ELECTRICITY INDUSTRY PARTICIPATION CODE
DISTRIBUTED UNMETERED LOAD AUDIT REPORT

For

WELLINGTON CITY COUNCIL AND MERIDIAN ENERGY

Prepared by: Steve Woods

Date audit commenced: 10 October 2022

Date audit report completed: 28 October 2022

Audit report due date: 19 October 2022

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EXECUTIVE SUMMARY

This audit of the **Wellington City Council (WCC)** DUML database and processes was conducted at the request of **Meridian Energy (Meridian)** 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 used for submission is managed by WCC. New connection, fault and maintenance work is completed by Fulton Hogan. All contractors update the database using Pocket RAMM.

WCC provides a monthly report to Meridian from the RAMM database, which is used to create submission information. WCC also uses the PLANet CMS to manage their LED lights.

The database still contains many discrepancies, a number of which were present during the last audit. Field updates do not always appear to be accurate and updates for new connections are not always timely.

Database accuracy is described as follows:

Result	Percentage	Comments
The point estimate of R	105.1	Wattage from survey is higher than the database wattage by 5.1%
R_L	97.8	With a 95% level of confidence, it can be concluded that the error could be between -2.2% and +15.3%
R_H	115.3	

These results were categorised in accordance with the "Distributed Unmetered Load Statistical Sampling Audit Guideline", effective from 1 February 2019 and the table below shows that Scenario B (detailed below) applies.

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 2.2% lower and 15.3% higher than the wattage recorded in the DUML database

In absolute terms the installed capacity is estimated to be 69 kW higher than the database indicates.

There is a 95% level of confidence that the installed capacity is between 30kW lower and 207 kW higher than the database.

In absolute terms, total annual consumption is estimated to be 294,400 kWh higher than the DUML database indicates.

There is a 95% level of confidence that the annual consumption is between 127,800 kWh lower and 883,300 kWh p.a. higher than the database indicates.

The audit found six non-compliances, four recommendations and one issue were made.

The future risk rating of 33 indicates that the next audit be completed in three months. I have considered this in conjunction with Meridians responses and recommend the next audit be due in 6 months.

The matters raised are shown in the tables 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 used to prepare submissions contains some inaccurate information: • 294,400 kWh per annum under submission from field audit, • 7,117 per annum under submission due to incorrect lamp or gear wattages, • 2,776 kWh per annum under submission due to missing lamp or gear wattages, • 1,811,553 kWh per annum over submission due to static dimming adjustment not applied to submission capacities, and • Dynamic dimming is sometimes used, and the full lamp wattage is recorded in RAMM for the dynamically dimmed lights. The impact varies but is expected to be low.	Weak	High	9	Identified
Location of each item of load	2.3	11(2)(b) of Schedule 15.3	64 items of load do not have GPS coordinates or street numbers.	Moderate	Low	2	Investigating
Description and capacity of load	2.4	11(2)(c) and (d) of Schedule 15.3	Some description and capacity information is incomplete or unknown, including: • 76 lamps with unknown or blank lamp descriptions, and • 57 gear wattages discrepancies.	Moderate	Low	2	Investigating
All load recorded in database	2.5	11(2A) of Schedule 15.3	38 additional lamps in the field were not recorded in the database from a sample of 554 items of load.	Moderate	Low	2	Investigating

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 database accuracy is assessed to be 105.1% of the database for the sample checked indicating a potential under submission of approximately 294,400 kWh per annum. 205 items of load have lamp and/or gear wattages recorded which differed from the published standardised wattage table and manufacturer's specifications available. The impact of these differences is estimated to be approximately 7,117 kWh of under submission (based on annual burn hours of 4,271 as detailed in the DUML database auditing tool). Field audit identified 118 items of load that have incorrect wattages, leading to under submission by 3,242 kWh per annum. Dynamic dimming is sometimes used, and the full lamp wattage is recorded in RAMM for the dynamically dimmed lights. The impact varies but is expected to be low.	Weak	High	9	Investigating
Volume information accuracy	3.2	15.2 and 15.37B(c)	The database used to prepare submissions contains some inaccurate information: • 294,400 kWh per annum under submission from field audit, • 7,117 per annum under submission due to incorrect lamp or gear wattages, • 2,776 kWh per annum under submission due to missing lamp or gear wattages, • 1,811,553 kWh per annum over submission due to static dimming	Weak	High	9	Identified

Subject	Section	Clause	Non-Compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
			adjustment not applied to submission capacities, and • Dynamic dimming is sometimes used, and the full lamp wattage is recorded in RAMM for the dynamically dimmed lights. The impact varies but is expected to be low.				
Future Risk Rating						33	

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

RECOMMENDATIONS

Subject	Section	Description
ICP identifier and items of load	2.2	Meridian to work with WCC to confirm who is responsible for the illuminated paths along the Wellington Waterfront and ensure that these are being accounted for.
Database Accuracy	3.1	Check and correct light wattages provided.
Database Accuracy	3.1	WCC and Meridian review the new connection process to ensure all lights are updated in both the RAMM database and the PLANet CMS systems so that these lights are accounted for. This will also enable WCC to statically dim lights for streets not yet vested to the council to zero or near zero load to reduce the operational cost of these lights.
Database Accuracy	3.1	Meridian works with both WCC and Wellington Electricity to ensure that all new private lights can be clearly identified through the new connection application process to ensure these are managed separately from the DUML connections and ICPs are created accordingly.

ISSUES

Subject	Section	Description	Issue
ICP identifier and items of load	2.2	Mechanism to ensure identified private streetlights from DUML audits are accounted in the market settlement process.	Where private lights are identified as part of a DUML audit, the process to ensure these lights are investigated by the distributor as potential standard unmetered or shared unmetered is not well understood including

			the ownership or responsibility for following up with the distributor.

