ELECTRICITY INDUSTRY PARTICIPATION CODE
DISTRIBUTED UNMETERED LOAD AUDIT REPORT

VERITEK

For

AUCKLAND TRANSPORT AND CONTACT ENERGY (CTCS)

Prepared by: Steve Woods

Date audit commenced: 15 April 2021

Date audit report completed: 13 May 2021

Audit report due date: 15-Apr-21

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EXECUTIVE SUMMARY

This audit of the **Auckland Transport Unmetered Streetlights (Auckland Transport)** DUML database and processes was conducted at the request of **Contact Energy Limited (Contact)**, in accordance with clause 15.37B. The purpose of this audit is to verify that the volume information is being calculated accurately, and that profiles have been correctly applied.

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

The streetlight data is held in a RAMM database, and this continues to be managed by Opus Consulting, 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. The intention is that once the system has been thoroughly tested and the necessary approvals have been granted by the Electricity Authority, this system will be used to calculate submission for the LED lights. Discussions with the Electricity Authority are progressing.

Results from the 40 check meters installed comparing the volumes recorded in SLV against the check meters are showing a high level of accuracy. In the interim, the LED lights are being recorded in both databases. Dimming is being used on the SLV system, but this is not reflected in submission as this system is yet to be approved, therefore over submission will be occurring. The SLV system was not assessed as part of this audit and therefore I was not able to calculate the kWh volume impact.

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,
- a variance exists between the database and the monthly report sent to Contact and the LED wattages being adjusted outside of RAMM resulting in the monthly report being less than the database output by approx. 1,272,000 kWh per annum,
- 228 items of load with zero or blank wattage recorded indicating potential under submission of 48,960 kWh,
- 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,
- incorrect ballasts recorded in RAMM indicate over submission of an estimated 3,785 kWh over submission per annum,
- 110 items of load with incorrect ICP and balancing area, 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 five non-compliances and no recommendation were made. The future risk rating of 24 indicates that the next audit be completed in three months, but I recommend that the next audit be in six months to allow time for Auckland Transport and Contact to make improvements to processes and to the 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	Over submission because of dimming being used. The impact on submission is unknown. 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. 228 items of load with zero or blank wattage recorded indicating potential under submission of 48,690 kWh. 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. Incorrect ballasts recorded in RAMM indicate over submission of an estimated 3,785 kWh per annum. 110 items of load with incorrect ICP and balancing area. 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
Description and capacity of load	2.4	11(2)(c) and (d) of Schedule 15.3	228 items of load with blank or zero wattage recorded. 126 items of load with blank light description. 136 items of load with invalid descriptions.	Moderate	High	6	Identified
All load recorded in database	2.5	11(2A) and (d) of Schedule 15.3	Not all load recorded in the database (3 additional lights found or 0.3% of the load sampled).	Moderate	Low	2	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)	In absolute terms the installed capacity is estimated to be 474 kW lower than the database indicates. 228 items of load with blank or zero no wattage recorded. 126 items of load with blank lamp description. 136 items of load were identified with an invalid light type description. 5,225 26.7 watt LEDs are recorded as 26 watts in the database. 110 items of load with incorrect ICPs. 491 items of load with a ballast discrepancy. 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	Moderate	High	6	Identified
Volume information accuracy	3.2	15.2 and 15.37B(c)	Over submission because of dimming being used. The impact on submission is unknown. 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. 228 items of load with zero or blank wattage recorded indicating potential under submission of 48,690 kWh. 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. Incorrect ballasts recorded in RAMM indicate over submission of an estimated 3,785 kWh per annum. 110 items of load with incorrect ICP and balancing area. 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
					Future Risk Rating	**26**	

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

RECOMMENDATIONS

Subject	Section	Description	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.

