ELECTRICITY INDUSTRY PARTICIPATION CODE
DISTRIBUTED UNMETERED LOAD AUDIT REPORT

VERITEK

For

AUCKLAND TRANSPORT AND MERIDIAN ENERGY NZBN: 9429037696863

Prepared by: Rebecca Elliot

Date audit commenced: 5 September 2022

Date audit report completed: 22 December 2022

Audit report due date: 15 January 2023

TABLE OF CONTENTS

EXECUTIVE SUMMARY

This audit of the **Auckland Transport Unmetered Streetlights (Auckland Transport)** DUML database and processes was conducted at the request of **Meridian Energy Limited (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.

In this audit I have assessed the accuracy of the RAMM database. Auckland Transport are still working to use the SLV system output for the reconciliation of the LED lighting load. This accounts for approximately 89% or 106,000 items of load of the total lighting load. Meridian is working with Auckland Transport to get an approved profile/s in place. Data cleansing is continuing to align both datasets. The SLV system is able to record the light wattage on each pole and identify any items of load with a wattage different to that recorded in RAMM. These will be flagged as exceptions and investigated. It also measures the energy usage, so can account for dimming. There are 40 check metered lights installed to check the accuracy of the SLV system output. The error rate is less than 1%. Once Auckland Transport can use this for submission the overall accuracy of submission will be greatly improved. The remaining older HPS etc. streetlights will continue to be reconciled on the existing unmetered ICPs but the data cleansing being undertaken between SLV and RAMM will ensure both datasets are as accurate as possible.

Overall, the accuracy of the database has improved. Specifically:

- the field audit results indicated that the database is within the +/-5% accuracy allowable threshold,
- the metered embedded network streetlights have been removed from the unmetered load,
- no unmetered load was found to be allocated to the incorrect network,
- the volume of incorrect wattages and ballasts recorded in the database has improved, and
- the volume of metered or solar lights incorrectly recorded against the unmetered load has reduced from 856 to 156 items of load.

Some data inaccuracies are still to be resolved:

- over submission because of dimming being used; the impact on submission is unknown,
- four LE ICPs with load allocated are still to be investigated to determine if these are Auckland Transport items of load and if they are metered or unmetered; this could potentially result in an estimated under submission of 6,753 kWh per annum,
- there was an increase in the number of lights with zero or no wattage recorded from 185 Items of load to 591 items of load; Auckland Transport are investigating as these may be metered items of load and could potentially result in an estimated under submission of 126,208 kWh (assuming 50 watts per light), and
- any changes that are made during any given month take effect from the beginning of that month; this process does not account for historic changes or changes within a month.

This audit found six non-compliances and no recommendations were made. The future risk rating of 34 indicates that the next audit be completed in three months, but I recommend that the next audit be in nine months on 15 October 2023 as Auckland Transport and Meridian are making good progress in improving the accuracy of the database and more time is needed to get profiles in place to move submission to the CMS system.

The matters raised are detailed below:

AUDIT SUMMARY

NON-COMPLIANCES

Subject	Section	Clause	Non-Compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
Deriving submission information	2.1	11(1) of Schedule 15.3	The variance of wattage values between the SLV system and RAMM is calculated to be 237,955 kWh per annum. I have not considered this in the audit risk rating as RAMM is less accurate, but the more accurate SLV is being used for submission. Over submission because of dimming being used. The impact on submission is unknown. 850 items of load with no ICP recorded indicating a potential under submission of 174,631 kWh per annum. Incorrect wattages applied based on lamp description for 60 lamp types recorded resulting in an estimated over submission of 379,238 kWh per annum. Incorrect ballasts applied to some items of load recorded resulting in an estimated over submission of 5,166 kWh per annum. Seven LE ICPs with unmetered load allocated resulting in an estimated under submission of 13,594 kWh per annum. Four LE ICPs with load allocated are still to be investigated to determine if these are Auckland Transport items of load and are metered or unmetered potentially resulting in an estimated under submission of 6,753 kWh per annum. 156 metered or solar items of load recorded against unmetered ICPs resulting in an estimated over submission of 54,245 kWh per annum. Any changes that are made during any given month take effect from the beginning of that month. This process does not account for historic changes or changes within a month.	Moderate	High	6	Identified

Subject	Section	Clause	Non-Compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
ICP identifier and items of load	2.2	11(2)(a) of Schedule 15.3	850 items of load with no ICP recorded indicating a potential under submission of 174,631 kWh per annum.	Moderate	High	6	Identified
Description and capacity of load	2.4	11(2)(c) and (d) of Schedule 15.3	591 items of load with zero or blank wattage recorded indicating a potential under submission of 126,208 kWh per annum.	Moderate	High	6	Identified
All load recorded in database	2.5	11(2A) and (d) of Schedule 15.3	22 additional lights found in the field or 2% of the load sampled.	Moderate	Medium	4	Identified
Database accuracy	3.1	15.2 and 15.37B(b)	Incorrect wattages applied based on lamp description for 60 lamp types recorded resulting in an estimated over submission of 379,238 kWh per annum. Incorrect ballasts applied to some items of load recorded resulting in an estimated over submission of 5,166 kWh per annum. 850 items of load with no ICP recorded indicating a potential under submission of 174,631 kWh per annum.. Seven embedded networks with unmetered streetlights incorrectly allocated to an LE ICP resulting in an estimated under submission of 13,594 kWh for since October 2022. Four LE ICPs with load allocated are still to be investigated to determine if these are Auckland Transport items of load and are metered or unmetered potentially resulting in an estimated under submission of 6,753 kWh per annum. 156 metered or solar items of load recorded against unmetered ICPs resulting in an estimated over submission of 54,245 kWh per annum.	Moderate	High	6	Identified

Subject	Section	Clause	Non-Compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
Volume information accuracy	3.2	15.2 and 15.37B(c)	The variance of wattage values between the SLV system and RAMM is calculated to be 237,955 kWh per annum. I have not considered this in the audit risk rating as RAMM is less accurate, but the more accurate SLV is being used for submission. Over submission because of dimming being used. The impact on submission is unknown. 850 items of load with no ICP recorded indicating a potential under submission of 174,631 kWh per annum. Incorrect wattages applied based on lamp description for 60 lamp types recorded resulting in an estimated over submission of 379,238 kWh per annum. Incorrect ballasts applied to some items of load recorded resulting in an estimated over submission of 5,166 kWh per annum. Seven embedded networks with unmetered streetlights incorrectly allocated to an LE ICP resulting in an estimated under submission of 13,594 kWh for since October 2022. Four LE ICPs with load allocated are still to be investigated to determine if these are Auckland Transport items of load and are metered or unmetered potentially resulting in an estimated under submission of 6,753 kWh per annum. 156 metered or solar items of load recorded against unmetered ICPs resulting in an estimated over submission of 54,245 kWh per annum. Any changes that are made during any given month take effect from the beginning of that month. This process does not account for historic changes or changes within a month.	Moderate	High	6	Identified
					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	Recommendation
		Nil