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

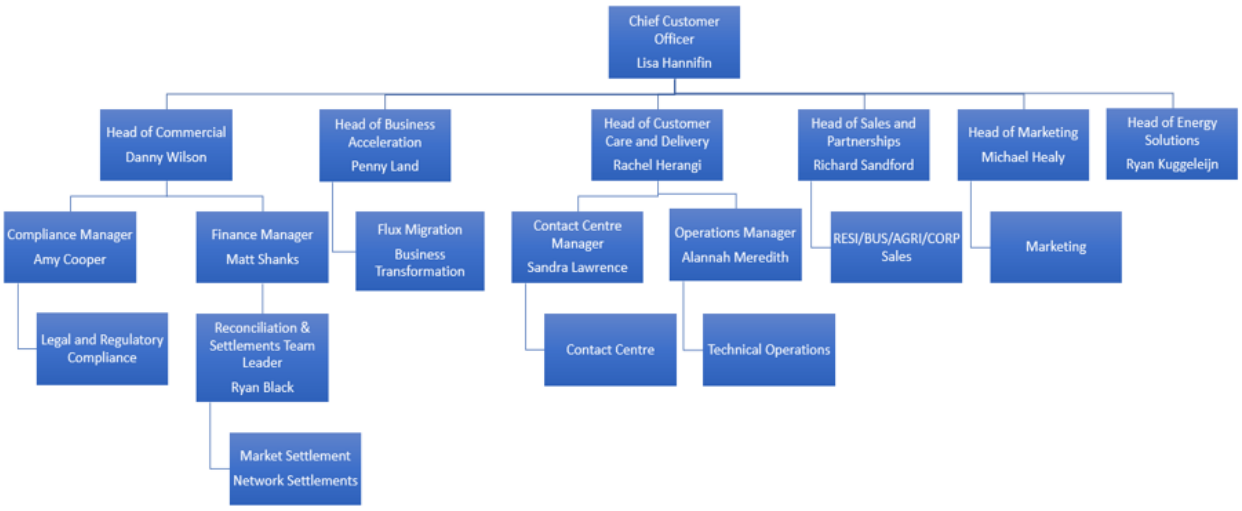
The Electricity Authority's website was reviewed to identify any exemptions relevant to the scope of this audit.

Audit commentary

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

1.2. Structure of Organisation

Meridian provided a copy of their organisational structure:



1.3. Persons involved in this audit.

Name	Company	Role
Steve Woods	Veritek Limited	Lead Auditor
Bernie Cross	Veritek Limited	Supporting Auditor

Other personnel assisting in this audit were:

Name	Title	Company
Steve Wright	Team Leader, Resurfacing and Contracts	Wellington City Council
Melanie Matthews	Quality and Compliance Advisor	Meridian Energy
Amy Cooper	Compliance Officer	Meridian Energy

1.4. Hardware and Software

The SQL database used for the management of DUML is remotely hosted by thinkproject New Zealand 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.

WCC also uses the PLANet CMS to manage their LED lights.

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

Systems used by the trader and their agent to calculate submissions were assessed as part of their reconciliation participant audits.

1.5. Breaches or Breach Allegations

There are no breach allegations relevant to the scope of this audit.

1.6. ICP Data

ICP Number	Description	NSP	Number of items of load	Database wattage (watts)
0001255309UN981	MSTR ICP WCC CPK0331	CPK0331	7,407	547,542
0001256880UN374	MSTR ICP WCC CPK0111	CPK0111	529	40,132
0001256885UNE3B	MASTER ICP WIL0331	WIL0331	4,326	322,680
0001256890UN9D9	AOTEA QUAY	TKR0331	4,185	230,366
0001256892UN95C	MSTR ICP WCC KWA0111	KWA0111	1,020	80,609
1001102041UNDDC	MASTER ICP AIRPORT	CPK0331	294	53,920
1001152333CKC0E	AMENITY LIGHTING	CPK0331	1,060	47,063
1001152334CK1C4	DECORATIVE LIGHTING	CPK0331	219	9,473
1001152335CKD81	24/7 (1) LIGHTING	CPK0331	69	8,240
1001152336CK141	24/7 (2) LIGHTING	WIL0331	14	956
1001152339CKE9F	4 HOUR LIGHTING	CPK0331	33	12,476
0000156771CKE59	WCC UML MASTER 24HR TKR0331	TKR0331	4	504
0000159586CK0E3	WCC MASTER ICP - CAMERAS KWA0111	KWA0111	13	520
Total			**19,173**	**1,354,481**