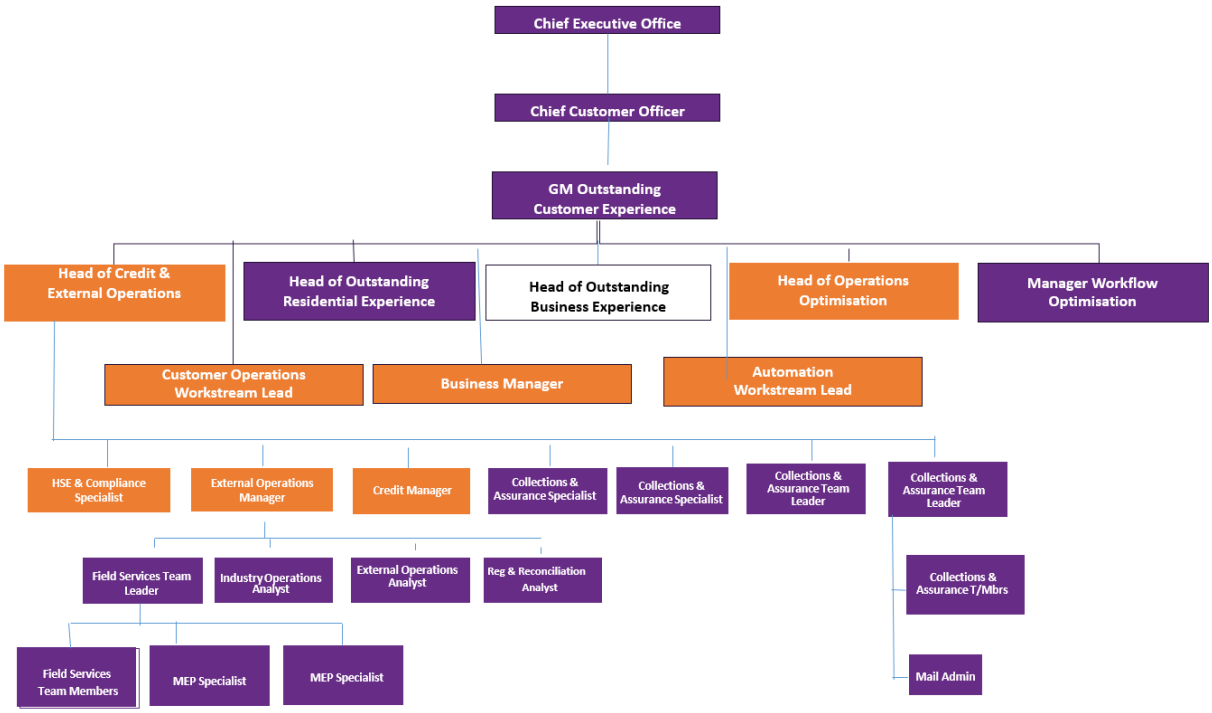
Audit commentary

There is an exemption is in place relevant to the scope of this audit:

- Exemption No. 177. Exemption to clause 8(g) of schedule 15.3 of the Electricity Industry Participation Code 2010 ("Code") in respect of providing half-hour ("HHR") submission information instead of non-half-hour ("NHH") submission information for distributed unmetered load ("DUML"). This exemption expires at the close of 31 October 2023.

1.2. Structure of Organisation

Contact Energy provided a copy of their organisational structure.



1.3. Persons involved in this audit

Auditor:

Steve Woods

Veritek Limited

Electricity Authority Approved Auditor

Other personnel assisting in this audit were:

Name	Title	Company
Luke Cartmell-Gollan	Commercial Operations Manager	Contact Energy
Scott Donaldson	Account Executive	Contact Energy
David Dick	Team Leader Street Lights	Auckland Transport

1.4. Hardware and Software

The streetlight data is held in a RAMM database. Auckland Transport also record the LED lights in a CMS system called the SLV tele-management system (street light vision). This system is not used for submission purposes yet, but Auckland Transport has met with Ron Beatty of the Electricity Authority to progress this. For this reason, data from SLV has not been reviewed as part of this audit.

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 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 46 ICPs associated with the Auckland Transport DUML load.

ICP Number	Network	Profile	Number of items of load	Database wattage (watts)
0000018370WE118	WAIK	DST	21	2,457
0000019359WE3BC	WAIK	DST	114	10,857
0000019934WE91D	WAIK	DST	15	904
0000041244WE13A	WAIK	DST	0	0
0000041245WED7F	WAIK	DST	8	304

