ELECTRICITY INDUSTRY PARTICIPATION CODE
DISTRIBUTED UNMETERED LOAD AUDIT REPORT

For

UPPER HUTT CITY COUNCIL AND TRUSTPOWER

Prepared by: Steve Woods

Date audit commenced: 15 August 2019

Date audit report completed: 2 September 2019

Audit report due date: 1 October 2019

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EXECUTIVE SUMMARY

This audit of the **Upper Hutt City Council (UHCC)** DUML database and processes was conducted at the request of **Trustpower Energy (Trustpower)** 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 RAMM database used for submission is managed by UHCC. Fulton Hogan is the streetlight contractor and they update the database using Pocket RAMM. UHCC sends a monthly report to Trustpower.

The database contains three ICPs which include all relevant items of load, including NZTA and private lights.

Five non-compliances were identified, and one recommendation is made.

The field audit found the database had an accuracy within +/- 5% with a 95% level of confidence.

The main issue found is that monthly reporting is provided as a snapshot and although the impact is low, this practice is non-compliant. The database contains a "light install date" and a "lamp install date" but there is not a field for "livening date" for newly connected lights. 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.

The future risk rating of eight indicates that the next audit be completed in 18 months. I agree with this recommendation because the issues raised have a low impact.

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 monthly database extract provided does not track changes at a daily basis and is provided as a snapshot. Livening dates not recorded for new connections.	Moderate	Low	2	Identified
ICP identifier	2.2	11(2)(a) and (d) of Schedule 15.3	Two records with a blank ICP.	Strong	Low	1	Identified
All load recorded in database	2.5	11(2A) of Schedule 15.3	Four items of load not recorded in the database.	Strong	Low	1	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)	The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot. Livening dates not recorded for new connections.	Moderate	Low	2	Identified
Volume information accuracy	3.2	15.2 and 15.37B(c)	The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot. Livening dates not recorded for new connections.	Moderate	Low	2	Identified
Future Risk Rating						8	

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

Clause	Subject	Section	Description
11(1) of Schedule 15.3	Deriving submission information	2.1	Use the STL profile for submission rather than the UML profile.

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

Trustpower provided a copy of their organisational structure.

1.3. Persons involved in this audit

Auditor:

Steve Woods

Veritek Limited

Electricity Authority Approved Auditor

Other personnel assisting in this audit were:

Name	Title	Company
Jakir Hussain	Roading Engineer – Operations	Upper Hutt City Council
Robbie Diederen	Reconciliation Analyst	Trustpower

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.

UHCC 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)
0001255307UNA1A	SHP78 Hutt Road	UHT0331	UML	2,376	149,940
0001256870UN363	SHP1 Hutt Road	HAY0111	UML	361	12,464
0001256872UN3E6	SHP30 Hutt Road	HAY0331	UML	1,333	73,675
Total				**4,070**	**236,079**

