ELECTRICITY INDUSTRY PARTICIPATION CODE
DISTRIBUTED UNMETERED LOAD AUDIT REPORT

VERITEK

For

AUCKLAND TRANSPORT AND CONTACT ENERGY

Prepared by: Steve Woods

Date audit commenced: 10 October 2019

Date audit report completed: 28 October 2019

Audit report due date: 15-Nov-19

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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.

Initial results from the 40 check meters installed comparing the volumes recorded in SLV against the check meters are looking promising. In the interim, the LED lights are being recorded in both databases. Discussions are progressing between Auckland Transport and the Electricity Authority to progress the approval of the SLV system to be used for reconciliation. 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. the LED wattages being adjusted outside of RAMM resulting in the monthly report being less than the database output by approx. 1,141,574 kWh per annum.
- 333 items of load with zero or blank wattage recorded indicating potential under submission of 72,112 kWh.
- In absolute terms, total annual consumption is estimated to be 1,165,100 kWh higher than the DUML database indicates based on the field audit.
- Incorrect ballasts recorded in RAMM indicate over submission of an estimated 14,350 kWh over submission per annum.
- 111 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. New connections are recorded from the time of vesting, not from the time of livening.

This audit found seven non-compliances and no recommendation 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 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. the LED wattages being adjusted outside of RAMM resulting in the monthly report being less than the database output by approx. 1,141,574 kWh per annum. 333 items of load with zero or blank wattage recorded indicating potential under submission of 72,112 kWh. In absolute terms, total annual consumption is estimated to be 1,165,100 kWh higher than the DUML database indicates based on the field audit. Incorrect ballasts recorded in RAMM indicate over submission of an estimated 14,350 kWh over submission per annum. 111 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. New connections are recorded from the time of vesting, not from the time of livening	Moderate	High	6	Investigating
ICP identifier	2.2	11(2)(a) and (aa) of Schedule 15.3	2 items of load without an ICP recorded	Strong	Low	1	Identified
Location of items of load	2.3	11(2)(b) of Schedule 15.3	7 items of load without location details	Strong	Low	1	Identified

Subject	Section	Clause	Non-Compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
Description and capacity of load	2.4	11(2)(c) and (d) of Schedule 15.3	333 items of load with blank or zero wattage recorded. 301 items of load with blank light description. 141 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 (63 additional lights found or 6% of the load sampled).	Moderate	High	6	Identified
Database accuracy	3.1	15.2 and 15.37B(b)	In absolute terms the installed capacity is estimated to be 273 kW higher than the database indicates. 333 items of load with blank or zero no wattage recorded 301 items of load with blank lamp description 141 items of load were identified with an invalid light type description 5,847 26.7 watt LEDs are recorded as 26 watts in the database 111 items of load with incorrect ICPs 1,118 items of load with a ballast discrepancy	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)	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. 1,141,574 kWh per annum. 333 items of load with zero or blank wattage recorded indicating potential under submission of 72,112 kWh. In absolute terms, total annual consumption is estimated to be 1,165,100 kWh higher than the DUML database indicates based on the field audit. Incorrect ballasts recorded in RAMM indicate over submission of an estimated 14,350 kWh over submission per annum. 111 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. New connections are recorded from the time of vesting, not from the time of livening	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	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.

