ELECTRICITY INDUSTRY PARTICIPATION CODE
DISTRIBUTED UNMETERED LOAD AUDIT REPORT

VERITEK

For

GISBORNE DISTRICT COUNCIL AND MERIDIAN ENERGY

Prepared by: Rebecca Elliot

Date audit commenced: 17 August 2020

Date audit report completed: 1 September 2020

Audit report due date: 01-Sep-20

TABLE OF CONTENTS

EXECUTIVE SUMMARY

This audit of the Gisborne District Council **(GDC)** Unmetered Streetlights 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.

An Access database is hosted and managed by Eastland and monthly reporting is provided to Meridian. GDC are working with Eastland to consolidate the number of ICPs associated with the database for all items of load. This includes creating two new ICPs for the NZTA lights in the Gisborne area and these will be reconciled by NZTA using the NZTA RAMM database, and the GDC RAMM database will be used to reconcile the GDC lighting once the ICPs have been consolidated and the dataset has been agreed between GDC and Eastland. This is an anticipated to be in place in January 2021.

The audit found five non-compliances and one recommendation is made.

The database does not include parks and amenity lighting and the under verandah lights and decorative LED lights in the central city. The unmetered parks and amenity lighting were present in the Eastland database prior to the 2017 but are no longer present. The volume associated with these lights is unknown and I recommend in **section 2.1**, that a full field audit of these lights be undertaken so that these lights are reconciled.

Database accuracy is described as follows:

Result	Percentage	Comments
The point estimate of R	98.7	Wattage from survey is lower than the database wattage by 1.3%
R_L	93.2	With a 95% level of confidence it can be concluded that the error could be between -6.8% and 6.4%
R_H	106.4	

The variability of the sample results across the strata means that the true wattage (installed in the field) could be between 6.8% lower and 6.4% higher than the wattage recorded in the DUML database. Non-compliance is recorded because the potential error is greater than 5.0%.

- In absolute terms the installed capacity is estimated to be 4.0 kW lower than the database indicates.
- There is a 95% level of confidence that the installed capacity is between 22.0 kW lower and 20.0 kW higher than the database.
- In absolute terms, total annual consumption is estimated to be 17,900 kWh lower than the DUML database indicates.
- There is a 95% level of confidence that the annual consumption is between 92,200 kWh p.a. lower to 87,300 kWh p.a. higher than the database indicates.

This is reflective of the intermittent updates that are reaching Eastland from GDC. It is expected that the RAMM database is more current and therefore the accuracy will improve when this is used for reconciliation.

The future risk rating of 39 indicates that the next audit be completed in three months. I have considered this in conjunction the GDC moving to their RAMM database for reconciliation and Meridian's comments and recommend that the next audit be undertaken in nine months to allow sufficient time for these changes to be completed.

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	Parks and amenity lighting and under verandah and decorative lighting not recorded in the database and are not being reconciled. Database is not confirmed as accurate with a 95% level of confidence resulting in an estimated over submission of 17,900 kWh per annum. Estimated under submission of 5,093.73 per annum due to incorrect wattages and ballasts applied. The data used for submission does not track changes at a daily basis and is provided as a snapshot.	Weak	High	9	Identified
Description and capacity	2.4	11(2)(c) of Schedule 15.3	Gear wattage is not recorded in the database.	Weak	Low	3	Identified
All load recorded in database	2.5	11(2A) of Schedule 15.3	Parks and amenity lighting and under verandah and decorative lighting not recorded in the database and are not being reconciled. 11 additional lights were identified in the field audit.	Weak	High	9	Identified

Subject	Section	Clause	Non-Compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
Database accuracy	3.1	15.2 and 15.37B(b)	Parks and amenity lighting and under verandah and decorative lighting not recorded in the database and are not being reconciled. Database is not confirmed as accurate with a 95% level of confidence resulting in an estimated over submission of 17,900 kWh per annum. Estimated under submission of 5,093.73 per annum due to incorrect wattages and ballasts applied.	Weak	High	9	Identified
Volume information accuracy	3.2	15.2 and 15.37B(c)	Parks and amenity lighting and under verandah and decorative lighting not recorded in the database and are not being reconciled. Database is not confirmed as accurate with a 95% level of confidence resulting in an estimated over submission of 17,900 kWh per annum. Estimated under submission of 5,093.73 per annum due to incorrect wattages and ballasts applied. The data used for submission does not track changes at a daily basis and is provided as a snapshot.	Weak	High	9	Identified
					Future Risk Rating	**39**	

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
Deriving submission accuracy	2.1	100% field audit be undertaken to capture the unmetered park and amenity lighting, under verandah lights and decorative lights in the central city (Gladstone Road and surrounds).