1.7. Authorisation Received

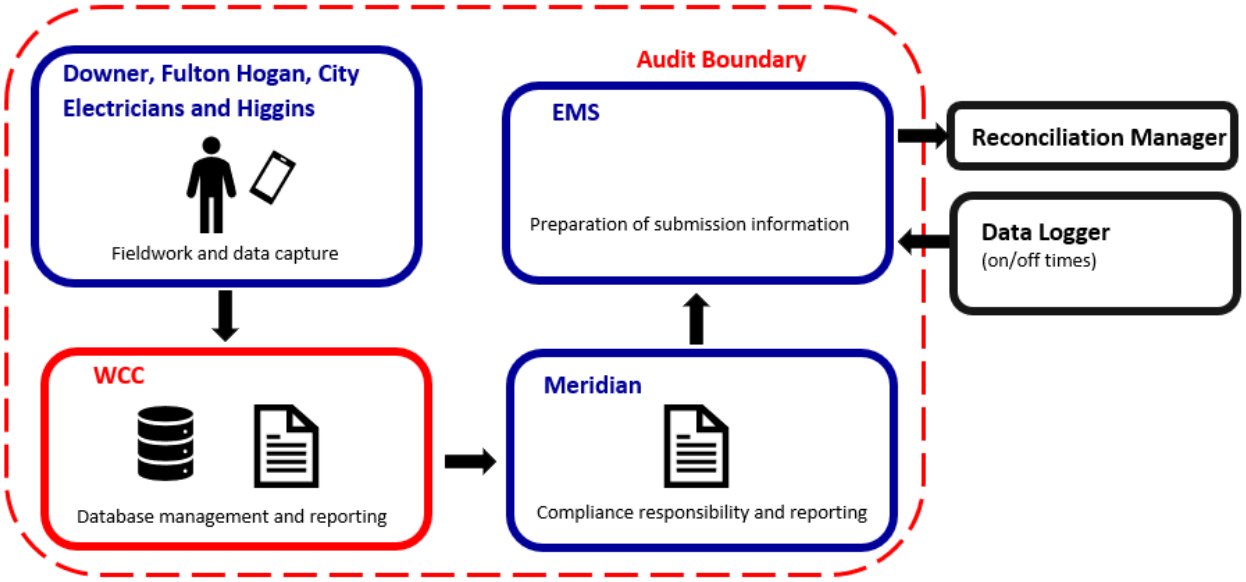
All information was provided directly by Meridian and WCC.

1.8. Scope of Audit

The RAMM database used for submission is managed by WCC. New connection, fault and maintenance work is completed by Fulton Hogan, and LED upgrade work is completed by Fulton Hogan. All contractors update the database using Pocket RAMM.

WCC provides a monthly report to Meridian from the RAMM database, which is used to create submission information. WCC also uses the PLANet to manage their LED lights.

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 554 items of load on 10 - 18 October 2022.

1.9. Summary of previous audit

The previous audit was completed in August 2021 by Steve Woods of Veritek Limited. Seven non-compliances were identified and six are still existing.

Table of Non-compliance

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: • 109,200 kWh per annum over submission from field audit, • 18,572 per annum under submission due to incorrect lamp or gear wattages, • 2,776 kWh per annum under submission due to missing lamp or gear wattages, • 8,862 kWh per annum under submission due to static dimming applied to incorrect lamp types, and • 65 Christmas lights do not have ICP numbers recorded.	Still existing
ICP identifier	2.2	11(2)(a) and (aa) of Schedule 15.3	ICP number is not recorded for 65 Christmas lights.	Cleared

Subject	Section	Clause	Non-compliance	Status
Location of each item of load	2.3	11(2)(b) of Schedule 15.3	62 items of load do not have GPS coordinates or street numbers.	Still existing
Description and capacity of load	2.4	11(2)(c) and (d) of Schedule 15.3	Some description and capacity information is incomplete or unknown, including: • 131 lamps with unknown or blank lamp descriptions, • 13 items of load with zero wattage recorded, and • 13 blank gear wattages	Still existing
All load recorded in database	2.5	11(2A) of Schedule 15.3	Nine additional items of load found in the March 2021 field audit.	Still existing
Database accuracy	3.1	15.2 and 15.37B(b)	The database accuracy is assessed to be 97.3% of the database for the sample checked indicating a potential over submission of approximately 109,200 kWh per annum. 262 items of load have lamp and/or gear wattages recorded which differed from the published standardised wattage table and manufacturer's specifications available. The impact of these differences is estimated to be approximately 18,572 kWh of under submission (based on annual burn hours of 4,271 as detailed in the DUML database auditing tool). 13 items of load have incorrect wattages, leading to under submission by 2,776 kWh per annum. Dynamic dimming is sometimes used, and the full lamp wattage is recorded in RAMM for the dynamically dimmed lights. The impact varies but is expected to be low. Static dimming was not correctly applied for 49 HPS lamps. The impact is expected to be at least approximately 8,862 kWh under submission (based on annual burn hours of 4,271 as detailed in the DUML database auditing tool). 65 Christmas lights do not have ICP numbers recorded.	Still existing

Subject	Section	Clause	Non-compliance	Status
Volume information accuracy	3.2	15.2 and 15.37B(c)	The database used to prepare submissions contains some inaccurate information: • 109,200 kWh per annum over submission from field audit, • 18,572 per annum under submission due to incorrect lamp or gear wattages, • 2,776 kWh per annum under submission due to missing lamp or gear wattages, • 8,862 kWh per annum under submission due to static dimming applied to incorrect lamp types, and • 65 Christmas lights do not have ICP numbers recorded.	Still existing

Subject	Section	Description	Status
Deriving submission accuracy	2.5	Check that all decorative lights are assigned to the correct ICP.	Cleared
Database Accuracy	3.1	Check and correct light wattages provided.	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

Meridian 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.

Audit commentary

Meridian reconciles this DUML load using the DST profile. The total volume submitted to the Reconciliation Manager is based on a monthly database report derived from RAMM and the "burn time" which is sourced from data loggers for eight of the ICPs. The burn hours for the remaining five ICPs are derived using set hours per day as detailed in the table below:

ICP	Profile	ICP description	Burn hours
1001152335CKD81	UML	24/7 (1) LIGHTING	24 hours x days in period
1001152336CK141	UML	24/7 (2) LIGHTING	24 hours x days in period
0000156771CKE59	RPS	WCC UML MASTER 24HR TKR0331	24 hours x days in period
0000159586CK0E3	RPS	WCC MASTER ICP - CAMERAS KWA0111	24 hours x days in period
1001152339CKE9F	UML	4 HOUR LIGHTING	4 hours x days in period

I recalculated the expected submission volumes for each ICP for September 2022 based on the database wattages and burn hours provided and confirmed all values to be correct as Meridian uses the total wattage value in its calculation which excludes any allowance for static dimming. This is discussed further in **section 3.2**.

