

ELECTRICITY INDUSTRY PARTICIPATION CODE
DISTRIBUTED UNMETERED LOAD AUDIT REPORT



For

WELLINGTON CITY COUNCIL AND
MERIDIAN ENERGY

NZBN: 9429037696863

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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.

WCC uses two databases for streetlight information - RAMM and PLANet. RAMM is used to record all streetlight assets including dimming information and provide monthly extracts which Meridian uses to calculate submission information. PLANet is used to manage LED streetlights, including dimming.

Streetlight maintenance is completed by Fulton Hogan, who update the database using Pocket RAMM. New connections are completed by Wellington Electricity's approved contractors, and WCC updates RAMM once they receive paperwork confirming that the lights are installed and inspected including "as built" plans, a certificate of compliance, and a record of inspection.

WCC uses two types of dimming for its LED streetlights; static dimming where the light is dimmed by the same percentage for every hour it is on, and dynamic dimming where a program varies the dimming level based on the time. No check or golden meters are installed to validate the dimming information recorded by PLANet.

Approximately half of WCC's streetlights have static dimming. Where lights have static dimming, WCC prefers to dim by 50% but the dimming level can be adjusted for individual lights if needed to resolve customer complaints. The dimming percentage is transferred from PLANet to RAMM as part of the process to update PLANet.

Some lights have dynamic dimming set by a Telensa program, which allows dimming to be increased and decreased during the night hours. These lights are recorded with the full manufacturer's wattage as the effective wattage in RAMM, which is likely to result in over submission because the lights are dimmed by 40-60% for part of the night. Previous audits have found around 85 lights connected to this program.

Meridian submits unmetered load as NHH for all WCC ICPs. Eight ICPs have DST profile and submission data is derived by EMS from the total effective wattage (accounting for dimming) in the RAMM database extract, and the on hours recorded by a data logger. Five ICPs have unmetered load connected for either four or 24 hours per day. Meridian submits the load for these ICPs using the UML profile, based on the daily unmetered kWh on the registry multiplied by the number of days that the ICP is active.

The field audit of 568 items of load found that the database was not accurate within $\pm 5.0\%$. Total annual consumption is estimated to be 398,300 kWh higher than the DUML database indicates before dimming is accounted for. The actual amount of under submission is likely to be closer to half this volume, because just over half of the lights in the database are dimmed. Each dimmed light is dimmed by an average of 50%.

Some other database accuracy discrepancies were identified during the audit including 115 items of load with no lamp make, model, lamp or gear wattages recorded. WCC intends to investigate and resolve these discrepancies along with the field audit discrepancies.

The audit found five non-compliances and raises three recommendations. The future risk rating of 34 (a decrease from 38 in the previous audit) indicates that the next audit be completed in three months. I have considered this in conjunction with Meridian's responses and recommend the next audit be in a minimum of six months' time to enable Wellington City Council to make progress on resolving the exceptions before the next audit is completed.

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	<p>Under submission of 88.04 kWh occurred for January 2024 for 1001152339CKE9F, because the load was calculated based on 49.9 kWh per day but should have been based on 52.74 kWh.</p> <p>The database was found not to be accurate within $\pm 5.0\%$. Based on the field audit total annual consumption is estimated to be 398,300 kWh higher than the DUML database indicates before dimming is accounted for. The actual amount of under submission is likely to be closer to half this volume, because just over half of the lights in the database are dimmed. Each dimmed light is dimmed by an average of 50%.</p> <p>115 items of load had no lamp make, model, lamp and gear wattage recorded. 20 are feedback signs and 95 are IoT Access Point/Gateways. The expected wattage is to be confirmed.</p> <p>The total effective wattage is rounded to the nearest whole number. For example, a 27W light dimmed by 50% is recorded as 14W rather than 13.5W. This could result in estimated over submission of 10,822 kWh per annum across all the dimmed lights.</p> <p>Lights which are dynamically dimmed have the full wattage recorded in the total effective wattage field in RAMM, which will result in over submission.</p> <p>The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot.</p>	Weak	High	9	Identified
Description and capacity of load	2.4	11(2)(c) and (d) of	115 items of load had no lamp make, model, lamp and gear wattage recorded.	Moderate	Medium	4	Identified

Subject	Section	Clause	Non-Compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
		Schedule 15.3					
All load recorded in database	2.5	11(2A) of Schedule 15.3	30 additional lamps in the field were not recorded in the database from a sample of 568 items of load.	Weak	Low	3	Identified
Database accuracy	3.1	15.2 and 15.37B(b)	<p>The database was found not to be accurate within $\pm 5.0\%$. Based on the field audit total annual consumption is estimated to be 398,300 kWh higher than the DUML database indicates before dimming is accounted for. The actual amount of under submission is likely to be closer to half this volume, because just over half of the lights in the database are dimmed. Each dimmed light is dimmed by an average of 50%.</p> <p>115 items of load had no lamp make, model, lamp and gear wattage recorded. 20 are feedback signs and 95 are IoT Access Point/Gateways. The expected wattage is to be confirmed.</p> <p>The total effective wattage is rounded to the nearest whole number. For example, a 27W light dimmed by 50% is recorded as 14W rather than 13.5W. This could result in estimated over submission of 10,822 kWh per annum across all the dimmed lights.</p> <p>Lights which are dynamically dimmed have the full wattage recorded in the total effective wattage field in RAMM, which will result in over submission.</p>	Weak	High	9	Identified
Volume information accuracy	3.2	15.2 and 15.37B(c)	<p>Under submission of 88.04 kWh occurred for January 2024 for 1001152339CKE9F, because the load was calculated based on 49.9 kWh per day but should have been based on 52.74 kWh.</p> <p>The database was found not to be accurate within $\pm 5.0\%$. Based on the field audit total annual consumption is estimated to be 398,300 kWh</p>	Weak	High	9	Identified

Subject	Section	Clause	Non-Compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
			<p>higher than the DUML database indicates before dimming is accounted for. The actual amount of under submission is likely to be closer to half this volume, because just over half of the lights in the database are dimmed. Each dimmed light is dimmed by an average of 50%.</p> <p>115 items of load had no lamp make, model, lamp and gear wattage recorded. 20 are feedback signs and 95 are IoT Access Point/Gateways. The expected wattage is to be confirmed.</p> <p>The total effective wattage is rounded to the nearest whole number. For example, a 27W light dimmed by 50% is recorded as 14W rather than 13.5W. This could result in estimated over submission of 10,822 kWh per annum across all the dimmed lights.</p> <p>Lights which are dynamically dimmed have the full wattage recorded in the total effective wattage field in RAMM, which will result in over submission.</p> <p>The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot.</p>				
Future Risk Rating						34	

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	Comment
Validate additional load excluded from the RAMM extracts but included in submission information for ICPs 0000156771CKE59 and 0000159586CK0E3.	2.1	<p>Validate additional load excluded from the RAMM extracts but included in submission information, and update RAMM and submission information as necessary.</p> <p>ICP 0000156771CKE59 has 2 x 69 W (total of 138W) flow meters added before submission and ICP 0000159586CK0E3 has</p>	<p>Meridian has advised WCC of the recommendation.</p> <p>WCC advise, these are water meters and cameras from a different business unit. They are currently reviewing how this should be reported.</p>

Subject	Section	Description	Comment
		a 75.2 W traffic camera added before submission.	
Confirm the correct details and wattages for the feedback signs and IoT Access Point/Gateways with no wattages recorded.	2.4	Confirm the correct details and wattages for the feedback signs and IoT Access Point/Gateways with no wattages recorded. Update the database as necessary.	WCC advise the IoT access points have been deleted as they are no longer being used. The new parking stations are operating, we are waiting on Traffic signals to advise on the wattages for the driver feedback signs.
Confirm the correct lamp details and wattage for "Phillips LEDBulb MV(6W) on 8h".	3.1	Confirm the correct lamp details, on hours and wattage for "Phillips LEDBulb MV(6W) on 8h" which are currently recorded with 12W and connected to DUMML ICPs settled using DST profile. Update the database as necessary.	WCC advise, these are the light bulbs for the Belisha beacons on the pedestrian crossings and are 12W.

