

ELECTRICITY INDUSTRY PARTICIPATION CODE
DISTRIBUTED UNMETERED LOAD AUDIT REPORT



For

AUCKLAND TRANSPORT AND
MERIDIAN ENERGY

Prepared by: Rebecca Elliot

Date audit commenced: 15 March 2022

Date audit report completed: 8 April 2022

Audit report due date: 15-Apr-22

TABLE OF CONTENTS

Executive summary	3
Audit summary	4
Non-compliances	4
Recommendations	8
Issues 8	
1. Administrative	9
1.1. Exemptions from Obligations to Comply with Code	9
1.2. Structure of Organisation	9
1.3. Persons involved in this audit.....	10
1.4. Hardware and Software	10
1.5. Breaches or Breach Allegations.....	10
1.6. ICP Data	10
1.7. Authorisation Received	13
1.8. Scope of Audit	13
1.9. Summary of previous audit	14
Recommendations	15
1.10. Distributed unmetered load audits (Clause 16A.26 and 17.295F).....	16
2. DUML database requirements.....	17
2.1. Deriving submission information (Clause 11(1) of Schedule 15.3)	17
2.2. ICP identifier and items of load (Clause 11(2)(a) and (aa) of Schedule 15.3)	20
2.3. Location of each item of load (Clause 11(2)(b) of Schedule 15.3)	22
2.4. Description and capacity of load (Clause 11(2)(c) and (d) of Schedule 15.3)	22
2.5. All load recorded in database (Clause 11(2A) of Schedule 15.3)	24
2.6. Tracking of load changes (Clause 11(3) of Schedule 15.3).....	26
2.7. Audit trail (Clause 11(4) of Schedule 15.3).....	26
3. Accuracy of DUML database	27
3.1. Database accuracy (Clause 15.2 and 15.37B(b))	27
3.2. Volume information accuracy (Clause 15.2 and 15.37B(c)).....	35
Conclusion	39
Participant response	40

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.

This database switched to Meridian from 1 July 2021.

In this audit I have assessed the accuracy of the RAMM database. Auckland Transport intends to use the SLV system output for the reconciliation of the LED lighting load. This accounts for approximately 83% or 102,000 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 underway to align both datasets. I have identified in **section 3.1**, some further areas to be reviewed. The SLV system records the actual light wattage on each pole. RAMM records the maximum wattage. There is a data cleansing exercise underway to make sure the datasets are aligned. 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.

There were a number of database and submission accuracy issues identified. The main ones are listed below:

- over submission because of dimming being used; the impact on submission is unknown,
- the field audit identified with 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,
- 185 Items of load with zero or no wattage recorded, indicate an estimated under submission of 39,507 kWh per annum,
- incorrect ballasts recorded in RAMM indicate over submission of an estimated 23,540 kWh over submission per annum,
- items of load for NSP STG0111 recorded against the incorrect ICP (and therefore the incorrect network) indicate an estimated 32,927 kWh per annum reconciled to the incorrect network,
- metered streetlights for five embedded networks also being reconciled as unmetered load indicate an estimated over submission of 96,675 kWh per annum reconciled, and to the incorrect network,
- 107 items of load reconciled to the incorrect ICP and also the incorrect network,
- 856 metered or solar powered items of load recorded against an unmetered ICP, indicate an estimated over submission of 332,284.65 kWh per annum, 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 three recommendations were made. The future risk rating of 32 indicates that the next audit be completed in three months, but I recommend that the next audit be in six to nine months to allow time for Auckland Transport and Meridian to progress moving submission to the CMS system and complete the cleansing of the RAMM database.

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	<p>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.</p> <p>Over submission because of dimming being used. The impact on submission is unknown.</p> <p>185 items of load with zero or blank wattage recorded indicating potential under submission of 39,507 kWh.</p> <p>491 items of load with the incorrect ballast recorded resulting in an estimated over submission of 23,540 kWh per annum.</p> <p>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.</p> <p>Metered streetlights on embedded networks NSP WHA0011, CMW0011, KUA0011, ORA0011 and B JL0011 incorrectly reconciled as unmetered load resulting in an estimated over submission of 96,674.78 kWh per annum.</p> <p>856 metered or solar items of load recorded against unmetered ICPs resulting in an estimated over submission of 332,284.65 kWh per annum.</p> <p>107 items of load recorded against the incorrect ICP, NSP and network.</p> <p>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.</p> <p>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.</p>	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	No load associated with ICP 0000041244WE13A resulting in an estimated 20,586.11 kWh being reconciled to the incorrect ICP and network.	Weak	Medium	6	Identified
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. 134 items of load with invalid descriptions.	Moderate	Medium	4	Identified
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.	Moderate	Medium	4	Identified

Subject	Section	Clause	Non-Compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
Database accuracy	3.1	15.2 and 15.37B(b)	<p>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.</p> <p>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.</p> <p>134 items of load with invalid descriptions.</p> <p>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.</p> <p>491 items of load with the incorrect ballast recorded resulting in an estimated over submission of 23,540 kWh per annum.</p> <p>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.</p> <p>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.</p> <p>107 items of load recorded against the incorrect ICP, NSP and network.</p> <p>856 metered or solar items of load recorded against unmetered ICPs resulting in an estimated over submission of 332,284.65 kWh per annum.</p>	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)	<p>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.</p> <p>Over submission because of dimming being used. The impact on submission is unknown.</p> <p>185 items of load with zero or blank wattage recorded indicating potential under submission of 39,507 kWh.</p> <p>491 items of load with the incorrect ballast recorded resulting in an estimated over submission of 23,540 kWh per annum.</p> <p>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.</p> <p>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.</p> <p>856 metered or solar items of load recorded against unmetered ICPs resulting in an estimated over submission of 332,284.65 kWh per annum.</p> <p>107 items of load recorded against the incorrect ICP, NSP and network.</p> <p>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.</p> <p>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.</p>	Moderate	High	6	Identified
Future Risk Rating						32	

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
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.
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.
		Confirm the correct ICP is allocated to all metered and solar items of load so over submission is not occurring.