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

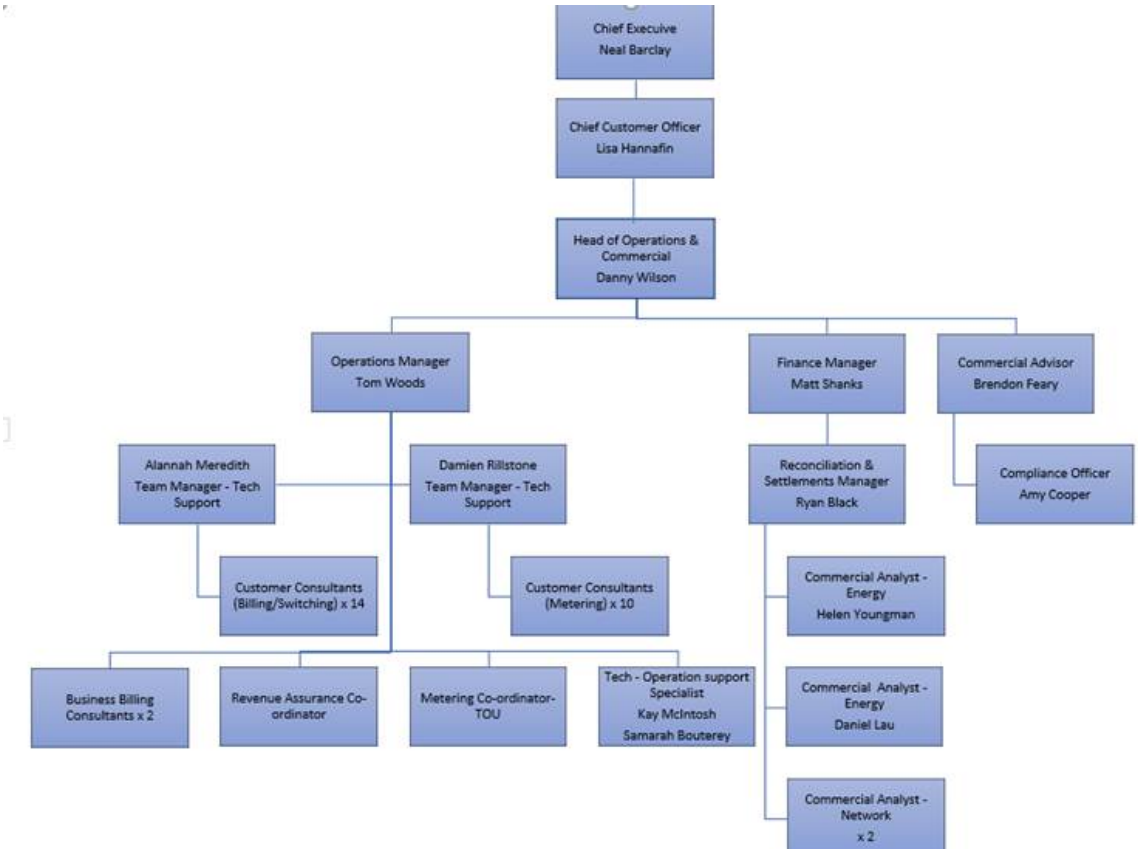
Section 11 of the Electricity Industry Act provides for the Electricity Authority to exempt any participant from compliance with all or any of the clauses.

Audit commentary

Meridian confirms that there are no exemptions in place relevant to the scope of this audit.

1.2. Structure of Organisation

Meridian provided the relevant organisational structure:



1.3. Persons involved in this audit

Auditor:

Name	Title
Rebecca Elliot	Electricity Authority Approved Auditor

Other personnel assisting in this audit were:

Name	Title	Company
Amy Cooper	Compliance Officer	Meridian
Andrew Haughey	Senior Procurement Advisor	Gisborne DC
Aroha Arago-Kemp	GIS and Data Manager	Eastland
Jarred Moroney	General Manager Networks	Eastland
Jennette Moore	Billing and Revenue Manager	Eastland
Kara Atkinson	Project Manager for the LED Accelerated Renewals Programme and Energy Manager for GDC Journeys (formerly Tairawhiti Roads)	NZ Streetlighting Ltd
Tomas Kocar	Regulatory and Pricing Manager	Eastland

1.4. Hardware and Software

The database used for reporting is an Access database hosted and managed by Eastland. Eastland performs a nightly server backup and on a fortnightly basis a tape backup is performed which are stored off-site. These are periodically restored to check readability. A mirrored server also exists in a separate building.

In the future the GDC RAMM database will be used. The database is backed-up in accordance with standard industry procedures. Access to the database is secure by way of password protection.

Systems used by the trader and their agent to calculate submissions are assessed as part of their reconciliation participant audits.

1.5. Breaches or Breach Allegations

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

1.6. ICP Data

GDC has a large number of DUML ICPs as there is one for each streetlight circuit. This is being rationalised and the NZTA streetlights will be assigned to their own ICPs and be included in the appropriate NZTA audit.