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

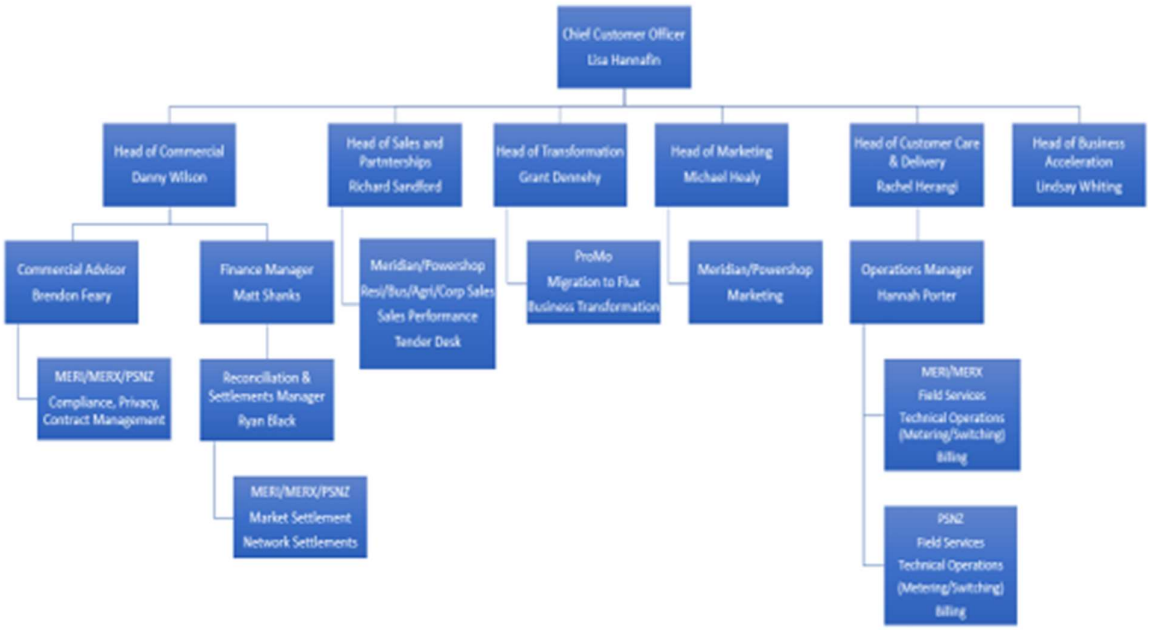
The Electricity Authority's website was reviewed to identify any exemptions relevant to the scope of this audit.

Audit commentary

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

1.2. Structure of Organisation

Meridian Energy provided a copy of their organisational structure.



1.3. Persons involved in this audit

Auditor:

Name	Company	Title
Rebecca Elliot	Veritek Limited	Lead Auditor
Steve Woods	Veritek Limited	Supporting Auditor

Other personnel assisting in this audit were:

Name	Title	Company
Amy Cooper	Compliance Officer	Meridian Energy
David Dick	Team Leader Street Lights	Auckland Transport
Nick Kershaw	Director	Asset Data Solutions Ltd

1.4. Hardware and Software

The streetlight data is held in a RAMM database, and this audit has assessed the accuracy of RAMM. Auckland Transport intends to use the SLV system output for the reconciliation of the LED lighting load. This accounts for approximately 86% or 106,000 items of load of the total lighting load. Meridian is working with Auckland Transport to get an approved profile/s in place. Once in place the SLV tele-management system will be audited for the LED load.

Both systems are backed up in accordance with standard industry procedures. Access to RAMM and the SLV tele-management is secure by way of password protection.

Systems used by the trader and their agent to calculate submissions are 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

There are 48 ICPs associated with the Auckland Transport DUML load. Some embedded streetlight load has been reallocated as detailed below:

ICP Number	Network	Profile	NSP	Number of items of load	Database wattage (watts)
0000019359WE3BC	WAIK	DST	TAK0331	46	2498
0000019934WE91D	WAIK	DST	WIR0331	11	782
0000041245WED7F	WAIK	DST	HMB0111	4	152
0000041246WE1BF	WAIK	DST	POR0111	166	13,371
0000041247WEDFA	WAIK	DST	JEF0111	29	1374
0003281740CNA88	COUP	DST	BOB1101	1,505	10,2342
0900343060LC471	VECT	DST	TAK0331	1,863	18,9758
0905321057LCB09	VECT	DST	HEP0331	17	3054
0914050273LCECE	VECT	DST	ROS0221	697	91,491
0915197278LC21F	VECT	DST	PEN0221	220	3,4224
0918033403LCA10	VECT	DST	PEN0331	1,127	17,0027
0929040953LCE6D	VECT	DST	PEN1101	1,286	166,778
0954776933LCC4F	VECT	DST	PAK0331	989	124,462
0977883655LCF24	VECT	DST	MNG0331	964	114,284
0984112723LC1A6	VECT	DST	WIR0331	692	93,523
0987075446LC985	VECT	DST	OTA0221	1,188	143,523
1001138654LC940	VECT	DST	ROS1101	864	131,532
1001282117UNECE	UNET	DST	ALB1101	895	127,723
1001282119UND55	UNET	DST	ALB0331	1,308	153,718
1001282121UN8B9	UNET	DST	HEN0331	1,457	138,344
1001282123UN83C	UNET	DST	HEP0331(N)	978	111,224
1001282124UN5F6	UNET	DST	SLV0331	1,446	183,135
1001282125UN9B3	UNET	DST	WRD0331	69	11,442
1001282126UN573	UNET	DST	WEL0331	118	13,808

ICP Number	Network	Profile	NSP	Number of items of load	Database wattage (watts)
1001282153UND61	UNET	DST	ALB1101	6,498	316,424
1001282154UN0AB	UNET	DST	ALB0331	7,807	396,107
1001282155UNCEE	UNET	DST	HEN0331	9,778	387,556
1001282156UN02E	UNET	DST	HEP0331(N)	7,444	328,537
1001282163UNA99	UNET	DST	WRD0331	474	25,640
1001282164UN753	UNET	DST	WEL0331	1,650	63,444
1001282166LCDC2	VECT	DST	HEP0331	923	37,160
1001282171LCAA5	VECT	DST	MNG0331	4,766	210,753
1001282172LC665	VECT	DST	OTA0221	5,473	255,413
1001282174LC7EA	VECT	DST	PEN0221	2,081	111,779
1001282175LCBAF	VECT	DST	PEN0331	12,354	583,591
1001282176LC76F	VECT	DST	PEN1101	2,512	173,724
1001282177LCB2A	VECT	DST	ROS0221	8,425	375,430
1001282178LC4F4	VECT	DST	ROS1101	6,026	293,066
1001282179LC8B1	VECT	DST	TAK0331	7,678	326,234
1001282180LC6F7	VECT	DST	WIR0331	3,780	193,620
1001287978LC3D9	VECT	DST	PAK0331	6,978	293,838
1001287979UN588	UNET	DST	SLV0331	5,684	251,666
1099572697CNB44	COUP	DST	BOB0331	87	7,243
1099572698CN49A	COUP	DST	GLN0332	499	35,560
			TOTAL	118,799	6,786,074

Auckland Transport has identified that there are more metered lights that are not identified in the RAMM database as such but are incorrectly allocated to the unmetered load. A project team is being formed to identify and correct these lights. The number affected is yet to be quantified.

