ELECTRICITY INDUSTRY PARTICIPATION CODE
DISTRIBUTED UNMETERED LOAD AUDIT REPORT

VERITEK

For

NEW ZEALAND TRANSPORT AGENCY AND MERIDIAN ENERGY LIMITED

Prepared by: Steve Woods (assisted by Deborah Anderson)

Date audit commenced: 23 April 2018

Date audit report completed: 25 May 2018

Audit report due date: 01-Jun-18

TABLE OF CONTENTS

EXECUTIVE SUMMARY

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

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

The database is managed by Orion, the Distributor for parts of the Canterbury area. The streetlight data is held in Orion's GIS and an SQL database, which interfaces with the GIS.

This audit found four non-compliances and makes no recommendations. The field audit resulted in one lamp that could not be located. Orion is investigating this. Overall, Orion have robust controls and management in place.

The database accuracy is assessed to be 99.52% indicating an estimated over submission of 6,209 kWh per annum.

The future risk rating of seven indicates that the next audit be completed in 18 months. The database is now accurate; therefore I recommend the next audit is conducted in 24 months.

AUDIT SUMMARY

NON-COMPLIANCES

Subject	Section	Clause	Non Compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
Deriving submission information	2.1	11(1) of Schedule 15.3	The database used to prepare submissions contains some inaccurate information. • One less lamp in the field • The database accuracy is assessed to be 99.52% indicating an estimated over submission of 6,209 kWh per annum	Moderate	Low	2	Identified
Description and capacity of load	2.4	11(2)(c) and (d) of Schedule 15.3	One lamp type has incorrect lamp wattage recorded. The expected wattage is 77 and expected under reporting is 34.2 kWh per annum.	Strong	Low	1	Cleared
Database	3.1		The database used to	Moderate	Low	2	Cleared

accuracy			prepare submissions contains some inaccurate information. • One less lamp in the field • The database accuracy is assessed to be 99.52% indicating an estimated over submission of 6,209 kWh per annum				
Volume accuracy	3.2	11(1) of Schedule 15.3	The database accuracy is assessed to be 99.52% indicating an estimated over submission of 6,209 kWh per annum	Moderate	Low	2	
					Future Risk Rating	**7**	

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

ISSUES

Subject	Section	Description	Issue

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.

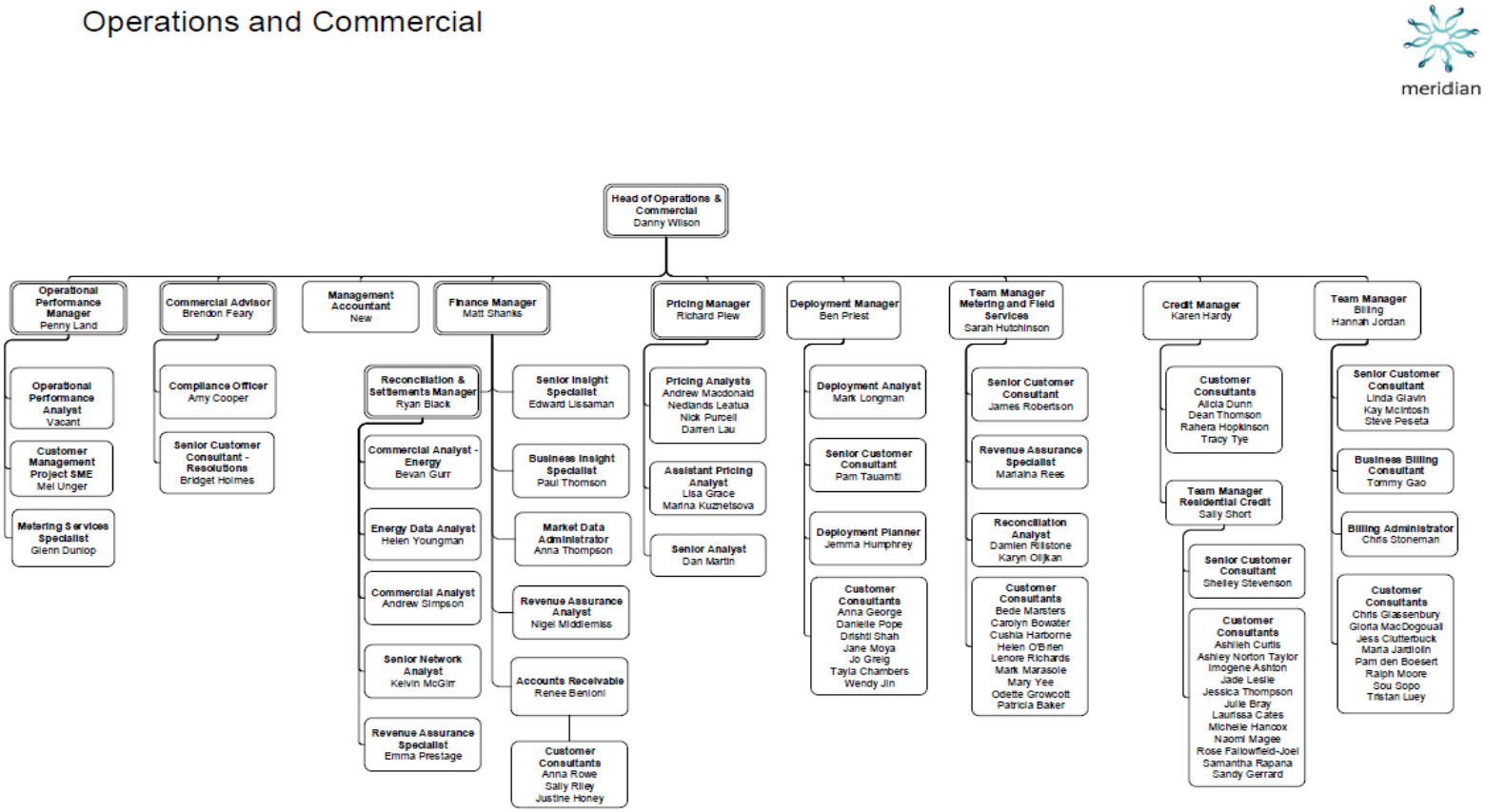
There are no exemptions in place relevant to the scope of this audit.

