ELECTRICITY INDUSTRY PARTICIPATION CODE
DISTRIBUTED UNMETERED LOAD AUDIT REPORT

VERITEK

For

SOUTH WAIRARAPA DISTRICT COUNCIL AND MERCURY NZ LIMITED

Prepared by: Rebecca Elliot

Date audit commenced: 17 May 2021

Date audit report completed: 28 May 2021

Audit report due date: 1 June 2021

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EXECUTIVE SUMMARY

This audit of the **South Wairarapa District Council (SWDC)** DUML database and processes was conducted at the request of **Mercury NZ Limited (Mercury)** 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 RAMM database continues to be maintained by Fulton Hogan. PSW complete all fieldwork for the SWDC streetlights, with assistance from Fulton Hogan as required. Additions, removals, and changes to lights are communicated to Fulton Hogan. The information is provided in a spreadsheet and manually keyed into RAMM.

In the last audit it was noted that Dave Patten was working with the SWDC to arrange for the missing and incorrect RAMM data identified during that audit to be updated, this has been completed. Reporting is provided directly from the RAMM database, the audit found that some errors still exist, and these will need to be corrected by SWDC.

Mercury reconciles the SWDC DUML load using the HHR profile in accordance with exemption 233. Wattages are derived from a RAMM database extract. On and off times are derived from a data logger.

The accuracy of the database extract provided to Mercury was assessed:

Result	Percentage	Comments
The point estimate of R	95.4	Wattage from the survey is higher than the database wattage by 4.6%
R_L	91.8	With a 95% level of confidence, it can be concluded that the error could be between -8.2% and +0.2%
R_H	100.2	

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

The results indicate that the best available estimate is not precise enough to conclude that the database is accurate within ±5%.

- The variability of the sample results across the strata means that the true wattage (installed in the field) could be between 8.2% lower and 0.2% 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 3 kW lower than the database indicates.
- There is a 95% level of confidence that the installed capacity is between 5 kW lower than the database.
- In absolute terms, total annual consumption is estimated to be 11,400 kWh lower than the DUML database indicates.
- There is a 95% level of confidence that the annual consumption is between 20,300 kWh p.a. lower to 600 kWh p.a. higher than the database indicates.

Four non-compliances were identified, and three recommendations were made. The future risk rating of 14 indicates that the next audit be completed in 12 months. I have considered this in conjunction with Mercury's comments and recommend that the next audit period be in 12 motnhs.

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	Variance in light volumes reported to Mercury vs what is recorded in the database is likely to be resulting in an estimated 48,756 kWh per annum of under submission. The database accuracy is assessed to be 95.4% of the database for the sample checked indicating a potential under submission of approximately 14,400 kWh per annum. 14 items of load have incorrect lamp wattage resulting in an estimated minor over submission of 222 kWh p.a. based on 4,271 burn hours. 12 items of load have incorrect gear wattage resulting in an estimated minor under submission of 406 kWh p.a. based on 4,271 burn hours. Changes are not always recorded in the database extract from the date which they became effective.	Moderate	Medium	4	Disputed
ICP identifier and items of load	2.2	11(2)(a) and (aa) of Schedule 15.3	Blank or incorrect ICP number recorded in the database for 861 items of load.	Moderate	Low	2	Disputed
Database accuracy	3.1	15.2 and 15.37B (b)	The database accuracy is assessed to be 95.4% of the database for the sample checked indicating a potential under submission of approximately 14,400 kWh per annum. 14 items of load have incorrect lamp wattage resulting in an estimated minor over submission of 222 kWh p.a. based on 4,271 burn hours. 12 items of load have incorrect gear wattage resulting in an estimated minor under submission of 406 kWh p.a. based on 4,271 burn hours. Blank or incorrect ICP number recorded in the database for 861 items of load. Changes are not always recorded in the database extract from the date which they became effective.	Moderate	Medium	4	Disputed

Subject	Section	Clause	Non-Compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
Volume information accuracy	3.2	15.2 and 15.37B (c)	Variance in light volumes reported to Mercury vs what is recorded in the database is likely to be resulting in an estimated 48,756 kWh per annum of under submission. The database accuracy is assessed to be 95.4% of the database for the sample checked indicating a potential under submission of approximately 14,400 kWh per annum. 14 items of load have incorrect lamp wattage resulting in an estimated minor over submission of 222 kWh p.a. based on 4,271 burn hours. 12 items of load have incorrect gear wattage resulting in an estimated minor under submission of 406 kWh p.a. based on 4,271 burn hours. Changes are not always recorded in the database extract from the date which they became effective.	Moderate	Medium	4	Disputed
Future Risk Rating						10	

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
Deriving submission information	2.1	Mercury to work with the South Wairarapa DC to determine why there is a difference in the data that has been provided for the audit and the data that the customer has received for the same date period.
Database Accuracy	3.1	Mercury to liaise with South Wairarapa DC to update the ICP in RAMM for all items of load. Correct the 147 items of load that have transposed GPS coordinates, with the northing value recorded in the easting field and vice versa. Correct the street addresses for the nine items of load with the correct GPS coordinates. The street names should be updated from Esther St to Tuscan Lane and Burgundy Drive.

