ELECTRICITY INDUSTRY PARTICIPATION CODE
DISTRIBUTED UNMETERED LOAD AUDIT REPORT

VERITEK

For

AUCKLAND TRANSPORT AND CONTACT ENERGY

Prepared by: Rebecca Elliot

Date audit commenced: 3 April 2018

Date audit report completed: 28 May 2018

Audit report due date: 01-Jun-18

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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, which became effective on 1 June 2017.

Auckland Transport have switched the ICPs previously with Meridian Energy to Contact Energy. Therefore, Contact now manages all 54 DUML ICPs. Four of these ICPs have been with Contact for some time and no RAMM database is used to derive submission. The potentially duplicated DUML load recorded on these ICPs is still being investigated and it is hoped that now all of the distributed unmetered load is with Contact that these will be able to be resolved.

The RAMM database is used for to derive submission for the remaining 50 ICPs. As reported the in the last audit, Auckland Transport have recorded all the LED lights in the SLV tele-management system. This system is still being trialled to record the street light energy consumption with 40 check meters installed to confirm its accuracy. 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. These LED lights are 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.

I checked the submission accuracy for the month of April for those ICPs supplied in the database extract and found differences for almost every ICP. Auckland Transport believe this is due to the incorrect LED wattages recorded in the RAMM and they are addressing this as discussed in **section 2.6**. I recorded in the last audit that these were expected to be corrected in RAMM. These differences indicate a potential under submission of 1,169,418.59 kWh per annum if the wattages in RAMM are correct.

Analysis of the database found discrepancies in the data and in the field. These are detailed in the report. Auckland Transport is working to improve the data quality and have a number of initiatives that should assist with addressing this.

This audit found nine non-compliances and no recommendation were made. The future risk rating of 78 indicates that the next audit be completed in three months. 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	4 ICPs with DUML reconciled without a database. Over submission because of dimming being used. The impact on submission is unknown. The wattage report is adjusted outside of RAMM specifically in relation to the LED light values this is resulting in an estimated under submission of 1,169,418.59 kWh if the wattages in RAMM are correct. The database accuracy is assessed to be 99.6% indicating an estimated over submission of 213,200 kWh per annum if the database was used for submission without the current LED light adjustments being made. Incorrect ballasts recorded in RAMM indicate an over submission of an estimated 546,518.44 kWh per annum (excluding LED lights which are being adjusted outside of RAMM as discussed in **sections 2.1** & **3.1**). 50 items of load with no light or wattage recorded. 206 items of load with an invalid light description.	Weak	High	9	Investigating

Subject	Section	Clause	Non-Compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
ICP Identifier	2.2	11(2)(a) and (aa) of Schedule 15.3	4 ICPs with no database associated to record the ICP against each item of load.	Weak	High	9	Investigating
Location of each items of load	2.3	11(2)(b) of Schedule 15.3	4 ICPs with no database associated. 54 items of load with insufficient details recorded to locate these.	Weak	High	9	Investigating
Description and capacity of load	2.4	11(2)(c) and (d) of Schedule 15.3	4 ICPs with no database associated. 50 items of load with no light or wattage recorded. 206 items of load with an invalid light description.	Weak	High	9	Investigating
All load recorded in database	2.5	11(2A) and (d) of Schedule 15.3	4 ICPs with no database. Not all load recorded in the database (46 additional lights found or 4.7% of the total load recorded in RAMM).	Weak	High	9	Investigating
Tracking of load change	2.6	11(3) of Schedule 11.3	4 ICPs with no database associated. New streetlights not captured in RAMM when they are electrically connected. Festive lighting not recorded in RAMM but is being reconciled.	Weak	High	9	Investigating
Audit trail	2.7	11(4) of Schedule 15.3	4 ICPs with no database and therefore no audit trail.	Moderate	High	6	Investigating

Subject	Section	Clause	Non-Compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
Database accuracy	3.1	15.2 and 15.37B(b)	4 ICPs with no DUML database. The database accuracy is assessed to be 99.6% indicating an estimated over submission of 213,200 kWh per annum. Incorrect ballasts recorded in RAMM indicate over submission of an estimated 546,518.44 kWh per annum (excluding LED lights which are being adjusted outside of RAMM as discussed in **sections 2.1** & **3.2**). 50 items of load with no light or wattage recorded. 206 items of load with an invalid light description.	Weak	High	9	Investigating

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)	4 ICPs with DUML reconciled without a database. Incorrect profile of RPS HHR applied to 46 ICPs Over submission because of dimming being used. The impact on submission is unknown. The wattage report is adjusted outside of RAMM specifically in relation to the LED light values this is resulting in an estimated under submission of 1,169,418.59 kWh if the wattages in RAMM are correct. The database accuracy is assessed to be 99.6% indicating an estimated over submission of 213,200 kWh per annum if the database was used for submission without the current LED light adjustments being made. Incorrect ballasts recorded in RAMM indicate an over submission of an estimated 546,518.44 kWh per annum (excluding LED lights which are being adjusted outside of RAMM as discussed in **sections 2.1** & **3.1**). 50 items of load with no light or wattage recorded. 206 items of load with an invalid light description.	Weak	High	9	Investigating
Future Risk Rating						78	

Future risk rating	1-3	4-6	7-8	9-17	18-26	27+
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.

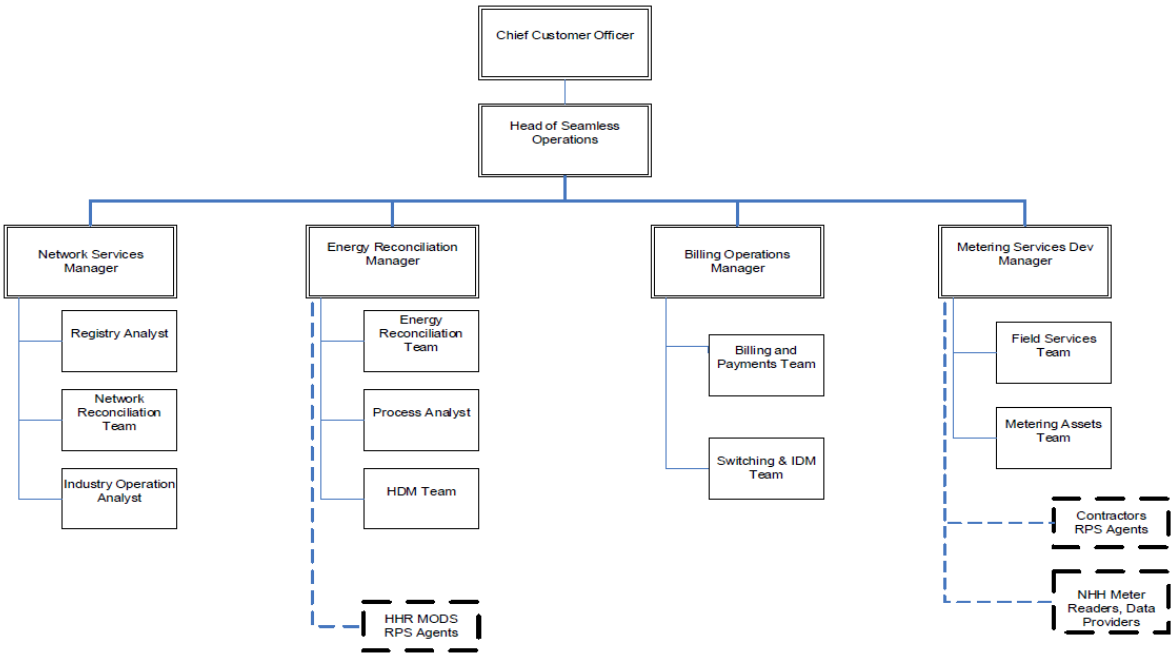
Audit commentary

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:

Rebecca Elliot

Veritek Limited

Electricity Authority Approved Auditor

Other personnel assisting in this audit were:

Name	Title	Company
Allie Jones	HDM Team Analyst	Contact Energy
Bernie Cross	Energy Reconciliation Manager	Contact Energy
Jess Low	Account Manager	Contact Energy
David Dick	Team Leader Street Lights	Auckland Transport
Amali De Alwis	Not provided	Auckland Transport
Derek McGoldrick	Data & Reporting Analyst |Asset Management - Systems	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 as yet, but Auckland Transport has met with Ron Beattie 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 54 ICPs associated with the Auckland Transport DUML load. There was no data in the database extract for eight of these. These are discussed in **section 2.5** below. In summary:

- Four ICPs appear to have been excluded from the database extract due to human error as I confirmed that Contact is submitting the volumes for these (highlighted in blue below).
- The remaining four ICPs (highlighted in orange below) are the same ICPs that have always been with Contact Energy, but these is no database that can be located to confirm what distributed unmetered load is associated with them. These are discussed further in the report.