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

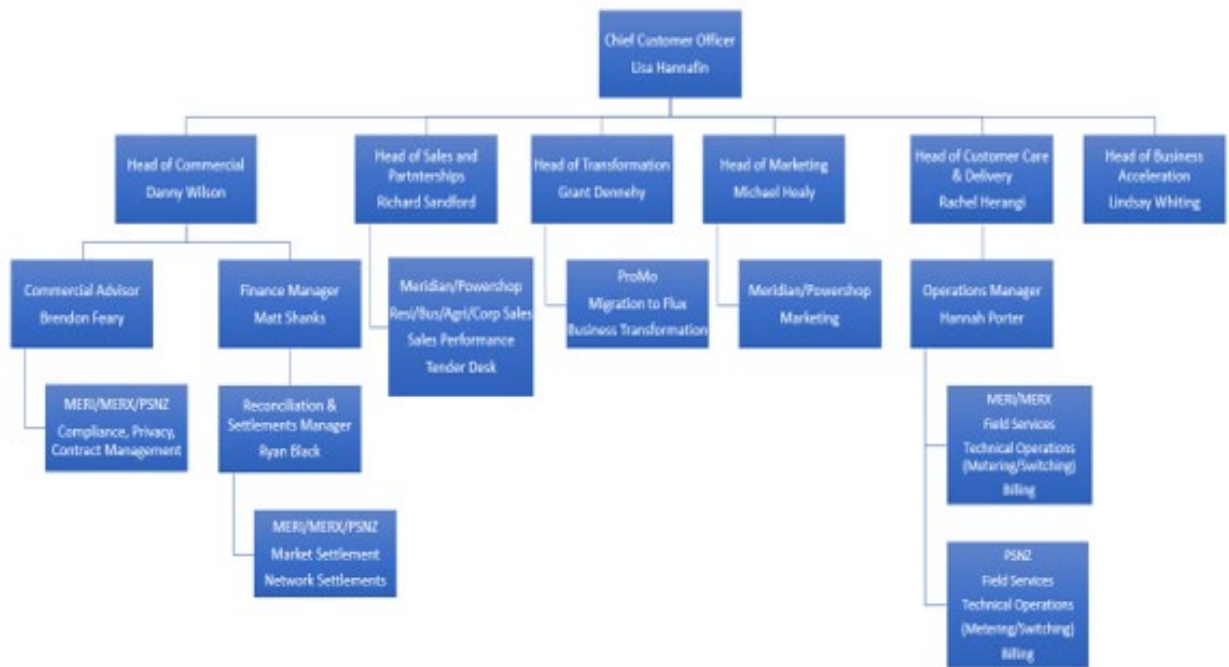
The Electricity Authority's website was reviewed to identify any exemptions relevant to the scope of this audit.

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
Narendra Uttam	Account Executive	Meridian Energy
David Dick	Team Leader Street Lights	Auckland Transport

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 83% or 102,000 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 DUMML load.

ICP Number	Network	Profile	NSP	Number of items of load	Database wattage (watts)
0000018370WE118	WAIK	DST	PAK0331	21	2,507
0000019359WE3BC	WAIK	DST	TAK0331	114	4,955
0000019934WE91D	WAIK	DST	WIR0331	15	904

ICP Number	Network	Profile	NSP	Number of items of load	Database wattage (watts)
0000041245WED7F	WAIK	DST	HEP0331(N)	8	304
0000041246WE1BF	WAIK	DST	TAK0331	245	18,921
0000041247WEDFA	WAIK	DST	OTA0221	199	5,829
0003281740CNA88	COUP	DST	BOB1101	4,622	237,248
0900343060LC471	VECT	DST	TAK0331	2,578	265,324
0905321057LCB09	VECT	DST	HEP0331	70	9,349
0914050273LCECE	VECT	DST	ROS0221	1,015	135,223
0915197278LC21F	VECT	DST	PEN0221	453	70,981
0918033403LCA10	VECT	DST	PEN0331	1,801	268,901
0929040953LCE6D	VECT	DST	PEN1101	2,354	295,580
0954776933LCC4F	VECT	DST	PAK0331	1,344	161,546
0977883655LCF24	VECT	DST	MNG0331	1,147	143,451
0984112723LC1A6	VECT	DST	WIR0331	967	129,997
0987075446LC985	VECT	DST	OTA0221	1,605	183,702
1001138654LC940	VECT	DST	ROS1101	885	135,765
1001282117UNECE	UNET	DST	ALB1101	5,818	459,810
1001282119UND55	UNET	DST	ALB0331	2,722	309,974
1001282121UN8B9	UNET	DST	HEN0331	1,331	128,116
1001282123UN83C	UNET	DST	HEP0331(N)	1,193	139,333
1001282124UN5F6	UNET	DST	SLV0331	1,894	221,480
1001282125UN9B3	UNET	DST	WRD0331	73	6,380
1001282126UN573	UNET	DST	WEL0331	190	20,174
1001282153UND61	UNET	DST	ALB1101	1,683	47,470
1001282154UN0AB	UNET	DST	ALB0331	8,956	422,643
1001282155UNC EE	UNET	DST	HEN0331	7,420	302,407
1001282156UN02E	UNET	DST	HEP0331(N)	7,105	313,164

