The background of the page features a halftone dot pattern. The top half of the image is a light gray field with a white, irregular shape that resembles a map of Australia. The bottom half of the image is a darker, textured field, possibly representing a crop field or a field of tall grass.

# **Public Lighting Policy Community Consultation Decorative Lighting Overview**

**Prepared for**  
Maroondah City Council

| Version | Author        | Date      | Description of changes |
|---------|---------------|-----------|------------------------|
| V1a     | Keith Harwood | 25/2/2019 | First Draft            |
| V1b     | Keith Harwood | 26/3/2019 | Final Version          |
| V1c     | Keith Harwood | 1/4/2019  | Added glossary         |

**Prepared by**  
Ironbark Sustainability

Suite 8, 70-80 Wellington St, Collingwood 3066  
 ABN: 51 127 566 090  
 Ph: 1300 288 262 | [info@realaction.com.au](mailto:info@realaction.com.au) | [www.realaction.com.au](http://www.realaction.com.au)  
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Ironbark Sustainability is a specialist consultancy that works with government and business around Australia by assisting them to reduce energy and water usage through sustainable asset and data management and on-the-ground implementation.

Ironbark has been operating since 2005 and brings together a wealth of technical and financial analysis, maintenance and implementation experience in the areas of building energy and water efficiency, public lighting and data management. We pride ourselves on supporting our clients to achieve real action regarding the sustainable management of their operations.

#### **Our Mission**

The Ironbark mission is to achieve real action on sustainability for councils and their communities.

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# 1. Introduction

In 2018, Maroondah City Council developed a DRAFT Public Lighting Policy. The DRAFT Policy aims to provide guidance on the design, installation and management of public lighting within the municipality. It is Council's intention for the DRAFT Policy to promote a consistent approach to public lighting in Maroondah that reflects best practice and contributes to the sustainability and amenity of the municipality.

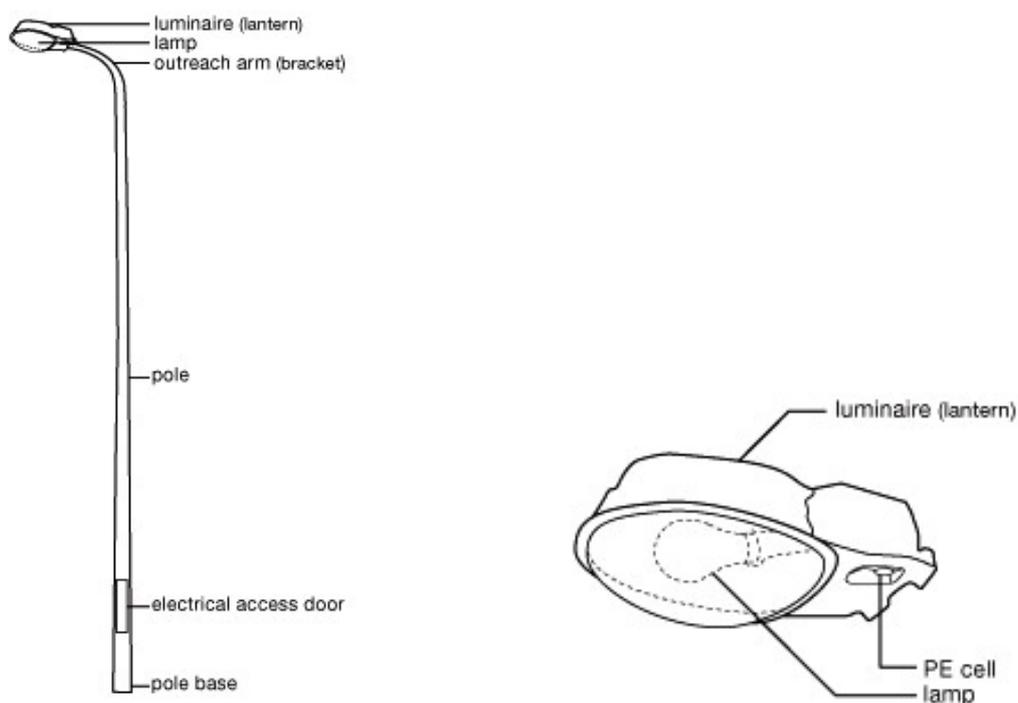
In late 2018 and early 2019 Council sought feedback from the community about the content and direction of the DRAFT Policy. One of the most common themes of the feedback related to Council's DRAFT policy position of replacing non-standard decorative street lights with standard street lights.