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

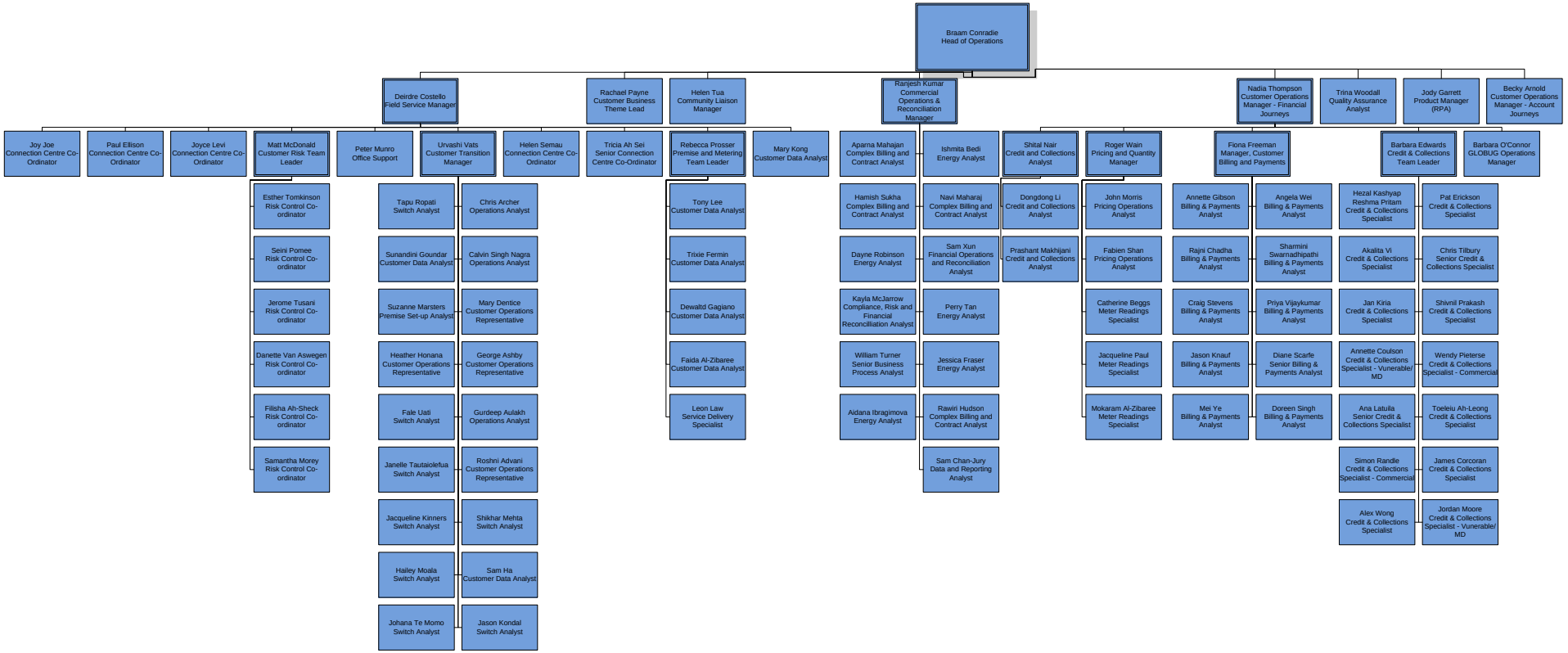
Current code exemptions were reviewed on the Electricity Authority website.

Audit commentary

Mercury has been granted exemption No. 233. This allows them to provide half-hour ("HHR") submission information instead of non-half-hour ("NHH") submission information for distributed unmetered load ("DUML"). This exemption expires on 31 October 2023.

1.2. Structure of Organisation

Mercury provided their current organisational structure:



1.3. Persons involved in this audit

Auditor:

Name	Title	
Rebecca Elliot	Auditor	Veritek Ltd
Claire Stanley	Supporting Auditor	Veritek Ltd

Other personnel assisting in this audit were:

Name	Title	Company
Tim Langley	Roading Manager	South Wairarapa District Council
Kayla McJarrow	Compliance, Risk & Financial Reconciliation Analyst	Mercury NZ Ltd

1.4. Hardware and Software

RAMM

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.

