

LED STREET LIGHTING ON STRATEGIC HIGHWAY ROUTES

REPORT OF DIRECTOR CITY OPERATIONS

AGENDA ITEM: 11

**PORTFOLIO: TRANSPORT, PLANNING & SUSTAINABILITY (COUNCILLOR
RAMESH PATEL)**

Reason for this Report

1. To seek Cabinet approval to procure a contract for the prompt delivery of LED Street Lighting on Strategic.

Background

2. The City of Cardiff council has the aspiration of becoming the most liveable European capital city. A key theme within this is enhancing the quality of environment, reducing carbon footprint within the context of effective budgetary control. The proposal to convert 13,608 street lights located on strategic highway routes to LED street lighting directly is a very positive step in achieving this objective in terms of the street environment.
3. The Strategic Highway Routes comprises the major traffic routes through the City. This incorporates general 'A' roads but also other non-classified roads that are key to traffic movements.
4. The Well-being of Future Generations Act came into force for local authorities in April 2016. The legislation requires us to contribute positively to 7 national Well-being Goals and 5 Ways of Working. The 'Prosperous Wales' goal promotes a low carbon society, and climate change mitigation actions demonstrate both the 'Longterm' and 'Preventative' Ways of Working. Climate change actions also contribute positively to the 'Energy' and 'Place' strands of One Planet Cardiff.

Positive Impacts: Carbon Reduction

5. Street lighting in the City of Cardiff is responsible for 25% of the Councils operational CO2 emissions, therefore reducing energy and the resulting CO2 emissions in this area is a priority. Total CO2 emissions for the Councils operations in 2015/16 were 41,850 tonnes (Carbon Reduction

Commitment (CRC) data) and street lighting contributed 10,331 tonnes to this.

6. By implementing the proposal to provide LED street lighting on the strategic highway routes a total of 3,476 tonnes of CO2 could be saved from Council operations. This equates to an 8% reduction in total Council emissions (based on 2015/16 CRC data). This is a good reduction saving and will contribute positively to the Councils carbon reduction target of 60% reduction in CO2 emissions from key Council operations by 2018 (from 2005/06 baseline).
7. The project will provide a reduction in associated carbon emissions providing a projected saving of £63,100 per annum. The saving associated with carbon emissions will be seen against the budget for carbon emission payments. These savings have been excluded from the cost benefit analysis.

Table 2: Savings associated with carbon emissions reduction

Type	Number	kWh Savings	CO2 Savings (tonnes)	CRC saving
8m	6,668	2,988,824	1,483.53	£26,927
10m	5,296	2,938,020	1,458.32	£26,469
12m	1,644	1,077,046	534.60	£9,704
TOTAL	13,608	7,003,890	3,476	£63,100

8. As well as the Councils own CO2 target we also have wider city commitments to taking action at a local level on global climate change. We are signatories to both the EU Covenant of Mayors and the Compact of Mayors. The former commits us to a citywide per capita CO2 reduction target of 26% by 2020 (based on 2005 baseline). Latest DECC CO2 figures for the city (2013 data as produced with 2 year lag) show we have achieved a 27% reduction in per capita CO2 emissions and 20% reduction in absolute CO2 emissions. As the Councils operational emissions are included in this citywide data any reduction we make will contribute towards these wider targets (The total Councils operational CO2 emissions equate to roughly 2% of total city CO2 emissions).

Proposed Budgetary Impacts

9. If LED street lighting is implemented on strategic highway routes there is a reduction in energy costs at £791,440 per annum, if energy costs remain at current levels. The actual savings take account of installation costs, maintenance and financing of the project, estimated at £4,446,130.76. The cost benefit analysis is shown in the Appendix 1 for 12-year capital repayment period.
10. The project supports reducing financial pressures identified in Corporate Plan. The savings associated with the introduction of LED street lighting on strategic highway routes have been accepted in the Medium Term

Financial Plan (MTFP) although only the budget savings for 2016/17 have been formally accepted.

Table 1: MTFP Savings associated with LED street lighting on the strategic road network.

