Aberdeenshire COUNCIL Environment & Infrastructure Services

REPORT TO SUSTAINABILITY COMMITTEE – 15 JUNE 2022

STREET LIGHTING LED UPGRADE PROGRAMME - UPDATE

1 Executive Summary/Recommendations

1.1 This report advises the Committee on progress in implementing the street lighting LED upgrade programme. It provides information on units upgraded, energy reduction, and carbon reduction. Figures are also presented on the cumulative costs and savings arising from the programme to date. A significant milestone has been reached in that the total capital expenditure on the programme has now been matched by savings in electricity costs which will continue to increase in the future.

1.2 The Committee is recommended to:

1.2.1 Acknowledge the progress that has been made in the Street Lighting LED Upgrade Programme to date;

1.2.2 Endorse the completion of the programme to cover the remainder of the Council's street lighting stock; and

1.2.3 Note that the process applied effectively to street lighting can produce a substantial carbon reduction and a good financial rate of return.

2 Decision Making Route

2.1 On 29 November 2012 Infrastructure Services Committee considered a report on options to reduce energy consumption from street lighting and approved a policy for Aberdeenshire Council. This included the following:

- A long-term programme to upgrade the Council's street lighting stock to the most economic units meeting nationally recommended minimum lighting levels, whenever new or replacement lanterns are installed.

2.2 At that time, LED lanterns were not the most economic option owing to their high cost. However, by 2015 the situation had changed and a programme to upgrade the Council's street lighting stock to LED units was started. Councillors were updated on progress with Briefing Notes made available through the Ward Pages, most recently in April 2019. The programme has now reached a significant milestone, and so it is felt appropriate to report formally on this to the Sustainability Committee.

3 Discussion

3.1 Our highest street lighting energy consumption was in 2013-14 with 18,539,894 kilowatt-hours. Prior to the commencement of the LED replacement programme, some other energy saving measures were implemented and the consumption in 2014-15 was down to 18,312,528 kwh. The energy cost in that year was £1,995,398 and 9,834 tonnes of carbon were emitted. These figures have been used as a base against which the impact of the LED energy reduction programme has been evaluated.

3.2 The timing and phasing of the LED energy reduction programme were critical in obtaining the best return for the Council. When consideration was first given to the project in 2012, LED lanterns cost upwards of £500 each and a full replacement programme would have cost around £30 million. The technology was in a phase of rapid development with prices falling and efficiency improving year on year. The annual reduction in price was roughly double the potential annual saving at this stage, so early implementation would have come at a high price. The Service decided to start the programme when the price reached about £200 per lantern and to phase it over 5 years to benefit from further price reductions on the prediction that it would fall further to a stable rate of around £100 per lantern. The Service concentrated on straightforward sites where it would be easy to make a saving in the early years and saved the sites where savings would be more difficult to achieve, for instance those with heritage lanterns, for the later years when we could benefit from the lower prices and higher efficiencies. To maximise the benefits, the Service designed each scheme from first principles to achieve the minimum recommended lighting levels rather than simply swapping to a unit giving the same light output as that being replaced. This meant that we exceeded our initially predicted savings, as more locations had previously been over-lit than under-lit.

3.3 The price threshold for starting the programme was reached in 2015, so it commenced in 2015-16. It was planned as a 5-year programme to upgrade all our streetlights to LED costing a total of £6 million and saving 50% on our energy consumption. The programme has had a few setbacks, notably when work had to stop during Covid 19 restrictions and subsequently with worldwide shortages of various key components. However, the Service is getting back on course and now anticipate completion in 2023-24.

3.4 By 2021-22 the Service had spent a total of £4,724,596 on LED upgrades and 72.05% of our lanterns were LED units. The Council's annual energy consumption had reduced by 45.96% to 9,856,296 kwh, the cost had fallen by 17.87% to £1,636,860 and carbon emissions by 76.3% to 2,331 tonnes. Over this period, the unit cost of electricity had increased by 51.98% and the carbon emissions per unit of electricity had reduced by 56.27%. Bar charts showing the change in energy consumption and carbon emissions since 2013 are provided in **Appendix 1.**

3.5 Electricity cost savings have been calculated by comparing the actual cost for each year with that which would have been incurred had the energy consumption remained at its 2014-15 level. The cumulative savings by the end of 2021-22 on this basis amount to £4,705,665. These savings continue so by the date of this meeting the Council will have more than recovered its cumulative investment of £4,724,596. Having passed this break-even point, the savings will continue to mount up and in a year's time the Service anticipates that the savings will have exceeded the expenditure by over £1 million.