ICP Number	Network	Profile	Number of items of load	Database wattage (watts)
0000041246WE1BF	WAIK	DST	245	23,290
0000041247WEDFA	WAIK	DST	199	7,851
0003281740CNA88	COUP	DST	4525	280,079
0900343060LC471	VECT	DST	3426	377,239
0905321057LCB09	VECT	DST	262	21,424
0914050273LCECE	VECT	DST	1738	256,878
0915197278LC21F	VECT	DST	862	151,103
0918033403LCA10	VECT	DST	3456	563,851
0929040953LCE6D	VECT	DST	3151	446,380
0954776933LCC4F	VECT	DST	2545	330,052
0977883655LCF24	VECT	DST	1651	224,061
0984112723LC1A6	VECT	DST	1509	235,696
0987075446LC985	VECT	DST	2836	339,281
1001138654LC940	VECT	DST	1604	273,913
1001282117UNECE	VECT	DST	5768	592,033
1001282119UND55	VECT	DST	4961	646,610
1001282121UN8B9	VECT	DST	2172	245,675
1001282123UN83C	VECT	DST	2455	335,355
1001282124UN5F6	VECT	DST	2456	295,379
1001282125UN9B3	VECT	DST	139	15,856
1001282126UN573	VECT	DST	300	32,633
1001282153UND61	VECT	DST	1541	40,227
1001282154UN0AB	VECT	DST	6575	259,541
1001282155UNCEE	VECT	DST	6308	246,216
1001282156UN02E	VECT	DST	5770	218,936
1001282163UNA99	VECT	DST	1151	36,498

ICP Number	Network	Profile	Number of items of load	Database wattage (watts)
1001282164UN753	UNET	DST	1404	52,571
1001282166LCDC2	VECT	DST	700	26,263
1001282171LCAA5	VECT	DST	4066	166,229
1001282172LC665	VECT	DST	3496	161,434
1001282174LC7EA	VECT	DST	1473	61,470
1001282175LCBAF	VECT	DST	9974	415,024
1001282176LC76F	VECT	DST	2141	117,583
1001282177LCB2A	VECT	DST	7014	284,705
1001282178LC4F4	VECT	DST	3662	144,310
1001282179LC8B1	VECT	DST	5923	219,090
1001282180LC6F7	VECT	DST	2983	132,171
1001287978LC3D9	VECT	DST	5424	207,650
1001287979UN588	UNET	DST	4298	185,247
1099572697CNB44	COUP	DST	111	9,867
1099572698CN49A	COUP	DST	1645	85,164
			122,077	8,779,355

1.7. Authorisation Received

All information was provided directly by Contact or Auckland Transport.

1.8. Scope of Audit

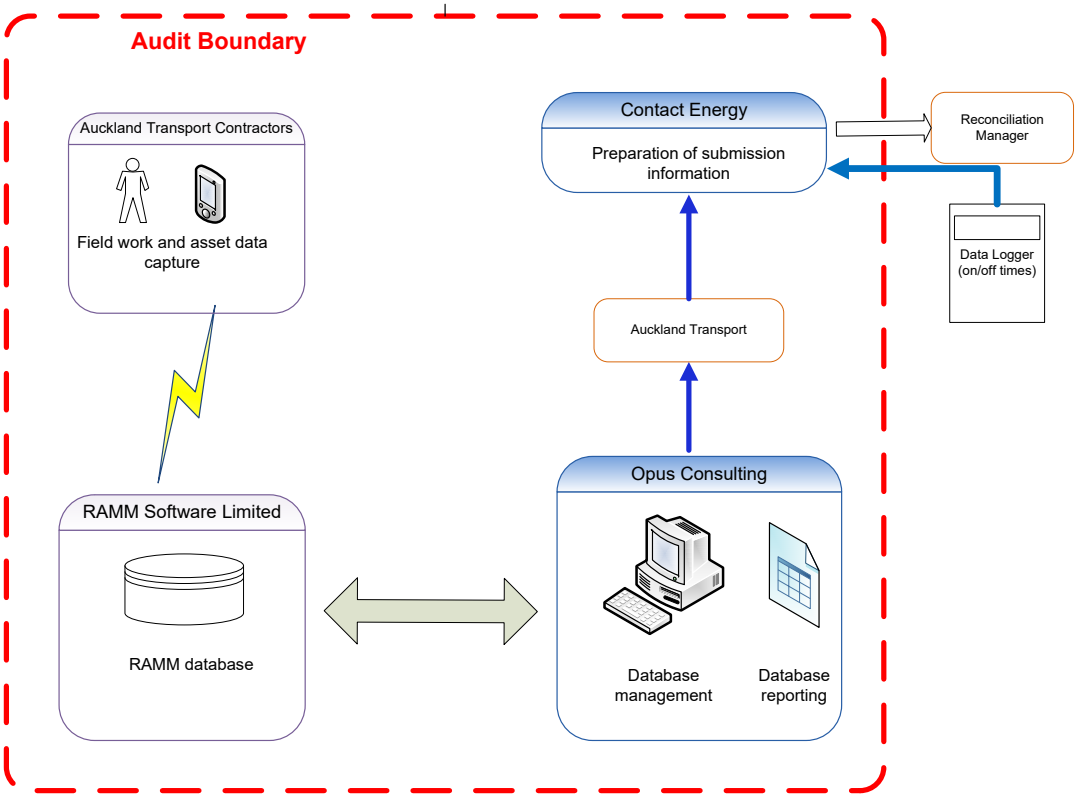
This audit of the Auckland Transport Unmetered Streetlights (AT) DUML database and processes was conducted at the request of Contact Energy Limited (Contact), in accordance with clause 15.37B. The purpose of this audit is to verify that the volume information is being calculated accurately, and that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

