ELECTRICITY INDUSTRY PARTICIPATION CODE
DISTRIBUTED UNMETERED LOAD AUDIT REPORT

VERITEK

For

HOROWHENUA DISTRICT COUNCIL AND GENESIS ENERGY LIMITED

Prepared by: Tara Gannon

Date audit commenced: 26 November 2019

Date audit report completed: 4 December 2019

Audit report due date: 18 December 2019

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EXECUTIVE SUMMARY

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

The 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 load is determined by wattages held within HDC's RAMM database, and a monthly extract is provided to Genesis. ICP 0016097099EL1B6 is settled based on registry information. New connection, fault, maintenance and upgrade work is completed by Fulton Hogan, Electra and East Coast Powerlines. All contractors completing work on HDC's streetlights have access to RAMM, and update the database using Pocket RAMM from the field.

An audit was undertaken by Fulton Hogan on completion of HDC's LED upgrade project to ensure that the database records were accurate.

Database accuracy is described as follows:

Result	Percentage	Comments
The point estimate of R	108.3	Wattage from survey is higher than the database wattage by 8.3%
R_L	97.9	With a 95% level of confidence it can be concluded that the error could be between -2.1% and 24.8%
R_H	124.8	

The variability of the sample results across the strata means that the true wattage (installed in the field) could be between 2.1% lower and 24.8% higher than the wattage recorded in the DUML database. Non-compliance is recorded because the potential error is greater than ±5.0%.

- In absolute terms the installed capacity is estimated to be 8 kW higher than the database indicates.
- There is a 95% level of confidence that the installed capacity is between 2 kW lower to 23 kW higher than the database.
- In absolute terms, total annual consumption is estimated to be 33,200 kWh higher than the DUML database indicates.
- There is a 95% level of confidence that the annual consumption is between 8,200 kWh p.a. lower to 98,900 kWh p.a. higher than the database indicates.

Genesis reconciles this DUML load as follows:

ICP	Profile	On hours	Wattage
0016099004EL9CA	CST	Data logger	Monthly extract from the RAMM database
0016097099EL1B6	UNM	Electricity registry	Electricity registry

On 18 June 2019, the Electricity Authority issued a memo clarifying the memo of 2012 that stated that a monthly snapshot was sufficient to calculate submission from, and confirmed the code requirement to calculate the correct monthly load must:

- take into account when each item of load was physically installed or removed; and

- wash up volumes must take into account where historical corrections have been made to the DUML load and volumes.

The current monthly report is provided as a snapshot and is non-compliant, and Genesis completes revision submissions where corrections are required. Genesis is working to develop event-based calculations, which will enable accurate volume calculations where lamps change part way through a month.

The future risk rating of 20 indicates that the next audit be completed in three months. This may not be sufficient time to resolve the matters raised and I recommend the Authority considers an audit period of at least six months to allow time for the identified issues to be resolved. The matters raised are detailed below:

AUDIT SUMMARY

NON-COMPLIANCES

Subject	Section	Clause	Non-Compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
Deriving submission information	2.1	11(1) of Schedule 15.3	The database is not confirmed as accurate with a 95% level of confidence. The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot. Livening dates are recorded as the vesting date for new connections, and change dates may not reflect the date of the change if they are not processed in RAMM at the time that the change occurs. 39 items of load had invalid gear wattages for their lamp model description, resulting in an estimated under submission of 179 kWh p.a. The incorrect records were updated during the audit. 91 items of load do not have ICP numbers recorded, including: • one 22W LED council parks light resulting in estimated under submission of 94 kWh p.a.; • 87 private lights resulting in estimated under submission of 31,823 kWh p.a.; and • three festive lights, which have no impact on submission because volumes are recorded against ICP 0016099004EL9CA when the lights are connected. Levin Mall lights are submitted against ICP 0016099004EL9CA based on database information, and also ICP 0016097099EL1B6 based on registry information, resulting in estimated over submission of 28,652 kWh p.a.	Weak	Medium	6	Identified

Subject	Section	Clause	Non-Compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
ICP identifier and items of load	2.2	11(2)(a) and (aa) of Schedule 15.3	One 22W LED does not have an ICP number recorded against it, resulting in estimated under submission of 94 kWh p.a. Three festive lights do not have an ICP number recorded against them. There is no impact on submission because the load is reported against the correct ICP number when connected. 87 private lights do not have an ICP number recorded against them, resulting in estimated under submission of 31,823 kWh p.a.	Moderate	Medium	4	
Database accuracy	3.1	15.2 and 15.37B(b)	The database is not confirmed as accurate with a 95% level of confidence. The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot. Livening dates are recorded as the vesting date for new connections, and change dates may not reflect the date of the change if they are not processed in RAMM at the time that the change occurs. 39 items of load had invalid gear wattages for their lamp model description, resulting in an estimated under submission of 179 kWh p.a. The incorrect records were updated during the audit. Four items of load have some inaccurate address information. 91 items of load do not have ICP numbers recorded, including: • one 22W LED council parks light resulting in estimated under submission of 94 kWh p.a.; • 87 private lights resulting in estimated under submission of 31,823 kWh p.a.; and	Weak	Medium	6	Investigating