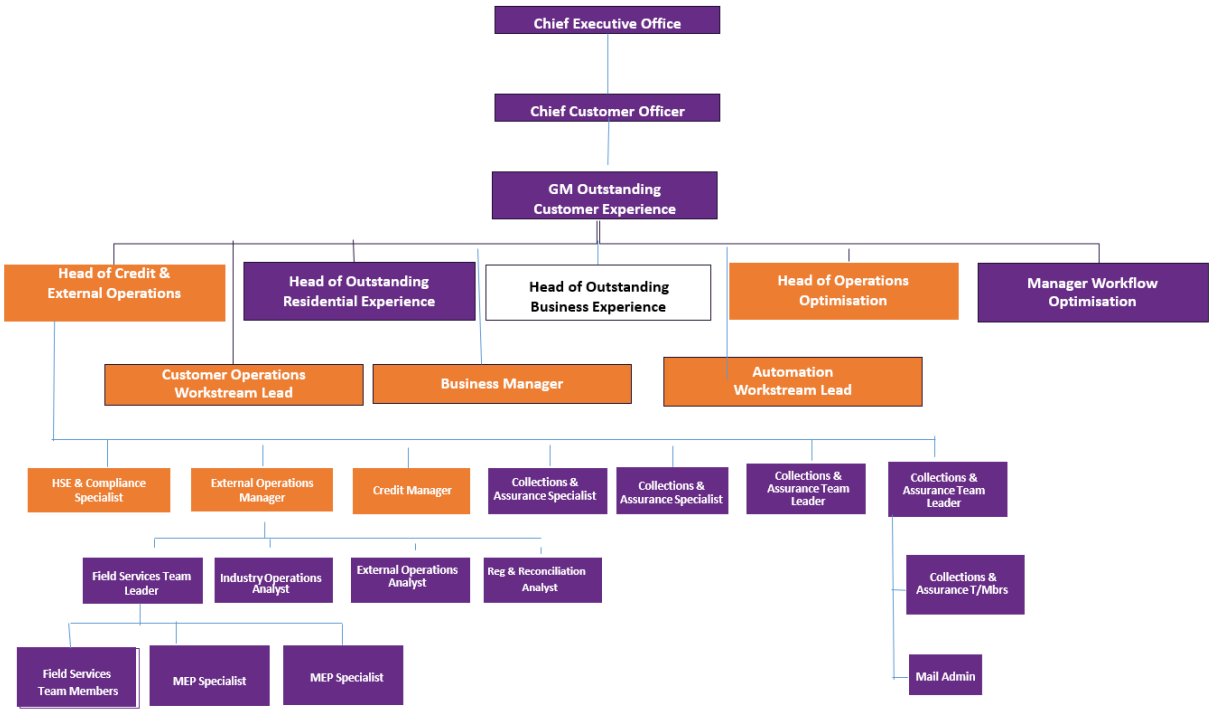
Audit commentary

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
Ahmed Osman	Project Manager Streetlights	Auckland Transport
Allie Jones	External Operations Analyst	Contact Energy
Charmaine Okros	Asset Systems Manager	Auckland Transport
David Dick	Team Leader Street Lights	Auckland Transport
Scott Donaldson	Account Executive	Contact Energy

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.

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	HHR	21	2,603
0000019359WE3BC	WAIK	HHR	114	13,595
0000019934WE91D	WAIK	HHR	15	2,441
0000041244WE13A	WAIK	HHR	0	0
0000041245WED7F	WAIK	HHR	8	743

ICP Number	Network	Profile	Number of items of load	Database wattage (watts)
0000041246WE1BF	WAIK	HHR	250	30,060
0000041247WEDFA	WAIK	HHR	199	8,596
0003281740CNA88	COUP	HHR	4,189	274,443
0900343060LC471	VECT	HHR	4,347	696,388
0905321057LCB09	VECT	HHR	404	57,994
0914050273LCECE	VECT	HHR	3,048	604,971
0915197278LC21F	VECT	HHR	1,321	255,188
0918033403LCA10	VECT	HHR	5,799	1,160,776
0929040953LCE6D	VECT	HHR	3,719	632,704
0954776933LCC4F	VECT	HHR	3,991	739,375
0977883655LCF24	VECT	HHR	2,528	462,555
0984112723LC1A6	VECT	HHR	2,434	480,575
0987075446LC985	VECT	HHR	3,790	572,005
1001138654LC940	VECT	HHR	2,368	422,588
1001282117UNECE	VECT	HHR	5,754	856,461
1001282119UND55	VECT	HHR	6,907	1,041,653
1001282121UN8B9	VECT	HHR	3,568	591,268
1001282123UN83C	VECT	HHR	4,217	714,650
1001282124UN5F6	VECT	HHR	3,997	570,784
1001282125UN9B3	VECT	HHR	324	57,569
1001282126UN573	VECT	HHR	1,218	163,143
1001282153UND61	VECT	HHR	1,473	37,653
1001282154UN0AB	VECT	HHR	4,043	67,685
1001282155UNCEE	VECT	HHR	4,375	72,247
1001282156UN02E	VECT	HHR	3,904	68,663
1001282163UNA99	VECT	HHR	987	22,298