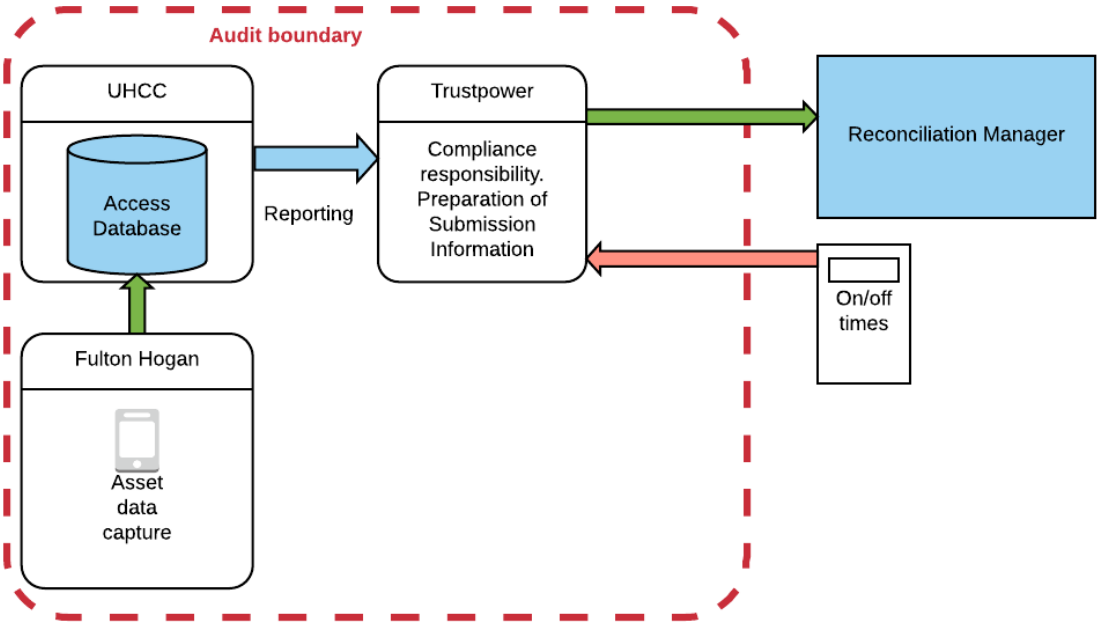
1.7. Authorisation Received

All information was provided directly by Trustpower and UHCC.

1.8. Scope of Audit

The RAMM database used for submission is managed by UHCC. Fulton Hogan is the streetlight contractor and they update the database using Pocket RAMM. UHCC sends a monthly report to Trustpower.

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

The field audit was undertaken of a statistical sample of 306 items of load on 20 August 2019.

The database contains private lighting and NZTA lighting. These two groups of lights do not have individual ICPs, they are included with the road lighting.

1.9. Summary of previous audit

The previous audit was completed in April 2018 by Tara Gannon of Veritek Limited. Four non-compliances were identified. The statuses of the non-compliances and recommendation are described below.

Subject	Section	Clause	Non-compliance	Status
Deriving submission information	2.1	11(1) of Schedule 15.3	The database used to prepare submissions contains some inaccurate information. • The database accuracy is assessed to be 96.6% indicating an estimated over submission of 1,405 kWh per annum. • 109 lamps have incorrect ballast wattage recorded, and the errors will result in estimated under submission of 598 watts or 2,554 kWh per annum. • One lamp has missing wattage information. The expected wattage is 103 and expected under reporting is 439 kWh per annum. Incorrect profiles are recorded on the registry.	Still existing Not applicable
Description and capacity of load	2.4	11(2)(c) and (d) of Schedule 15.3	One lamp has some missing make and model information and no lamp wattage recorded.	Cleared
Database accuracy	3.1	15.2 and 15.37B(b)	The database used to prepare submissions contains some inaccurate information. • The database accuracy is assessed to be 96.6% indicating an estimated over submission of 1,405 kWh per annum. • 109 lamps have incorrect ballast wattage recorded, and the errors will result in estimated under submission of 598 watts or 2,554 kWh per annum. One lamp has missing wattage information. The expected wattage is 103 and expected under reporting is 439 kWh per annum.	Still existing
Volume information accuracy	3.2	15.2 and 15.37B(c)	The database used to prepare submissions contains some inaccurate information. • The database accuracy is assessed to be 96.6% indicating an estimated over submission of 1,405 kWh per annum. • 109 lamps have incorrect ballast wattage recorded, and the errors will result in estimated under submission of 598 watts or 2,554 kWh per annum. • One lamp has missing wattage information. The expected wattage is 103 and expected under reporting is 439 kWh per annum. Incorrect profiles are recorded on the registry.	Still existing Not applicable

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

Trustpower 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.

Audit commentary

Trustpower reconciles this DUML load using the UML profile. Whilst the Code allows the use of this profile, it is an "NSP derived" profile, meaning that it assumes consumption occurs all day, where streetlights only operate at night. I recommend Trustpower uses the STL profile for reconciling this load.

Recommendation	Description	Audited party comment	Remedial action
Regarding Clause 11(1) of Schedule 15.3	Use the STL profile for submission rather than the UML profile.	Trustpower is using the STL profile .This was initiated September 2018 but the Registry had not been update. This has now been rectified – No re-submissions needed.	Cleared

Submissions are based on the database information, with on and off times derived from data logger information.

I recalculated the submissions for July 2019. I confirmed that the calculation method was correct. Festive lights were correctly excluded from the calculation because they were not connected.

There is some inaccurate data within the database used to calculate submissions. This is recorded as non-compliance and discussed in **sections 3.1** and **3.2**.

