AUDIT REPORT

PUBLIC LIGHTING ASSETS

Sunshine Coast Council

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EXECUTIVE SUMMARY

An ageing network in poor condition using inefficient lighting technology facing global obsolescence places the Sunshine Coast Council with significant future decisions.

It must decide how best to provide the community with the service of public lighting that continues to shape the council's vision to be the most sustainable region in Australia.

In accordance with a contractual agreement between Council and Citelum, an audit of Council's public lighting assets was undertaken between December 2013 and February 2014.

The contractual agreement resulted from a drive within Council to seek alternative and financially viable opportunities, outside of business as usual.

The data compiled from the field audit provides crucial information regarding the quantity, composition and condition of Council's public lighting assets. This audit report provides a detailed summary of the process and methodology of collecting information in the field, in addition to summarisation of the data in a succinct and clear structure.

In summary, key informational aspects of the audit report are:

- Definition and summarisation of the audit data: quantity, composition, condition
- Analysis of key findings and trends
- Valuation of the asset base using a discounted cash flow methodology
- Age of the assets
- Exposure to a potentially sharp and unexpected cost increase due to transition of Rate 2 assets to Rate 1
- Condition of the assets
- Technological obsolescence, particularly in relation to mercury vapour lamps, which comprise almost 60% of the assets.
- Exposure to continually increasing ACS charges, with limited capacity to influence cost increases. The regulated business model for energy distribution provides the DNSP with a guaranteed rate of return for capital, with comparatively high costs of capital.

This report will provide Council with accurate information and a robust foundation on which to base future decisions regarding their public lighting assets.

Key findings of the report are as follows:

The Audit discovered

- approximately $1,600,598 in Energex overcharges over 4 years for Rate 1 assets for 3824 assets older than 20 years.
- maintenance costs may rise $1,652,100 per annum due to the significant number Rate 2 Assets that have been found to be in a poor or bad condition and the number of Rate 2 assets aged 20+ years. It is possible that these assets will be replaced by the DNSP, causing a Rate 1 Charge to Council.
- maintenance costs may rise following a European and US Ban in 2015 for the production and sale of Mercury Vapour lamps. Council has 14,949 mercury vapour lamp types.
- 70% of the network is identified as 10 years or older.
- the quality of the poles being supplied for new Rate 2 sub-division installations has been found not to meet Energex's Technical guidelines. This may cause a failure of poles and the resultant increase in Council costs.
- the majority of luminaires installed are of a type that provide little or no glare control. This design feature causes visual discomfort and creates upward waste light, and unnecessary sky glow.

1. INTRODUCTION

1.1 Contractual Background

On 18 October 2013 Sunshine Coast Council (Council) executed Contract 1112021, contracting a public lighting services company Citelum Australia Pty Ltd (Citelum) to provide Council with public lighting management services.

The contractual agreement was the result of a drive within Council to seek an alternative public lighting services management structure to business as usual.

The initial part of the contractual arrangement required Citelum to undertake a comprehensive field audit of Council's public lighting assets, and provide a detailed audit report to Council. The field audit was completed on 27 February 2014. Further reviews and analysis were then undertaken on the database during March 2014.

A key contractual intent of the audit activity is to enable Council to make a decision regarding whether to proceed past an initial hold point in Contract 1112021 and continue negotiations with the DNSP to gain ownership of the public lighting assets, thereby allowing outsourcing of maintenance of the asset base.

1.2 Purpose of Audit and Audit Report

The field audit is crucial to ascertain the quantity and composition of assets that comprise Council's public lighting network, whilst also collecting detailed assessment of the condition of the assets. Furthermore, the audit data enables a verification process, comparing the inventory on which monthly billing is based and the actual assets that exist on the ground.

The purpose of the audit report is to summarise the findings from the field audit and provide assessment and analysis of the asset data. Citelum intends, within this report, to provide Council with accurate information and a robust foundation on which to base future decisions regarding their public lighting assets and to estimate an accurate written down value of the lighting points and associated electrical assets.

Key informational aspects of the audit report are:

- The information in this report is correct as at the date of 26 March 2014
- Definition and summarisation of the audit data: quantity, composition, condition
- Summary and analysis of key findings and trends
- Valuation of the asset base using a discounted cash flow methodology

In particular, the audit report will enable Council to make reasonable and informed decisions in relation to:

- The financial viability of incurring a Transfer Cost in order to transfer ownership of assets from the DNSP to Council
- Estimation of the value of the Transfer Cost

Valuation of the asset base is discussed and summarised within Attachment 2.

2. SCOPE OF THE AUDIT

2.1 Geographic Scope

As at 18 October 2013, the date of contract execution, the geographic area of the Council included the area currently known as Noosa Shire Council. It was known at the time of contract execution that the Noosa Shire Council was to be de-amalgamated from the Council, effective 1 January 2014.

Accordingly, Contract 1112021 specified that the geographic area remaining within Council's boundaries (following de amalgamation of Noosa Shire Council) would provide the boundary limitations to define the geographic scope of the field work.

Following contract execution, Council provided mapping information to finalise the geographical boundaries of the audit. It should be noted that the mapping information provided included the Noosa Shire Council region, and used the regions of the former Maroochydore and Caloundra Shire Council's to finalise the geographical boundaries of the audit.

2.2 Input Dataset

2.2.1 Initial Dataset

In November 2013, Council provided a dataset of public lighting assets, extracted from Council's GIS mapping service. This followed a meeting between Council and the Citelum held on 8 November 2013 to discuss the commencement of the audit and informational requirements of Citelum. The minutes of this meeting are included within Attachment 1.

It is noted that this dataset included assets requiring exclusion from the scope of the audit, such as those belonging to Noosa Shire Council, Queensland Rail, DTMR and Watchman Lights. The age of this information set is unknown.

These out of scope assets were manually extracted using a combination of known asset field ownerships. The remaining dataset was integrated into CMMS software, providing the scope and basis for the audit field work.

2.2.2 Billing Dataset

In January 2014, Council provided a copy of the asset inventory list that received from the DNSP within a monthly billing cycle. This inventory list is to be known as the billing dataset, for the purposes of this report.

The billing dataset was incorporated into the audit dataset as part of the data interrogation and analysis phase.

2.2.3 Input Dataset Variance

It should be noted that a variance of 6.47% existed between the number of assets within the December billing inventory list provided by the DNSP and the number of extracted assets within the GIS mapping provided by Council in November 2013.

2.3 Dataset – Asset Groups

2.3.1 Group 1 Assets

The focus and intention of the audit field work is to ascertain the quantity, composition and condition of Council's public lighting assets, particularly those lighting assets that are considered "street lights". These are the lighting assets that are categorised as Rate 1, Rate 2 or Rate 3 and belong within NMI's 31950000501 and 31950000491 for the purpose of energy retailing. For the purpose of this audit report, these assets are known as Group 1 Assets.

GROUP 1 ASSETS		
RATE 1	**RATE 2**	**RATE 3**
Generally an asset that comprises of both the luminaire and bracket that is mounted on a wooden or concrete pole carrying overhead electrical distribution cables connected to an unmetered network.	Generally an asset that comprises of both a luminaire and a steel pole connected to an unmetered network.	A decorative luminaire connected to unmetered network.
Public lighting supplied, installed, owned and maintained by the DNSP [1]	Public lighting for which all supply and installation costs are funded by the Public Body or Developer and then ownership is vested in Energex on completion of the installation. The DNSP then assumes responsibility for maintenance of the asset [1]	Public lighting supplied, installed, owned and maintained by the Public Body [1]

Table 1. Group 1 Assets [1] Energex – Public Lighting – Standard Conditions for Public Lighting Services V04

Rate 1, 2 and 3 assets are typically comprised of:

- Poles
- Brackets/arms
- Luminaires
- Lamps
- Cables (The cables that form part of the public lighting network comprise from the terminal connection point or from the downside of the connection point associated with the distribution network to the end of the luminaire).

2.3.2 Group 2 Assets

During collaborative discussions with Council, it was agreed to collect data in relation to lighting assets within parks (such as those associated with barbeques, club houses and public toilet blocks), other lighting assets used in residential streets and public areas.

For the purposes of this audit report, these assets are known as Group 2 Assets. The audit identified 4,824 Group 2 Assets, which are outside the scope of the audit report. It is proposed to provide Council with a separate Group 2 Assets Report at a later stage.