Volume inaccuracy is present in the database as follows:

Issue	Estimated volume information impact (annual kWh)
Potential under submission due to database inaccuracy identified during the field audit	294,400 kWh under submission
Lamp and/or gear wattages which differ from the published standardised wattage table and manufacturer's specifications available.	7,117 kWh under submission
Items of load with invalid zero lamp or gear wattages	2,776 kWh of under submission (wattage assumed to be 50, which is the database average)
Unapproved dynamic dimming	Unknown, but expected to result in low over submission

Issue	Estimated volume information impact (annual kWh)
Static dimming adjustment not applied to capacities used for submission	1,811,553 kWh over submission

Rounding of statically dimmed lights was recorded as non-compliance during the last audit. This issue is not present currently as Meridian uses the unrounded field total wattage values for submission purposes.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.1 With: Clause 11(1) of Schedule 15.3 From: 01-Sep-21 To: 30-Sep-22	The database used to prepare submissions contains some inaccurate information: • 294,400 kWh per annum under submission from field audit, • 7,117 per annum under submission due to incorrect lamp or gear wattages, • 2,776 kWh per annum under submission due to missing lamp or gear wattages, and • 1,811,553 kWh per annum over submission due to static dimming adjustment not applied to submission capacities. • Dynamic dimming is sometimes used, and the full lamp wattage is recorded in RAMM for the dynamically dimmed lights. The impact varies but is expected to be low. Potential impact: High Actual impact: High Audit history: Multiple times Controls: Weak Breach risk rating: 9
Audit risk rating	**Rationale for audit risk rating**
High	Overall, the controls are rated as weak, primarily due to the database accuracy issues discussed further in **section 3.1**. The impact is assessed to be high, based on the kWh differences described above.

Actions taken to resolve the issue	Completion date	Remedial action status
We will revise Jul – Sept submissions using capacities with static dimming adjustment applied and will use the adjusted capacities for submission calcs going forward. WCC have been provided audit findings for resolution.	28 Feb 2023 25 Oct 2022	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	

We will be discussing with WCC operational requirements for use of approved static dimming profile and progress made to date on meter installations etc. We will continue to work with WCC to implement an approved method of settlement for dimming lights and follow up re database corrections required and improvements to maintenance processes for changes and new connections.	30 Nov 2023 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

As reported in the last audit, ICP numbers are recorded for each item of load in the database except solar, metered and private lights.

- Solar lights are not connected to the streetlight circuits, and an ICP number is not required.
- Metered lights have consumption volumes measured and separate ICPs numbers exist for these connections.
- Private lights are connected to the streetlight circuits but are not WCC's responsibility. They are recorded in the database for completeness only. Each month, a database extract is provided to Wellington Electricity which includes these private lights. Shared unmetered load ICPs have not been created for these lights and this issue has been present for several years. As identified in previous audits, the subdivision at Saddleback Grove was never vested and is unlikely to be vested. It has 1.4kW of lighting (17x70 watt HPS). There will need to be shared unmetered load ICPs created for this subdivision. Tiketike Way is also not in the database and likely needs to have shared unmetered ICP created as well.

Because these lights have now been livened and the subdivision has been vested to the local council there is little incentive for any participant to follow up and ensure these lights have ICPs created, and a retailer takes responsibility for. These private lights will continue to continue to contribute towards network UFE until action is taken by the responsible participants and I have recorded the lack of progress in ensuring these lights are included in the market settlement process as an issue.

Issue	Section	Clause	Description
Mechanism to ensure identified private streetlights identified from DUML audits are accounted in the market settlement process.	2.2	Clause 11(3)(e) Part 11	Where private lights are identified as part of a DUML audit, the process to ensure these lights are investigated by the distributor as potential standard unmetered or shared unmetered is not well understood including the ownership or responsibility for following up with the distributor.

WCC also manages 20 ha of waterfront land extending from Waterloo Apartments to Clyde Quay wharf and there is several illuminated paths and walkways within this area. The responsibility for these lights is currently unknown as they do not appear in the DUML database and also there does not appear to be DUML or metered ICPs created for these. I recommend that Meridian works with WCC to confirm who is responsible for these lights. If it is confirmed that WCC is responsible, then how are these lights being correctly accounted for. I recommend that Meridian works with WCC to confirm responsibility for these lights.

Recommendation	Description	Audited party comment	Remedial action
ICP identifier and items of load	Meridian to work with WCC to confirm who is responsible for the illuminated paths along the Wellington Waterfront and ensure that these are being accounted for.	We will discuss this recommendation with WCC when we meet with them	Investigating

Audit outcome

Compliant

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

Code reference

Clause 11(2)(b) of Schedule 15.3

Code related audit information

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

Audit observation

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

Audit commentary

64 items of load do not have GPS coordinates or street number recorded.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.3 With: Clause 11(2)(b) of Schedule 15.3 From: 01-Sep-21 To: 30-Sep-22	64 items of load do not have GPS coordinates or street numbers. Potential impact: Low Actual impact: Low Audit history: None Controls: Moderate Breach risk rating: 2
Audit risk rating	**Rationale for audit risk rating**
Low	The controls are recorded as moderate because they mitigate risk most of the time but there is room for improvement. 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
WCC have been provided audit findings for resolution.	25 Oct 2022	Investigating
Preventative actions taken to ensure no further issues will occur	**Completion date**	
We will continue to follow up with WCC re database corrections required and improvements to maintenance processes for changes and new connections.	Ongoing	

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 and model, gear model, lamp wattage, gear wattage and total wattage are included in the database.