3.6 The estimate of the benefits above are very conservative as since 2014-15, the total number of streetlights has increased by 7.62% from 43,516 to 46,831. This has arisen partly from the adoption of street lighting in new developments and partly from the new roads transferred to the Council when the AWPR and Balmedie to Tipperty schemes were opened. This will have increased the Council's energy consumption, so an alternative calculation of savings has been done based on the number of lamps remaining at its 2014-15 level. On this basis, the cumulative savings by the end of 2021-22 would amount to £5,211,751, well ahead of cumulative expenditure.

3.7 Electricity prices are currently rising fast. This will further enhance the value to the Council of the energy savings arising from the Street Lighting LED upgrade programme.

3.8 The programme is continuing and there is a lag between installing the new lights and updating our inventory. The Service estimates that on work completed around 76% of our network is now upgraded to LED. The Council's inventory is being updated to reflect this. The Service has scheduled the upgrading of the remaining lights over the next two years and anticipate completion by the end of 2023-24. The Service does not recommend any acceleration of the work at this stage. World supply problems continue and having saved the most difficult sites to last, the design resources will be fully occupied in meeting this timetable.

3.9 The Service now has a well-established and effective process for designing and implementing LED upgrades to external lighting system. On completion of the programme to upgrade the street lighting stock, it may be worth extending the process to other external lighting within the service.

4 Council Priorities, Implications and Risk

4.1 This report helps deliver the Strategic Priority "Infrastructure" within the Pillar "Our Environment" by minimising the impact of our street lighting infrastructure on the key principle of "climate and sustainability" and delivering the key principle of "responsible finances" by phasing the programme to give the maximum financial benefit to the Council.

4.2 The Street Lighting LED upgrade programme will help the Council to achieve its carbon reduction target by cutting energy consumption to less than half its previous level.

4.3 The table below shows whether risks and implications apply if the recommendations are agreed.

Subject	**Yes**	**No**	**N/A**
Financial	**X**		
Staffing		**X**	
Equalities and Fairer Duty Scotland	**X** [IIA attached as Appendix 2]		
Children and Young People's Rights and Wellbeing		**X**	
Climate Change and Sustainability	**X** [IIA attached as Appendix 2]		
Health and Wellbeing	**X** [IIA attached as Appendix 2]		
Town Centre First	**X** [IIA attached as Appendix 2]		

4.4 The financial implication will be to protect the Council from what would otherwise have been a very substantial rise in annual electricity costs. In 2021-22 the energy cost for street lighting would have been around £1.4 million greater had the LED upgrades to date not been completed. The programme has a further two years to run and electricity prices are still rising so the financial benefits to the Council will continue to grow.

4.5 An integrated impact assessment has been carried out as part of the development of the proposals set out above. It is included as **Appendix 2.** The main impact is a net benefit to Climate Change and Sustainability arising from a substantial reduction in carbon emissions. There are more marginal net positive impacts on Equalities and Fairer Duty, Health and Wellbeing and Town Centre First.

4.6 The following Risks have been identified as relevant to this matter on a Corporate Level:

- ACORP001 Budget Pressures: The Street Lighting LED Upgrade Programme will help to mitigate the risk of budget pressures arising from rising electricity prices

- ACORP010 Environmental Challenges: The Street Lighting LED Upgrade programme will help to mitigate the risk of climate change by reducing CO2 emissions.

- *Link to risk register page on website*

5 Scheme of Governance

5.1 The Head of Finance and Monitoring Officer within Business Services have been consulted in the preparation of this report and their comments are incorporated within the report and are satisfied that the report complies with the Scheme of Governance and relevant legislation.

5.2 The Committee is able to consider this item in terms of Section R.1.1 of the List of Committee Powers in Part 2A of the Scheme of Governance as it relates to the approval, review and monitoring of the Council's work in respect of sustainable development and climate change in order to ensure compliance with relevant statutory duties, with particular reference to the Climate Change Action Plan.