The scope of Group 2 Assets was limited to lighting points installed externally on public amenities, for example BBQ shelters and toilet blocks.

GROUP 2 ASSETS		
Unknown if metered (NMI) or unmetered		
Park/Public Amenities	**Residential Streets**	**Carparks**
The audit will include all lights in public areas other than those on an administrative building. By way of example, barbeque shelter, ground level mounted lights and public amenities lights would be included.	Light fittings located within the road reserve that serve the purpose of providing street lighting	Light fittings that are located in a carpark owned by Council

Table 2. Group 2 Assets

2.4 Supporting Information

As part of the GIS mapping information provided by Council in November 2013, additional spatial datasets were included, such as public amenities, open spaces, water bodies, localities and localities of interest. These spatial datasets played a crucial role in ensuring that auditing teams were well orientated whilst conducting the audit field work, and are listed within Table 3.

ADDITIONAL SPATIAL DATASETS	
➢ Water bodies and courses	➢ Park fixtures, BBQ shelters
➢ Community markets	➢ Localities of interest
➢ Railways	➢ Wifi access points
➢ Rural fire brigade	➢ Environmental landmarks
➢ Urban fire stations	➢ Council facilities
➢ Public artwork	➢ Non-government facilities
➢ Bus stops	➢ Localities
➢ Capital works	➢ Open spaces
➢ Beaches	➢ Pathways
➢ Bridges	➢ Property boundaries
➢ Airport runway	➢ Public amenities
➢ Traffic signals	➢ Recreation facilities
➢ Buildings	➢ Roads

Table 3. Additional Spatial Datasets

3. AUDIT METHODOLOGY AND PLANNING

3.1 Methodical Approach

A key planning aspect of the audit was development of a clear methodology for the audit field work to ensure accuracy and consistency.

Particularly, the methodology focussed on preparing predefined structures for collection of information during the field work. These predefined structures considered segmentation of the audit geographic region, development of an audit language and terminology, classification levels and categorisation hierarchy and a process for handling new, missing and obsolete assets.

A methodical and structured approach ensures:

- Consistency of information collection during the field work
- Output of a reliable audit dataset to be used for analysis and to inform decision making
- Verification and comparison of assets on the ground with those that exist within inventory lists on which monthly billing is based
- Detailed condition information to inform valuation of the public lighting assets

3.2 Geographic Segmentation

The geographic audit area was divided into 16 segments, based upon the density and locality of each area. Areas that contain a fewer number of lighting assets were identified as being able to be audited by a roaming audit team, whilst coastal areas that contain a higher density of lighting points were identified as requiring a larger amount of time and resources during the field work.

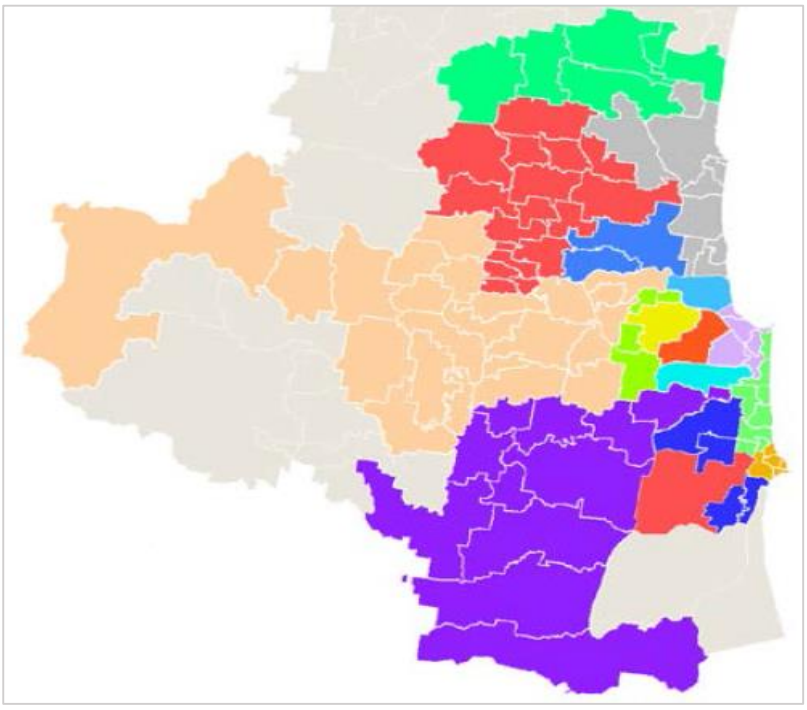

Figure 1. Geographic Segmentation

3.3 Integration of Dataset and Information

As described in Section 2.2, Council provided an existing set of information relating to Council's public lighting assets, in addition to other supporting information. The intention of this was to optimise the execution and outcome of the audit.

After receiving this information from Council in early November 2013, the data was integrated into CMMS software and prepared for use as part of the field work.

The software used during the audit is part of the Computerised Maintenance Management System (CMMS) used by Citelum around the world to manage 2.5 million lighting points.

Specifically, this process involved reviewing the different fields and information available in the provided datasets and selecting those relevant to the audit, discussion and operation activities. Selected fields and information are mapped within the CMMS, then inputted to a central database.

3.4 Terminology

An audit language and terminology was developed for use within the audit database to capture the majority of scenarios that would arise during the audit field activity and to derive logical conclusions as necessary.

Given the complexity and detail of the audit field work, this facilitated consistency during information collection, and ensured that any party interrogating, querying and analysing the dataset would determine and draw similar conclusions.

3.5 Classification and Categorisation

3.5.1 Domain (Location)

This classification level specifies the location of the asset into five pre-defined categories:

- Street lighting Installation
- Traffic Light Installation
- Street Furniture Installation
- Park and Pedestrian Installation
- Other type of Installation

It should be noted that classification level was also used to define the assets as Group 1 or Group 2 Assets.

3.5.2 Installation Type

This categorisation pertains to the type of installation and includes the following categories:

- Dedicated Lighting Pole
- Ornamental Lighting Installation
- Public Amenities Direct Mount
- Shared Transmission Pole
- Traffic Light Mounted
- Wall Mounted

3.5.3 Asset Categorisation – General

ASSET CATEGORISATION	
➢ Other Asset	Captures all Group 2 Assets
➢ Existing Asset	Asset exists on the ground and has a matching record within the billing dataset.
➢ Missing Asset	Asset exists within the January 2014 billing dataset but is not identified on the ground.
➢ New Asset	Asset is identified on the ground but does not exist within the January 2014 billing dataset.
➢ Watchman Lights	This category is in place to capture watchman lights identified during the audit field work. These security lights are generally located on a shared transmission pole. The scope of the audit included recording these assets, where relevant. In the case of watchman lights, the audit teams were asked to record, where relevant, the property lit by the watchman light.
➢ Department of Transport and Main Roads	A number of major roads within the Council region are the responsibility of the Department of Transport and Main Roads. Contract 1112021 excludes DTMR assets from the audit scope. At times, the audit field work required verification of assets placed at the intersection of a Council road and DTMR road to ensure that the audit field work captured all Council assets.
➢ Traffic Lights	Some Council assets are located on traffic light installations. A specific category was created to record these assets

Table 4. Asset Categorisation

3.5.4 Categorisation – Charging Mechanism

As described earlier in the report, Group 1 Assets are defined as either Rate 1, 2 or 3. These rates provide a categorisation for a charging mechanism by the DNSP.

To support analysis, valuation of the asset base and verification of the current billing inventory, a categorisation method was developed and implemented for identifying public lighting assets as Rate 1, 2 or 3 as part of the audit process.

The categorisation method is designed to capture majority of scenarios. The categorisation method and possible scenarios are summarised within Table 5. This categorisation largely relies on accepted energy industry generalisations in relation to public lighting to assist those collecting data in the field to ascertain/assign a charging mechanism category to each asset.

ASSET CATEGORISATION – CHARGING MECHANISM		
Asset Category	**Rule**	**Categorisation**
➢ Other Asset	Not a street light	Group 2 Asset
➢ Existing Asset	Assigned Rate 1 within the billing dataset	1
	Assigned Rate 2 within the billing dataset	2
	Assigned Rate 3 within the billing dataset	3
➢ Missing Asset	Assigned Rate 1 within the billing dataset	R1
	Assigned Rate 2 within the billing dataset	R2
	Assigned Rate 3 within the billing dataset	R3
➢ New Asset (Rule is based on domain, installation category and pole composition)	Pole is timber/concrete construction	Assumed Rate 1
	Pole is steel/construction	Assumed Rate 2
	Pole is decorative	Assumed Rate 3
➢ Queensland Rail Asset	Asset belongs to Queensland Rail	R8
➢ Watchman Light	Asset is a Watchman Light	R9

Table 5. Asset Categorisation – Charging Mechanism

3.6 Condition Assessment

The process of giving each lighting point a condition rating relies on a baseline list of anomalies prepared prior to the audit field work commencing. Each anomaly is assigned a specific rating, depending on the severity of the situation.