Trader systems

Systems used by Mercury to calculate submissions are assessed as part of their reconciliation participant audit.

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)
0020906000WRDFA	STREET LIGHTING FEATHERSTON	GYT0331	HHR	1,042	57,719
Total				**1,042**	**57,719**

1.7. Authorisation Received

All information was provided directly by Mercury and SWDC.

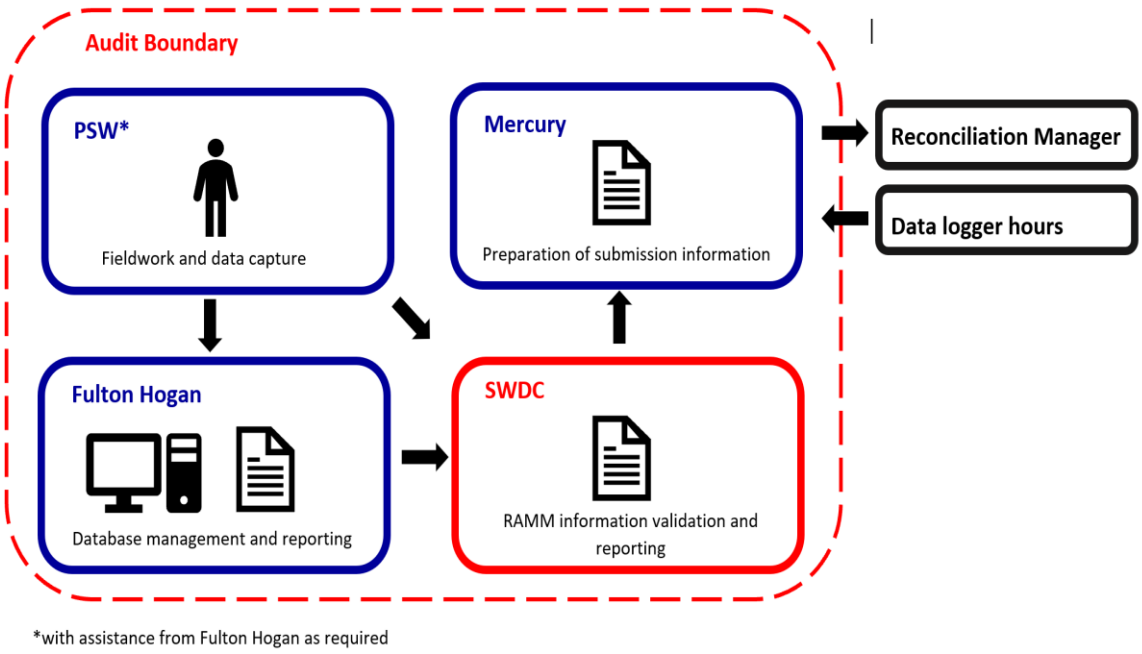
1.8. Scope of Audit

This audit of the SWDC DUML database and processes was conducted at the request of Mercury 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 RAMM database is maintained by Fulton Hogan. PSW complete all fieldwork for the SWDC streetlights, with assistance from Fulton Hogan as required. Additions, removals, and changes to lights are communicated to Fulton Hogan. The information is provided in a spreadsheet and manually keyed into RAMM.

Mercury reconciles the SWDC DUML load using the HHR profile in accordance with exemption 233. Wattages are derived from a RAMM database extract. On and off times are derived from a data logger.

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 boundaries for clarity.



The field audit was undertaken of a statistical sample of 165 items of load on 19 May 2021.

1.9. Summary of previous audit

The previous audit of this database was undertaken by Tara Gannon of Veritek Limited in May 2020. 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
Profiles	2.1	11(1) of Schedule 15.3	The database is not confirmed as accurate with a 95% level of confidence as recorded in **section 3.1**.	Still existing
			15 lamps had incorrect total wattages, resulting in potential over submission of 171W or 730 kWh p.a. based on 4,271 burn hours. Corrections were processed in the database extract for February 2020, and revised submission information was provided for February 2020 revision 1.	Existing for different lights.
			The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot.	Still existing
			Changes are not always recorded in the database extract from the date which they became effective.	Still existing
Location of each item of load	2.3	11(2B) of Schedule 15.3	20 items of load do not have sufficient location information recorded to enable them to be readily located.	Cleared
Database accuracy	3.1	Clause 15.2 & 15.37(b)	The database is not confirmed as accurate with a 95% level of confidence.	Still existing
			15 lamps had incorrect total wattages, resulting in potential over submission of 171W or 730 kWh p.a. based on 4,271 burn hours. Corrections were processed in the database extract for February 2020, and revised submission information was provided for February 2020 revision 1.	Still existing for different lights
			20 items of load do not have sufficient location information recorded to enable them to be readily located.	Still existing
			Two items of load had correct GPS coordinates, but incorrectly recorded street addresses. • A light situated at the end of Westwood Lane, Greytown was recorded against Kuratawhiti St, Greytown. • A light outside 17 Homestead Lane, Greytown was recorded against Udy Street, Greytown.	Cleared
			95 items of load had transposed GPS coordinates, with the northing value recorded in the easting field and vice versa. Dave Patten	Still existing

