



Town of Cottesloe

LIGHTING STRATEGY

Town of Cottesloe 2021 to 2024

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1. Background

Street lighting plays a vital role for pedestrian, traffic and general public safety by illuminating roads and footpaths at night. A lighting audit has concluded that 84% of the gazetted roads within Cottesloe do not meet current standards. Given the limitation in both human and financial resources, a framework that takes into consideration a range of risk exposure factors is required to determine an order of priority for the District's lighting to be upgraded over time. This needs to be delivered in a way that minimises the risk of roads awaiting such improvements whilst others are being done.

This strategy identifies and prioritises non-compliant lighting regardless of infrastructure ownership within Cottesloe to improve both traffic and community safety. The improvements required ranges from increasing the number of luminaries to simply upgrading existing lights by modifying bulbs to light emitting diode (LED) type globes to meet standards. Priorities will then be communicated to the respective asset custodians, requesting for these works to occur.

It is expected that the delivery of the upgrade over time will reduce the risk of night time crimes and crashes to provide a vibrant, safe and reliable environment to the community as well as tourists and visitors. Other benefits of such enhancements include sustainable outcomes seen from reduced electricity consumption, cost effective maintenance and lowered carbon footprint.

2. Extent of Lighting Study

2.1 Geographical and Locality In and Out of Scope

The lighting study has been limited to only gazetted roads within the Town of Cottesloe Local Government boundary that has a total district area of approximately 4 km². Public open spaces and right of ways have not been included in this study given that these areas are not lighted but can be taken into consideration as part of their upgrade prioritised in separate strategies.



Fig 1: Existing Land use boundary within Town of Cottesloe

3. Current District Lighting

Western Power owns and maintains a majority of street lights within Cottesloe with the exception of the Curtin Avenue Shared Path and Infrastructure on the Train Station land where jurisdiction either sits with Main Roads Western Australia or the Public Transportation Authority.

This study has found that current street lamps are illuminated by the following types of globes with varying wattages (42, 70, 80, 125, 150 and 250), depending on the lighting standard required:

- Century old high pressure sodium light technology (mostly on Marine Parade, Curtin and Stirling highway),
- Mercury vapour/Universal (mostly on local distribution road),
- Metal Halide on Marine parade and on Curtin Ave,
- Compact Fluorescent (few are on local distribution road) and
- TOC owned solar lights.

Diagram below provides an overview of how the globe and wattage type for lights owned by Western Power are distributed throughout Cottesloe.

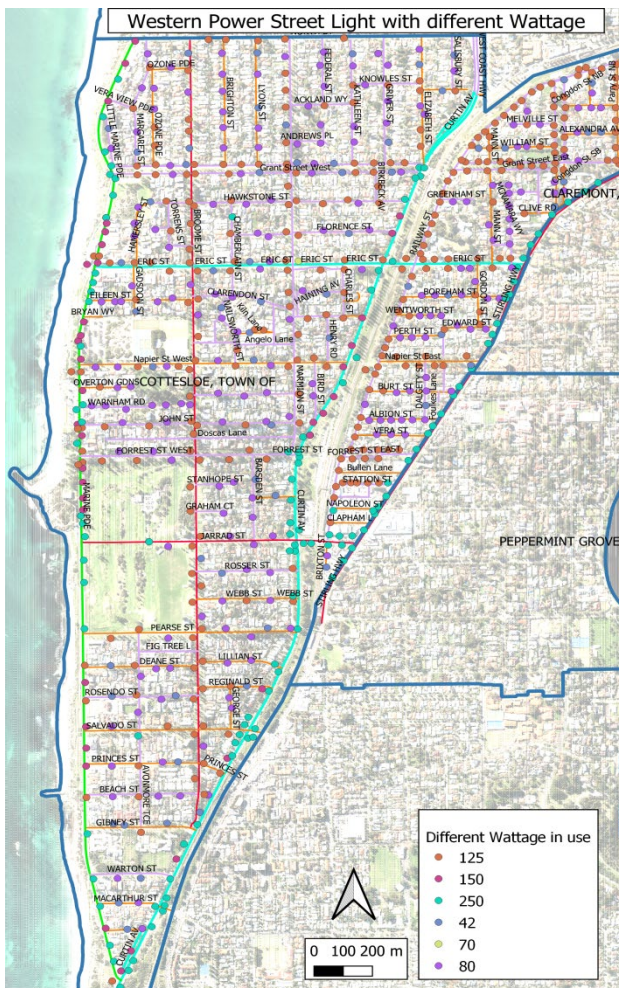


Fig 2a: Existing Western Power owned Watts varieties in use within Cottesloe (data 2017)



Fig 2b: Existing Western Power owned different types of bulbs within Cottesloe (data 2017).