The audit teams were trained to inspect the assets and list all the anomalies found. The condition rating of an asset is defined by the most critical rating level among the anomalies. In specific cases, where the defect cannot be found in the prepared list, the auditors were required to record any unusual situation.

PRE-DEFINED ANOMOLIES - POLES	
ANOMOLY	**CONDITION RATING**
➢ No pole number on an existing asset	Fair
➢ Pole number incomplete	Fair
➢ Graffiti or poster	Fair
➢ Paint peeling or scratches	Fair
➢ Corrosion / rust	Poor
➢ Exposed cables	Bad
➢ Leaning pole / poorly aligned	Bad
➢ Damaged / dented / cracked	Bad
➢ Access door open / missing	Bad

Table 6. Pre-defined anomalies – Poles

PRE-DEFINED ANOMOLIES – ARM/BRACKET	
ANOMOLY	**CONDITION RATING**
➢ Corrosion / rust	Poor
➢ Leaning / poorly aligned / bent	Bad

Table 7. Pre-defined anomalies – Arm/Bracket

PRE-DEFINED ANOMOLIES - LUMINAIRE	
ANOMOLY	**CONDITION RATING**
➢ Diffuser dirty which may affect performance	Fair
➢ Diffuser dirty affecting performance	Bad
➢ Water or moisture in luminaire	Bad
➢ Exposed cables	Bad
➢ Poor paint / corrosion	Fair
➢ Diffuser missing/ damaged	Bad
➢ Body cracked / missing / damaged	Bad
➢ Tree trimming required	Fair
➢ External factors	Fair
➢ No date stamp / sticker	Fair
➢ Date stamp / sticker present but unreadable	Fair
➢ No lamp type stamp / sticker	Fair
➢ Lamp type stamp / sticker present but unreadable	Fair

Table 8. Pre-defined anomalies – Luminaire

PRE-DEFINED ANOMOLIES - LAMP	
ANOMOLY	**CONDITION RATING**
➢ Lamp ON during daytime	Bad
➢ Lamp OFF at night	Bad

Table 9. Pre-defined anomalies – Lamp

PRE-DEFINED ANOMOLIES - OTHER	
ANOMOLY	**CONDITION RATING**
➢ No date/lamp type expected	Good
➢ Lighting pit cracked or damaged	Fair
➢ Accessories affected: damaged or poor state	Fair
➢ Public safety hazard	Bad
➢ Missing asset	Bad

Table 10. Pre-defined anomalies – Other

3.7 Resourcing

The geographic area and clusters of public lighting concentrations were considered in order to determine the number of audit teams required to complete the audit field work within the contractual timeframes.

Sufficient personnel were sourced to create six audit teams, each consisting of two persons. The role of each person within the audit team is described within section 4.2.

3.8 Training

3.8.1 General

Comprehensive training was undertaken with each individual field auditor to carry out the audit field work. This training included:

- Provision of a specific set of tools and equipment
- Provision of guidelines and information regarding Workplace Health & Safety
- Specific training for the use of audit software
- General training regarding public lighting concepts

Training on the auditing process, methodology and required outcomes, particularly:

- Collection methodology
- How to specify an asset category
- How to specify asset category (e.g. street lighting, decorative);
- How to record installation type (e.g. shared transmission pole, dedicated pole, wall mount);
- How to record details of the asset, including composition (e.g. pole, arm(s), luminaire(s));
- How to list anomalies;
- How to choose a condition rating based on anomalies;
- How to record lamp type and date information where available on luminaires;
- How to record additional information and comments on any specific situation.

3.8.2 Data Collection Process

During the training provided to field auditors, the importance of respecting a strict process was emphasised, to minimise human error.

Strictly following a linear input process facilitated a high quality and consistency of data collection, as well as a higher input speed. It also ensured a consistent data collection methodology across audit teams.

Each audit team was provided with the following instruments to control, update or create information in the audit database in a structured, organised and controlled manner:

- Tablet computer with touch screen for data input,
- Compact camera with GPS receiver
- Distance meter to verify pole height, when relevant,
- In car charger for both camera and table computer

3.8.3 Vehicles guidelines & safety equipment

Particular training and instruction was provided to the person appointed as the designated driver within each audit team. These instructions were based on regulations and policies of Citelum, including driving speed, parking and low speed driving.

All vehicles were equipped with a flashing light to be used as appropriate, in conjunction with the vehicle's warning lights. Additionally, reflective stickers bearing the message *"Car stopping frequently"* were installed on the back window of each car.

3.8.4 Safety Awareness

All persons involved in the audit field work were inducted into Citelum's safety management system, in compliance with all relevant legislative requirements.

Furthermore, safety of audit field workers was promoted by providing each person with a safety jacket, protection hat, sunscreen, sunglasses, first aid kit and daily supply of water.

4. AUDIT – EXECUTION

4.1 Timeline

During the audit planning stages, a timeline was established to consider field work, input and review of data to the CMMS and additional time contingences to allow for data cleansing and rectification of information gaps within the dataset.

The schedule of audit field work was based on 6 audit teams, each averaging a daily collection of 200 lighting points. The audit field work commenced on 18 November 2013 and ran for the duration of 5 weeks.

During the early stages of the field work, audit teams averaged a lower daily collection rate due to a learning phase. From the second week onward, the audit teams significantly improved the efficiency of data collection, averaging 250 lighting points per team per day.

In early 2014, the data collected during the field work was consolidated into the CMMS and then exported into a format from which data analysis and interrogation could occur.

Further field work was required during February 2014 as part of the data cleansing process, with field work completed on 27 February 2014. This audit report relies on the data collected and verified at this point in time.

Given that assets on the ground may be removed, new assets may be installed and so forth, it is pertinent to note that the database should be considered "live" in this regard.

4.2 Audit Team Composition - Data Input and Inspection

As discussed in section 3.8.2, auditors were trained to adhere to a strict data input process for each asset, outlined in Table 11.

DATA INPUT PROCESS – AUDIT FIELD WORK	
➢ **STEP 1**	Take picture, confirm and input picture number
➢ **STEP 2**	Define category and installation type
➢ **STEP 3**	Collect asset details
➢ **STEP 4**	Collect date and lamp type
➢ **STEP 5**	List anomalies
➢ **STEP 6**	Add any relevant comments

Table 11. Data Input Process

Each of the six teams comprised of two auditors; a designated driver and data input auditor. Each auditor maintained their designated role throughout the survey to ensure consistency in condition assessment and in data input.

AUDIT FIELD TEAMS	
ROLE	**KEY TASKS**
➢ Data Input Auditor	▪ Ensure the correct location and numbering of the audited asset in the dataset, and correct position where relevant ▪ Ensure sequence between picture number and reference input ▪ Record all information collected by the driving auditor ▪ Ensure all required data is collected. Instruct driver to recover any missing information ▪ Define condition rating depending on anomalies detected
➢ Driving Auditor	▪ Drive in a safe and responsible manner ▪ Take a picture of the audited asset ▪ Verbally identify both asset number and picture number ▪ Inspect the audited assets ▪ Scout and inspect surroundings to ensure all assets are recorded

Table 12. Audit Field Teams

4.3 Data Collection

DATA COLLECTED	
A	The lighting point reference number or asset number allocated to that existing lighting point. During the audit, if no lighting point number was found, a new unique asset number was allocated to the asset
B	Height of luminaire
C	Height of pole
D	Type of luminaire
E	Type of lamp. For newly added asset, the lamp type was recorded only if available on the luminaire
F	Condition rating. This condition rating is based on a list of anomalies associated with a level of severity, as explained in Audit training section
G	Ownership details (if available at the time of the Audit)
H	XY coordinate location
I	Details (including anomalies) of other electrical assets in connection with each existing lighting point (for example, bracket length, traffic lights, signs)
J	The date stamp on the luminaire (if observable)
K	Anomalies for the lighting point including damage to the luminaire, bracket or fuse and any tree trimming required
L	Verification of Rate Type (refer to Section 3.5.4)

Table 13. Data Collected

4.4 Control Method

A daily control method was employed during the audit field work to ensure data quality and provide additional information to the audit teams as required.