Below is a summary from the database extract provided. All are connected to TUI1011 as Eastland have only one NSP and all are reconciled using the DST profile:

ICP	Number of items of load	Total wattage
0000003068EN9A3	1	27
0000003532EN63F	3	81
0000004056EN9A0	1	54
0000004069EN186	14	974
0000004823EN1BF	3	450
0000004829EN32E	10	356
0000019075ENAF4	4	280
0000019099EN350	17	1190
0000280110EN2F3	3	1200
0000301429EN4B6	5	400
0000361147ENF80	1	150
0000490413EN2B0	4	108
0000740001EN47C	21	936
0000740005EN576	3	81
0000740009EN668	8	259
0000740011ENED1	3	124
0000740015ENFDB	27	855
0000740019ENCC5	11	377
0000740023EN9AC	6	162
0000740025EN823	8	259
0000740027EN8A6	3	124
0000740031EN384	28	839
0000740033EN301	45	1592
0000740035EN28E	7	189
0000740037EN20B	2	54
0000740041EN6D9	21	903
0000740043EN65C	2	54
0000740045EN7D3	28	1125
0000740047EN756	5	135
0000740049EN4CD	1	27
0000740053ENCF1	24	1260
0000740057ENDFB	4	151
0000740059ENE60	7	189
0000740063ENB09	3	81
0000740065ENA86	6	162
0000740067ENA03	17	1171
0000740069EN998	83	4763
0000740071EN121	2	54
0000740075EN02B	53	1518
0000740077EN0AE	16	566
0000740079EN335	40	2716
0000740081EN136	12	1168
0000740085EN03C	2	143
0000740087EN0B9	8	216
0000740089EN322	4	108
0000740093ENB1E	18	1103
0000740095ENA91	55	1794

ICP	Number of items of load	Total wattage
0000740097ENA14	6	730
0000740101END78	4	108
0000740103ENDFD	24	755
0000740105ENC72	3	121
0000740107ENCF7	1	150
0000740109ENF6C	20	2320
0000740111EN7D5	3	348
0000740113EN750	3	81
0000740115EN6DF	15	1740
0000740117EN65A	3	348
0000740121EN02D	3	348
0000740123EN0A8	16	1183
0000740127EN1A2	13	534
0000740131ENA80	8	2000
0000740135ENB8A	5	135
0000740139EN894	45	1339
0000740141ENFDD	1	70
0000740145ENED7	1	27
0000740147ENE52	7	189
0000740151EN570	13	378
0000740153EN5F5	5	175
0000740157EN4FF	19	873
0000740501EN179	30	3860
0000740503EN1FC	56	2835
0000740505EN073	13	661
0000740507EN0F6	131	9777
0000740509EN36D	6	592
0000740511ENBD4	41	2892
0000740513ENB51	102	8393
0000740515ENADE	24	1769
0000740517ENA5B	29	2614
0000740519EN9C0	24	2634
0000740521ENC2C	13	910
0000740523ENCA9	2	54
0000740525END26	42	4978
0000740527ENDA3	62	4340
0000740529ENE38	15	1050
0000740531EN681	71	5660
0000740533EN604	4	280
0000740535EN78B	105	9121
0000740537EN70E	42	3924
0000740539EN495	15	1450
0000740541EN3DC	21	1861
0000740543EN359	27	1644
0000740545EN2D6	4	326
0000740547EN253	37	3064
0000740549EN1C8	94	7196
0000740551EN971	7	628
0000740553EN9F4	36	3984
0000740555EN87B	33	3009

ICP	Number of items of load	Total wattage
0000740557EN8FE	20	612
0000740559ENB65	12	702
0000740561ENE89	12	951
0000740563ENE0C	12	1494
0000740565ENF83	40	4612
0000740567ENF06	29	2203
0000740569ENC9D	13	1067
0000740571EN424	4	464
0000740573EN4A1	61	4646
0000740575EN52E	10	705
0000740577EN5AB	4	464
0000740579EN630	40	2787
0000740581EN433	47	4370
0000740583EN4B6	25	1796
0000740585EN539	82	6533
0000740587EN5BC	40	2690
0000740589EN627	46	3652
0000740591ENE9E	49	4682
0000740593ENE1B	89	8426
0000740595ENF94	57	3966
0000740597ENF11	72	5520
0000740599ENC8A	48	3161
0000740601EN27A	5	350
0000740603EN2FF	9	630
0000740605EN370	7	490
0000740607EN3F5	3	210
0000740609EN06E	9	630
0000740611EN8D7	3	210
0000740613EN852	20	1400
0000740615EN9DD	11	770
0000740617EN958	10	788
0000740619ENAC3	22	2617
0000740621ENF2F	71	5046
0000740623ENFAA	4	486
0000740625ENE25	3	450
0000740627ENEA0	59	6626
0000740629END3B	4	296
0000740631EN582	11	727
0000740633EN507	5	246
0000740635EN488	75	5237
0000740637EN40D	90	7539
0000740639EN796	43	4462
0000740641EN0DF	33	2218
0000740643EN05A	40	4136
0000740645EN1D5	4	280
0000740647EN150	23	1138
0000740649EN2CB	5	350
0000740651ENA72	1	150
0000740653ENAF7	31	1894
0000740655ENB78	32	1572