Alan Wood
Director of Environment & Infrastructure Services

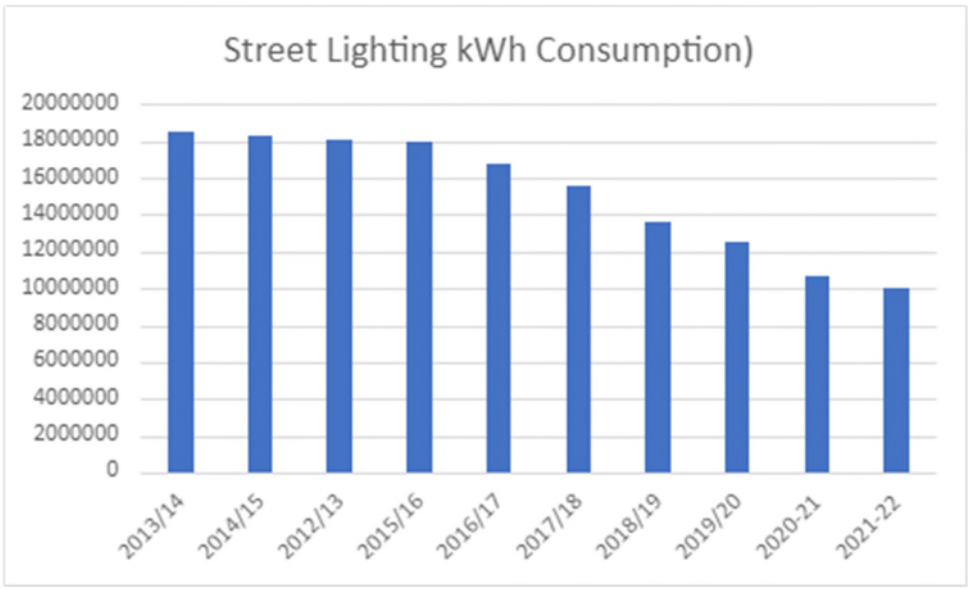
Report prepared by David Armitage, Roads Policy & Asset Manager & Keith Melvin, Street Lighting Officer
Date: 27 May 2022

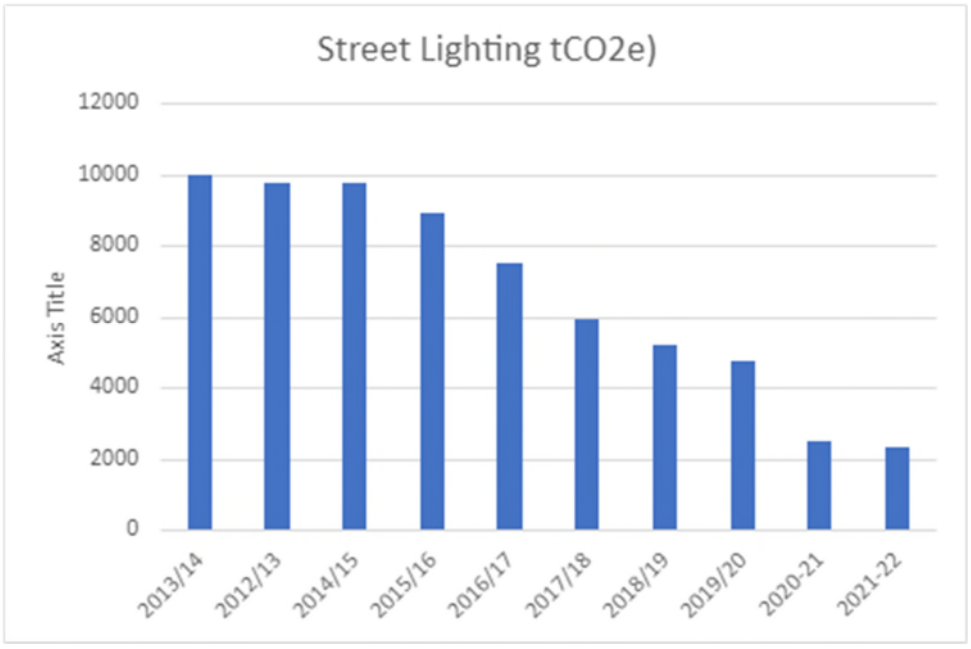
List of Appendices:

Appendix 1 - Histograms plotting energy consumption and carbon emissions over time
Appendix 2 - Integrated Impact Assessment

Appendix 1

2022 06 15 Sustainability Committee - Street Lighting LED Upgrade Programme





Aberdeenshire Council

Integrated Impact Assessment

STREET LIGHTING LED UPGRADE PROGRAMME

Assessment ID	IIA-000688
Lead Author	Keith Melvin
Additional Authors	John Bruce
Service Reviewers	David Armitage
Subject Matter Experts	Suzanne Rhind, Susan Forbes, Claudia Cowie, Kakuen Mo
Approved By	Philip McKay
Approved On	Wednesday June 01, 2022
Publication Date	Wednesday June 01, 2022

1. Overview

This document has been generated from information entered into the Integrated Impact Assessment system.