The embedded network streetlight loads were allocated to the LE ICP for the embedded network from October 2022. LE ICPs are a distributor only ICP and cannot be used for reconciliation. Meridian has reviewed these and found some metered supplies and unmetered supplies and a small number that require further investigation as detailed below.

Unmetered Embedded Network Streetlights

The unmetered ICPs affected are detailed below:

LE ICP Number	Embedded Network NSP	DUML ICP	Number of items of load	Database wattage (watts)
1001134797LC0EB	FLG0111	0000019934WE91D	4	122
1001134798LCF35	HMB0111	0000018370WE118	23	2,748
1001134800LCDC9	JEF0111	0000041247WEDFA	205	5,400
1001134801LC18C	KIR0111	0000019359WE3BC	69	2,092
1001134847UN8B2	BRI0111	0000041245WED7F	5	190
1001136028UNBD1	STG0111	0000041244WE13A	35	3,340
1001148805LC1BF	POR0111	0000041246WE1BF	79	5,155
		TOTAL	420	19,047

This will be resulting in an estimated under submission of 13,594 kWh for since October 2022. Meridian and Auckland Transport are working to correct this through the revision process.

Metered Embedded Network Streetlights

The load below has been confirmed as being metered load. Auckland Transport are updating the ICPs with the metered ICPs:

LE ICP Number	Embedded Network Address	Metered ICP	Number of items of load	Database wattage (watts)
1001282157UNC6B	TOTARA ROAD	1000010001OY2F7 1000010002OYE37	214	5,903
1001291905LC4FE	BEACHLANDS ROAD	5000000003SN355 5000000004SNE9F 5000000005SN2DA	41	1,266
1001300254UNBA1	ORAHA ROAD	2000000001SNE2C 2000000002SN2EC	64	3,035
1002040160LC8AE	WALTERS ROAD	8000000001SNCF9 8000000002SN039 8000000003SNC7C 8000000039SN915	71	3,022
1002068633LC7A9	KUAKA DRIVE	1400000001SN2A3	38	845

LE ICP Number	Embedded Network Address	Metered ICP	Number of items of load	Database wattage (watts)
		1400000002SNE63 1400000003SN226 1400000004SNFEC 1400000005SN3A9		
			TOTAL	14,071

Embedded Network Streetlights to be investigated:

The load below is being investigated to determine if these are Auckland Transport items of load and if so, how they are connected e.g., metered or unmetered:

LE ICP Number	Embedded Network Address	DUML ICP	Number of items of load	Database wattage (watts)
1001134799UN964	HULME PLACE, HENDERSON	Being investigated	7	369
1001134871UNEC5	TAHAROTO ROAD	Being investigated	2	322
1001136252LCC0E	INTERNATIONAL AIRPORT	Being investigated	4	432
1001244317UN5B9	MAYFAIR DRIVE	Being investigated	5	458
		TOTAL	18	1,581

This could be resulting in an estimated under submission of 6,753 kWh per annum.

1.7. Authorisation Received

All information was provided directly by Meridian, Auckland Transport and Asset Data Solutions Ltd.

1.8. Scope of Audit

This audit of the Auckland Transport Unmetered Streetlights (AT) DUML database and processes was conducted at the request of Meridian Energy Limited (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.

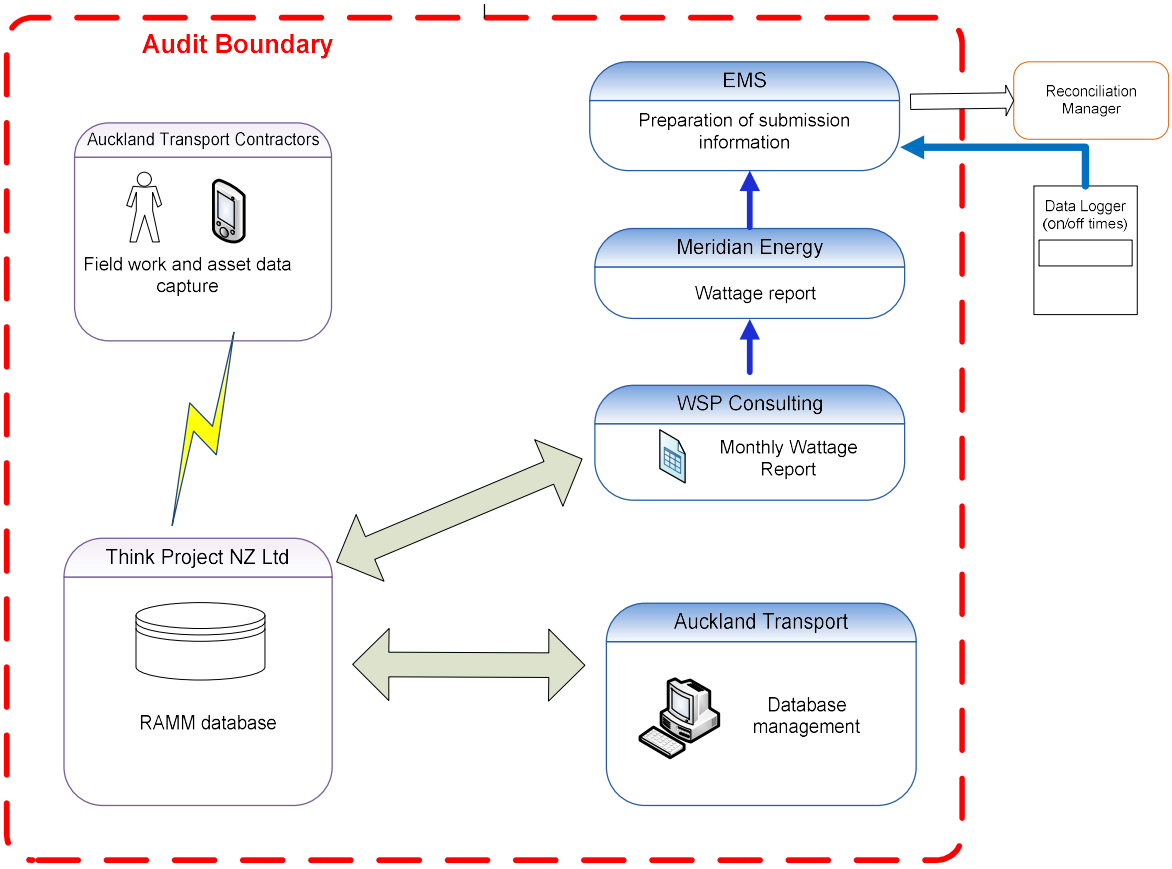
The audit was conducted in accordance with the audit guidelines for DUML audits version 1.1.

There are 48 ICPs associated with Auckland Transport.

The streetlight data is held in a RAMM database, and this continues to be managed by Opus Consulting. This audit has assessed the accuracy of RAMM. on behalf of Auckland Transport. In addition to the RAMM database Auckland Transport are recording all the LED lights in the SLV tele-management system. They intend to use the SLV system output for the reconciliation of the LED lighting load. Meridian is working

with Auckland Transport to get an approved profile/s in place. Once in place the SLV tele-management system will be audited for the LED load.