Audit commentary

Compliance is confirmed.

1.2. Structure of Organisation

Meridian 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
Amy Cooper	Compliance Officer	Meridian Energy
Helen Youngman	Energy Data Analyst	Meridian Energy
Penny Lawrence	Operations Services	Orion

1.4. Hardware and Software

Orion use a purpose-built Oracle system for the management of the DUML information. Backup and restoration procedures are in accordance with normal industry protocols.

1.5. Breaches or Breach Allegations

There are no breach allegations relevant to the scope of this audit.

1.6. ICP Data

ICP Number	Description	Profile	Number of items of load	Database wattage (watts)
0007131645RN4D1	ADD0111 (Decommissioned)	N/A	0	
0006752829RN952	ADD0661 (Decommissioned)	N/A	0	
0007131646RN811	BRY0661	DST	48	12,525
0007131641RN5DB	CLH0111	DST	1	114
0007131642RN91B	HOR0331	DST	22	2,583
0007135577RN62F	HOR0661	DST	32	5,376
0007131647RN454	ISL0331	DST	138	37,121
0007131644RN894	ISL0661	DST	986	238,148
0007152477RN913	KBY0661	DST	32	4,506
0007134887RN290	MLN0661 (Decommissioned)	N/A	0	0

1.7. Authorisation Received

All information was provided directly by Meridian or Orion.

1.8. Scope of Audit

This audit of the Orion DUML database and processes was conducted at the request of Meridian, in accordance with clause 15.37B. The purpose of this audit is to verify that the volume information is being calculated accurately, and that profiles have been correctly applied.