ICP Number	Network	Profile	NSP	Number of items of load	Database wattage (watts)
0000018370WE118	WAIK	HHR	PAK0331	21	2601
0000019359WE3BC	WAIK	HHR	TAK0331	114	13737.7
0000019934WE91D	WAIK	HHR	WIR0331	15	2428
0000041244WE13A	WAIK	RPS HHR	WEL0331	52	5457.5
0000041245WED7F	WAIK	RPS HHR	HEP0331(N)	8	743
0000041246WE1BF	WAIK	RPS HHR	TAK0331	252	29889.6
0000041247WEDFA	WAIK	RPS HHR	OTA0221	199	8622.8
0003281740CNA88	COUP	RPS HHR	BOB1101	3826	291378.1
0900343060LC471	VECT	RPS HHR	TAK0331	6548	747307.1
0905321057LCB09	VECT	RPS HHR	HEP0331	285	55828
0914050273LCECE	VECT	RPS HHR	ROS0221	3236	616854
0915197278LC21F	VECT	RPS HHR	PEN0221	1359	257849.8
0918033403LCA10	VECT	RPS HHR	PEN0331	6007	1182089
0929040953LCE6D	VECT	RPS HHR	PEN1101	3938	650565.5
0954776933LCC4F	VECT	RPS HHR	PAK0331	7114	831651.2
0977883655LCF24	VECT	RPS HHR	MNG0331	4567	582404.8
0984112723LC1A6	VECT	RPS HHR	WIR0331	3192	506887.9
0987075446LC985	VECT	RPS HHR	OTA0221	4766	624854.4
1001138654LC940	VECT	RPS HHR	ROS1101	2518	452862.8
1001282117UNECE	VECT	RPS HHR	ALB1101	5706	878707.1
1001282119UND55	VECT	RPS HHR	ALB0331	8359	1113035
1001282121UN8B9	VECT	RPS HHR	HEN0331	4922	616809.1
1001282123UN83C	VECT	RPS HHR	HEP0331(N)	5786	756867.2
1001282124UN5F6	VECT	RPS HHR	SLV0331	4585	603793.7
1001282125UN9B3	VECT	RPS HHR	WRD0331	618	70549.7
1001282126UN573	VECT	RPS HHR	WEL0331	1482	166568.2
1001282153UND61	VECT	RPS HHR	ALB1101	1443	36271.6
1001282154UN0AB	VECT	RPS HHR	ALB0331	1968	53617.6
1001282155UNCEE	VECT	RPS HHR	HEN0331	2511	64505.2
1001282156UN02E	VECT	RPS HHR	HEP0331(N)	2242	55616.8
1001282163UNA99	VECT	RPS HHR	WRD0331	687	16097.9
1001282164UN753	UNET	RPS HHR	WEL0331	52	1390.5
1001282166LCDC2	VECT	RPS HHR	HEP0331	465	11257.3
1001282171LCAA5	VECT	RPS HHR	MNG0331	975	29177.3
1001282172LC665	VECT	RPS HHR	OTA0221	1008	29490.6
1001282174LC7EA	VECT	RPS HHR	PEN0221	923	23440.4
1001282175LCBAF	VECT	RPS HHR	PEN0331	7101	176259.8
1001282176LC76F	VECT	RPS HHR	PEN1101	1049	28399.4

ICP Number	Network	Profile	NSP	Number of items of load	Database wattage (watts)
1001282177LCB2A	VECT	RPS HHR	ROS0221	5106	143250.8
1001282178LC4F4	VECT	RPS HHR	ROS1101	2531	65616.4
1001282179LC8B1	VECT	RPS HHR	TAK0331	1860	48818.3
1001282180LC6F7	VECT	RPS HHR	WIR0331	1131	28503.6
1001287978LC3D9	VECT	RPS HHR	PAK0331	695	15445.6
1001287979UN588	UNET	RPS HHR	SLV0331	1136	39553.9
1099572697CNB44	COUP	RPS HHR	BOB0331	55	3900.8
1099572698CN49A	COUP	RPS HHR	GLN0332	1175	83077
1001282117UNECE	UNET	RPS HHR	ALB1101	not found in data extract	0
1001282124UN5F6	UNET	RPS HHR	SVL0331	not found in data extract	0
0000018370WE118	WAIK	HHR	HMB0111	not found in data extract	0
0000019359WE3BC	WAIK	RPS HHR	KIR0111	not found in data extract	0
0900262060LC870	VECT	RPS	ROS0221	No known database	16.8 daily kWh on registry
0000100031UN137	UNET	RPS	ALB1101	No known database	316.80 daily kWh on registry
0911282326LC116	VECT	RPS	ROS0221	No known database	11.30 daily kWh on registry
0000100023UNB1F	UNET	RPS	ALB0311	No known database	10.25 daily kWh on registry

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.

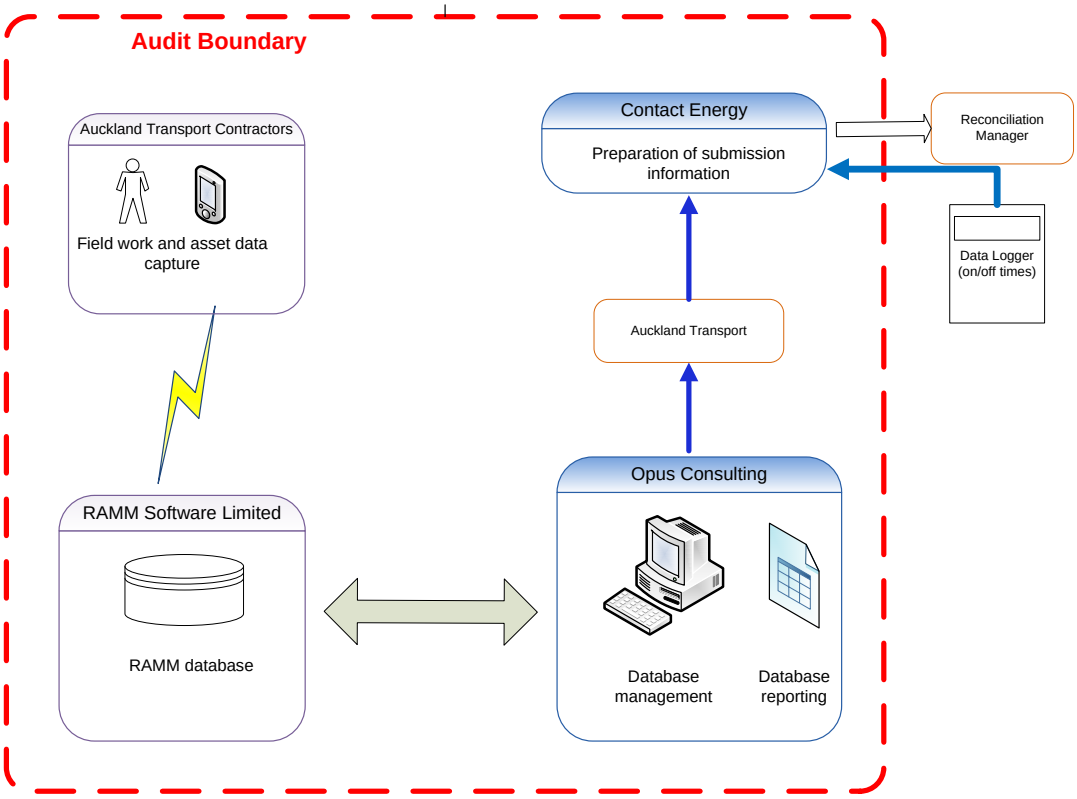
The audit was conducted in accordance with the audit guidelines for DUML audits version 1.1, which became effective on 1 June 2017.