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 1,121 items of load in November 2022.

1.9. Summary of previous audit

The last audit report undertaken by Rebecca Elliot of Veritek Limited in March 2022. The current status of the non-compliances is recorded below:

Table of Non-compliances

Subject	Section	Clause	Non-Compliance	Status
Deriving submission information	2.1	11(1) of Schedule 15.3	The variance of wattage values between the SLV system and RAMM is calculated to be 414,131.54 kWh per annum. I have not considered this in the audit risk rating as RAMM is less accurate, but the more accurate SLV is being used for submission.	Still existing
			Over submission because of dimming being used. The impact on submission is unknown.	Still existing
			185 items of load with zero or blank wattage recorded indicating potential under submission of 39,507 kWh.	Still existing
			491 items of load with the incorrect ballast recorded resulting in an estimated over submission of 23,540 kWh per annum.	Still existing
			Items of load for NSP STG0111 recorded against the incorrect ICP resulting in an estimated 20,586.22 kWh per annum being reconciled to the wrong network.	Still existing but for a different reason
			Metered streetlights on embedded networks NSP WHA0011, CMW0011, KUA0011, ORA0011 and BJL0011 incorrectly reconciled as unmetered load resulting in an estimated over submission of 96,674.78 kWh per annum.	Cleared but ICP needs correction
			856 metered or solar items of load recorded against unmetered ICPs resulting in an estimated over submission of 332,284.65 kWh per annum.	Still existing but much reduced
			107 items of load recorded against the incorrect ICP, NSP and network.	Cleared
			There is a 95% level of confidence that the annual consumption is between 1,772,300 kWh p.a. lower to 1,824,300 kWh p.a. higher than the database indicates.	Cleared
			Any changes that are made during any given month take effect from the beginning of that month. This process does not account for historic changes or changes within a month.	Still existing
ICP identifier and items of load	2.2	11(2)(a) of Schedule 15.3	No load associated with ICP 0000041244WE13A resulting in an estimated 20,586.11 kWh being reconciled to the incorrect ICP and network.	Still existing but for a different reason
Description and capacity of load	2.4	11(2)(c) and (d) of Schedule 15.3	185 items of load with blank or zero wattage recorded. 173 of these have no lamp description resulting in an estimated annual under submission of 39,507 kWh.	Still existing
			134 items of load with invalid descriptions.	

Subject	Section	Clause	Non-Compliance	Status
All load recorded in database	2.5	11(2A) and (d) of Schedule 15.3	48 additional lights found in the field or 5.5% of the load sampled.	Still existing but fewer additional lights found in the field
Database accuracy	3.1	15.2 and 15.37B(b)	There is a 95% level of confidence that the annual consumption is between 1,772,300 kWh p.a. lower to 1,824,300 kWh p.a. higher than the database indicates.	Cleared
			185 items of load with blank or zero wattage recorded. 173 of these have no lamp description resulting in an estimated annual under submission of 39,507 kWh.	Still existing
			134 items of load with invalid descriptions.	Still existing
			4,887 26.7watt LEDs are recorded as 26 watts in the database. The wattage will be correctly recorded in SLV, so I have not considered this in the audit risk rating.	Still existing
			491 items of load with the incorrect ballast recorded resulting in an estimated over submission of 23,540 kWh per annum.	Still existing
			Items of load for NSP STG0111 recorded against the incorrect ICP resulting in an estimated 20,586.22 kWh per annum being reconciled to the wrong network.	Still existing but for a different reason
			Metered streetlights on embedded networks NSP WHA0011, CMW0011, KUA0011, ORA0011 and BJL0011 incorrectly reconciled as unmetered load resulting in an estimated over submission of 96,674.78 kWh per annum.	Cleared but correct ICP to recorded
			107 items of load recorded against the incorrect ICP, NSP and network.	Cleared
			856 metered or solar items of load recorded against unmetered ICPs resulting in an estimated over submission of 332,284.65 kWh per annum.	Still existing but much smaller volume
Volume information accuracy	3.2	15.2 and 15.37B(c)	The variance of wattage values between the SLV system and RAMM is calculated to be 414,131.54 kWh per annum. I have not considered this in the audit risk rating as RAMM is less accurate, but the more accurate SLV is being used for submission.	Still existing
			Over submission because of dimming being used. The impact on submission is unknown.	Still existing
			185 items of load with zero or blank wattage recorded indicating potential under submission of 39,507 kWh.	Still existing
			491 items of load with the incorrect ballast recorded resulting in an estimated over submission of 23,540 kWh per annum.	Still existing
			Items of load for NSP STG0111 recorded against the incorrect ICP resulting in an estimated 20,586.22 kWh per annum being reconciled to the wrong network.	Still existing but for a different reason
			Metered streetlights on embedded networks NSP WHA0011, CMW0011, KUA0011, ORA0011 and BJL0011	Cleared but ICP needs correction

Subject	Section	Clause	Non-Compliance	Status
			incorrectly reconciled as unmetered load resulting in an estimated over submission of 96,674.78 kWh per annum.	
			856 metered or solar items of load recorded against unmetered ICPs resulting in an estimated over submission of 332,284.65 kWh per annum.	Still existing but much reduced
			107 items of load recorded against the incorrect ICP, NSP and network.	Cleared
			There is a 95% level of confidence that the annual consumption is between 1,772,300 kWh p.a. lower to 1,824,300 kWh p.a. higher than the database indicates.	Cleared
			Any changes that are made during any given month take effect from the beginning of that month. This process does not account for historic changes or changes within a month.	Still existing

Table of Recommendations

Subject	Section	Description	Status
ICP identifier and items of load	2.2	Investigate ICPs 1001282117UNECE and 1001282124UN5F6 and either allocate load or decommission these if no load is associated with them.	Cleared - load confirmed as being in database
Database accuracy	3.1	Confirm that the correct ICP is allocated to items of load and that the load is allocated to the correct NSP, so that volumes are reconciled correctly.	Adopted
		Confirm the correct ICP is allocated to all metered and solar items of load so over submission is not occurring.	Adopted

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 compliance with the requirement to have the database audited.

Audit outcome

Compliant

2. DUML DATABASE REQUIREMENTS

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

Code reference

Clause 11(1) of Schedule 15.3

Code related audit information

The retailer must ensure the:

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

Audit observation

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

Audit commentary

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 a data logger. Meridian supplies EMS with the capacity information and EMS calculates the kWh figure for each ICP and includes this in the relevant AV080 file. This process was audited during Meridian's reconciliation participant audit and EMS' agent audit and compliance was confirmed.

As reported in the last audit, the monthly report is adjusted by Auckland Transport by using the LED wattages from the SLV system (central management system) which can detect the wattage of each light, as many of the LED lights were set to a lower wattage than their rated wattage when they were installed. The RAMM database contains the rated wattage not the adjusted wattage, therefore the SLV wattage is likely to be more accurate than the wattage contained in the RAMM database. Meridian uses the adjusted wattage from SLV not the rated wattage from RAMM for submission. Therefore, when I checked the RAMM database output with the kW values being submitted by Meridian it appears there is an under submission of an estimated 237,955 kWh per annum assuming burn hours of 4,271.

