ELECTRICITY INDUSTRY PARTICIPATION CODE
DISTRIBUTED UNMETERED LOAD AUDIT REPORT

VERITEK

For

WAITOMO DISTRICT COUNCIL AND MERIDIAN ENERGY LIMITED

Prepared by: Tara Gannon

Date audit commenced: 6 January 2020

Date audit report completed: 21 January 2020

Audit report due date: 1 February 2020

TABLE OF CONTENTS

Executive summary 3
Audit summary 5

Non-compliances 5
Recommendations 7
Issues 7

1. Administrative 8

1.1. Exemptions from Obligations to Comply with Code 8
1.2. Structure of Organisation 9
1.3. Persons involved in this audit 10
1.4. Hardware and Software 10
1.5. Breaches or Breach Allegations 10
1.6. ICP Data 11
1.7. Authorisation Received 11
1.8. Scope of Audit 12
1.9. Summary of previous audit 13
1.10. Distributed unmetered load audits (Clause 16A.26 and 17.295F) 13

2. DUML database requirements 14

2.1. Deriving submission information (Clause 11(1) of Schedule 15.3) 14
2.2. ICP identifier and items of load (Clause 11(2)(a) and (aa) of Schedule 15.3) 17
2.3. Location of each item of load (Clause 11(2)(b) of Schedule 15.3) 19
2.4. Description and capacity of load (Clause 11(2)(c) and (d) of Schedule 15.3) 19
2.5. All load recorded in database (Clause 11(2A) of Schedule 15.3) 20
2.6. Tracking of load changes (Clause 11(3) of Schedule 15.3) 21
2.7. Audit trail (Clause 11(4) of Schedule 15.3) 22

3. Accuracy of DUML database 23

3.1. Database accuracy (Clause 15.2 and 15.37B(b)) 23
3.2. Volume information accuracy (Clause 15.2 and 15.37B(c)) 28

Conclusion 32

Participant response 34

EXECUTIVE SUMMARY

This audit of the **Waitomo District Council (WDC)** 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. The scope of the audit encompasses the collection, security and accuracy of the data, including the preparation of submission information.

WDC DUML ICPs 0008807413WMA59 and 0001060300WMD10 switched to Meridian on 01/04/19.

A RAMM database is managed by **Alf Downs Streetlighting Limited (Alf Downs)** on behalf of WDC. The database is remotely hosted by RAMM Software Ltd. The field work, asset data capture and database population is conducted by Alf Downs. Alf Downs staff update the database from the field using Pocket RAMM.

NZTA's urban lights in the WDC region are recorded in the database without an ICP number recorded. This NZTA urban load is not submitted for reconciliation or billed to WDC by Meridian. Trustpower supplies the NZTA rural lights under ICP 0008806768WM373, and investigation is required to determine whether WDC and Meridian are responsible for the urban load. Broadspectrum have recently taken responsibility for maintaining the NZTA urban lights, and changes are not communicated to Alf Downs so they can be updated in the database.

Database accuracy is described as follows:

Result	Percentage	Comments
The point estimate of R	101.3	Wattage from survey is higher than the database wattage by 1.3%
R_L	96.6	With a 95% level of confidence it can be concluded that the error could be between -3.4% and +8.8%
R_H	108.8	

The variability of the sample results across the strata means that the true wattage (installed in the field) could be between 3.4% lower and 8.8% higher than the wattage recorded in the DUML database.

These results were categorised in accordance with the "Distributed Unmetered Load Statistical Sampling Audit Guideline", effective from 01/02/19. The best available estimate is not precise enough to conclude that the database is accurate within ±5.0%. Most wattage differences were very small at street level and were less than 55W. The variability of the sample results was impacted by larger wattage differences for Moa St SH3 (414W) and Kaka St (112W). Because these streets were within smaller stratums (NZTA and other) the differences significantly affected the precision findings in relation to R_H. The point of estimate of R is within the accuracy threshold.

- In absolute terms the installed capacity is estimated to be 1 kW higher than the database indicates.
- There is a 95% level of confidence that the installed capacity is between 2 kW lower and 6 kW higher than the database.
- In absolute terms, total annual consumption is estimated to be 3,800 kWh higher than the DUML database indicates.
- There is a 95% level of confidence that the annual consumption is between 9,700 kWh p.a. lower and 25,100 kWh p.a. higher than the database indicates.

Meridian reconciles this DUML load using the DST profile. Wattages are derived from a RAMM extract provided by Alf Downs each month. On and off times are derived from a data logger read by EMS and are used to create a shape file. Meridian supplies EMS with the capacity information from Alf Downs, and EMS calculates the kWh figures for each ICP and includes them in the relevant AV080 file. This process was audited during Meridian's reconciliation participant audit and EMS' agent audit.

On 18 June 2019, the Electricity Authority issued a memo clarifying the memo of 2012 that stated that a monthly snapshot was sufficient to calculate submission from, and confirmed the code requirement to calculate the correct monthly load must:

- take into account when each item of load was physically installed or removed; and
- wash up volumes must take into account where historical corrections have been made to the DUML load and volumes.

The current monthly report is provided as a snapshot and is non-compliant, and Meridian completes revision submissions where corrections are required. Meridian has not yet updated their processes to be consistent with the Authority's memo.

The future risk rating of 24 indicates that the next audit be completed in three months. This may not be sufficient time to resolve the matters raised and I recommend the Authority considers an audit period of at least nine months, because the point of estimate R was within the prescribed accuracy threshold. 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	The database is not confirmed as accurate with a 95% level of confidence as recorded in **section 3.1**. Potential under submission of 0 to 129,024.8 kWh per annum (including festive lights) for NZTA urban lights depending on whether WDC and Meridian are responsible for this load. Under submission of 1,553 kWh p.a. for private lights. Over submission of 2,398W (estimated 6,827 kWh) for festive lights during the eight months Meridian has supplied 0008807413WMA59 and the lights were disconnected. The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot. Livening dates are not recorded for new connections, and lamp installation dates are replaced where lights change.	Weak	Medium	6	Identified
ICP identifier and items of load	2.2	11(2)(a) and (aa) of Schedule 15.3	ICP numbers are not recorded in the database for 201 NZTA urban lights and ten private lights.	Weak	Medium	6	Identified
Database accuracy	3.1	15.2 and 15.37B(b)	The database is not confirmed as accurate with a 95% level of confidence as recorded in **section 3.1**. Potential under submission of 0 to 129,024.8 kWh per annum (including festive lights) for NZTA urban lights depending on whether WDC and Meridian are responsible for this load. Broadspectrum have recently taken responsibility for maintaining the NZTA urban lights, and changes are not communicated to Alf Downs so they can be updated in the database. Under submission of 1,553 kWh p.a. for private lights.	Weak	Medium	6	Identified

