWh per annum (based on annual burn hours of 4,271 as detailed in the DUML database auditing tool) of under submission but as the accuracy falls within the 2.5% threshold compliance is recorded. The statistical sampling tool reported with 95% confidence that there is a potential estimated submission variance range of between 9,300 kWh of under submission and 388,600kWh over submission.

100 Christmas lights have been added to the database but rather than record the actual light values and include them for the period they are burning the total wattage x total hours have been averaged across the whole year. This is recorded as non-compliance. Genesis are working with HCC to ensure that Christmas lights are included in the wattage report for the correct period.

The check of wattages found:

- 74x 33W LEDs recorded as 32.5W. This will result in an estimated under submission by 158 kWh per annum, these have been corrected to 33W
- 930 items of load were found to have an invalid light type recorded, this is a good improvement from the 9,074 items of load recorded in the last audit.

Light Type	Volume
140 Watts HPS	3
20 Watts MH	13
150 Watts Down Light	165
140 Watts MH	80
Double 4FT Fluro- 70W	35
Double 5FT Fluro- 70W	165
Single 4FT Fluro- 45W	101
Single 5FT Fluro- 35W	362
89 Watts Double 4Ft Fluro	6
TOTAL	930

All of the above lights are in the process of being replaced with LEDs.

The analysis of ballasts found 4,464 items of load with the incorrect ballast applied. This is a good improvement from the 12,588 recorded in the last audit. All but 163 of these relate to old HPS, metal halide or mercury vapour lights that are expected to be replaced. The LED rollout is discussed in **section 2.5**. The incorrect ballasts indicate an estimated 28,825 kWh under submission per annum (based on annual burn hours of 4,271 as detailed in the DUML database auditing tool).

The monthly wattage report sent to Genesis each month indicates that the ballasts are being averaged across light types rather than being added as a whole value to the lamp wattage as it is recorded in the database. e.g. 70W HPS light has an average ballast of 9.034988. This is being investigated and is expected to be corrected by HCC. Due to the low and diminishing volume of these lights in the HCC area the impact of this is expected to be minimal.

As detailed in **section 2.1**, HCC are excluding all items of load where they are not recorded as the light owner in the database. HCC have reviewed these items and either corrected the owner so they are included, or confirmed they are not part of the unmetered load that HCC are responsible for, and have now added the correct ICP. The 323 items of load with "*Local Authority- Metered light*" incorrectly recorded against them being excluded from the monthly wattage report are being corrected and will be included going forward. This is expected to be corrected through the revision process.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 3.1 With: Clause 15.2 and 15.37B(b) From: 01-Apr-18 To: 30-Nov-18	1,021 items of load with the incorrect ICP or light owner allocated. 323 items of load incorrectly recorded as a metered light but are unmetered. Analysis of the database identified 930 items of load with an invalid light description. Analysis of the ballasts applied indicate an under submission of 28,825 kWh per annum. Ballast is being averaged in the monthly wattage report to Genesis. Christmas light volumes included for the whole year and not the electrically connected period. Potential impact: Low Actual impact: High Audit history: Once Controls: Moderate Breach risk rating: 6
Audit risk rating	**Rationale for audit risk rating**
High	The controls are rated as moderate, because the inaccuracies are being addressed through the LED roll out and accuracy will continue to improve. The impact is assessed to be medium, based on the kWh differences described above and in sections **2.1** & **3.2.**

Actions taken to resolve the issue	Completion date	Remedial action status
Met with HCC and have established that there are lamps within the database only for enquiry based reasons, however they have an incorrect ICP applied to them. HCC are correcting this to ensure that reporting is accurate. The description of lamps/ballasts should be amended and was most likely a timing issue as the audit was conducted during the active LED replacement project. HCC had present a proposed fix for the Christmas lighting which Genesis and the auditor both declined as this does not meet compliance. HCC will be revisiting this and will advise.	01/03/2019	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
HCC & Genesis will continue working together to maintain a high level of accuracy. Genesis has requested RAMM extractions quarterly to assist in the database analysis by Genesis.	01/03/2019	

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
- checking the database extract combined with the burn hours against the submitted figure to confirm accuracy.

Audit commentary

Genesis reconciles this DUML load using the NST profile. The total volume submitted to the Reconciliation Manager is based on a monthly database report from RAMM and the "burn time" which is sourced from a data logger installed on the WEL network. As detailed in **section 2.1**, I checked the wattage report values to the database values and found a variance of 43,698 kWh of potential under submission for the month of December. I have examined the differences found between the database extract and the monthly wattage report sent to Genesis and found three causes. HCC have indicated they are only responsible for lights where the asset owner is recorded as "*Local Authority or Local Authority – Metered light"*. This excludes 1,021 lights with the DUML ICP recorded against them. The other light owners are detailed in the table below:

Light owner by ICP	Light count
0000011087WE366	**870**
NZTA	820
Other	1
Parks and Gardens	7
Power Board	1
Private	8
Unknown	33
0000025004WED40	**151**
NZTA	67
Parks and Gardens	35
Private	39
Unknown	9
WEL Networks	1
Grand Total	**1021**

Of these 877 have NZTA recorded as the light owner. This was discussed and determined that the historic arrangement for the council to pay for the NZTA lights and then claim cost of these back from NZTA is no longer in place therefore HCC are excluding these lights from the monthly wattage report. Genesis are working with NZTA to determine if these lights are recorded in an NZTA database.

