ELECTRICITY INDUSTRY PARTICIPATION CODE DISTRIBUTED UNMETERED LOAD AUDIT REPORT



For

HAURAKI DISTRICT COUNCIL AND MERIDIAN ENERGY

Prepared by: Steve Woods

Date audit commenced: 26 August 2020

Date audit report completed: 23 October 2020

Audit report due date: 01-Oct-20

TABLE OF CONTENTS

	cutive summary	
Aud	dit summary	3
	Non-compliances	3
	Recommendations	4
	Issues 4	
1.	Administrative	5
	1.1. Exemptions from Obligations to Comply with Code	5
	1.2. Structure of Organisation	5
	1.3. Persons involved in this audit	6
	1.4. Hardware and Software	6
	1.5. Breaches or Breach Allegations	6
	1.6. ICP Data	
	1.7. Authorisation Received	6
	1.8. Scope of Audit	7
	1.9. Summary of previous audit	8
	1.10. Distributed unmetered load audits (Clause 16A.26 and 17.295F)	9
2.	DUML database requirements	10
	2.1. Deriving submission information (Clause 11(1) of Schedule 15.3)	10
	2.2. ICP identifier and items of load (Clause 11(2)(a) and (aa) of Schedule 15.3)	11
	2.3. Location of each item of load (Clause 11(2)(b) of Schedule 15.3)	12
	2.4. Description and capacity of load (Clause 11(2)(c) and (d) of Schedule 15.3)	12
	2.5. All load recorded in database (Clause 11(2A) of Schedule 15.3)	13
	2.6. Tracking of load changes (Clause 11(3) of Schedule 15.3)	13
	2.7. Audit trail (Clause 11(4) of Schedule 15.3)	14
3.	Accuracy of DUML database	15
	3.1. Database accuracy (Clause 15.2 and 15.37B(b))	15
	3.2. Volume information accuracy (Clause 15.2 and 15.37B(c))	
Con	nclusion	
	Participant response	21

EXECUTIVE SUMMARY

This audit of the Hauraki District Council Unmetered Streetlights (**HDC**) DUML database and processes was conducted at the request of Meridian Energy Limited (**Meridian**), in accordance with clause 15.37B. The purpose of this audit is to verify that the volume information is being calculated accurately, and that profiles have been correctly applied.

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

The database is remotely hosted by RAMM Software Ltd. The field work and asset data capture is conducted by McKay Electrical using Pocket RAMM. HDC manage the database and Power Solutions produce the monthly wattage report, on behalf of the HDC, and provide this to Meridian on a monthly basis.

The main findings are as follows:

- 1. The issue found during the last audit where reporting was incorrect has now been resolved.
- 2. In absolute terms, total annual consumption is estimated to be 11,200 kWh lower than the DUML database indicates.
- 3. Submission is based on a snapshot and does not consider historic adjustments.
- 4. There were a small number of incorrect ballasts for 250 w HPS lights.

This audit found three non-compliances and no recommendations are made. The future risk rating of 12 indicates that the next audit be completed in 12 months and I agree with this recommendation.

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	In absolute terms, total annual consumption is estimated to be 11,200 kWh lower than the DUML database indicates. Submission is based on a snapshot and does not consider historic adjustments.	Moderate	Medium	4	Identified
Database accuracy	3.1	15.2 and 15.37B(b)	In absolute terms, total annual consumption is estimated to be 11,200 kWh lower than the DUML database indicates. 8 items of load have incorrect ballast wattage recorded	Moderate	Medium	4	Identified

Subject	Section	Clause	Non-Compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action		
Volume information accuracy	3.2	15.2 and 15.37B(c)	In absolute terms, total annual consumption is estimated to be 11,200 kWh lower than the DUML database indicates. Submission is based on a snapshot and does not consider historic adjustments.	Moderate	Medium	4	Identified		
Future Risk Ra	Future Risk Rating								

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	Clause	Recommendation
			Nil

ISSUES

Subject	Section	Description	Issue
		Nil	

1. ADMINISTRATIVE

1.1. Exemptions from Obligations to Comply with Code

Code reference

Section 11 of Electricity Industry Act 2010.