The control process involved reviewing the data collected by all teams, such as selection of pole, luminaire and arm categorisation, in addition to identification of anomalies and quality of pictures.

Additionally, the performance of teams was monitored on a daily basis to ensure project flow occurred in accordance with initial scheduling. This allowed for timely adjustment of resources, if necessary.

Weekly summaries and continuous training were provided to the audit staff.

4.5 Data Review

Towards the end of the audit and the beginning of the audit report, a thorough data review was undertaken. Senior personnel with an extensive understanding of the composition of the lighting assets then questioned the dataset with the project.

This process involved undertaking specific queries in relation to the dataset. During the data review stage, it was identified that some items of collection were missed and this resulted in secondary field audit activities to review those items.

5. AUDIT RESULTS

As described earlier within the report, a key purpose of the audit report is to provide Council with summarisation of the audit data (quantity, composition and condition), analysis of key findings and trends and to support a valuation of the asset base.

Additionally, the audit data collected enables a verification process, comparing the inventory listed within the January 2014 billing data and the audit dataset resulting from the identification of actual assets that exist on the ground. This is important for Council to gain a robust understanding of the quantity of lights within their asset base and associated costs.

5.1 Summarisation of Audit Data

5.1.1 Quantity of Assets

The audit dataset identifies that there are 25,011 Group 1 (Rate 1, 2 and 3) assets on the ground.

Table 14 shows a comparison of the quantity of assets within the audit dataset, to the quantity of assets within the inventory list provided by the DNSP as part of Council's January 2014 billing cycle.

ASSET QUANTITY - COMPARISON		
Inventory List (per billing January 2014)	**Audit Dataset – February 2014**	**Variation**
24,791	25,011	0.88%

Table 14. Asset Quantity - Comparison

Table 15 provides a categorisation of the Audit Dataset asset quantity as per charging mechanism. The categorisation draws upon the asset categorisation outlined in Tables 4 and 5, which have been inserted below for ease of reference.

ASSET CATEGORISATION – CHARGING MECHANISM		
Asset Category	**Rule**	**Categorisation**
➢ Other Asset	Not a street light	Group 2 Asset
➢ Existing Asset	Assigned Rate 1 within the billing dataset	1
	Assigned Rate 2 within the billing dataset	2
	Assigned Rate 3 within the billing dataset	3
➢ Missing Asset	Assigned Rate 1 within the billing dataset	R1
	Assigned Rate 2 within the billing dataset	R2
	Assigned Rate 3 within the billing dataset	R3
➢ New Asset (Rule is based on domain, installation category and pole composition)	Pole is timber/concrete construction	Assumed Rate 1
	Pole is steel/construction	Assumed Rate 2
	Pole is decorative	Assumed Rate 3

Excerpt from Table 5. Asset Categorisation – Charging Mechanism

ASSET CATEGORISATION	
➢ Other Asset	Captures all Group 2 Assets
➢ Existing Asset	Asset exists on the ground and has a matching record within the billing dataset.
➢ Missing Asset	Asset exists within the January 2014 billing dataset but is not identified on the ground.
➢ New Asset	Asset is identified on the ground but does not exist within the January 2014 billing dataset.

Excerpt from Table 4. Asset Categorisation

AUDIT DATASET – FEBRUARY 2014 – ASSET CATEGORISATION			
Asset Category	Categorisation	Quantity	Percentage
Existing Asset	1	8,257	33.0%
Existing Asset	2	15,239	60.9%
Existing Asset	3	550	2.2%
Subtotal		**24,046**	**96.1%**
New Asset	Assumed Rate 1, 2 or 3	865	3.5%
Missing Asset	R1, R2 or R3	100	0.4%
Total		**25,011**	**100%**

Table 15. Audit Dataset – Asset Categorisation

Based on these data results the council should be charged on 24,911 assets as 100 assets are currently missing and 865 assets are new assets, however it should be noted that often there is a delay between construction and data making its way onto the billing data.

5.1.2 New and Missing Assets

- New Asset: Asset is identified on the ground but does not exist within the January 2014 billing dataset. Please note that there is a current delay between new subdivisions being built and the transition to billing.
- Missing Asset: Asset exists within the January 2014 billing dataset but is not identified on the ground.

New Assets

As per Table 5, new assets are categorised as either Assumed Rate 1, 2 or 3. Using the categorisation and classifications described in section 3.5, the methodology for categorising new assets uses “Domain”, “Asset Category” and pole composition (using the industry accepted assumption that concrete or timber poles are generally shared transmission poles).

Secondary categorisation identifies the assets as major or minor, depending on the type and wattage of the lamp.

NEW ASSETS – CATEGORISATION						
Asset Category	**Domain**	**Installation**	**Pole Composition**	**Major**	**Minor**	**Total**
Assumed Rate 1	"Street lighting installation"	"Shared transmission pole"	Pole is timber/ concrete construction	31	159	190
Assumed Rate 2	"Street lighting installation"	"Dedicated street lighting pole"	Pole is steel/ construction	181	470	651
Assumed Rate 3	"Street lighting installation"	"Dedicated street lighting pole"	Pole is decorative	0	24	24
Total				212	653	865

Table 16. New Assets – Categorisation

Reconciliation of the January 2014 billing dataset and the audit dataset shows that there are 865 assets that exist on the ground, for which Council is not currently being billed:

- 190 Assumed Rate 1 assets for which Council currently not being bill for the capital cost recovery and maintenance charge within the DNSP's ACS charge, or energy charges from the retailer.
- 651 Assumed Rate 2 assets for which Council is currently not being billed for the maintenance charge within the DNSP's ACS charge, or energy charges from the retailer,
- 24 Assumed Rate 3 assets for which Council is not paying energy charges from the retailer.

Missing Assets

Missing assets are those that exist within the January 2014 billing dataset but are not identified on the ground during the audit field work. Categorisation of these is simple, as the rate assigned in the billing dataset can be used.

MISSING ASSETS – CATEGORISATION				
Asset Category	**Rate assigned in billing dataset**	**Major**	**Minor**	**Quantity**
R1	1	8	12	20
R2	2	11	13	24
R3	3	31	25	56
Total		50	50	100

Table 17. Missing Assets – Categorisation

Reconciliation of the January 2014 billing dataset and the audit dataset shows that there are 100 assets that Council is currently being billed for, which do not exist on the ground.

- 20 Rate 1 assets for which Council should not be billed the capital cost recovery and maintenance charge within the DNSP's ACS charge, or energy charges from the retailer.

- 24 Rate 2 assets for which Council should not be billed the maintenance charge within the DNSP's ACS charge, or energy charges from the retailer,
- 56 Rate 3 assets for which Council should not be billed energy charges from the retailer.

5.1.3 Pole Composition

The audit identified that the majority of Council's street lighting assets have a pole composition of concrete, steel or timber. Table 18 provides an overview of the number of assets with these pole compositions.

POLE COMPOSITION – AUDIT DATASET		
Pole Type	**Quantity**	**Percentage**
Concrete	226	1%
Steel	16,015	64%
Timber	8,534	34%
Other	236	1%
Total	25,011	100%

Table 18. Pole Composition – Audit Dataset

POLE COMPOSITION – AUDIT DATASET - ASSET CATEGORISATION 1			
Pole Type	**Asset Category**	**Count**	**Percentage**
Concrete	1, Assumed Rate 1 and R1	132	58.4%
	2, Assumed Rate 2 and R2	94**	41.6%
	3, Assumed Rate 3 and R3	0	0%
	Total	**226**	**100%**
Steel	1, Assumed Rate 1 and R1	1,177**	7.3%
	2, Assumed Rate 2 and R2	14,445	90.2%
	3, Assumed Rate 3 and R3	393	2.5%
	Total	**16,015**	**100%**
Timber	1, Assumed Rate 1 and R1	7,154	83.8%
	2, Assumed Rate 2 and R2	1,357**	15.9%
	3, Assumed Rate 3 and R3	23	0.27%
	Total	**8,534**	**100%**
Others(*)	1, Assumed Rate 1 and R1	4	1.7%
	2, Assumed Rate 2 and R2	18	7.6%
	3, Assumed Rate 3 and R3	214	90.7%
	Total	**236**	**100%**
	TOTAL	**25,011**	

Table 19. Pole Composition – Audit Dataset – Asset Categorisation 1

(*) Others comprised the following:

- Alloy Pole
- Stainless Steel Pole
- Navigation Light
- BBQ Shelters
- Embedded Lighting
- Up-lighting
- Wall Mounted Lighting

AUDIT DATASET – FEBRUARY 2014 – ASSET CATEGORISATION 2				
Pole Type	**Quantity**	**Rate 1**	**Rate 2**	**Rate 3**
Concrete	226	132	94(**)	0
Steel	16,015	1,177**	14,445	393
Timber	8,534	7,154	1,357**	23
Others	236	4	18	214
Total	25,011	8,467	15,914	630
Percentage	**100%**	**33.85%**	**63.6%**	**2.25%**

Table 20. Pole Composition – Audit Dataset – Asset Categorisation 2

Comment

(**) These installations are an exception to the rule that Rate 1 installations are all concrete poles and Rate 2 are steel poles. Typically a Rate 1 installation is a wooden pole/concrete pole with overhead transmission lines. This may require further discussion with Energex as to define the history of the installation.