ISSUES

Subject	Section	Description	Issue
		Nil	

1. ADMINISTRATIVE

1.1. Exemptions from Obligations to Comply with Code

Code reference

Section 11 of Electricity Industry Act 2010.

Code related audit information

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

Audit observation

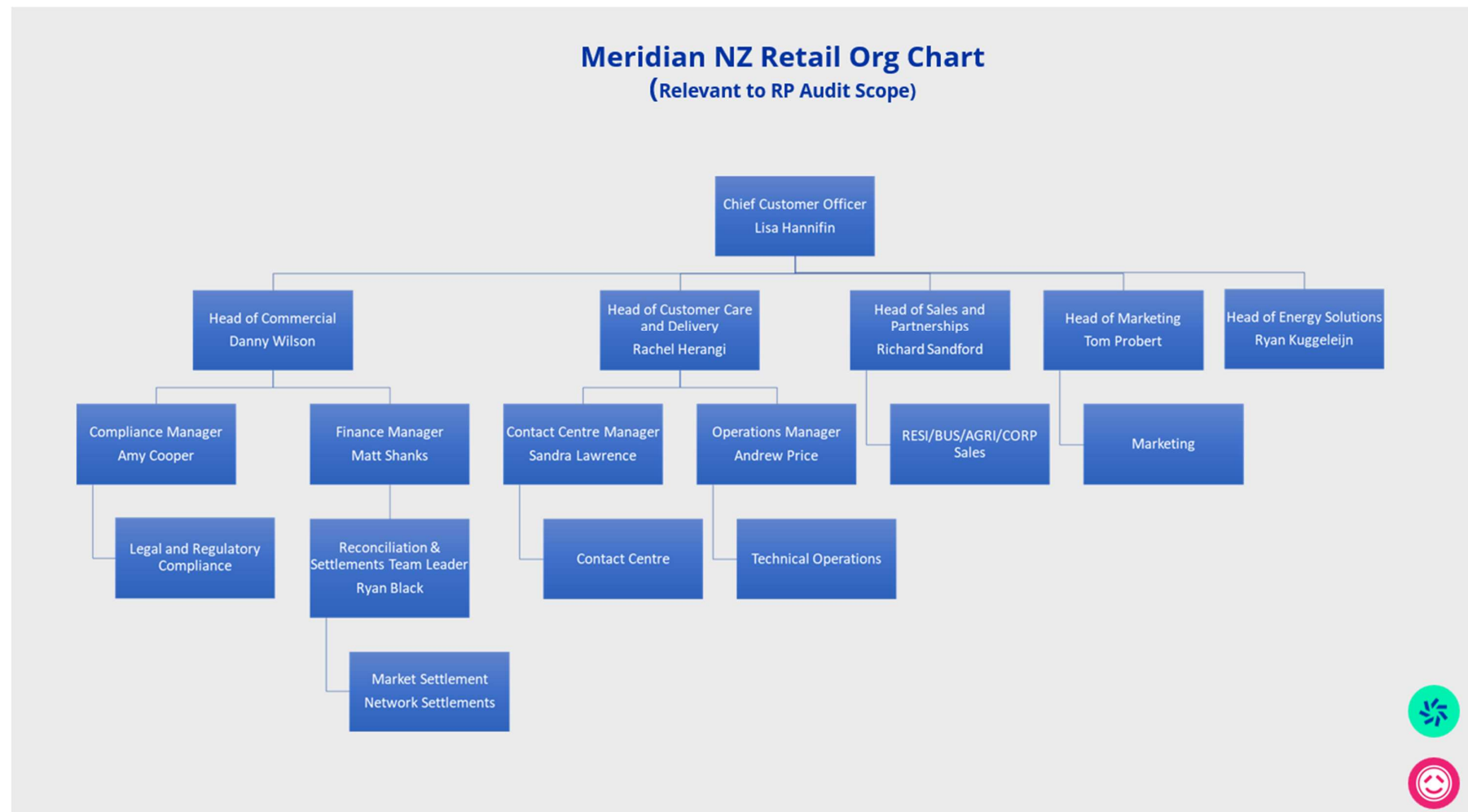
The Electricity Authority's website was reviewed to identify any exemptions relevant to the scope of this audit.

Audit commentary

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

1.2. Structure of Organisation

Meridian provided a copy of their organisational structure:



1.3. Persons involved in this audit.

Auditor:

Name	Title	Company
Tara Gannon	Auditor	Provera

Other personnel assisting in this audit were:

Name	Title	Company
John Kandralides	Project Engineer Streetlights T/L Pedestrian Network Maintenance	WCC
Amy Cooper	Compliance Officer	Meridian Energy

1.4. Hardware and Software

RAMM

The SQL database used for the management of DUML is remotely hosted by thinkproject New Zealand Limited. The database is commonly known as “RAMM” which stands for “Road Assessment and Maintenance Management”. The specific data used for DUML is held in the Streetlight tables. thinkproject New Zealand Limited backs up the database and assists with disaster recovery as part of their hosting service. Access to RAMM is restricted using logins and passwords.

PLANet

WCC uses the Telensa PLANet Centralised Management System (CMS) to manage dimming and control its LED streetlights. WCC confirmed that the database is backed up and access is restricted using logins and passwords.

Meridian systems

Systems used by the trader are assessed as part of their reconciliation participant audit.

EMS systems

Systems used by EMS are assessed as part of their agent 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)
0000156771CKE59	WCC UML MASTER 24HR TKR0331	TKR0331	UML	4	576
0000159586CK0E3	WCC MASTER ICP - CAMERAS KWA0111	KWA0111	UML	13	520
1001152335CKD81	24/7 (1) LIGHTING	CPK0331	UML	63	6,585
1001152336CK141	24/7 (2) LIGHTING	WIL0331	UML	13	1,008
1001152339CKE9F	4 HOUR LIGHTING	CPK0331	UML	31	13,186
0001255309UN981	MSTR ICP WCC CPK0331	CPK0331	DST	7,445	355,116
0001256880UN374	MSTR ICP WCC CPK0111	CPK0111	DST	533	23,517
0001256885UNE3B	MASTER ICP WIL0331	WIL0331	DST	4,332	207,935
0001256890UN9D9	AOTEA QUAY	TKR0331	DST	4,076	155,921
0001256892UN95C	MSTR ICP WCC KWA0111	KWA0111	DST	1,022	47,974
1001102041UNDDC	MASTER ICP AIRPORT	CPK0331	DST	293	53,052
1001152333CKCOE	AMENITY LIGHTING	CPK0331	DST	1,036	43,630
1001152334CK1C4	DECORATIVE LIGHTING	CPK0331	DST	215	8,913
Total				19,076	917,932

The database also includes:

ICP group	Comment
1001102046UN016	Two lights (201 W) are recorded against this "MASTER ICP NZTA/NGAURANGA TO TCE TUNNEL" ICP. These lights are not WCC's responsibility and are supplied by Genesis Energy as part of the NZTA Greater Wellington DUMML database.
Metered	139 metered lights (23,060 W) are recorded in the database for completeness but are not part of the DUMML load.
Private	There are 273 lights (17,762 W) with the ICP group recorded as "private". These lights are not WCC's responsibility and are included in the database so that the correct owner can be determined if a fault is raised.
Solar	Seven solar powered lights (162 W) are recorded in the database for completeness but are not part of the DUMML load.