Subject	Section	Clause	Non-Compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
			• three festive lights, which have no impact on submission because volumes are recorded against ICP 0016099004EL9CA when the lights are connected. Levin Mall lights are submitted against ICP 0016099004EL9CA based on database information, and also ICP 0016097099EL1B6 based on registry information, resulting in estimated over submission of 28,652 kWh p.a.				
Volume information accuracy	3.2	15.2 and 15.37B(c)	The database is not confirmed as accurate with a 95% level of confidence. The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot. Livening dates are recorded as the vesting date for new connections, and change dates may not reflect the date of the change if they are not processed in RAMM at the time that the change occurs. 39 items of load had invalid gear wattages for their lamp model description, resulting in an estimated under submission of 179 kWh p.a. The incorrect records were updated during the audit. 91 items of load do not have ICP numbers recorded, including: • one 22W LED council parks light resulting in estimated under submission of 94 kWh p.a.; • 87 private lights resulting in estimated under submission of 31,823 kWh p.a.; and • three festive lights, which have no impact on submission because volumes are recorded against ICP	Weak	Medium	6	Identified

Subject	Section	Clause	Non-Compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
			0016099004EL9CA when the lights are connected. Levin Mall lights are submitted against ICP 0016099004EL9CA based on database information, and also ICP 0016097099EL1B6 based on registry information, resulting in estimated over submission of 28,652 kWh p.a.				
Future Risk Rating						20	

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
Database Accuracy	3.1	Confirm the correct lamp and gear wattages for the unknown lights on Muhunoa West Road (467).

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

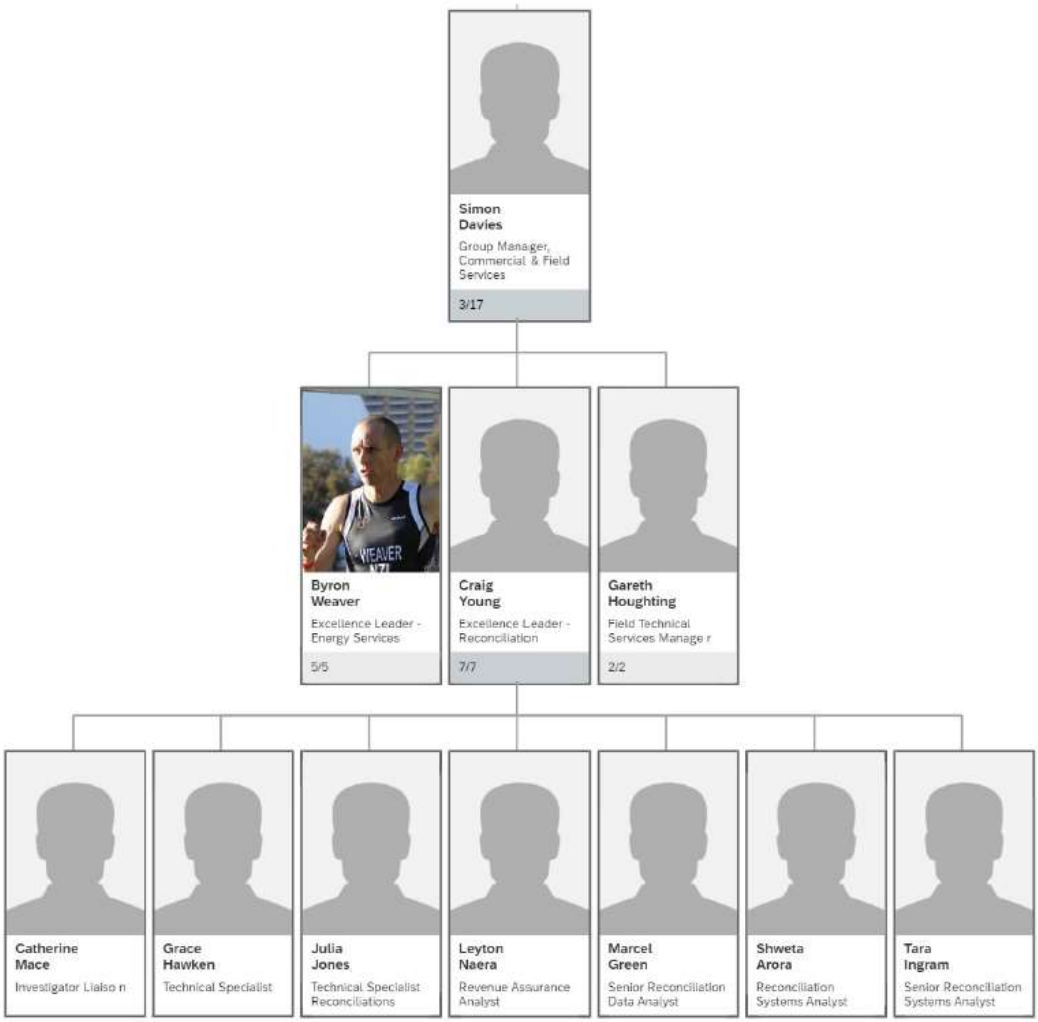
The Electricity Authority's website was reviewed to identify any exemptions relevant to the scope of this audit.

Audit commentary

There are no exemptions in place relevant to the scope of this audit.