ICP	Number of items of load	Total wattage
0000740657ENBFD	17	822
0000740659EN866	6	558
0000740661END8A	39	2774
0000740663END0F	15	1050
0000740665ENC80	15	1050
0000740667ENC05	2	140
0000740669ENF9E	31	3012
0000740671EN727	24	2509
0000740673EN7A2	16	1256
0000740674ENA68	20	2694
0000740675EN62D	19	2308
0000740677EN6A8	20	2422
0000740678EN976	1	150
0000740679EN533	22	2571
0000740680ENB75	1	150
0000740681EN730	6	696
0000740682ENBF0	1	150
0000740683EN7B5	5	614
0000740684ENA7F	1	150
0000740685EN63A	16	1856
0000740686ENAFA	1	150
0000740687EN6BF	6	681
0000740688EN961	1	150
0000740689EN524	5	580
0000740691END9D	18	1990
0000740693END18	102	5632
0000740695ENC97	15	553
0000740697ENC12	70	6762
0000740699ENF89	97	8472
0000740701ENB7E	14	3834
0000740703ENBFB	11	942
0000740705ENA74	1	24
0000740707ENAF1	35	3954
0000740709EN96A	24	2423
0000740711EN1D3	20	2274
0000740713EN156	28	2998
0000740714ENC9C	1	150
0004801505EN6D7	2	140
Grand Total	**4126**	**319,078**

I note that the total wattage recorded in the database excludes ballast but as detailed in **section 2.1**, this is added to the monthly wattage report sent by Eastland.

The database also excludes parks and amenity lights, under verandah lights and decorative LED lights in the central city. I recommend in **section 2.1** that a full field audit of these lights be undertaken so that these lights are reconciled.

1.7. Authorisation Received

All information was provided directly by GDC, Eastland, Meridian or NZ Streetlighting.

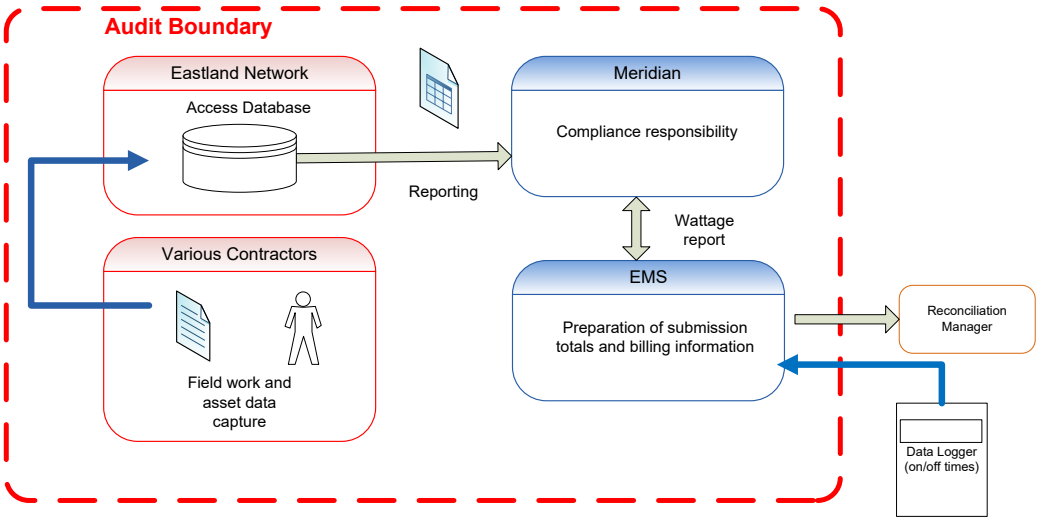
1.8. Scope of Audit

This audit of the GDC 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.

Eastland data is contained in an Access database and Eastland provides reporting to Meridian on a monthly basis, detailing the total kW per ICP. The on/off times are derived by a data logger interrogated by EMS. Lamp ballast information is not stored in the database, instead is calculated at the time of billing.

The diagram below shows the audit boundary for clarity.



The field audit was carried out of 290 items of load.

1.9. Summary of previous audit

The previous audit was conducted for Meridian by Steve Woods of Veritek Limited in August 2019. The table below records the findings.

Table of Non-Compliance

Subject	Section	Clause	Non-compliance	Status
Deriving submission information	2.1	11(1) of Schedule 15.3	Estimated over submission of 1,708 kWh due to incorrect wattage recorded for one 400W MV lamp in the database. Estimated under submission of 7,534 kWh per annum due to incorrect gear wattages applied in the monthly wattage report. In absolute terms, total annual consumption is estimated to be 160,200 kWh lower than the DUML database indicates.	Still existing Still existing

Subject	Section	Clause	Non-compliance	Status
ICP Identifier and items of load	2.2	11(2)(a) and (aa) of Schedule 15.3	Three items of load do not have an ICP identifier recorded.	Cleared
Description and capacity	2.4	11(2)(c) of Schedule 15.3	25 items of load have no lamp model or type recorded. Gear wattage is not recorded in the database.	Cleared Still existing
All load recorded in database	2.5	11(2A) of Schedule 15.3	Eight additional lights were identified in the field.	Still existing
Database accuracy	3.1	15.2 and 15.37B(b)	In absolute terms, total annual consumption is estimated to be 160,200 kWh lower than the DUML database indicates. The lamp model is blank for 25 items of load. Three items of load do not have an ICP identifier recorded. Estimated over submission of 1,708 kWh due to incorrect wattage recorded in the database for one 400W MV lamp.	Still existing Cleared Cleared Still existing
Volume information accuracy	3.2	15.2 and 15.37B(c)	Estimated over submission of 1,708 kWh due to incorrect wattage recorded for one 400W MV lamp in the database. Estimated under submission of 7,534 kWh per annum due to incorrect gear wattages applied in the monthly wattage report. In absolute terms, total annual consumption is estimated to be 160,200 kWh lower than the DUML database indicates.	Still existing Still existing 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 has 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

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 was examined during EMS' audit in June 2020 and compliance was confirmed. I checked the figures for August 2020, and I confirm the kW value matches the database extract.