4. Methodology

The strategy has been developed based on the following approach:

Lux analysis of gazetted roads within the District

A consultant was commissioned to determine the current lux readings along the 140 roads within the District.

Identification of routes with non-compliant lighting

The audit results were then benchmarked against AS/NZS 1158.3.1 (Standards: Lighting for Roads and Public Spaces) to establish non-compliant roads requiring further analysis in accordance with the subsequent work breakdown structure highlighted below.

Collation traffic crash and crime data occurring after night fall (6pm to 6am)

Taking into consideration the daylight hours throughout the year, it has been determined that the crime and traffic crashes that occur between 6pm and 6am would best represent the night time adversity due to sub-standard lighting. The crime and crash statistics have been obtained from the following sources:

- Western Australia Local Government Association
- Western Australia Police
- Main Roads CARS Database

Establish a score weightage system for road classification, severity of non-compliance, crash and crime type to determine the upgrade priority for non-compliant routes

- **Road Classification:**

A majority of the roads within Cottesloe are classed as local roads or streets given that they are primarily used for abutting access to properties.

Broome Street, Congdon Street, Curtin Avenue, Eric Street, Grant Street, Marine Parade, Marmion Street, North Street, Railway Street and Victoria Street given their traffic volumes are classed as collector roads and as such would carry a higher weightage in comparison to lower flow local roads.

Napoleon Street and Station Street, whilst not heavy volume routes, have been classed as arterial roads due to it's town centre locality that requires a higher standard of lighting due to these street being pedestrian promenades. As a result the road classification weightage for these links are higher than the local and collector roads mentioned earlier.

- **Severity of non-compliance:**

This refers to the extent that a road falls short of meeting lux compliance. To ensure that this factor is taken into consideration as part of the prioritisation process, a factor equivalent to the percentage length of a road that is non-compliant has been applied to the road classification weightage.

- **Traffic Crash Data**

There is a relationship between poor lighting and traffic crashes that occur at night. Similar to road classifications, different weightages have been assigned to the following crash types that have different levels of injury / property damage severity:

- Minor property damage with no injury
- Major property damage with no injury
- Medical treatment
- Hospitalisation
- Fatality

It would be important to note that available 4 year data has not shown any crashes resulting in hospitalisation or fatality. Such a reflection is very possible due to the lower speed environment within the District.

- **Crime Statistics**

Due to the limited information available, the high level statics have been used to validate the appropriateness of the upgrade priority list such that links with higher crime numbers are ranked in the correct order of importance.

Integration of Scores

The scores from both categories were integrated by applying a 90% weightage for the crash type and a 10% weightage for road classification (adjusted by a non-compliant severity factor). The outcome from this calculation was then used to prioritise the upgrades for the various non-compliant lighting streets.

5. Relevant Strategies and Standards

This strategy has been developed in accordance with the priorities within the Town of Cottesloe's Strategic Community Plan (2013 to 2023) and Corporate Business (2020 to 2024). Other relevant documents include:

- Town Centre Public Domain Infrastructure Improvement Plan (2010)
- Station Street Place Making Strategy (2017)
- Public Open Space and Playground Strategy (2019)
- Right of Way Strategy (2020)
- Foreshore Redevelopment Masterplan (2019)
- Foreshore Redevelopment Detail Design (2021)
- AS/NZS 1158.3.1 series: Lighting for P (Local) roads and public spaces

The Foreshore Master Plan, Public Open Space Strategy and Right of Way Strategy provide an indication of possible future lighting upgrades outside the 140 gazetted District roads audited. Australian New Zealand (ANZ) Engineering Standards provide a benchmark for the lighting audit and lighting maintenance levels of service upon the adoption of this strategy.