Subject	Section	Clause	Non-Compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
			Over submission of 2,398W (estimated 6,827 kWh) for festive lights during the eight months Meridian has supplied 0008807413WMA59 and the lights were disconnected. The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot. Livening dates are not recorded for new connections, and lamp installation dates are replaced where lights change.				
Volume information accuracy	3.2	15.2 and 15.37B(c)	The database is not confirmed as accurate with a 95% level of confidence as recorded in **section 3.1**. Potential under submission of 0 to 129,024.8 kWh per annum (including festive lights) for NZTA urban lights depending on whether WDC and Meridian are responsible for this load. Under submission of 1,553 kWh p.a. for private lights. Over submission of 2,398W (estimated 6,827 kWh) for festive lights during the eight months Meridian has supplied 0008807413WMA59 and the lights were disconnected. The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot. Livening dates are not recorded for new connections, and lamp installation dates are replaced where lights change.	Weak	Medium	6	Identified
Future Risk Rating						24	

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

RECOMMENDATIONS

Subject	Section	Recommendation
Database accuracy	3.1	If NZTA urban lights are confirmed to be connected to a WDC ICP and be Meridian's responsibility, establish a change management process to ensure that additions, removals, and modifications to NZTA urban lights are correctly recorded in the database.

ISSUES

Subject	Section	Description	Issue
		Nil	

1. ADMINISTRATIVE

1.1. Exemptions from Obligations to Comply with Code

Code reference

Section 11 of Electricity Industry Act 2010.

Code related audit information

Section 11 of the Electricity Industry Act provides for the Electricity Authority to exempt any participant from compliance with all or any of the clauses.

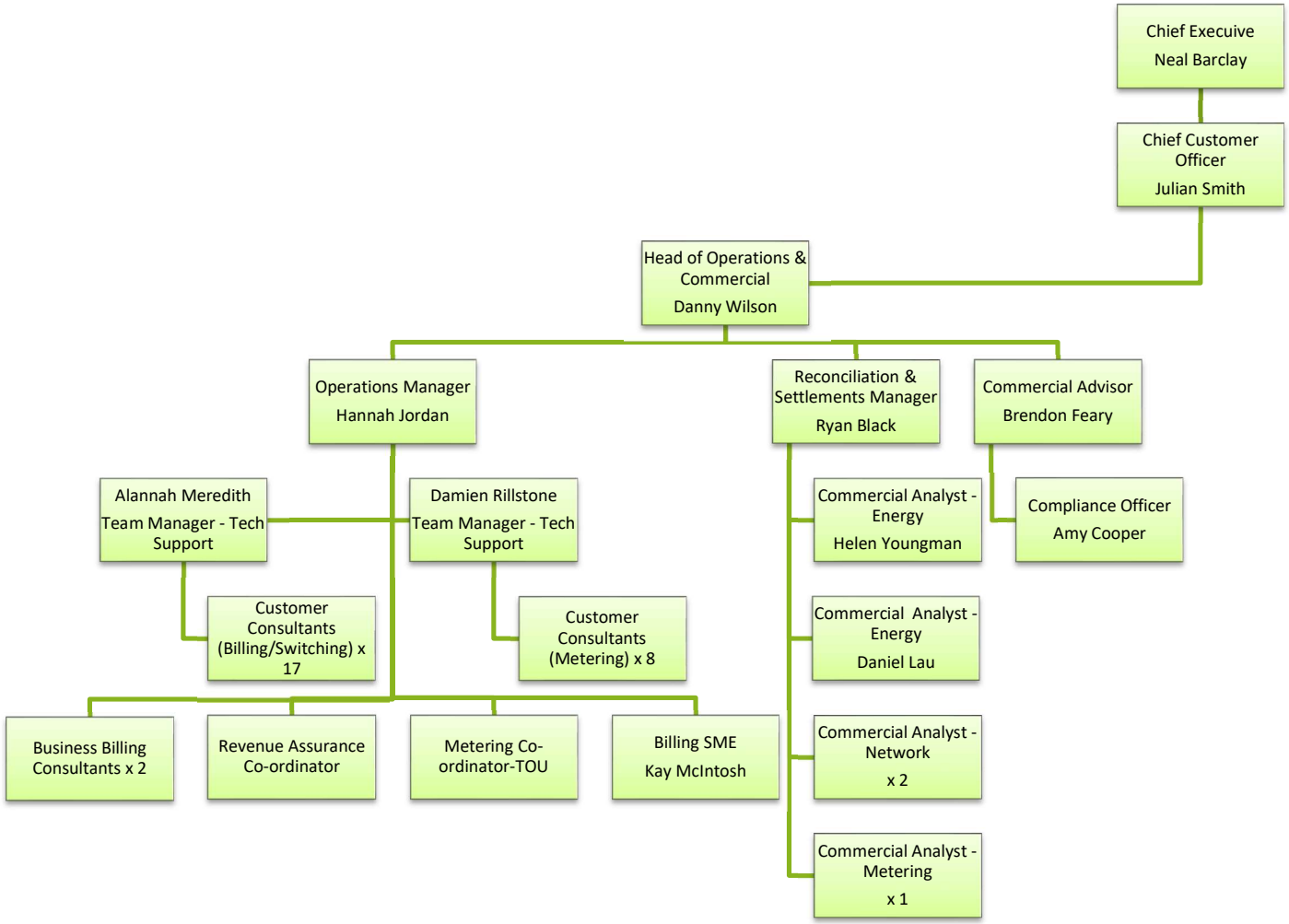
Audit observation

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

Audit commentary

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

1.2. Structure of Organisation



1.3. Persons involved in this audit

Auditor:

Tara Gannon

Veritek Limited

Electricity Authority Approved Auditor

Other personnel assisting in this audit were:

Name	Title	Company
Joanna Towler	Manager - Local Roads	Waitomo District Council
Philip Harris	Street Lighting Contract Administration	The Downs Group
Dr. Miftah Al Karim	Manager, Asset Information	The Lines Company
Lynne Sutton	Key Account Manager - Auckland	Meridian Energy Limited
Amy Cooper	Compliance Officer	Meridian Energy Limited

1.4. Hardware and Software

The SQL database used for the management of DUML is remotely hosted by RAMM Software Ltd. The database is commonly known as "RAMM" which stands for "Roading Asset and Maintenance Management". The specific module used for DUML is called RAMM Contractor.