The methodology for deriving submission information is compliant, but there is some inaccurate data within the database used to calculate submissions, and ballasts are applied outside of the database. This is recorded as non-compliance below and in **sections 3.1** and **3.2**.

Examination of the database found some incorrect wattages and ballasts resulting in an estimated under submission of 5,093.17kWh per annum. These are detailed in **section 3.1**.

The database does not include all parks and amenity lighting and the under verandah lights and decorative LED lights in the central city. The volume associated with these lights is unknown and I recommend that a full field audit of these lights be undertaken so that these lights are reconciled. This is recorded as non-compliance below and in **sections 2.5, 3.1** and **3.2**.

Description	Recommendation	Audited party comment	Remedial action
Deriving submission information.	100% field audit be undertaken to capture the unmetered park and amenity lighting, under verandah lights and decorative lights in the central city (Gladstone Road and surrounds).	Power Solutions have been engaged to carry out a survey of all council lighting in Gisborne.	Identified

The field audit against the database quantities found that the database is not confirmed as accurate with a 95% level of confidence resulting in an estimated over submission of 17,900 kWh per annum. This is detailed in **section 3.1**.

GDC are working with Eastland to consolidate the number of ICPs associated with the database for all items of load. This includes splitting out and creating two new ICPs for the NZTA lights in the Gisborne area and these will be reconciled by NZTA using the NZTA RAMM database and the GDC RAMM database will be used to reconcile the GDC lighting.

Submission is based on a snapshot of the database at the end of the month and does not consider historic adjustments or the fact that lights can be livened before they are entered into the database.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.1 With: Clause 11(1) of Schedule 15.3 From: 26-Nov-19 To: 31-Aug-20	Parks and amenity lighting and under verandah and decorative lighting not recorded in the database and are not being reconciled. Database is not confirmed as accurate with a 95% level of confidence resulting in an estimated over submission of 17,900 kWh per annum. Estimated under submission of 5,093.73 per annum due to incorrect wattages and ballasts applied. The data used for submission does not track changes at a daily basis and is provided as a snapshot. 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, because updates to the database are being provided on an intermittent basis from GDC and not all load is captured. The impact is assessed to be high, as the quantity of missing lights is unknown.

Actions taken to resolve the issue	Completion date	Remedial action status
Meridian has been in ongoing discussion with GDC and Eastland regarding the requirement for an accurate DUML database. Progress to use GDC's RAMM database has been stalled by the inability to gain agreement from Eastland regarding consolidation of the numerous ICPs associated with streetlights on their network.		Identified
Agreement of all parties has now been reached on this point and Eastland will be creating one ICP per GXP per owner (GDC & NZTA).	November 2020	
The new GDC ICP will be populated against assets in the GDC RAMM database and database reporting will be provided by GDC moving forward.	Jan 2021	
The new NZTA ICP will be populated in the NZTA RAMM database and database reporting will be provided by NZTA moving forward	Jan 2021	
A contractor has been engaged to undertake a full audit of GDC owned lighting to ensure the RAMM database is complete.	March 2021	
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

All items of load had an ICP recorded.

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 database contains the nearest street address and GPS coordinates.

Audit outcome

Compliant

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

Code reference

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

Code related audit information

The DUML database must contain:

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

Audit observation

The database was checked to confirm that it contained a field for lamp type and wattage capacity and included any ballast or gear wattage and that all items of load were recorded.

Audit commentary

Lamp make, lamp mode and lamp wattage are included in the database. All were populated

The gear wattages are still to be added to the database to ensure all information is in the database as required by the code. The gear wattage is added by Eastland during the network billing process. This is recorded as non-compliance.

GDC intend to start using their RAMM database for submission and the gear wattage will be recorded in the database once the ICPs have been consolidated.

The accuracy of lamp descriptions, wattages and ballasts is recorded in **section 3.1**.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.4 With: Clause 11(2)(c) of Schedule 15.3 From: 22-Nov-19 To: 31-Aug-20	Gear wattage is not recorded in the database. Potential impact: Low Actual impact: Low Audit history: Multiple times Controls: Weak Breach risk rating: 3
Audit risk rating	**Rationale for audit risk rating**
Low	The controls are recorded as weak as the gear wattage is added outside of the database. The impact on settlement is low as the database submission inaccuracies are recorded as small.

Actions taken to resolve the issue	Completion date	Remedial action status
As the Eastland database will no longer be used for submission gear wattages will continue to be applied outside the database in the interim	N/A	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
We will ensure correct gear wattages are included in GDC's RAMM database.	Jan 2021	

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 290 lights using the statistical sampling methodology.

Audit commentary

The field audit findings are detailed in the table below.