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

There are 46 ICPs associated with Auckland Transport.

The streetlight data is held in a RAMM database and this continues to be managed by Opus Consulting, 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. The intention is that once the system has been thoroughly tested and the necessary approvals have been granted by the Electricity Authority, this system will be used to calculate submission for the LED lights. Discussions with the Electricity Authority are progressing. The SLV system was not examined as part of this audit.

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 996 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:

NON-COMPLIANCES

Subject	Section	Clause	Non-Compliance	Status
Deriving submission information	2.1	11(1) of Schedule 15.3	Over submission because of dimming being used. The impact on submission is unknown. A variance exists between the database and the monthly report sent to Contact. the LED wattages being adjusted outside of RAMM resulting in the monthly report being less than the database output by approx. 6,163 kWh per annum. 313 items of load with zero or blank wattage recorded indicating potential under submission of 66,841 kWh. In absolute terms, total annual consumption is estimated to be 936,700 kWh lower than the DUML database indicates based on the field audit. Incorrect ballasts recorded in RAMM indicate over submission of an estimated 2,088 kWh over submission per annum. 110 items of load with incorrect ICP and balancing area. 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	2.2	11(2)(a) and (aa) of Schedule 15.3	4 items of load without an ICP recorded.	Cleared
Location of items of load	2.3	11(2)(b) of Schedule 15.3	7 items of load without location details.	Cleared
Description and capacity of load	2.4	11(2)(c) and (d) of Schedule 15.3	313 items of load with blank or zero wattage recorded. 253 items of load with blank light description. 146 items of load with invalid descriptions.	Still existing
All load recorded in database	2.5	11(2A) and (d) of Schedule 15.3	Not all load recorded in the database (17 additional lights found or 1.5% of the load sampled).	Still existing
Database accuracy	3.1	15.2 and 15.37B(b)	In absolute terms the installed capacity is estimated to be 219 kW lower than the database indicates.	Still existing

Subject	Section	Clause	Non-Compliance	Status
			313 items of load with blank or zero no wattage recorded. 253 items of load with blank lamp description. 146 items of load were identified with an invalid light type description. 5,443 26.7 watt LEDs are recorded as 26 watts in the database. 110 items of load with incorrect ICPs. 160 items of load with a ballast discrepancy	
Volume information accuracy	3.2	15.2 and 15.37B(c)	Over submission because of dimming being used. The impact on submission is unknown. A variance exists between the database and the monthly report sent to Contact. the LED wattages being adjusted outside of RAMM resulting in the monthly report being less than the database output by approx. 6,163 kWh per annum. 313 items of load with zero or blank wattage recorded indicating potential under submission of 66,841 kWh. In absolute terms, total annual consumption is estimated to be 936,700 kWh lower than the DUML database indicates based on the field audit. Incorrect ballasts recorded in RAMM indicate over submission of an estimated 2,088 kWh over submission per annum. 110 items of load with incorrect ICP and balancing area. 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

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

Contact 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

The registry was checked for all 46 ICPs. All are reconciled using the DST profile.

Auckland Transport provide Contact with a monthly report from RAMM. The total "on time" is derived from a data logger and is "actual" on time not estimated. I confirmed the methodology is correct.