5.1.4 Luminaire Types

Table 21 shows the distribution of luminaire types across the audit dataset.

LUMINAIRE TYPES			
	Luminaire Type/Model	**Quantity**	**Percentage**
➢	Sylvania Nostalgia	4791	19.16%
➢	Sylvania Avenue	4779	19.11%
➢	Sylvania Roadster full cut-off	2719	10.87%
➢	Sylvania Urban HID semi cut-off	2525	10.10%
➢	Sylvania "Cupcake" B2224	2133	8.53%
➢	Sylvania Roadster semi cut-off	1132	4.53%
➢	Sylvania B2222 semi cut-off	876	3.50%
➢	Sylvania "Cupcake" B2223	862	3.45%
➢	Sylvania Suburban HID semi cut-off	789	3.15%
➢	Sylvania Urban HID full cut-off	734	2.93%
➢	Sylvania GTE B3000 (requires verification)	412	1.65%
➢	Sylvania B3000 semi cut-off	394	1.58%
➢	Other semi cut-off luminaire	388	1.55%
➢	Sylvania Roadspan standard/top full cut-off	285	1.14%
➢	Sylvania Roadspan standard/top semi cut-off	280	1.12%
➢	Sylvania B3000 full cut-off	264	1.06%
➢	We-ef "Wedge" PFL series	232	0.93%
➢	Spotlight (pedestrian & others)	220	0.88%
➢	Other full cut off	201	0.80%
➢	GEC Optispec semi cut-off	191	0.76%
➢	Sylvania B2222 full cut-off	135	0.54%
➢	Fluorescent tube light fitting	146	0.58%
➢	Sylvania "Cupcake" B2001 Top	107	0.43%
➢	Sylvania Urban semi cut-off	93	0.37%
➢	Decorative	48	0.19%

Table 21. Luminaire Types – Audit Dataset

➢	LED functional fitting	46	0.18%
➢	Suburban semi cut-off	44	0.18%
➢	Sylvania Roadster (requires verification)	41	0.16%
➢	Sylvania Urban (requires verification)	29	0.12%
➢	Sylvania Urban full cut-off	29	0.12%
➢	Security or spot lighting	20	0.08%
➢	Unspecified model	17	0.07%
➢	Sylvania Roadspan (requires verification)	10	0.04%
➢	Sylvania B2222 (requires verification)	9	0.04%
➢	Sylvania stallion	8	0.03%
➢	Sylvania Suburban HID full cut-off	7	0.03%
➢	GEC Optispec full cut-off	6	0.02%
➢	Sylvania Suburban Eco semi cut-off	6	0.02%
➢	Sylvania Hampton	2	0.01%
➢	We-ef ALP/BOP/BLP series	1	0.00%
	Total	25,011	100%

Particularly, Table 21 shows that two types of luminaires, Sylvania Nostalgia and Sylvania Avenue comprise 38.18% of the street lighting assets. Also highlighted is that only six types of luminaires comprise 72.28% of the network, all of which are manufactured by Sylvania and are installed across major and minor roads. These luminaires are typically of basic technology and used by DNSP's across Australia.

5.1.5 Lamp Family and Type

Lamp types are coded on each streetlight luminaire according to the wattage within the lamp. It was a requirement in Australian Standards to mark the outer body of the luminaire with certain amounts of information that would assist utilities identify the lamp installed and to ease maintenance procedures. The DNSP maintained its membership of that committee through the Energy Supply Association of Australia and the requirement to mark luminaires externally is still a requirement of ASNZS1158.6.

DISTRIBUTION OF LAMP TYPES – AUDIT DATASET			
	Lamp Family	**Quantity**	**Percentage**
➢	Mercury Vapour	14,949	59.77%
➢	High Pressure Sodium	9,258	37.02%
➢	Metal Halide	80	0.32%
➢	Fluorescent	250	1.00%
➢	LED	47	0.19%
➢	Unknown type of lamp	427	1.71%
	Total	**25,011**	**100%**

Table 22. Lamp Types – Audit Dataset

Rate 1 Assets

RATE 1 – DISTRIBUTION OF LAMP TYPES – AUDIT DATASET		
Lamp Family	**Quantity**	**Percentage**
➢ Mercury Vapour	5,143	60.74%
➢ High Pressure Sodium	3,194	37.70%
➢ Metal Halide	5	0.06%
➢ Fluorescent	21	0.25%
➢ LED	1	0.01%
➢ Unknown type of lamp	103	1.22%
Total	**8,467**	**100%**

Table 23. Rate 1 – Distribution of Lamp Types

RATE 1 – MAJOR LAMP WATTAGES			RATE 1 – MINOR LAMP WATTAGES		
Type of Lamp	**Quantity**	**Percentage**	**Type of Lamp**	**Quantity**	**Percentage**
S100	765	35.32%	F14	7	0.11%
S150	740	34.16%	F18	3	0.05%
S250	325	15%	F26	3	0.05%
M250	197	9.1%	F32	6	0.10%
M400	77	3.55%	F36	1	0.02%
S400	57	2.63%	F58	1	0.02%
H150	4	0.18%	LED	1	0.02%
H400	1	0.05%	M125	713	11.32%
Total	**2,166**	**100%**	M250	1	0.02%
			M50	3,248	51.55%
			M80	907	14.39%
			S50	246	3.90%
			S70	1,061	16.84%
			Unknown lamp	103	1.63%
			Total	**6,301**	**100%**

Table 24. Rate 1 – Distribution of Major and Minor Lamp Types

Rate 2 Assets

RATE 2 – DISTRIBUTION OF LAMP TYPES – AUDIT DATASET		
Lamp Family	**Quantity**	**Percentage**
➢ Mercury Vapour	9,768	61.38%
➢ High Pressure Sodium	5,798	36.43%
➢ Metal Halide	9	0.06%
➢ Fluorescent	48	0.30%
➢ LED	37	0.23%
➢ Unknown type of lamp	254	1.60%
Total	**15,914**	**100%**

Table 25. Rate 2 – Distribution of Lamp Types

RATE 2 – MAJOR LAMP WATTAGES			RATE 2 – MINOR LAMP WATTAGES		
Type of Lamp	**Quantity**	**Percentage**	**Type of Lamp**	**Quantity**	**Percentage**
H400	3	0.08%	F14	12	0.10%
M250	3	0.08%	F26	5	0.04%
M400	10	0.27%	F32	27	0.22%
S100	908	24.77%	F36	4	0.03%
S150	2,054	56.04%	H35	6	0.05%
S250	651	17.76%	LED	37	0.30%
S400	36	0.98%	M125	75	0.61%
Total	**3,665**	**100%**	M50	5,082	41.49%
			M80	4,598	37.54%
			S50	481	3.93%
			S70	1,668	13.62%
			Unknown lamp	254	2.07%
			Total	**12,249**	**100%**

Table 26. Rate 2 – Distribution of Major and Minor Lamp Types

5.1.6 Comment – Quantity and Composition of Assets

Mercury Vapour Lamps

The high proportion of Rate 2 Minor Road Mercury Vapour lamps poses a significant concern for Council in consideration of technology obsolescence.
The Audit identified 14,949 Mercury Vapour lamps representing 59.77% of the network (see table 22).
The 125 watt Mercury has been classified as Major but this may need further investigation as to whether it actually falls under the Minor category.