Street/Area	Database Count	Field Count	Lamp no. difference	No of incorrect lamp wattage	Comments
Atkinson Street	12	13	+1	-	1 x additional 70W HPS
College Road	1	1	-	1	1 x 67W LED (assumed- no markings) recorded as 150W HPS
Hall Street	3	3	-	1	1 x 70W LED recorded as 150W HPS
Hirini Street	2	7	+5	1	5 x additional 67W LED (assumed wattage- no markings) 1 x 67W LED recorded as 70W HPS
Huxley Road	23	23	+1 -1	1	1 x additional 70W HPS 1 x 70W HPS not found 1 x 150W HPS recorded as 100W HPS
Library Road	7	7	-	2	2 x 27W LED recorded as 70W HPS & 250W HPS
Macdonald Road	3	3	-	2	2 x 67W LED (assumed- no markings) recorded as 150W HPS
Makorori Beach Road	11	12	+1		1 x additional 27W LED
Munro Street	12	13	+1	1	1 x additional 27W LED 1x 150W HPS recorded as 67W LED
Murphy Road	9	8	-1	-	1 x 27W LED not found
Norman Road	4	5	+1	-	1 x additional 70W
Park Road	3	2	-1	1	1 x 27W LED recorded as 70W HPS 1x 27W LED not found
Patutahi Road	4	3	-1		1 x 70W HPS not found
Shelley Road	7	7	-	1	1 x 27W LED recorded as 70W HPS
Sievwright Lane	3	4	+1	-	1 x additional 70W HPS
Tauwhareparae Road	10	9	-1	-	1 x 27W LED not found
Uawa Parade	6	5	-1	-	1 x 27W LED not found
TOTAL	290	294	17	11	

This clause relates to lights in the field not recorded in the database. 11 additional lights were identified in the field.

The database does not include all parks and amenity lighting and the under verandah lights and decorative LED lights in the central city. The volume associated with these lights is unknown and I recommend in **section 2.1**, that a full field audit of these lights be undertaken so that these lights are reconciled. This is recorded as non-compliance below and in **sections 2.1, 3.1** and **3.2**.

GDC are working with Eastland to consolidate the number of ICPs associated with the database for all items of load. This includes creating two new ICPs for the NZTA lights in the Gisborne area and these will be reconciled by NZTA using the NZTA RAMM database and the GDC RAMM database will be used to reconcile the GDC lighting. This is an anticipated to be in place in January 2021.

The accuracy of the database is discussed in **section 3.1**.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.5 With: Clause 11(2A) of Schedule 15.3 From: 26-Nov-19 To: 31-Aug-20	Parks and amenity lighting and under verandah and decorative lighting not recorded in the database and are not being reconciled. 11 additional lights were identified in the field audit. Potential impact: High Actual impact: Unknown Audit history: None Controls: Weak Breach risk rating: 9
Audit risk rating	**Rationale for audit risk rating**
High	The controls are rated as weak, because updates to the database are being provided on an intermittent basis from GDC and not all load is captured. The impact is assessed to be high, as the quantity of missing lights is unknown.

Actions taken to resolve the issue	Completion date	Remedial action status
We intend to use the GDC RAMM database for submission, which is expected to be more accurate than the current database. A contractor has been engaged to undertake a full audit of GDC owned lighting to ensure the RAMM database complete.	Jan 2021 March 2021	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
As above		

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

Code reference

Clause 11(3) of Schedule 15.3

Code related audit information

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

Audit observation

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

Audit commentary

The database functionality achieves compliance with the code.

Audit outcome

Compliant

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

Code reference

Clause 11(4) of Schedule 15.3

Code related audit information

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

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

Audit observation

The database was checked for audit trails.

Audit commentary

The 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

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	Gisborne District Council
Strata	The database contains items of unmetered load in the Gisborne District Council area. The processes for the management of items of load are the same, but I decided to place the items of load into four strata, as follows: Street name A-D Street name E-K Street name L-P Street name Q-W
Area units	I created a pivot table of the ICP in each area and used a random number generator in a spreadsheet to select a total of 67 sub-units.
Total items of load	290 items of load were checked.

Wattages were checked for alignment with the published standardised wattage table produced by the Electricity Authority against the database or in the case of LED lights against the LED light specification.

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

Audit commentary

Database accuracy based on the field audit

A field audit was conducted of a statistical sample of 290 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	98.7	Wattage from survey is lower than the database wattage by 1.3%
R_L	93.2	With a 95% level of confidence it can be concluded that the error could be between -6.8% and 6.4%
R_H	106.4	

These results were categorised in accordance with the "Distributed Unmetered Load Statistical Sampling Audit Guideline", effective from 01/02/19 and the table below shows that Scenario B (detailed below) applies.

The conclusion from Scenario B is that the variability of the sample results across the strata means that the true wattage (installed in the field) could be between 6.8% lower and 6.4% higher than the wattage recorded in the DUML database. Non-compliance is recorded because the potential error is greater than 5.0%.

In absolute terms the installed capacity is estimated to be 4.0 kW lower than the database indicates.

There is a 95% level of confidence that the installed capacity is between 22.0 kW lower and 20.0 kW higher than the database.

In absolute terms, total annual consumption is estimated to be 17,900 kWh lower than the DUML database indicates.