Auckland Transport have switched the remainder of their ICPs to Contact Energy in January this year. The potentially duplicated DUML load recorded on the four ICPs that Contact has had for some time are

still being investigated, and it is hoped that now all of the distributed unmetered load is with Contact that these will be able to be resolved.

The streetlight data is held in a RAMM database and this continues to be managed by Opus Consulting; on behalf of Auckland Transport. As reported last year, in addition to the RAMM database Auckland Transport are recording all the LED lights in the SLV tele-management system. This system is being trialled to record street light energy consumption. 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. 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 977 items of load in April 2018.

1.9. Summary of previous audit

Contact provided a copy of the last audit report undertaken by Rebecca Elliot of Veritek Limited in June 2015 for Auckland Transport. In addition to this another audit report was undertaken May 2017 by Rebecca Elliot of Veritek Limited for Meridian Energy as part of their 2017 reconciliation participant audit. This audit wasn't submitted due to the audit regime change that occurred on 1st June 2017. For completeness I have included the findings from both reports for reference below:

NON-COMPLIANCES

Contact Energy

Subject	Section	Clause	Non-Compliance	Status
Deriving Submission Information	2.1	11(1) of schedule 15.3	DUML load not derived from a database. DUML load is incorrect for one ICP when compared with the Distributors UML load details from the registry.	Still existing Cleared
Database Contents	2.2	11(2) of schedule 15.3	No database being used to derive submission.	Still existing
Tracking of Load Changes	2.3	11(3) of schedule 15.3	No tracking of load changes.	Still existing
Audit Trail	2.4	11(4) of schedule 15.3	No audit trail of changes.	Still existing refer **section 2.7**

Meridian Energy

Subject	Section	Clause	Non-Compliance	Status
Deriving Submission Information	2.1	11(1) of schedule 15.3	Variance between RAMM extract and Meridian's capacities of an estimated 6,276,974 kWh per annum. Estimated under submission of 405,246 kWh per annum of unmetered load recorded incorrectly as metered.	Still existing
ICP Identifier	2.2.1	11(2)(a) of schedule 15.3	23 items of load with no ICP recorded. 1,063 Items of load recorded as metered in the monthly report against unmetered ICPs.	Cleared refer **sections 2.2 & 3.1**
Description of Load Type	2.2.3	11(2)(c) of schedule 15.3	46 items of load with no load type recorded. Database found to have incorrect light descriptions.	Still existing refer **section 2.4 & 3.1**
Capacity of Each item of load	2.2.4	11(2)(d) of schedule 15.3	Incorrect wattages recorded for some LED lights. Some incorrect ballasts recorded.	Still existing refer **section 3.1**
Tracking of Load Changes	2.3	11(3) of schedule 15.3	Database inaccuracies found equating to an estimated 12% error rate.	Still existing refer **section 2.1, 3.1 & 3.2**

RECOMMENDATIONS

Subject	Section	Clause	Description	Status
Deriving submission information	2.1	11(1) of schedule 15.3	Investigate variance between RAMM extract and the Auckland Transport monthly report.	AT has switched during the audit period. Contact are

				already working with AT to resolve these issues
ICP Identifier	2.2.1 refer **section 2.2**	11(2)(a) of schedule 15.3	Liaise with Auckland Transport. Vector and Contact Energy to determine if the load for Contact Energy's 7 remaining Auckland Transport UML ICPs are already recorded by Meridian under another ICP.	Still existing for 4 ICPs - expected to be resolved now Contact is the sole UML retailer
Description of Load Type	2.2.3 refer **section 2.4**	11(2)(c) of schedule 15.3	Review light type, wattage and ballast to against the Electricity Authorities wattage table to correct historic errors.	Still existing
Tracking of Load Changes	2.3 refer **section 2.6**	11(3) of schedule 15.3	Work with Auckland Transport and Vector to ensure lighting in new subdivisions are added in a timely manner.	Still existing
			Work with Auckland Transport and Vector to determine how ex-military roads that will not be vested to Council are recorded.	Cleared - was one road not multiple

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 54 ICPs. Contact Energy have four ICPs, detailed in **section 1.6**, that have always been with them for some time, but no database can be located to confirm what distributed unmetered load is associated with them. These are reconciled using the RPS profile. Contact are continuing to work with Auckland Transport and Vector to resolve these historic ICPs. This is recorded as non-compliance.

The remaining 50 are reconciled half hourly. 46 of the ICPs have the incorrect profile of RPS HHR recorded on the registry. This is recorded as non-compliance in **section 3.2**.

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 April and found differences for almost every ICP as detailed in the table in **section 3.2**. Auckland Transport believe this is due to the incorrect LED wattages recorded in the RAMM which they adjust outside of RAMM. They are addressing the RAMM inaccuracies as discussed in **sections 2.6**. I recorded in the last audit that these were expected to be corrected in RAMM. These differences indicate a potential under submission of 1,169,418.59 kWh per annum if the RAMM is correct.

As discussed in **sections 3.1** and **3.2**, the database and associated processes to derive submission were found to contain some inaccuracies and missing data. This is recorded as non-compliance below.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.1 With: From: 01-Jun-17 To: 30-Apr-18	4 ICPs with DUML reconciled without a database. Over submission because of dimming being used. The impact on submission is unknown. The wattage report is adjusted outside of RAMM specifically in relation to the LED light values this is resulting in an estimated under submission of 1,169,418.59 kWh if the wattages in RAMM are correct. The database accuracy is assessed to be 99.6% indicating an estimated over submission of 213,200 kWh per annum if the database was used for submission without the current LED light adjustments being made. Incorrect ballasts recorded in RAMM indicate an over submission of an estimated 546,518.44 kWh per annum (excluding LED lights which are being adjusted outside of RAMM as discussed in **sections 2.1** & **3.1**). 50 items of load with no light or wattage recorded. 206 items of load with an invalid light description. Potential impact: High Actual impact: Unknown Audit history: Twice Controls: Weak Breach risk rating: 9
Audit risk rating	**Rationale for audit risk rating**
High	The controls are rated as weak due to the inaccuracies and discrepancies found. The audit risk rating is high due to the kWh hours.

Actions taken to resolve the issue	Completion date	Remedial action status

4 ICPs with DUML reconciled without a database Contact will work with AT to identify via field audit whether the lights associated with these ICPs are included in the DUML database against a different ICP number. It is likely that the lights associated with these ICPs are being counted twice as this is what had occurred with 3 other ICPs Contact and AT investigated in 2017.	Aug 2018	Investigating
Over submission because of dimming being used The current regulations around unmetered loads do not cater for the concept of dynamic dimming which results in over submission of energy volumes as a consequence. AT and Contact have committed to working together to find a solution to for this issue either by the creation and approval of a dynamic profile or a rule change to treat the central management system operating these lights as a 'virtual' HHR meter.	Dec 2018	
The wattage report is adjusted outside of RAMM The adjustments made to the wattage report to Contact outside of RAMM appear to be an attempt to adjust the connect load values in recognition that RAMM has a number of inaccurate light types populated that would result in an overstatement of load. AT have committed to conducting a full field audit of the entire light population – the outcome of this full field audit will remove the need for this practice	Oct 2018	
The database accuracy is assessed to be 99.6% AT have committed to conducting a full field audit of the entire light population – the outcome of this full field audit will improve further the database accuracy.	Oct 2018	
Incorrect ballasts recorded in RAMM Contact will work with AT to identify and correct these in conjunction with the full field audit of their entire streetlight population. This two pronged approach is expected improved the population of ballast values in a relatively short period of time.	Oct 2018	
50 items of load with no light or wattage recorded AT have committed to conducting a full field audit of the entire light population – the outcome of this full field audit will improve further the database accuracy.	Oct 2018	
206 items of load with an invalid light description AT have committed to conducting a full field audit of the entire light population – the outcome of this full field audit will improve further the database accuracy	Oct 2018	
Preventative actions taken to ensure no further issues will occur	**Completion date**	

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 four ICPs listed below have no load recorded in the database. Therefore, the ICP is not recorded against each item of load in a database, as is required by this clause. Contact are continuing to work with Auckland Transport and Vector to resolve these historic ICPs. This is recorded as non-compliance.