5.1 Strategic Community Plan (2013 to 2023)

<https://www.cottesloe.wa.gov.au/documents/1299/strategic-community-plan-2013-2023>

Challenges and major strategies within the various areas of priority as set out below have driven the need for lighting improvements to be one of Council's key focuses:

Priority Area One: Protecting and enhancing the well-being of residents and visitors

Cottesloe is a destination of choice of many tourist and visitors due to the area's picturesque nature, accessibility, and predominantly low-rise facilities that cater to a range of age groups and activities, including the two historic hotels and some short-stay accommodation.

Providing facilities that support health and well-being activities including managing anti-social behaviour are major challenges that need to be addressed.

For these reasons, the review of lighting in all public areas to assess environmental sustainability of and the adequacy of lighting from a personal safety perspective (Major Strategy 1.8) has been identified as an approach to tackling such problems.

Priority Area Five: Providing Sustainable Infrastructure and Community Amenities

Local government legislation holds Council accountable towards ensuring that the needs of current and future generations are met in a sustainable way. This would require capital, operational and maintenance costs for major assets such as lighting to be managed in an affordable fashion to avoid spikes of expenditure required for major upgrades.

Providing the highest possible quality infrastructure at a price that best meets financial long term viability has been identified to be a hurdle that needs to be overcome. This is especially important in the Town Centre area to ensure the Cottesloe Village continues to be a desirable destination for residents and visitors.

The community as part of developing the Strategic Community Plan has identified the following three strategies as solutions towards delivering this priority:

- Major Strategy 5.1: Develop sustainability and capacity criteria to assess major strategies.
- Major Strategy 5.2 Manage assets that have a realisable value.
- Major Strategy 5.3 Implement the Town Centre Public Domain Infrastructure Improvement Plan

5.2 Corporate Business Plan (2020 to 2024)

<https://www.cottesloe.wa.gov.au/documents/1502/corporate-business-plan-2020-2024>

Council adopted the Town's Corporate Business Plan following the recent review of this document in 2020. Whilst there may have been some changes to the areas of priority by Council, the focus on delivering lighting improvements within Cottesloe remains an importance in order to deliver the various Business Plan agreed outcomes:

- Priority Area 1 – COMMUNITY - Protect and Enhance the Well Being of Residents and Visitors

- Priority Area 2 – INFRASTRUCTURE – Achieving Connectivity Between East and West Cottesloe
- Priority Area 3 – ENVIRONMENT – Enhancing Beach Access and the Foreshore
- Priority Area 4 – DEVELOPMENT – Managing Development
- Priority Area 5 – ECONOMIC SUSTAINABILITY - Providing Sustainable Infrastructure and Community Amenities
- Priority Area 6 – GOVERNANCE – Providing Open and Accountable Local Governance.

5.3 Town Centre Public Domain Infrastructure Improvement Plan (2010)

<https://www.cottesloe.wa.gov.au/documents/1307/public-domain-infrastructure-improvement-plan-september-2011>

This strategy provides an approach to the streetscape improvements within the Town Centre Precinct. It includes the future lighting improvements, a critical component, for this part of the District in order to continue preserving amenity and preventing anti-social behaviours.

5.4 Station Street Place Making Strategy (2017)

<https://www.cottesloe.wa.gov.au/documents/1302/station-street-place-making-strategy-may-2017>

This document has been developed to activate Station Street as part of improving the link's streetscape.

5.5 Public Open Space and Playground Strategy (2019)

<https://www.cottesloe.wa.gov.au/documents/1509/public-open-space-strategy-final-nov-2019>

This strategy provides a framework on the order of priority to which playgrounds and public open spaces within the Cottesloe are upgraded. A majority of these areas are not illuminated and do not form part of the lighting strategy, such infrastructure can be included as part their improvement scope or at least make provisions future luminaires to be installed.

5.6 Right of Way Strategy (2020)

<https://www.cottesloe.wa.gov.au/documents/1448/right-of-way-strategy>

Similarly, this strategy informs both the long term financial and annual budget when it comes to the planning for right of way improvements within Cottesloe. None of the right of ways are currently lighted and this can be done when these laneways are resealed. Conduits and pits will be installed as a minimum to future proof the site should lights be required in the long term.

5.7 AS/NZS 1158.3.1 series: Lighting for P (Local) roads and public spaces

This standard provides the technical requirements associated with lighting circuitry, materials, software and required documentations. This needs to be adhered to as part of installation, maintenance, and upgrade lighting work.