Dimming is applied to some lights, but the output of the central management system is not yet approved for use and is not considered when deriving submission. Over submission will be occurring but the extent is not yet known.

Auckland Transport are still working to use the SLV system output for the reconciliation of the LED lighting load. This accounts for approximately 89% or 106,000 items of load of the total lighting load. Meridian is working with Auckland Transport to get an approved profile/s in place. Data cleansing is continuing to align both datasets. The SLV system is able to record the light wattage on each pole and identify any items of load with a wattage different to that recorded in RAMM. These will be flagged as exceptions and investigated. It also measures the energy usage, so can account for dimming. There are 40 check metered lights installed to check the accuracy of the SLV system output. The error rate is less than 1%. Once Auckland Transport can use this for submission the overall accuracy of submission will be greatly improved. The remaining older HPS etc. streetlights will continue to be reconciled on the existing unmetered ICPs but the data cleansing being undertaken between SLV and RAMM will ensure both datasets are as accurate as possible.

Analysis of the database contents found the issues shown in the table below.

Issue	Volume information impact (annual kWh)
850 (259 Items of load with wattage recorded + 591 items of load with no ICP or wattage recorded) items of load with no wattage recorded. Auckland Transport are investigating as these maybe metered items of load.	174,631 kWh under submission
Incorrect wattages applied based on lamp description for 60 lamp types	379,238 kWh over submission
Incorrect ballasts applied to some items of load (improved from last audit)	5,166 kWh over submission
Four LE ICPs with load allocated are still to be investigated to determine if these are Auckland Transport items of load and if so, how they are connected.	6,753 kWh under submission
156 metered or solar powered items of load recorded against an unmetered ICP (improved from last audit)	54,245 kWh over submission

Auckland Transport has identified that there are more metered lights that are not identified in the RAMM database as such but are incorrectly allocated to the unmetered load. A project team is being formed to identify and correct these lights. The number affected is yet to be quantified.

As detailed in **section 1.6**, the embedded network streetlight loads were allocated to the LE ICP for the embedded network from October 2022. LE ICPs are a distributor only ICP and cannot be used for reconciliation. The load for seven unmetered ICPs was affected, resulting in an estimated under submission of 13,594 kWh since October 2022. Meridian and Auckland Transport are working to correct this, and this is expected to be corrected through the revision process.

The field audit confirmed that the database accuracy fell within the allowable +/-5% allowable threshold which could still result with a 95% level of confidence that the annual consumption is between 1,508,900 kWh p.a. lower to 643,000 kWh p.a. higher than the database indicates.

The data inaccuracies found have been passed to Auckland Transport to investigate and correct.

Any changes that are made during any given month take effect from the beginning of that month. This process does not account for historic changes or changes within a month. The SLV system tracks change at a daily level so once in use this issue will be resolved.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.1 With: 11(1) of Schedule 15.3 From: 06-Apr-22 To: 15-Nov-22	The variance of wattage values between the SLV system and RAMM is calculated to be 237,955 kWh per annum. I have not considered this in the audit risk rating as RAMM is less accurate, but the more accurate SLV is being used for submission. Over submission because of dimming being used. The impact on submission is unknown. 850 items of load with no ICP recorded indicating a potential under submission of 174,631 kWh per annum. Incorrect wattages applied based on lamp description for 60 lamp types recorded resulting in an estimated over submission of 379,238 kWh per annum. Incorrect ballasts applied to some items of load recorded resulting in an estimated over submission of 5,166 kWh per annum. Seven embedded networks with unmetered streetlights incorrectly allocated to an LE ICP resulting in an estimated under submission of 13,594 kWh for since October 2022. Four LE ICPs with load allocated are still to be investigated to determine if these are Auckland Transport items of load and are metered or not, potentially resulting in an estimated under submission of 6,753 kWh per annum. 156 metered or solar items of load recorded against unmetered ICPs resulting in an estimated over submission of 54,245 kWh per annum. Any changes that are made during any given month take effect from the beginning of that month. This process does not account for historic changes or changes within a month. Potential impact: High Actual impact: High Audit history: Multiple times Controls: Moderate Breach risk rating: 6
Audit risk rating	**Rationale for audit risk rating**
High	The controls are rated as moderate. The accuracy of the database has improved, and processes continue to be strengthened to ensure accuracy. The audit risk rating is high due to the indicative kWh variances found for those that can be quantified.

Actions taken to resolve the issue	Completion date	Remedial action status
Meridian has continued to work with Auckland Transport, Smart power and Veritek toward use of an approved profile for dimming lights. Following a meeting in Nov 22 we are awaiting information from AT to progress this.	Oct 2023	Ongoing
Auckland Transport has been notified of the database discrepancies identified during this audit and required corrections. Auckland Transport has advised that they are continuing investigation and site visits and will	31/03/2023	

continue to work on making corrections to the database. Meridian will revise historic submissions for embedded networks with unmetered lights back to Oct 22 to correct the under submission due to incorrect allocation of the LE ICP.	31/05/2023	
Preventative actions taken to ensure no further issues will occur	**Completion date**	
Meridian will continue to work with Auckland Transport regularly to ensure continued improvements on the database and that corrections are up to date. Once there is an approved profile for the dimming lights and the SLV System Output is used for submission, there will be significant improvement on accuracy	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 was recorded against each item of load.

Audit commentary

The RAMM database extract was analysed.

There are 259 items of load with no ICP recorded against them, but the wattage is recorded. There are a further 591 items of load with no ICP or wattage recorded. This is estimated to be resulting in an under submission of 174,631 kWh. Auckland Transport are investigating if these are metered or not. The accuracy of ICP allocation is detailed in **section 3.1**.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.2 With: 11(2)(a) of Schedule 15.3 From: 06-Apr-22 To: 15-Nov-22	850 items of load with no ICP recorded indicating a potential under submission of 174,631 kWh per annum. Potential impact: High Actual impact: High Audit history: Once previously Controls: Moderate Breach risk rating: 6
Audit risk rating	**Rationale for audit risk rating**
High	The controls are rated as moderate. ICP allocation of new load has robust controls but there is still some data cleansing to be done of historical data. The audit risk rating is high due to potential submission against the incorrect NSP and balancing area having a direct impact on settlement

Actions taken to resolve the issue	Completion date	Remedial action status
Auckland Transport has been notified of the database discrepancies identified during this audit and required corrections. Auckland Transport has advised that they are continuing investigation and site visits and will continue to work on making corrections to the database.	31/03/2023	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
Meridian will continue to work with Auckland Transport regularly to ensure continued improvements on the database and that corrections are up to date.	Ongoing	

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

Pocket RAMM is used by all contractors to capture the GPS co-ordinates of each item of load in the RAMM database.

Analysis of the RAMM database extract confirmed all items of load have GPS coordinates.

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 and that each item of load had a value recorded in these fields.