RAMM Software Limited backs up the database and assists with disaster recovery as part of their hosting service. Nightly backups are performed. As a minimum, daily backups are retained for the previous five working days, weekly backups are retained for the previous four weeks, and monthly backups are retained for the previous six months.

Access to the database 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

ICP Number	Description	NSP	Profile	Number of items of load	Database wattage (watts)
0001060300WMD10	SKATE PARK STREETLIGHT	HTI0331	DST	13	3,216
0008807413WMA59	Waitomo District Council	HTI0331	DST	824	32,874.5
NZTA Urban				201	30,209.5
Private				10	363.5
Total				1,048	66,663.5

NZTA lights

According to the previous audit, the NZTA rural lights are connected to ICP 0008806768WM373 which is supplied by Trustpower and excluded from the scope of the audit. These have been correctly excluded from the database extracts provided to Meridian.

I have been unable to confirm the correct ICP number for the NZTA urban lights. These are included in the database extracts provided to Meridian, but they are excluded from their submission information and are not billed to WDC.

Meridian intends to investigate to determine the correct ICP for the NZTA urban lights and confirm who is responsible for submission of the unmetered load.

Private lights

The Lines Company (TLC) has been working with Waitomo District Council to determine the ownership of all known private streetlights. TLC contacted each of the affected owners, to arrange for standard unmetered load to be created. Most of the owners have responded that they believe the Waitomo District Council should be responsible for the street lighting. WDC accepts responsibility for one light on Ruaparaha St and is investigating taking responsibility for the lights at Kaka St, but believes the other light is genuinely privately owned. TLC is awaiting further information from the Waitomo District Council, before resolving the issues.

1.7. Authorisation Received

All information was provided directly by Meridian, WDC, TLC or Alf Downs.

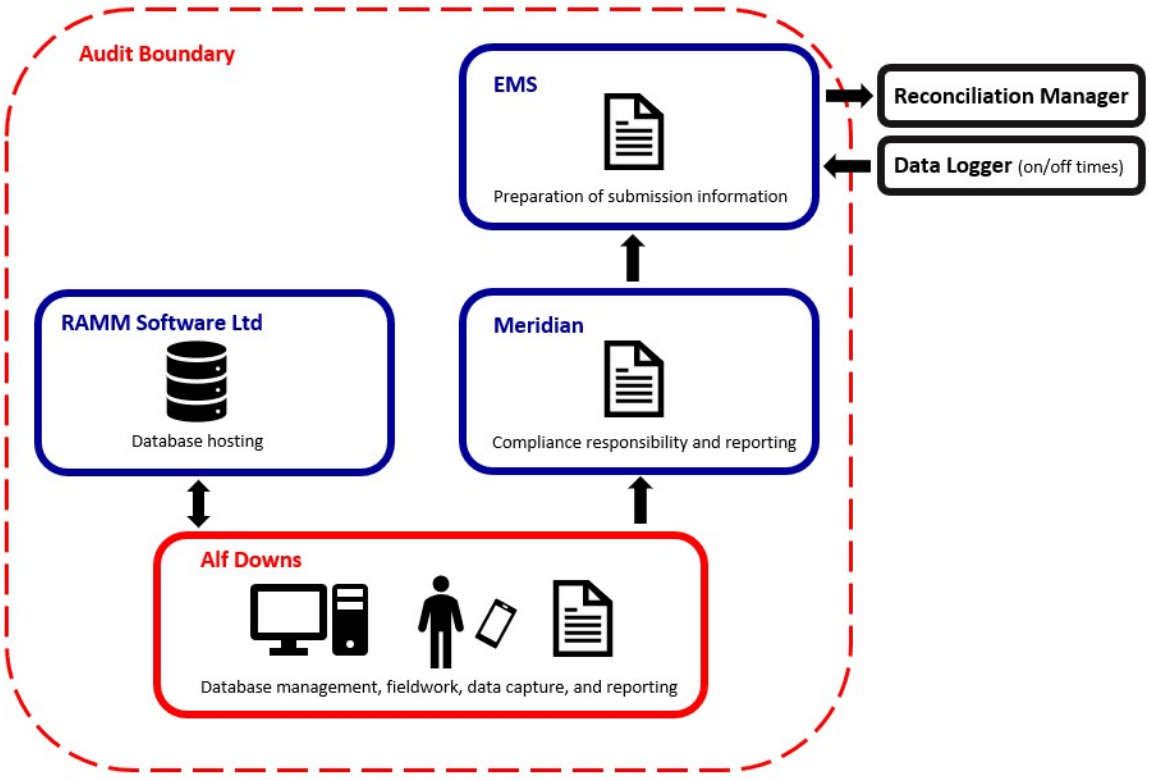
1.8. Scope of Audit

This audit of the WDC 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.

A RAMM database is managed by Alf Downs on behalf of WDC and they provide the monthly reporting to Meridian. The database is remotely hosted by RAMM Software Ltd. The field work, asset data capture and database population is conducted by Alf Downs. Broadspectrum have recently taken responsibility for maintaining the NZTA urban lights, and changes are not communicated to Alf Downs so they can be updated in the database. Meridian is conducting an investigation to determine whether these lights are WDC and Meridian's responsibility.

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 167 items of load on 13 January 2020.

1.9. Summary of previous audit

The previous audit of this database was undertaken by Steve Woods of Veritek Limited in July 2017. The summary table below shows the statuses of the non-compliances raised in the previous audit. Further comment is made in the relevant sections of this report.