ICP Number	Network	Profile	NSP	Number of items of load	Database wattage (watts)
1001282163UNA99	UNET	DST	WRD0331	1,215	39,050
1001282164UN753	UNET	DST	WEL0331	1,554	59,422
1001282166LCDC2	VECT	DST	HEP0331	923	33,842
1001282171LCAA5	VECT	DST	MNG0331	4,578	195,612
1001282172LC665	VECT	DST	OTA0221	4,900	226,524
1001282174LC7EA	VECT	DST	PEN0221	1,897	91,825
1001282175LCBAF	VECT	DST	PEN0331	11,700	519,355
1001282176LC76F	VECT	DST	PEN1101	2,972	179,220
1001282177LCB2A	VECT	DST	ROS0221	7,815	335,230
1001282178LC4F4	VECT	DST	ROS1101	4,394	199,955
1001282179LC8B1	VECT	DST	TAK0331	6,858	270,636
1001282180LC6F7	VECT	DST	WIR0331	3,602	173,994
1001287978LC3D9	VECT	DST	PAK0331	6,626	267,036
1001287979UN588	UNET	DST	SLV0331	5,186	232,255
1099572697CNB44	COUP	DST	BOB0331	114	10,206
1099572698CN49A	COUP	DST	GLN0332	1,656	78,186
1001282117UNECE	UNET	DST	ALB1101	0	not found in data extract
1001282124UN5F6	UNET	DST	SVL0331	0	not found in data extract
0000041244WE13A	WAIK	DST	STG0111	0	not found in data extract
				123,818	7,353,784

The two active ICPs with no load associated on the Vector network are likely to be duplicate ICPs but need investigating to either add load or decommission. ICP 0000041244WE13A is associated with the Southgate embedded network in Warkworth. I identified the roads in this network and found 70 lights associated with the network that are being reconciled to the Vector network. Resulting in an estimated 20,586.22 kWh per annum being reconciled to the wrong network. This is discussed in **section 3.1**.

1.7. Authorisation Received

All information was provided directly by Meridian or Auckland Transport.

1.8. Scope of Audit

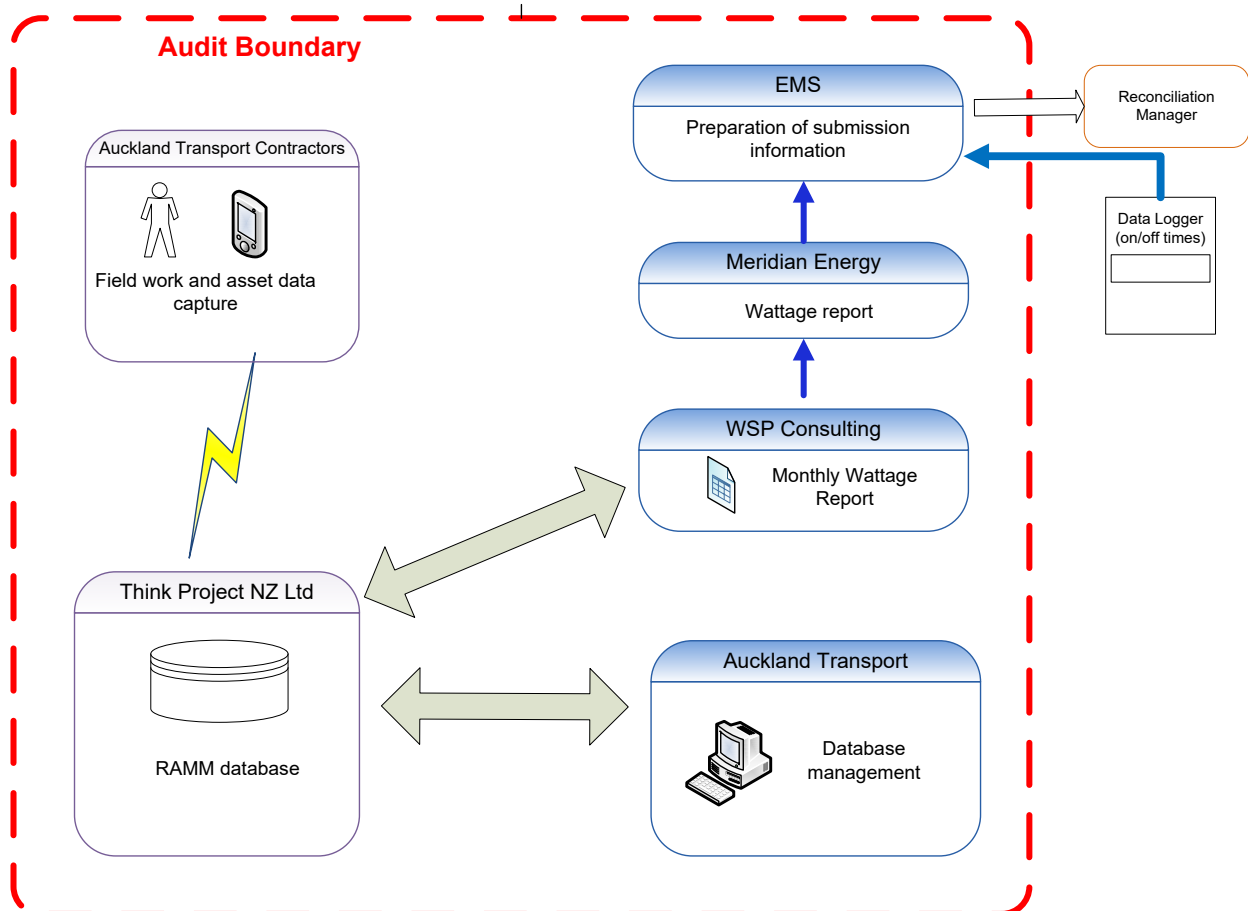
This audit of the Auckland Transport Unmetered Streetlights (AT) DUML database and processes was conducted at the request of Meridian Energy Limited (Meridian), in accordance with clause 15.37B. The purpose of this audit is to verify that the volume information is being calculated accurately, and that 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 864 items of load.