Code related audit information

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

Audit observation

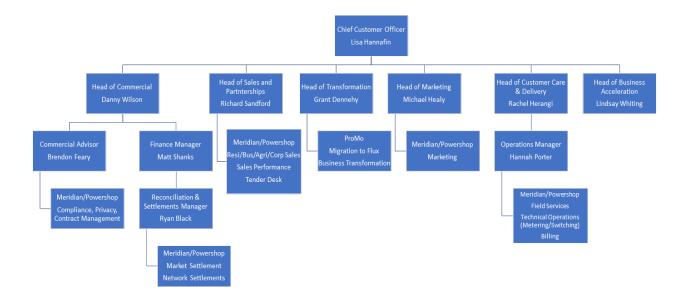
Section 11 of the Electricity Industry Act provides for the Electricity Authority to exempt any participant from compliance with all or any of the clauses.

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:

Steve Woods

Veritek Limited

Electricity Authority Approved Auditor

Claire Stanley Veritek Supporting Auditor

Other personnel assisting in this audit were:

Name	Title	Company
Joel Hogan	Transport Team Leader	Hauraki DC

1.4. Hardware and Software

Section 1.8 records that Roading Asset and Maintenance Management database, commonly known as RAMM continues to be used the management of DUML. This is remotely hosted by RAMM Software Ltd. The specific module used for DUML is called "SLIMM" which stands for "Streetlighting Inventory Maintenance Management".

Power Solutions confirmed that the database back-up is in accordance with standard industry procedures. Access to the database is secure by way of password protection.

Systems used by the trader and their agents 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

ICP Number	Description	NSP	Profile	Number of items of load	Database wattage (watts)
1000508887PC891	ST_LIGHTS- Powerco	WKO0331	DST	1,877	113,733
1099570384CNB6C	Hauraki Streetlights Counties	BOB0331	DST	33	1,432

1.7. Authorisation Received

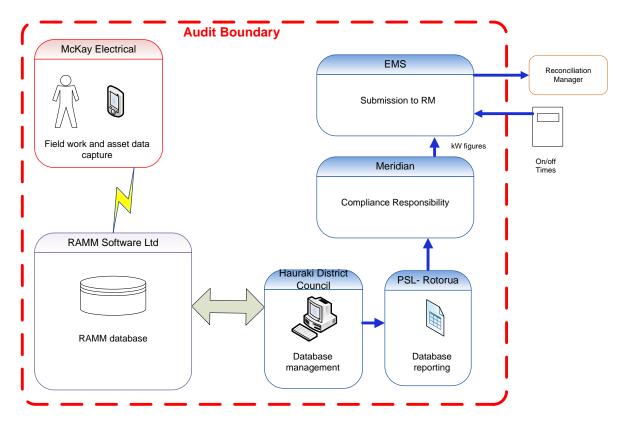
All information was provided directly by Meridian or Power Solutions.

1.8. Scope of Audit

This audit of the Hauraki District Council Unmetered Streetlights (**HDC**) DUML database and processes was conducted at the request of Meridian Energy Limited (**Meridian**), in accordance with clause 15.37B. The purpose of this audit is to verify that the volume information is being calculated accurately, and that profiles have been correctly applied.

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

The database is remotely hosted by RAMM Software Ltd. The field work and asset data capture is conducted by McKay Electrical using Pocket RAMM. HDC manage the database and Power Solutions produce the monthly wattage report, on behalf of the HDC, and provide this to Meridian on a monthly basis. 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 at the time of the site audit.



The field audit was undertaken of a statistical sample of 284 items of load.