Subject	Section	Clause	Non-compliance	Status
ICP identifier	2.2.1	11(2)(a) of schedule 15.3	ICP identifiers not in database for NZTA lights	Still existing
Database accuracy	2.4	11(1) of schedule 15.3	Database not 100% accurate	Still existing

1.10. Distributed unmetered load audits (Clause 16A.26 and 17.295F)

Code reference

Clause 16A.26 and 17.295F

Code related audit information

Retailers must ensure that DUML database audits are completed:

1. *by 1 June 2018 (for DUML that existed prior to 1 June 2017)*
2. *within three months of submission to the reconciliation manager (for new DUML)*
3. *within the timeframe specified by the Authority for DUML that has been audited since 1 June 2017.*

Audit observation

Meridian have requested Veritek to undertake this streetlight audit.

Audit commentary

This audit report confirms that the requirement to conduct an audit has been met for this database within the required timeframe.

Audit outcome

Compliant

2. DUML DATABASE REQUIREMENTS

2.1. Deriving submission information (Clause 11(1) of Schedule 15.3)

Code reference

Clause 11(1) of Schedule 15.3

Code related audit information

The retailer must ensure the:

- *DUML database is up to date*
- *methodology for deriving submission information complies with Schedule 15.5.*

Audit observation

The process for calculation of consumption was examined and the application of profiles was checked. The database was checked for accuracy.

Audit commentary

WDC DUML ICPs 0008807413WMA59 and 0001060300WMD10 switched to Meridian on 01/04/19.

Wattages are derived from a RAMM extract provided by Alf Downs each month. The field survey found that the best available estimate of field wattage is not precise enough to conclude that the database is accurate within ±5.0% as recorded in **section 3.1**. Most wattage differences were very small at street level and were less than 55W. The variability of the sample results was impacted by larger wattage differences for Moa St SH3 (414W) and Kaka St (112W). Because these streets were within smaller stratums (NZTA and other) the differences significantly affected the precision findings in relation to R_H.

Meridian reconciles this DUML load using the DST profile, and on and off times are derived from a data logger read by EMS and are used to create a shape file. Meridian supplies EMS with the capacity information from Alf Downs, and EMS calculates the kWh figures for the ICPs and includes them in the relevant AV080 file. This process was audited during Meridian's reconciliation participant audit and EMS' agent audit.

I compared the RAMM extract provided by Alf Downs for 0001060300WMD10 and 0008807413WMA59 to the capacities provided to EMS for November 2019 and found that they matched exactly, except for the festive lights connected to 0008807413WMA59.

Festive lights are recorded against the ICP for the pole that they are attached to, either 0008807413WMA59 or NZTA urban. The festive light wattage must be deducted from the total wattage for the ICP when they are not connected, rather than being added to the total wattage when they are connected. To date, Meridian has not excluded the festive lights when they are disconnected, resulting in over submission of 2,398W for the eight months that ICP 0008807413WMA59 has been supplied and the lights were disconnected. Meridian intends to revise their process to exclude the festive lights when they are disconnected.

Alf Downs usually provides connection and disconnection dates, but I found these had not been updated since January 2017. Alf Downs intends to update these dates.

No load is submitted for the NZTA urban lights, including the festive lights.

Sources of inaccuracy are as follows:

Issue	Estimated volume information impact (annual kWh)
201 NZTA urban lights do not have an ICP number recorded against them. I have been unable to confirm whether WDC and Meridian are responsible for this load. Trustpower supplies the NZTA rural ICPs for this load under ICP 0008806768WM373, and Meridian confirmed that they do not bill WDC for these lights.	Under submission of 0 to 129,024.8 kWh p.a. (including festive lights) depending on whether WDC and Meridian are responsible for this load.
Ten private lights do not have an ICP number recorded against them.	Under submission of 1,553 kWh p.a.

On 18 June 2019, the Electricity Authority issued a memo clarifying the memo of 2012 that stated that a monthly snapshot was sufficient to calculate submission from, and confirmed the code requirement to calculate the correct monthly load must:

- take into account when each item of load was physically installed or removed; and
- wash up volumes must take into account where historical corrections have been made to the DUML load and volumes.

The current monthly report is provided as a snapshot and is non-compliant, and Meridian completes revision submissions where corrections are required. Meridian has not yet updated their processes to be consistent with the Authority's memo.

The database contains a "light install date" and a "lamp install date" but there is not a field for "livening date" for newly connected lights. New connections are rare, and the last subdivision was created approximately ten years ago.

Alf Downs records the date that the data is loaded for all new connections and changes. This means that where Alf Downs has completed the new connection or change, the date is likely to be accurate. Where another party has completed the work, the date will only be accurate if Alf Downs has recorded the data on the day the change was made.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.1 With: Clause 11(1) of Schedule 15.3 From: 01-Apr-19 To: 30-Nov-19	The database is not confirmed as accurate with a 95% level of confidence as recorded in **section 3.1**. Potential under submission of 0 to 129,024.8 kWh per annum (including festive lights) for NZTA urban lights depending on whether WDC and Meridian are responsible for this load. Under submission of 1,553 kWh p.a. for private lights. Over submission of 2,398W (estimated 6,827 kWh) for festive lights during the eight months Meridian has supplied 0008807413WMA59 and the lights were disconnected. The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot. Livening dates are not recorded for new connections, and lamp installation dates are replaced where lights change. Potential impact: High Actual impact: Unknown Audit history: None Controls: Weak Breach risk rating: 6
Audit risk rating	**Rationale for audit risk rating**
Medium	The risk rating and impact depends on the correct ICP number for the NZTA urban lights, and who is responsible for the load. If WDC and Meridian are not responsible, there is no impact. I have recorded the controls as weak, based on the exceptions identified during the field audit, lights with missing ICP numbers, and incorrect treatment of festive lights. The maximum potential impact is high, based on the NZTA urban light wattage and if WDC and Meridian are responsible for the load. The minimum potential impact is low based on the wattage differences excluding the NZTA urban lights. Because the responsible party is not known, and Trustpower is responsible for other NZTA lights within the region I have assessed the impact to be medium.