Audit commentary

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

Analysis of the database found 591 items of load with no wattage recorded with a potential 126,208 kWh under submission (assuming 50 watts per light). Auckland Transport is investigating if these are metered items of load.

The overall accuracy of the wattages is discussed in **section 3.1**.

This is recorded as non-compliance below and in **sections 2.1, 3.1** and **3.2**.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.4 With: 11(2)(c) and (d) of Schedule 15.3 From: 06-Apr-22 To: 15-Nov-22	591 items of load with zero or blank wattage recorded indicating a potential under submission of 126,208 kWh per annum Potential impact: High Actual impact: High Audit history: Multiple times Controls: Moderate Breach risk rating: 6
Audit risk rating	**Rationale for audit risk rating**
High	The controls are rated as moderate. The accuracy of the database has improved, and processes continue to be strengthened to ensure accuracy. The audit risk rating is high due to potential impact on reconciliation.

Actions taken to resolve the issue	Completion date	Remedial action status
Auckland Transport has been notified of the database discrepancies identified during this audit and required corrections. Auckland Transport has advised that they are continuing investigation and site visits and will continue to work on making corrections to the database.	31/03/2023	Identified

Preventative actions taken to ensure no further issues will occur	Completion date	
Meridian will continue to work with Auckland Transport regularly to ensure continued improvements on the database and that corrections are up to date.	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

The field audit was undertaken of 1,121 lights using the statistical sampling methodology.

Audit commentary

The field audit discrepancies were numerous, and a spreadsheet of the findings has been supplied with this report. The table below shows a summary of findings.

Finding	Quantity
Lights missing from the database	22
Lights missing from the field	14
Incorrect or missing wattage in database	119

Not all load was recorded in the database. The accuracy of the database load is discussed in **section 3.1.**

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.5 With: 11(2A) of Schedule 15.3 From: 06-Apr-22 To: 16-Nov-22	22 additional lights found in the field or 2% of the load sampled. Potential impact: High Actual impact: Medium Audit history: Multiple times Controls: Moderate Breach risk rating: 4
Audit risk rating	**Rationale for audit risk rating**
Medium	The controls are recorded as moderate as they will mitigate risk most of the time but there is room for improvement. The audit risk rating is medium as the number of additional lights found in the field was 2% of the overall sample checked which would potentially have a medium impact on reconciliation accuracy for this large database.

Actions taken to resolve the issue	Completion date	Remedial action status
Auckland Transport has been notified of the database discrepancies identified during this audit and required corrections. Auckland Transport has advised that they are continuing investigation and site visits and will continue to work on making corrections to the database.	31/03/2023	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
Meridian will continue to work with Auckland Transport regularly to ensure continued improvements on the database and that corrections are up to date.	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 ability of the database to track changes was assessed and the process for tracking of changes in the database was examined.

Audit commentary

The RAMM database functionality achieves compliance with the code.

Audit outcome

Compliant

2.7. Audit trail (Clause 11(4) of Schedule 15.3)

Code reference

Clause 11(4) of Schedule 15.3

Code related audit information

The DUML database must incorporate an audit trail of all additions and changes that identify:

- *the before and after values for changes*
- *the date and time of the change or addition*
- *the person who made the addition or change to the database.*

Audit observation

The database was checked for audit trails.

Audit commentary

The RAMM database has a complete audit trail of all additions and changes to the database information.

Audit outcome

Compliant

3. ACCURACY OF DUML DATABASE

3.1. Database accuracy (Clause 15.2 and 15.37B(b))

Code reference

Clause 15.2 and 15.37B(b)

Code related audit information

Audit must verify that the information recorded in the retailer's DUML database is complete and accurate.

Audit observation

The DUML Statistical Sampling Guideline was used to determine the database accuracy of the Auckland Transport DUML load for the 48 ICPs supplied in the database extract. The table below shows the survey plan.

Plan Item	Comments
Area of interest	Auckland Council region
Strata	The database contains items of load in Auckland area. The area has four sub geographical regions of Central, North, South and West. The processes for the management of Auckland Transport items of load are the same, but I decided to place the items of load into four strata, as follows: 1. Central, 2. North, 3. South, and 4. West.
Area units	I created a pivot table of the roads in each area, and I used a random number generator in a spreadsheet to select a total of 119 sub-units.
Total items of load	1,121 items of load were checked.

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

Audit commentary

Database accuracy based on the field audit

A field audit was conducted of a statistical sample of 1,121 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	99.0	Wattage from survey is higher than the database wattage by 0.1%
R_L	95.0	With a 95% level of confidence, it can be concluded that the error could be between -5% and +2.1%
R_H	102.1	

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 A (detailed below) applies. The conclusion from Scenario A is that the database is within the allowable +/-5% variance threshold and compliance is confirmed.

In absolute terms the installed capacity is estimated to be 70 kW higher than the database indicates.

There is a 95% level of confidence that the installed capacity is between 353 kW lower to 151 kW higher than the database.

In absolute terms, total annual consumption is estimated to be 297,600 kWh lower than the DUML database indicates.

There is a 95% level of confidence that the annual consumption is between 1,508,900 kWh p.a. lower to 643,000 kWh p.a. higher than the database indicates.

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

Lamp description and capacity accuracy

As detailed in **sections 2.1** and **3.2**, the wattage recorded in the SLV database is used to calculate the kW value for the LED lights. This accounts for approximately 89% or 106,000 items of load of the total lighting load. The wattages recorded in the RAMM database are the full wattage value. Data cleansing is underway to align the SLV dataset with RAMM. Auckland Transport are working with Meridian to move the calculation of the LED lighting load to be derived from the SLV system. This system can accurately determine what wattage is being used for each light.

The RAMM data extract was examined and found:

- 60 light types were identified with an invalid light type description, or the incorrect wattage applied resulting in 379,237.47 kWh of over submission per annum.

- incorrect ballasts applied to some items of load resulting in 5,166 kWh of over submission per annum, and
- 591 items of load with no ICP or wattage recorded. This is estimated to be resulting in an under submission of 126,208 kWh. These are not detailed separately in the non-compliance table as they are part of the load with no ICP recorded detailed below.

Auckland Transport have engaged a specialist RAMM consultant, Asset Data Solutions Ltd, who has been cleansing the database, hence the improved results since the last audit. This work is ongoing.

ICP accuracy

Auckland Transport have been working to correctly allocate ICPs. The embedded network streetlight loads were allocated to the LE ICP for the embedded network from October 2022. LE ICPs are a distributor only ICP and cannot be used for reconciliation. The load for seven unmetered ICPs was affected, resulting in an estimated under submission of 13,594 kWh since October 2022. Meridian and Auckland Transport are working to correct this, and this is expected to be corrected through the revision process.

There are 259 items of load with no ICP recorded against them, but the wattage is recorded. There are a further 591 items of load with no ICP or wattage recorded. This is estimated to be resulting in an under submission of 174,631 kWh. Auckland Transport are investigating if these are metered or not. They have identified that there are more metered lights that are not identified in the RAMM database as such but are incorrectly allocated to the unmetered load. A project team is being formed to identify and correct these lights. The number affected is yet to be quantified.