Subject	Section	Clause	Non-compliance	Status
			confirmed he will arrange for the GPS coordinates to be updated.	
Volume information accuracy	3.2	15.2 and 15.37B(c)	The database is not confirmed as accurate with a 95% level of confidence as recorded in **section 3.1**. 15 lamps had incorrect total wattages, resulting in potential over submission of 171W or 730 kWh p.a. based on 4,271 burn hours. Corrections were processed in the database extract for February 2020, and revised submission information was provided for February 2020 revision 1. The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot. Changes are not always recorded in the database extract from the date which they became effective.	Still existing Still existing for different lights. Still existing 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

Mercury 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

Mercury reconciles this DUML load using the HHR profile in accordance with exemption 233. On and off times are derived from a data logger.

I reviewed the submission information for the April 2021 submissions and confirmed that the calculation methodology was correct. I checked the submission calculation provided by Mercury against the data extract and found a variance:

ICP	Light Count April 2021	Database extract light count	Light count difference	Submitted kWh Value	Expected kWh Value	kWh difference
0020906000WRDFA	948	1,042	94	18,624	22,687	4,063

This is potentially resulting in an estimated under submission of 48,756 kWh per annum. I recommend that Mercury work with SWDC to determine why there is a difference in the monthly report provided to Mercury and the database extract provided.

Subject	Section	Recommendation
Database accuracy	2.1	Mercury to work with the South Wairarapa DC to determine why there is a difference in the data that has been provided for the audit and the data that the customer has received for the same date period.

As detailed in **section 3.1** the database accuracy is assessed to be 95.4% of the database for the sample checked indicating a potential under submission of approximately 14,400 kWh per annum.

As detailed in **section 3.1**, examination of the RAMM database found a total of 14 lights with the incorrect wattage value recorded and 12 lights with the incorrect ballast values applied. This will be resulting in a minor estimated over submission of 222 kWh per annum for the incorrect wattages and 406 kWh of under submission for the incorrect ballasts applied.

The current monthly report is compliant, and Mercury completes revision submissions where corrections are required.

The RAMM 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 changes are processed in the database extract used

for submission, they are applied from the first day of the month, rather than the date that the change took effect.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.1 With: Clause 11(1) of Schedule 15.3 From: 15-May-20 To: 17-May-21	Variance in light volumes reported to Mercury vs what is recorded in the database is likely to be resulting in an estimated 48,756 kWh per annum of under submission. The database accuracy is assessed to be 95.4% of the database for the sample checked indicating a potential under submission of approximately 14,400 kWh per annum. 14 items of load have incorrect lamp wattage resulting in an estimated minor over submission of 222 kWh p.a. based on 4,271 burn hours. 12 items of load have incorrect gear wattage resulting in an estimated minor under submission of 406 kWh p.a. based on 4,271 burn hours. Changes are not always recorded in the database extract from the date which they became effective. Potential impact: Medium Actual impact: Medium Audit history: Twice Controls: Moderate Breach risk rating: 4
Audit risk rating	**Rationale for audit risk rating**
Medium	The controls are rated as moderate as controls will mitigate risk most of the time, but there is room for improvement. The audit risk rating is assessed to be medium based on the potential submission inaccuracies.