ICP Number	Network	Profile	Number of items of load	Database wattage (watts)
1001282164UN753	UNET	HHR	498	2,769
1001282166LCDC2	VECT	HHR	553	11,716
1001282171LCAA5	VECT	HHR	3,094	70,111
1001282172LC665	VECT	HHR	2,283	42,855
1001282174LC7EA	VECT	HHR	992	25,169
1001282175LCBAF	VECT	HHR	7,481	182,004
1001282176LC76F	VECT	HHR	1,465	37,819
1001282177LCB2A	VECT	HHR	5,579	146,380
1001282178LC4F4	VECT	HHR	2,824	77,221
1001282179LC8B1	VECT	HHR	4,574	63,552
1001282180LC6F7	VECT	HHR	1,968	35,105
1001287978LC3D9	VECT	HHR	3,928	50,677
1001287979UN588	UNET	HHR	2,257	43,992
1099572697CNB44	COUP	HHR	56	3,717
1099572698CN49A	COUP	HHR	1,312	76,361
			118,178	10,927,115

1.7. Authorisation Received

All information was provided directly by Contact or Auckland Transport.

1.8. Scope of Audit

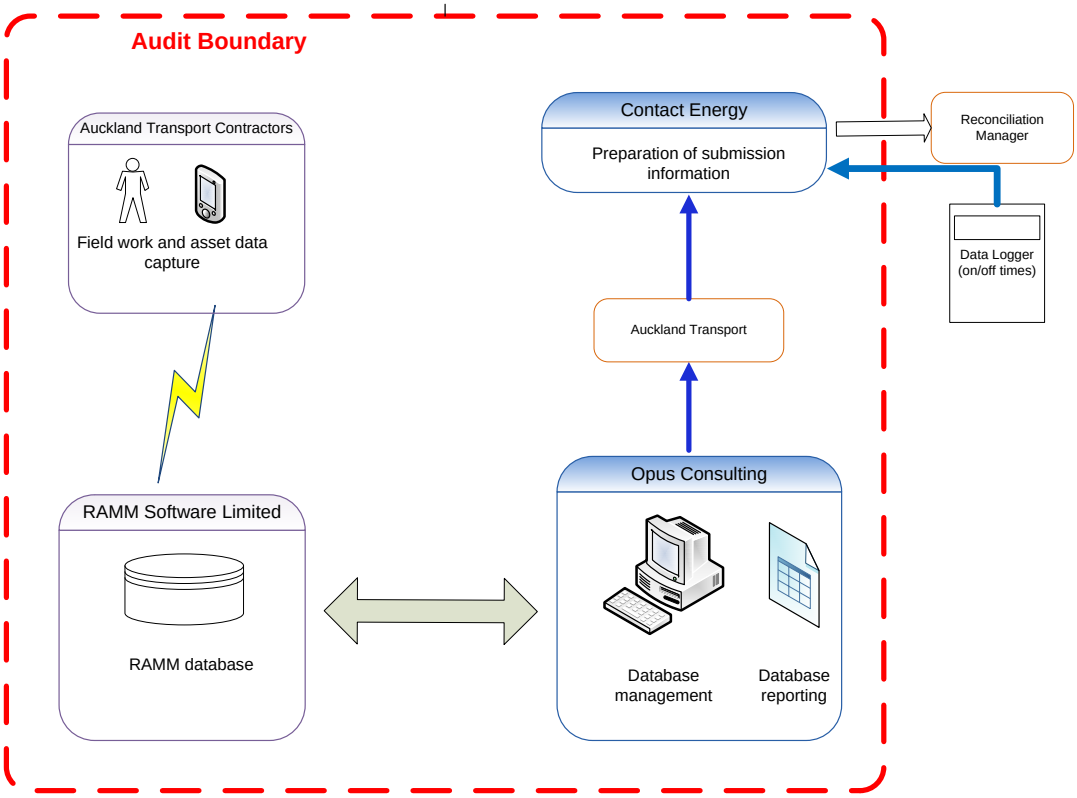
This audit of the Auckland Transport Unmetered Streetlights (AT) DUML database and processes was conducted at the request of Contact Energy Limited (Contact), in accordance with clause 15.37B. The purpose of this audit is to verify that the volume information is being calculated accurately, and that 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 1,055 items of load.