1.9. Summary of previous audit

Contact provided a copy of the last audit report undertaken by Steve Woods of Veritek Limited in July 2020. 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	<p>Over submission because of dimming being used. The impact on submission is unknown.</p> <p>A variance exists between the database and the monthly report sent to Contact, as the LED wattages are being adjusted outside of RAMM resulting in the monthly report being less than the database output by approx. 1,272,000 kWh per annum.</p> <p>228 items of load with zero or blank wattage recorded indicating potential under submission of 48,690 kWh.</p> <p>In absolute terms, total annual consumption is estimated to be 2,024,400 kWh lower than the DUML database indicates, based on the field audit.</p> <p>Incorrect ballasts recorded in RAMM indicate over submission of an estimated 3,785 kWh per annum.</p> <p>110 items of load with incorrect ICP and balancing area.</p> <p>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.</p>	Still existing
Description and capacity of load	2.4	11(2)(c) and (d) of Schedule 15.3	<p>228 items of load with blank or zero wattage recorded.</p> <p>126 items of load with blank light description.</p> <p>136 items of load with invalid descriptions.</p>	Still existing
All load recorded in database	2.5	11(2A) and (d) of Schedule 15.3	<p>Not all load recorded in the database (3 additional lights found or 0.3% of the load sampled).</p>	Still existing
Database accuracy	3.1	15.2 and 15.37B(b)	<p>In absolute terms the installed capacity is estimated to be 474 kW lower than the database indicates.</p> <p>228 items of load with blank or zero no wattage recorded.</p> <p>126 items of load with blank lamp description.</p> <p>136 items of load were identified with an invalid light type description.</p> <p>5,225 26.7 watt LEDs are recorded as 26 watts in the database.</p> <p>110 items of load with incorrect ICPs.</p> <p>491 items of load with a ballast discrepancy.</p>	Still existing

Subject	Section	Clause	Non-Compliance	Status
			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	
Volume information accuracy	3.2	15.2 and 15.37B(c)	<p>Over submission because of dimming being used. The impact on submission is unknown.</p> <p>A variance exists between the database and the monthly report sent to Contact, as the LED wattages are being adjusted outside of RAMM resulting in the monthly report being less than the database output by approx. 1,272,000 kWh per annum.</p> <p>228 items of load with zero or blank wattage recorded indicating potential under submission of 48,690 kWh.</p> <p>In absolute terms, total annual consumption is estimated to be 2,024,400 kWh lower than the DUML database indicates based on the field audit.</p> <p>Incorrect ballasts recorded in RAMM indicate over submission of an estimated 3,785 kWh per annum.</p> <p>110 items of load with incorrect ICP and balancing area.</p> <p>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.</p>	Still existing

RECOMMENDATIONS

Subject	Section	Clause	Description	Status
			Nil	

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.

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 414,131.54 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 intends to use the SLV system output for the reconciliation of the LED lighting load. This accounts for approximately 83% or 102,000 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 underway to align both datasets. I have identified in **section 3.1**, some further areas to be reviewed. 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)
185 Items of load with zero or no wattage recorded	39,507 kWh under submission (assuming 50 watts per light)
Incorrect ballasts applied to 491 items of load	23,540 kWh over submission
Items of load for NSP STG0111 recorded against the incorrect ICP and the incorrect network. This has been reported in the last two audits.	32,927.27 kWh reconciled to the Vector network rather than the embedded network.
Metered streetlights for five embedded networks also being reconciled as unmetered load to the incorrect network.	96,674.78 kWh over submission
856 metered or solar powered items of load recorded against an unmetered ICP.	332,284.65 kWh over submission

The field audit identified with 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.

I checked for discrepancies between the Counties, United and Vector networks balancing areas and found the 107 discrepancies detailed in **section 3.1**. These are being reconciled to the incorrect network and therefore the incorrect balancing area.