Many of the submissions received via the consultation process did not support the removal of existing decorative lighting. In response to this, Council has commissioned the development of this documents, which seeks to examine possible alternatives or solutions, and identify any potential changes that could be made to the DRAFT policy position.

## 2. Overview of Non-standard Street Lighting

### 2.1 Defining Street Lighting

All street lighting contains the same basic parts. Descriptions of these basic parts are found below.



**Figure 1: Pole and luminaire diagrams**

**Luminaire (lantern)** – A device that distributes, filters or transforms the light emitted by a lamp or lamps and which includes all the items necessary for fixing and protecting these lamps.

**Lamp (globe)** – The lamp emits light and is located within the luminaire (lantern).

**Photoelectric (PE) Cell** – A device that is normally incorporated in a luminaire that detects outside light levels to automatically switch the luminaire on and off as required.

**Bracket- (outreach arm)** – the supporting connection from the pole to the luminaire.

## 2.2 What is Non-standard street lighting

Non-standard street lighting provides developers with the opportunity to move away from a purely utilitarian form of street lighting and contribute to a streetscape that reflects a more bucolic or heritage aesthetic. The various styles, paint colours and accompanying pole types can be combined to clearly differentiate one development or precinct from the other and thus contribute to the unique identity of a neighborhood.



**Figure 2: Examples of non-standard street lights (left and centre) and a standard street light (right)**

## 2.3 Standard vs. Non-Standard Lighting

Besides the obvious aesthetic differences, the main differences between non-standard and standard street lighting relates to the ownership and maintenance structure.

Standard street lights are owned and managed by AusNet, whereas non-standard street lights are owned by Council and managed by AusNet. These differences in ownership structure impacts the obligations of AusNet in terms of how it operates and maintains non-standard street lights.

The financial implications of this ownership/management structure are discussed further in Section 3.2.1.

## 2.4 Council's Non-standard Street Lights

Two types of non-standard street lights are currently present in the City of Maroondah. These are top-entry luminaires as shown in Figure 3 and post-top luminaires as shown in Figure 4.



**Figure 3: Example top-entry luminaire**



**Figure 4: Example post-top luminaire**

## 3. Council's Existing DRAFT Policy Position

### 3.1 Overview

Council's existing DRAFT policy position states that:

- Council will not stock non-standard luminaires and poles for maintenance of unmetered public lighting.
- [Council]... will consider options for the replacement of non-standard unmetered street lighting with standard street lighting.

It should be noted that Council's existing DRAFT policy position does not explicitly state that it will undertake a program to transition existing non-standard unmetered street lighting to standard street lighting.

In addition to the above listed DRAFT policy positions, it should also be clarified that Council's DRAFT Public Lighting Guidelines states that new non-standard unmetered street lighting is not permitted in new developments. This will ensure that there is no growth in the number of non-standard street lighting assets within the municipality. It will also eliminate future conflict where/if Council seeks to replace non-standard unmetered street lighting with standard street lighting.

### 3.2 Why is Council Exploring Moving to Standard Assets?

Council's DRAFT policy position is predicated on a number of factors that combine to make non-standard street lighting assets an increasingly costly and risky option moving forward when compared to standard equivalents. These factors are detailed below.

#### 3.2.1 Tariff Structure

Standard street lights are owned and managed by AusNet. Council pays an annual service charge to AusNet to maintain the light and pole over its life. Under this arrangement, the service charge covers regular maintenance (scheduled lamp and PE cell replacement, visor cleaning) and the replacement of failed assets, be it a faulty luminaire or a damaged pole.