1.2. Structure of Organisation

Genesis provided a copy of their organisational structure:



1.3. Persons involved in this audit

Auditor:

Tara Gannon

Veritek Limited

Electricity Authority Approved Auditor

Other personnel assisting in this audit were:

Name	Title	Company
Varunesh Sinha	Roading Maintenance Engineer	Horowhenua District Council
Grace Hawken	Technical Specialist - Reconciliation Team	Genesis Energy

1.4. Hardware and Software

The SQL database used for the management of DUML is remotely hosted by RAMM Software Ltd. The database is commonly known as "RAMM" which stands for "Roading Asset and Maintenance Management". The specific module used for DUML is called RAMM Contractor.

RAMM Software Limited backs up the database and assists with disaster recovery as part of their hosting service. Nightly backups are performed. As a minimum, daily backups are retained for the previous five working days, weekly backups are retained for the previous four weeks, and monthly backups are retained for the previous six months.

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

The following ICPs are listed for HDC on the DUML audit register:

ICP Number	Description	NSP	Profile	Number of items of load	Database wattage (watts)
0016099004EL9CA	HDC - STREETLIGHTS	MHO0331	CST	2,573	101,470
0016097099EL1B6	Levin Mall	MHO0331	UNM	-	-
Total				2,573	101,470

ICP 0016097099EL1B6

Levin Mall lights connected to 0016097099EL1B6 have ICP 0016099004EL9CA recorded in RAMM. There is potential over submission of 28,652 kWh p.a. because these lights are submitted against ICP 0016099004EL9CA based on database information, and ICP 0016097099EL1B6 based on the registry information below. This is recorded as non-compliance in **sections 2.1**, **3.1**, and **3.2**.

Daily Unmetered kWh	Daily Unmetered kWh	Unmetered Load Details - Trader
0016097099EL1B6	78.5	6.6KW;11.9; 33XTWIN 40W;33X100W SIGNS

ICP 0016099060EL730

ICP 0016099060EL730 is also included in the database but is outside the scope of the audit. HDC confirmed that ICP 0016099060EL730 is used to record NZTA lights, and HDC is responsible for maintaining the area around the poles, but not the lights themselves. The ICP is supplied by Contact Energy and is settled as standard unmetered load. The database load does not match to the registry details and it appears this ICP is multiple connections across more than one circuit and therefore should be treated as distributed unmetered load. These details have been passed to Contact to investigate.

1.7. Authorisation Received

All information was provided directly by Genesis or HDC.

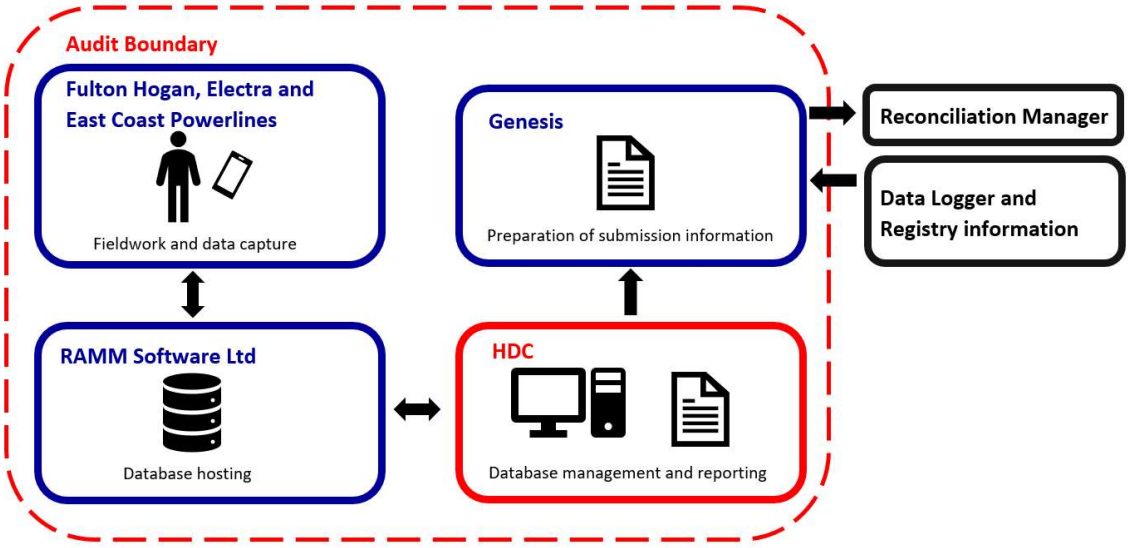
1.8. Scope of Audit

This audit of the HDC DUML database and processes was conducted at the request of Genesis in accordance with clause 15.37B. The purpose of this audit is to verify that the volume information is being calculated accurately, and that profiles have been correctly applied.

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

Streetlight load is determined by wattages held within HDC's RAMM database, and a monthly extract is provided to Genesis. New connection, fault, maintenance and upgrade work is completed by Fulton Hogan, Electra and East Coast Powerlines. All contractors completing work on HDC's streetlights have access to RAMM, and update the database using Pocket RAMM from the field.

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 252 items of load on 26 November 2019.

1.9. Summary of previous audit

The previous audit of this database was undertaken by Rebecca Elliot of Veritek Limited in December 2018. The summary table below shows the statuses of the non-compliances raised in the previous audit. Further comment is made in the relevant sections of this report.