Assess the impact of the introduction of LED street lights.

During screening 6 of 10 questions indicated that detailed assessments were required, the screening questions and their answers are listed in the next section. This led to 4 out of 5 detailed impact assessments being completed. The assessments required are:

- Equalities and Fairer Scotland Duty
- Health Inequalities
- Sustainability and Climate Change
- Town Centres First

In total there are 15 positive impacts as part of this activity. There is 1 negative impact, the impact has been mitigated.

A detailed action plan with 1 points has been provided.

This assessment has been approved by philip.mckay@aberdeenshire.gov.uk.

The remainder of this document sets out the details of all completed impact assessments.

2. Screening

Could your activity / proposal / policy cause an impact in one (or more) of the identified town centres?	Yes
Would this activity / proposal / policy have consequences for the health and wellbeing of the population in the affected communities?	Yes
Does the activity / proposal / policy have the potential to affect greenhouse gas emissions (CO2e) in the Council or community and / or the procurement, use or disposal of physical resources?	Yes
Does the activity / proposal / policy have the potential to affect the resilience to extreme weather events and/or a changing climate of Aberdeenshire Council or community?	No
Does the activity / proposal / policy have the potential to affect the environment, wildlife or biodiversity?	Yes
Does the activity / proposal / policy have an impact on people and / or groups with protected characteristics?	Yes
Is this activity / proposal / policy of strategic importance for the council?	Yes
Does this activity / proposal / policy reduce inequality of outcome?	No
Does this activity / proposal / policy have an impact on children / young people's rights?	No
Does this activity / proposal / policy have an impact on children / young people's wellbeing?	No

3. Impact Assessments

Children's Rights and Wellbeing	Not Required
Climate Change and Sustainability	All Negative Impacts Can Be Mitigated
Equalities and Fairer Scotland Duty	No Negative Impacts Identified
Health Inequalities	No Negative Impacts Identified
Town Centre's First	No Negative Impacts Identified

4. Equalities and Fairer Scotland Duty Impact Assessment

4.1. Protected Groups

Indicator	Positive	Neutral	Negative	Unknown
Age (Younger)	Yes			
Age (Older)	Yes			
Disability	Yes			
Race		Yes		
Religion or Belief		Yes		
Sex		Yes		
Pregnancy and Maternity		Yes		
Sexual Orientation		Yes		
Gender Reassignment		Yes		
Marriage or Civil Partnership		Yes		

4.2. Socio-economic Groups

Indicator	Positive	Neutral	Negative	Unknown
Low income		Yes		
Low wealth		Yes		
Material deprivation		Yes		
Area deprivation		Yes		
Socioeconomic background		Yes		

4.3. Positive Impacts

Impact Area	Impact
Age (Older)	LED lighting produce white light which has a greater average colour rendering index(RA) than traditional high intensity discharge lights (HID) lamps. Traditional lamps produces orange glows which could produce monochrome lighting with poor definition. LED lighting produces full colour thus giving the perception of a brighter light. This whiter light highlights obstacles and provides better facial recognition. As people age their sight deteriorates, good LED lighting can help with navigating the footways and carriageways.
Age (Younger)	LED lighting produce white light which has a greater average colour rendering index(RA) than traditional high intensity discharge lights (HID) lamps.. Traditional lamps produces orange glows which could produce monochrome lighting with poor definition. LED lighting produces full colour thus giving the perception of a brighter light. This whiter light highlights obstacles and provides better facial recognition.

Impact Area	Impact
Disability	LED lighting produce white light which has a greater average colour rendering index(RA) than traditional high intensity discharge lights (HID) lamps.. Traditional lamps produces orange glows which could produce monochrome lighting with poor definition. LED lighting produces full colour thus giving the perception of a brighter light. This whiter light highlights obstacles and provides better facial recognition. Good LED lighting can help with navigating the footways and carriageways.