Actions taken to resolve the issue	Completion date	Remedial action status
We are confirming with WDC whether the NZTA Urban lights are their responsibility and will have the ICP included against these items of load if this is the case. Historic submissions will be revised to include NZTA urban lights if required and exclude festive lights where these were not connected. We will confirm with WDC which of the private lights they will take responsibility for and whether these will be included with the DUML or have individual ICPs created.	15 Feb 2020 15 Feb 2020 31 March 2020	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
We will revise our process to exclude the festive lights where these are not connected.	28 Feb 2020	

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 database records an ICP group. All items of load have a valid ICP number recorded except:

ICP Group	Total wattage	Count	Findings
NZTA Urban	30,209.5	201	I have been unable to confirm the correct ICP number for the NZTA urban lights. These are included in the database extracts provided to Meridian but excluded from Meridian's submission information and not billed to WDC. Meridian intends to investigate to determine the correct ICP for the NZTA urban lights and confirm who is responsible for submission of the unmetered load. Trustpower is responsible for the NZTA rural lights in the WDC region, which are recorded under ICP 0008806768WM373.

ICP Group	Total wattage	Count	Findings
Private	363.5	10	No ICP number is recorded because private lights are excluded from submission information. Private lights are discussed further in **section 3.1**.
Total	**9542**	**91**	

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.2 With: Clause 11(2)(a) and (aa) of Schedule 15.3 From: 01-Apr-19 To: 30-Nov-19	ICP numbers are not recorded in the database for 201 NZTA urban lights and ten private lights. Potential impact: High Actual impact: Unknown Audit history: Once Controls: Weak Breach risk rating: 6
Audit risk rating	**Rationale for audit risk rating**
Medium	The risk rating and impact depends on the correct ICP number for the NZTA urban lights, and who is responsible for the load. If WDC and Meridian are not responsible, there is no impact. I have recorded the controls as weak, because no ICP number is recorded in the database for the NZTA urban lights or private lights. The maximum potential impact is high, based on the NZTA urban light wattage and if WDC and Meridian are responsible for the load. The minimum potential impact is low, with the NZTA urban lights having no impact if Meridian and Waitomo DC are not responsible. The private lights have a low impact based on the wattage and that WDC and TLC working to resolve this issue. Because the responsible party is not known, and Trustpower is responsible for other NZTA lights within the region I have assessed the impact to be medium.

Actions taken to resolve the issue	Completion date	Remedial action status
We are confirming with WDC whether the NZTA Urban lights are their responsibility and will have the ICP included against these items of load if this is the case. Historic submissions will be revised to include NZTA urban lights if required and exclude festive lights where these were not connected. We will confirm with WDC which of the private lights they will take responsibility for and whether these will be included with the DUML or have individual ICPs created.	15 Feb 2020 15 Feb 2020 31 March 2020	Identified
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 RAMM database contains road names, displacements, GPS coordinates and pole numbers.

All except two Items of load have GPS coordinates, and for the other two items of load there is sufficient location information to enable them to be located.

Audit outcome

Compliant

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

Code reference

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

Code related audit information

The DUML database must contain:

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

Audit observation

The database was checked to confirm that:

- it contained a field for light type and wattage capacity
- wattage capacities include any ballast or gear wattage; and
- each item of load has a light type, light wattage, and gear wattage recorded.

Audit commentary

A description of each light is recorded in the lamp model field, and wattages are recorded in the lamp wattage and gear wattage fields.

All items of load have a lamp model, lamp wattage, and gear wattage populated. No lamp or gear wattages were invalidly recorded as zero.

The accuracy of the recorded wattages is discussed in **section 3.1**.

Audit outcome

Compliant

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 167 items of load on 13 January 2020. The sample was selected from three strata, as follows:

1. Local authority lighting
2. NZTA lighting
3. Other lighting.

Audit commentary

The field audit discrepancies are detailed in the table below:

Street	Database count	Field count	Light count difference	Wattage recorded incorrectly	Comments
Local authority lighting					
COTTER ST	4	4	-	4	Four L20 LEDs were recorded as LED22W in the database.
ESPLANADE (NORTH)	24	24	-	24	24 L20 LEDs were recorded as LED22W in the database.
KAKA ST	7	7	-	7	Three L70 LEDs were recorded as LED81W in the database

Street	Database count	Field count	Light count difference	Wattage recorded incorrectly	Comments
					Four L36 LEDs were recorded as LED40W in the database.
TONGA ST	3	3	-	3	Three L36 LEDs were recorded as LED40W in the database.
TUI ST	10	10	-	10	Ten L20 LEDs were recorded as LED22W in the database.
VIEW RD	10	10	-	10	Ten L36 LEDs were recorded as LED40W in the database.
WAITOMO VILLAGE RD	5	5	-	5	Five L70 LEDs were recorded as LED81W in the database.
WEKA ST	1	1	-	1	One L36 LED was recorded as LED40W in the database.
WILLIAM ST	13	13	-	13	13 L20 LEDs were recorded as LED22W in the database.
NZTA lighting					
MOA ST (SH 3)	21	21	-	2	The database recorded seven 15 x 25W strings, but nine were present. The database recorded 21 150W HPS, but two heads were missing and 19 were present.
Other lighting					
ESPLANADE (NORTH)	1	1	-	1	One L20 LED was recorded as LED22W in the database.
KAKA ST	8	8	-	8	Eight L36 LEDs were recorded as LED22W in the database.
Grand Total	167	167	-	88	

This clause relates to lights in the field that are not recorded in the database. The audit did not find any additional lights in the field. Wattage differences are discussed in **section 3.1**.

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

The RAMM database functionality achieves compliance with the code.

The change management process and the compliance of the database reporting provided to Meridian is detailed in **sections 3.1** and **3.2**.

Audit outcome

Compliant

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

Code reference

Clause 11(4) of Schedule 15.3

Code related audit information

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

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

Audit observation

The database was checked for audit trails.

Audit commentary

The database has a complete audit trail.

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

Meridian's submissions are based on a monthly extract from the RAMM database. A RAMM database extract was provided in December 2019 and I assessed the accuracy of this by using the DUML Statistical Sampling Guideline. The table below shows the survey plan.