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

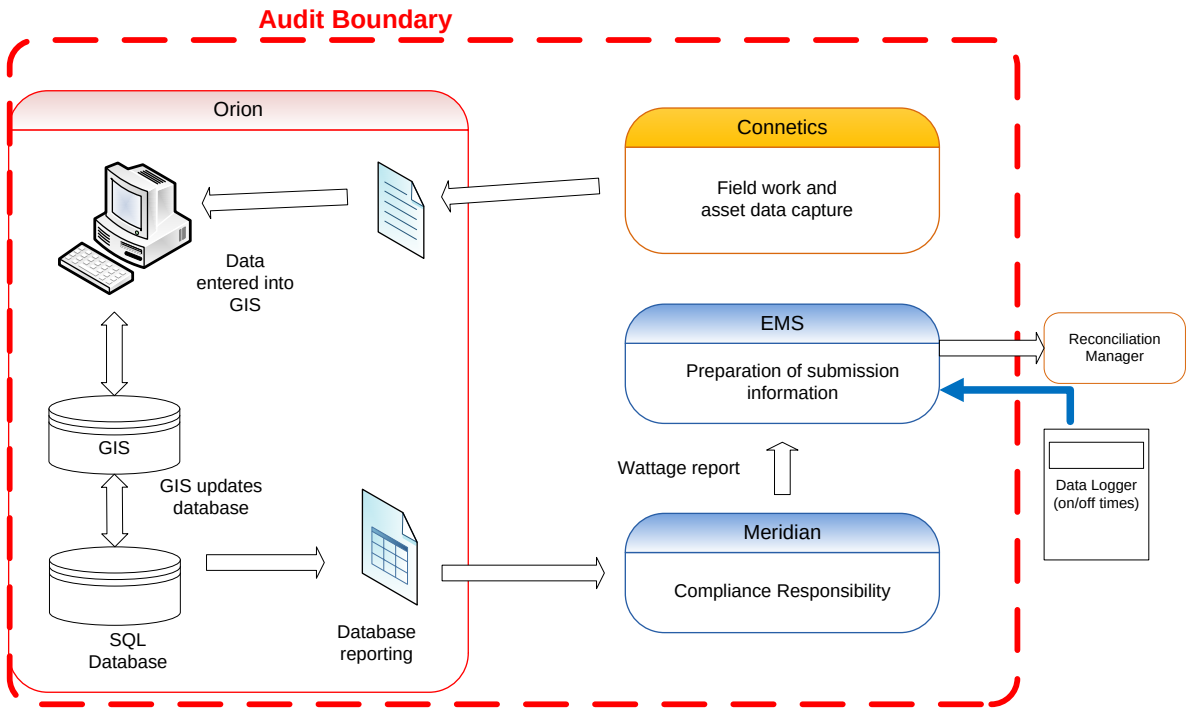
The scope of the audit encompasses the collection, security and accuracy of the data, including the preparation of submission information based on the database reporting.

The NZTA boundary is part of the Orion Network. Orion manages their own database for NZTA. Monthly reporting is supplied to Meridian by Orion.

This audit covers the Orion database. The database is managed by Orion, the Distributor for parts of the Canterbury area. The streetlight data is held in Orion's GIS and an SQL database. There is an interface between the SQL database and GIS. Orion engages Connetics for the fieldwork and asset data capture. They use a RAMM database. Orion has a well-defined process to manage any additions/changes. Once the work is complete, the data is manually entered into the GIS, which then populates the database.

The diagram below shows the audit boundary for clarity.

Orion Database



The field audit was undertaken of a statistical sample of 152 items of load on 26 – 27th April 2018.

1.9. Summary of previous audit

Meridian provided a copy of the last audit report undertaken by Steve Woods of Veritek, completed in May 2017.

There were no non-compliances or recommendations recorded.

Table of Non-Compliance

Subject	Section	Clause	Non-compliance	Indicative Impact	Audit History	Procedures	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 3 months of submission to the reconciliation manager (for new DUML)*
3. *within the timeframe specified by the Authority for DUML that has been audited since 1 June 2017.*

Audit observation

Meridian have requested Veritek to undertake this streetlight audit.

Audit commentary

This audit report confirms that the requirement to conduct an audit has been met for the Orion 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

Meridian reconciles this DUML load using the DST profile. The on and off times are derived from a data logger read by EMS. This information is used to create a shape file. Meridian supplies EMS with the capacity information and EMS calculates the kWh figure for each ICP and includes this in the relevant AV080 file. This process has been audited to confirm its accuracy and compliance. Compliance is confirmed.

I checked the March 2018 extract provided by Orion against the submission totals supplied by Meridian and found that submission matched the database.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.1 With: Clause 11(1) of Schedule 15.3 From: 01-Apr-17 To: 30-Apr-18	The database used to prepare submissions contains some inaccurate information as summarised below: • One less lamp in the field • The database accuracy is assessed to be 99.52% indicating an estimated over submission of 6,209 kWh per annum Potential impact: Low Actual impact: Low Audit history: None Controls: Moderate Breach risk rating: 2
Audit risk rating	**Rationale for audit risk rating**
Low	The controls are rated as moderate, because they are sufficient to ensure that submission information is correctly recorded most of the time but there are still some errors. The impact is assessed to be low, based on the over submission of 6,209 kWh per annum

Actions taken to resolve the issue	Completion date	Remedial action status
All inaccuracies identified in this audit have been corrected in the database.	28/05/2018	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	This matter can be cleared once revisions are conducted
Existing controls are considered adequate to mitigate risk to an acceptable level.	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

All Orion items of load have an ICP recorded against them.