1.7. Authorisation Received

All information was provided directly by Meridian and WCC.

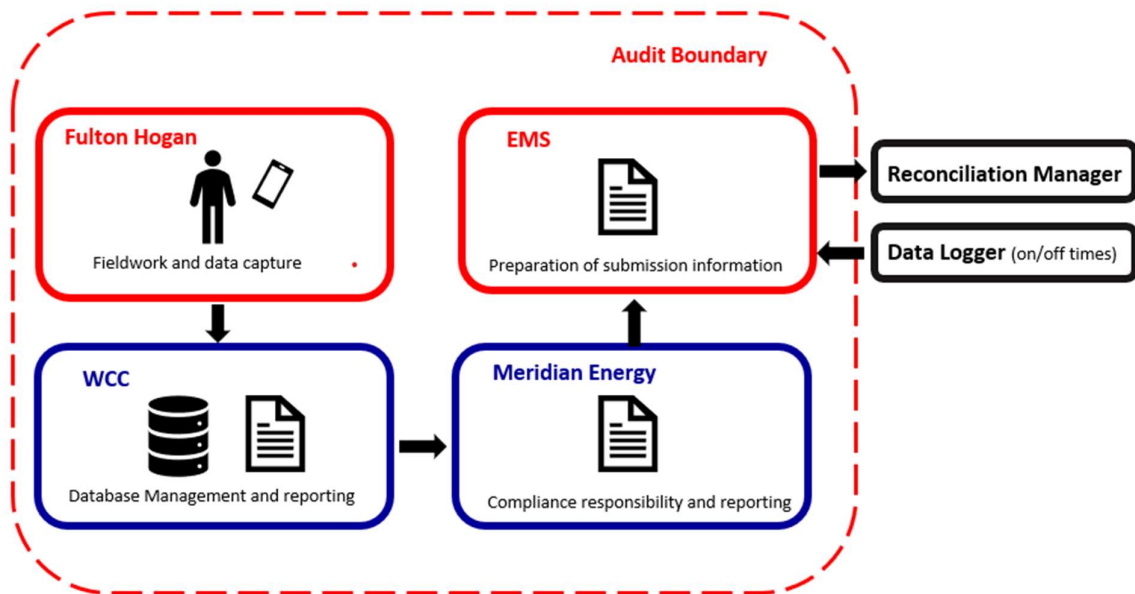
1.8. Scope of Audit

This audit of the WCC DUML database and processes was conducted at the request of 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.

WCC uses two databases for streetlight information - RAMM and PLANet. RAMM is used to record all streetlight assets including dimming information and provide monthly extracts which Meridian uses to calculate submission information. PLANet is used to manage LED streetlights, including dimming.

Streetlight maintenance is completed by Fulton Hogan, who update the database using Pocket RAMM. New connections are completed by Wellington Electricity's approved contractors, and WCC updates RAMM once they receive paperwork confirming that the lights are installed and inspected including "as built" plans, a certificate of compliance, and a record of inspection.

The scope of the audit encompasses the collection, security, and accuracy of the data, including the preparation of submission information based on the database reporting. The diagram below shows the audit boundary for clarity.



The field audit was undertaken of a statistical sample of 568 items of load on 30 and 31 March 2024.

1.9. Summary of previous audit

The previous audit was completed in April 2023 by Bernie Cross of Veritek Limited. Six non-compliances were identified, and three recommendations and one issue were raised. The statuses of the non-compliances and recommendations are listed in the table below.

Table of non-compliance

Subject	Section	Clause	Non-compliance	Status
Deriving submission	2.1	11(1) of Schedule 15.3	The database used to prepare submissions contains some inaccurate information:	<ol style="list-style-type: none"> 1. Still existing 2. Still existing for some lamps with

Subject	Section	Clause	Non-compliance	Status
information			<ol style="list-style-type: none"> 1. 294,400 kWh per annum under submission from field audit, 2. 7,117 per annum under submission due to incorrect lamp or gear wattages, 3. 2,776 kWh per annum under submission due to missing lamp or gear wattages, 4. 1,811,553 kWh per annum over submission due to static dimming adjustment not applied to submission capacities, and 5. 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. 	<ol style="list-style-type: none"> 3. Still existing for some lamps with missing wattage information 4. Cleared, Meridian is using the effective wattages including dimming for submission. 5. Still existing.
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.	Cleared.
Description and capacity of load	2.4	11(2)(c) and (d) of Schedule 15.3	<p>Some description and capacity information are incomplete or unknown, including:</p> <ul style="list-style-type: none"> • 76 lamps with unknown or blank lamp descriptions, and • 57 gear wattages discrepancies. 	Still existing.
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.	Still existing.
Database accuracy	3.1	15.2 and 15.37B(b)	<p>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.</p> <p>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).</p> <p>Field audit identified 118 items of load that have incorrect wattages, leading to under submission by 3,242 kWh per annum.</p> <p>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.</p>	<p>Some field audit accuracy issues are still existing.</p> <p>Dynamically dimmed ICPs still have the full lamp wattage recorded in RAMM.</p>

Subject	Section	Clause	Non-compliance	Status
Volume information accuracy	3.2	15.2 and 15.37B(c)	<p>The database used to prepare submissions contains some inaccurate information:</p> <ol style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> Still existing. Still existing for some lamps with missing wattage information. Still existing for some lamps with missing wattage information. Cleared, Meridian is using the effective wattages including dimming for submission. Still existing.

Table of recommendations

Subject	Section	Recommendation	Status
Database Accuracy	3.1	Check and correct light wattages provided.	Adopted.
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.	This was considered but not adopted, because it is not practical to run the bulk update process more frequently.
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.	Now that WCC is validating Fulton Hogan's claim information against expected work and RAMM records, unapproved connections should be able to be identified and resolved.

Table of issues

Subject	Section	Description	Issue	Status
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.	No response received, not re-raised.

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 Provera 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

DST profile ICPs

Eight ICPs have DST profile and submission data is derived by EMS from the total effective wattage (accounting for static dimming) in the RAMM database extract, and the on hours recorded by a data logger. Meridian provides the wattage to EMS using a capacity report and I verified that the capacities provided to EMS were correct for January 2024.

Lights which are dynamically dimmed have the full wattage recorded in the total effective wattage field in RAMM, which will result in over submission.