1.9. Summary of previous audit

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

Subject	Section	Clause	Non-Compliance	Status
Deriving submission information	2.1	11(1) of Schedule 15.3	In absolute terms, total annual consumption is estimated to be 21,800 kWh lower than the DUML database indicates.	Still existing
			Submission is based on a snapshot and does not consider historic adjustments.	
			The ballasts are not recorded correctly in the RAMM database.	Cleared
			Submission is incorrectly allocated across the 2 ICPs.	Cleared
ICP identifier	2.2	11(2)(a) and (aa) of Schedule 15.3	One item of load without an ICP identifier.	Cleared
All load recorded in database	2.5	11(2A) of Schedule 15.3	One additional item of load found in the field audit.	Cleared
Database accuracy	3.1	15.2 and 15.37B(b)	In absolute terms, total annual consumption is estimated to be 21,800 kWh lower than the DUML database indicates.	Still existing
			The ballasts are not recorded correctly in the RAMM database.	
			One item of load does not have the ICP recorded.	Cleared
Volume information accuracy	3.2	15.2 and 15.37B(c)	In absolute terms, total annual consumption is estimated to be 21,800 kWh lower than the DUML database indicates.	Still existing
			Submission is based on a snapshot and does not consider historic adjustments.	
			The ballasts are not recorded correctly in the RAMM database.	
			Submission is incorrectly allocated across the 2 ICPs.	Cleared

Subject	Section	Clause	Recommendation	Status
Location of items of load	2.3	11(2)(b) of Schedule 15.3	Populate GPS coordinates for 180 items of load where this information is missing.	Cleared

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. Compliance is confirmed.

2. DUML DATABASE REQUIREMENTS

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

Code reference

Clause 11(1) of Schedule 15.3

Code related audit information

The retailer must ensure the:

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

Audit observation

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

Audit commentary

Meridian reconciles this DUML load using the DST profile. The total volume submitted to the Reconciliation Manager is based on a monthly database report derived from RAMM and the "burn time" which is sourced from data loggers installed on the Counties and Powerco networks. 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 audited during Meridian's reconciliation participant audit and EMS' agent audit.

The capacities supplied to EMS for June 2020 were checked and confirmed to be the same as the database.

The previous audit found that the ballast capacities were not recorded in RAMM but were added in the monthly report. This matter is now resolved, and the ballast capacities are recorded in RAMM.

There is some inaccurate data within the database used to calculate submissions. This is recorded as non-compliance and discussed in **section 3.1** and **3.2**.

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.

The previous audit found that submission information is allocated to the incorrect ICPs due to a reporting issue. This has now been resolved.

Audit outcome

Non-compliant

Non-compliance	Description						
Audit Ref: 2.1 With: Clause 11(1) of	In absolute terms, total annual consum than the DUML database indicates.	ption is estimated	d to be 11,200 kWh lower				
Schedule 15.3	Submission is based on a snapshot and o	Submission is based on a snapshot and does not consider historic adjustr					
	Potential impact: Medium						
	Actual impact: Medium						
	Audit history: Once						
From: 01-Sep-19	Controls: Moderate						
To: 31-Aug-20	Breach risk rating: 4						
Audit risk rating	Rationale for	audit risk rating					
Medium	The controls are rated as moderate, because to the database are correctly re	-					
	The impact is assessed to be medium, ba above.	ased on the kWh o	differences described				
Actions to	aken to resolve the issue	Completion date	Remedial action status				
The accuracy issues raised the council for resolution	d in this report have been provided to	18 Sept 20	Identified				
	gnificant retrospective changes to ric submissions are revised accordingly.	In place					
	o manage minor retrospective/mid changes/removals/additions) are being						
Preventative actions take	en to ensure no further issues will occur	Completion date					
A full field audit will be re database following LED ro	commended to confirm accuracy of the oll out.	Oct 2021					

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 in the database. The previous audit identified one item of load did not have an ICP recorded against it in the database. This has now been resolved and all items of load have an ICP recorded.

The previous audit report recorded incorrect ICP's in the monthly report, this is now resolved. Compliance is confirmed.

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, pole numbers and Global Positioning System (GPS) coordinates for each item of load, and users in the office and field can view these locations on a mapping system.

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 each item of load had a value recorded in these fields.