Plan Item	Comments
Area of interest	Waitomo Council Street Lights
Strata	The database contains the WDC items of load for the DUML ICPs in the Waitomo region. The processes for the management of all WDC items of load are the same, but I decided to place the items of load into three strata: 1. Local authority lighting 2. NZTA lighting; and 3. Other lighting.
Area units	I created a pivot table of the roads and I used a random number generator in a spreadsheet to select a total of 20 sub-units.
Total items of load	167 items of load were checked.

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

The change management process and timeliness of database updates was evaluated.

Audit commentary

Field audit findings

A field audit was conducted of a statistical sample of 167 items of load. The "database auditing tool" was used to analyse the results, which are shown in the table below.

Result	Percentage	Comments
The point estimate of R	101.3	Wattage from survey is higher than the database wattage by 1.3%
R_L	96.6	With a 95% level of confidence it can be concluded that the error could be between -3.4% and +8.8%
R_H	108.8	

The variability of the sample results across the strata means that the true wattage (installed in the field) could be between 3.4% lower and 8.8% higher than the wattage recorded in the DUML database.

These results were categorised in accordance with the "Distributed Unmetered Load Statistical Sampling Audit Guideline", effective from 01/02/19. The table below shows that Scenario C (detailed below) applies, and the best available estimate is not precise enough to conclude that the database is accurate within ±5.0%. Most wattage differences were very small at street level and were less than 55W. The variability of the sample results was impacted by larger wattage differences for Moa St SH3 (414W) and Kaka St (112W). Because these streets were within smaller stratums (NZTA and other) the differences significantly affected the precision findings in relation to R_H. The point of estimate of R is within the accuracy threshold.

- In absolute terms the installed capacity is estimated to be 1 kW higher than the database indicates.
- There is a 95% level of confidence that the installed capacity is between 2 kW lower and 6 kW higher than the database.
- In absolute terms, total annual consumption is estimated to be 3,800 kWh higher than the DUML database indicates.
- There is a 95% level of confidence that the annual consumption is between 9,700 kWh p.a. lower and 25,100 kWh p.a. higher than the database indicates.

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

Light description and capacity accuracy

As discussed in **section 2.4**, all lights have a lamp and gear wattage recorded. Lamp and gear wattages were compared to the expected values for the lamp description and found to match.

ICP number and owner accuracy

As discussed in **section 2.2**, NZTA urban lights and private lights do not have a valid ICP number recorded.

NZTA lights

NZTA's urban lights (201 lights with a combined load of 30,209.5W) in the WDC region do not have an ICP number recorded. This NZTA urban load is not submitted for reconciliation or billed to WDC by Meridian. Trustpower supplies the NZTA rural lights under ICP 0008806768WM373, and Meridian plans to investigate to determine whether WDC and Meridian are responsible for the urban load.

Private lights

Private lights are recorded in the database with "Private" as the ICP group. They are recorded in the database for completeness only. WDC does not have responsibility for maintaining private lights and does not expect to be billed for them. End users are not billed for electricity consumption for private lights by WDC.

Slim Pole ID	Council Pole No	Road Name	Lamp Model	Lamp Wattage	Gear Wattage	Total Wattage
1839	L0056	KAKA ST	LED22NW	22	0	22
1842	L0063	KAKA ST	LED22NW	22	0	22
1843	L0062	KAKA ST	LED22NW	22	0	22
1844	L0061	KAKA ST	LED22NW	22	0	22
1845	L0060	KAKA ST	LED22NW	22	0	22
1847	L0058	KAKA ST	LED22NW	22	0	22
1849	L0057	KAKA ST	LED22NW	22	0	22
1850	L0059	KAKA ST	LED22NW	22	0	22
2190	L0372	RAUPARAHA ST	Itron Zero 0c6 STA 4.5-2M/D/NZ	19.5	0	19.5
1088	POLE 2	WAITOMO VILLAGE RD	150w HPS	150	18	168
Total				**345.5**	**18**	**363.5**

The Lines Company (TLC) has been working with Waitomo District Council to determine the ownership of all known private streetlights. TLC contacted each of the affected owners, to arrange for standard unmetered load to be created. Most of the owners have responded that they believe WDC should be responsible for the street lighting. WDC accepts responsibility for one light on Ruaparaha St and is investigating taking responsibility for the lights at Kaka St, but believes the other light is genuinely

privately owned. TLC is awaiting further information from the Waitomo District Council, before resolving the issues.

Festive lights

Festive lights are recorded against the ICP for the pole that they are attached to, either 0008807413WMA59 or NZTA urban. There are 46 unmetered festive lights:

ICP Group	Total wattage	Count
0008807413WMA59	2,398	26
NZTA Urban	3,612	20
Grand Total	6,010	46

Alf Downs usually provides connection and disconnection dates, but I found these had not been updated since January 2017. Alf Downs intends to update these dates. Festive lights are normally connected from the first week of December until WDC requests they are disconnected in January.

The festive light wattage must be deducted from the total wattage for the ICP when they are not connected, rather than being added to the total wattage when they are connected. To date, Meridian has not excluded the festive lights when they are disconnected, and this is recorded as non-compliance in **section 2.1**.

Change management process findings

Changes in the field are conducted by Alf Downs and recorded in RAMM using "pocket RAMM" which is a field version of RAMM allowing population of the database through hand-held devices. This process also plots the GPS coordinates. Broadspectrum have recently taken responsibility for maintaining the NZTA urban lights, and changes are not communicated to Alf Downs so they can be updated in the database.

Recommendation	Description	Audited party comment	Remedial action
Change management process for NZTA urban lights	If NZTA urban lights are confirmed to be connected to a WDC ICP and be Meridian's responsibility, establish a change management process to ensure that additions, removals, and modifications to NZTA urban lights are correctly recorded in the database.	We will work with WDC on this once confirmed where responsibility for the NZTA urban lights sits.	Identified

I walked through the new connection process. New connections are rare, and the last new subdivision was added approximately ten years ago. Alf Downs has monthly meetings with the council and are advised of any pending new connections. Alf Downs visits the site once connection is complete to capture the asset data.

An LED upgrade is mostly complete, most of the remaining non-LED lights are NZTA or overbridge lights.