ICP	Network	Profile	NSP
0900262060LC870	VECT	RPS	ROS0221
0000100031UN137	UNET	RPS	ALB1101
0911282326LC116	VECT	RPS	ROS0221
0000100023UNB1F	UNET	RPS	ALB0311

The RAMM database extract was analysed and found all items of load had an ICP allocated.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.2 With: 11(2)(a) and (aa) of Schedule 15.3 From: Unknown To: 30-Apr-18	4 ICPs with no database associated to record the ICP against each item of load. Potential impact: High Actual impact: High Audit history: Twice Controls: Weak Breach risk rating: 9
Audit risk rating	**Rationale for audit risk rating**
High	The controls are rated as weak as there is no database for four ICPs. The audit risk is rated as high as this equates to 129,629.75 kWh per annum.

Actions taken to resolve the issue	Completion date	Remedial action status
4 ICPs with DUML reconciled without a database Contact will work with AT to identify via field audit whether the lights associated with these ICPs are included in the DUML database against a different ICP number. It is likely that the lights associated with these ICPs are being counted twice as this is what had occurred with 3 other ICPs Contact and AT investigated in 2017.	Aug 2018	Investigating
Preventative actions taken to ensure no further issues will occur	**Completion date**	

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

Code reference

Clause 11(2)(b) of Schedule 15.3

Code related audit information

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

Audit observation

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

Audit commentary

The four ICPs listed detailed in **section 2.2** have no load recorded in the database. Therefore, the location of each item of load is not recorded from a database, as is required by this clause. Contact are continuing to work with Auckland Transport and Vector to resolve these historic ICPs. This is recorded as non-compliance below.

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 all but 74 items of load have GPS co-ordinates recorded. These items of load were examined and found 20 of these had sufficient details to locate them. The remaining 54 items of load had insufficient address detail to locate them. These have been sent to Auckland Transport for correction. This is recorded as non-compliance below.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.3 With: 11(2)(b) of Schedule 15.3 From: Unknown To: 30-Apr-18	4 ICPs with no database associated. 54 items of load with insufficient details recorded to locate these. Potential impact: High Actual impact: High Audit history: Twice Controls: Weak Breach risk rating: 9
Audit risk rating	**Rationale for audit risk rating**
High	The controls are rated as weak as there is no database for four ICPs, but the location was recorded for all but 54 items of load. The audit risk is rated as high as this equates to 129,629.75 kWh per annum.

Actions taken to resolve the issue	Completion date	Remedial action status
4 ICPs with DUML reconciled without a database Contact will work with AT to identify via field audit whether the lights associated with these ICPs are included in the DUML database against a different ICP number. It is likely that the lights associated with these ICPs are being counted twice as this is what had occurred with 3 other ICPs Contact and AT investigated in 2017. ***54 items of load with insufficient location details*** AT have committed to conducting a full field audit of the entire light population – the outcome of this full field audit will improve further the database accuracy	Aug 2018 Oct 2018	Investigating
Preventative actions taken to ensure no further issues will occur	**Completion date**	

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 four ICPs listed detailed in **section 2.2** have no load recorded in the database. Therefore, the description and capacity of each item of load is not recorded from a database, as is required by this clause. Contact are continuing to work with Auckland Transport and Vector to resolve these historic ICPs. This is recorded as non-compliance below.

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

Analysis of the database found 50 items of load with an "Unknown" light type with a wattage of zero recorded. These have been sent to Auckland Transport to correct. This is recorded as non-compliance below.

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

Light Type	Volume
350W Metal Halide	17
45W Metal Halide	1
500W HPS	1
57W Metal Halide	9
60W Metal Halide	37
70W Mercury Vapour	33
Mercury Vapour 70W	108
GRAND TOTAL	**206**

These have been sent to Auckland Transport to correct.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.4 With: 11(2)(c) and (d) of Schedule 15.3 From: 01-Jun-17 To: 30-Apr-18	4 ICPs with no database associated. 50 items of load with no light or wattage recorded. 206 items of load with an invalid light description. Potential impact: Low Actual impact: Low Audit history: Twice Controls: Moderate Breach risk rating:
Audit risk rating	**Rationale for audit risk rating**
Low	The controls are rated as moderate as the majority of the load is recorded in the RAMM database. The audit risk rating is low as the volume of lights represents less than 1% of the overall lights in the database.

Actions taken to resolve the issue	Completion date	Remedial action status
4 ICPs with DUML reconciled without a database Contact will work with AT to identify via field audit whether the lights associated with these ICPs are included in the DUML database against a different ICP number. It is likely that the lights associated with these ICPs are being counted twice as this is what had occurred with 3 other ICPs Contact and AT investigated in 2017. ***50 items of load with no light or wattage recorded*** AT have committed to conducting a full field audit of the entire light population – the outcome of this full field audit will improve further the database accuracy. ***206 items of load with an invalid light description*** AT have committed to conducting a full field audit of the entire light population – the outcome of this full field audit will improve further the database accuracy [Participant comment]	Aug 2018 Oct 2018 Oct 2018]	Investigating
Preventative actions taken to ensure no further issues will occur	**Completion date**	

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

Code reference

Clause 11(2A) of Schedule 15.3

Code related audit information

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

Audit observation

The field audit was undertaken of 977 lights using the statistical sampling methodology.

Audit commentary

The four ICPs listed in **section 2.2** have no load recorded in the database. Therefore, not all load is recorded in a database, as is required by this clause. Contact are continuing to work with Auckland Transport and Vector to resolve these historic ICPs. This is recorded as non-compliance.

The field audit findings of those ICPs recorded in the RAMM database are detailed in the table below:

Street	Database count	Field count	Light count differences	Wattage recorded incorrectly	Comments
Carpark & Path					
HOGARTH RISE WWAY	2	2			
MARA/TAHAPA WWAY (RP80 END)	3	3			
MILLBROOK RD CYWAY	3	3			
PLUMPTON/WAITE WWAY (RP96 RHS)	2	2			
TARATA CRES-MILLER RD	4	4			
Central					
AKAROA ST	3	3			
ALANBROOKE CRES	10	10			
ATARANGI RD	13	13			
CRUMMER RD (WEST)	25	25		2	2x LED recorded as 22W but 29W found in the field
HOROEKA AVE	10	11	1		1x additional 22W LED
JOPARD PL	4	4			
LAVAS PL	4	4			
LOWER MUNICIPAL PL	5	7	2		2x additional 135W LED
MASONS AVE	8	8			
MCCULLOUGH AVE (THREE KINGS)	19	19			
MORELAND RD	3	3			

Street	Database count	Field count	Light count differences	Wattage recorded incorrectly	Comments
MT ALBERT RD (THREE KINGS) (CWC)	102	101	-1	5	1x less 250W HPS 5x incorrect wattage recorded (was HPS now LED)
PLUMER ST	6	6			
PUREWA RD	6	6			
RALEIGH ST	4	4			
ST FRANCIS DE SALES ST	3	3			
STILWELL RD	5	5			
SUMMER ST (PONSONBY)	13	13			
THATCHER ST	8	8			
TRENT RD	1	4	3		3x additional 21W LED lights
WANGANUI AVE	11	11			
WIMBLEDON CRES	9	9			
New					
ASHLEY AVE (LONG BAY)	84	94	10	1	10x additional lights found in the field - 6x 29W LED & 4x 279W LED 1 incorrect wattage recorded (150W HPS but is a 279W LED)
CALDERA DR	19	19			
COOLADAWSON DR	6	6			
HOLLOWOUT ST	6	6			
KAIMANAWA RD	3	3			
MANGATITI ST	5	5			
SHELDUCK WAY	3	3			
SOARING BIRD DR	11	11			

Street	Database count	Field count	Light count differences	Wattage recorded incorrectly	Comments
TE ONEROA WAY (SB)	18	18			
WESTPOINT DRIVE	10	10			
North					
BEN NEVIS PL	5	5			
CEDAR TCE	9	9			
CLAYDEN DR	7	8	1		1x additional 100w HPS
COLONIAL DR	15	30	15		15 x 44W LED additional lights
CRICKLADE TCE	5	5			
EXMOUTH RD	33	33			
HIBISCUS COAST HIGHWAY (178 - 202)	2	2			
KAIPARA LAKE RD	2	2			
KAKA ST (NORTHCOTE)	2	2			
KITCHENER RD (DEVONPORT)	64	67	3		3x additional 150W HPS
KOKIHI LANE	5	5			
STANDISH PL	1	1			
TOIA LANE (PVT)	2	2		2	2x lights recorded as zero- assumed 26.7W LED
WERANUI RD (EAST)	4	4			
WILLIAM BAYES PL	7	8	1		1x additional 150W HPS
South					
ANDREA PL	4	4			
BERNARD ST (PAPATOETOE)	3	3			
CASTLETON DR	11	11			
COLMAR RD	8	8			
COUBRAY PL	2	2			