In contrast, non-standard street lights are considered the property of Council. Whilst Council still pays an annual service charge to maintain the light and pole over its life, failed assets are not covered by under this charge. Instead, Council is responsible for purchasing replacement poles and lights as well as for paying for the associated labour to carry out the replacement.

So, whilst a non-standard and standard street light of the same lamp type and wattage is charged out to Council for the same annual fee (approx. \$18 in 2018), the following additional costs apply for non-standard street lights upon failure:

- A luminaire that fails and needs to be replaced costs Council in the order of \$1,000 for parts and labour.

- A pole that fails and needs to be replaced costs Council in the order of \$3,500 for parts and labour.

### **3.2.2 Upcoming need for Replacement: Minimata Convention & Luminaire Age/Condition**

The signing of the Minimata Convention is currently being considered by the Australian government. If adopted this would prohibit the import, export and manufacture of certain mercury added products including the mercury vapour lamps commonly found in Council's non-standard street lights. The adoption would mean that mercury vapour lamps cannot be imported after 2020. Whilst AusNet will be able to draw down on lamp stockpiles after this date, once they are exhausted Council's non-standard street lighting will need to be replaced upon lamp failure. It is expected that all mercury vapour luminaires in Australia will need to be replaced by 2024 at the latest due to regulations that require lamps to be in service for no longer than 4 years.

Further to this, luminaires typically last 20 years. Many of the non-standard luminaires are now reaching this age. It is therefore expected that their condition will warrant an increased rate of replacement in the coming few years.

The fact that Council will be forced to replace non-standard lighting assets at an increasing rate over the coming years means that an opportunity exists to assess more economically viable replacement options using standard assets. In many cases, the capital costs associated with moving to standard assets can be seen as a cost saving because they would be \$500 to \$1,000 cheaper than non-standard assets depending on whether just the luminaire or both the luminaire and pole are replaced.

On top of this, moving to standard assets significantly reduces ongoing maintenance costs as discussed in Section 3.2.1.

### **3.2.3 Limited AusNet Approved Options**

Currently, a limited range of AusNet approved non-standard LED street lights are available to Council. This limits the ability of Council to provide aesthetically equivalent energy-efficient post-top luminaires should it seek to upgrade non-standard assets with like-for-like equivalents.

As it currently stands, approved non-standard LED street lights are available for Council's top-entry luminaires but not for its post-top luminaires (see Section 0 for details on Council's existing non-standard street lights).

Currently, no LED lamp retrofit option exists that would allow the existing mercury vapour lamp to be replaced with an LED equivalent without the need to remove the entire luminaire.

### **3.2.4 Compliance**

Recent analysis has identified poor lighting levels (when assessed against AS/NZS 1158.3.1) in select residential areas where non-standard lighting is present. Transitioning to standard street lighting, which has significantly better performance in terms of light distribution, would allow Council to deliver a higher quality of lighting to the community.

## 4. Upgrade Options

A range of options exist for Council when upgrading non-standard street lighting in the future. The following section provides a summary of each of these options. The upgrade options are broken up into two broad sub-categories:

- Those that result in a transition to standard assets that deliver reductions to ongoing maintenance and replacement costs; and
- Those that result in a retention of the existing aesthetics that non-standards assets provide.

Table 1 below provides a brief overview of costs and benefits of each upgrade option.

**Table 1: Overview of Upgrade Options**

| Option   | Capital Cost | Complexity | Aesthetic Appeal | Lighting Quality | Ongoing Cost | Ready to Progress |
|--|--------------|------------|------------------|------------------|--------------|-------------------|
| <b>Options to Transition to Standard Assets</b>                |              |            |                  |                  |              |                   |
| 1: Convert to standard luminaires and poles                    | \$\$\$\$     | Very high  | Medium           | High             | \$           | Yes               |
| 1a: Convert to standard luminaires and painted poles           | \$\$\$\$     | Very High  | Medium           | High             | \$\$         | Yes               |
| 1b: Convert to standard luminaires and poles to meet Standards | \$\$\$\$\$   | Very high  | Medium           | Very High        | \$\$         | Yes               |
| 2: Convert to standard luminaires, retain poles                | \$\$         | Medium     | Very-low         | High             | \$\$\$       | Yes               |