Audit outcome

Compliant

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

Code reference

Clause 11(2)(b) of Schedule 15.3

Code related audit information

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

Audit observation

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

Audit commentary

The Orion database contains fields for the street address and also GPS coordinates. There are 14 records that do not have a Street number but in the majority of cases that is not possible and in all cases there is GPS information.

Audit outcome

Compliant

2.4. Description and capacity of load (Clause 11(2)(c) and (d) of Schedule 15.3)

Code reference

Clause 11(2)(c) and (d) of Schedule 15.3

Code related audit information

The DUML database must contain:

- *a description of load type for each item of load and any assumptions regarding the capacity*
- *the capacity of each item in watts.*

Audit observation

The databases were checked to confirm that they 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

Orion's database contains the manufacturers rated wattage and the ballast wattage. The extract provided has a field for 'Lamp Type' and an additional table was provided which contained more detail for each lamp type – description, amps, wattage (incl ballast) & lamp type category.

The Orion database was found to contain one inaccurate lamp type wattage when matched to the published standardised wattage table. The difference found was one lamp type and wattage difference, affecting four lamps with an overall wattage difference of 8W, which equates to 34.2 kWh per annum.

Lamp Type	Description	Wattage	Lamp Type Category	Orion database	Correct wattage	Lamps affected	wattage difference	total difference
2*30W FF	2*30W FF	75	Fluorescent	2*30W FF	77	4	2	8
						4		8W

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.4 With: Clauses 11(2)(c) and (d) of Schedule 15.3 From: unknown To: 23-Apr-18	One lamp type has the incorrect lamp wattage recorded in the database, affecting four lamps. The expected wattage is 77 and expected under reporting is 34.2 kWh per annum. 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 rated as strong because only 4 of the 1,315 lamps in the database has incorrect wattage information. The impact is low; the expected wattage for the lamp type is 77 not 75.

Actions taken to resolve the issue	**Completion date**	**Remedial action status**
Wattages for this lamp type have been corrected in the database	28/05/2018	Cleared
Preventative actions taken to ensure no further issues will occur	**Completion date**	
The standardised wattage table has been provided to Orion to ensure all lamp types have the correct wattage applied going forward.	28/05/2018	

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 a statistical sample of 152 items of load on 26 - 27th April.

Audit commentary

The field audit findings for the Orion sample are detailed in the table below:

Address	Database Count	Field Count	Count differences	Wattage differences	Comments
Summary 1					
Chaneys Link Rd	13	13	-	-	
Northern Motorway Underpass	4	4	-	-	
Johns Rd/Gardiners Rd Intersection	1	1	-	-	
Johns Rd/Wilkinsons Rd Intersection	4	4	-	-	
Johns Rd (between Harewood Rd and Sawyer	47	47	-	-	
Sawyers Arms Rd	10	10	-	-	
Russley Rd/Harewood Rd Roundabout	3	3	-	-	
Russley Rd by Wairakei Rd	2	2	-	-	
Wairakei Rd	2	2	-	-	
Russley Rd and Memorial Av Underpass	4	4	-	-	
Memorial Av	10	10	-	-	
Summary 2					

SH 73 Paparua Prison	3	3	-	-	
Branston St	1	1	-	-	
Springs Rd	5	5	-	-	
Awatea Rd Bridge	8	8	-	-	
Main North Rd opp	1	1	-	-	
Barrington St Overpass	6	6	-	-	
Rolleston					
Rolleston Dr	3	3	-	-	
Dunsandel					
SH 1	11	11	-	-	
Rakaia					
SH 1/Two Chain Rd	1	0	-1	168	I was unable to locate this lamp
Rakaia Overbridge	13	13	-	-	
Total	**152**	**151**	**-1**	**168W**	

Unable to locate

Relay_Site	SL_Conn_Id	Status	Street	Lamp_Type	East	North
SE14/2	SL025608	In Service	SH 1/Two Chain Rd	150W HPS	1523262.486	5157166.025

My field audit found one less lamp in the field than was recorded in the database, and no lamp wattage differences.

The field data was 99.52% of the database data for the sample checked. The total wattage recorded in the database for the sample was 34,672 watts. The total wattage found in the field for the sample checked was 34,504 watts, a difference of 168 watts. This will result in estimated over submission of 717.5 kWh per annum (based on annual burn hours of 4,271 as detailed in the DUML database auditing tool).

These differences are recorded as non-compliance in **section 3.1**. I did not identify any load missing from the database.