1.9. Summary of previous audit

Contact provided a copy of the last audit report undertaken by Rebecca Elliot of Veritek Limited in November 2018 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	Incorrect profile of RPS HHR applied to 44 ICPs. Over submission because of dimming being used. The impact on submission is unknown. Potential under submission of 847,622.56kWh due to the LED wattages being adjusted outside of RAMM and metered load recorded incorrectly against unmetered load ICPs in the RAMM database. 526 items of load with no wattage recorded and 27 items of load with zero wattage recorded indicating potential under submission of 66,132 kWh of under submission. Incorrect ballasts recorded in RAMM indicate over submission of an estimated 8,073 kWh over submission per annum. 187 items of load with an invalid light description.	Still existing
Description and capacity of load	2.4	11(2)(c) and (d) of Schedule 15.3	526 items of load with no wattage recorded. 27 items of load with zero wattage recorded. 187 items of load with an invalid light description.	Still existing
All load recorded in database	2.5	11(2A) and (d) of Schedule 15.3	Not all load recorded in the database (16 additional lights found or 1.5% of the load sampled).	Still existing
Database accuracy	3.1	15.2 and 15.37B(b)	187 items of load with an invalid light description. 526 items of load with no wattage recorded and 27 items of load with zero wattage recorded indicating potential under submission of 66,132 kWh of under submission. Incorrect ballasts recorded in RAMM indicate over submission of an estimated 8,073 kWh over submission per annum.	Still existing
Volume information accuracy	3.2	15.2 and 15.37B(c)	Incorrect profile of RPS HHR applied to 44 ICPs. Over submission because of dimming being used. The impact on submission is unknown. Potential under submission of 847,622.56kWh due to the LED wattages being adjusted outside of RAMM and metered load recorded incorrectly against unmetered load ICPs in the RAMM database.	Still existing

Subject	Section	Clause	Non-Compliance	Status
			526 items of load with no wattage recorded and 27 items of load with zero wattage recorded indicating potential under submission of 66,132 kWh of under submission. Incorrect ballasts recorded in RAMM indicate over submission of an estimated 8,073 kWh over submission per annum. Unmetered ICPs incorrectly assigned to 1,022 metered items of load in the database 187 items of load with an invalid light description.	

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 that the requirement to conduct an audit has been met for this database within the required timeframe. Compliance is confirmed.

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 half hourly with the correct HHR 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.

I checked the submission accuracy for the month of August 2019 against the data extract provided. The table below shows the difference between the database extract and the monthly report.

	Quantity	Watts
Database extract	118,178	10,927,115
Monthly report	118,191	10,659,830

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.

The difference between the database wattage and the monthly report wattage is approx. 1,141,574 kWh per annum assuming burn hours of 4,271.

Issue	Volume information impact (annual kWh)
333 Items of load with zero or no wattage recorded	71,112 kWh under submission (assuming 50 watts per light)
Incorrect ballasts applied	14,350 kWh over submission

In absolute terms, total annual consumption is estimated to be 1,165,100 kWh higher than the DUML database indicates.

ICP 0000041244WE13A is for items of load on an embedded network (NSP STG0111). The embedded network has 71 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. I haven't checked between NSPs within the UNET and VECT balancing areas.

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. New connections are recorded from the time of vesting, not from the time of livening.