5.8 Foreshore Redevelopment Masterplan (2019) and Detail Design (2021)

The Foreshore Redevelopment Masterplan approved by Council in 2019 was used to progress the detail design in 2020 and 2021. The scope of works covers lighting improvements within in the main beach public open space section located between Forrest Street and Eric Street including Marine Parade road lighting.

6. Strategy Objectives

Poor lighting poses a risk to both traffic and community safety. Luminaires not installed with modern day LED globes are unsustainable in the long run and can have fairly high running cost. It is expected that the upgrade to street lighting along non-compliant links will yield the following outcomes:

6.1 Road Safety Improvements

The risk of night time car crash is one of the key factors for developing lighting upgrade strategy. Research has found that there is a direct correlation between insufficient poor lighting and traffic crashes.

In such adverse lux condition, the driver's visibility is impaired, reaction times are increased, resulting in collision and associated injuries (Plainis, et.at 2006). According to Plainis, the number of such traffic incidents decreased by three folds in the United Kingdom and in Greece through the upgrade of street lighting.

A report from 62 studies within 15 countries have come to the conclusion that road lighting on traffic routes reduces about 13% to 85% of night time crashes (International Commission on Illumination, 1992). In developed countries, street light installation is a relatively cost effective method to reduce the risk of luminaire related traffic crashes (Beyer et. Al., 2009).

6.2 Community Safety and Crime Prevention

With Cottesloe being a destination of choice by many visitors and locals enjoying the various aspects of Cottesloe, crime prevention and anti-social behaviour management particularly after daylight is important. Street lighting has been considering as one of the capital investment to improve public safety management for more than 100 years (Chalfin et. at. 2020).

It has been found from 13 studies that the improvement in street lighting can reduce crime by up to 20% (Farrington et. Al. 2002). Based on research it can be concluded that lighting will improve surveillance and this in turn will mitigate against the risk of crime and anti-social activities to create a pedestrian friendly after dark environment.

6.3 Environmental and Economic Sustainability

Street lighting can have a positive impact on economic growth. Economic development can be achieved by illuminating an area that can be activated through various business types after dark.

After nightfall, particularly on weekends, population driven business such as retail, hospitality, entertainments heavily rely on patronage from volume of pedestrian flow on streets. This number of pedestrian flow can be achieved by installing/upgrading street light in such areas. On the same note, proper lighting also encourages employees to attend their work without the fear of having to commute home later that night. Statistics have shown that in the United Kingdom that the employment of 1.3 million at night was worth £66 billion to the afterhour's economy (Stears business, 2021).

When it came to environmental sustainability, Colon et. Al., in a 2010 research found that LED street lighting is 21% more cost beneficial than High-Pressure Sodium (HPS) and has less environmental impact. This is further evident from the Americans saving US\$6 billion annually and have achieved carbon reduction equivalent to 8.5 million cars with LED upgrades (LED street lighting, 2017). It is

anticipated that further savings can be achieved through operation and maintenance cost given that LED lights can last up to 4 times longer than the traditional globes, therefore it is sustainable.

The following summarises the benefits of LED lighting:

- Helps reducing greenhouse gas emissions
- Reduces maintenance costs
- Has a life span about 100,000 hrs (Western Power, 2021)
- Reduces glare and spread the light in only focused zone
- Environmentally safe as it doesn't contain any hazardous substances.
- Reduces energy consumption as the new LED streetlights are powered by a mere 17, 22 or 33 watts of electricity while the older streetlights use 95 or more watts. It is 40 to 60 percent more energy efficient than other typical existing road lighting.

Mercury type bulbs currently used in a majority of lights have been found to be less environmentally friendly than LEDs at landfill sites given that each 80 watt globe contains 14 mg of mercury. Whilst insignificant when disposed singly, its compounding effect could be detrimental in the long term.

7. Recent and Future Lighting Improvement Projects

Foreshore Redevelopment Project

A Foreshore Redevelopment design approved by Council in March 2021 will improve lighting within the Main Beach Public Open Space and also road luminaires along Marine Parade between Forrest Street and Eric Street.

Napoleon Street Streetscape Enhancement

In 2017, streetscape improvements were made along Napoleon Street within the Town Centre. These works incorporated the upgrade to the lighting

Town Centre Precinct Plan

The Town is currently working in cooperation with the Town of Peppermint Grove to develop an improvement concept for the Town Centre. Consideration will be given to upgrading the streetlights.