ICP Number	Description	NSP	Profile
0001255309UN981	MSTR ICP WCC CPK0331	CPK0331	DST
0001256880UN374	MSTR ICP WCC CPK0111	CPK0111	DST
0001256885UNE3B	MASTER ICP WIL0331	WIL0331	DST
0001256890UN9D9	AOTEA QUAY	TKR0331	DST
0001256892UN95C	MSTR ICP WCC KWA0111	KWA0111	DST
1001102041UNDDC	MASTER ICP AIRPORT	CPK0331	DST
1001152333CKCOE	AMENITY LIGHTING	CPK0331	DST
1001152334CK1C4	DECORATIVE LIGHTING	CPK0331	DST

UML profile ICPs

Five ICPs have unmetered load connected for either four or 24 hours per day. There is one dimmed light connected to 1001152335CKD81, but otherwise no dimming for any load connected to these ICPs.

Meridian submits the load as NHH using the UML profile, based on the daily unmetered kWh on the registry multiplied by the number of days that the ICP is active. Meridian calculates the daily unmetered load on the registry as the total effective wattage (accounting for dimming) in the RAMM database extract multiplied by daily on hours from the table below. For two of the ICPs, some extra load not included in the database is added by Meridian when calculating the daily unmetered kWh as shown in the table below. This extra load is to be investigated by Meridian and WCC to determine whether it should be added to the database and continue to be included in submission information.

ICP Number	Description	NSP	Profile	Daily on hours	Extra load added
0000156771CKE59	WCC UML MASTER 24HR TKR0331	TKR0331	UML	24	2 x 69 W (total of 138W) flow meters.
0000159586CK0E3	WCC MASTER ICP - CAMERAS KWA0111	KWA0111	UML	24	75.2 W traffic camera.
1001152335CKD81	24/7 (1) LIGHTING	CPK0331	UML	24	
1001152336CK141	24/7 (2) LIGHTING	WIL0331	UML	24	
1001152339CKE9F	4 HOUR LIGHTING	CPK0331	UML	4	

Recommendation	Description	Audited party comment	Remedial action
Validate additional load excluded from the RAMM extracts but included in submission information for ICPs 0000156771CKE59 and 0000159586CK0E3.	Validate additional load excluded from the RAMM extracts but included in submission information, and update RAMM and submission information as necessary. ICP 0000156771CKE59 has 2 x 69 W (total of 138W) flow meters added before submission and ICP 0000159586CK0E3 has a 75.2 W traffic camera added before submission.	Meridian has advised WCC of the recommendation. WCC advise, these are water meters and cameras from a different business unit. They are currently reviewing how this should be reported.	Investigating

I checked the unmetered load submissions for January 2024 and found that the calculation was correct and matched the expected value, except for 1001152339CKE9F which had its load calculated based on 49.9 kWh instead of 52.74 kWh. The load was corrected effective from 1 February 2024, and under submission of 88.04 kWh occurred for January 2024.

Festive lights

Festive lights are recorded in the database and a review of the monthly capacity values applied by Meridian confirmed that this festive light load is included in submission information for the period this lighting is operational (December to January).

Daily load calculation

On 18 June 2019, the Electricity Authority issued a memo confirming that the code requirement to calculate the correct monthly load must:

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

The current monthly report is provided as a snapshot and this practice is non-compliant. The database contains a "light install date" and a "lamp install date" field but these are not used to re-calculate historic submissions. When a wattage is changed in the database due to a physical change or a correction, only the record present at the time the report is run is recorded, not the historical information showing dates of changes.

Database accuracy

Volume inaccuracy is present in the database as follows:

Issue	Estimated volume information impact (annual kWh)
The database was found not to be accurate within $\pm 5.0\%$. Based on the field audit total annual consumption is estimated to be 398,300 kWh higher than the DUML database indicates before dimming is accounted for.	398,300 kWh under submission ¹ before dimming is accounted for.
115 items of load had no lamp make, model, lamp and gear wattage recorded. 20 are feedback signs and 95 are IoT Access Point/Gateways.	Unknown
The total effective wattage is rounded to the nearest whole number. For example, a 27W light dimmed by 50% is recorded as 14W rather than 13.5W.	10,822 kWh per annum

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.1 With: Clause 11(1) of Schedule 15.3	<p>Under submission of 88.04 kWh occurred for January 2024 for 1001152339CKE9F, because the load was calculated based on 49.9 kWh per day but should have been based on 52.74 kWh.</p> <p>The database was found not to be accurate within $\pm 5.0\%$. Based on the field audit total annual consumption is estimated to be 398,300 kWh higher than the DUML database indicates before dimming is accounted for. The actual amount of under submission is likely to be closer to half this volume, because just over half of the lights in the database are dimmed. Each dimmed light is dimmed by an average of 50%.</p> <p>115 items of load had no lamp make, model, lamp and gear wattage recorded. 20 are feedback signs and 95 are IoT Access Point/Gateways. The expected wattage is to be confirmed.</p> <p>The total effective wattage is rounded to the nearest whole number. For example, a 27W light dimmed by 50% is recorded as 14W rather than 13.5W. This could result in estimated over submission of 10,822 kWh per annum across all the dimmed lights.</p> <p>Lights which are dynamically dimmed have the full wattage recorded in the total effective wattage field in RAMM, which will result in over submission.</p> <p>The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot.</p> <p>Potential impact: High Actual impact: Unknown</p>

¹ The actual amount of under submission is likely to be closer to half this volume, because just over half of the lights in the database are dimmed. Each dimmed light is dimmed by an average of 50%.

From: 01-Jan-24 To: 31-Mar-24	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, because the database was confirmed not to be accurate within $\pm 5\%$. 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
Meridian has advised WCC of the inaccuracies identified and has requested for corrections to be made.		9/04/2024	Identified
115 items of load – WCC has advised, they are not luminaires; they have a single nominal operating wattage which is mapped to the total effective wattage and the total wattage in the power return.		10/04/2024	
The total effective wattage is rounded to the nearest whole number – WCC has advised that their system does round up to the closet whole number. They have approached the platform developers to see if this is something that can be amended.		10/04/2024	
Lights which are dynamically dimmed – WCC has advised, the lights are statically dimmed, and the dimmed wattage shows in the total effective wattage field in Ramm.		10/04/2024	
Preventative actions taken to ensure no further issues will occur		Completion date	
Meridian will continue to follow up with WCC regularly to have the inaccuracies corrected.		13/10/2024	
We have assessed our processes and tools to account for historic lamp installations and changes to the database at a daily level. There are checks in place comparing month to month data to identify any material changes and confirm details for these. These are accounted for in monthly submission.		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

All items of load have an ICP number recorded except:

ICP group	Comment
Metered	139 metered lights (23,060 W) which are recorded in the database for completeness, but are not part of the DUML load.
Private	273 lights (17,762 W) with the ICP group recorded as "private". These lights are not WCC's responsibility and are included in the database so that the correct owner can be determined if a fault is raised. The previous audit identified the following streets where private lights were installed, and no shared or standard unmetered load was created: Saddleback Grove, Tiketike Way, Brasch Way, Curnow Way, Hervey Way, Marsh Way, Sargeson Way and Satchell Way. I confirmed that no new standard or shared unmetered load has been added on the registry for these roads.
Solar	Seven solar powered lights (162 W) which are recorded in the database for completeness but are not part of the DUML load.

The previous audit raised an issue relating to treatment of private lights, including clarifying responsibilities for identifying private lights and ensuring that ICPs are recorded. No response has been received from the Electricity Authority, and compliance is recorded in this audit because the private lights are not the responsibility of WCC.

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

The database records a road name, suburb, and GPS coordinates. All items of load have GPS coordinates and a street name recorded.