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-May-18 To: 10-Oct-19	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. 1,141,574 kWh per annum. 333 items of load with zero or blank wattage recorded indicating potential under submission of 72,112 kWh. In absolute terms, total annual consumption is estimated to be 1,165,100 kWh higher than the DUML database indicates based on the field audit. Incorrect ballasts recorded in RAMM indicate over submission of an estimated 14,350 kWh over submission per annum. 111 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. New connections are recorded from the time of vesting, not from the time of livening. 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

Most of these are common recurrences for AT. Contact have been working with AT to attempt to get them to ensure their data is accurate and we will continue to attempt to work with AT. AT are hesitant to adjust some of their processes due to their intentions of using a smart system. Contact will continue to promote accurate record keeping until such time that there is an approved Smart System in place	Ongoing	Investigating
Oversubmission due to dimming: Contact are in the process of attempting to get an exemption from the Authority for a profile shape for these dimmed lights. Then we will be able to work with AT to have these turned on, dimmed, brought back up and turned off at certain times where we can accurately submit the usage. We have submitted for review and have had feedback and will resubmit in the near future	Ongoing	
Variance because of manual adjustment: until Contact have the above profile we should be submitting data on what the light wattage actually is rather than a process of manual adjustment that has not been approved by the EA	Ongoing	
Zero or blank Wattage: Contact are to continue to work with AT to ensure they are updating their records accurately. AT were going through a process where they were having someone attend each light to confirm it's details, Contact will follow up to make sure this is still happening	Ongoing	
Incorrect ballast: Contact are to continue to work with AT to ensure they are updating their records accurately. AT were going through a process where they were having someone attend each light to confirm it's details, Contact will follow up to make sure this is still happening	Ongoing	
Incorrect balancing area: Contact will work with AT to make sure they have their lights on the correct ICP's	Ongoing	
Changes during the month: Contact have advised AT that this is to be monitored now, we have also advised that we will be in contact when we have an idea of how we are going to achieve this	December 2020	
Preventative actions taken to ensure no further issues will occur	**Completion date**	
Contact have been working with AT to attempt to get them to ensure their data is accurate and we will continue to attempt to work with AT. AT are hesitant to adjust some of their processes due to their intentions of using a smart system. Contact will continue to promote accurate record keeping until such time that there is an approved Smart System in place.	Ongoing	

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

Code reference

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

Code related audit information

The DUML database must contain:

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

Audit observation

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

Audit commentary

The RAMM database extract was analysed and I found that two items of load do not have an ICP recorded. I have discussed the accuracy of these ICPs in **section 3.1**.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.2 With: Clause 11(2)(a) and (aa) of Schedule 15.3 From: 26-Aug-19 To: 10-Oct-19	2 items of load without an ICP recorded Potential impact: Low Actual impact: Low Audit history: None Controls: Strong Breach risk rating: 1
Audit risk rating	**Rationale for audit risk rating**
Low	The controls are recorded as strong because they mitigate risk to an acceptable level. The impact on settlement and participants is minor; therefore the audit risk rating is low.

Actions taken to resolve the issue	Completion date	Remedial action status
Contact are to continue to work with AT to ensure they are updating their records accurately. AT were going through a process where they were having someone attend each light to confirm it's details, Contact will follow up to make sure this is still happening	01/02/2020	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
Contact will continue to promote accurate record keeping until such time that there is an approved Smart System in place. Contact will then ensure that attention remains focused on accurate records	01/02/2020	

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 identified seven items of load without address or GPS details recorded.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.3 With: Clause 11(2)(b) of Schedule 15.3 From: 01-Mar-15 To: 10-Oct-19	7 items of load without location details Potential impact: Low Actual impact: Low Audit history: None Controls: Strong Breach risk rating: 1
Audit risk rating	**Rationale for audit risk rating**
Low	The controls are recorded as strong because they mitigate risk to an acceptable level. The impact on settlement and participants is minor; therefore the audit risk rating is low.