8. Summary of Lighting Audit Results

The lighting challenges within Cottesloe can be summarised as follows:

- 84% of the streets in Cottesloe have been found to contain some form of non-compliant lighting.
- Non-contemporary wooden poles with overhead power requiring replacement.
- Non-compliant footings and luminaries with a number of lamps being deployed that are roadway focused with limited shine onto footpaths.
- There are a number of non-compliant lighting poles that are not compatible with other types of luminaries. For example, LED globes cannot be installed without replacing the pole in its entirety.

The table below provides a summary of the impact index when road classifications, severity of non-compliance and traffic safety have been taken into consideration:

Road Name	Lighting Scenario	Weighted Avg (Crash + Substandard)
Eric St	PR3	50.74
Marine Pde	PR3	40.05
Broome St	PR3	24.96
Jarrad St	PR5	20.9
Grant St West WB	PR3	15.09
Grant St West EB	PR3	14.36
John St	PR5	13.53
Station St	V4	12.89
Forrest East	PR3	11.57
Federal St	PR5	10.33
Grant St East	PR5	10.11
Kathleen St	PR5	9.84
Warnham Rd	PR5	9.51
Beach St	PR5	9.39
Chamberlain St	PR5	9.39
Griver St	PR5	8.95
Florence St	PR5	8.77
Clarendon St	PR5	8.71
Avonmore Tce	PR5	8.59
Forrest West St	PR5	8.44
Hawkstone St	PR5	8.27
Marmion St	PR3	8.23
Congdon St NB	PR3	7.97
Margaret St	PR5	7.7
Dalgety St	PR5	7.63
Nailsworth St	PR5	7.58
North St	PR3	7.41
Ackland Way	PR5	6.5
Andrews Pl	PR5	6.5
Angelo Lane	PR5	6.5
Athelstan Rd West	PR5	6.5
Barsden St	PR5	6.5
Bird St	PR5	6.5
Birkbeck Av	PR5	6.5
De Nardi Lane	PR5	6.5
Doscas Lane	PR5	6.5
Drayton Lane	PR5	6.5
Fig Tree Lane	PR5	6.5
Foulkes Lane	PR5	6.5

Graham Ct	PR5	6.5
Greenham St	PR5	6.5
Haining Av	PR5	6.5
Henry Rd	PR5	6.5
Joinery Way	PR5	6.5
Lane St	PR5	6.5
Little Marine Pde	PR5	6.5
Loma St	PR5	6.5
Marchant Walk	PR5	6.5
Marchant Walk	PR5	6.5
Melville St	PR5	6.5
Pennefather Lane	PR5	6.5
Rockett Lane	PR5	6.5
Rosser St	PR5	6.5
Salisbury St	PR5	6.5
Sea View Tce	PR5	6.5
Stanhope St	PR5	6.5
Torrens Ct	PR5	6.5
Torrens St	PR5	6.5
Vera View Pde	PR5	6.5
Warton St	PR5	6.5
Delamare Lane	PR5	6.5
Mcnamara Way	PR5	6.48
Rosendo St	PR5	6.44
Charles St	PR5	6.43
Railway St	PR3	6.38
Knowles St	PR5	6.27
Pearse St	PR5	5.98
Curtin Ave Service Rd 2	PR5	5.96
Overton Gdns	PR5	5.94
Geraldine St	PR5	5.86
Vera St	PR5	5.79
Parry St NB	PR5	5.78
Hammersley St	PR5	5.68
Wentworth St	PR5	5.59
Burt St	PR5	5.57
Congdon St SB	PR3	5.56
Elizabeth St	PR5	5.56
Gordon St	PR5	5.34
Bullen Lane	PR5	5.34
Fahey Lane	PR5	5.3
Webb St	PR5	5.21
Perth St	PR5	5.21
Albion St	PR5	5.11