Actions taken to resolve the issue	Completion date	Remedial action status

Variance in raw database and monthly extract used for submission We will be liaising with SWDC to determine the reason for the raw RAMM database and monthly database extract variances however, we note that our database extract is consistent with the auditor findings below and therefore we deem our database extract and submission to be correct. **Database accuracy** We dispute the findings as the audit was conducted based on the raw RAMM database and not the extract that SWDC provide to Mercury for submission. **14 items with incorrect lamp wattage** We dispute the findings as the monthly database extract that SWDC sends to Mercury for submission has the correct lamp wattage values of 58 for the ITALO 1 STU-S 4.7-3M model and 51 for the Itron Zero 0C6 STA model. Our submission is based on the correct lamp wattage and therefore there is no over submission due to lamp wattage. **12 items with incorrect gear wattage** We dispute the findings as the monthly database extract that SWDC sends to Mercury for submission has the correct gear wattage values of 14 for the 100W SON model, 18 for the 150W SON model and 9 for the 50W HPL model. Our submission is based on the correct gear wattage and therefore there is no under submission due to gear wattage. **Blank or incorrect ICP** The monthly database extract that Mercury receives from SWDC does not have any blank or incorrect ICPs. Mercury will be liaising with SWDC to determine why the raw RAMM database is different to the monthly extract provided to Mercury. We accept that the raw RAMM database varies from the database extract that Mercury receives monthly and uses for submission. We will be liaising with SWDC to determine the reason for this and will correct as necessary.	Oct21	Disputed
Preventative actions taken to ensure no further issues will occur	**Completion date**	
Mercury will be liaising with SWDC to determine why the raw RAMM database is different to the monthly extract provided to Mercury. We will work with SWDC to ensure the change management process is working as expected and that any database variances are corrected.	Oct21	

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

All DUML load is connected to ICP 0020906000WRDFA and is being reconciled against this ICP. 181 lamps have this ICP recorded in the database.

- 38 lamps have ICP 0020907000WRC5A, this ICP is decommissioned on the registry.
- 823 do not have the ICP recorded in the database.

Audit outcome

Non-compliant

<table>
<tr><th>Non-compliance</th><th colspan="3">Description</th></tr>
<tr><td>Audit Ref: 2.2
With: Clause 11(2)(a) and (aa) of Schedule 15.3
From: 15-May-20
To: 17-May-21</td><td colspan="3">Blank or incorrect ICP number recorded in the database for 861 items of load.
Potential impact: Low
Actual impact: Low
Audit history: None
Controls: Moderate
Breach risk rating: 2</td></tr>
<tr><th>Audit risk rating</th><th colspan="3">Rationale for audit risk rating</th></tr>
<tr><td>Low</td><td colspan="3">The controls are recorded as moderate because they mitigate risk most of the time but there is room for improvement.
There is no impact on settlement as the load is being reconciled to the correct ICP. There is no option to record none so I recorded this as low.</td></tr>
<tr><th colspan="2">Actions taken to resolve the issue</th><th>Completion date</th><th>Remedial action status</th></tr>
<tr><td colspan="2">The monthly database that Mercury receives from SWDC does not have any blank or incorrect ICPs. Mercury will be liaising with SWDC to determine why the raw RAMM database is different to the monthly extract provided to Mercury.</td><td>Oct21</td><td rowspan="3">Disputed</td></tr>
<tr><th colspan="2">Preventative actions taken to ensure no further issues will occur</th><th>Completion date</th></tr>
<tr><td colspan="2">Mercury will be liaising with SWDC to determine why the raw RAMM database is different to the monthly extract provided to Mercury. We will work with SWDC to ensure the change management process is working as expected and that any database variances are corrected.</td><td>Oct21</td></tr>
</table>

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

All items of load have a road name and location recorded. All items of load also have GPS co-ordinates recorded to assist with the location of the items. Most items of load have a pole number recorded.

The accuracy of the recorded address information 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

A description of each light is recorded in the lamp model field, and wattages are recorded in the lamp wattage and gear wattage fields.

As detailed in the last audit, SWDC confirmed previously that their 26W fluorescent lights are self-ballasted, and the zero gear wattages recorded for the 23 lamps of this type is correct.

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 165 items of load on 19 May 2021.

Audit commentary

The field audit discrepancies are detailed in the table below:

Street	Database count	Field count	Light count difference	Wattage recorded incorrectly	Comments
BELL ST	17	17		2	2 x 27W LED recorded in the database but 2 x 23 LED found in the field
SH53 KITCHENER ST (M)	17	13	-4		2 x 150W SON not located in the field 1 x 70W SON not located in the field 1 x 100 W SON not located in the field
Grand Total	**34**	**30**	**-4**	**2**	

The field audit did not find any items of load missing from the database. The database accuracy is discussed 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.

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

RAMM records audit trail information of changes made.

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	South Wairarapa DC streetlights
Strata	The database contains 1,042 items of load in the South Wairarapa DC region. The management process is the same for all lights. I created three strata: 1. NZTA and other, 2. Roading street names A-M, and 3. Roading street names N-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 16 sub-units.
Total items of load	165 items of load were checked.

Wattages were checked for alignment with the published standardised wattage table produced by the Electricity Authority against the database or in the case of LED lights against the LED light specification.