On 18 June 2019, the Electricity Authority issued a memo confirming that 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. The database contains a "light install date" and a "lamp install date" but there is not a field for "livening date" for newly connected lights. 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.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.1 With: Clause 11(1) of Schedule 15.3 From: unknown To: 24-Aug-19	The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot. Livening dates not recorded for new connections. Potential impact: Low Actual impact: Low Audit history: Multiple times 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 submission information has a high level of accuracy. The impact is assessed to be low, because the difference between a monthly snapshot and daily recording of changes is a small percentage of the total consumption for any given month.

Actions taken to resolve the issue	Completion date	Remedial action status
Customer will be advised to implement daily updates of SL.on database.	15/12/2019	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
While Trustpower has no authority to make a customer comply, we will endeavour to check the daily changes on the monthly updates and advise the customer each time that this is not compliant.	Ongoing	

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

Code reference

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

Code related audit information

The DUML database must contain:

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

Audit observation

The database was checked to confirm an ICP is recorded for each item of load.

Audit commentary

Two items of load have a blank ICP.

Audit outcome

Non-compliant

Non-compliance	Description		
Audit Ref: 2.2 With: Clause 11(2)(a) and (aa) of Schedule 15.3 From: 01-Jul-19 To: 24-Aug-19	Two records with a blank ICP. Potential impact: Low Actual impact: Low Audit history: None Controls: Strong Breach risk rating: 1		
Audit risk rating	**Rationale for audit risk rating**		
Low	The controls are recorded as strong because they mitigate risk to an acceptable level. The impact on settlement and participants is minor; therefore the audit risk rating is low.		
Actions taken to resolve the issue		**Completion date**	**Remedial action status**
Will ask Customer to input correct ICP number for these two items.		15/12/2019	Identified
Preventative actions taken to ensure no further issues will occur		**Completion date**	
Trustpower will check database to ensure this has been done.		15/12/2019	

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 and 1,644 of 4072 records have GPS coordinates. There is sufficient information to locate items of load.

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.

Audit commentary

Lamp make, model, lamp wattage and ballast wattage are included in the database.

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 306 items of load.

Audit commentary

The field audit discrepancies are detailed in the table below.

Address	Database Count	Field Count	Count differences	Wattage differences	Comments
Oaklands Grove	7	7	0	3	3 x 27W LED recorded as 24W
Henry Street	10	12	2	0	2 additional lights
Ranfurly St	4	6	2	0	2 additional lights
Total			**+4**	**3**	

I found four more lamps in the field than were recorded in the database, and three lamp wattage differences.

Audit outcome

Non-compliant

Non-compliance	Description		
Audit Ref: 2.5 With: Clause 11(2A) of Schedule 15.3 From: 01-May-18 To: 24-Aug-19	Four items of load not recorded in the database. Potential impact: Low Actual impact: Low Audit history: None Controls: Strong Breach risk rating: 1		
Audit risk rating	**Rationale for audit risk rating**		
Low	The controls are recorded as strong because they mitigate risk to an acceptable level. The impact on settlement and participants is minor; therefore the audit risk rating is low.		
Actions taken to resolve the issue		**Completion date**	**Remedial action status**
Will ask Customer to investigate these lamps and enter into the database.		15/12/2019	Identified
Preventative actions taken to ensure no further issues will occur		**Completion date**	
Trustpower will check the database and monthly update report to ensure this has been done.		Ongoing	

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 Trustpower 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

UHCC demonstrated 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	UHCC region
Strata	The database contains items of load in Upper Hutt area. The processes for the management of all UHCC items of load are the same, and I decided to create three strata, one for each ICP.
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 49 sub-units.
Total items of load	306 items of load were checked.

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

Audit commentary

Field Audit Findings

A field audit was conducted of a statistical sample of 306 items of load. The "database auditing tool" was used to analyse the results, which are shown in the table below.

Result	Percentage	Comments
The point estimate of R	101.0	Wattage from survey is higher than the database wattage by 1.0%
R_L	100.1	With a 95% level of confidence it can be concluded that the error could be between 0.1% and 3.4%
R_H	103.4	

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 A applies.

The conclusion from Scenario A is that the database is accurate to within +/- 5%. Compliance is recorded for database accuracy.

In absolute terms the installed capacity is estimated to be 2.0 kW higher than the database indicates.

There is a 95% level of confidence that the installed capacity is between 0.0 kW to 8.0 kW higher than the database.