Street	Database count	Field count	Light count differences	Wattage recorded incorrectly	Comments
DERRETT PL	2	2			
DORENDIA PL	2	2			
HALBERG ST (ARDMORE)	6	6		1	1 incorrect wattage recorded (HPS changed to LED)
HATTAWAY AVE	20	23	3		3 x 21W additional LED lights
JILLTERESA CRES	8	8			
KAIAWA ST	9	9			
LOUGHINISLAND PL	5	5			
MATAI ST	8	8			
NELSON AVE (WAIHEKE)	3	3			
OLIVE CRES	5	5			
PETTIT PL	2	2			
POUTINI PL	5	5			
ROBERTSON/BADER RAB	4	4			
ROSELAWN LANE	1	1			
SETTLEMENT RD (PAPAKURA)	72	73	+2 -1	12	2x additional LED lights and 1 less than plotted 12x incorrect wattages (HPS changed to LED)
SETTLEMENT/DOMINION RAB	1	1			
SULLIVAN AVE	7	7			
TANNERS RD	11	11			
TOWNLEY PL	3	3			
TRUGOOD DR	14	14			
TSAR CRT EXTN	1	1			
WILMA RD	4	4			
State Highway					

Street	Database count	Field count	Light count differences	Wattage recorded incorrectly	Comments
ELLERSLIE INTERCHANGE (WESTBOUND)	7	13	6		6x additional LED
SUNNYNOOK BUSWAY	7	7			
UPPER HARBOUR HIGHWAY - SH18	20	21	+2 -1		1x 67W LED not found & 2x additional 53W LED lights
West					
BRITTANY DR	9	9			
CAPSTAN CRT	1	1			
CIPRIAN PL	2	2			
CRABB FIELDS LANE	12	12			
KOPI PL	4	4			
KUKUPA RD	2	2			
MILLCROFT LANE	4	5	1		1x additional LED
OLD TITIRANGI RD	10	9	-1		1 less 100W HPS
SAN BERNADINO DR	9	9			
SCANLEN TCE	3	3			
TAREMARO PL	6	6			
VERDALE CIRCLE	7	8	1		1x additional 70W HPS
WAIMUMU RD	37	36	-1		1x 100w HPS not found
WEST HARBOUR DR LOOP	1	1			
WEZA LANE (NORTH)	1	1			
Grand Total	**977**	**1022**	**46**	**22**	

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-Jun-17 To: 30-Apr-18	4 ICPs with no database. Not all load recorded in the database (51 additional lights found or 5% of the load sampled). Potential impact: High Actual impact: High Audit history: Twice Controls: Weak Breach risk rating: 9
Audit risk rating	**Rationale for audit risk rating**
High	The controls are rated as weak due to the four ICPs with no database and the volume of additional lights found in the field. The audit risk rating is high as the level of inaccuracy found for this large database has a major impact on reconciliation.

Actions taken to resolve the issue	Completion date	Remedial action status
4 ICPs with DUML reconciled without a database Contact will work with AT to identify via field audit whether the lights associated with these ICPs are included in the DUML database against a different ICP number. It is likely that the lights associated with these ICPs are being counted twice as this is what had occurred with 3 other ICPs Contact and AT investigated in 2017. ***The database accuracy is assessed to be 99.6%*** AT have committed to conducting a full field audit of the entire light population – the outcome of this full field audit will improve further the database accuracy.	Aug 2018 Oct 2018	Investigating
Preventative actions taken to ensure no further issues will occur	**Completion date**	

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

Code reference

Clause 11(3) of Schedule 15.3

Code related audit information

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

Audit observation

The process for tracking of changes in the database was examined.

Audit commentary

Any changes that are made during any given month take effect from the beginning of that month. The information is available which would allow for the total load in kW to be retrospectively derived for any day. On 20th September 2012, the Authority sent a memo to Retailers and auditors advising that tracking of load changes at a daily level was not required as long as the database contained an audit trail. I have interpreted this to mean that the production of a monthly "snapshot" report is sufficient to achieve compliance.

For new connections or upgrades, Auckland Transport contractors use RAMM to directly enter the details in the field. The field contractors are financially incentivised to complete all field work correctly. Auckland Transport staff carry out a random audit of 10% of all fieldwork to confirm that what has been claimed has been completed to the correct standard including the data capture into RAMM. Auckland Transport acknowledge this is not delivering the desired level of accuracy and lighting in new subdivisions are not added to RAMM until they are vested to council which can take some months or years to be completed. This is recorded as non-compliance. These processes are under review. Specifically, Auckland Transport are:

- Reviewing the field contracts and these will be retendered.
- All new lights will be labelled with a code which will be specific and identify the light type and wattage - therefore the correct light type and wattage will be recorded correctly in RAMM.
- Auckland Transport intend to use the SLV systems capability to detect any items of load which have a wattage outside of the light type threshold. These will be flagged as exceptions and investigated.
- Street light designers will be tasked with completing a field check confirming that what was proposed has been installed.
- Auckland Transport intend to request that the Vector and Counties network do not connect any new street light circuits without a check with Auckland Transport to confirm that these items are recorded in the Auckland Transport RAMM database. Auckland Transport then intend to charge the developer for these lights until such time as they are vested to Auckland Transport. The on-charging component will require a change to the consenting process.
- Auckland Transport has been installing LED lights for some time and as discussed in **section 2.4**, the quality of this data is variable. Opus are currently training three auditors to undertake a field audit of all the LED light heads to confirm and record in RAMM the correct model and wattage are recorded.

Outage patrols are regularly carried out by all field contractors across Auckland Transport's area.

Festive lights are connected to the unmetered streetlight circuits. These are being added to the monthly wattage report but are not recorded in the RAMM database. This is recorded as non-compliance.

In the last audit report completed for Meridian, I recorded at there was a military road (Launch Road) which could not be added to RAMM as it hadn't been vested to Auckland Transport. This has been resolved during the audit period and I confirmed that the lights on this road are recorded in RAMM.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.6 With: 11(3) of Schedule 11.3 From: 01-Jun-17 To: 30-Apr-18	4 ICPs with no database associated. New streetlights not captured in RAMM when they are electrically connected. Festive lighting not recorded in RAMM but is being reconciled. Potential impact: High Actual impact: Unknown Audit history: Twice Controls: Moderate Breach risk rating: 6
Audit risk rating	**Rationale for audit risk rating**
High	Controls will mitigate risk most of the time but there is room for errors to occur. I cannot calculate the kWh value for the new subdivisions, but due to Auckland Transports DUML size and the new developments occurring I believe the audit risk rating to be high.

Actions taken to resolve the issue	Completion date	Remedial action status
4 ICPs with DUML reconciled without a database Contact will work with AT to identify via field audit whether the lights associated with these ICPs are included in the DUML database against a different ICP number. It is likely that the lights associated with these ICPs are being counted twice as this is what had occurred with 3 other ICPs Contact and AT investigated in 2017. ***New streetlights not captured in RAMM when they are electrically connected*** Once AT complete their LED roll out, Contact will work with AT around processes for new connection streetlight population and management – it is likely that AT's SLV central controller can ensure these new lights are non operational until vested to the council ***Festive lighting not recorded in RAMM but is being reconciled*** Contact will work with AT regarding what is the best mechanism to ensure festive lights are accounted for within their RAMM database	Aug 2018 2019 Dec 2018	Investigating
Preventative actions taken to ensure no further issues will occur	**Completion date**	

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 four ICPs listed in **section 1.6**, have no load recorded in the database. Therefore, there is no audit trail of changes. This is recorded as non-compliance.

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

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.7 With: 11(4) of Schedule 15.3 From: Unknown To: 30-Apr-18	4 ICPs with no database and therefore no audit trail. Potential impact: High Actual impact: High Audit history: Twice Controls: Moderate Breach risk rating: 6
Audit risk rating	**Rationale for audit risk rating**
High	The controls are rated as weak as there is no database for four ICPs. The audit risk is rated as high as this equates to 129,629.75 kWh per annum.