Comment

Mercury Vapour lamps are facing global obsolescence. Both the US and Europe have legislation that would seek to ban the manufacture, importation and distribution of this lamp type through their respective jurisdictions.

From 2015, the EU passed legislation that would remove the CE mark from the lamp thereby effectively preventing the lamp from being sold. The members of the European Lamp Companies Federation comprise of lamp manufacturers that comprise 95% of all sales of lamps within the EU and this organisation supports the ban of Mercury Vapour lamps throughout the EU.

In addition to this, the United Nations are seeking to reduce the use of Mercury through globally binding legislation under the United Nations Environment Programme UNEP INC 3. The goal of this programme is as follows:

"Reducing the level of mercury in lamps and moving towards energy-efficient mercury-free Alternatives," - UNEP (DTIE)/Hg/INC.3/4

Australia does not manufacturer lamps especially Mercury Vapour lamps and any company other Philips, GE, OSRAM Venture and EYE lighting simply rebrand their lamps from other manufacturers.

Through legislation such as Minimum Energy Performance Standards (MEPS), the banning of the Incandescent GLS Lamp occurred in 2009. Energy Efficiency programs have been in operation in Australia for 20 years and lighting technologies have been regulated since 2003.

Already we can identify within Australian Standards that the design and installation of new Category P lighting schemes does not permit the use of the Mercury Vapour lamps.

Australian Standard 1158.3.1:2005 states:

"The use of high pressure mercury lamps in new Category P lighting schemes is not permitted," effective after 31 December 2010.

It is foreseeable within the next five years from 2015-2020, that Australia will follow and ban the importation and sale of the Mercury Vapour lamp.

Age of Assets

The audit dataset identifies an ageing asset base. Tables 27, 28 and 29 group the assets by categorisation and age.

AGE OF ASSETS – AUDIT DATASET		
Year Range	**Quantity**	**Percentage**
➢ 1/ Less than 5 years	2,497	10.0%
➢ 2/ 5 years up to 10 years	5,199	20.8%
➢ 3/ 10 years up to 15 years	4,103	16.4%
➢ 4/ 15 years up to 20 years	1,058	4.2%
➢ 5/ More than 20 years old	1,125	4.5%
➢ 6/ No date (pre-1990)	8,263	33.0%
➢ 7/ Date unreadable	2,478	9.9%
➢ 8/ No date expected	288	1.2%
Total	**25,011**	**100%**

Table 27. Age of Assets – Audit Dataset

AGE OF ASSETS – AUDIT DATASET – Rate 1 Major and Minor				
Year Range	Rate 1 Major Assets		Rate 1 Minor Assets	
	Quantity	Percentage	Quantity	Percentage
➢ 1/ Less than 5 years	165	7.6%	601	9.5%
➢ 2/ 5 years up to 10 years	248	11.4%	784	12.4%
➢ 3/ 10 years up to 15 years	138	6.4%	449	7.1%
➢ 4/ 15 years up to 20 years	82	3.8%	566	9.0%
➢ 5/ More than 20 years old	149	6.9%	535	8.5%
➢ 6/ No date (pre-1990)	956	44.1%	2184	34.7%
➢ 7/ Date unreadable	384	17.7%	1170	18.6%
➢ 8/ No date expected	44	2.0%	12	0.2%
Total	**2,166**	**100%**	**6,301**	**100%**
TOTAL		**8,467**		

Table 28. Age of Assets – Audit Dataset – Rate 1 Major and Minor

AGE OF ASSETS – AUDIT DATASET – Rate 2 Major and Minor				
Year Range	Rate 2 Major Assets		Rate 2 Minor Assets	
	Quantity	Percentage	Quantity	Percentage
➢ 1/ Less than 5 years	601	16.4%	1,120	9.1%
➢ 2/ 5 years up to 10 years	1,055	28.8%	3,000	24.5%
➢ 3/ 10 years up to 15 years	521	14.2%	2,981	24.3%
➢ 4/ 15 years up to 20 years	123	3.4%	287	2.3%
➢ 5/ More than 20 years old	74	2.0%	367	3.0%
➢ 6/ No date (pre-1990)	725	19.8%	4,089	33.4%
➢ 7/ Date unreadable	553	15.1%	350	2.9%
➢ 8/ No date expected	13	0.4%	55	0.4%
Total	**3,665**	**100%**	**12,249**	**100%**
TOTAL		**15,914**		

Table 29. Age of Assets – Audit Dataset – Rate 2 Major and Minor

Comment

By adding "5/ More than 20 years old" and"6/ No date", the Audit reveals:

- 3824 Rate 1 assets, and
- 5255 Rate 2 assets
- Total 9079 assets representing 37.5% of the network are over 20 years old.

This may pose a twofold risk exposure to Council:

- Council has been paying for capital contribution on Rate 1 assets
- Rate 2 assets may be replaced at any time, then transferred from Rate 2 to Rate 1, incurring a higher ACS charge.

It should be noted that the basis for assuming that assets categorised as "6/ No date" were installed prior to 1990 relies on the premise that Australian Standards in 1990 required Luminaire Manufacturers to mark the outside of the luminaire with indelible paint quality, noting the lamp type the luminaire accommodated and the year in which the luminaire was produced.

Condition rating

As describe earlier within the report, the audit dataset captured information relating to the condition of each asset. Tables 30, 31 and 32 group the assets by the highest condition rating given to the asset.

CONDITION OF ASSETS – AUDIT DATASET		
Condition Rating	**Quantity**	**Percentage**
➢ 1 - Good	6,970	27.87%
➢ 2 - Fair	11,097	44.37%
➢ 3 - Poor	3,241	12.96%
➢ 4 - Bad	3,703	14.81%
Total	**25,011**	**100%**

Table 30. Condition of Assets – Audit Dataset

CONDITION OF ASSETS – AUDIT DATASET – Rate 1 Major and Minor				
Year Range	**Rate 1 Major Assets**		**Rate 1 Minor Assets**	
	Quantity	**Percentage**	**Quantity**	**Percentage**
➢ 1 - Good	498	22.99%	1,941	30.80%
➢ 2 - Fair	1,169	53.97%	3,476	55.17%
➢ 3 - Poor	312	14.40%	473	7.51%
➢ 4 - Bad	187	8.63%	411	6.52%
Total	**2,166**	**100%**	**6,301**	**100%**

Table 31. Condition of Assets – Audit Dataset – Rate 1 Major and Minor

CONDITION OF ASSETS – AUDIT DATASET – Rate 2 Major and Minor				
Year Range	**Rate 2 Major Assets**		**Rate 2 Minor Assets**	
	Quantity	**Percentage**	**Quantity**	**Percentage**
➢ 1 - Good	1,294	35.31%	3,042	24.83%
➢ 2 - Fair	1,349	36.81%	4,814	39.30%
➢ 3 - Poor	571	15.58%	1,807	14.75%
➢ 4 - Bad	451	12.31%	2,586	21.11%
Total	**3,665**	**100%**	**12,249**	**100%**

Table 32. Condition of Assets – Audit Dataset – Rate 2 Major and Minor

Comment

The majority of assets that are in a poor or bad condition are Rate 2 assets.

Of the Rate 2 assets that are in poor and bad condition, 34.71% of the Rate 2 assets are in a condition which would normally trigger an upgrade and therefore transfer to a Rate 1 charging mechanism, thereby presenting a price cost risk increase to the Sunshine Coast Council.

Of the steel pole types, 5778 poles are either in a poor or bad condition. The steel pole types are predominantly Rate 2 Assets.

Where these poles are replaced due to poor or bad condition, this may trigger a transfer to Rate 1, thereby increasing Council's charges. If the Council chose to replace those poles independent of the DNSP there would be significant capital cost.

Citelum undertook verification of the required service life of the poles and brackets within the technical standard published by Energex.

Following are relevant excerpts from this document;

> *12. RELIABILITY*
> *12.1. Guarantee*
> *Tenderers are required to guarantee the reliability and the performance of the Poles, Outreach Arms & Brackets offered for a* ***service life of thirty five (35) years*** *under the specified system and environmental conditions by specifying the guaranteed performance and service life in the Attachments of Technical Details.*
>
> *12.2. Service Life*
> *Where the specified guaranteed service life is less than thirty five (35) years Tenderers are required to provide comment and submit evidence in support of the reliability and performance claimed including detailed information on Failure Mode and Effect Analysis*

Further investigation was undertaken by contacting the manufacturer with the current contract for supply of poles to the DNSP. It was indicated that the stated life of the poles was in accordance with Energex specifications, identifying an inconsistency to the technical standards published by the DNSP.