There is a 95% level of confidence that the annual consumption is between 92,200 kWh p.a. lower to 87,300 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 %

The database does not include all parks and amenity lighting and the under verandah lights and decorative LED lights in the central city. The volume associated with these lights is unknown and I recommend in **section 2.1**, that a full field audit of these lights be undertaken so that these lights are reconciled. This is recorded as non-compliance below and in **sections 2.1, 2.5** and **3.2**.

Lamp description and capacity accuracy

Examination of the database found one 400W Mercury vapour lamp has an incorrect wattage of 800W recorded. This will be resulting in an estimated over submission of 1,708 kWh per annum.

The gear wattages are still to be added to the database to ensure all information is in the database as required by the code. The gear wattage is added by Eastland during the network billing process. I checked the ballasts being added and found three errors:

Lamps	Total number of Lamps	kW variance	Annualised kWh variance
1 x 400W Mercury Vapour lamp has a wattage of 800 recorded	1	-0.362	+1,411.00
Incorrect ballast of 12W instead of 13W applied in the monthly report from Eastland	1,559	+1.599	+6,658.49
Incorrect ballast of 45W applied instead of 38W	6	-0.036	-153.76
TOTAL			+5,093.73

The incorrect ballasts will be resulting in an estimated under submission of 5,093.73 kWh per annum. This is recorded as non-compliance below.

NZTA lighting

NZTA lighting is included in the database and was checked as part of the field audit but this is being removed and ICPs created for the NZTA items of load. These will be reconciled by NZTA using the NZTA RAMM database once the ICPs are created and the load is confirmed as being recorded in the NZTA database.

ICP accuracy

All items of load have an ICP identifier recorded.

Location accuracy

The database contains fields for the street address and also GPS coordinates.

Change management process findings

All new streetlight circuits are required to be metered. Eastland are considering allowing unmetered load connections, but this will only proceed if they are satisfied that the controls in place will ensure that load is not connected without being accepted by a trader and recorded in a database.

Eastland are receiving intermittent database updates. This is causing database inaccuracy as is evident with the number of errors found during the field audit. GDC plan to use their RAMM database once the ICPs have been consolidated. The change management process requires that field contractors provide updates of changes promptly.

The LED roll out is expected to take a further two years. These updates are carried out on a monthly basis into RAMM. The date of installation is recorded in RAMM. This frequency will not meet the requirements of the code to update the database. GDC are reviewing this in anticipation of using their RAMM database going forward.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 3.1 With: Clause 15.2 and 15.37B(b) From: 26-Nov-19 To: 31-Aug-20	Parks and amenity lighting and under verandah and decorative lighting not recorded in the database and are not being reconciled. Database is not confirmed as accurate with a 95% level of confidence resulting in an estimated over submission of 17,900 kWh per annum. The incorrect wattage and ballasts will be resulting in an estimated under submission of 5,093.17 kWh per annum. Potential impact: High Actual impact: Unknown Audit history: Three times Controls: Weak Breach risk rating: 9
Audit risk rating	**Rationale for audit risk rating**
High	The controls are rated as weak, because updates to the database are only occurring due to "local knowledge" by Eastland staff, not through a formal update process. The impact is assessed to be high, as the quantity of missing lights is unknown.

Actions taken to resolve the issue	Completion date	Remedial action status
Meridian has been in ongoing discussion with GDC and Eastland regarding the requirement for an accurate DUML database. Progress to use GDC's RAMM database has been stalled by the inability to gain agreement from Eastland regarding consolidation of the numerous ICPs associated with streetlights on their network.		Identified
Agreement of all parties has now been reached on this point and Eastland will be creating one ICP per GXP per owner (GDC & NZTA).	November 2020	
The new GDC ICP will be populated against assets in the GDC RAMM database and database reporting will be provided by GDC moving forward.	Jan 2021	
The new NZTA ICP will be populated in the NZTA RAMM database and database reporting will be provided by NZTA moving forward	Jan 2021	
A contractor has been engaged to undertake a full audit of GDC owned lighting to ensure the RAMM database is complete.	March 2021	
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, and
- 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 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 was examined during EMS' audit in June 2020 and compliance was confirmed. I checked the figures for August 2020, and I confirm the kW value matches the database extract.

The methodology for deriving submission information is compliant, but there is some inaccurate data within the database used to calculate submissions, and ballasts are applied outside of the database. This is recorded as non-compliance below and in **sections 2.1** and **3.1**.

Submission is based on a snapshot of the database at the end of the month and does not consider historic adjustments or the fact that lights can be livened before they are entered into the database.

Examination of the database found some incorrect wattages and ballasts resulting in an estimated under submission of 5,093.17 kWh per annum. These are detailed in **section 3.1**.

The database does not include all parks and amenity lighting and the under verandah lights and decorative LED lights in the central city. The volume associated with these lights is unknown and I recommend in **section 2.1**, that a full field audit of these lights be undertaken so that these lights are reconciled. This is recorded as non-compliance below and in **sections 2.1, 2.5** and **3.1**.

The field audit against the database quantities found that the database is not confirmed as accurate with a 95% level of confidence resulting in an estimated over submission of 17,900 kWh per annum. This is detailed in **section 3.1**.