Savings Title	2016/17	2017/18	2018/19	TOTAL 3 YEAR
Street Lighting - Conversion to LED	150	100	50	300

11. The business case for the project has been scrutinised at the Investment Review Board, with project costs being funded from a combination of interest free loans from Salix and other Council borrowing which are repayable and to be the first call savings to be generated.
12. The savings have been optimised by utilising the Salix 'Energy Efficiency Loan Scheme'. Subject to S151 Officer agreement of the terms and conditions of any such loans, this will provide interest free capital funding to deliver the scheme with repayments being made over the subsequent 6 years.

Positive impacts: New Central Management System

13. No Central Management System exists for the street lighting asset and it is proposed that a CMS system will be implemented on the strategic road network as part of this project.
14. A Central Management System will allow Officers to raise lighting levels if issues occur with the public and Local Members, during events or when there has been an accident. This will reduce ongoing risks or concerns as the project proceeds. There have been numerous media articles where Local Authorities have been criticised for their approach and it is felt that this option provides a solution to limit the likelihood of criticism taking place.
15. A Central Management System may allow integration with other technology in a SMART-City. This would not support improved savings relating to this specific project but could support collaborative work to reduce aspects such as crime and disorder.
16. There is a further £129,531 savings per annum that could be achieved by the introduction of a Central Management System and other associated benefits from the introduction of LED technology. Appendix 2 shows technical information on reducing street lighting energy consumption and associated savings.

Table 3: Other potential savings associated with the introduction of a Central Management System and other associated benefits from the introduction of LED technology

Savings which have been excluded from the analysis	LED excluding CMS	LED including CMS
Reduction in Maintenance Costs	£35,000	£35,000
LED aspect (improvement in LED technology)	Not considered	Not considered
Metering system and trimming	£0	£26,618
Faults and failure prediction	£0	£20,000
Dimming (estimated based on midnight to 6am dimming already in place in residential areas).	£0	£47,913

Issues

17. The project will be tendered via OJEU open procedure via 'Sell to Wales' as it was felt that the South East Wales Contractor framework did not offer the scope for competition for this specialist contract. The Council will utilise the Welsh Government SQUID pre-qualification document for the purposes of the selection process. Within the selection process (Part A) failure to meet the mandatory requirements, and achieve a minimum score of 37 out of 74 within sections B, C, D, E, F and G will result in bidders not being considered further. The attached Appendix B is the Selection stage questionnaire to be returned.
18. The proposed procurement timetable is shown below. This is intended as a guide.

Stage	Date(s)/time
Issue of Invitation to Tender	Friday 1 st July, 2016
Closing date for the downloading of documents and for requests for information.	23:00:00, Friday 29 th July, 2016.
Final Issue of clarification responses	By Tuesday, 2 nd August, 2016
Closing date for submission of Tenders	12:00:00, Noon on Friday 12 th August, 2016.
Evaluation of Tenders	By Friday 19 th August, 2016.
Notification of result of evaluation	By Friday 26 th August, 2016.
Standstill period	Friday 26 th May to Monday 5 th September, 2016.
Expected date of award of Contract	Monday 5 th September, 2016
Contract Start Date	26 th September, 2016.

19. The term of contract will be NEC Engineering and Construction Contract Option B – Priced Contract with Bill of Quantities, April 2013. The proposed commencement date for the contract will be September 2016 and it is estimated the contract duration will be 2 years.
20. Since 2008 Salix has committed funding to over £55.2 million of street lighting projects, working with over 50 local authorities across England. In recent years Salix has seen a steady growth in interest for LED street lighting technology. The first LED project to be committed was in 2011 with Gloucestershire County Council through their recycling fund.