Most items of load have lamp and gear make and model information recorded. All items of load have a gear wattage and lamp wattage recorded, but some were invalidly recorded as zero.

- 76 items of load[1] had an unknown lamp description recorded.
- 57 items of load[2] had missing, incomplete or unknown gear descriptions and zero or incorrect gear wattages recorded.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.4 With: Clauses 11(2)(c) and (d) of Schedule 15.3 From: 01-Sep-21 To: 30-Sep-22	Some description and capacity information is incomplete or unknown, including: • 76 lamps with unknown or blank lamp descriptions, and • 57 gear wattages discrepancies. Potential impact: Low Actual impact: Low Audit history: Three times Controls: Moderate Breach risk rating: 2
Audit risk rating	**Rationale for audit risk rating**
Low	Controls are rated as moderate, as they are sufficient to ensure that almost all items of load have wattage and description information recorded. The impact is estimated to be low, based on the information available.

Actions taken to resolve the issue	Completion date	Remedial action status
WCC have been provided audit findings for resolution.	25 Oct 2022	Investigating
Preventative actions taken to ensure no further issues will occur	**Completion date**	
We will continue to follow up with WCC re database corrections required and improvements to maintenance processes for changes and new connections.	Ongoing	

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

[1] Excluding solar, private lights, and fuse boxes with no draw which are included in the database for completeness.
[2] Excluding solar, private lights, and fuse boxes with no draw which are included in the database for completeness.

The field audit was undertaken of a statistical sample of 554 items of load on 10 - 18 October 2022.

Audit commentary

The discrepancies are summarised in the table below. A spreadsheet of all discrepancies was provided to Meridian.

Street	Database count	Field count	Light count differences	Wattage recorded incorrectly	Comments
AWARUA ST #25 PATH	1	1	0	1	1 x 16w LED incorrectly recorded as 36w
CABLE ST	29	37	+8	10	8 x footpath spotlights not recorded in the database, 9 x spotlight on shared pole with L158 not recorded in the database, 1 x L158 on shared pole not recorded
CALCUTTA ST	23	23	0	19	17 x 35w LED incorrectly recorded as 27w, 1x 27w LED incorrectly recorded as 35w, 1 x 35w LED incorrectly recorded as 17w.
CAM ST	2	2	0	2	1 x 33w LED incorrectly recorded as 46w, 1 x 16w LED incorrectly recorded as 18w
CAMBRIAN ST	8	8	0	1	27w LED incorrectly recorded as 158w
CARROLL ST	3	2	-1	2	1 x 47w LED no found in the field, 2 x 35w LED incorrectly recorded as 28w
CLAYTONS AVE	1	2	+1	0	1 x 70w GL500 HPS not recorded in the database
CROMPTON AVE	5	5	0	5	4 x 35w LED incorrectly recorded as 28w, 1 x 35w LED incorrectly recorded as 27w
DUNDAS ST	20	20	0	1	1 x 27w LED incorrectly recorded as 70 HPS
FARNWORTH TCE	13	16	+3	13	3 x 21w LED not recorded in the database, 1 x 35w LED incorrectly recorded as 28w, 5 x 33w LED incorrectly recorded as 28w, 7 x 21w LED incorrectly recorded as 28w
FORTIFICATION RD	15	15	0	1	1 x 36w LED incorrectly recorded as 20w
HIGH ST	10	10	0	1	1 x 27w LED incorrectly recorded as 23w
IMLAY CRES-#17 PATH	5	5	0	3	1 x 16w LED incorrectly recorded as 70 HPS, 1 x 16w LED incorrectly recorded as 20w, 1 x 26w LED incorrectly recorded as 20w
KAHIKATEA GR	4	4	0	1	1 x 36w LED incorrectly recorded as 20w
KATE SHEPPARD PL	4	2	-2	0	1 x 70w GL500 HPS not found in the field, 1 x 150w GL600 HPS not found in the field

Street	Database count	Field count	Light count differences	Wattage recorded incorrectly	Comments
LAVAUD ST	8	9	+1	0	1 x 27w LED not recorded in the database
MAKERERUA ST	5	5	0	1	1 x 36w LED incorrectly recorded as 30w
MARQUIS ST	2	1	-1	0	1 x 70w GL500 HPS not found in the field
MIRO ST	15	15	+1	0	1 x 27w LED not recorded in the database
NGATITOA ST-#3 DWAY	2	2	0	2	1 x 22w LED incorrectly recorded as 27w, 1 x 26w LED incorrectly recorded as 27w
NICHOLSON RD	35	33	+1, -1	23	1 x 70w GL500 HPS not found in the field, 1 x 70w GL500 HPS not recorded in database, 18 x 35w LED incorrectly recorded as 28w, 1 x 35w LED incorrectly recorded as 41w, 1 x 35w LED incorrectly recorded as 50w MV, 1 x 35w LED incorrectly records as 70w HPS, 1 x 22w LED incorrectly recorded as 27w, 1 x 26w LED incorrectly recorded as 27w
ONEHUNGA RD	2	2	0	2	2 x 36w LED incorrectly recorded as 20w
OWEN ST	39	33	-6	4	5 x 70w HPS not found in the field, 1 x 158w LED not found in the field, 2 x 36w LED on shared pole incorrectly recorded as 158w single lamp, 1 x 36w LED incorrectly recorded as 158w, 1 x 158w LED incorrectly recorded as 23w
PEMBROKE RD-#100 PATH	3	3	0	2	1 x 36w LED incorrectly recorded as 20w, 1 x 26w LED incorrectly recorded as 20w
PEMBROKE RD-#70 PATH	2	2	0	2	1 x 26w LED incorrectly recorded as 20w, 1 x 26w LED incorrectly recorded as 70 HPS
PRESTWICH RISE	4	10	+6	4	6 x 21w LED not recorded in the database, 3 x 35w LED incorrectly recorded as 28w, 1 x 21w LED incorrectly recorded as 28w
PURIRI ST	5	7	+2	1	2 x 27w LED not recorded in the database, 1 x 22w LED incorrectly recorded as 18w
ROCHDALE DR	8	8	0	7	4 x 35w LED incorrectly recorded as 28w, 3 x 21w LED incorrectly recorded as 28w
SOUTH KARORI RD #113 PATH	3	3	0	3	2 x 36w LED incorrectly recorded as 20w, 1 x 26w LED incorrectly recorded as 20w