Actions taken to resolve the issue	Completion date	Remedial action status
Contact are to continue to work with AT to ensure they are updating their records accurately. AT were going through a process where they were having someone attend each light to confirm it's details, Contact will follow up to make sure this is still happening	01/02/2020	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	

Contact will continue to promote accurate record keeping until such time that there is an approved Smart System in place. Contact will then ensure that attention remains focused on accurate records	01/02/2020	

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:

- 333 items of load with blank or zero no wattage recorded
- 301 items of load with blank lamp description

I have estimated 71,112 kWh of under submission per annum based on an average wattage of 50.

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

Light Type	Volume
45W Metal Halide	1
500W HPS	1
57W Metal Halide	5
60W Metal Halide	34
70W Mercury Vapour	4
Mercury Vapour 70W	96
GRAND TOTAL	**141**

5,847 26.7 watt LEDs are recorded as 26 watts in the database.

I checked the ballasts being applied and found 1,118 items of load with a ballast discrepancy.

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: 30-Apr-18 To: 10-Oct-19	333 items of load with blank or zero wattage recorded. 301 items of load with blank light description. 141 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 71,112 kWh per annum

Actions taken to resolve the issue	Completion date	Remedial action status
Contact are to continue to work with AT to ensure they are updating their records accurately. AT were going through a process where they were having someone attend each light to confirm it's details, Contact will follow up to make sure this is still happening	Ongoing	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
Contact will continue to promote accurate record keeping until such time that there is an approved Smart System in place. Contact will then ensure that attention remains focused on accurate records	Ongoing	

2.5. All load recorded in database (Clause 11(2A) of Schedule 15.3)

Code reference

Clause 11(2A) of Schedule 15.3

Code related audit information

The retailer must ensure that each item of DUML for which it is responsible is recorded in this database.

Audit observation

The field audit was undertaken of 1,055 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	63
Lights missing from the field	4
Incorrect or missing wattage in database	66

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-May-18 To: 10-Oct-19	Not all load recorded in the database (63 additional lights found or 6% of the load sampled). 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 recorded as moderate because they mitigate risk most of the time but there is room for improvement. The audit risk rating is high due to the impact of 6% variance for this large database potentially has on reconciliation.

Actions taken to resolve the issue	Completion date	Remedial action status
Contact are to continue to work with AT to ensure they are updating their records accurately. AT were going through a process where they were having someone attend each light to confirm it's details, Contact will follow up to make sure this is still happening	Ongoing	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
Contact will continue to promote accurate record keeping until such time that there is an approved Smart System in place. Contact will then ensure that attention remains focused on accurate records	Ongoing	

2.6. Tracking of load changes (Clause 11(3) of Schedule 15.3)

Code reference

Clause 11(3) of Schedule 15.3

Code related audit information

The DUML database must track additions and removals in a manner that allows the total load (in kW) to be retrospectively derived for any given day.

Audit observation

The ability of the database to track changes was assessed and the process for tracking of changes in the database was examined.

Audit commentary

The RAMM database functionality achieves compliance with the code.

Audit outcome

Compliant

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

Code reference

Clause 11(4) of Schedule 15.3

Code related audit information

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

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

Audit observation

The database was checked for audit trails.

Audit commentary

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

Audit outcome

Compliant

3. ACCURACY OF DUML DATABASE

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

Code reference

Clause 15.2 and 15.37B(b)

Code related audit information

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

Audit observation

The DUML Statistical Sampling Guideline was used to determine the database accuracy of the Auckland Transport DUML load for the 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 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 190 sub-units.
Total items of load	1,055 items of load were checked.

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

Audit commentary

Database accuracy based on the field audit

A field audit was conducted of a statistical sample of 1,055 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	102.5	Wattage from survey is higher than the database wattage by 2.5%
R_L	97.8	With a 95% level of confidence it can be concluded that the error could be between -2.8% and 10.3%
R_H	110.3	

These results were categorised in accordance with the "Distributed Unmetered Load Statistical Sampling Audit Guideline", effective from 01/02/19 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 between 2.8% lower and 10.3% higher than the wattage recorded in the DUML database. Non-compliance is recorded because the potential error is greater than 5.0%.