Actions taken to resolve the issue	Completion date	Remedial action status
4 ICPs with DUML reconciled without a database Contact will work with AT to identify via field audit whether the lights associated with these ICPs are included in the DUML database against a different ICP number. It is likely that the lights associated with these ICPs are being counted twice as this is what had occurred with 3 other ICPs Contact and AT investigated in 2017.	Aug 2018	Choose an item.
Preventative actions taken to ensure no further issues will occur	**Completion date**	

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

Contact has four ICPs that have no DUML database associated with them but are distributed unmetered loads, therefore there is no database available to confirm accuracy. This is recorded as non-compliance below.

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 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 six strata, as follows: 1. Central 2. North 3. South 4. West 5. State Highway 6. New.
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 88 sub-units.
Total items of load	977 items of load were checked.

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

Audit commentary

The database was found to contain some inaccuracies and missing data. The field data was 99.6% of the database data for the sample checked. The total wattage recorded in the database for the sample was 108,837 watts. The estimated total wattage found in the field for the sample checked was 107,898 watts, a difference of 939 watts. This will result in estimated over submission of 213,200 kWh per annum (based on annual burn hours of 4,271 as detailed in the DUML database auditing tool) if the database was used for submission without the LED lighting volumes being adjusted outside of RAMM.

I checked the wattages and ballasts being applied and found 7,038 items of load had a wattage or ballast discrepancy when compared to the standardised wattage table.

This is detailed in the table below:

Light Type	Incorrect ballast	Total lights	Percentage of light type	Ballast difference (W)
70	0	4	25%	52
80	3	3	100%	0
100	1	1	100%	14
125	4	4	100%	44
150	1	3	33%	54
250	1	45	2%	10
100 LED 163w				
163	19	27	70%	-171
1000W Halogen				
1000	14	14	100%	-452
100W HPS				
100	215	6857	3%	62
100W Incandescent				
100	69	71	97%	-966
100W Metal Halide				
100	447	461	97%	-27
110w lamp				
110	12	12	100%	-24
11W Energy Saver				
11	8	33	24%	-73
11W Fluorescent PL				
11	36	36	100%	-396
125w				
125	1	1	100%	-7
125W Mercury Vapour				
125	44	45	98%	33
13W Incandescent				
13	12	12	100%	-98
140W Cosmo				
140	76	571	13%	-321
150 Watt				

Light Type	Incorrect ballast	Total lights	Percentage of light type	Ballast difference (W)
150	2	22	9%	-5
150W Bi Pin Metal Halide				
150	2	53	4%	10
150W Halogen				
150	8	8	100%	-136
150W HPS				
150	692	14421	5%	901
150W HPS GL500				
150	1	3	33%	-2
150W Incandescent				
150	1	1	100%	-18
150W LED				
150	1	23	4%	-18
150W Metal Halide				
150	624	4532	14%	1220
18W Fluorescent				
18	14	15	93%	-129.5
20 LED				
37	1	44	2%	-11
2000W Halogen				
2000	1	1	100%	-38
210W Cosmo				
210	4	100	4%	-26
250 MV lamp				
250	2	2	100%	-16
250W HPS				
250	245	7956	3%	-77095
250W Mercury Vapour				
250	3	55	5%	-414
250W Metal Halide				
250	249	4055	6%	-38478
250W Queen/Quay St M/H				
250	19	21	90%	-20
25W Fluorescent				
25	34	34	100%	-86.8
2x20W Fluorescent				
40	32	63	51%	102
35W Metal Halide				
35	18	187	10%	-7
36W 26mm Fluorescent Tube				
36	2	4	50%	4
40 LED 67w				

Light Type	Incorrect ballast	Total lights	Percentage of light type	Ballast difference (W)
67	3	276	1%	-41
400W Halogen				
400	5	5	100%	-190
400W HPS				
400	8	172	5%	40
400W Mercury Vapour				
400	5	5	100%	-52
400W Metal Halide				
400	36	346	10%	477
45W Cosmo				
45	12	27	44%	-86
500W Halogen				
500	4	4	100%	-212
50W Halogen				
50	8	8	100%	-88
50W HPS				
50	65	638	10%	-147
50W Metal Halide				
50	8	9	89%	0
60 LED 99w				
99	5	8	63%	-70
60W Cosmo				
60	242	463	52%	-1821
60W CPO Lamp PGZ12 Base				
60	1	5	20%	-7
60W Incandescent				
60	6	6	100%	-49
70W Halogen				
70	2	2	100%	-26
70W HPS				
70	482	10562	5%	2067
70W HPS - E type				
70	2081	3306	63%	-12504
70W HPS - I Type				
70	13	601	2%	39
70W HPS E-Type				
70	4	5	80%	-24
70W Metal Halide				
70	112	1549	7%	375
70W MH Bi Pin				
70	1	14	7%	-5
70W OPTIMUM				

Light Type	Incorrect ballast	Total lights	Percentage of light type	Ballast difference (W)
70	2	28	7%	-10
70Watt				
70	2	11	18%	-3
70Whps - E type				
70	34	50	68%	-204
70Whps - I type				
70	2	177	1%	-10
75W Incandescent				
75	2	2	100%	-23
80W HPS				
80	4	4	100%	19
80W MV				
80	1	19	5%	-23
80W MV GL500				
80	1	1	100%	-8
90W Cosmo				
90	8	187	4%	-24
90W SOX				
90	1	1	100%	17
A2 LED 20 (5) 37w				
37	1	223	0%	-15
A2 LED 30 (5) 54w				
54	27	394	7%	-135
Ambar-2 HPS 100W				
100	2	5	40%	28
Ambar-2 HPS 150w				
150	25	25	100%	450
Ambar-2 HPS 70w				
70	7	7	100%	91
Dulux 10W				
10	1	1	100%	-14
Fluorescent to 58w				
58	7	7	100%	-38
Fluorescent up to 58W				
58	20	22	91%	-77
HB SMD LED				
18	12	248	5%	-295
HIT-CE 70w				
70	21	156	13%	95
Incandescent 100w				
100	1	1	100%	-14
ITALO 1 STA1 (5) 28.5w				

Light Type	Incorrect ballast	Total lights	Percentage of light type	Ballast difference (W)
28.5	3	1911	0%	-70
ITALO2 LED STA 122w				
122	14	367	4%	-262
ITALO2 LED STA 37w				
37	3	751	0%	-74
LEDway (20 XIL 3M -L35)				
35	2	1110	0%	-26
LEDway (30 XIL 3M-L35)				
35	8	1319	1%	-92
Metal Halide 100W				
100	15	15	100%	-4
Metal Halide 150W				
150	2	68	3%	-7
Metal Halide 250W				
250	2	117	2%	20
Metal Halide 70W				
70	5	18	28%	11
NAV 150Whps				
150	17	913	2%	-139
NAV 250Whps				
250	14	822	2%	148
NAV 400Whps				
400	1	3	33%	10
NEOJ2018-00 38w				
38	8	8	100%	-2
Queen St 400W Metal Halide				
400	1	3	33%	10
S70				
70	1	109	1%	-26
Sodium Vapour 100w				
100	4	85	5%	-16
Sodium Vapour 150w				
150	46	1035	4%	29
Sodium Vapour 250w				
250	190	207	92%	243
Sodium Vapour 50w				
50	1	42	2%	-2
Sodium Vapour 70w				
70	1	155	1%	6
Sodium Vapour SON 100W				
100	13	318	4%	1
Sodium Vapour SON 150W				

Light Type	Incorrect ballast	Total lights	Percentage of light type	Ballast difference (W)
150	13	938	1%	13
Sodium Vapour SON 250W				
250	11	507	2%	104
Sodium Vapour SON 50W				
50	14	97	14%	-39
Sodium Vapour SON 70W				
70	30	1360	2%	-32
StreetLED (18) 26.7w				
26.7	17	7160	0%	-200
Teceo1 5068 Optic LED 35w				
35	7	167	4%	-114
Teceo2 80 86w				
86	36	376	10%	-850
TerraLED L20 (AP2)				
20	3	2416	0%	-38
TerraLED L21(AP1)				
21	45	6690	1%	-530
TerraLED Mini MX1				
24	1	545	0%	-13
TerraLED Mini WX1				
24	14	8515	0%	-162
Wow Mini BU59 37w				
37	291	467	62%	-3823
XSP1 (3M-L30)				
29	2	2055	0%	-14
	7038	100049	7.0%	
Total kW difference				**-135.0**
Annualised kWh calculation (based on 4,271 burn hours)				**-569,526.49**

The incorrect ballasts indicate an estimated 569,526.5 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. When these are excluded an estimated 546,518.44 kWh over submission per annum remains. The incorrect wattage and ballasts recorded in RAMM are recorded as non-compliance.