In absolute terms, total annual consumption is estimated to be 10,200 kWh higher than the DUML database indicates.

There is a 95% level of confidence that the annual consumption is between 700kWh p.a. to 342,300 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 %

Wattages for all items of load were checked against the published standardised wattage table produced by the Electricity Authority, and the manufacturer's specifications where they were not included in the standardised wattage table. All wattages and ballast wattages were found to be correct.

Wattage and ballast accuracy findings

As recorded in **section 2.4**, all wattage and ballast wattage figures were correct.

Change management process findings

The RAMM database used for submission is managed by UHCC. Fulton Hogan is the streetlight contractor and they update the database using Pocket RAMM. UHCC is installing a central management system and does not plan to use dimming.

I conducted a walkthrough of the new connection process. The lights are recorded in RAMM when an "as built" plan is provided to UHCC, and a field check by the Asset Engineer is completed as part of this process. UHCC notifies Trustpower when new lights are ready to be livened, and Trustpower provides Wellington Electricity with an approval to liven.

The current monthly report is provided as a snapshot and this practice is non-compliant. The database contains a "light install date" and a "lamp install date" but there is not a field for "livening date" for newly connected lights. 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.

UHCC provides the dates the festive lights are connected to Trustpower, so they can include or exclude the lights in their submissions as appropriate. This process was checked and found to be compliant.

Outage patrols occur periodically but are not as critical now that LED lighting is in place.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 3.1 With: Clause 15.2 and 15.37B(b) From: unknown To: 24-Aug-19	The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot. Livening dates not recorded for new connections. 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 submission information has a high level of accuracy. The impact is assessed to be low, because the difference between a monthly snapshot and daily recording of changes is a small percentage of the total consumption for any given month.

Actions taken to resolve the issue	Completion date	Remedial action status
Customer will be advised to implement daily updates of SL.on database.	15/12/2019	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
While Trustpower has no authority to make a customer comply, we will endeavour to check the daily changes on the monthly updates and advise the customer each time that this it not compliant.	Ongoing	

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 all ICPs have the correct profile and submission flag; and
- checking the database extract combined with the burn hours against the submitted figure to confirm accuracy.

Audit commentary

Trustpower reconciles this DUML load using the UML profile. Whilst the Code allows the use of this profile, it is an "NSP derived" profile, meaning that it assumes consumption occurs all day, where streetlights only operate at night. I recommended in **section 2.1**, that Trustpower uses the STL profile for reconciling this load.

Submissions are based on the database information, with on and off times derived from data logger information.

I recalculated the submissions for July 2019. I confirmed that the calculation method was correct. Festive lights were correctly excluded from the calculation because they were not connected.

There is some inaccurate data within the database used to calculate submissions. This is recorded as non-compliance and discussed in **sections 3.1** and **3.2**.

On 18 June 2019, the Electricity Authority issued a memo confirming that 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. The database contains a "light install date" and a "lamp install date" but there is not a field for "livening date" for newly connected lights. 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.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 3.2 With: Clause 15.2 and 15.37B(c) From: unknown To: 24-Aug-19	The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot. Livening dates not recorded for new connections. 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 submission information has a high level of accuracy. The impact is assessed to be low, because the difference between a monthly snapshot and daily recording of changes is a small percentage of the total consumption for any given month.

Actions taken to resolve the issue	Completion date	Remedial action status
Customer will be advised to implement daily updates of SL.on database.	15/12/2019	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
While Trustpower has no authority to make a customer comply, we will endeavour to check the daily changes on the monthly updates and advise the customer each time that this it not compliant.	Ongoing	

CONCLUSION

The RAMM database used for submission is managed by UHCC. Fulton Hogan is the streetlight contractor and they update the database using Pocket RAMM. UHCC sends a monthly report to Trustpower.

The database contains three ICPs which include all relevant items of load, including NZTA and private lights.

The field audit found the database had an accuracy within +/- 5% with a 95% level of confidence.

The main issue found is that monthly report is provided as a snapshot and although the impact is low, this practice is non-compliant. The database contains a "light install date" and a "lamp install date" but there is not a field for "livening date" for newly connected lights. 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.

The future risk rating of eight indicates that the next audit be completed in 18 months. I agree with this recommendation because the issues raised have a low impact.

PARTICIPANT RESPONSE

Trustpower has reviewed this report and their comments are contained within its body.