Street	Database count	Field count	Light count differences	Wattage recorded incorrectly	Comments
STOCKPORT GR	6	6	0	2	2 x 33w LED incorrectly recorded as 21w
STRATHMORE AVE	25	25	0	1	1 x 27w LED incorrectly recorded as 70 HPS
SWINTON PL	2	2	0	2	2 x 21w LED incorrectly recorded as 33w
TASMAN ST	31	46	+15	0	12 x 70w HPS walkway lamps not recorded in database, 3 x 50w MH walkway lamps not recorded in database, 1 x 158w LED not recorded in database
WADE ST	11	11	0	1	1 x 36w LED incorrectly recorded as 20w
WATERFORD DR	1	1	0	1	1 x 23w LED incorrectly recorded as 16w
Grand Total	**554**	**592**	**49 (+38/-11)**	**118**	

The field audit found 38 additional lights and could not find 11 lights listed in the database. This is recorded as non-compliance below.

The database accuracy has declined during the audit period across a similar sample size as detailed in the table below:

Street	Sept 2022	Sept 2021	March 2021
Incorrect wattages	118	31	14
Items of load in the database not found in the field	11	12	25
Items of load in the field not found in the database	38	-	14

The database accuracy is discussed in **section 3.1**.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.5 With: Clauses 11(2A) of Schedule 15.3 From: 01-Sep-21 To: 30-Sep-22	38 additional lamps in the field were not recorded in the database from a sample of 554 items of load. Potential impact: Low Actual impact: Low Audit history: Twice Controls: Moderate Breach risk rating: 2
Audit risk rating	**Rationale for audit risk rating**
Low	Controls are rated as moderate, as they are sufficient to ensure that the majority of items of load are recorded in the database. The impact is estimated to be low, based on the information available.

Actions taken to resolve the issue	Completion date	Remedial action status
WCC have been provided audit findings for resolution.	25 Oct 2022	Investigating
Preventative actions taken to ensure no further issues will occur	**Completion date**	
We will continue to follow up with WCC re database corrections required and improvements to maintenance processes for changes and new connections.	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 contains a complete audit trail. Reporting provided to Meridian is from the RAMM database.

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

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	WCC streetlights in the Wellington region.
Strata	The database contains items of load in WCC area. The processes for the management of all WCC items of load are the same. Strata were created based on road names, because this gave good coverage of owners, install dates, and ICPs.
Area units	I created a pivot table of the roads in each of the five strata and I used a random number generator in a spreadsheet to select a total of 72 sub-units.
Total items of load	554 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

Database accuracy based on the field audit

A field audit was conducted of a statistical sample of 554 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	105.1	Wattage from survey is higher than the database wattage by 5.1%
R_L	97.8	With a 95% level of confidence, it can be concluded that the error could be between -2.2% and 15.3%
R_H	115.3	

These results were categorised in accordance with the "Distributed Unmetered Load Statistical Sampling Audit Guideline", effective from 1 February 2019 and the table below shows that Scenario B (detailed below) applies.

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 2.2% lower and 15.3% 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 69 kW higher than the database indicates.

There is a 95% level of confidence that the installed capacity is between 30 kW lower and 207 kW higher than the database.

In absolute terms, total annual consumption is estimated to be 294,400 kWh higher than the DUML database indicates.

There is a 95% level of confidence that the annual consumption is between 127,800kWh lower and 883,300 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 RL is less than 0.95 or RH 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 %.

The change management process appears to have a poor level of accuracy.

Wattage accuracy

The database wattages were checked against the published standardised wattage table and manufacturer's specifications, where available.

A check of the database extract found the same discrepancies as recorded in the last audit for 22 lamp models (205 items of load). The lamp and/or gear wattages recorded differed from the published standardised wattage table and manufacturer's specifications available. A full list has been provided to Wellington City Council for review, and I repeat the recommendation that wattages should be updated if found to be incorrect.

Recommendation	Description	Audited party comment	Remedial action
Database Accuracy	Check and correct light wattages provided.	WCC have been provided audit findings for review and resolution	Investigating

As discussed in **section 2.4**, some items of load had missing, incomplete or unknown lamp and/or gear wattages and descriptions. 57 have unknown lamp descriptions and 76 have incorrect or zero gear wattages.

As identified in the previous audit, dynamic dimming is used for a small number of lights. The full lamp wattage is recorded in RAMM for the dynamically dimmed lights therefore a minor amount of over submission will be occurring. Meridian has not yet indicated whether they intend to use a profile that allows dimming. Check meters have been installed and it's likely these will need to be changed to certified meters. Dimming details are as follows:

- Two programs allow lights to be dimmed to different levels at certain times during the night. The previous audit identified 85 items of load connected to these two programs, which are applied at the request of Wellington residents affected by the streetlights. The full wattage for the lights is recorded in the database, which will result in over submission. Most of the affected lights are 158W LEDs, and they are dimmed by 40% to 60% for part of the night.
- Occasionally organisers of events request streetlights be dimmed for one night. This occurs rarely, and no adjustment is made to the database. This practice is expected to result in a small amount of over submission from time to time.