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
<p>Audit Ref: 2.1 With: 11(1) of Schedule 15.3</p> <p>From: 30-Apr-21 To: 05-Apr-22</p>	<p>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.</p> <p>Over submission because of dimming being used. The impact on submission is unknown.</p> <p>185 items of load with zero or blank wattage recorded indicating potential under submission of 39,507 kWh.</p> <p>491 items of load with the incorrect ballast recorded resulting in an estimated over submission of 23,540 kWh per annum.</p> <p>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.</p> <p>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.</p> <p>856 metered or solar items of load recorded against unmetered ICPs resulting in an estimated over submission of 332,284.65 kWh per annum.</p> <p>107 items of load recorded against the incorrect ICP, NSP and network.</p> <p>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.</p> <p>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.</p> <p>Potential impact: High Actual impact: High Audit history: Multiple times Controls: Moderate Breach risk rating: 6</p>
Audit risk rating	Rationale for audit risk rating
<p>High</p>	<p>The controls are rated as moderate, as the processes in place will mitigate risk to an acceptable level and once submission is derived from the SLV system this should move to strong.</p> <p>The audit risk rating is high due to the indicative kWh variances found for those that can be quantified.</p>

Actions taken to resolve the issue	Completion date	Remedial action status
<p>Meridian is working with Auckland Transport to determine whether eligibility criteria for recently approved profiles can be met with the SLV system or whether a further profile for the dimming lights will be necessary.</p> <p>Meridian has notified Auckland Transport of the discrepancies and required corrections. Auckland Transport has advised that they will be conducting site visits and will work on corrections over the next 2 months. There has been a dedicated resource allocated.</p>	<p>Ongoing</p> <p>1/7/2022</p>	<p>Identified</p>
Preventative actions taken to ensure no further issues will occur	Completion date	
<p>Meridian will continue to work with Auckland Transport regularly to ensure continued improvements on the database and that corrections are up to date.</p> <p>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</p>	<p>Ongoing</p>	

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 DUMML database must contain:

- *each ICP identifier for which the retailer is responsible for the DUMML,*
- *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. ICP 0000041244WE13A has no load recorded in the database. The embedded network has 70 items of load, and they are all recorded against 1001282126UN573, which is in a different balancing area with a different network owner resulting in an estimated 20,586.22 kWh per annum being reconciled to the wrong network. Therefore, the ICP is not recorded against each item of load in a database, as is required by this clause. This is recorded as non-compliance.

ICPs 1001282117UNECE and 1001282124UN5F6 have no load associated with them in the database. I recommend that these are investigated and if they have load associated with them get this corrected in the database or if it is confirmed there is no load associated then decommission these.

Recommendation	Description	Audited party comment	Remedial action
ICP identifier and items of load	Investigate ICPs 1001282117UNECE and 1001282124UN5F6 and either allocate load or decommission these if no load is associated with them.	Auckland Transport will be conducting a field visit to investigate this and will decommission if no load is found. Time frame advised is 2 months.	Identified

I found that all items of load have an ICP recorded. I have discussed the accuracy of ICP allocation in **section 3.1**.

Audit outcome

Non-compliant

Non-compliance	Description		
Audit Ref: 2.2 With: 11(2)(a) of Schedule 15.3 From: 30-Apr-21 To: 05-Apr-22	No load associated with ICP 0000041244WE13A resulting in an estimated 20,586.11 kWh being reconciled to the incorrect ICP and network. Potential impact: Medium Actual impact: Medium Audit history: None Controls: Weak Breach risk rating: 6		
Audit risk rating	Rationale for audit risk rating		
Medium	The controls are rated as weak as the accuracy of load associated with ICPs is not managed. The audit risk rating is medium 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
Meridian has notified Auckland Transport of the discrepancies and required corrections. Auckland Transport has advised that they will be conducting site visits and will work on corrections over the next 2 months. There has been a dedicated resource allocated.		1/7/2022	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. 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	

2.3. 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:

- 185 items of load with blank or zero wattage recorded, and
- 173 of the 185 items of load also had a blank lamp description.

I have estimated 39,507 kWh of under submission per annum based on an average wattage of 50.

134 items of load were identified with an invalid light type description as detailed in the table below:

Light Type	Volume
500W HPS	3
57W Metal Halide	6
Fluorescent to 58w	9
Fluorescent up to 58W	37
60W Metal Halide	26
70W Mercury Vapour	2
Mercury Vapour 70W	32
160W lamp	1
160W Mercury Vapour	1
350W Metal Halide	17
GRAND TOTAL	134

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: 03-May-21 To: 31-Mar-22	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. 134 items of load with invalid descriptions. 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 rated as moderate. Meridian are working with Auckland Transport to align the data in RAMM with SLV and SLV is expected to be used for the LED lighting load which will move the controls to strong. The audit risk rating is medium due to potential under submission of 39,507 kWh per annum.		
Actions taken to resolve the issue		Completion date	Remedial action status
Meridian has notified Auckland Transport of the discrepancies and required corrections. Auckland Transport has advised that they will be conducting site visits and will work on corrections over the next 2 months. There has been a dedicated resource allocated.		1/7/2022	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. 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	

2.5. 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 864 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	48
Lights missing from the field	12
Incorrect or missing wattage in database	185

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: 01-Aug-20 To: 30-Apr-21	48 additional lights found in the field or 5.5% 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 5% 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
Meridian has notified Auckland Transport of the discrepancies and required corrections. Auckland Transport has advised that they will be conducting site visits and will work on corrections over the next 2 months. There has been a dedicated resource allocated.		1/7/2022	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. 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	

2.6. 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 DUMML 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 DUMML 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 DUMML 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 DUMML database is complete and accurate.