Monthly “outage patrols” are conducted by Alf Downs and the process is used to identify any incorrect wattage and location issues that may exist.

The current monthly report is provided as a snapshot and this practice is non-compliant. When a wattage is changed in the database due to a physical change or a correction, only the record present at the time the report is run is recorded, not the historical information showing dates of changes.

The database contains a “light install date” and a “lamp install date” but there is not a field for “livening date” for newly connected lights. New connections are rare, and the last subdivision was created approximately ten years ago.

Alf Downs records the date that the data is loaded for all new connections and changes. This means that where Alf Downs has completed the new connection or change, the date is likely to be accurate. Where another party has completed the work, the date will only be accurate if Alf Downs has recorded the data on the day the change was made.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 3.1 With: Clause 15.2 and 15.37B(b) From: 01-Apr-19 To: 13-Jan-20	The database is not confirmed as accurate with a 95% level of confidence as recorded in **section 3.1**. Potential under submission of 0 to 129,024.8 kWh per annum (including festive lights) for NZTA urban lights depending on whether WDC and Meridian are responsible for this load. Broadspectrum have recently taken responsibility for maintaining the NZTA urban lights, and changes are not communicated to Alf Downs so they can be updated in the database. Under submission of 1,553 kWh p.a. for private lights. Over submission of 2,398W (estimated 6,827 kWh) for festive lights during the eight months Meridian has supplied 0008807413WMA59 and the lights were disconnected. The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot. Livening dates are not recorded for new connections, and lamp installation dates are replaced where lights change. Potential impact: High Actual impact: Unknown Audit history: Once Controls: Weak Breach risk rating: 6

Audit risk rating	Rationale for audit risk rating
Medium	The risk rating and impact depends on the correct ICP number for the NZTA urban lights, and who is responsible for the load. If WDC and Meridian are not responsible, there is no impact. I have recorded the controls as weak, based on the exceptions identified during the field audit, lights with missing ICP numbers, and incorrect treatment of festive lights. The maximum potential impact is high, based on the NZTA urban light wattage and if WDC and Meridian are responsible for the load. The minimum potential impact is low based on the wattage differences excluding the NZTA urban lights. Because the responsible party is not known, and Trustpower is responsible for other NZTA lights within the region I have assessed the impact to be medium.

Actions taken to resolve the issue	Completion date	Remedial action status
We are confirming with WDC whether the NZTA Urban lights are their responsibility and will have the ICP included against these items of load if this is the case.	15 Feb 2020	Identified
Historic submissions will be revised to include NZTA urban lights if required and exclude festive lights where these were not connected.	15 Feb 2020	
We will confirm with WDC which of the private lights they will take responsibility for and whether these will be included with the DUML or have individual ICPs created.	31 March 2020	
Preventative actions taken to ensure no further issues will occur	**Completion date**	
We will revise our process to exclude the festive lights where these are not connected.	28 Feb 2020	

3.2. Volume information accuracy (Clause 15.2 and 15.37B(c))

Code reference

Clause 15.2 and 15.37B(c)

Code related audit information

The audit must verify that:

- *volume information for the DUML is being calculated accurately*
- *profiles for DUML have been correctly applied.*

Audit observation

The submission was checked for accuracy for the month the database extract was supplied. This included:

- checking the registry to confirm that the ICP has the correct profile and submission flag; and

- checking the database extract combined with the on hours against the submitted figure to confirm accuracy.

Audit commentary

Meridian reconciles this DUML load using the DST profile, and the correct profiles and submission types are recorded on the registry.

WDC DUML ICPs 0008807413WMA59 and 0001060300WMD10 switched to Meridian on 01/04/19.

Wattages are derived from a RAMM extract provided by Alf Downs each month. The field survey found that the best available estimate of field wattage is not precise enough to conclude that the database is accurate within ±5.0% as recorded in **section 3.1**. Most wattage differences were very small at street level and were less than 55W. The variability of the sample results was impacted by larger wattage differences for Moa St SH3 (414W) and Kaka St (112W). Because these streets were within smaller stratums (NZTA and other) the differences significantly affected the precision findings in relation to R_H.

Meridian reconciles this DUML load using the DST profile, and on and off times are derived from a data logger read by EMS and are used to create a shape file. Meridian supplies EMS with the capacity information from Alf Downs, and EMS calculates the kWh figures for the ICPs and includes them in the relevant AV080 file. This process was audited during Meridian's reconciliation participant audit and EMS' agent audit.

I compared the RAMM extract provided by Alf Downs for 0001060300WMD10 and 0008807413WMA59 to the capacities provided to EMS for November 2019 and found that they matched exactly, except for the festive lights connected to 0008807413WMA59.

Festive lights are recorded against the ICP for the pole that they are attached to, either 0008807413WMA59 or NZTA urban. The festive light wattage must be deducted from the total wattage for the ICP when they are not connected, rather than being added to the total wattage when they are connected. To date, Meridian has not excluded the festive lights when they are disconnected, resulting in over submission of 2,398W for the eight months that ICP 0008807413WMA59 has been supplied and the lights were disconnected. Meridian intends to revise their process to exclude the festive lights when they are disconnected.

Alf Downs usually provides connection and disconnection dates, but I found these had not been updated since January 2017. Alf Downs intends to update these dates.

No load is submitted for the NZTA urban lights, including the festive lights.

Sources of inaccuracy are as follows:

Issue	Estimated volume information impact (annual kWh)
201 NZTA urban lights do not have an ICP number recorded against them. I have been unable to confirm whether WDC and Meridian are responsible for this load. Trustpower supplies the NZTA rural ICPs for this load under ICP 0008806768WM373, and Meridian confirmed that they do not bill WDC for these lights.	Under submission of 0 to 129,024.8 kWh p.a. (including festive lights) depending on whether WDC and Meridian are responsible for this load.
Ten private lights do not have an ICP number recorded against them.	Under submission of 1,553 kWh p.a.

On 18 June 2019, the Electricity Authority issued a memo clarifying the memo of 2012 that stated that a monthly snapshot was sufficient to calculate submission from, and confirmed the code requirement to calculate the correct monthly load must:

- take into account when each item of load was physically installed or removed; and
- wash up volumes must take into account where historical corrections have been made to the DUML load and volumes.