PLANet also records when lights are not burning and when outages occur. If this were able to be used for submission it is expected to provide a higher level of submission accuracy than the current process.

WCC began to apply static dimming percentages in December 2018. Static dimming is applied for 9,932 lamps. The dimmed wattages are calculated based on the manufacturer's wattage multiplied by the static dimming percentage to give an effective wattage. The dimming percentages are transferred to PLANet to ensure that RAMM is consistent with how the lamps are programmed to be dimmed.

WCC has previously confirmed that only LED Roadway NXT-12S (27W), Teceo (55W), and LED Roadway NXT 72m (158W) are expected to be statically dimmed. 170 lamps should not be showing as dimmed. Discrepancies between PLANet lamp types and RAMM lamp model information may be contributing to the invalidly applied dimming.

As reported in previous audits, there are some items of load included in the database that are not streetlights, including driver feedback signs, parking space information, and parking sensors. All of these items of load have a battery attached so that they can continue to operate when the streetlight circuit is turned off. Wattage is recorded as the full wattage to charge the battery as it is not possible to determine the actual load being used. This will result in a very minor amount of over submission but is the most accurate figure available. WCC confirmed that the base stations and fuse boxes correctly show zero wattage.

Change Management

The RAMM database used for submission is managed by WCC. New connection, fault and maintenance work is completed by Fulton Hogan, and LED upgrade work is completed by Fulton Hogan. All contractors update the database using Pocket RAMM.

PLANet is used to manage the LED lamps and apply static and dynamic dimming as discussed above. Most LED lamps have telecells which allow communication with PLANet. Eventually almost all LED lights will

have telecells, apart from some walkway lights and lights located in Makara. WCC continues to maintain its streetlight records in RAMM as well as PLANet.

The new connections process was discussed and for subdivisions has the following steps:

1. a plan is prepared by the developer and approved by WCC,
2. the installation is completed,
3. WCC notifies Meridian that livening is required, Northpower and Wellington Electricity are notified at the same time, and a certificate of compliance is provided,
4. Meridian requests livening from Wellington Electricity,
5. an "as built" plan is provided to WCC, and
6. the database is updated.

Steps 5 and 6 can be delayed and the items of load do not have a "start date" in the database, the date they are entered is the start date. WCC intend to work with the planning department to get better cohesion between them so the onboarding of streetlights can be quicker and the date of lights becoming council property is correctly recorded.

A number of streets associated with the Churton Park subdivision were included in the latest field audit and the results indicated that the new connection process is not being followed consistently.

- The number of incorrect wattages identified in Rochdale Drive, Farnsworth Terrace and Crompton Avenue indicates that either the "as built" plans are not being provided or if they are these are not being used to update RAMM.
- Some streets have been fully formed and streetlights installed for a number of years however as the developer is only releasing sections in stages along these streets, these portions of roads are not being vested in a timely manner meaning the database is not being updated therefore no party is responsible for the consumption from these connected lights.

I recommend that WCC and Meridian review the new connection process to ensure all lights are updated in both the RAMM database and the PLANet CMS systems so that these lights are accounted for. This will also enable WCC to statically dim lights for streets not yet vested to the council to zero or near zero load to reduce the operational cost of these lights.

Recommendation	Description	Audited party comment	Remedial action
Database Accuracy	WCC and Meridian review the new connection process to ensure all lights are updated in both the RAMM database and the PLANet CMS systems so that these lights are accounted for. This will also enable WCC to statically dim lights for streets not yet vested to the council to zero or near zero load to reduce the operational cost of these lights.	We will discuss this recommendation with WCC when we meet with them.	Investigating

Private lights are connected to the streetlight circuits but are not WCC's responsibility. They are recorded in the database for completeness only. Each month, a database extract is provided to Wellington Electricity which includes these private lights. It is understood that Wellington Electricity intends to create ICPs for this load.

The current new connection process does not include any checks to ensure new private lights are connected inadvertently as part of a DUML new connection request similar to Saddleback Grove. With

the recent urban housing intensification activity that is underway the industry is seeing an increase in private lights being created and connected without the local distributor creating ICPs for these lights as these lights are initially thought to be additional DUML lights.

I recommend that Meridian works with both WCC and Wellington Electricity to ensure that all new private lights can be clearly identified through the new connection application process to ensure these are managed separately from the DUML connections and ICPs are created accordingly.

Recommendation	Description	Audited party comment	Remedial action
Database Accuracy	Meridian works with both WCC and Wellington Electricity to ensure that all new private lights can be clearly identified through the new connection application process to ensure these are managed separately from the DUML connections and ICPs are created accordingly.	We will discuss additional controls around connection of new lights with WCC when we meet with them.	Investigating

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 3.1 With: Clause 15.2 and 15.37B(b) From: 01-Sep-21 To: 30-Sep-22	The database accuracy is assessed to be 105.1% of the database for the sample checked indicating a potential under submission of approximately 294,400 kWh per annum. 205 items of load have lamp and/or gear wattages recorded which differed from the published standardised wattage table and manufacturer's specifications available. The impact of these differences is estimated to be approximately 7,117 kWh of under submission (based on annual burn hours of 4,271 as detailed in the DUML database auditing tool). Field audit identified 118 items of load that have incorrect wattages, leading to under submission by 3,242 kWh per annum. Dynamic dimming is sometimes used, and the full lamp wattage is recorded in RAMM for the dynamically dimmed lights. The impact varies but is expected to be low. Potential impact: High Actual impact: High Audit history: Three times Controls: Weak Breach risk rating: 9
Audit risk rating	**Rationale for audit risk rating**

High	The controls are rated as weak, because they are not sufficient to ensure that database wattage is consistently accurate. The impact is assessed to be medium based on the wattage differences described above.