Audit outcome

Compliant

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

For Orion - the processes were reviewed for new lamp connections and the tracking of load changes due to faults and maintenance. Connetics is the maintenance contractor for CCC region. Outage patrols are conducted on a regular basis. Lamp outages are also notified to CCC by residents and work requests are made to Connetics personnel.

New connections require a proposed plan to be provided and an "as built" plan once the development is complete. The Council has an acceptance process for new subdivisions. Once installed, the receipt of this information is passed to Orion, for the entire project, and processed within the month that it is received. Orion update the status as at the day of livening.

On September 20th 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.

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

Orion demonstrated 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. The table below shows the survey plan.

Plan Item	Comments
Area of interest	New Zealand Transport Authorities Street Lights
Strata	The database contains 1385 items of load in NZTA's area. The processes for the management of all NZTA items of load is the same. The database can be treated as two strata for all lights. • State Highways • Motorways
Area units	I created a pivot table of the roads in the database and used a random number generator to select a total of 21 subunits.
Total items of load	152 items of load were checked. • State Highways 16 subunits • Motorways 5 subunits

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

Audit commentary

The field audit found one less lamp in the field than was recorded in the database.

The field data was 99.52% of the database data for the sample checked. This will result in estimated over submission of 6,209 kWh per annum (based on annual burn hours of 4,271 as detailed in the DUML database auditing tool).

The Orion database was found to contain one inaccurate lamp type and wattage difference when matched to the published standardised wattage table, this is recorded as a non-compliance in **section 2.4**.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 3.1 With: Clause 15.2 and 15.37B(b) From: 01-Apr-17 To: 30-Apr-18	The database used to prepare submissions contains some inaccurate information. • One less lamp in the field • The database accuracy is assessed to be 99.52% indicating an estimated over submission of 6,209 kWh per annum Potential impact: Low Actual impact: Low Audit history: None Controls: Moderate Breach risk rating: 2
Audit risk rating	**Rationale for audit risk rating**
Low	The controls are rated as moderate, because they are sufficient to ensure that changes to the database are correctly recorded most of the time, but there are still some errors. The impact is assessed to be low, based on the 6,209 kWh differences described above.

Actions taken to resolve the issue	Completion date	Remedial action status
All inaccuracies identified in this audit have been corrected in the database.	28/05/2018	Cleared
Preventative actions taken to ensure no further issues will occur	**Completion date**	
Existing controls are considered adequate to mitigate risk to an acceptable level.	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

Meridian reconciles this DUML load using the DST profile.

The registry shows DST profile for the Orion NZTA ICPs.

Submissions are based on the database information, with on and off times derived from data logger information.

I recalculated the submissions for March 2018 for Orion I confirmed that the calculation method was correct. The database accuracy was 99.52%, indicating over submission of 6,209 kWh per annum.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.1 With: Clause 11(1) of Schedule 15.3 From: 01-Apr-17 To: 30-Apr-18	The database accuracy is assessed to be 99.52% indicating an estimated over submission of 6,209 kWh per annum Potential impact: Medium Actual impact: Low Audit history: None Controls: Moderate Breach risk rating: 2
Audit risk rating	**Rationale for audit risk rating**
Low	The controls are rated as moderate, because they are sufficient to ensure that lamp information is correctly recorded most of the time but there are still some errors. The impact is assessed to be low, based on the kWh differences described above.

Actions taken to resolve the issue	Completion date	Remedial action status
All inaccuracies identified in this audit have been corrected in the database.	28/05/2018	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	This matter can be cleared once revisions are conducted
Existing controls are considered adequate to mitigate risk to an acceptable level.	Ongoing	

CONCLUSION

Orion use a purpose-built Oracle system for the management of the DUML information

The database is managed by Orion; the Distributor for parts of the Canterbury area. The streetlight data is held in Orion's GIS and an SQL database, which interfaces with the GIS.

The database is managed by Orion, the Distributor for parts of the Canterbury area. The streetlight data is held in Orion's GIS and an SQL database, which interfaces with the GIS.

This audit found four non-compliances and makes no recommendations. The field audit resulted in one lamp that could not be located. Orion is investigating this. Overall, Orion have robust controls and management in place.

The database accuracy is assessed to be 99.52% indicating an estimated over submission of 6,209 kWh per annum.

The future risk rating of seven indicates that the next audit be completed in 18 months. The database is now accurate, therefore I recommend the next audit is conducted in 24 months.

PARTICIPANT RESPONSE