4.4. Evidence

Type	Source	It says?	It Means?
External Data	Institute of Lighting Professionals- Various Publication	There has been many research studies undertaken re the benefits of good LED lighting. LED lighting if designed well can give the perception of brighter lighting, which can help people with visual impairment, can illuminate obstacles and hazards on the footway and carriageway. Provides better contrast. Also been proven to reduce the fear of crime as LED lighting produces a white light which provides better facial recognition.	It can make footways and carriageways safer.

4.5. Overall Outcome

No Negative Impacts Identified.

The introduction of LED lighting does not have a negative impact on equalities. Well designed LED will provide better lighting for all users.

4.6. Improving Relations

The LED street lighting project has been well advertised and the benefits to the whole community are clear to see. The proposed works are highlighted in the local areas RMP plans which are approved by the local committees, the overall project was signed off by ISC and is also reported to the Sustainability Committee.
LED lighting has the ability to control the light emitted from the lantern, and thus reduces unwanted light which would otherwise fall into private gardens and onto the walls of some houses. Some homeowners welcome this light as it lights up their paths and front doors but others are against the unwanted light. Less light intrusion is also good for Flora and Fauna.
We have had complaints that lighting levels are too high and also complaints the new LED lighting is too dim, and poorer than the previous street lighting. In these cases we have undertook desktop exercises and also undertook night time surveys. The majority of the complaints have been found to be none justified and the lighting levels were indeed compliant. Those we found to be justified have been actioned and remedial works undertaken to remove the problem.

5. Health Inequalities Impact Assessment

5.1. Health Behaviours

Indicator	Positive	Neutral	Negative	Unknown
Healthy eating		Yes		
Exercise and physical activity	Yes			
Substance use – tobacco		Yes		
Substance use – alcohol		Yes		
Substance use – drugs		Yes		
Mental health		Yes		

5.2. Positive Impacts

Impact Area	Impact
Exercise and physical activity	Improved street lighting can allow users to undertake walks and exercise during the hours of darkness

5.3. Evidence

Type	Source	It says?	It Means?
External Data	Institute of Lighting Proffessionals: External Publications	Well designed LED street lighting can allow users to undertake walks and exercise during the hours of darkness. This can also help reduce the use of motor vehicles for short journeys if the route is well maintained and well lit. A well lit footpath can give the perception of a safer route, can reduce the fear of crime, making it more inviting to use, Healthy body and healthy mind.	It can help with fitness and overall wellbeing.

5.4. Overall Outcome

No Negative Impacts Identified.

By installing LED with high RA values can give the the road user the perception of better lighting, provides increased facial recognition and the reduction in fear when out and about during the hours of darkness. Helps promote night time activities including taking exercise.

6. Sustainability and Climate Change Impact Assessment

6.1. Emissions and Resources

Indicator	Positive	Neutral	Negative	Unknown
Consumption of energy	Yes			
Energy efficiency	Yes			
Energy source		Yes		
Low carbon transition	Yes			
Consumption of physical resources	Yes			
Waste and circularity	Yes			
Circular economy transition		Yes		
Economic and social transition	Yes			

6.2. Biodiversity and Resilience

Indicator	Positive	Neutral	Negative	Unknown
Quality of environment		Yes		
Quantity of environment		Yes		
Wildlife and biodiversity			Yes	
Infrastructure resilience		Yes		
Council resilience		Yes		
Community resilience		Yes		
Adaptation		Yes		

6.3. Positive Impacts

Impact Area	Impact
Consumption of energy	LED lighting consumes less energy than traditional HID lamps.
Energy efficiency	LED lighting is more energy efficient than traditional HID lamps.
Economic and social transition	LED lights consume less energy so therefore less carbon, contributing to the councils carbon reduction targets. Street lighting contributes 6% of the councils energy consumption.
Low carbon transition	LED lanterns consume less energy than traditional HID lamps and thus help reduce carbon consumption.
Consumption of physical resources	LED lanterns have a whole life in excess of 50,000 hours. Traditional HID lamps had a life around 12,000 to 16,000 hours meaning they only last around 4 years. Less frequency to attend to repair also reduces fuel and carbon expenditure. Although all lamps are recycled through the WEEE scheme still they still use resources, by not changing lamps we also use less use of rare earth materials. No harmful mercury in LED lamps.
Waste and circularity	LED lanterns can be recycled, less waste going to landfill.