Audit outcome

Compliant

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

Code reference

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

Code related audit information

The DUML database must contain:

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

Audit observation

The database was checked to confirm that it contained a field for lamp type and wattage capacity and included any ballast or gear wattage.

Audit commentary

Lamp make, model, manufacturer lamp wattage and gear wattage are recorded in the database, along with whether the light is dimmed, the dimming percentage and the effective wattage including dimming.

115 items of load had no lamp make, model, lamp and gear wattage recorded. 20 are feedback signs and 95 are IoT Access Point/Gateways.

Recommendation	Description	Audited party comment	Remedial action
Confirm the correct details and wattages for the feedback signs and IoT Access Point/Gateways with no wattages recorded.	Confirm the correct details and wattages for the feedback signs and IoT Access Point/Gateways with no wattages recorded. Update the database as necessary.	WCC advise the IoT access points have been deleted as they are no longer being used. The new parking stations are operating, we are waiting on Traffic signals to advise on the wattages for the driver feedback signs.	Identified

No other items of load had invalid zero lamp or gear wattages recorded. The accuracy of recorded wattages is discussed in **section 3.1**.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.4 With: Clauses 11(2)(c) and (d) of Schedule 15.3 From: 01-Feb-24 To: 28-Feb-24	115 items of load had no lamp make, model, lamp and gear wattage recorded. Potential impact: Low Actual impact: Low Audit history: Multiple times Controls: Moderate Breach risk rating: 4
Audit risk rating	Rationale for audit risk rating

Medium	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 medium, based on the number of exceptions identified.	
Actions taken to resolve the issue	Completion date	Remedial action status
WCC has advised, they are not luminaires; they have a single nominal operating wattage which is mapped to the total effective wattage and the total wattage in the power return.	10/04/2024	Identified
Preventative actions taken to ensure no further issues will occur	Completion date	

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 on a statistical sample of 568 items of load selected from the following strata on 30 and 31 March 2024:

- central and central suburbs,
- eastern suburbs,
- northern suburbs, and
- south-western suburbs.

Audit commentary

The discrepancies are summarised in the table below.

Street	Database count	Field count	Light count differences	Wattage recorded incorrectly	Comments
MT VICTORIA - AUSTIN ST	14	14	-	9	Nine 56W LEDs are recorded in the database as 30W LEDs.
MT VICTORIA - HANIA ST-#27 PATH	1	1	-	1	One 16W LED is recorded in the database as a 70W SON.
MT VICTORIA - SCARBOROUGH TCE	7	7	-	1	One 36W LED is recorded in the database as a 27W LED (asset ID 251038).
NEWTOWN - COROMANDEL ST	20	21	1	4	One 70W SON at the south end of the street was missing from the database. Two 26W LEDs (asset IDs 248900 and 248901) and two 36W LEDs

Street	Database count	Field count	Light count differences	Wattage recorded incorrectly	Comments
					(asset IDs 249009 and 248899) were recorded in the database as 20W LEDs.
NEWTOWN - MANSFIELD ST	9	8	-1	-	One 150W SON was not located during the field audit.
NEWTOWN - MILLWARD ST	6	6	-	1	One 36W LED was recorded in the database as a 20W LED (asset ID 245549).
KILBIRNIE - NAUGHTON TCE	7	7	-	1	One 27W LED was recorded in the database as a 23W LED (asset ID 233860).
KILBIRNIE - RODRIGO RD	21	21	-	1	One 36W LED was recorded in the database as a 20W LED (asset ID 227146).
MIRAMAR - APARIMA AVE	6	7	1	1	One 27W LED is recorded in the database as a 30W LED. One 36W LED on a pole that also has a light facing Chelsea St is missing from the database.
MIRAMAR - ELLESMERE AVE	12	13	1	1	One 27W LED was recorded in the database as a 30W LED (asset ID 255540). One 27W LED between Devonshire Road and Strathavon Road is missing from the database.
MIRAMAR - MIRO ST	15	16	1	-	One 27W LED on the same pole as asset ID 255849 was not recorded in the database.
MIRAMAR - REX ST	14	14	-	7	Six L36 lights between Tauhinu Road and Park Road are recorded in the database as L27. One 27W LED is recorded in the database as a 36W LED (asset ID 256009).
MIRAMAR - WEKA ST	11	12	1	-	One 36W LED near 42 Weka Street is not recorded in the database.
MIRAMAR - PARK RD-SLIP	11	17	6	-	Six 150W lights are missing from the database. Only one light per pole is recorded.
CHURTON PARK - NESTON GR	4	4	-	1	One 36W LED is recorded in the database as a 27W LED (asset ID 240579).

Street	Database count	Field count	Light count differences	Wattage recorded incorrectly	Comments
CHURTON PARK - ROCHDALE DR	8	8	-	7	Three 21W LEDs and four 35W LEDs are recorded in the database as 28W LEDs.
TAWA - CECIL RD-TAWA	7	12	5	2	Two 27W LEDs were recorded as a 20W LED (asset ID 240991) and a 23W LED (asset ID 239662). Five 27W LEDs on Cecil Road were not recorded in the database.
TAWA - DAVIDSON CRES-#76 PATH	3	3	-	3	One 26W LED (asset ID 242193), one 56W LED (asset ID 243952) and one 36W LED (asset ID 243953) are recorded in the database as 20W LED.
TAWA - MAGDALEN ST	2	3	1	-	One 36W LED near 8 Magdalen Street was missing from the database.
TAWA - MCLELLAN ST	6	11	5	-	Five 36W LEDs near the corner of Nathan Street, Luckie Street Davies Street and Ranui Terrace were not recorded in the database.
TAWA - OXFORD ST-TAWA	33	37	4	6	One 35W LED was recorded in the database as a 70W SON (asset ID 232822). One 22W LED was recorded in the database as a 18W LED (asset ID 232907). One 27W LED was recorded in the database as a 36W LED (asset ID 257287). The New World car park recorded three 250W SON and one 158W LED but eight 158W LEDs were present.
TAWA - PEMBROKE ST	9	9	-	1	One 36W LED was recorded in the database as a 27W LED (asset ID 240963).
TAWA - ROBERTS ST	7	7	-	1	One 27W LED was recorded in the database as a 35W LED (asset ID 252815).
TAWA - WESTHAVEN DR	6	8	2	-	Two 27W LEDs at the end of Westhaven Drive were not recorded in the database.
TAWA - WOODMAN DR	30	30	-	7	One 26W LED is recorded in the database as a 20W LED (asset ID 239726).

Street	Database count	Field count	Light count differences	Wattage recorded incorrectly	Comments
					Six 36W LEDs were recorded in the database as 27W LEDs.
TAWA - WOODMAN DR-#155 EXT	1	2	1	-	One 27W LED is missing from the database
BROOKLYN - JEFFERSON ST	4	5	1	-	One 27W LED near 5 Jefferson Street was not recorded in the database.
BROOKLYN - MORNINGTON RD	21	19	-2	4	One 35W LED was recorded in the database as a 55W LED (asset ID 224857). Three 36W LEDs were recorded in the database as 20W LEDs (asset IDs 239795, 245416 and 245417). Two 70W SON lights were not located during the field audit.
BROOKLYN - TANERA CRES	13	13	-	1	One 26W LED was recorded in the database as a 20W LED (asset ID 255486).
BROOKLYN - TANERA CRES-#12 PATH	1	1	-	1	One 16W LED was recorded in the database as a 27W LED (asset ID 254291).
KARORI - CROYDON ST	19	18	-1	-	One 18W LED (asset ID 235123) was not located during the field audit.
KARORI - KHOURI AVE	9	9	-	2	One 27W LED was recorded in the database as 150W SON (asset ID 236314). One 16W LED was recorded in the database as a 27W LED (asset ID 255509).
KARORI - MARSDEN AVE	6	5	-1	-	One 70W SON (asset ID 215767) was not located during the field audit.
KARORI - PERCY DYETT DR	15	15	-	1	One 36W LED was recorded in the database as a 100W SON (asset ID 238046).
KARORI - TISDALL ST	3	3	-	1	One 22W LED was recorded in the database as an 18W LED (asset ID 235307).
Total	568	593	35 (+30/-5)	65	

The field audit found 30 additional lights and could not find five lights listed in the database. This is recorded as non-compliance below. The accuracy of the database is discussed further in **section 3.1**.