The monthly report is adjusted by Auckland Transport. The rationale provided for the adjustment is that when many of the LED lights were fitted, they were set to a lower wattage than their rated wattage. The database contains the rated wattage not the adjusted wattage. The adjusted wattage in the monthly report has not been verified, but Auckland Transport identified the ICPs where the wattage was adjusted to an average of 30 watts, based on their calculation of average adjusted wattage. Contact uses the adjusted wattage not the rated wattage.

The difference between the database wattage and the submission wattage is 86,620 for February 2021, which is approx. 1,272,000 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, so the rated wattage in RAMM is used for submission. Over submission will be occurring but the extent is not yet known.

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

Issue	Volume information impact (annual kWh)
228 Items of load with zero or no wattage recorded	48,690 kWh under submission (assuming 50 watts per light)
Incorrect ballasts applied	3,785 kWh over submission

The field audit identified that in absolute terms, total annual consumption is estimated to be 2,024,400 kWh lower than the DUML database indicates.

As recorded in the previous 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.

I also checked the discrepancies identified during the last audit where 40 ICPs had the incorrect NSP and ICP. These discrepancies are still present.

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.

Improvements have been made to the new connections process and a check is now made at the time of livening to ensure the ICP is identified, and the data is in the database. Vector doesn't liven until Auckland Transport has provided approval.

There is some inaccurate data within the database used to calculate submissions. This is recorded as non-compliance and discussed in **sections 2.4, 3.1** and **3.2.**

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.1 With: 11(1) of Schedule 15.3 From: 01-Aug-20 To: 30-Apr-21	Over submission because of dimming being used. The impact on submission is unknown. 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. 228 items of load with zero or blank wattage recorded indicating potential under submission of 48,690 kWh. 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. Incorrect ballasts recorded in RAMM indicate over submission of an estimated 3,785 kWh per annum. 110 items of load with incorrect ICP and balancing area. 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, as processes to improve the database accuracy have commenced. 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
Auckland Transport received and corrected the items of load within the database with incorrect wattage values. Database switched to an alternative retailer prior to other issues being addressed. No wash-up capacity files have been received to justify amendment of submission information		Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
N/a Client database left Contact (CTCS) 1/7/2021 prior to the audit being completed by Contact.		

2.2. ICP identifier and items of load (Clause 11(2)(a) and (aa) of Schedule 15.3)

Code reference

Clause 11(2)(a) and (aa) of Schedule 15.3

Code related audit information

The DUML database must contain:

- *each ICP identifier for which the retailer is responsible for the DUML*
- *the items of load associated with the ICP identifier.*

Audit observation

The database was checked to confirm the correct ICP was recorded against each item of load.

Audit commentary

The RAMM database extract was analysed, and I found that all items of load have an ICP recorded. I have discussed the accuracy of these ICPs in **section 3.1**.

Audit outcome

Compliant

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

Code reference

Clause 11(2)(b) of Schedule 15.3

Code related audit information

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

Audit observation

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

Audit commentary

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:

- 228 items of load with blank or zero wattage recorded, and
- 126 items of load with blank lamp description.

I have estimated 48,690 kWh of under submission per annum based on an average wattage of 50.

136 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
60W Metal Halide	35
70W Mercury Vapour	3
Mercury Vapour 70W	87
GRAND TOTAL	**136**

5,225 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 3,785 kWh per annum.

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: 01-Aug-20 To: 30-Apr-21	228 items of load with blank or zero wattage recorded. 126 items of load with blank light description. 136 items of load with invalid descriptions. 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 as the majority of the load is recorded in the RAMM database. The audit risk rating is high due to potential under submission of 48,690 kWh per annum

Actions taken to resolve the issue	Completion date	Remedial action status
Auckland Transport received and corrected the items of load within the database with incorrect wattage values.		Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
N/a Client database left Contact (CTCS) 1/7/2021 prior to the audit being completed by Contact.		

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 996 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	3
Lights missing from the field	7

Incorrect or missing wattage in database	136

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	Not all load recorded in the database (3 additional lights found or 0.3% of the load sampled). Potential impact: High Actual impact: Low Audit history: Multiple times Controls: Moderate Breach risk rating: 2
Audit risk rating	**Rationale for audit risk rating**
Low	The controls are recorded as moderate because they mitigate risk most of the time but there is room for improvement. The audit risk rating is low due to the impact a 0.3% % variance for this large database potentially has on reconciliation.