The remaining items with various light owners have all been reviewed and either the light owner has been corrected and these lights will now be included in the monthly wattage report or the correct ICP has been allocated with the exception of private lights. The DUML ICPs are expected to be removed from these lights and "private" used instead. HCC does not pay for private lights and these are only maintained in the database to ensure that HCC does not undertake any field maintenance in relation to these if calls are received from the public.

There are a further 323 lights with "*Local Authority- Metered light*" recorded against them but that have the UML ICP recorded against them. These too are being excluded leaving 52 items of load difference which will be due to timing between the database extract and the monthly wattage report. HCC have reviewed these items and confirmed they are unmetered load and are correcting these in the database so they will be included in the monthly wattage report. These lights equate to 27,013 kW of the load detailed above or 115,372 kWh of potential annual under submission. This error occurred due to one operator entering data incorrectly. They are no longer working for Infrastructure Alliance. Genesis will carry out revisions to correct this.

The monthly wattage report sent to Genesis each month indicates that the ballasts are being averaged across light types rather than being added as a whole value to the lamp wattage as it is recorded in the database. e.g. 70W HPS light has an average ballast of 9.034988. This is being investigated and is expected to be corrected by HCC. Due to the low and diminishing volume of these lights in the HCC area the impact of this is expected to be minimal.

100 Christmas lights have been added to the database but rather than record the actual light values and include them for the period they are burning the total wattage x total hours have been averaged across the whole year. This is recorded as non-compliance. Genesis are working with HCC to ensure that Christmas lights are included in the wattage report for the correct period.

There is some inaccurate data within the database used to calculate submissions. The analysis of ballasts found the incorrect ballasts being applied indicate an estimated 28,825 kWh under submission per annum but as noted in **section 3.1**, these are in the process of being changed out to LED lights as part of the LED rollout.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 3.2 With: Clause 15.2 and 15.37B(c) From: 01-Apr-18 To: 30-Nov-18	1,021 items of load with the incorrect ICP or light owner allocated. 323 items of load excluded from the monthly wattage report due to being incorrectly recorded as metered lights resulting in an estimated annual under submission of 115,372 kWh. Analysis of the ballasts applied indicate an under submission of 28,825 kWh. Christmas light volumes included for the whole year and not the electrically connected period. Ballast is being averaged in the monthly wattage report to Genesis. Potential impact: Low Actual impact: High Audit history: None Controls: Moderate Breach risk rating: 6
Audit risk rating	**Rationale for audit risk rating**
High	The controls are rated as moderate, because they are sufficient to ensure that lamp information is correctly recorded most of the time. 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
Met with HCC and have established that there are lamps within the database only for enquiry based reasons, however they have an incorrect ICP applied to them. HCC are correcting this to ensure that reporting is accurate. The description of lamps/ballasts should be amended and was most likely a timing issue as the audit was conducted during the active LED replacement project. HCC had present a proposed fix for the Christmas lighting which Genesis and the auditor both declined as this does not meet compliance. HCC will be revisiting this and will advise.	01/03/2019	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
HCC & Genesis will continue working together to maintain a high level of accuracy. Genesis has requested RAMM extractions quarterly to assist in the database analysis by Genesis.	01/03/2019	

CONCLUSION

HCC have completed the standard lamp streetlight upgrade to LED. This was completed in late January. The next stage of the project is upgrading all of under verandah lighting and decorative lighting i.e. bespoke lamp heads where a standard LED lamp head cannot be installed is about to commence. The under verandah portion is expected to be completed by June 2019. The remaining decorative LED light replacement will commence in July 2019 and is expected to be completed by December 2019. The field audit was undertaken in December 2018 whilst the LED roll out was still in progress. Despite this the overall database accuracy has improved as expected and fell within the acceptable +/- 2.5%.

This audit found variances between the monthly wattage report and the database extract values. I examined this and found two main causes:

- NZTA lights are no longer included in the monthly wattage report as the long-standing arrangement between the council and NZTA to be recompensed for the power usage has ended, Genesis are working with NZTA to ensure that these lights are being recorded and paid for by NZTA directly
- 323 lights were incorrectly recorded as metered lights. HCC have fixed this and corrections will flow the revision process.

The incorrect ballasts have reduced greatly during the audit period and will continue to once the LED roll out is complete. HCC are working hard to provide accurate data for reconciliation.

The audit found five non-compliance issues and makes one recommendation. The future risk rating of 22 indicates that the next audit be completed in three months, but I recommend that the next audit be in 12 months as:

- HCC have already commenced addressing the majority of the issues found in this audit.
- the LED rollout will be completed by this time.
- the overall database accuracy falls well within the 5% accuracy rate that comes into effect 1st February.

PARTICIPANT RESPONSE

Genesis Energy are pleased to see a good level of database accuracy achieved and is a direct result of the management by HCC, Infrastructure Alliance & Genesis. With the pending under veranda and decorative lighting project to start Genesis agrees with the 12-month audit period to allow for these projects to be completed and database accuracies to be conducted.