Audit commentary

The database contains two records for wattage, firstly the lamp wattage and secondly the gear wattage, which represents ballast losses. The database now correctly records the gear wattage in the gear wattage field; however, eight errors were found where 250 HPS lights had 20 watts for ballast and should have had 28 watts. This is recorded as non-compliance 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 284 items of load.

Audit commentary

The field audit discrepancies are detailed in the table below:

Street	Database count	Field count	Light count differences	Wattage recorded incorrectly	Comments
AORANGI RD	19	19	-	2	1 x 70w LED recorded as 70w HPS 1 x 70w LED recorded as 26w LED
CLARKE ST	9	8	-1		1 x20w Light not found
HASZARD ST SERVICE LANE (RP265 LHS)	1	1	-	1	1 x 150 HPS not found 1 x 100w LED found
PARK LANE	2	2	-	1	1 x 150 HPS not found 1 x 70w LED found
SLEVIN ST	1	0	-1		1 x 19w Light not found
Grand Total			-2 (net)	4	

There were no additional items of load found in the field.

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

Audit outcome

Compliant

3. ACCURACY OF DUML DATABASE

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

Code reference

Clause 15.2 and 15.37B(b)

Code related audit information

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

Audit observation

The DUML Statistical Sampling Guideline was used to determine the database accuracy. The table below shows the survey plan.

Plan Item	Comments	
Area of interest	Hauraki plains area	
Strata	The database contains items of load in Hauraki District Council area.	
	The area is across two networks. There were no new developments identified.	
	The processes for the management of HDC items of load are the same, but I decided to place the items of load into four strata, as follows:	
	1. Rural	
	2. Paeroa	
	3. Waihi A-O	
	4. Waihi P-Z	
Area units	I created a pivot table of the roads in each area and I used a random number generator in a spreadsheet to select a total of 78 sub-units.	
Total items of load	284 items of load were checked.	

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

Audit commentary

Database accuracy based on the field audit

A field audit was conducted of a statistical sample of 284 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	97.7	Wattage from survey is lower than the database wattage by 2.3%
RL	93.6	

R _H	99.6	With a 95% level of confidence it can be concluded that the
		error could be between -0.4% and -6.4%

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 C (detailed below) applies.

The conclusion from Scenario C is that the variability of the sample results across the strata means that the true wattage (installed in the field) could be between 0.4% lower and 6.4% lower 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 3 kW lower than the database indicates.

There is a 95% level of confidence that the installed capacity is between 7 kW lower to 1 kW higher than the database.

In absolute terms, total annual consumption is estimated to be 11,200 kWh lower than the DUML database indicates.

There is a 95% level of confidence that the annual consumption is between -31,500 kWh p.a. lower to 2,200 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.	
significance	This scenario applies if:	
	(a) the point estimate of R is less than 0.95 or greater than 1.05	
	(b) as a result, either R_{L} is less than 0.95 or R_{H} is greater than 1.05.	
	There is evidence to support this finding. In statistical terms, the inaccuracy is statistically significant at the 95% level	
C - Poor precision	This scenario applies if:	
	(a) the point estimate of R is between 0.95 and 1.05	
	(b) R_L is less than 0.95 and/or R_H is greater than 1.05	
	The conclusion from this scenario is that the best available estimate is not precise enough to conclude that the database is accurate within +/- 5 %	

Lamp description and capacity accuracy

The database contains two records for wattage, firstly the lamp wattage and secondly the gear wattage, which represents ballast losses. The database now correctly records the gear wattage in the gear wattage field; however, eight errors were found where 250 HPS lights had 20 watts for ballast and should have had 28 watts.

NZTA lighting

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

ICP accuracy

All items of load have the correct ICP recorded.

Location accuracy

The location details were found to be accurate.

Change management process findings

Processes to track changes to the database were reviewed.

For all new connections, "as builts" are required to be submitted to council before connection can occur. These are added to RAMM once the lights have been confirmed as connected. The current reporting practice is based on a snapshot at the end of the month, which does not cater or historic changes or delayed updates.

All fault and maintenance work is controlled by HDC and conducted by McKay Electrical through "RAMM Contractor" and once each job is completed the database is updated via field PDA's.