Actions taken to resolve the issue	Completion date	Remedial action status
Auckland Transport received and corrected the items of load within the database by adding the missing lights.		Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
N/a Client database left Contact (CTCS) 1/7/2021 prior to the audit being completed by Contact.		

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 46 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. This is reflective of the field contractor management areas. 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 140 sub-units.
Total items of load	996 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 996 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	94.6	Wattage from survey is lower than the database wattage by 5.4%
R_L	89.7	With a 95% level of confidence, it can be concluded that the error could be between -10.3% and -1.2%
R_H	98.8	

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 10.3% lower 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 474 kW lower than the database indicates.

There is a 95% level of confidence that the installed capacity is between 910 kW lower to 106 kW lower than the database.

In absolute terms, total annual consumption is estimated to be 2,024,400 kWh lower than the DUML database indicates.

There is a 95% level of confidence that the annual consumption is between 451,700 kWh p.a. lower to 3,888,100 kWh p.a. lower 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 recorded in **section 2.4**:

- 228 items of load with blank or zero no wattage recorded, and
- 126 items of load with blank lamp description.

I have estimated 48,690 kWh of under submission per annum based on an average wattage of 50.

136 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
60W Metal Halide	35
70W Mercury Vapour	3
Mercury Vapour 70W	87
GRAND TOTAL	**136**

5,225 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.

NZTA lighting

NZTA lighting is included in the database and was checked as part of the field audit.

ICP accuracy

There are some ICP discrepancies, as recorded below.

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.

I also checked for discrepancies between Vector balancing areas and found the 40 discrepancies shown below. I haven't checked between NSPs within the UNET and VECT balancing areas.

Row Labels	ALB0331	ALB1101	GLN0332	HEN0331	HEP0331	HEP0331(N)	MNG0331	PEN0221	PEN1101	ROS0221	SLV0331	TAK0331	WEL0331	WIR0331	WRD0331
ABBEYGATE ST				1											6
BIRDWOOD RD (WAITAKERE)				43										1	
BOLTON ST (WAITAKERE)						2				1					
BRIGHAM ST/QUAY ST CYWAY				2					60						
CLARKE RD	1							5							
CONNAUGHT ST						3				14					
CONNELL ST						2				20					
EALING CRES CARPARK (RP432 LHS)												5	1		
FRUITLANDS RD	12											1			
HUARAHI PAI ROAD	6			7					1						
KAURI GROVE DR	6											2			
KINROSS ST						6				21					
KIRKALDY ST				1								1			
LANDMARK TCE				1							9				
PARKHURST RD			1								40				
ROSCOMMON RD (NORTHBOUND)									1					51	2
ROSCOMMON RD (SOUTHBOUND)														58	2
WELDENE AVE		14						1							
WICKMAN WAY					1		19								
WOLVERTON ST						2				50					

Location accuracy

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

Change management process findings

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.

Auckland Transport has three field contractors. The contracts include data accuracy and Auckland Transport conducts audits of the contractors.

Auckland Transport still intend to use the SLV system to manage the LED wattages. This is currently being trialled with the initial accuracy results looking promising. This system will be 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. If this information can be used for submission this will resolve the LED wattages that are currently adjusted outside of RAMM and will also be able to measure accurately any dimming occurring. There are currently 40 metered lights being trialled.

- The new light labels which will be specific and identify the light type and wattage are about to be put in place - therefore the correct light type and wattage will be recorded correctly in RAMM.
- Festive lights have been added to the database and are recorded for the period they are on.

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

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 3.1 With: Clause 15.2 and 15.37B(b) From: 01-Aug-20 To: 30-Apr-21	In absolute terms the installed capacity is estimated to be 474 kW lower than the database indicates. 228 items of load with blank or zero no wattage recorded. 126 items of load with blank lamp description. 136 items of load were identified with an invalid light type description. 5,225 26.7 watt LEDs are recorded as 26 watts in the database. 110 items of load with incorrect ICPs. 491 items of load with a ballast discrepancy. 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. Whilst there are a large number of discrepancies, processes are being improved to ensure accuracy becomes better. 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 received and corrected the items of load within the database with incorrect wattage values.		Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
N/a Client database left Contact (CTCS) 1/7/2021 prior to the audit being completed by Contact.		