Actions taken to resolve the issue	Completion date	Remedial action status
WCC have been provided audit findings for resolution.	25 Oct 2022	Investigating
Preventative actions taken to ensure no further issues will occur	**Completion date**	
We will continue to follow up with WCC re database corrections required and improvements to maintenance processes for changes and new connections.	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

Meridian reconciles this DUML load using the DST profile. The total volume submitted to the Reconciliation Manager is based on a monthly database report derived from RAMM and the "burn time" which is sourced from data loggers for eight of the ICPs. The burn hours for the remaining three ICPs are derived using set hours per day as detailed in the table below:

ICP	Profile	ICP description	Burn hours
1001152335CKD81	UNM	24/7 (1) LIGHTING	24 hours x days in period
1001152336CK141	UNM	24/7 (2) LIGHTING	24 hours x days in period
1001152339CKE9F	CST	4 HOUR LIGHTING	4 hours x days in period

I recalculated the expected submission volumes for each ICP for September 2022 based on the database wattages and burn hours provided and confirmed that Meridian uses the total wattage value from the

streetlighting power return report from the WCC RAMM system. This total wattage field does not include any allowance for static dimming activities that has been performed by WCC since December 2018. By not applying the total effective wattage value which allows for static dimming the result is an over submission in the region of 1,811,553 kWh per annum. This over submission will also have an impact to the calculation of seasonal shapes used by other NHH retailers for the calculation of historic estimate as the Meridian DST profile is applied to these volumes meaning this over submission is included by the Reconciliation Manager to derive the seasonal shapes

Volume inaccuracy is present in the database as follows:

Issue	Estimated volume information impact (annual kWh)
Potential under submission due to database inaccuracy identified during the field audit	294,400 kWh under submission
Lamp and/or gear wattages which differ from the published standardised wattage table and manufacturer's specifications available.	7,117 kWh under submission
Items of load with invalid zero lamp or gear wattages	2,776 kWh of under submission (wattage assumed to be 50, which is the database average)
Unapproved dynamic dimming	Unknown, but expected to result in low over submission
Static dimming adjustment not applied to capacities used for submission	1,811,553 kWh over submission

Rounding of statically dimmed lights was recorded as non-compliance during previous audits. This issue is not present currently as Meridian does not use the dimmed capacity value for submission purposes.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 3.2 With: Clause 15.2 and 15.37B(c) From: 01-Sep-21 To: 30-Sep-22	The database used to prepare submissions contains some inaccurate information: • 294,400 kWh per annum under submission from field audit, • 7,117 per annum under submission due to incorrect lamp or gear wattages, • 2,776 kWh per annum under submission due to missing lamp or gear wattages, and • 1,811,553 kWh per annum over submission due to static dimming adjustment not applied to submission capacities. • Dynamic dimming is sometimes used, and the full lamp wattage is recorded in RAMM for the dynamically dimmed lights. The impact varies but is expected to be low. Potential impact: High Actual impact: High Audit history: Three times

	Controls: Weak Breach risk rating: 9		
Audit risk rating	**Rationale for audit risk rating**		
High	Overall, the controls are rated as weak, primarily due to the database accuracy issues discussed further in **section 3.1**. The impact is assessed to be high, based on the kWh differences described above.		
Actions taken to resolve the issue		**Completion date**	**Remedial action status**
We will revise Jul – Sept submissions using capacities with static dimming adjustment applied and will use the adjusted capacities for submission calcs going forward. WCC have been provided audit findings for resolution.		28 Feb 2023 25 Oct 2022	Identified
Preventative actions taken to ensure no further issues will occur		**Completion date**	
We will be discussing with WCC operational requirements for use of approved static dimming profile and progress made to date on meter installations etc. We will continue to work with WCC to implement an approved method of settlement for dimming lights and follow up re database corrections required and improvements to maintenance processes for changes and new connections.		30 Nov 2023 Ongoing	

CONCLUSION

The database still contains many discrepancies, a number of which were present during the last audit. Field updates do not always appear to be accurate and updates for new connections are not always timely.

Database accuracy is described as follows:

Result	Percentage	Comments
The point estimate of R	105.1	Wattage from survey is higher than the database wattage by 5.1%
R_L	97.8	With a 95% level of confidence, it can be concluded that the error could be between -2.2% and +15.3%
R_H	115.3	

These results were categorised in accordance with the "Distributed Unmetered Load Statistical Sampling Audit Guideline", effective from 1 February 2019 and the table below shows that Scenario B (detailed below) applies.

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 2.2% lower and 15.3% higher than the wattage recorded in the DUML database

In absolute terms the installed capacity is estimated to be 69 kW higher than the database indicates.

There is a 95% level of confidence that the installed capacity is between 30kW lower and 207 kW higher than the database.

In absolute terms, total annual consumption is estimated to be 294,400 kWh higher than the DUML database indicates.

There is a 95% level of confidence that the annual consumption is between 127,800 kWh lower and 883,300 kWh p.a. higher than the database indicates.

The audit found six non-compliances, four recommendations and one issue were made.

The future risk rating of 33 indicates that the next audit be completed in three months. I have considered this in conjunction with Meridians responses and recommend the next audit be due in 6 months.

PARTICIPANT RESPONSE