The change management process and timeliness of database updates was evaluated.

Audit commentary

Field audit findings

A field audit was conducted of a statistical sample of 165 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	95.4	Wattage from the survey is higher than the database wattage by 4.6%
R_L	91.8	With a 95% level of confidence, it can be concluded that the error could be between -8.2% and +0.2%
R_H	100.2	

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

The conclusion from Scenario C is that the variability of the sample results across the strata means that the true wattage (installed in the field) could be between 8.2% lower and 0.2% 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 3 kW lower than the database indicates.

There is a 95% level of confidence that the installed capacity is between zero and 5 kW lower than the database.

In absolute terms, total annual consumption is estimated to be 11,400 kWh lower than the DUML database indicates.

There is a 95% level of confidence that the annual consumption is between 20,300 kWh p.a. lower to 600 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

Wattages for all items of load were checked against the published standardised wattage tables produced by the Electricity Authority, and the manufacturer's specifications. Examination of the database extract found 14 have an incorrect lamp wattage recorded and 12 have an incorrect gear wattage recorded. The records are detailed in the tables below:

Model	Database lamp wattage	Correct lamp wattage	Quantity	Total wattage difference
ITALO 1 STU-S 4.7-3M	61	58	4	-12
Itron Zero 0C6 STA	55	51	10	-40
		Total	**14**	**-52**

The incorrect wattages being applied will be resulting in a minor estimated over submission of 222 kWh per annum.

Model	Database gear wattage	Correct gear wattage	Quantity	Total gear difference
100W SON	13	14	1	+1
100W SON	18	14	1	-4
150W SON	0	18	2	+36
150W SON	14	18	2	+8
50W HPL	0	9	6	+54
		Total	**12**	**+95**

The incorrect ballasts being applied will be resulting in a minor estimated annual under submission of 406 kWh per annum.

ICP number accuracy

As detailed in **section 2.2**. All DUML load is connected to ICP 0020906000WRDFA and all items are being reconciled to this ICP. Examination of the database found that only 181 lamps have this ICP recorded in the database. The remaining items of load are recorded as:

- 38 lamps have ICP 0020907000WRC5A recorded, this ICP is decommissioned on the registry.
- 823 do not have the ICP recorded in the database.

This is recorded as non-compliance below. I recommend that Mercury liaise with South Wairarapa DC to update the RAMM database with the ICP for all items of load.

Subject	Section	Recommendation
ICP identifier	3.1	Populate the ICP field in RAMM with the relevant ICP for all items of load.

Address location accuracy

As discussed in **section 2.3** all items of load have a road name and location recorded. All items of load also have GPS co-ordinates recorded to assist with the location of the items. Most items of load have a pole number recorded; all items of load are locatable.

147 items of load had transposed GPS coordinates, with the northing value recorded in the easting field and vice versa. This was also identified in the last audit; the volume of ICP's with this issue has increased slightly. The GPS co-ordinates should be updated in RAMM.

Nine items of load had the correct GPS coordinates, but incorrectly recorded street addresses. This is a new subdivision, and the street names should be updated from Esther St to Tuscan Lane and Burgundy Drive.

One item of load has the correct street address of Birdie Way but has the incorrect GPS co-ordinates in the database.

Subject	Section	Recommendation
Address location accuracy	3.1	Correct the 147 items of load that have transposed GPS coordinates, with the northing value recorded in the easting field and vice versa. Correct the street addresses for the nine items of load with the correct GPS coordinates. The street names should be updated from Esther St to Tuscan Lane and Burgundy Drive.

Change management process findings

A RAMM database is maintained by Fulton Hogan. PSW complete all fieldwork for the SWDC streetlights, with assistance from Fulton Hogan as required. Additions, removals, and changes to lights are communicated to Fulton Hogan. The information is provided in a spreadsheet and manually keyed into RAMM.

For new connections, lights are loaded into RAMM once the lights are vested in council. SWDC has requested developers not connect lights until this process is complete and working to improve communications between developers and the council. SWDC monitors new subdivisions and keeps in close contact with Powerco to ensure that they are aware quickly when the lights are connected.

Fulton Hogan have a maintenance contract with SWDC and complete outage patrols in one town per month, so each town is patrolled every four months. Any outages identified during patrols are passed to PSW, who complete the repairs and provide any resulting database changes back to Fulton Hogan. SWDC are currently in discussion with Fulton Hogan to ensure all changes are updated in RAMM.

SWDC's LED upgrade project is complete.

The RAMM 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 changes are processed in the database extract used for submission, they are applied from the first day of the month, rather than the date that the change took effect.