Other Local Authorities

21. A number of Local Authorities in Wales have in recent years commenced the introduction of LED street lighting in recent years including Rhondda Cynon Taf Council, The Vale of Glamorgan Council, Merthyr Tydfil Council, Powys County Council, Monmouth County Council, Gwynedd Council and Wrexham Council. Further to this Welsh Government has commenced the installation of LED lighting on sections of the Welsh Government trunk road network
22. Due to the nature of heritage and non-strategic highway lanterns the costs for these lanterns are high in comparison and although there will be a revenue saving the payback will be significantly longer and therefore has not been considered in the business case. Further work will be undertaken once a suitable product has been identified and trialled.
23. Currently out of scope is street lighting in Parks and on Housing Land where we currently do not hold any asset data or direct budgetary control. These street lights could be brought within scope during the delivery of the contract if timescales permit. If timescale do not permit subsequent smaller contracts or Direct Labour Operatives could undertake the work based on our strategic approach.
24. If the quality of LED product is deemed unsuitable in certain locations then there may be a dilution of the ongoing cost savings. Mitigation is that a detailed review has been commissioned with Jacob Consultancy to provide information on lumen or lighting levels for our roads.
25. If LED costs decrease in coming years, there could be an adjustment of savings associated with the project. Mitigation is that the Council has monitored savings associated with LED installation and the savings are now in the region of 75%. There has been increased competition in the market for the provision of LED street light lanterns which has driven the costs of lanterns down and this competition has now stabilised lanterns at a reduced cost.
26. In order to fully understand the impacts of LED on city streets, a trial of LED street lighting lanterns has taken place and included consultation with vulnerable users, the night sky group and the individual who took Trafford Council to court. The specification has been set for white light of 3000 kelvins – this is a warmer light colour which matches our existing

lighting in residential areas. To date we have not received any complaints from the project that implemented changes in residential areas.

27. Street Lighting Officers and the Senior Management Team have set the specification to 3000 Kelvins to mimic current street lighting and reduce the potential of ongoing concerns. There is no legislation or specific guidance with respect to the specification of LED street lighting kelvin levels but Officers have set the specification by reviewing literature and the issues encountered by other Local Authorities. By installing on the strategic routes first the Council will be able to gauge citizen concerns prior to delivering LED street lighting in residential areas.

Local Member consultation

28. Whilst formal Member consultation is not required an information pack and programme will be developed and circulated prior to commencement of the contract. This will contain frequently asked questions to ensure that Local Members are fully informed and are able to engage and correspond directly with constituents as required.

Reason for Recommendations

29. To allow the contract to be delivered promptly by an appropriate procurement route .

Financial Implications

30. Subject to a business case the scheme is included in the Council's Capital Programme as an Invest to Save Scheme. The initial business case indicates that implementing LED Lighting on strategic routes coupled with a Central Management System will allow savings to be generated from existing energy usage. This will allow both repayment of any loans undertaken to pay for the initial investments as well as meeting revenue budget savings targets of £300k offered by the Directorate by 2018/19. Loans will need to be repaid irrespective of whether the savings target is met, with any shortfall arising in future years to be met from the Directorate Revenue budget should this scenario arise.
31. Simple payback (Point at which savings are equal to initial investment) is deemed to be just over 6 years, with the actual repayment period of the investment to be 12 years in order to allow savings to be released. Whilst there may be further savings to be generated as mentioned in the report, these would need to be considered fully after implementation and any post project implementation review. Following receipt of final tender costs, the business case should be updated before entering into a contract for implementation and effective processes should be put in place to manage any implementation and any variations to that contract.
32. Whilst the price of LED units have fallen in recent years and performance improving, the report indicates that market changes have now stabilised. In order to avoid any adverse financial implications, any procurement

should be undertaken to ensure that the correct specification is implemented. Delays to procurement and installation will result in a delay in any savings receivable.

33. Salix have offered in principal interest free loans towards the cost of this project. The terms and conditions will need to be reviewed by Finance before acceptance of such loans.