HDC has installed 1,315 LEDs out of 1,911 total lights.

There are no festive lights connected to the streetlight circuits.

Audit outcome

Non-compliant

Non-compliance	Description	
Audit Ref: 3.1 With: Clause 15.2 and 15.37B(b)	In absolute terms, total annual consumption is estimated to be 11,200 kWh lower than the DUML database indicates. 8 items of load have incorrect ballast wattage recorded. Potential impact: Medium Actual impact: Medium Audit history: Once	
From: 01-Sep-19	Controls: Moderate	
To: 31-Aug-20	Breach risk rating: 4	
Audit risk rating	Rationale for audit risk rating	
Medium	The controls are rated as moderate, because they are sufficient to ensure that changes to the database are correctly recorded most of the time. The impact is assessed to be medium, based on the kWh differences described above.	

Actions taken to resolve the issue	Completion date	Remedial action status
The accuracy issues raised in this report have been provided to the council for resolution.	18 Sept 20	Identified
Preventative actions taken to ensure no further issues will occur	Completion date	
A full field audit will be recommended to confirm accuracy of the database following LED roll out.	Oct 2021	

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 total volume submitted to the Reconciliation Manager is based on a monthly database report derived from RAMM and the "burn time" which is sourced from data loggers installed on the Counties and Powerco networks. 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 audited during Meridian's reconciliation participant audit and EMS' agent audit.

The capacities supplied to EMS for June 2020 were checked and confirmed to be the same as the database.

The previous audit found that the ballast capacities were not recorded in RAMM but were added in the monthly report. This matter is now resolved, and the ballast capacities are recorded in RAMM.

There is some inaccurate data within the database used to calculate submissions. This is recorded as non-compliance and discussed in **section 3.1** and **3.2**.

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.

The previous audit found that submission information is allocated to the incorrect ICPs due to a reporting issue. This has now been resolved.

Audit outcome

Non-compliant

Non-compliance	Description		
Audit Ref: 3.2 With: Clause 15.2 and	In absolute terms, total annual consumption is estimated to be 11,200 kWh lower than the DUML database indicates.		
15.37B(c)	Submission is based on a snapshot and does not consider historic adjustments.		
	Potential impact: Medium		
	Actual impact: Medium		
	Audit history: Once		
From: 01-Sep-19	Controls: Moderate		
To: 31-Aug-20	Breach risk rating: 4		
Audit risk rating	Rationale for	audit risk rating	
Medium	The controls are rated as moderate, because they are sufficient to ensure that changes to the database are correctly recorded most of the time.		
	The impact is assessed to be medium, based on the kWh differences described above.		
Actions to	aken to resolve the issue	Completion date	Remedial action status
The accuracy issues raised in this report have been provided to the council for resolution.		18 Sept 20	Identified
Where we are aware of significant retrospective changes to database quantities historic submissions are revised accordingly.		In place	
Processes and reporting to manage minor retrospective/mid month changes (e.g. bulb changes/removals/additions) are being considered.			
Preventative actions taken to ensure no further issues will occur		Completion date	
A full field audit will be recommended to confirm accuracy of the database following LED roll out.		Oct 2021	

CONCLUSION

The database is remotely hosted by RAMM Software Ltd. The field work and asset data capture is conducted by McKay Electrical using Pocket RAMM. HDC manage the database and Power Solutions produce the monthly wattage report, on behalf of the HDC, and provide this to Meridian on a monthly basis.

The main findings are as follows:

- 1. The issue found during the last audit where reporting was incorrect has now been resolved.
- 2. In absolute terms, total annual consumption is estimated to be 11,200 kWh lower than the DUML database indicates.
- 3. Submission is based on a snapshot and does not consider historic adjustments.
- 4. There were a small number of incorrect ballasts for 250 w HPS lights.

This audit found three non-compliances and no recommendations are made. The future risk rating of 12 indicates that the next audit be completed in 12 months and I agree with this recommendation.

PARTICIPANT RESPONSE