> *"Street lighting poles are designed in accordance with the criteria specified by the relevant public utility (e.g. Energex, Ergon or Main Roads).*
>
> *If your query relates more to the expected life of a heritage pole, it is worth noting that these poles are supplied as a powdercoated product and that both Energex and Ergon only offer a 12 month warranty for these products. The expected life of the pole is certainly much greater than 12 months and in non-coastal applications a powdercoated product could expect to perform quite well for more than 5 years provided it is maintained and undamaged. Poles which are hot dip galvanized only and if installed correctly and maintained, a minimum of 10 years under normal operating conditions (i.e. not marine) could be expected."*

This indicates Council may be exposed to a cost impact as the transition to Rate 1 may occur well before the end of useful life of a pole, particularly in relation to poles supplied to the DNSP and on sold to property developers for the purpose of new public lighting installations.

Anomalies

There are 55,624 anomalies noted within the audit dataset, across various levels of severity. Each asset may have one, or several, anomalies given that each component of the composition of each asset has been assessed.

Table 33 provides an overview of the more notable anomalies and quantity of assets.

ANOMALIES – POLES, BRACKETS, LAMPS, LUMINAIRES
➢ 13,221 **poles** were identified as having an anomaly of some kind
➢ 1,084 **poles** are affected by graffiti or posters
➢ 6,202 **poles** are scratched or have paint peeling
➢ 468 **poles** have stickers missing from Pole Identification Number
➢ 4,006 **poles** are affected by rust or corrosion
➢ 852 **poles** are cracked or dented
➢ 1,658 **brackets** are affected by rust or corrosion
➢ 245 **brackets** are leaning or poorly aligned
➢ 427 **lamps** were not working at the time of night auditing
➢ 434 **lamps** were operating during daylight hours
➢ 50 **lamps** were flickering
➢ 9,319 **luminaires** were dirt to the point it affected lighting performance
➢ 2,181 **luminaires** were severely dirty and affecting lighting performance
➢ 881 **luminaires** have a cracked body or diffuser missing
➢ 241 **luminaires** were affected by moisture, indicating a sealing issue
➢ 1,448 **luminaires** were affected by overhanging trees, reducing performance

Table 33. Anomalies –Poles, Brackets, Lamps, Luminaires

5.2 Financial and Risk Analysis

This section provides a high level identification of key financial and risk exposures identified during analysis and assessment of the audit data.

The financial analysis comparisons concluded within this audit report are based upon the latest billing data from Energex as of January 2014 and make reference to the ACS charges detailing 2014-2015 Tariff charges.

5.2.1 Risk analysis

There are a number of key risk exposures currently attributed to Council's public lighting network, namely technology obsolescence, ageing of the network and the condition of the network.

Technology Obsolescence

From a global perspective, the European Union (EU) has forewarned the banning of importation, production and sale of Mercury Vapour lamps in 2015 by removing the CE Mark from the lamps, meaning that GE, Philips and Sylvania / OSRAM and manufacturers operating out of the European Lighting Market will be prohibited from selling Mercury Vapour lamps.

From 2012 metal halide and high pressure sodium lamps will no longer be put on the market for sale and by 2015 high pressure mercury lamps will follow.

In this regard, the EU has the following directive:

> *The ErP - Energy related Product - legislation (Commission Regulation (EC) No 245/2009) promotes energy efficiency and energy-efficient products in terms of their environmental impact.*

General Electric (GE) made the following comment regarding the removal of the CE mark from all Mercury Vapour lamps:

> *This legislation is a directive of the European Parliament and council regarding eco-design requirements for lamps, ballasts and luminaires. Formerly known as the EuP, it affects the availability of such products in EU27 countries.*

In addition to these global aspects of regulating the supply of certain types of products, we must look more broadly into the overarching schemes and legislation that is being passed that reduce energy costs.

The rapid transition of streetlighting to LED also needs to be considered as manufacturers focus their product development of solely considering LED over previous technologies.

Replacement of these mercury lamps with another accepted and approved type of lamp may result in two key risks:

- Shortage of supply, resulting in exposure to price increases and volatility as the market adjusts to demand for a different lamp type

- Potential reduction of lighting quality as a result of sourcing lesser known lamp types

In addition, a number of governments around the world have taken legislative and regulatory action in an effort to markedly reduce their energy footprint. The United States Congress passed maximum wattage standards for general service incandescent lamps as part of the Energy Security and Independence Act of 2007, which phase in between 2012 and 2014 and effectively require a 25 percent increase in the efficacy of general service incandescent lamps. (US Department of Energy, 2013)

As in the United States, the European Union, the United Kingdom, Japan, China, India, Russia, Brazil, Canada, Australia, Cuba, Taiwan, and Korea have all passed stringent regulations or phase-outs of incandescent bulbs, taking effect between 2008 and 2017. IHS forecasts that these regulations will reduce unit shipments of incandescent lamps from 49 percent of shipments in 2011 to 12 percent in 2020. (IHS, 2012)

Major lighting manufacturers are phasing out sale of inefficient incandescent lamps to meet these energy efficiency standards.

It is reasonable to consider that these risks may potentially affect both the maintenance and capital cost recovery portions of the ACS charge, and under the National Electricity Rules, the DNSP is able to pass on costs extenuating from external market situations, with Council having a limited capacity to influence this outcome.

Ageing of the Network

The network is aged with almost 70% of the network identified within the audit dataset as being 10 years and older.

The key risk associated with the age of the asset base is the sharp increase in cost when transition of an asset from Rate 2 to Rate 1 occurs.

The audit dataset identifies 15,914 Rate 2 assets. Table 29 provides a summary of the age categories of these assets, and shows that 1,443 Rate 2 Major assets may be considered 10 years and older, whilst 7,724 Rate 2 Minor assets may be 10 years and older.

Table 34 provides a high level exemplification of the cost exposure to the transition of assets from Rate 2 to Rate 1, based on the quantity of Rate 2 assets within the audit dataset and using the DNSP's ACS charge for financial year 2013/14.

Table 34 shows that the transition from Rate 2 to Rate 1 assets, both major and minor, will incur a 267% increase in the ACS charge, corresponding directly to a 267% potential cost increase.

TRANSITION OF ASSETS FROM RATE 2 TO RATE 1 – 10 years and older					
Rate / Lamp Category	**Quantity**	**Age**	**ACS Charge ($/light/day)**	**ACS Charge ($/light/yr)**	**Total Yearly Cost**
Major Rate 2	644	10 – 20 years	$0.30	$109.50	$70,518
Major Rate 1	644	10 – 20 years	$1.10	$401.50	$258,566
Major Rate 2	799	20 years and older	$0.30	$109.50	$87,491
Major Rate 1	799	20 years and older	$1.10	$401.50	$320,799
Minor Rate 2	3,268	10 – 20 years	$0.12	$43.80	$143,138
Minor Rate 1	3,268	10 – 20 years	$0.44	$160.60	$524,841
Minor Rate 2	4,456	20 years and older	$0.12	$43.80	$195,173
Minor Rate 1	4,456	20 years and older	$0.44	$160.60	$715,634
				Percentage Increase	267%
				Potential Cost Increase/Yr	$1,323,520

Table 34. Potential Cost Exposure – Transition of assets from Rate 2 to Rate 1

5.2.2 Capital Contribution

The economic life of the street lighting asset is 20 years. From the audited data as shown in Table 28 and selecting the data from rows 5 & 6 we can ascertain that council has been contributing capital paid on Rate 1 charges beyond the economic life of the asset.

CAPITAL COST					
Rate / Lamp Category	**Quantity**	**Description**	**ACS Charge ($/light/day)**	**ACS Charge ($/light/yr)**	**Total Yearly Cost**
Major Rate 1	1105	Energex ACS Charge	$1.10	$401.50	$443,657.50
Capital	1105	Diff between Rate 1 /Rate 2 Charge	$0.80	$292.00	$322,660.00
Maintenance	1105	ACS Rate 2 Major	$0.30	$109.50	$122,997.50
Capital Difference between Maintenance and ACS Charge Rate 1 pa					$201,662,50
Over 4 years capital cost paid to Energex for assets older than 20 years					$806,550.00
Minor Rate 1	2,719	Energex ACS Charge	$0.44	$160.60	$436,671.40
Capital	2,719	Diff between Rate 1/ Rate 2 charge	$0.32	$116.80	$317,579.20
Maintenance	2,719	ACS Rate 2 Minor	$0.12	$43.80	$119,092,20
Capital Difference between Maintenance and ACS Charge Rate 1 pa					$198,487.00
Over 4 years capital cost paid to Energex for assets older than 20 years					$793,498.00
Total Overpayments cumulative over 4 years					**$1,600,598.00**

Table 35. Capital Contribution to Aged Rate 1 Assets.