I rechecked for discrepancies between the Counties, United and Vector networks balancing areas and found none in this audit.

I checked where the item of load is identified as metered or recorded as solar but has an unmetered ICP recorded against it and found only 156 items of load. This is an improvement from the 832 items of load recorded in the last audit. Auckland Transport are working to resolve the reaming items of load. This will be resulting in an estimated over submission of 54,245 kWh per annum.

Four LE ICPs with load allocated are still to be investigated to determine if these are Auckland Transport items of load and are metered or not, potentially resulting in an estimated under submission of 6,753 kWh per annum.

Location accuracy

Analysis of the RAMM database extract identified all items of load had GPS details recorded.

Change management process findings

Auckland Transport has three field contractors that cover North, Central and South geographical areas. The contracts include data accuracy and Auckland Transport conducts audits of the contractors. Contractors use pocket RAMM to track changes made in the database. Auckland Transport have identified some of the issues they have with database accuracy is due to unauthorised people working on the streetlight network. They are investigating putting in place a permit system so that only permitted people can work on the streetlight network which will give them better control.

The new connections process requires that a check is made at the time of livening to ensure the ICP is identified, and the data is in the database. This is often prior to the asset being vested to the council. Vector and Counties Power do not liven streetlights until Auckland Transport has provided approval.

The outage patrols are still being carried out regularly by all field contractors across Auckland Transport's area as part of their contract.

NZTA lighting

NZTA lighting is not included in the database. Any State Highway references relate to former state Highways that have now been vested to Auckland Transport. Contact was made with NZTA Auckland who advised that all lighting load is metered in the Auckland area.

Festive lighting

Festive lights are recorded in the database and are included in the monthly wattage reports for the period they are on.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 3.1 With: Clause 15.2 and 15.37B(b) From: 06-Apr-22 To: 15-Nov-22	Incorrect wattages applied based on lamp description for 60 lamp types recorded resulting in an estimated over submission of 379,238 kWh per annum. Incorrect ballasts applied to some items of load recorded resulting in an estimated over submission of 5,166 kWh per annum. 850 items of load with no ICP recorded indicating a potential under submission of 174,631 kWh per annum. Seven embedded networks with unmetered streetlights incorrectly allocated to an LE ICP resulting in an estimated under submission of 13,594 kWh for since October 2022. Four LE ICPs with load allocated are still to be investigated to determine if these are Auckland Transport items of load and are metered or not, potentially resulting in an estimated under submission of 6,753 kWh per annum. 156 metered or solar items of load recorded against unmetered ICPs resulting in an estimated over submission of 54,245 kWh per annum. Potential impact: High Actual impact: High Audit history: Multiple times Controls: Moderate Breach risk rating: 6
Audit risk rating	**Rationale for audit risk rating**
High	The controls are rated as moderate. The accuracy of the database has improved and processed continue to be strengthened to ensure the accuracy. 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
Auckland Transport has been notified of the database discrepancies identified during this audit and required corrections. Auckland Transport has advised that they are continuing investigation and site visits and will continue to work on making corrections to the database.	31/03/2023	Identified

Meridian will revise historic submissions for embedded networks with unmetered lights back to Oct 22 to correct the under submission due to incorrect allocation of the LE ICP.	31/05/2023	
Preventative actions taken to ensure no further issues will occur	**Completion date**	
Meridian will continue to work with Auckland Transport regularly to ensure continued improvements on the database and that corrections are up to date.	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 the ICP has 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 a data logger. Meridian supplies EMS with the capacity information and EMS calculates the kWh figure for each ICP and includes this in the relevant AV080 file. This process was audited during Meridian's reconciliation participant audit and EMS' agent audit and compliance was confirmed.

As reported in the last audit, the monthly report is adjusted by Auckland Transport by using the LED wattages from the SLV system (central management system) which can detect the wattage of each light, as many of the LED lights were set to a lower wattage than their rated wattage when they were installed. The RAMM database contains the rated wattage not the adjusted wattage, therefore the SLV wattage is likely to be more accurate than the wattage contained in the RAMM database. Meridian uses the adjusted wattage from SLV not the rated wattage from RAMM for submission. Therefore, when I checked the RAMM database output with the kW values being submitted by Meridian it appears there is an under submission of an estimated 237,955 kWh per annum assuming burn hours of 4,271.

Dimming is applied to some lights, but the output of the central management system is not yet approved for use and is not considered when deriving submission. Over submission will be occurring but the extent is not yet known.

Auckland Transport are still working to use the SLV system output for the reconciliation of the LED lighting load. This accounts for approximately 89% or 106,000 items of load of the total lighting load. Meridian is working with Auckland Transport to get an approved profile/s in place. Data cleansing is continuing to align both datasets. The SLV system is able to record the light wattage on each pole and identify any items

of load with a wattage different to that recorded in RAMM. These will be flagged as exceptions and investigated. It also measures the energy usage, so can account for dimming. There are 40 check metered lights installed to check the accuracy of the SLV system output. The error rate is less than 1%. Once Auckland Transport can use this for submission the overall accuracy of submission will be greatly improved. The remaining older HPS etc. streetlights will continue to be reconciled on the existing unmetered ICPs but the data cleansing being undertaken between SLV and RAMM will ensure both datasets are as accurate as possible.

Analysis of the database contents found the issues shown in the table below.

Issue	Volume information impact (annual kWh)
850 (259 Items of load with wattage recorded + 591 items of load with no ICP or wattage recorded) items of load with no wattage recorded. Auckland Transport are investigating as these maybe metered items of load.	174,631 kWh under submission (assuming 50 watts per light)
Incorrect wattages applied based on lamp description for 60 lamp types	379,238 kWh over submission
Incorrect ballasts applied to some items of load (improved from last audit)	5,166 kWh over submission
Four LE ICPs with load allocated are still to be investigated to determine if these are Auckland Transport items of load and if so, how they are connected.	6,753 kWh under submission
156 metered or solar powered items of load recorded against an unmetered ICP (improved from last audit)	54,245 kWh over submission

Auckland Transport has identified that there are more metered lights that are not identified in the RAMM database as such but are incorrectly allocated to the unmetered load. A project team is being formed to identify and correct these lights. The number affected is yet to be quantified.

As detailed in **section 1.6**, the embedded network streetlight loads were allocated to the LE ICP for the embedded network from October 2022. LE ICPs are a distributor only ICP and cannot be used for reconciliation. The load for seven unmetered ICPs was affected, resulting in an estimated under submission of 13,594 kWh since October 2022. Meridian and Auckland Transport are working to correct this, and this is expected to be corrected through the revision process.

The field audit confirmed that the database accuracy fell within the allowable +/-5% allowable threshold which could still result with a 95% level of confidence that the annual consumption is between 1,508,900 kWh p.a. lower to 643,000 kWh p.a. higher than the database indicates.

The data inaccuracies found have been passed to Auckland Transport to investigate and correct.