Audit observation

The DUMML Statistical Sampling Guideline was used to determine the database accuracy of the Auckland Transport DUMML 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	<p>The database contains items of load in Auckland area.</p> <p>The area has four sub geographical regions of Central, North, South and West. This is reflective of the field contractor management areas.</p> <p>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:</p> <ol style="list-style-type: none">1. Central,2. North,3. South, and4. 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 143 sub-units.
Total items of load	864 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 864 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	100.1	Wattage from survey is higher than the database wattage by 0.1%
R _L	94.3	With a 95% level of confidence, it can be concluded that the error could be between -6.7% and +5.9%
R _H	105.9	

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 C (detailed below) applies.

The conclusion from Scenario C is that the variability of the sample results across the strata means that the true wattage (installed in the field) could be up to 6.7% lower to 5.9% higher than the wattage recorded in the DUML database. Non-compliance is recorded because the potential error is greater than 5.0%.

In absolute terms the installed capacity is estimated to be 4 kW higher than the database indicates.

There is a 95% level of confidence that the installed capacity is between 415 kW lower to 427 kW higher than the database.

In absolute terms, total annual consumption is estimated to be 16,200 kWh higher than the DUML database indicates.

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.

Scenario	Description
A - Good accuracy, good precision	<p>This scenario applies if:</p> <ul style="list-style-type: none"> (a) R_H is less than 1.05; and (b) R_L is greater than 0.95 <p>The conclusion from this scenario is that:</p> <ul style="list-style-type: none"> (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	<p>This scenario applies if:</p> <ul style="list-style-type: none"> (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. <p>There is evidence to support this finding. In statistical terms, the inaccuracy is statistically significant at the 95% level</p>

Scenario	Description
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>

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 83% or 102,000 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.

For this audit I have checked accuracy for lights against the RAMM database as this is still principally the database in use. Analysis of this database found, as recorded in **section 2.4**:

- 185 items of load with blank or zero no wattage recorded, and
- 173 of the 185 items of load with a blank or unknown lamp description.

I have estimated 39,507 kWh of under submission per annum based on an average wattage of 50.

134 items of load were identified with an invalid light type description as detailed in the table below:

Light Type	Volume
500W HPS	3
57W Metal Halide	6
Fluorescent to 58w	9
Fluorescent up to 58W	37
60W Metal Halide	26
70W Mercury Vapour	2
Mercury Vapour 70W	32
160W lamp	1
160W Mercury Vapour	1
350W Metal Halide	17
GRAND TOTAL	134

4,887 26.7 watt LEDs are recorded as 26 watts in the database.

I checked the ballasts being applied and found 491 items of load with a ballast discrepancy. The impact is over submission by 23,540 kWh per annum.

ICP accuracy

There are some ICP discrepancies, as recorded below.

As detailed in the last audit, ICP 0000041244WE13A is for items of load on an embedded network (NSP STG0111). The embedded network has 70 items of load, and they are all recorded against 1001282126UN573, which is in a different balancing area with a different network owner resulting in an estimated 20,586.22 kWh per annum being reconciled to the wrong network.

The streetlight load for the Oyster embedded network in Whenuapai (NSP WHA0011) is being reconciled against two metered ICPs (1000010001OY2F7 and 1000010002OYE37) as well as the unmetered ICPs 1001282155UNCEE (HEN0331) and ICP 1001282154UNOAB (ALB0331) resulting in an estimated over submission of 32,927.27 kWh per annum.

The streetlight load for the Smart Net Limited embedded network at 190 Walters Road (NSP CMW0011) is being reconciled against four metered ICPs (8000000001SNCF9, 8000000002SN039, 8000000003SNC7C and 8000000039SN915) as well as the unmetered ICPs 0900343060LC471 (TAK0331) and 1001282179LC8B1 (TAK0331) resulting in an estimated over submission of 10,709.53 kWh per annum.

The streetlight load for the Smart Net Limited embedded network at 70 Kuaka Drive Takanini (NSP KUA0011) is being reconciled against five metered ICPs (1400000001SN2A3, 1400000002SNE63, 1400000003SN226, 1400000004SNFEC and 1400000005SN3A9) as well as the unmetered ICPs 0000041246WE1BF (TAK0331), 0900343060LC471 (TAK0331) and 1001282179LC8B1 (TAK0331) resulting in an estimated over submission of 20,499.09 kWh per annum.

The streetlight load for the Smart Net Limited embedded network at 105 Oraha Road Kumeu (NSP ORA0011) is being reconciled against two metered ICPs (2000000001SNE2C and 2000000002SN2EC) as well as the unmetered ICPs 1001282121UN8B9 (HEN0331) and 1001282155UNCEE (HEN0331) resulting in an estimated over submission of 16,257.56 kWh per annum.