The previous two audits found that some lights on Wellington’s waterfront were not recorded in the database. WCC investigated these lights following the last audit and confirmed that they are not their responsibility, and are correctly excluded from the database.

Audit outcome

Non-compliant

Non-compliance	Description	
Audit Ref: 2.5 With: Clauses 11(2A) of Schedule 15.3 From: 01-Jan-24 To: 31-Mar-24	30 additional lamps in the field were not recorded in the database from a sample of 568 items of load. Potential impact: High Actual impact: Unknown Audit history: Multiple times Controls: Weak Breach risk rating: 3	
Audit risk rating	Rationale for audit risk rating	
Low	The controls are rated as weak due to the quantity of missing lights relative to the sample size. The impact is expected to be low, based on an estimate of the unreported consumption using the average load across all lights in the database.	
Actions taken to resolve the issue	Completion date	Remedial action status
Meridian has advised WCC of the inaccuracies identified and has requested for corrections to be made. WCC has advised that they will perform site visits to confirm data before updating the database	9/4/2024	Identified
	10/04/2024	
Preventative actions taken to ensure no further issues will occur	Completion date	
Meridian will continue to follow up with WCC regularly to have the inaccuracies corrected.	13/10/2024	

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 DURL 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

Meridian's submissions are based on a monthly extract from the RAMM database.

A RAMM database extract was provided in February 2024 and I assessed the accuracy of this by using the DUML Statistical Sampling Guideline. The table below shows the survey plan.

Plan Item	Comments
Area of interest	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 for: <ul style="list-style-type: none"> • central and central suburbs, • eastern suburbs, • northern suburbs, and • south-western suburbs.
Area units	I created a pivot table by suburb and used a random number generator to select a sample of two suburbs within each strata. I created a pivot table by suburb and road and used a random number generator to select a sample roads within the sampled suburbs. I selected a total of 68 road sub-units making up 2% of the load in each strata and across all DUML ICPs.
Total items of load	568 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 568 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	107.0	Wattage from survey is higher than the database wattage by 7.07%

Result	Percentage	Comments
R _L	101.6	With a 95% level of confidence, it can be concluded that the error could be between +1.6% and +15.9%
R _H	115.9	

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 potential error is greater than $\pm 5.0\%$ and there is statistical evidence to support this finding.

- In absolute terms the installed capacity is estimated to be 93 kW higher than the database indicates.
- There is a 95% level of confidence that the installed capacity is between 21 and 212 kW higher than the database.
- In absolute terms, total annual consumption is estimated to be 398,300 kWh higher than the DUML database indicates.
- There is a 95% level of confidence that the annual consumption is between 88,600 kWh lower and 906,600 kWh p.a. higher than the database indicates.

The actual amount of under submission is likely to be closer to half this volume, because just over half of the lights in the database are dimmed. Each dimmed light is dimmed by an average of 50%.

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

WCC provided information showing that database accuracy exceptions identified during the previous audit had been resolved, or were in the process of being resolved.

Each audit, a sample of items of load are selected using a random number generator, and it appears that over 5% of lights have had different information in the field to in the database for the last five audits. The

increase in exceptions this audit may be partly explained by WCC’s efforts to replace lights quickly for safety reasons where the lights were at risk of detaching from the bracket, and RAMM not being correctly updated due to time pressure.

Street	Mar 2024	Mar 2023	Sept 2022	Sept 2021	March 2021
Incorrect wattages	65	35	118	31	14
Items of load in the database not found in the field	5	12	11	12	25
Items of load in the field not found in the database	30	15	38	-	14
Total discrepancies	100	62	167	43	53
Total sample	568	546	554	487	526
Percentage of sample with discrepancies	17.6%	11.4%	30.1%	8.8%	10.1%

Wattage accuracy

Lamp make, model, manufacturer lamp wattage and gear wattage are recorded in the database, along with whether the light is statically dimmed, the dimming percentage and the effective wattage including dimming.

Manufacturer wattages

115 items of load had no lamp make, model, lamp and gear wattage recorded. 20 are feedback signs and 95 are IoT Access Point/Gateways. A recommendation to check and update the information for these lights is made in **section 2.4**.

I checked the manufacturer’s lamp and gear wattages against expected values and found they were consistent except for “Phillips LEDBulb MV(6W) on 8h” which are recorded with a manufacturer’s lamp wattage of 12W. WCC plans to confirm the correct wattage and update the database. If these lights are connected for eight hours each day as the description suggests, a separate ICP may be required. Lights connected to existing DUML ICPs settled using the DST profile are recorded as being on for the hours recorded by the streetlight logger, and ICPs settled using the UML profile are recorded as being on for either four or 12 hours per day.

Recommendation	Description	Audited party comment	Remedial action
Confirm the correct lamp details and wattage for “Phillips LEDBulb MV(6W) on 8h”.	Confirm the correct lamp details, on hours and wattage for “Phillips LEDBulb MV(6W) on 8h” which are currently recorded with 12W and connected to DUML ICPs settled using DST profile. Update the database as necessary.	WCC advise, these are the light bulbs for the Belisha beacons on the pedestrian crossings and are 12W.	Identified

Other lamp and gear wattage discrepancies identified during the previous audit have been resolved.

Dimmed wattage calculations

The effective wattage, which takes static dimming into account, is used by Meridian to calculate submissions. Lights are static dimmed to 30%, 50%, 65%, 75% or 85% of the manufacturer’s wattage.

I compared the total effective wattage to a manual calculation using the manufacturer's wattage and dimming percentage and found that the dimmed wattages were calculated correctly but rounded to the nearest whole number. For example, a 27W light dimmed by 50% is recorded as 14W rather than 13.5W. This could result in estimated over submission of 2,534 W or 10,822 kWh per annum across all the dimmed lights.

Lights which are dynamically dimmed have the full wattage recorded in the total effective wattage field in RAMM, which will result in over submission.

ICP number accuracy

All items of load have an ICP number recorded except some metered, private and solar powered lights which are discussed in **section 2.2**.

The previous audit raised an issue relating treatment of private lights, including clarifying responsibilities for identifying private lights and ensuring that ICPs are recorded. No response has been received from the Electricity Authority, and compliance is recorded in this audit because the private lights are not the responsibility of WCC.

A sample of 2,000 items of load were plotted to assess the accuracy of NSP assignment, and the NSP assignments appeared reasonable based on the GPS location.

Change Management

WCC uses two databases for streetlight information - RAMM and PLANet. RAMM is used to record all streetlight assets including dimming information and provide extracts to be used by Meridian to calculate submissions. PLANet is used to manage LED streetlights, including dimming.