Subject	Section	Clause	Non-compliance	Status
Deriving submission information	2.1	11(1) of Schedule 15.3	The database accuracy is assessed to be 105.1% indicating an estimated under submission of 22,000 kWh per annum. One 22W LED does not have an ICP number recorded against it, amounting to 94 kWh per annum under submission.	Still existing

Subject	Section	Clause	Non-compliance	Status
ICP identifier and items of load	2.2	11(2)(a) and (aa) of Schedule 15.3	One 22W LED does not have an ICP number recorded against it, amounting to 94 kWh per annum under submission.	Still existing
Database accuracy	3.1	15.2 and 15.37B(b)	The database accuracy is assessed to be 105.1% indicating an estimated under submission of 22,000 kWh per annum. One 22W LED does not have an ICP number recorded against it, amounting to 94 kWh per annum under submission.	Still existing
Volume information accuracy	3.2	15.2 and 15.37B(c)	The database accuracy is assessed to be 105.1% indicating an estimated under submission of 22,000 kWh per annum. One 22W LED does not have an ICP number recorded against it, amounting to 94 kWh per annum under submission.	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.

Audit outcome

Compliant

2. DUML DATABASE REQUIREMENTS

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

Code reference

Clause 11(1) of Schedule 15.3

Code related audit information

The retailer must ensure the:

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

Audit observation

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

Audit commentary

Genesis reconciles this DUML load as follows:

ICP	Profile	On hours	Wattage
0016099004EL9CA	CST	Data logger	Monthly extract from the RAMM database. The database is not confirmed as accurate with a 95% level of confidence as recorded in **section 3.1**.
0016097099EL1B6	UNM	Electricity registry (11.9 hours)	Electricity registry (78.5 kWh per day). HDC confirmed that these lights are currently recorded against ICP 0016099004EL9CA in RAMM. HDC is working with RAMM to update the ICP number to 0016097099EL1B6, so that the RAMM information can be used for submission.

I checked the submission data for October 2019 and found the load for 0016099004EL9CA had been correctly calculated based on the data logger and monthly extract information, and 0016097099EL1B6 had been correctly calculated based on the registry information. Festive light volumes are included when connected.

Sources of inaccuracy are as follows:

Issue	Estimated volume information impact (annual kWh)
One 22W LED does not have an ICP number recorded against it	Under submission of 94 kWh p.a.
Three festive lights do not have an ICP number recorded against them	No impact, because load is submitted with the correct ICP number when connected
87 private lights do not have an ICP number recorded against them.	Under submission of 31,823 kWh p.a.

Issue	Estimated volume information impact (annual kWh)
Levin Mall lights connected to 0016097099EL1B6 have ICP 0016099004EL9CA recorded in RAMM. HDC is working with RAMM to correct the ICP number.	Over submission of 28,652 kWh p.a. because these lights are submitted against ICP 0016099004EL9CA based on database information, and also ICP 0016097099EL1B6 based on registry information.
39 items of load had invalid gear wattages for their lamp model description. The incorrect records were updated during the audit.	Under submission of 179 kWh p.a.

On 18 June 2019, the Electricity Authority issued a memo clarifying the memo of 2012 that stated that a monthly snapshot was sufficient to calculate submission from, and confirmed the code requirement to calculate the correct monthly load must:

- take into account when each item of load was physically installed or removed; and
- wash up volumes must take into account where historical corrections have been made to the DUML load and volumes.

The current monthly report is provided as a snapshot and this practice is non-compliant. When a wattage is changed in the database due to a physical change or a correction, only the record present at the time the report is run is recorded, not the historical information showing dates of changes. Genesis is working to develop event-based calculations, which will enable accurate volume calculations where lamps change part way through a month.

The RAMM database records an installation date, which is used to record the date the light is vested in council once this occurs. There is no separate livening date.

Change dates are automatically generated by RAMM when records change but cannot be selected by the user. Changes are generally entered by TDC when the change is confirmed and may be after the physical date of the change. For the bulk LED rollouts, a change date was not consistently provided by the contractor.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.1 With: Clause 11(1) of Schedule 15.3 From: 01-Oct-19 To: 14-Oct-19	The database is not confirmed as accurate with a 95% level of confidence. The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot. Livening dates are recorded as the vesting date for new connections, and change dates may not reflect the date of the change if they are not processed in RAMM at the time that the change occurs. 39 items of load had invalid gear wattages for their lamp model description, resulting in an estimated under submission of 179 kWh p.a. The incorrect records were updated during the audit. 91 items of load do not have ICP numbers recorded, including: • one 22W LED council parks light resulting in estimated under submission of 94 kWh p.a.; • 87 private lights resulting in estimated under submission of 31,823 kWh p.a.; and • three festive lights, which have no impact on submission because volumes are recorded against ICP 0016099004EL9CA when the lights are connected. Levin Mall lights are submitted against ICP 0016099004EL9CA based on database information, and also ICP 0016097099EL1B6 based on registry information, resulting in estimated over submission of 28,652 kWh p.a. Potential impact: Medium Actual impact: Unknown Audit history: Twice Controls: Weak Breach risk rating: 6
Audit risk rating	**Rationale for audit risk rating**
Medium	The controls over the database are rated as weak because database accuracy falls outside the ±5% accuracy threshold, and issues were identified across a range database information. The impact is assessed to be medium based on the kWh differences described above. The incorrect gear wattages have already been corrected.