Part of the streetlight load for the Smart Net Limited embedded network at 129 Beachlands Road, Beachlands (NSP BJL0011) is being reconciled against three metered ICPs (5000000003SN355, 5000000004SNE9F and 5000000005SN2DA) as well as the unmetered ICPs 0900343060LC471 (TAK0331) and 1001282179LC8B1 (TAK0331) resulting in an estimated over submission of 16,281.33 kWh per annum. Eight items of load are correctly recorded against ICP 5000000005SN2DA.

The combined over submission for the five metered embedded networks that also being reconciled as unmetered load will be resulting in an estimated 96,674.78 kWh of over submission per annum:

NSP	Annual over submission
WHA0011	32,927.27
CMW0011	10,709.53
KUA0011	20,499.09
ORA0011	16,257.56
BJL0011	16,281.33
Total	96,674.78

I checked for discrepancies between the Counties, United and Vector networks balancing areas and found the 107 discrepancies shown below. These are being reconciled to the incorrect network and therefore the incorrect balancing area.

Road Name	NSP														Grand Tot								
	ALB03	ALB11	BOB03	BOB11	GLN03	HEN03	HEP03	HEP0331(f)	MNG03	OTA02	PAK03	PEN02	PEN03	PEN11		ROS02	ROS11	SLV03	TAK03	WEL03	WIR03	WRD03	
APPLEMOORS WAY						4	4	1															5
ASHDOWN PL				4															5				9
BAYVISTA DR EXT																							1
BIOKOVO ST							5						1										6
BIRDWOOD RD (WAITAKERE)						57															1		58
BRIGHAM ST/ QUAY ST CYWAY						2								59									61
CLARK ST (NEW LYNN)								98							1								99
CONNAUGHT ST								3							14								18
CONNELL ST								2							20								22
EALING CRES																		12					13
FORREST HILL RD	99	3																					103
FRUITLANDS RD	12																						13
GREENFINCH ROAD	14																						15
HEIGHTS RD				2																			5
HUARAHI PAI RD	6					7								2									14
IAN MCKINNON DR				1										29		15							45
KAURI GROVE DR	6																						8
KINROSS ST								5							21								26
KIRKALDY ST						1																	2
MASSEY AVE (PUKEKOHE)				31						1													32
OLD NORTH RD (KUMEU)						11											3						16
PORTAGE RD (AVONDALE - WCC)								3		94													97
ROSCOMMON RD (NORTHBOUND)														1									55
ROSCOMMON RD (SOUTHBOUND)																					52	2	60
SQUADRON DR	52					7																	59
SUNCREST DR						9																	10
TE AUTE RD				3																			4
WHARF RD (CLARKS BEACH)					8																		9
WOLVERTON ST							2		1						52								55

I recommend below that the ICP/ NSP allocation be reviewed to ensure that the load is being reconciled to the correct NSP and therefore the correct balancing area and network.

I also checked where the item of load is identified as metered or recorded as solar but has an unmetered ICP recorded against it and found:

Unmetered ICP	Metered	Wattage	Solar	Wattage
0914050273LCECE	8	822		
0918033403LCA10	10	1327.2		
0929040953LCE6D	15	999		
0977883655LCF24	1	130		
0987075446LC985	1	168		
1001138654LC940	5	841		
1001282117UNECE	451	43079		
1001282119UND55	113	22037		
1001282121UN8B9	2	446		
1001282123UN83C	2	188		
1001282124UN5F6	147	5899		
1001282125UN9B3	11	769		
1001282153UND61	4	332		
1001282177LCB2A	1	103		
1001282178LC4F4	10	180		
1099572698CN49A	0	0	24	480
Grand Total	832	77,320.20	29	480

The 856 metered or solar items of load recorded against unmetered ICPs will be resulting in an estimated 332,284.65 kWh of over submission. I recommend below that these are investigated to confirm if these are recorded against the correct ICP.

Recommendation	Description	Audited party comment	Remedial action
Database accuracy	<p>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.</p> <p>Confirm the correct ICP is allocated to all metered and solar items of load so over submission is not occurring.</p>	<p>Meridian has notified Auckland Transport of the discrepancies and required corrections. Auckland Transport has advised that they will investigate and make corrections over the next 2 months. There has been a dedicated resource allocated.</p> <p>Auckland Transport has advised these are the metered lights. There are very few (around 12) solar lights on the network in the country areas where there is no power supply. Auckland Transport will check and correct. The time frame advised is 2 months.</p>	Identified

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 field audit found 12 additional lights in a new subdivision. This example is being investigated by Auckland transport to confirm the correct processes are being followed.

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		
<p>Audit Ref: 3.1 With: Clause 15.2 and 15.37B(b)</p> <p>From: 03-May-21 To: 31-Mar-22</p>	<p>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.</p> <p>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.</p> <p>134 items of load with invalid descriptions.</p> <p>4,887 26.7 watt 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.</p> <p>491 items of load with the incorrect ballast recorded resulting in an estimated over submission of 23,540 kWh per annum.</p> <p>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.</p> <p>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.</p> <p>107 items of load recorded against the incorrect ICP, NSP and network.</p> <p>856 metered or solar items of load recorded against unmetered ICPs resulting in an estimated over submission of 332,284.65 kWh per annum.</p> <p>Potential impact: High Actual impact: High Audit history: Multiple times Controls: Moderate Breach risk rating: 6</p>		
Audit risk rating	Rationale for audit risk rating		
<p>High</p>	<p>The controls are rated as moderate. Whilst there are a large number of discrepancies, processes are being improved to ensure the accuracy improves.</p> <p>The impact is assessed to be high, based on the kWh differences described above.</p>		
Actions taken to resolve the issue		Completion date	Remedial action status
No comment provided			Identified
Preventative actions taken to ensure no further issues will occur		Completion date	
<p>Meridian will continue to work with Auckland Transport regularly to ensure continued improvements on the database and that corrections are up to date.</p> <p>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</p>		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.