PLANet change management

Quarterly, an XML file is extracted from RAMM containing all lights in the database and provided to Telensa. Telensa loads the file into PLANet, so that it reflects any additions, removals or changes since the last RAMM update. If an existing light in PLANet requires a dimming change, it will be manually entered by WCC.

The previous audit had recommended the new connections process should be reviewed so that data can be entered into PLANet more quickly. This was considered but not adopted, because it is not practical to run the bulk update process more frequently.

RAMM change management

Fulton Hogan completes streetlight maintenance, and enters changes from the field using Pocket RAMM. When invoice and claim data is received from Fulton Hogan, it is matched against RAMM and the work expected to be completed. If the RAMM information is incomplete, inaccurate or not recorded against an asset number, payment will be withheld until the data has corrected. This process was implemented in around June 2023 and has helped to improve accuracy.

New connections may occur for subdivisions initiated by developers, or be initiated by WCC. The process for new connections is:

- a plan for the streetlights is prepared and approved by WCC,
- the installation is completed but not livened, and the certificate of compliance, record of inspection and "as built" plans are provided to the WCC data team,
- the WCC data team enters the information into RAMM based on the paperwork received, and completes a reasonableness check,
- the T/L Pedestrian Network Maintenance reviews the information and completes Meridian's new connection form which specifies the ICP the load is connected to, and the capacity,
- Meridian requests livening from Wellington Electricity and provides approval to WCC, and

- Meridian advises its settlement team of when liveness occurs to ensure that new lights are correctly included in submission information.

WCC is not always aware of the exact date that the lights are connected, but endeavours to enter them into RAMM as soon as possible.

When a dimming value is changed in PLANet, a drop down box appears to remind the user to check an option which will automatically transfer the change to RAMM.

Dimming management

Any LED light with a telecell recorded in PLANet can be dimmed. Eventually WCC plans to have telecells installed on all LED lights except walkways and some lights in Makara. WCC uses two types of dimming:

- static, where the light is dimmed by the same percentage for every hour it is on, and
- dynamic, where a program varies dimming level based on the time of night.

Where lights have static dimming, WCC prefers to dim by 50%. If they receive customer complaints they can adjust the dimming percentage for individual lights. The number of ICPs dimmed to each percentage are set out in the table below.

Percentage dimmed to	30%	50%	65%	75%	85%	Dimmed Count	Total count	Percent dimmed
0001255309UN981	1	4117	4	77	70	4,269	7,445	57.3%
0001256880UN374		369	3	44		416	533	78.0%
0001256885UNE3B		2389	1	23	12	2,425	4,332	56.0%
0001256890UN9D9		1958	1		6	1,965	4,076	48.2%
0001256892UN95C		737	1	2		740	1,022	72.4%
1001102041UNDDC		10				10	293	3.4%
1001152333CKCOE		59				59	1,036	5.7%
1001152335CKD81		1				1	63	1.6%
Total	1	9,640	10	146	88	9,885	18,800	52.6%

A small number of lights have dynamic dimming set by a Telensa program, which allows dimming to be increased and decreased during the night hours. These lights are recorded with the full manufacturer's wattage as the effective wattage, which is likely to result in over submission because the lights are dimmed by 40-60% for part of the night. Previous audits have found around 85 lights connected to this program.

A second Telensa program enables whole groups of lights to be dimmed for an event. WCC confirmed that this program has not been used for at least the past year.

For both dimming types there are no check (or golden) meters installed to validate the dimming data.

Outage patrols

Two night audits are completed each month, and the area of Wellington checked during each night patrol rotates between areas. Other outages are identified through the faults process.

Private lights

There are 273 lights (17,762 W) with the ICP group recorded as “private”. These lights are not WCC’s responsibility and are included in the database so that the correct owner can be determined if a fault is raised.

A full database extract is provided to Wellington Electricity each month, including these private lights. This will enable Wellington Electricity to identify the private lights so they can investigate whether standard or shared unmetered load is required.

The previous audit found that when new subdivisions were connected, private lights could accidentally be connected along with the approved DUMML lights. Now that WCC is validating Fulton Hogan’s claim information against expected work and RAMM records, unapproved connections should be able to be identified and resolved.

Festive light management

Festive lights are recorded in the database and a review of the monthly capacity values applied by Meridian confirmed that this festive light load is included in submission information for the period this lighting is operational (December to January).

Audit outcome

Non-compliant

Non-compliance	Description
<p>Audit Ref: 3.1 With: Clause 15.2 and 15.37B(b)</p> <p>From: 01-Jan-24 To: 31-Mar-24</p>	<p>The database was found not to be accurate within $\pm 5.0\%$. Based on the field audit total annual consumption is estimated to be 398,300 kWh higher than the DUMML database indicates before dimming is accounted for. The actual amount of under submission is likely to be closer to half this volume, because just over half of the lights in the database are dimmed. Each dimmed light is dimmed by an average of 50%.</p> <p>115 items of load had no lamp make, model, lamp and gear wattage recorded. 20 are feedback signs and 95 are IoT Access Point/Gateways. The expected wattage is to be confirmed.</p> <p>The total effective wattage is rounded to the nearest whole number. For example, a 27W light dimmed by 50% is recorded as 14W rather than 13.5W. This could result in estimated over submission of 10,822 kWh per annum across all the dimmed lights.</p> <p>Lights which are dynamically dimmed have the full wattage recorded in the total effective wattage field in RAMM, which will result in over submission.</p> <p>Potential impact: High Actual impact: High Audit history: Multiple times Controls: Weak Breach risk rating: 9</p>
Audit risk rating	Rationale for audit risk rating
High	Overall, the controls are rated as weak, because the database was confirmed not to be accurate within $\pm 5\%$. 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
<p>Meridian has advised WCC of the inaccuracies identified and has requested for corrections to be made.</p> <p>115 items of load – WCC has advised, they are not luminaires; they have a single nominal operating wattage which is mapped to the total effective wattage and the total wattage in the power return.</p> <p>The total effective wattage is rounded to the nearest whole number – WCC has advised that their system does round up to the closet whole number. They have approached the platform developers to see if this is something that can be amended.</p> <p>Lights which are dynamically dimmed – WCC has advised, the lights are statically dimmed, and the dimmed wattage shows in the total effective wattage field in Ramm.</p>	<p>9/04/2024</p> <p>10/04/2024</p> <p>10/04/2024</p> <p>10/04/2024</p>	<p>Identified</p>
<p>Preventative actions taken to ensure no further issues will occur</p>	<p>Completion date</p>	
<p>Meridian will continue to follow up with WCC regularly to have the inaccuracies corrected.</p>	<p>13/10/2024</p>	

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

Application of profiles

Correct profiles and submission types are recorded on the registry for each of the DUML ICPs.

DST profile ICPs

Eight ICPs have DST profile and submission data is derived by EMS from the total effective wattage (accounting for static dimming) in the RAMM database extract, and the on hours recorded by a data logger. Meridian provides the wattage to EMS using a capacity report and I verified that the capacities provided to EMS were correct for January 2024.

Lights which are dynamically dimmed have the full wattage recorded in the total effective wattage field in RAMM, which will result in over submission.