Eileen St	PR5	5.01
Napoleon St	V4	5
Brighton St	PR5	4.97
Gadsdon St	PR5	4.78
Lillian St	PR5	4.72
Curtin Ave Service Rd 3	PR5	4.67
Princes St	PR5	4.65
Balfour St	PR5	4.63
Ozone Pde	PR5	4.47
Napier St East	PR5	4.45
Alexandra Ave	PR5	4.13
Lyons St	PR5	4.11
Salvado St	PR5	3.99
Macarthur St	PR5	3.95
Gibney St	PR5	3.9
George St	PR5	3.9
Napier St West	PR5	3.9
William St	PR5	3.82
Mann St	PR5	3.78
Boreham St	PR5	3.64
Sydney St	PR5	3.55
Windsor St	PR5	3.51
Victoria St	PR3	3.5
Kiln Lane	PR5	3.37
Hillside Ave	PR5	3.01
Deane St	PR5	2.72
Parry SB	PR5	2.58
Clive Rd	PR5	1.93
Athelstan Rd East	PR5	1.5
Brixton St	PR5	1.5
Clapham Lane	PR5	1.5
Curtin Ave Service Rd 1	PR5	1.5
Curtin Ave Service Rd 4	PR5	1.5
Edward St	PR5	1.5
Finey St	PR5	1.5
Millers Ct	PR5	1.5
Reginald St	PR5	1.5

9. Lighting Improvement and Upgrade Design Considerations

- Latest equipment, technology and design creativity for lighting replacement/installation that will deliver both traffic and community safety including sustainability outcomes.
- Street lighting should meet the standards for pedestrian and vehicular safety with consideration given to installation complexities and operating cost.
- Pole colour scheme and feature lighting to suit the aesthetics significance of an area such as the Town Centre or Foreshore.
- Lighting spillage will be avoided by ensuring that all luminaires (road, parks and laneways) are design to the required standards and appropriate shielding devices installed as required. Lux modelling will be undertaken as mitigation prior to any installation.
- The strategy will be implemented based on a certain priority that achieves optimal traffic and community safety outcomes within limited funding
- Before implementation of the Lighting, the end user will make sure about the engineering input, design and maintenance schedule of particular light installation or replacement. And also have to be aware of the design that follows the lighting standard.

10. Existing Street Lighting Maintenance Framework

- Any issue regarding lighting conditions are reported to the Town either by email or telephone. This is then logged onto CRM and assigned to the Operations Branch to determine the appropriate course of action
- The Town's lights are maintained by the Council appointed Electrical Contractor whilst luminaires owned by others (Main Roads, PTA and Western Power) are reported through their fault contact.
- The Town in addition to addressing defects from public complains, also carries out it's own inspection and monitoring for defects to ensure they are rectified in a timely manner
- Emergency 24/7 responses should be available for any life threatening street lighting defects.

11. Delivering the Lighting Strategy

The following would be the priority of the lighting strategy:

Priority	Description	Scope of Works	Timeframe	Success Indicator
1	Lighting Improvements on Streets with Non-Compliant Street Lights	<ul style="list-style-type: none"> (1) Removal of vegetation or obstruction that impact lighting (2) Upgrade globes to LED of equivalent (3) Upgrade globes to LED of higher wattage (4) Installation of additional solar powered light poles with LED globes (5) Installation of additional Western Power electricity grid owned light poles with LED globes (as an alternative to point 4) (6) Replace wooden poles with steel ones (7) Replace overhead powered lights with underground feed type supply 	5 years (2021/2022 to 2025/2026)	<ul style="list-style-type: none"> (1) Lux meets AS1158 standards (2) No traffic and /or community safety related incidents as a result of poor lighting (3) Reduction in operations cost (4) Community satisfaction
2	Upgrade of Street Lighting on Streets with Compliant Street Lights	<ul style="list-style-type: none"> (1) Upgrade of existing bulbs to LED Globes (2) Replace wooden poles with steel ones (3) Replace overhead powered lights with underground feed type supply 	3 years (2023/2024 to 2025/2026)	<ul style="list-style-type: none"> (1) Lux continues to meet standards (2) Reduction in operations cost (3) Community satisfaction (4) maintains traffic and community safety standards
Rolling initiative as Part of Other Infrastructure Upgrade Programs	Lighting Installation / Upgrade within Public Open Spaces	<ul style="list-style-type: none"> (1) Installation of new lighting (preferably LED solar) (2) Upgrade of existing lighting to LED (3) where (1) is not done, install infrastructure to make provision for lighting to be installed in the future. 	As per Public Open Space and Playground Upgrade Strategy	<ul style="list-style-type: none"> (1) Lux meets AS1158 standards (2) No traffic and /or community safety related incidents as a result of poor lighting (3) Low operations cost (4) Community satisfaction
	Lighting Installation and /or upgrades along Right of Ways/Pedestrian Access Ways		As per Right of Way Strategy	