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 414,131.54 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 intends to use the SLV system output for the reconciliation of the LED lighting load. This accounts for approximately 83% or 102,000 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 underway to align both datasets. I have identified in **section 3.1**, some further areas to be reviewed. This 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)
185 Items of load with zero or no wattage recorded	39,507 kWh under submission (assuming 50 watts per light)
Incorrect ballasts applied to 491 items of load	23,540 kWh over submission
Items of load for NSP STG0111 recorded against the incorrect ICP and therefore the incorrect network. This has been reported in the last two audits.	32,927.27 kWh reconciled to the Vector network rather than the embedded network.
Metered streetlights for five embedded networks also being reconciled as unmetered load to the incorrect network.	96,674.78 kWh over submission
856 metered or solar powered items of load recorded against an unmetered ICP	332,284.65 kWh over submission

The field audit identified with 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.

I checked for discrepancies between the Counties, United and Vector networks balancing areas and found the 107 discrepancies as detailed in **section 3.1**. These are being reconciled to the incorrect network and therefore the incorrect balancing area.

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
<p>Audit Ref: 3.2 With: Clause 15.2 and 15.37B(c)</p> <p>From: 30-Apr-21 To: 05-Apr-22</p>	<p>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.</p> <p>Over submission because of dimming being used. The impact on submission is unknown.</p> <p>185 items of load with zero or blank wattage recorded indicating potential under submission of 39,507 kWh.</p> <p>491 items of load with the incorrect ballast recorded resulting in an estimated over submission of 23,540 kWh per annum.</p> <p>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.</p> <p>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.</p> <p>856 metered or solar items of load recorded against unmetered ICPs resulting in an estimated over submission of 332,284.65 kWh per annum.</p> <p>107 items of load recorded against the incorrect ICP, NSP and network.</p> <p>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.</p> <p>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.</p> <p>Potential impact: High Actual impact: High Audit history: Multiple times Controls: Moderate Breach risk rating: 6</p>
Audit risk rating	Rationale for audit risk rating
<p>High</p>	<p>The controls are rated as moderate, as the processes in place will mitigate risk to an acceptable level and once submission is derived from the SLV system this should move to strong.</p> <p>The audit risk rating is high due to the indicative kWh variances found for those that can be quantified.</p>

Actions taken to resolve the issue	Completion date	Remedial action status
<p>Meridian is working with Auckland Transport to determine whether eligibility criteria for recently approved profiles can be met with the SLV system or whether a further profile for the dimming lights will be necessary.</p> <p>Meridian has notified Auckland Transport of the discrepancies and required corrections. Auckland Transport has advised that they will be conducting site visits and will work on corrections over the next 2 months. There has been a dedicated resource allocated.</p>	<p>Ongoing</p> <p>1/7/2022</p>	<p>Identified</p>
Preventative actions taken to ensure no further issues will occur	Completion date	
<p>Meridian will continue to work with Auckland Transport regularly to ensure continued improvements on the database and that corrections are up to date.</p> <p>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</p>	<p>Ongoing</p>	

CONCLUSION

This database switched to Meridian from 1 July 2021.

In this audit I have assessed the accuracy of the RAMM database. Auckland Transport intends to use the SLV system output for the reconciliation of the LED lighting load. This accounts for approximately 83% or 102,000 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 underway to align both datasets. I have identified in **section 3.1**, some further areas to be reviewed. 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.

There were a number of database and submission accuracy issues identified. The main ones are listed below:

- over submission because of dimming being used; the impact on submission is unknown,
- the field audit identified with 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,
- 185 Items of load with zero or no wattage recorded, indicate an estimated over submission of 39,507 kWh per annum,
- incorrect ballasts recorded in RAMM indicate over submission of an estimated 23,540 kWh over submission per annum,
- items of load for NSP STG0111 recorded against the incorrect ICP (and therefore the incorrect network) indicate an estimated 32,927 kWh per annum reconciled to the incorrect network,
- metered streetlights for five embedded networks also being reconciled as unmetered load indicate an estimated over submission of 96,675 kWh per annum reconciled, also to the incorrect network,
- 107 items of load reconciled to the incorrect ICP and also the incorrect network,
- 856 metered or solar powered items of load recorded against an unmetered ICP, indicate an estimated over submission of 332,284.65 kWh per annum, 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 three recommendations were made. The future risk rating of 32 indicates that the next audit be completed in three months, but I recommend that the next audit be in six to nine months to allow time for Auckland Transport and Meridian to progress moving submission to the CMS system and complete the cleansing of the RAMM database.

PARTICIPANT RESPONSE

Meridian Energy have reviewed this report and their comments are provided in the body of the report. No further comments were provided.