Actions taken to resolve the issue	Completion date	Remedial action status
Genesis will work with HDC and SmartPower to correct any invalid asset information	01/03/2020	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
Confirm asset ICP identifier and have RAMM updated accordingly	01/03/2020	

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

Code reference

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

Code related audit information

The DUML database must contain:

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

Audit observation

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

Audit commentary

The database records an ICP group. All items of load have a valid ICP number recorded except:

ICP Group	Total wattage	Count	Findings
Council Parks	22	1	One council parks light at Playford Park Road (pole 47108E) does not have an ICP number recorded. It should be recorded against ICP 0016099004EL9CA, and HDC is working with RAMM to update the record.
Festive Lighting	2069	3	Festive light connection and disconnection dates are communicated to Genesis, and the lights with ICP group "Festive Lighting" are included in the submission information for 0016099004EL9CA when connected.
Private	7451	87	No ICP number is recorded because private lights are excluded from submission information. Private lights are discussed further in **section 3.1**.
Total	**9542**	**91**	

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.2 With: Clause 11(2)(a) and (aa) of Schedule 15.3 From: 01-Apr-18 To: 14-Oct-19	One 22W LED does not have an ICP number recorded against it, resulting in estimated under submission of 94 kWh p.a. Three festive lights do not have an ICP number recorded against them. There is no impact on submission because the load is reported against the correct ICP number when connected. 87 private lights do not have an ICP number recorded against them, resulting in estimated under submission of 31,823 kWh p.a. Potential impact: Medium Actual impact: Unknown Audit history: Once Controls: Moderate Breach risk rating: 4
Audit risk rating	**Rationale for audit risk rating**
Medium	The controls are rated as moderate because a small number of items of load do not have valid ICP numbers recorded. The impact is assessed to be medium based on the kWh differences described above.

Actions taken to resolve the issue	Completion date	Remedial action status
Genesis will work with HDC and SmartPower to correct any invalid asset information	01/03/2020	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
Confirm asset ICP identifier and have RAMM updated accordingly	01/03/2020	

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

Code reference

Clause 11(2)(b) of Schedule 15.3

Code related audit information

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

Audit observation

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

Audit commentary

The database contains fields for the road name, location number, pole number, and GPS coordinates.

GPS coordinates are populated for all except ten items of load. The ten items of load without GPS coordinates have location numbers, pole numbers, and road names which allow them to be located.

The accuracy of locations is discussed in **section 3.1**.

Audit outcome

Compliant

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

Code reference

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

Code related audit information

The DUML database must contain:

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

Audit observation

The database was checked to confirm that:

- it contained a field for light type and wattage capacity;
- wattage capacities include any ballast or gear wattage; and
- each item of load has a light type, light wattage, and gear wattage recorded.

Audit commentary

The database contains the lamp make and model, lamp wattage and gear wattage.

All items of load have a lamp model, lamp wattage, and gear wattage populated. No lamp or gear wattages were invalidly recorded as zero.

The accuracy of the recorded wattages 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 252 items of load on 26 November 2019. The sample was selected from four strata as follows:

1. Road names A-E
2. Road names F-Mb
3. Road names Mc-R; and
4. Road names S-Z.

Audit commentary

The field audit discrepancies are detailed in the table below:

Street	Database count	Field count	Light count difference	Wattage recorded incorrectly	Comments
Road names A-E					
AVENUE NORTH ROAD (352)	2	2	-	1	One 70W SON was recorded as 22W LED in the database.
BRISTOL STREET (21)	10	10	-	4	Three 150W SON and one 70W SON were recorded as 22W LED in the database.
CHURCHILL CRESCENT (FXT) (255)	4	4	-	1	One 70W SON was recorded as 22W LED in the database.
DENTON ROAD (380)	1	1	-	1	One L42 LED was recorded as a 22W LED in the database.
EXETER STREET (67)	4	4	-	3	Two L42 LEDs were recorded as 41W LEDs in the database, and one 150W SON was recorded as a 22W LED in the database.
Road names F-Mb					
HARTLEY STREET (312)	20	20	-	3	Two 22W LEDs at the wharf were labelled 150W SON in the database. One 70W SON was labelled 22W LED in the database.
Road names Mc-R					
MOUTERE ROAD (464)	2	2	-	1	One L22 LED was recorded in the database as a 70W SON.
NIKAU STREET (LVN) (143)	1	1	-	1	One L42 LED was recorded in the database as a 22W LED.
QUEEN STREET EAST (RURAL) (497)	2	2	-	2	Two 70W SON were recorded in the database as 22W LED.
Road names S-Z					
STRATHMORE AVENUE (188)	12	12	-	1	One L22 LED was recorded in the database as a 69W LED.
WHARF STREET (287)	3	3	-	1	One L42 LED was recorded as a 41W LED in the database.
Grand Total	**252**	**252**	-	**19**	

All lights checked during the field survey were present in the database. Wattage differences are recorded as non-compliance in **section 3.1**.