Festive and private lights

There are no festive or private lights in use in the SWDC region.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 3.1 With: Clause 15.2 and 15.37B(b) From: 15-May-20 To: 17-May-21	The database accuracy is assessed to be 95.4% of the database for the sample checked indicating a potential under submission of approximately 14,400 kWh per annum. 14 items of load have incorrect lamp wattage resulting in an estimated minor over submission of 222 kWh p.a. based on 4,271 burn hours. 12 items of load have incorrect gear wattage resulting in an estimated minor under submission of 406 kWh p.a. based on 4,271 burn hours. Blank or incorrect ICP number recorded in the database for 861 items of load. Changes are not always recorded in the database extract from the date which they became effective. Potential impact: Medium Actual impact: Medium Audit history: Twice Controls: Moderate Breach risk rating: 4
Audit risk rating	**Rationale for audit risk rating**
Medium	The controls are rated as moderate as controls will mitigate risk most of the time, but there is room for improvement. The audit risk rating is assessed to be medium based on the potential submission inaccuracies.

Actions taken to resolve the issue	Completion date	Remedial action status

Database accuracy We dispute the findings as the audit was conducted based on the raw RAMM database and not the extract that SWDC provide to Mercury for submission. We will be liaising with SWDC to determine the reason for the raw RAMM database and monthly database extract variances however, we note that our database extract is consistent with the auditor findings below and therefore we deem our database extract and submission to be correct. **14 items with incorrect lamp wattage** We dispute the findings as the monthly database extract that SWDC sends to Mercury for submission has the correct lamp wattage values of 58 for the ITALO 1 STU-S 4.7-3M model and 51 for the Itron Zero 0C6 STA model. Our submission is based on the correct lamp wattage and therefore there is no over submission due to lamp wattage. **12 items with incorrect gear wattage** We dispute the findings as the monthly database extract that SWDC sends to Mercury for submission has the correct gear wattage values of 14 for the 100W SON model, 18 for the 150W SON model and 9 for the 50W HPL model. Our submission is based on the correct gear wattage and therefore there is no under submission due to gear wattage. **Blank or incorrect ICP** The monthly database that Mercury receives from SWDC does not have any blank or incorrect ICPs. Mercury will be liaising with SWDC to determine why the raw RAMM database is different to the monthly extract provided to Mercury. **GPS coordinates** The monthly extract contains 94 items with transposed GPS coordinates. We will be liaising with SWDC to have these corrected. We accept that the raw RAMM database varies from the database extract that Mercury receives monthly and uses for submission. We will be liaising with SWDC to determine the reason for this and will correct as necessary.	Oct21	Disputed
Preventative actions taken to ensure no further issues will occur	**Completion date**	
Mercury will be liaising with SWDC to determine why the raw RAMM database is different to the monthly extract provided to Mercury. We will work with SWDC to ensure the change management process is working as expected and that any database variances are corrected.	Oct21	

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

I reviewed the submission information for the April 2021 submissions and confirmed that the calculation methodology was correct, and that wattages were based on the extract and on hours were based on data logger information. I reviewed the submission information for the April 2021 submissions and confirmed that the calculation methodology was correct. I checked the submission calculation provided by Mercury against the data extract and found a variance:

ICP	Light Count April 2021	Database extract light count	Light count difference	Submitted kWh Value	Expected kWh Value	kWh difference
0020906000WRDFA	948	1,042	94	18,624	22,687	4,063

This is potentially resulting in an estimated under submission of 48,756 kWh per annum. I recommend in **section 2.1** that Mercury work with SWDC to determine why there is a difference in the monthly report provided to Mercury and the database extract provided.

As detailed in **section 3.1** the database accuracy is assessed to be 95.4% of the database for the sample checked indicating a potential under submission of approximately 14,400 kWh per annum.

As detailed in **section 3.1**, examination of the RAMM database found a total of 14 lights with the incorrect wattage value recorded and 12 lights with the incorrect ballast values applied. This will be resulting in a minor estimated over submission of 222 kWh per annum for the incorrect wattages and 406 kWh of under submission for the incorrect ballasts applied.

The current monthly report is compliant, and Mercury completes revision submissions where corrections are required.