Any changes that are made during any given month take effect from the beginning of that month. This process does not account for historic changes or changes within a month. The SLV system tracks change at a daily level so once in use this issue will be resolved.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 3.2 With: Clause 15.2 and 15.37B(c) From: 06-Apr-22 To: 15-Nov-22	The variance of wattage values between the SLV system and RAMM is calculated to be 237,955 kWh per annum. I have not considered this in the audit risk rating as RAMM is less accurate, but the more accurate SLV is being used for submission. Over submission because of dimming being used. The impact on submission is unknown. 850 items of load with no ICP recorded indicating a potential under submission of 174,631 kWh per annum. Incorrect wattages applied based on lamp description for 60 lamp types recorded resulting in an estimated over submission of 379,238 kWh per annum. Incorrect ballasts applied to some items of load recorded resulting in an estimated over submission of 5,166 kWh per annum. Seven embedded networks with unmetered streetlights incorrectly allocated to an LE ICP resulting in an estimated under submission of 13,594 kWh for since October 2022. Four LE ICPs with load allocated are still to be investigated to determine if these are Auckland Transport items of load potentially resulting in an estimated under submission of 6,753 kWh per annum. 156 metered or solar items of load recorded against unmetered ICPs resulting in an estimated over submission of 54,245 kWh per annum. Any changes that are made during any given month take effect from the beginning of that month. This process does not account for historic changes or changes within a month. Potential impact: High Actual impact: High Audit history: Multiple times Controls: Moderate Breach risk rating: 6
Audit risk rating	**Rationale for audit risk rating**
High	The controls are rated as moderate. The accuracy of the database has improved, and processes continue to be strengthened to ensure accuracy. The audit risk rating is high due to the indicative kWh variances found for those that can be quantified.

Actions taken to resolve the issue	Completion date	Remedial action status
Meridian has continued to work with Auckland Transport, Smart power and Veritek toward use of an approved profile for dimming lights. Following a meeting in Nov 22 we are awaiting information from AT to progress this.	Oct 2023	Identified
Auckland Transport has been notified of the database discrepancies identified during this audit and required corrections. Auckland Transport has advised that they are continuing investigation and site visits and will continue to work on making corrections to the database.	31/03/2023	

Meridian will revise historic submissions for embedded networks with unmetered lights back to Oct 22 to correct the under submission due to incorrect allocation of the LE ICP.	31/05/2023	
Preventative actions taken to ensure no further issues will occur	**Completion date**	
Meridian will continue to work with Auckland Transport regularly to ensure continued improvements on the database and that corrections are up to date. Once there is an approved profile for the dimming lights and the SLV System Output is used for submission, there will be significant improvement on accuracy	Ongoing	

CONCLUSION

In this audit I have assessed the accuracy of the RAMM database. Auckland Transport are still working to use the SLV system output for the reconciliation of the LED lighting load. This accounts for approximately 89% or 106,000 items of load of the total lighting load. Meridian is working with Auckland Transport to get an approved profile/s in place. Data cleansing is continuing to align both datasets. The SLV system is able to record the light wattage on each pole and identify any items of load with a wattage different to that recorded in RAMM. These will be flagged as exceptions and investigated. It also measures the energy usage, so can account for dimming. There are 40 check metered lights installed to check the accuracy of the SLV system output. The error rate is less than 1%. Once Auckland Transport can use this for submission the overall accuracy of submission will be greatly improved. The remaining older HPS etc. streetlights will continue to be reconciled on the existing unmetered ICPs but the data cleansing being undertaken between SLV and RAMM will ensure both datasets are as accurate as possible.

Overall, the accuracy of the database has improved. Specifically:

- the field audit results indicated that the database is within the +/-5% accuracy allowable threshold,
- the metered embedded network streetlights have been removed from the unmetered load,
- no unmetered load was found to be allocated to the incorrect network,
- the volume of incorrect wattages and ballasts recorded in the database has improved, and
- the volume of metered or solar lights incorrectly recorded against the unmetered load has reduced from 856 to 156 items of load.

Some data inaccuracies are still to be resolved:

- over submission because of dimming being used; the impact on submission is unknown,
- over submission because of dimming being used; the impact on submission is unknown,
- four LE ICPs with load allocated are still to be investigated to determine if these are Auckland Transport items of load and if they are metered or unmetered; this could potentially result in an estimated under submission of 6,753 kWh per annum,
- there was an increase in the number of lights with zero or no wattage recorded from 185 Items of load to 591 items of load; Auckland Transport are investigating as these may be metered items of load and could potentially result in an estimated under submission of 126,208 kWh (assuming 50 watts per light), and
- any changes that are made during any given month take effect from the beginning of that month; this process does not account for historic changes or changes within a month.

This audit found six non-compliances and no recommendations were made. The future risk rating of 34 indicates that the next audit be completed in three months, but I recommend that the next audit be in nine months on 15 October 2023 as Auckland Transport and Meridian are making good progress in improving the accuracy of the database and more time is needed to get profiles in place to move submission to the CMS system.

PARTICIPANT RESPONSE

Auckland Transport and Meridian are actively working on reviewing and amending the inaccuracies to the database.

Please find below further supplementary information regarding the reported non-compliances following AT investigation since the audit was completed.

Non-Compliance Item	Updated comments as at 9/1/2023
• 850 items of load with no ICP recorded indicating a potential under submission of 174,631 kWh per annum.	Auckland Transport have confirmed that of the lights without an ICP, 837 are metered and 13 are solar. Therefore, there is no under submission as a result on no ICP being recorded against these items of load. RAMM will be updated with the relevant metered ICPs.
• Incorrect wattages applied based on lamp description for 60 lamp types recorded resulting in an estimated over submission of 379,238 kWh per annum.	Auckland Transport has reviewed these discrepancies and notes that audit analysis appears to have been carried out on the database Light Model information rather than the Lamp Model information which is where database wattage is assigned. Wattages recorded for these lights are correct based on the Lamp model information which is the more up to date information.
• Incorrect ballasts applied to some items of load recorded resulting in an estimated over submission of 5,166 kWh per annum.	As above, audit analysis was based on the Light Model (not the lamp model - where the wattage is assigned) as the field to check the ballast against. If using the lamp model the results are near zero incorrect ballast.
• Seven LE ICPs with unmetered load allocated resulting in an estimated under submission of 13,594 kWh per annum.	Auckland Transport has now reassigned the lights on these seven embedded networks to the correct DUML ICPs in the database. Meridian will be revising affected submissions.
• Four LE ICPs with load allocated are still to be investigated to determine if these are Auckland Transport items of load and are	Auckland Transport has investigated and 3 of the 4 ICP issues have been resolved.

Non-Compliance Item	Updated comments as at 9/1/2023
metered or unmetered potentially resulting in an estimated under submission of 6,753 kWh per annum	Meridian will follow up with the embedded network owner to confirm whether there is a DUML ICP for the lights recorded against LE ICP 1001134799UN964.
• 156 metered or solar items of load recorded against unmetered ICPs resulting in an estimated over submission of 54,245 kWh per annum.	Still under investigation
• 22 additional lights found in the field or 2% of the load sampled	Investigations and corrections are in progress
• 14 Lights missing from the field	Investigations and corrections are in progress
• 119 Incorrect or missing wattage in database	Investigations and corrections are in progress