**Table 1 (Continued): Overview of Upgrade Options**

| Option   | Capital Cost | Complexity | Aesthetic Appeal | Lighting Quality           | Ongoing Cost | Ready to Progress                     |
|--|--------------|------------|------------------|----------------------------|--------------|---------------------------------------|
| <b>Options to Retain Existing Aesthetics</b>         |              |            |                  |                            |              |                                       |
| 3: Replace all luminaires with aesthetic equivalents | \$\$\$       | Medium     | Very high        | Moderate                   | \$\$\$\$\$   | Currently not possible for all lights |
| 4: Retrofit with LED lamps                           | \$           | High       | Very high        | Unknown (testing required) | \$\$\$\$\$   | Currently not possible                |

## 4.1 Transition to Standard Assets

A number of options exist if Council elects to transition to standard assets. These are detailed below.

### 4.1.1 Option 1: Convert to Standard Luminaires and Poles

This option would see both the pole and luminaire converted to standard assets as shown in the image below.

This scenario is the most expensive option due to the upgrade of both lights and poles. The process from both a DNSP and Council perspective also has high complexity. While it is expected that many of the pole replacements will be straight forward in nature, specific locations will require the use of non-destructive excavation where under-ground assets are in close proximity; re-instatement of pavement where required; and re-wiring of pole to pit where required to meet standards.

The aesthetic outcome is rated as medium because while the standard poles and lights will not have the same aesthetic appeal as the decorative lights and poles, the upgrade of both lights and poles at the same time will provide consistency in the look of the street lights.

The lighting quality outcome is rated as high because standard luminaires are able to achieve a maximum spacing that is 15-20m further than non-standard luminaires at the same mounting height. This means that a large portion of existing light-level non-compliances (which have been identified as an issue) could be addressed simply by converting to standard luminaries.

From an ongoing cost perspective, this option would present Council with the lowest of all the scenarios as it reduces both energy usage and maintenance/repair costs.

This option is able to be progressed within the current regulatory environment.



**Figure 5: Example of a standard luminaire and pole**

### **4.1.2 Option 1a: Convert to Standard Luminaires and Painted Poles**

As per Option 1, but with the inclusion of painted standard poles. Painted poles would provide the ability to retain some of the aesthetic value of the existing non-standard assets with black or green paint instead of plain galvanised poles.

Painted poles would not be serviced by AusNet in the same way as galvanised poles. Upon failure, painted poles would be replaced with galvanised poles and it would be Council's responsibility to ensure these are painted. Because of this, ongoing costs are slightly higher than using galvanised poles.



**Figure 6: Example of a painted standard pole**

### **4.1.3 Option 1b: Convert to Standard Luminaires and Modify Pole Spacing to meet Australian Standards.**

As per Option 1, however due to preliminary studies indicating that there are compliance issues with existing non-standard lighting assets, some pole locations may need to be modified to ensure a better level of lighting. This will increase the number of poles/luminaires required in certain areas adding to both the capital costs and ongoing costs.

#### 4.1.4 Option 2: Convert to Standards Luminaires, Retain Poles

This option would see luminaires converted to a standard asset with the existing non-standard pole retained.

The capital costs for this option are considered low because pole replacement is excluded and standard luminaires are considerably cheaper than non-standard luminaires.

The process with AusNet is relatively straightforward because there is a known, standard DNSP process. However, most lights will require spigot adaptors and/or require bespoke solutions to accommodate a standard luminaire and some lights may not be able to be replaced at all. This adds some complexity to the process and is likely to contribute to an already poor aesthetic outcome.

Aesthetically, this option is considered is very low due to the makeshift look of the final conversion.

The lighting quality outcome is rated as high because standard luminaires are able to achieve a maximum spacing that is 15-20m further than non-standard luminaires at the same mounting height. This means that a large portion of existing light-level non-compliances (which have been identified as an issue) could be addressed simply by converting to standard luminaries.