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

The registry was checked for all 46 ICPs. All are reconciled using the DST profile.

Auckland Transport provide Contact with a monthly report from RAMM. The total "on time" is derived from a data logger and is "actual" on time not estimated. I confirmed the methodology is correct.

The monthly report is adjusted by Auckland Transport. The rationale provided for the adjustment is that when many of the LED lights were fitted, they were set to a lower wattage than their rated wattage. The database contains the rated wattage not the adjusted wattage. The adjusted wattage in the monthly report has not been verified, but Auckland Transport identified the ICPs where the wattage was adjusted to an average of 30 watts, based on their calculation of average adjusted wattage. Contact uses the adjusted wattage not the rated wattage.

The difference between the database wattage and the submission wattage is 86,620 for February 2021, which is approx. 1,272,000 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, so the rated wattage in RAMM is used for submission. Over submission will be occurring but the extent is not yet known.

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

Issue	Volume information impact (annual kWh)
228 Items of load with zero or no wattage recorded	48,690 kWh under submission (assuming 50 watts per light)
Incorrect ballasts applied	3,785 kWh over submission

The field audit identified that in absolute terms, total annual consumption is estimated to be 2,024,400 kWh lower than the DUML database indicates.

As recorded in the previous 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.

I also checked the discrepancies identified during the last audit where 40 ICPs had the incorrect NSP and ICP. These discrepancies are still present.

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.

Improvements have been made to the new connections process and a check is now made at the time of livening to ensure the ICP is identified, and the data is in the database. Vector doesn't liven until Auckland Transport has provided approval.

There is some inaccurate data within the database used to calculate submissions. This is recorded as non-compliance and discussed in **sections 2.4, 3.1** and **3.2.**

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 3.2 With: Clause 15.2 and 15.37B(c) From: 10-Oct-19 To: 25-Jul-20	Over submission because of dimming being used. The impact on submission is unknown. 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. 228 items of load with zero or blank wattage recorded indicating potential under submission of 48,690 kWh. 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. Incorrect ballasts recorded in RAMM indicate over submission of an estimated 3,785 kWh per annum. 110 items of load with incorrect ICP and balancing area. 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, as processes to improve the database accuracy have commenced. 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
Auckland Transport received and corrected the items of load within the database with incorrect wattage values.		Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
N/a Client database left Contact (CTCS) 1/7/2021 prior to the audit being completed by Contact.		

CONCLUSION

The streetlight data is held in a RAMM database and this continues to be managed by Opus Consulting, 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. The intention is that once the system has been thoroughly tested and the necessary approvals have been granted by the Electricity Authority, this system will be used to calculate submission for the LED lights. Discussions with the Electricity Authority are progressing.

Results from the 40 check meters installed comparing the volumes recorded in SLV against the check meters are showing a high level of accuracy. In the interim, the LED lights are being recorded in both databases. Dimming is being used on the SLV system, but this is not reflected in submission as this system is yet to be approved, therefore over submission will be occurring. The SLV system was not assessed as part of this audit and therefore I was not able to calculate the kWh volume impact.

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,
- a variance exists between the database and the monthly report sent to Contact and the LED wattages being adjusted outside of RAMM resulting in the monthly report being less than the database output by approx. 1,272,000 kWh per annum,
- 228 items of load with zero or blank wattage recorded indicating potential under submission of 48,960 kWh,
- 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,
- incorrect ballasts recorded in RAMM indicate over submission of an estimated 3,785 kWh over submission per annum,
- 110 items of load with incorrect ICP and balancing area, 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 five non-compliances and no recommendation were made. The future risk rating of 24 indicates that the next audit be completed in three months, but I recommend that the next audit be in six months to allow time for Auckland Transport and Contact to make improvements to processes and to the database.

PARTICIPANT RESPONSE

This report highlights a number of issues that require resolution and that indicate at under-reconciliation of their load. However, at a macro level, Auckland Transport are over reconciling, and over-paying, their energy use for streetlighting as a result of their rollout of dimming on the network with no approved method to reconcile the volume. These issues require resolution, however this resolution will exacerbate the over reconciliation of their total load in the short-term whilst the industry works towards the rollout of the new dimming profiles that have been approved by the EA since this audit was completed by Veritek.

This finalisation of this report by Contact has made the commentary rather limited as the database has switched away from Contact (CTCS) before this