ICP Number	Description	NSP	Profile
0001255309UN981	MSTR ICP WCC CPK0331	CPK0331	DST
0001256880UN374	MSTR ICP WCC CPK0111	CPK0111	DST
0001256885UNE3B	MASTER ICP WIL0331	WIL0331	DST
0001256890UN9D9	AOTEA QUAY	TKR0331	DST
0001256892UN95C	MSTR ICP WCC KWA0111	KWA0111	DST
1001102041UNDDC	MASTER ICP AIRPORT	CPK0331	DST
1001152333CK0E	AMENITY LIGHTING	CPK0331	DST
1001152334CK1C4	DECORATIVE LIGHTING	CPK0331	DST

UML profile ICPs

Five ICPs have unmetered load connected for either four or 24 hours per day. There is one dimmed light connected to 1001152335CKD81, but otherwise no dimming for any load connected to these ICPs.

Meridian submits the load as NHH using the UML profile, based on the daily unmetered kWh on the registry multiplied by the number of days that the ICP is active. Meridian calculates the daily unmetered load on the registry as the total effective wattage (accounting for dimming) in the RAMM database extract multiplied by daily on hours from the table below. For two of the ICPs, some extra load not included in the database is added by Meridian when calculating the daily unmetered kWh as shown in the table below. This extra load is to be investigated by Meridian and WCC to determine whether it should be added to the database and continue to be included in submission information.

ICP Number	Description	NSP	Profile	Daily on hours	Extra load added
0000156771CKE59	WCC UML MASTER 24HR TKR0331	TKR0331	UML	24	2 x 69 W (total of 138W) flow meters.
0000159586CK0E3	WCC MASTER ICP - CAMERAS KWA0111	KWA0111	UML	24	75.2 W traffic camera.
1001152335CKD81	24/7 (1) LIGHTING	CPK0331	UML	24	
1001152336CK141	24/7 (2) LIGHTING	WIL0331	UML	24	
1001152339CKE9F	4 HOUR LIGHTING	CPK0331	UML	4	

I checked the unmetered load submissions for January 2024 and found that the calculation was correct and matched the expected value, except for 1001152339CKE9F which had its load calculated based on 49.9 kWh instead of 52.74 kWh. The load was corrected effective from 1 February 2024, and under submission of 88.04 kWh occurred for January 2024.

Festive lights

Festive lights are recorded in the database and a review of the monthly capacity values applied by Meridian confirmed that this festive light load is included in submission information for the period this lighting is operational (December to January).

Daily load calculation

On 18 June 2019, the Electricity Authority issued a memo confirming that the code requirement to calculate the correct monthly load must:

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

The current monthly report is provided as a snapshot and this practice is non-compliant. The database contains a “light install date” and a “lamp install date” field but these are not used to re-calculate historic submissions. When a wattage is changed in the database due to a physical change or a correction, only the record present at the time the report is run is recorded, not the historical information showing dates of changes.

Database accuracy

Volume inaccuracy is present in the database as follows:

Issue	Estimated volume information impact (annual kWh)
The database was found not to be accurate within ±5.0%. Based on the field audit total annual consumption is estimated to be 398,300 kWh higher than the DUML database indicates before dimming is accounted for.	398,300 kWh under submission ² before dimming is accounted for.
115 items of load had no lamp make, model, lamp and gear wattage recorded. 20 are feedback signs and 95 are IoT Access Point/Gateways.	Unknown
The total effective wattage is rounded to the nearest whole number. For example, a 27W light dimmed by 50% is recorded as 14W rather than 13.5W.	10,822 kWh per annum

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 3.2 With: Clause 15.2 and 15.37B(c)	Under submission of 88.04 kWh occurred for January 2024 for 1001152339CKE9F, because the load was calculated based on 49.9 kWh per day but should have been based on 52.74 kWh. The database was found not to be accurate within ±5.0%. Based on the field audit total annual consumption is estimated to be 398,300 kWh higher than the DUML database indicates before dimming is accounted for. The actual amount of under submission is likely to be closer to half this volume, because just over half of the lights in the database are dimmed. Each dimmed light is dimmed by an average of 50%. 115 items of load had no lamp make, model, lamp and gear wattage recorded. 20 are feedback signs and 95 are IoT Access Point/Gateways. The expected wattage is to be confirmed.

² The actual amount of under submission is likely to be closer to half this volume, because just over half of the lights in the database are dimmed. Each dimmed light is dimmed by an average of 50%.

<p>From: 01-Jan-24 To: 31-Mar-24</p>	<p>The total effective wattage is rounded to the nearest whole number. For example, a 27W light dimmed by 50% is recorded as 14W rather than 13.5W. This could result in estimated over submission of 10,822 kWh per annum across all the dimmed lights.</p> <p>Lights which are dynamically dimmed have the full wattage recorded in the total effective wattage field in RAMM, which will result in over submission.</p> <p>The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot.</p> <p>Potential impact: High</p> <p>Actual impact: Unknown</p> <p>Audit history: Multiple times</p> <p>Controls: Weak</p> <p>Breach risk rating: 9</p>		
<p>Audit risk rating</p>	<p>Rationale for audit risk rating</p>		
<p>High</p>	<p>Overall, the controls are rated as weak, because the database was confirmed not to be accurate within $\pm 5\%$. The impact is assessed to be high, based on the kWh differences described above.</p>		
<p>Actions taken to resolve the issue</p>	<p>Completion date</p>	<p>Remedial action status</p>	
<p>Meridian has advised WCC of the inaccuracies identified and has requested for corrections to be made.</p> <p>115 items of load – WCC has advised, they are not luminaires; they have a single nominal operating wattage which is mapped to the total effective wattage and the total wattage in the power return.</p> <p>The total effective wattage is rounded to the nearest whole number – WCC has advised that their system does round up to the closet whole number. They have approached the platform developers to see if this is something that can be amended.</p> <p>Lights which are dynamically dimmed – WCC has advised, the lights are statically dimmed, and the dimmed wattage shows in the total effective wattage field in Ramm.</p>	<p>9/04/2024</p> <p>10/04/2024</p> <p>10/04/2024</p> <p>10/04/2024</p>	<p>Identified</p>	
<p>Preventative actions taken to ensure no further issues will occur</p>	<p>Completion date</p>		
<p>Meridian will continue to follow up with WCC regularly to have the inaccuracies corrected.</p> <p>We have assessed our processes and tools to account for historic lamp installations and changes to the database at a daily level. There are checks in place comparing month to month data to identify any material changes and confirm details for these. These are accounted for in monthly submission.</p>	<p>13/10/2024</p> <p>Ongoing</p>		

CONCLUSION

The field audit of 568 items of load found that the database was not accurate within $\pm 5.0\%$. Total annual consumption is estimated to be 398,300 kWh higher than the DUML database indicates before dimming is accounted for. The actual amount of under submission is likely to be closer to half this volume, because just over half of the lights in the database are dimmed. Each dimmed light is dimmed by an average of 50%.

Some other database accuracy discrepancies were identified during the audit including 115 items of load with no lamp make, model, lamp or gear wattages recorded. WCC intends to investigate and resolve these discrepancies along with the field audit discrepancies.

The audit found five non-compliances and raises three recommendations. The future risk rating of 34 (a decrease from 38 in the previous audit) 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 in a minimum of six months' time to enable Wellington City Council to make progress on resolving the exceptions before the next audit is completed.

PARTICIPANT RESPONSE

Wellington City Council have also advised that they are currently looking at changing their CMS system so that they can have the correct the database information for the dimming lights.

They require Meridian to assist with trialling their options.

It is unknown when or if this will take place.