The current monthly report is provided as a snapshot and is non-compliant, and Meridian completes revision submissions where corrections are required. Meridian has not yet updated their processes to be consistent with the Authority's memo.

The database contains a "light install date" and a "lamp install date" but there is not a field for "livening date" for newly connected lights. New connections are rare, and the last subdivision was created approximately ten years ago.

Alf Downs records the date that the data is loaded for all new connections and changes. This means that where Alf Downs has completed the new connection or change, the date is likely to be accurate. Where another party has completed the work, the date will only be accurate if Alf Downs has recorded the data on the day the change was made.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 3.2 With: Clause 15.2 and 15.37B(c) From: 01-Apr-19 To: 30-Nov-19	The database is not confirmed as accurate with a 95% level of confidence as recorded in **section 3.1**. Potential under submission of 0 to 129,024.8 kWh per annum (including festive lights) for NZTA urban lights depending on whether WDC and Meridian are responsible for this load. Under submission of 1,553 kWh p.a. for private lights. Over submission of 2,398W (estimated 6,827 kWh) for festive lights during the eight months Meridian has supplied 0008807413WMA59 and the lights were disconnected. The monthly database extract provided does not track changes at a daily basis and is provided as a snapshot. Livening dates are not recorded for new connections, and lamp installation dates are replaced where lights change. Potential impact: High Actual impact: Unknown Audit history: None Controls: Weak Breach risk rating: 6

Audit risk rating	Rationale for audit risk rating
Medium	The risk rating and impact depends on the correct ICP number for the NZTA urban lights, and who is responsible for the load. If WDC and Meridian are not responsible, there is no impact. I have recorded the controls as weak, based on the exceptions identified during the field audit, lights with missing ICP numbers, and incorrect treatment of festive lights. The maximum potential impact is high, based on the NZTA urban light wattage and if WDC and Meridian are responsible for the load. The minimum potential impact is low based on the wattage differences excluding the NZTA urban lights. Because the responsible party is not known, and Trustpower is responsible for other NZTA lights within the region I have assessed the impact to be medium.

Actions taken to resolve the issue	Completion date	Remedial action status
We are confirming with WDC whether the NZTA Urban lights are their responsibility and will have the ICP included against these items of load if this is the case.	15 Feb 2020	Identified
Historic submissions will be revised to include NZTA urban lights if required and exclude festive lights where these were not connected.	15 Feb 2020	
We will confirm with WDC which of the private lights they will take responsibility for and whether these will be included with the DUML or have individual ICPs created.	31 March 2020	
Preventative actions taken to ensure no further issues will occur	**Completion date**	
We will revise our process to exclude the festive lights where these are not connected.	28 Feb 2020	

CONCLUSION

WDC DUML ICPs 0008807413WMA59 and 0001060300WMD10 switched to Meridian on 01/04/19.

A RAMM database is managed by Alf Downs on behalf of WDC. The database is remotely hosted by RAMM Software Ltd. The field work, asset data capture and database population is conducted by Alf Downs. Alf Downs staff update the database from the field using Pocket RAMM.

NZTA's urban lights in the WDC region recorded in the database without an ICP number recorded. This NZTA urban load is not submitted for reconciliation or billed to WDC by Meridian. Trustpower supplies the NZTA rural lights under ICP 0008806768WM373, and investigation is required to determine whether WDC and Meridian are responsible for the urban load. Broadspectrum have recently taken responsibility for maintaining the NZTA urban lights, and changes are not communicated to Alf Downs so they can be updated in the database.

Database accuracy is described as follows:

Result	Percentage	Comments
The point estimate of R	101.3	Wattage from survey is higher than the database wattage by 1.3%
R_L	96.6	With a 95% level of confidence it can be concluded that the error could be between -3.4% and +8.8%
R_H	108.8	

The variability of the sample results across the strata means that the true wattage (installed in the field) could be between 3.4% lower and 8.8% higher than the wattage recorded in the DUML database.

These results were categorised in accordance with the "Distributed Unmetered Load Statistical Sampling Audit Guideline", effective from 01/02/19. The best available estimate is not precise enough to conclude that the database is accurate within ±5.0%. Most wattage differences were very small at street level and were less than 55W. The variability of the sample results was impacted by larger wattage differences for Moa St SH3 (414W) and Kaka St (112W). Because these streets were within smaller stratums (NZTA and other) the differences significantly affected the precision findings in relation to R_H. The point of estimate of R is within the accuracy threshold.

- In absolute terms the installed capacity is estimated to be 1 kW higher than the database indicates.
- There is a 95% level of confidence that the installed capacity is between 2 kW lower and 6 kW higher than the database.
- In absolute terms, total annual consumption is estimated to be 3,800 kWh higher than the DUML database indicates.
- There is a 95% level of confidence that the annual consumption is between 9,700 kWh p.a. lower and 25,100 kWh p.a. higher than the database indicates.

Meridian reconciles this DUML load using the DST profile. Wattages are derived from a RAMM extract provided by Alf Downs each month. On and off times are derived from a data logger read by EMS and are used to create a shape file. Meridian supplies EMS with the capacity information from Alf Downs, and EMS calculates the kWh figures for each ICP and includes them in the relevant AV080 file. This process was audited during Meridian's reconciliation participant audit and EMS' agent audit.

On 18 June 2019, the Electricity Authority issued a memo clarifying the memo of 2012 that stated that a monthly snapshot was sufficient to calculate submission from, and confirmed the code requirement to calculate the correct monthly load must:

- take into account when each item of load was physically installed or removed; and
- wash up volumes must take into account where historical corrections have been made to the DUML load and volumes.

The current monthly report is provided as a snapshot and is non-compliant, and Meridian completes revision submissions where corrections are required. Meridian has not yet updated their processes to be consistent with the Authority's memo.

The future risk rating of 24 indicates that the next audit be completed in three months. This may not be sufficient time to resolve the matters raised and I recommend the Authority considers an audit period of at least nine months, because the point of estimate R was within the prescribed accuracy threshold.

PARTICIPANT RESPONSE

Meridian has reviewed this report and their comments are contained within its body.