The plan below provides an indication as to how priority one will be delivered over the next five years:

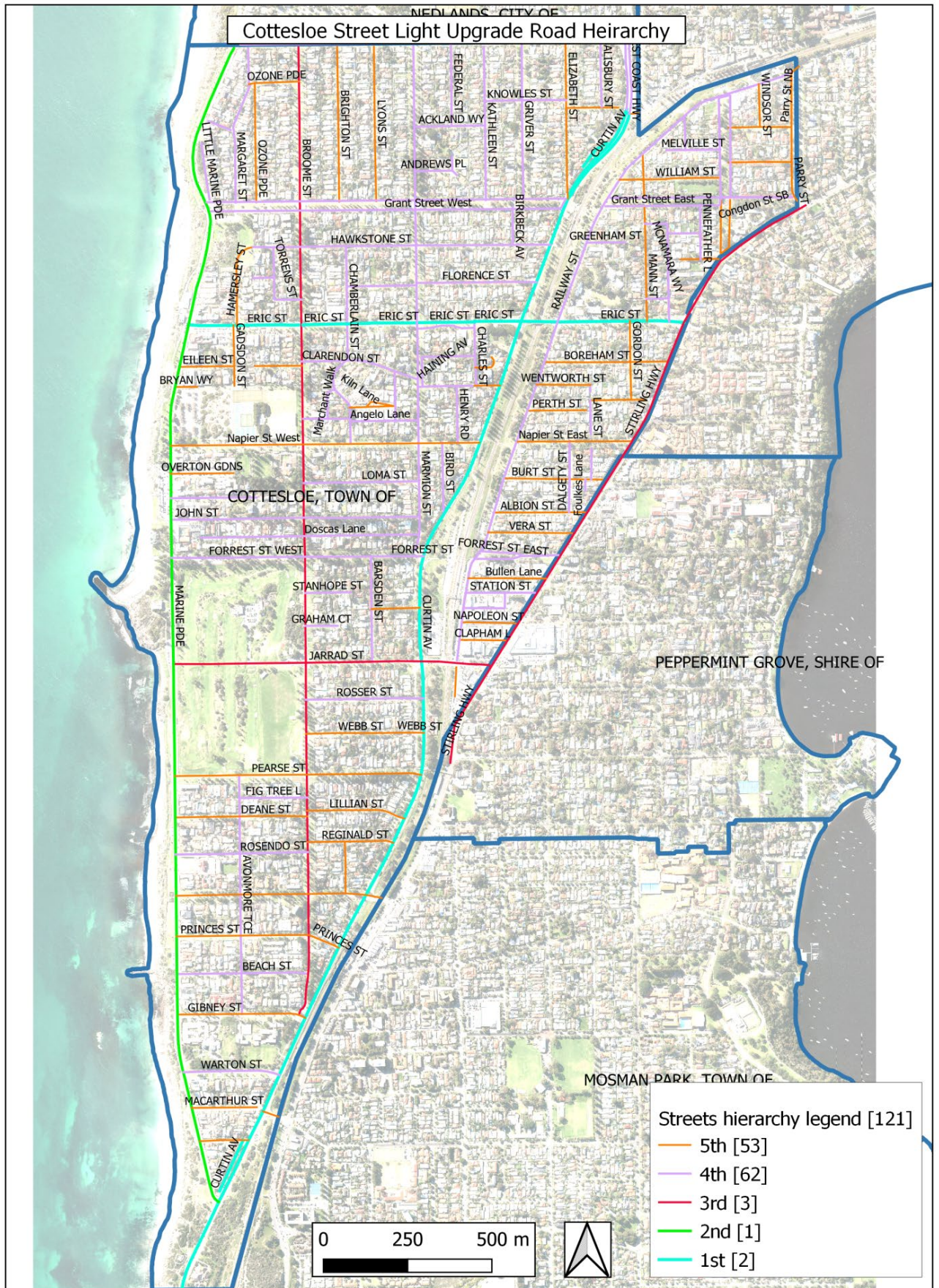


Fig 3: Road priority hierarchy with road names within Cottesloe district.

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