Audit outcome

Compliant

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

Code reference

Clause 11(3) of Schedule 15.3

Code related audit information

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

Audit observation

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

Audit commentary

The RAMM 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.

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

Genesis' submissions are based on a monthly extract from the RAMM database. A RAMM database extract was provided in October 2019 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	Horowhenua District Council streetlights
Strata	The database contains the HDC items of load DUML in the Horowhenua region. The processes for the management of all HDC items of load are the same, but I decided to place the items of load into four strata: 1. Road names A-E 2. Road names F-Mb 3. Road names Mc-R; and 4. Road names S-Z.
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 55 sub-units.
Total items of load	252 items of load were checked, making up 7.5% of the database load.

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

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

Result	Percentage	Comments
The point estimate of R	108.3	Wattage from survey is higher than the database wattage by 8.3%
R_L	97.9	With a 95% level of confidence it can be concluded that the error could be between -2.1% and 24.8%
R_H	124.8	

These results were categorised in accordance with the "Distributed Unmetered Load Statistical Sampling Audit Guideline", effective from 01/02/19 and the table below shows that Scenario B (detailed below) is the best fit.

The conclusion from Scenario B is that the variability of the sample results across the strata means that the true wattage (installed in the field) could be between 2.1% lower and 24.8% higher than the wattage recorded in the DUML database. Non-compliance is recorded because the potential error is greater than ±5.0%.

- In absolute terms the installed capacity is estimated to be 8 kW higher than the database indicates.
- There is a 95% level of confidence that the installed capacity is between 2 kW lower to 23 kW higher than the database.
- In absolute terms, total annual consumption is estimated to be 33,200 kWh higher than the DUML database indicates.
- There is a 95% level of confidence that the annual consumption is between 8,200 kWh p.a. lower to 98,900 kWh p.a. higher than the database indicates.

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

Light description and capacity accuracy

As discussed in **section 2.4**, all lights have a lamp and gear wattage recorded.

Lamp and gear wattages were compared to the expected values. No lamp wattage discrepancies were identified. 39 gear wattage discrepancies were identified. The differences are expected to result in under

submission of 42 W or 179 kWh p.a. based on 4,271 burn hours p.a. The incorrect records were updated during the audit.

Lamp make model	Description	Recorded gear wattage	Expected gear wattage	Count	Total difference (W)
PHIL (M100, 100 watts)	100W Metal Halide	15	14	3	-3
PHIL (M80, 80 watts)	80W Mercury Vapour	8	10	9	+18
PHIL (MH70, 70 watts)	70W Metal Halide	12	13	27	+27
			Total	**39**	**+42**

The light type and wattage was unable to be confirmed during the field audit for five lights recorded in the subway on Muhunoa West Road (467). The lights belong to NZTA and wattage information was not provided in time to be reviewed as part of this audit, and therefore I cannot confirm compliance. I recommend the potential discrepancies are checked, and the database is updated as necessary.

Recommendation	Description	Audited party comment	Remedial action
Database Accuracy	Confirm the correct lamp and gear wattages for the unknown lights on Muhunoa West Road (467).	Genesis will have the council investigate the assets to correct the information within the DUML database	Identified

Address accuracy

As discussed in **section 2.3**, all items of load have address information recorded.

The field audit of 252 items of load found that for four items of load, the street name and/or GPS coordinates did not reflect the correct location.

Street	Address comment
HARTLEY STREET (312)	Two lights at the wharf were recorded on the same pole (L128) but were located on separate poles.
PALMER ROAD (485)	One light is at the corner of Lakeview Dr and Carex Gr, and the other is on Carex Gr. The GPS locations are correct.
TEPPETT PLACE (617)	One light is located on Story St, but the GPS location is correct.

ICP number accuracy

As discussed in **section 2.2**, 91 items of load do not have a valid ICP number recorded.

Levin Mall lights connected to 0016097099EL1B6 have ICP 0016099004EL9CA recorded in RAMM. There is potential over submission of 28,652 kWh p.a. because these lights are submitted against ICP 0016099004EL9CA based on database information, and ICP 0016097099EL1B6 based on registry information.

Change management process findings

New connection, fault, maintenance and upgrade work is completed by Fulton Hogan, Electra and East Coast Powerlines. All contractors completing work on HDC's streetlights have access to RAMM, and update the database using Pocket RAMM from the field.

An audit was undertaken by Fulton Hogan on completion of HDC's LED upgrade project to check database accuracy.

I walked through the new connection process. New connections are initially recorded in the database as private lights (without an ICP number) and are updated to a valid HDC ICP once they are vested in council. Each new connection application to the Network includes an "as built" plan, and a site check is performed prior to approval. Livening is normally conducted by the developer or the Distributor, with updates to the database performed within two weeks.

Weekly and monthly movement analysis is undertaken on the database by HDC and recent changes made are checked against field invoices.

Outage patrols are not conducted. HDC relies on the public to advise of lights which need to be maintained.

The RAMM database records an installation date, which is used to record the date the light is vested in council once this occurs. There is no separate livening date.

Change dates are automatically generated by RAMM when records change but cannot be selected by the user. Changes normally entered using Pocket RAMM on the date of the change.