6.4. Negative Impacts and Mitigations

Impact Area	Details and Mitigation
Wildlife and biodiversity	Research has shown that LED lights produce more blue light which can affect Flora and Fauna. Can be mitigated: Yes Mitigation: By using LED lights that are 3000K, will reduce blue light emitted by the LED. We also dim all our lights between 00.00-06.00 which also helps reduce the impact. We have two remote communities where the street lights are switched off at 01.00 and 5.30am, removing blue light emission altogether. We limit the installation of lighting in our parks. Timescale: Ongoing till project ends in March 2024

6.5. Evidence

Type	Source	It says?	It Means?
External Data	Various	LED lighting consumes less energy than traditional HID lamps. LED lighting is more controllable and all the produced light falls on the adopted surfaces. LED lights produce little unwanted light so reduces light pollution. LED lights also produce little or no upward light so reduces Sky glow.	Less energy is required to run LED lights, light pollution can be limited or almost removed altogether.
External Data	ILP PUBLICATIONS: A Review of the Impact of Artificial Light on Invertebrates	Advises on the affect of LED lighting on Invertebrates	Considerations needed when changing from old type HID lamps to LED due to the LED having a higher blue content than HID lamps.
External Data	ILP: Guidance Note 8: Bats and artificial lighting	Legal requirements for lighting and impact of artificial lighting and mitigation of artificial lighting on bats	Raises awareness of the impacts of artificial lighting on bats, and mitigation.

6.6. Overall Outcome

All Negative Impacts Can Be Mitigated.

LED has been around for many years and technology is advancing at a rapid pace. LED lighting consumes less power than traditional HID to do the same task. i.e. illuminate the adopted footways and carriageways. All produced light is directed to the adoptable surfaces with little unwanted light/ light pollution being produced. This project contributes to the councils overall goal of becoming Net Zero by 2045.

7. Town Centre's First Impact Assessment

7.1. Local Factors

Indicator	Positive	Neutral	Negative	Unknown
Town centre assets	Yes			
Footfall	Yes			
Changes to road layouts		Yes		
Parking		Yes		
Infrastructure changes		Yes		
Aesthetics of the town centre	Yes			
Tourism		Yes		
Public safety	Yes			
Town centre business	Yes			
Cultural heritage and identity		Yes		
Social and cultural aspects		Yes		

7.2. Positive Impacts

Impact Area	Impact
Aesthetics of the town centre	Good LED lighting can enhance the appearance of town centres.
Footfall	Better street lighting can help increase footfall during the hours of darkness which in turn can benefit the night time economy of our towns.
Public safety	Good LED lighting can give the perception of increased illumination, which in turn can lead to users being more confident in their surroundings. LED lighting has a high RA which helps increase facial recognition which again helps reduce the fear of crime.
Town centre assets	LED lighting produces more controlled lighting which when designed properly can enhance the features of buildings while at the same time illuminating the footways to a very high standard. As LED lights last 10x longer than HID lamps, less maintenance is required which results in less maintenance in the town centres which can lead to temporary closures, barriers being erected making the town centre less appealing which can affect footfall.
Town centre business	Better street lighting can help increase footfall during the hours of darkness which in turn can benefit the night time economy of our town

7.3. Evidence

Type	Source	It says?	It Means?

Type	Source	It says?	It Means?
External Data	ILP	Better designed street lighting can enhance town centres	Can increase footfall and business patronage, helping business turnover and attracting more of both.

7.4. Overall Outcome

No Negative Impacts Identified.

Good LED lighting can enhance our town centres, which can attract night time activities which in turn helps businesses such a pubs and restaurants, increased patronage can lead to greater employment, new business opening all which help attract more of both.
Good LED Lighting can have a positive impact on social and cultural aspects of town centres, encouraging people of all ages to meet socially any time of the day.

8. Action Plan

Planned Action	Details	
To continue with the implementation of LED energy reduction program	**Lead Officer**	Keith Melvin
	Repeating Activity	No
	Planned Start	Friday April 01, 2022
	Planned Finish	Sunday March 31, 2024
	Expected Outcome	To convert all street lights to LED
	Resource Implications	Internal resource to be used to undertake the design work and deliver the project. Both internal and external resource to be used to undertake the installation of the LED lanterns.