In absolute terms the installed capacity is estimated to be 273 kW higher than the database indicates.

There is a 95% level of confidence that the installed capacity is between 242 kW lower to 1,123 kW higher than the database.

In absolute terms, total annual consumption is estimated to be 1,165,100 kWh higher than the DUML database indicates.

There is a 95% level of confidence that the annual consumption is between 1,033,400 kWh p.a. lower to 4,795,100 kWh p.a. higher than the database indicates.

Scenario	Description
A - **Good accuracy, good precision**	This scenario applies if: (a) R_H is less than 1.05; and (b) R_L is greater than 0.95 The conclusion from this scenario is that: (a) the best available estimate indicates that the database is accurate within +/- 5 %; and (b) this is the best outcome.
B - **Poor accuracy, demonstrated with statistical significance**	This scenario applies if: (a) the point estimate of R is less than 0.95 or greater than 1.05 (b) as a result, either R_L is less than 0.95 or R_H is greater than 1.05.

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

Lamp description and capacity accuracy

As recorded in Section 2.4:

- 333 items of load with blank or zero no wattage recorded
- 301 items of load with blank lamp description

I have estimated 71,112 kWh of under submission per annum based on an average wattage of 50.

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

Light Type	Volume
45W Metal Halide	1
500W HPS	1
57W Metal Halide	5
60W Metal Halide	34
70W Mercury Vapour	4
Mercury Vapour 70W	96
GRAND TOTAL	**141**

5,847 26.7 watt LEDs are recorded as 26 watts in the database.

I checked the ballasts being applied and found 1,118 items of load with a ballast discrepancy.

The incorrect ballasts indicate an estimated 14,350 kWh over submission per annum. These have been sent to Auckland Transport for correction. As detailed in **section 2.1** and **3.2**, the LED wattages are believed to be incorrectly recorded in RAMM and are being adjusted before the monthly report is sent to Contact. The incorrect wattage and ballasts recorded in RAMM are recorded as non-compliance.

NZTA lighting

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

ICP accuracy

Every item of load has an ICP recorded, but there are some discrepancies, as recorded below.

ICP 0000041244WE13A is for items of load on an embedded network (NSP STG0111). The embedded network has 71 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 seven items of load without address or 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. New connections are recorded from the time of vesting, not from the time of livening.

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 accurately able to record the light wattage on each pole and identify if any items of load which have a wattage outside of the light type threshold. 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 be 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 are being added to the RAMM database for the 2019 festive season and should flow through to submission.

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-May-18 To: 10-Oct-19	In absolute terms the installed capacity is estimated to be 273 kW higher than the database indicates. 333 items of load with blank or zero no wattage recorded 301 items of load with blank lamp description 141 items of load were identified with an invalid light type description 5,847 26.7 watt LEDs are recorded as 26 watts in the database 111 items of load with incorrect ICPs 1,118 items of load with a ballast discrepancy. 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
Contact are to continue to work with AT to ensure they are updating their records accurately. AT were going through a process where they were having someone attend each light to confirm it's details, Contact will follow up to make sure this is still happening	Ongoing	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
Contact will continue to promote accurate record keeping until such time that there is an approved Smart System in place. Contact will then ensure that attention remains focused on accurate records	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
- 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 half hourly with the correct HHR 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.

I checked the submission accuracy for the month of August 2019 against the data extract provided. The table below shows the difference between the database extract and the monthly report.

	Quantity	Watts
Database extract	118,178	10,927,115
Monthly report	118,191	10,659,830

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.

The difference between the database wattage and the monthly report wattage is approx. 1,141,574 kWh per annum assuming burn hours of 4,271.

Issue	Volume information impact (annual kWh)
333 Items of load with zero or no wattage recorded	71,112 kWh under submission (assuming 50 watts per light)
Incorrect ballasts applied	14,350 kWh over submission

In absolute terms, total annual consumption is estimated to be 1,165,100 kWh higher than the DUML database indicates.