From an ongoing cost perspective, this option would still present Council with ongoing costs relating to pole maintenance and replacement. Luminaire costs, however would be significantly reduced.



**Figure 7: Example of a standard luminaire installed on a non-standard pole**

## 4.2 Retain Existing Aesthetic

A number of options exist if Council elects to retain the existing aesthetic when upgrading its non-standard street lighting assets. These are detailed below.

### 4.2.1 Option 3: Replace Luminaires with Energy Efficient Aesthetic Equivalents

This option involves the replacement of existing non-standards luminaires with aesthetically equivalent energy efficient luminaires. Existing poles would be retained.

This option is straightforward from a process point of view because there is a known, standard AusNet process. While the cost per light is not the cheapest option, it is cheaper compared with those that involve the replacement of poles. The aesthetic outcome is high for this scenario because the like-for-like replacement will result in an indiscernible difference in the appearance of the luminaire.

There are, however, limitations to the number of luminaires that can be replaced under this scenario because there are currently no energy efficient post-top non-standard luminaires approved by AusNet. As such, some luminaires would have to be retained and eventually upgraded to standards assets if no aesthetically equivalent luminaires are approved in the near future.

From an ongoing cost perspective, this is considered very high. Whilst it will see energy costs reduced, the ongoing cost issues related to non-standard assets will remain.

#### 4.2.2 Option 4: Retrofit with LED Lamp

This option involves retrofitting the existing mercury vapour lamp found inside each non-standard luminaire with an LED lamp. The existing luminaire and pole would be retained, making this a relatively cheap option.

Although LED retrofit lamps exist in the market, they are not yet approved by AusNet. Considerable complexity may exist in getting LED retrofit lamps approved by AusNet due to the testing that is required as well as the level of satisfaction that is required from AusNet that the LED lamps will not increase their maintenance obligations. This would require investment from a lamp supplier with no guarantee of success. As such it is unclear whether a lamp supplier would be willing to commit to the approval process.



**Figure 8: Example of an LED retrofit lamp**

Further to this, the way in which LED retrofit lamps operate within each luminaire from the perspective of light-distribution and thus compliance with Australian Standards is uncertain. This will necessitate the requirement of photometric testing and subsequent detailed lighting design to ensure lighting levels are not being compromised via a retrofit program. This will impose even more costs to the process, much of which would likely be borne by Council via the facilitation of a trial.

Another consideration for this option is the remaining useable life of the luminaire that the lamp is being retrofitted into. Typically, street lights are thought of as having a life expectancy of 20 years. Therefore, retrofitting luminaires that only have a few functional years left will diminish the cost effectiveness of a lamp retrofit project. This is due to the simple fact the entire streetlight body will need to be replaced in a few years, thus wasting the majority of the retrofit's functional lifespan. Therefore, the age of the existing luminaire will need to be considered if preparing for a project of this nature. Considering that the expected lifespan of a decorative street lighting fixture is 20 years and the payback of an LED lamp retrofit is close to 5 years, only non-standard luminaires 15 years or younger should be considered for this option. A full luminaire replacement should be considered for all decorative lighting older than 15 years.

## 5. Recommended DRAFT Policy Changes

There are a number of uncertainties that make it difficult to definitively determine the best option for Council to proceed. It is recommended that a final policy position is not developed until the following actions are carried out:

- Advocate to AusNet and relevant lighting suppliers for the approval of a non-standard post-top LED luminaire
- Advocate to AusNet relevant lighting suppliers for the approval of an LED retrofit lamp and better understand the cost implications to Council
- Should an LED retrofit lamp be approved, carry out sufficient due diligence (potentially via a Council-led trial) to ensure lighting levels are not compromised.
- Source more accurate cost data from AusNet for large-scale pole upgrade programs to better understand the cost implications of options 1, 1a and 1b.
- Carry out a detailed cost-benefit analysis of each option. This analysis should take into account the information obtained via the above listed actions as well as asset age data obtained from AusNet Services.