GDC are working with Eastland to consolidate the number of ICPs associated with the database for all items of load. This includes creating two new ICPs for the NZTA lights in the Gisborne area and these will be reconciled by NZTA using the NZTA RAMM database and the GDC RAMM database will be used to reconcile the GDC lighting.

Submission is based on a snapshot of the database at the end of the month and does not consider historic adjustments or the fact that lights can be livened before they are entered into the database.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 3.2 With: Clause 15.2 and 15.37B(c) From: 26-Nov-19 To: 31-Aug-20	Parks and amenity lighting and under verandah and decorative lighting not recorded in the database and are not being reconciled. Database is not confirmed as accurate with a 95% level of confidence resulting in an estimated over submission of 17,900 kWh per annum. Estimated under submission of 5,093.73 per annum due to incorrect wattages applied in the monthly wattage report. The data used for submission does not track changes at a daily basis and is provided as a snapshot. Potential impact: High Actual impact: Unknown Audit history: Three times Controls: Weak Breach risk rating: 9

Audit risk rating	Rationale for audit risk rating
High	The controls are rated as weak, because updates to the database are being provided on an intermittent basis from GDC and not all load is captured. The impact is assessed to be high, as the quantity of missing lights is unknown.

Actions taken to resolve the issue	Completion date	Remedial action status
Meridian has been in ongoing discussion with GDC and Eastland regarding the requirement for an accurate DUML database. Progress to use GDC's RAMM database has been stalled by the inability to gain agreement from Eastland regarding consolidation of the numerous ICPs associated with streetlights on their network.		Identified
Agreement of all parties has now been reached on this point and Eastland will be creating one ICP per GXP per owner (GDC & NZTA).	November 2020	
The new GDC ICP will be populated against assets in the GDC RAMM database and database reporting will be provided by GDC moving forward.	Jan 2021	
The new NZTA ICP will be populated in the NZTA RAMM database and database reporting will be provided by NZTA moving forward	Jan 2021	
A contractor has been engaged to undertake a full audit of GDC owned lighting to ensure the RAMM database is complete.	March 2021	
Preventative actions taken to ensure no further issues will occur	**Completion date**	

CONCLUSION

An Access database is hosted and managed by Eastland and monthly reporting is provided to Meridian. GDC are working with Eastland to consolidate the number of ICPs associated with the database for all items of load. This includes creating two new ICPs for the NZTA lights in the Gisborne area and these will be reconciled by NZTA using the NZTA RAMM database, and the GDC RAMM database will be used to reconcile the GDC lighting once the ICPs have been consolidated and the dataset has been agreed between GDC and Eastland. This is an anticipated to be in place in January 2021.

The audit found five non-compliances and one recommendation is made.

The database does not include parks and amenity lighting and the under verandah lights and decorative LED lights in the central city. The unmetered parks and amenity lighting were present in the Eastland database prior to the 2017 but are no longer present. The volume associated with these lights is unknown and I recommend in **section 2.1**, that a full field audit of these lights be undertaken so that these lights are reconciled.

Database accuracy is described as follows:

Result	Percentage	Comments
The point estimate of R	98.7	Wattage from survey is lower than the database wattage by 1.3%
R_L	93.2	With a 95% level of confidence it can be concluded that the error could be between -6.8% and 6.4%
R_H	106.4	

The variability of the sample results across the strata means that the true wattage (installed in the field) could be between 6.8% lower and 6.4% higher than the wattage recorded in the DUML database. Non-compliance is recorded because the potential error is greater than 5.0%.

- In absolute terms the installed capacity is estimated to be 4.0 kW lower than the database indicates.
- There is a 95% level of confidence that the installed capacity is between 22.0 kW lower and 20.0 kW higher than the database.
- In absolute terms, total annual consumption is estimated to be 17,900 kWh lower than the DUML database indicates.
- There is a 95% level of confidence that the annual consumption is between 92,200 kWh p.a. lower to 87,300 kWh p.a. higher than the database indicates.

This is reflective of the intermittent updates that are reaching Eastland from GDC. It is expected that the RAMM database is more current and therefore the accuracy will improve when this is used for reconciliation.

The future risk rating of 39 indicates that the next audit be completed in three months. I have considered this in conjunction the GDC moving to their RAMM database for reconciliation and Meridian's comments and recommend that the next audit be undertaken in nine months to allow sufficient time for these changes to be completed.

PARTICIPANT RESPONSE

Meridian has been working toward the transition to using Gisborne DC's RAMM database for submission for a significant length of time. The number of ICPs associated with the lights has caused ongoing delay and a number of discussions have been held between parties regarding this point.

Following a meeting between the council, Eastland and Meridian, agreement has now been reached that ICPs will be consolidated to 2 new "bucket" ICPs for the streetlights in the Gisborne area – 1 for GDC owned lights and 1 for NZTA owned lights.

Each light owner will then populate the ICPs in their respective RAMM databases and data will be provided to the relevant traders moving forward.

In addition, Gisborne DC have appointed a contractor (Power Solutions) to undertake a field audit of their assets to get assurance their database is complete and accurate. At this point we have not been provided with a timeframe within which this audit is to be completed so have estimated March 2021 and will continue to follow up with Gisborne DC regarding progress.