The RAMM 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 changes are processed in the database extract used for submission, they are applied from the first day of the month, rather than the date that the change took effect.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 3.2 With: Clause 15.2 and 15.37B(c) From: 15-May-20 To: 17-May-21	Variance in light volumes reported to Mercury vs what is recorded in the database is likely to be resulting in an estimated 48,756 kWh per annum of under submission. The database accuracy is assessed to be 95.4% of the database for the sample checked indicating a potential under submission of approximately 14,400 kWh per annum. 14 items of load have incorrect lamp wattage resulting in an estimated minor over submission of 222 kWh p.a. based on 4,271 burn hours. 12 items of load have incorrect gear wattage resulting in an estimated minor under submission of 406 kWh p.a. based on 4,271 burn hours. Changes are not always recorded in the database extract from the date which they became effective. Potential impact: Medium Actual impact: Medium Audit history: Twice Controls: Moderate Breach risk rating: 4
Audit risk rating	**Rationale for audit risk rating**
Medium	The controls are rated as moderate as controls will mitigate risk most of the time, but there is room for improvement. The potential impact could be low as the issue will have a minor impact on settlement.

Actions taken to resolve the issue	Completion date	Remedial action status

Variance in raw database and monthly extract used for submission We will be liaising with SWDC to determine the reason for the raw database and monthly database extract variances; however, we note that our database extract is consistent with the auditor findings below and therefore we deem our database extract and submission to be correct. **Database accuracy** We dispute the findings as the audit was conducted based on the raw RAMM database and not the extract that SWDC provide to Mercury for submission. **14 items with incorrect lamp wattage** We dispute the findings as the monthly database extract that SWDC sends to Mercury for submission has the correct lamp wattage values of 58 for the ITALO 1 STU-S 4.7-3M model and 51 for the Itron Zero 0C6 STA model. Our submission is based on the correct lamp wattage and therefore there is no over submission due to lamp wattage. **12 items with incorrect gear wattage** We dispute the findings as the monthly database extract that SWDC sends to Mercury for submission has the correct gear wattage values of 14 for the 100W SON model, 18 for the 150W SON model and 9 for the 50W HPL model. Our submission is based on the correct gear wattage and therefore there is no under submission due to gear wattage. We accept that the raw RAMM database varies from the database extract that Mercury receives monthly and uses for submission. We will be liaising with SWDC to determine the reason for this and will correct as necessary.	Oct21	Disputed
Preventative actions taken to ensure no further issues will occur	**Completion date**	
Mercury will be liaising with SWDC to determine why the raw RAMM database is different to the monthly extract provided to Mercury. We will work with SWDC to ensure the change management process is working as expected and that any database variances are corrected.	Oct21	

CONCLUSION

The RAMM database continues to be maintained by Fulton Hogan. PSW complete all fieldwork for the SWDC streetlights, with assistance from Fulton Hogan as required. Additions, removals, and changes to lights are communicated to Fulton Hogan. The information is provided in a spreadsheet and manually keyed into RAMM.

In the last audit it was noted that Dave Patten was working with the SWDC to arrange for the missing and incorrect RAMM data identified during that audit to be updated, this has been completed. Reporting is provided directly from the RAMM database, the audit found that some errors still exist, and these will need to be corrected by SWDC.

Mercury reconciles the SWDC DUML load using the HHR profile in accordance with exemption 233. Wattages are derived from a RAMM database extract. On and off times are derived from a data logger.

The accuracy of the database extract provided to Mercury was assessed:

Result	Percentage	Comments
The point estimate of R	95.4	Wattage from the survey is higher than the database wattage by 4.6%
R_L	91.8	With a 95% level of confidence, it can be concluded that the error could be between -8.2% and +0.2%
R_H	100.2	

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

The results indicate that the best available estimate is not precise enough to conclude that the database is accurate within ±5%.

- The variability of the sample results across the strata means that the true wattage (installed in the field) could be between 8.2% lower and 0.2% 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 3 kW lower than the database indicates.
- There is a 95% level of confidence that the installed capacity is between 5 kW lower than the database.
- In absolute terms, total annual consumption is estimated to be 11,400 kWh lower than the DUML database indicates.
- There is a 95% level of confidence that the annual consumption is between 20,300 kWh p.a. lower to 600 kWh p.a. higher than the database indicates.

Four non-compliances were identified, and three recommendations were made. The future risk rating of 14 indicates that the next audit be completed in 12 months. I have considered this in conjunction with Mercury's comments and recommend that the next audit period be in 12 months.

PARTICIPANT RESPONSE

This audit has highlighted differences between the RAMM database, and the database extract that Mercury receives from SWDC each month for submission. The audit was completed based on the RAMM database and therefore we feel that the report does not accurately reflect our submission.

We would like to point out that the database extract, reflects the auditor's findings and therefore we believe our submission to be accurate.

Unfortunately, due to delays at SWDC we are unable to confirm the reason for the variances without causing further delay to the submission of this audit report.

We will liaise with SWDC to determine the reason for the database variances and ensure these are corrected accordingly.