Festive lights

The database contains Christmas lighting, which is connected in late November/early December and disconnected in mid-January. These items of load have "Festive Lighting" recorded as the ICP group and are excluded from submissions when they are disconnected. Genesis include these lights for submissions during the period in which they are switched on.

Private lights

Private lights are recorded in the database with "Private" as the ICP group. They are recorded in the database for completeness only. HDC does not have responsibility for maintaining private lights and does not expect to be billed for them. End users are not billed for electricity consumption for private lights by HDC.

As far as HDC is aware the 87 private lights (7451 W) are connected to the streetlight circuits and unmetered.

NZTA lights

NZTA lights are recorded against ICP 0016099060EL730, which is settled as standard unmetered load by Contact Energy. If issues with NZTA lights are reported to HDC, they are passed to NZTA for resolution. ICP 0016099060EL730 is discussed further in **section 1.6.**

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 3.1 With: Clause 15.2 and 15.37B(b) From: 01-Oct-19 To: 14-Oct-19	The database is not confirmed as accurate with a 95% level of confidence. Livening dates are recorded as the vesting date for new connections, and change dates may not reflect the date of the change if they are not processed in RAMM at the time that the change occurs. 39 items of load had invalid gear wattages for their lamp model description, resulting in estimated under submission of 179 kWh p.a. The incorrect records were updated during the audit. Four items of load have some inaccurate address information. 91 items of load do not have ICP numbers recorded, including: • one 22W LED council parks light resulting in estimated under submission of 94 kWh p.a.; • 87 private lights resulting in estimated under submission of 31,823 kWh p.a.; and • three festive lights, which have no impact on submission because volumes are recorded against ICP 0016099004EL9CA when the lights are connected. Levin Mall lights are submitted against ICP 0016099004EL9CA based on database information, and also ICP 0016097099EL1B6 based on registry information, resulting in estimated over submission of 28,652 kWh p.a. Potential impact: Medium Actual impact: Unknown Audit history: Twice Controls: Weak Breach risk rating: 6
Audit risk rating	**Rationale for audit risk rating**
Medium	The controls over the database are rated as weak because database accuracy falls outside the ±5% accuracy threshold, and issues were identified across a range database information. The impact is assessed to be medium based on the kWh differences described above. The incorrect gear wattages have already been corrected.

Actions taken to resolve the issue	Completion date	Remedial action status
Genesis will be assessing the information provided for the "Council lighting assets", Private lights are the responsibility of the Distributor, who is responsible for assigning a distributor only ICP and assigning the correct shared ICPs (SUML). This is not DUML and is not a trader or Council responsibility. The Distributor will be notified of these lights.	01/03/2020	Investigating

Preventative actions taken to ensure no further issues will occur	Completion date	
Genesis will work with the Council for completeness. Genesis has sent all Private lighting assets to the Distributor for confirmation.	01/03/2020	

3.2. Volume information accuracy (Clause 15.2 and 15.37B(c))

Code reference

Clause 15.2 and 15.37B(c)

Code related audit information

The audit must verify that:

- *volume information for the DUML is being calculated accurately*
- *profiles for DUML have been correctly applied.*

Audit observation

The submission was checked for accuracy for the month the database extract was supplied. This included:

- checking the registry to confirm that the ICP has the correct profile and submission flag; and
- checking the database extract combined with the on hours against the submitted figure to confirm accuracy.

Audit commentary

Genesis reconciles this DUML load using the CST profile for 0016099004EL9CA and UNM profile for 0016097099EL1B6. The correct profiles and submission types are recorded on the registry.

Genesis reconciles this DUML load as follows:

ICP	Profile	On hours	Wattage
0016099004EL9CA	CST	Data logger	Monthly extract from the RAMM database. The database is not confirmed as accurate with a 95% level of confidence as recorded in **section 3.1**.
0016097099EL1B6	UNM	Electricity registry (11.9 hours)	Electricity registry (78.5 kWh per day). HDC confirmed that these lights are currently recorded against ICP 0016099004EL9CA in RAMM. HDC is working with RAMM to update the ICP number to 0016097099EL1B6.

I checked the submission data for October 2019 and found the load for 0016099004EL9CA had been correctly calculated based on the data logger and monthly extract information, and 0016097099EL1B6 had been correctly calculated based on the registry information. Festive light volumes are included when connected.

Sources of inaccuracy are as follows:

Issue	Estimated volume information impact (annual kWh)
One 22W LED does not have an ICP number recorded against it	Under submission of 94 kWh p.a.
Three festive lights do not have an ICP number recorded against them	No impact, because load is submitted with the correct ICP number when connected
87 private lights do not have an ICP number recorded against them.	Under submission of 31,823 kWh p.a.
Levin Mall lights connected to 0016097099EL1B6 have ICP 0016099004EL9CA recorded in RAMM	Over submission of 28,652 kWh p.a. because these lights are submitted against ICP 0016099004EL9CA based on database information, and ICP 0016097099EL1B6 based on registry information.
39 items of load had invalid gear wattages for their lamp model description. The incorrect records were updated during the audit.	Under submission of 179 kWh p.a.

On 18 June 2019, the Electricity Authority issued a memo clarifying the memo of 2012 that stated that a monthly snapshot was sufficient to calculate submission from, and confirmed the code requirement to calculate the correct monthly load must:

- take into account when each item of load was physically installed or removed; and
- wash up volumes must take into account where historical corrections have been made to the DUML load and volumes.