As detailed in **section 2.3**, the 50 items of load with zero wattage recorded and the 206 items of load with incomplete or invalid light descriptions are recorded as non-compliance.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 3.1 With: Clause 15.2 and 15.37B(b) From: 01-Jun-17 To: 30-Apr-18	4 ICPs with DUML no database. The database accuracy is assessed to be 99.6% indicating an estimated over submission of 213,200 kWh per annum. Incorrect ballasts recorded in RAMM indicate over submission of an estimated 546,518.44 kWh per annum (excluding LED lights which are being adjusted outside of RAMM as discussed in **sections 2.1** & **3.2**). 50 items of load with no light or wattage recorded. 206 items of load with an invalid light description. Potential impact: High Actual impact: High Audit history: Twice Controls: Weak Breach risk rating: 9
Audit risk rating	**Rationale for audit risk rating**
High	The controls are rated as weak, as the incorrect ballasts have been reported for two years and not yet corrected. 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

4 ICPs with DUML reconciled without a database Contact will work with AT to identify via field audit whether the lights associated with these ICPs are included in the DUML database against a different ICP number. It is likely that the lights associated with these ICPs are being counted twice as this is what had occurred with 3 other ICPs Contact and AT investigated in 2017. ***The database accuracy is assessed to be 99.6%*** AT have committed to conducting a full field audit of the entire light population – the outcome of this full field audit will improve further the database accuracy. ***Incorrect ballasts recorded in RAMM*** Contact will work with AT to identify and correct these in conjunction with the full field audit of their entire streetlight population. This two pronged approach is expected improved the population of ballast values in a relatively short period of time. ***50 items of load with no light or wattage recorded*** AT have committed to conducting a full field audit of the entire light population – the outcome of this full field audit will improve further the database accuracy. ***206 items of load with an invalid light description*** AT have committed to conducting a full field audit of the entire light population – the outcome of this full field audit will improve further the database accuracy	Aug 2018 Oct 2018 Oct 2018 Oct 2018 Oct 2018	Investigating
Preventative actions taken to ensure no further issues will occur	**Completion date**	

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 54 ICPs. Contact Energy have four ICPs, detailed in **section 1.6**, that have been with them for some time, but there is no database that can be located to confirm what distributed unmetered load is associated with them. These are reconciled using the RPS profile. Contact are continuing to work with Auckland Transport and Vector to resolve these historic ICPs. This is recorded as non-compliance.

The remaining 50 are reconciled half hourly. 46 of the ICPs have the incorrect profile of RPS HHR recorded on the registry. This is recorded as non-compliance below.

As reported in the last audit report, in addition to the RAMM database Auckland Transport are also recording all the LED lights in the SLV tele-management system. This system is being trialled to record street light energy consumption. 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. There have been 40 check meters installed to confirm that the load being recorded in SLV is accurate. 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. This is recorded as non-compliance below.

I checked the submission accuracy for the month of April for those ICPs supplied in the database extract and found differences for almost every ICP as detailed in the table below:

ICP Number	Network	Profile	NSP	Number of items of load	April data extract	Light count difference	Database wattage (watts)	Database kW value	AT kW value	kW difference
0000018370WE118	WAIK	HHR	PAK0331	21	21	0	2601	2.601	2.601	0
0000019359WE3BC	WAIK	HHR	TAK0331	114	114	0	13737.7	13.7377	13.67	0.0677
0000019934WE91D	WAIK	HHR	WIR0331	15	14	-1	2428	2.428	2.363	0.065
0000041244WE13A	WAIK	RPS HHR	WEL0331	52	52	0	5457.5	5.4575	5.458	-0.0005
0000041245WED7F	WAIK	RPS HHR	HEP0331(N)	8	8	0	743	0.743	0.743	0
0000041246WE1BF	WAIK	RPS HHR	TAK0331	252	252	0	29889.6	29.8896	29.874	0.0156
0000041247WEDFA	WAIK	RPS HHR	OTA0221	199	199	0	8622.8	8.6228	8.983	-0.3602
0003281740CNA88	COUP	RPS HHR	BOB1101	3826	3830	4	291378.1	291.3781	286.758	4.6201
0900343060LC471	VECT	RPS HHR	TAK0331	6548	6444	-104	747307.1	747.3071	738.683	8.6241
0905321057LCB09	VECT	RPS HHR	HEP0331	285	273	-12	55828	55.828	55.381	0.447
0914050273LCECE	VECT	RPS HHR	ROS0221	3236	3273	37	616854	616.854	615.039	1.815
0915197278LC21F	VECT	RPS HHR	PEN0221	1359	1353	-6	257849.8	257.8498	258.158	-0.308
0918033403LCA10	VECT	RPS HHR	PEN0331	6007	5996	-11	1182089	1182.089	1,179.826	2.2632
0929040953LCE6D	VECT	RPS HHR	PEN1101	3938	3928	-10	650565.5	650.5655	646.099	4.4662
0954776933LCC4F	VECT	RPS HHR	PAK0331	7114	6462	-652	831651.2	831.6512	794.6801	36.9711

ICP Number	Network	Profile	NSP	Number of items of load	April data extract	Light count difference	Database wattage (watts)	Database kW value	AT kW value	kW difference
0977883655LCF24	VECT	RPS HHR	MNG0331	4567	4144	-423	582404.8	582.4048	559.0436	23.3612
0984112723LC1A6	VECT	RPS HHR	WIR0331	3192	3071	-121	506887.9	506.8879	494.9199	11.968
0987075446LC985	VECT	RPS HHR	OTA0221	4766	4753	-13	624854.4	624.8544	624.3855	0.4689
1001138654LC940	VECT	RPS HHR	ROS1101	2518	2471	-47	452862.8	452.8628	450.2048	2.658
1001282117UNECE	VECT	RPS HHR	ALB1101	5706	4855	-851	878707.1	878.7071	817.2082	61.4989
1001282119UND55	VECT	RPS HHR	ALB0331	8359	8047	-312	1113035	1113.035	1071.702	41.3327
1001282121UN8B9	VECT	RPS HHR	HEN0331	4922	4888	-34	616809.1	616.8091	611.3074	5.5017
1001282123UN83C	VECT	RPS HHR	HEP0331(N)	5786	5719	-67	756867.2	756.8672	751.8007	5.0665
1001282124UN5F6	VECT	RPS HHR	SLV0331	4585	4160	-425	603793.7	603.7937	566.2956	37.4981
1001282125UN9B3	VECT	RPS HHR	WRD0331	618	610	-8	70549.7	70.5497	69.202	1.3477
1001282126UN573	VECT	RPS HHR	WEL0331	1482	1476	-6	166568.2	166.5682	164.9021	1.6661
1001282153UND61	VECT	RPS HHR	ALB1101	1443	1800	357	36271.6	36.2716	43.2	-6.9284
1001282154UN0AB	VECT	RPS HHR	ALB0331	1968	2187	219	53617.6	53.6176	52.488	1.1296
1001282155UNCEE	VECT	RPS HHR	HEN0331	2511	2566	55	64505.2	64.5052	61.584	2.9212
1001282156UN02E	VECT	RPS HHR	HEP0331(N)	2242	2319	77	55616.8	55.6168	55.656	-0.0392
1001282163UNA99	VECT	RPS HHR	WRD0331	687	679	-8	16097.9	16.0979	16.296	-0.1981