Comment

By calculating the difference between the Rate 1 Charges and the Rate 2 Charges we are able to ascertain the capital payment difference on Rate 1 charges the council has been paying on assets that have exceeded the 20 year life.

Therefore if can be shown above that the Council has been overpaying capital for Rate 1 assets over 4 years totalling $1.6M.

It should be noted that this value is based on current ACS charges and therefore the values may be slightly inflated compared to previous charges. Internal business modelling from SSC indicates that ACS charges have risen 9% per annum and therefore this adjustment needs to be considered.

Condition of the Network

There are further financial exposures for Council attributed to the condition of the network. Particularly, there is a key risk associated with Rate 2 assets that are in poor or bad condition as these may be replaced or upgraded at any time as they age or degrade further, or are not performing to design life expectations, potentially exposing Council to a sharp increase in cost.

Given that 6,944 assets are identified as being in poor or bad condition, Council is potentially exposed to a directly relative increase in costs over this number of assets.

5.3 Summary

The audit dataset, and analysis of the same, highlights key considerations pertaining to Council's public lighting assets, particularly from a financial and asset management perspective.

These key considerations are summarised as:

- Age of the assets
- Exposure to a potentially sharp and unexpected cost increase due to transition of Rate 2 assets to Rate 1
- Condition of the assets
- Technological obsolescence, particularly in relation to mercury vapour lamps, which comprise almost 60% of the assets.
- Exposure to continually increasing ACS charges, with limited capacity to influence cost increases. The regulated business model for energy distribution provides the DNSP with a guaranteed rate of return for capital, with comparatively high costs of capital.

Strategic management of these key issues and mitigating, or eliminating the associated financial and asset management risks should be considered within the parameters of Council's desire to explore financially viable opportunities, outside of business as usual.

5.3.1 Application for Special Circumstances

It is estimated based on the audit that the following assets require immediate attention in accordance with the contract. According to the contract, the cost of these works equates to approximately $1.6M AUD. It is proposed that Council invest this into Part B of the contract.

INSTALLATION TYPE – OTHERS		
Installation	**Quantity**	**Cost**
➢ Replace new luminaire up 100 watts	850	$375,864
➢ Install new luminaire 100-400 watts	30	$24,647
➢ Install new pole 4.0m-7.0m	103	$241,717
➢ Install new pole 7.0m-12.0m	83	$258,109
➢ Replace Broken Cracked Diffuser	1419	$537,792
➢ Repair light operating during the day	143	$47,687
➢ Repair light not operating at night	414	$153,693
Total	**3042**	**$1,639,509**

Table 36. Application of Special Circumstances

Comment

The cost to repair the network could also be used to negotiate the cost of the transfer of assets as these items above are required to ensure the network is functioning properly.

5.4 Opportunities for Improvement

Given that nearly 60% of Council's lighting assets are of Mercury Lamp Types, an opportunity for energy efficiency exists via targeted replacement of these assets. Mercury vapour lamps are considered an inefficient lamp due to the amount of power (watts) it takes to convert to light (lumens) described in lighting terms as efficacy.

Further, the audit dataset identified that a number of lamps were incorrectly illuminated during the day, representing wasted energy and providing an opportunity for repair and replacement to achieve energy and cost savings.

5.5 Other Lights

Throughout the audit "Other" lights were captured as part of the audit. As discussed during the Audit workshop there was no available data on these assets that would assist the audit team in classifying or locating the lighting point.

During the Audit, 4,824 assets that are currently classified as "Others" were identified by data collection. They are generally considered as metered lighting points and therefore outside of the scope of the audit in relation to the transfer.

The metrics for value and costs associated with these assets are different to those assets which are part of the transfer and therefore we propose to treat them separately.

The analysis of the "Other" assets will be detailed in a separate report.

For general information we have summarised some high level information below.

Methodology

Using the same audit methodology, the audit teams ascertained on site where the installation was located and therefore were able to distinguish whether the asset should or should not be in billing:

- Park and Pedestrian Installation
- Street Furniture Installation
- Other type of installation

These assets were then classified against the following rules:

- Dedicated Lighting Pole
- Ornamental Installation
- Public Amenities Direct Mount
- Wall Mount

INSTALLATION TYPE – OTHERS		
Installation	**Quantity**	**Percentage**
➢ Dedicated Lighting Pole	1476	30%
➢ Ornamental Installation	1657	34%
➢ Public Amenities Direct Mount	1513	31%
➢ Wall Mount	178	4%
Total	**4824**	**100%**

Table 37. Installation Type Others

Using the same methodology we are able to ascertain the following about the assets:

Condition Rating

CONDITION OF ASSETS – OTHERS		
Condition Rating	**Quantity**	**Percentage**
➢ 1 - Good	1,457	30%
➢ 2 - Fair	1,895	39%
➢ 3 - Poor	697	15%
➢ 4 - Bad	775	16%
Total	**4824**	**100%**

Table 38. Condition Rating on Others

Comment

The audit of the “other” assets reveals a similar condition of assets to those of Rate 1 and rate 2 Assets, in particular the “poor” and “bad” condition ratings.

This poses a risk to Council to repair or replace these assets, to ensure correction and safe operation.

APPENDIX 1 Glossary

ACS	Alternative Control Service
AER	Australian Energy Regulator
AEMO	Australian Energy Market Operator
ASNZS	Australian Standards New Zealand Standards
BAU	Business As Usual as detailed in the Contract
CMMS	Computerised Maintenance Management System
Contract	Council Public Lighting Contract 1112021
Council	Sunshine Coast Council
DNSP	Distribution Network Service Provider (Energex)
DTMR	Department of Transport and Main Roads
GIS	Geographical Information Service
Major Road	Lamps in common use for Major Road lighting including: a) High Pressure Sodium 100 watt (S100) and above; b) Metal Halide 150 watt (H150) and above; and c) Mercury Vapour 250 watt (M250) and above.
Minor Road	All lamps in common use for Minor Road lighting, including: (a) Mercury Vapour 80 watt (MV80), (b)High Pressure Sodium (S50 and S70) and (c) Fluorescent (CFL and T5).
NER	National Electricity Rules
Network	Public Lighting Network within Sunshine Coast Council
NEL	National Electricity Law
NMI	National Metering Identification Number
QCA	Queensland Competition Authority
Rate 1	Non Contributed (Rate 1): Lighting: Public Lighting supplied, installed, owned and maintained by Energex.
Rate 2	Contributed (Rate 2) Lighting: Public Lighting for which all supply and installation costs are funded by the Public Body or Developer and then ownership is vested in Energex on completion of the installation. Energex then assumes responsibility for maintenance of the installation;
Rate 3	Unmetered (Rate 3) Lighting: Public Lighting supplied, installed, owned and maintained by the Public Body.
SCC	Sunshine Coast Council
Lighting Terminology	
FL	Fluorescent
CFL	Compact Fluorescent Lamp
HPS	High Pressure Sodium
INC	Incandescent
LED	Lighting Emitting Diode
LPS	Low Pressure Sodium
MH	Metal Halide
MV	Mercury Vapour
T5	16mm diameter lineal fluorescent
UNK	Unknown – Assets unable to be reliably identified during the audit – typically speciality or old (ancient) assets

REFERENCES

Australian Standards ASNZS1158.3.1-2005

Australian Standards AS3771-1990

Energex Public Lighting Poles and Brackets Technical Standard EX TS 300 Version D EE ETS05-02-01 Version 3

Energex Public Lighting Standard EX 03327 Version 4

Survey of Compliance with Registration Requirements – Lamps December 2013

Further comparative analysis of options for financial mechanisms to support the global legally binding instrument on mercury - United Nation Environment Programme UNEP (DTIE)/Hg/INC.3/4

ATTACHMENTS

Attachment 1 – Audit Meeting – Minutes – 8 November 2013
Attachment 2 – Valuation of Assets