ICP 0000041244WE13A is for items of load on an embedded network (NSP STG0111). The embedded network has 71 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. I haven't checked between NSPs within the UNET and VECT balancing areas.

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. New connections are recorded from the time of vesting, not from the time of livening.

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: 01-May-18 To: 10-Oct-19	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. 1,141,574 kWh per annum. 333 items of load with zero or blank wattage recorded indicating potential under submission of 72,112 kWh. In absolute terms, total annual consumption is estimated to be 1,165,100 kWh higher than the DUML database indicates based on the field audit. Incorrect ballasts recorded in RAMM indicate over submission of an estimated 14,350 kWh over submission per annum. 111 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. New connections are recorded from the time of vesting, not from the time of livening. 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

Most of these are common recurrences for AT. Contact have been working with AT to attempt to get them to ensure their data is accurate and we will continue to attempt to work with AT. AT are hesitant to adjust some of their processes due to their intentions of using a smart system. Contact will continue to promote accurate record keeping until such time that there is an approved Smart System in place	Ongoing	Identified
Oversubmission due to dimming: Contact are in the process of attempting to get an exemption from the Authority for a profile shape for these dimmed lights. Then we will be able to work with AT to have these turned on, dimmed, brought back up and turned off at certain times where we can accurately submit the usage. We have submitted for review and have had feedback and will resubmit in the near future	Ongoing	
Variance because of manual adjustment: until Contact have the above profile we should be submitting data on what the light wattage actually is rather than a process of manual adjustment that has not been approved by the EA	Ongoing	
Zero or blank Wattage: Contact are to continue to work with AT to ensure they are updating their records accurately. AT were going through a process where they were having someone attend each light to confirm it's details, Contact will follow up to make sure this is still happening	Ongoing Ongoing	
Incorrect ballast: Contact are to continue to work with AT to ensure they are updating their records accurately. AT were going through a process where they were having someone attend each light to confirm it's details, Contact will follow up to make sure this is still happening	Ongoing	
Incorrect balancing area: Contact will work with AT to make sure they have their lights on the correct ICP's	Ongoing	
Changes during the month: Contact have advised AT that this is to be monitored now, we have also advised that we will be in contact when we have an idea of how we are going to achieve this	December 2020	
Preventative actions taken to ensure no further issues will occur	**Completion date**	
Contact have been working with AT to attempt to get them to ensure their data is accurate and we will continue to attempt to work with AT. AT are hesitant to adjust some of their processes due to their intentions of using a smart system. Contact will continue to promote accurate record keeping until such time that there is an approved Smart System in place	Ongoing	

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.

Initial results from the 40 check meters installed comparing the volumes recorded in SLV against the check meters are looking promising. In the interim, the LED lights are being recorded in both databases. Discussions are progressing between Auckland Transport and the Electricity Authority to progress the approval of the SLV system to be used for reconciliation. 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. the LED wattages being adjusted outside of RAMM resulting in the monthly report being less than the database output by approx. 1,141,574 kWh per annum.
- 333 items of load with zero or blank wattage recorded indicating potential under submission of 72,112 kWh.
- In absolute terms, total annual consumption is estimated to be 1,165,100 kWh higher than the DUML database indicates based on the field audit.
- Incorrect ballasts recorded in RAMM indicate over submission of an estimated 14,350 kWh over submission per annum.
- 111 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. New connections are recorded from the time of vesting, not from the time of livening.

This audit found seven non-compliances and no recommendation were made.

This audit found seven non-compliances and no recommendation 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 months to allow time for Auckland Transport and Contact to make improvements to processes and to the database

PARTICIPANT RESPONSE

Contact Energy is committed to help Auckland Transport ensure their database is accurate and therefore their invoicing and submission is accurate

Contact Energy still wishes to be engaged with Auckland Transport in regards to their Smart System. We have not been a party to any progress that has been made since the last report but we continue to be engaged

Contact will continue to work with Auckland Transport to make sure they update the Locations details, ballast details, wattage details and any balancing area issues as quickly as possible