ICP Number	Network	Profile	NSP	Number of items of load	April data extract	Light count difference	Database wattage (watts)	Database kW value	AT kW value	kW difference
1001282164UN753	UNET	RPS HHR	WEL0331	52	60	8	1390.5	1.3905	1.44	-0.0495
1001282166LCDC2	VECT	RPS HHR	HEP0331	465	477	12	11257.3	11.2573	11.448	-0.1907
1001282171LCAA5	VECT	RPS HHR	MNG0331	975	1427	452	29177.3	29.1773	34.248	-5.0707
1001282172LC665	VECT	RPS HHR	OTA0221	1008	1030	22	29490.6	29.4906	24.72	4.7706
1001282174LC7EA	VECT	RPS HHR	PEN0221	923	930	7	23440.4	23.4404	22.32	1.1204
1001282175LCBAF	VECT	RPS HHR	PEN0331	7101	7110	9	176259.8	176.2598	170.64	5.6198
1001282176LC76F	VECT	RPS HHR	PEN1101	1049	1057	8	28399.4	28.3994	25.368	3.0314
1001282177LCB2A	VECT	RPS HHR	ROS0221	5106	5092	-14	143250.8	143.2508	122.208	21.0428
1001282178LC4F4	VECT	RPS HHR	ROS1101	2531	2579	48	65616.4	65.6164	61.896	3.7204
1001282179LC8B1	VECT	RPS HHR	TAK0331	1860	2019	159	48818.3	48.8183	48.456	0.3623
1001282180LC6F7	VECT	RPS HHR	WIR0331	1131	1126	-5	28503.6	28.5036	29.424	-0.9204
1001287978LC3D9	VECT	RPS HHR	PAK0331	695	1369	674	15445.6	15.4456	32.856	-17.4104
1001287979UN588	UNET	RPS HHR	SLV0331	1136	1324	188	39553.9	39.5539	31.7765	7.7774
1099572697CNB44	COUP	RPS HHR	BOB0331	55	55	0	3900.8	3.9008	3.874	0.0268
1099572698CN49A	COUP	RPS HHR	GLN0332	1175	1184	9	83077	83.077	81.042	2.035
Total kW value										273.8044

Auckland Transport believe this is due to the incorrect LED wattages recorded in the RAMM and they are addressing this as discussed in **section 2.6**. I recorded in the last audit that these were expected to be corrected in RAMM. These differences indicate a potential under submission of 1,169,418.59 kWh per annum if the wattages in RAMM are correct.

As detailed in **sections 3.1,** the DUML database auditing tool provided a result indicating the field data was 99.6% of the database data. This will result in estimated over submission of 213,200 kWh per annum (based on annual burn hours of 4,271 as detailed in the DUML database auditing tool) if the database was used for submission without the adjustments that are being made outside of RAMM to the LED lighting.

As detailed in **sections 3.1,** analysis of the Auckland Transport database identified 7,038 items of load had a wattage or ballast discrepancy when compared to the standardised wattage table. The incorrect capacities will result in an estimated 569,526.5 kWh over submission per annum (based on annual burn hours of 4,271 as is detailed in the DUML database auditing tool).

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 3.2 With: 15.37B(c) From: 01-Apr-18 To: 31-May-18	4 ICPs with DUML reconciled without a database. Incorrect profile of RPS HHR applied to 46 ICPs Over submission because of dimming being used. The impact on submission is unknown. The wattage report is adjusted outside of RAMM specifically in relation to the LED light values this is resulting in an estimated under submission of 1,169,418.59 kWh if the wattages in RAMM are correct. The database accuracy is assessed to be 99.6% indicating an estimated over submission of 213,200 kWh per annum if the database was used for submission without the current LED light adjustments being made. Incorrect ballasts recorded in RAMM indicate an over submission of an estimated 546,518.44 kWh per annum (excluding LED lights which are being adjusted outside of RAMM as discussed in **sections 2.1** & **3.1**). 50 items of load with no light or wattage recorded. 206 items of load with an invalid light description. Potential impact: High Actual impact: Unknown Audit history: None Controls: Weak Breach risk rating:
Audit risk rating	**Rationale for audit risk rating**
High	The controls are rated as weak due to the inaccuracies and discrepancies found. The audit risk rating is high as it has no material impact on submission.

Actions taken to resolve the issue	Completion date	Remedial action status
4 ICPs with DUML reconciled without a database Contact will work with AT to identify via field audit whether the lights associated with these ICPs are included in the DUML database against a different ICP number. It is likely that the lights associated with these ICPs are being counted twice as this is what had occurred with 3 other ICPs Contact and AT investigated in 2017.	Aug 2018	Choose an item.
Incorrect profile The incorrect profile on the registry issue is a result of a system defect – currently a fix is underway to prevent this issue from occurring. A manual work around is currently in place to update the registry where required	July 2018	
Over submission because of dimming being used The current regulations around unmetered loads do not cater for the concept of dynamic dimming which results in over submission of energy volumes as a consequence. AT and Contact have committed to working together to find a solution to for this issue either by the creation and approval of a dynamic profile or a rule change to treat the central management system operating these lights as a 'virtual' HHR meter.	Dec 2018	
The wattage report is adjusted outside of RAMM The adjustments made to the wattage report to Contact outside of RAMM appear to be an attempt to adjust the connect load values in recognition that RAMM has a number of inaccurate light types populated that would result in an overstatement of load. AT have committed to conducting a full field audit of the entire light population – the outcome of this full field audit will remove the need for this practice	Oct 2018	
The database accuracy is assessed to be 99.6% AT have committed to conducting a full field audit of the entire light population – the outcome of this full field audit will improve further the database accuracy.	Oct 2018	
Incorrect ballasts recorded in RAMM Contact will work with AT to identify and correct these in conjunction with the full field audit of their entire streetlight population. This two pronged approach is expected improved the population of ballast values in a relatively short period of time.	Oct 2018	
50 items of load with no light or wattage recorded AT have committed to conducting a full field audit of the entire light population – the outcome of this full field audit will improve further the database accuracy.	Oct 2018	
206 items of load with an invalid light description AT have committed to conducting a full field audit of the entire light population – the outcome of this full field audit will improve further the database accuracy	Oct 2018	

Preventative actions taken to ensure no further issues will occur	Completion date	

CONCLUSION

Auckland Transport have switched the ICPs previously with Meridian Energy to Contact Energy. Therefore, Contact now manage all 54 DUML ICPs. Four of these ICPs have been with Contact for some time and no RAMM database is used to derive submission. The potentially duplicated DUML load recorded on these ICPs are still being investigated and it is hoped that now all of the distributed unmetered load is with Contact that these will be able to be resolved.

The RAMM database is used for to derive submission for the remaining 50 ICPs. As reported the in the last audit, Auckland Transport have recorded all the LED lights in the SLV tele-management system. This system is still being trialled to record the street light energy consumption with 40 check meters installed to confirm its accuracy. 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. These LED lights are 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.

I checked the submission accuracy for the month of April for those ICPs supplied in the database extract and found differences for almost every ICP. Auckland Transport believe this is due to the incorrect LED wattages recorded in the RAMM and they are addressing this as discussed in **section 2.6**. I recorded in the last audit that these were expected to be corrected in RAMM. These differences indicate a potential under submission of 1,169,418.59 kWh per annum if the wattages in RAMM are correct.

Analysis of the database found discrepancies in the data and in the field. These are detailed in the report. Auckland Transport are working to improve the data quality and have a number of initiatives that should assist with addressing this.

This audit found nine non-compliances and no recommendation were made. The future risk rating of 78 indicates that the next audit be completed in three months.

PARTICIPANT RESPONSE

Auckland Transport have made consistent steady progress in improving their DUML database accuracy over the last few years. It is important to note that as part of the super city amalgamation, eight streetlight databases of various formats and stages of accuracy needed to be merged and the respective assets managed.

Auckland Transport distributed unmetered load is a significant share of the New Zealand streetlight load being around 1/3rd of all streetlights. This, combined with AT being the pioneering Council in developing and implement a mass LED light roll out in order to drive a more efficient use of energy, has resulted in significant updates to their DUML database.

When considering all potential under and over submission issues, Contact believes the overall actual market impact to be in the region of 250,000 to 500,00 kWh per annum

Contact and Auckland Transport are committed to further improvements to the accuracy of this streetlight load, both in terms of a full field audit to ensure RAMM is fully up to date and also in terms of delivering a dynamic streetlight dimming solution that will meet the regulatory requirements and also the financial savings this process is designed to deliver Auckland Transport.

Contact hopes that the Authority will recognise the effort required for AT to conduct this full field audit when it considers the next audit date as given the size of this requirement a three month timeframe will not be achievable.