The current monthly report is provided as a snapshot and this practice is non-compliant. When a wattage is changed in the database due to a physical change or a correction, only the record present at the time the report is run is recorded, not the historical information showing dates of changes. Genesis is working to develop event-based calculations, which will enable accurate volume calculations where lamps change part way through a month.

The RAMM database records an installation date, which is used to record the date the light is vested in council once this occurs. There is no separate livening date.

Change dates are automatically generated by RAMM when records change but cannot be selected by the user. Changes are generally entered by TDC when the change is confirmed and may be after the physical date of the change. For the bulk LED rollouts, a change date was not consistently provided by the contractor.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.1 With: Clause 11(1) of Schedule 15.3 From: 01-Oct-19 To: 14-Oct-19	The database is not confirmed as accurate with a 95% level of confidence. The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot. Livening dates are recorded as the vesting date for new connections, and change dates may not reflect the date of the change if they are not processed in RAMM at the time that the change occurs. 39 items of load had invalid gear wattages for their lamp model description, resulting in an estimated under submission of 179 kWh p.a. The incorrect records were updated during the audit. 90 items of load do not have ICP numbers recorded, including: • One 22W LED council parks light resulting in estimated under submission of 94 kWh p.a. • 87 private lights resulting in estimated under submission of 31,823 kWh p.a. • Three festive lights, which have no impact on submission because volumes are recorded against ICP 0016099004EL9CA when the lights are connected. Levin Mall lights are submitted against ICP 0016099004EL9CA based on database information, and also ICP 0016097099EL1B6 based on registry information, resulting in estimated over submission of 28,652 kWh p.a. Potential impact: Medium Actual impact: Unknown Audit history: Twice Controls: Weak Breach risk rating: 6
Audit risk rating	**Rationale for audit risk rating**
Medium	The controls over the database are rated as weak because database accuracy falls outside the ±5% accuracy threshold, and issues were identified across a range database information. The impact is assessed to be medium based on the kWh differences described above. The incorrect gear wattages have already been corrected.

Actions taken to resolve the issue	Completion date	Remedial action status
Genesis Will work with HDC and SmartPower to correct any invalid asset information. Private lights are not the responsibility of the Council. Genesis has requested the Distributor to review these assets. Tracking of changes will be discussed with the council.	01/03/2020	Identified

Preventative actions taken to ensure no further issues will occur	Completion date	
Confirm asset ICP identifier and have RAMM updated accordingly. Review asset information as required.	01/03/2020	

CONCLUSION

Streetlight load is determined by wattages held within HDC's RAMM database, and a monthly extract is provided to Genesis. ICP 0016097099EL1B6 is settled based on registry information. New connection, fault, maintenance and upgrade work is completed by Fulton Hogan, Electra and East Coast Powerlines. All contractors completing work on HDC's streetlights have access to RAMM, and update the database using Pocket RAMM from the field.

An audit was undertaken by Fulton Hogan on completion of HDC's LED upgrade project to ensure that the database records were accurate.

Database accuracy is described as follows:

Result	Percentage	Comments
The point estimate of R	108.3	Wattage from survey is higher than the database wattage by 8.3%
R_L	97.9	With a 95% level of confidence it can be concluded that the error could be between -2.1% and 24.8%
R_H	124.8	

The variability of the sample results across the strata means that the true wattage (installed in the field) could be between 2.1% lower and 24.8% higher than the wattage recorded in the DUML database. Non-compliance is recorded because the potential error is greater than ±5.0%.

- In absolute terms the installed capacity is estimated to be 8 kW higher than the database indicates.
- There is a 95% level of confidence that the installed capacity is between 2 kW lower to 23 kW higher than the database.
- In absolute terms, total annual consumption is estimated to be 33,200 kWh higher than the DUML database indicates.
- There is a 95% level of confidence that the annual consumption is between 8,200 kWh p.a. lower to 98,900 kWh p.a. higher than the database indicates.

Genesis reconciles this DUML load as follows:

ICP	Profile	On hours	Wattage
0016099004EL9CA	CST	Data logger	Monthly extract from the RAMM database
0016097099EL1B6	UNM	Electricity registry	Electricity registry

On 18 June 2019, the Electricity Authority issued a memo clarifying the memo of 2012 that stated that a monthly snapshot was sufficient to calculate submission from, and confirmed the code requirement to calculate the correct monthly load must:

- take into account when each item of load was physically installed or removed; and
- wash up volumes must take into account where historical corrections have been made to the DUML load and volumes.

The current monthly report is provided as a snapshot and is non-compliant, and Genesis completes revision submissions where corrections are required. Genesis is working to develop event-based calculations, which will enable accurate volume calculations where lamps change part way through a month.

The future risk rating of 20 indicates that the next audit be completed in three months. This may not be sufficient time to resolve the matters raised and I recommend the Authority considers an audit period of at least six months to allow time for the identified issues to be resolved.

PARTICIPANT RESPONSE

Genesis request that a 6 -9 month review be imposed in order to clarify the ownership of any Private lighting with the distributor and the council. And for Genesis and HDC to discuss the current processes around new connections and lamp replacements and their compliance requirements.