Legal Implications

34. Put simply, the proposed recommendation, is to seek approval to commence the tendering process to procure the Works contract to deliver LED street lighting.
35. The overall estimated value of the contract is £4.8 million and exceeds the EU threshold for Works contracts. As such, the full ambit of the Public Contract Regulations 2015 ("PCR 2015") apply along with the EC treaty based principles of equal treatment, non-discrimination, transparency, proportionality and mutual recognition.
36. It is understood from the body of the report that the Directorate intends to run a fully compliant procurement process following the Open procedure pursuant to Regulation 27 of the PCR 2015 and advertise a Contract Notice published via the Official Journal of the European Union (OJEU). In Open procedures, any interested economic operator may submit a tender in response to a contract notice . Accordingly all of the tender documents must be ready and available to the tenderers from the date of publication of the OJEU.
37. The body of the report details the proposed overarching evaluation criteria to be applied in this procurement process. It should be noted that the evaluation criteria cannot be amended once the OJEU has been published.
38. Detailed legal advice should be obtained throughout the procurement process with regard to i) the drafting of all the relevant procurement documentation (including the draft terms and conditions of contract) and ii) the procurement process in general.
39. In considering this matter the decision maker must have regard to the Council's duties under the Equality Act 2010. Pursuant to these legal duties Councils must, in making decisions, have due regard to the need to (1) eliminate unlawful discrimination, (2) advance equality of opportunity and (3) foster good relations on the basis of protected characteristics. Protected characteristics are: (a). Age, (b) Gender reassignment (c) Sex (d) Race – including ethnic or national origin, colour or nationality, (e) Disability, (f) Pregnancy and maternity, (g) Marriage and civil partnership, (h) Sexual orientation (l) Religion or belief – including lack of belief.
40. The report identifies that an Equality Impact Assessment has been carried out and is appended at Appendix 3. The purpose of the Equality

Impact Assessment is to ensure that the Council has understood the potential impacts of the proposal in terms of equality so that it can ensure that it is making proportionate and rational decisions having due regard to its public sector equality duty. The decision maker must have due regard to the Equality Impact Assessment in making its decision and the assessment should be regularly updated as the procurement progresses.

41. The decision maker should also be satisfied that the procurement is in accordance within the financial and budgetary policy.
42. It is noted from the body of the report that refers to a loan agreement as part of this arrangement – please see financial implications.

RECOMMENDATIONS

Cabinet is recommended to

1. Approve the procurement process to award a (Works) contract to deliver LED street lighting as set out in the body of the report;
2. Approve the issuing of tender documents (including the overarching evaluation, sub criteria and ITT);
3. Approve the issuing of the OJEU notice to formally commence the procurement process; and
4. Delegate authority to the Director of City Operations, subject to consultation with the Cabinet Member Corporate Services & Performance and the Cabinet Member Transport, Planning & Sustainability to deal with all aspects of the procurement process and ancillary matters up to and including contract award. Provided that the overall cost of the contract does not exceed a value of £5.5million, in which case matters will be referred back to Cabinet for consideration.

ANDREW GREGORY

Director of City Operations
10 June 2016

The following appendices are attached:

Appendix 1 – Cost benefit analysis for LED with CMS – 12-year repayment

Appendix 2 – Technical information on reducing street lighting energy consumption and associated savings

Appendix 3 – Equality Impact Assessment

The following background papers have been taken into account

Business Case for LED Street Lighting on Strategic Highway Routes (presented to investment review board on 25th April 2016)

Technical information on reducing street lighting energy consumption and associated savings

There are no specific legislative requirements that make the project essential in terms of lighting provision but when reviewing the provision, maintenance and operation of street lighting systems Officers take account of the following:

- A Highway Authority has a power, not a duty, under the Highways Act 1980 to provide and maintain road lighting. Similarly, the Local Authority has the power to provide and maintain footway lighting.
- In exercising its powers with regards to the extent, operation and maintenance of its road lighting, a Highway Authority should act reasonably. If it acts in a way that no reasonable authority would act then the decision of that authority could be subject to review in the courts.
- Road lighting has many community benefits; such as, the prevention of night time road accidents, the reduction in street crime and the fear of crime. In exercising the Highways Act powers, the Highway Authority is required under s.17 of the Crime and Disorder Act 1998 to have regard to the effect on crime and disorder in the exercise of those powers and have regards to the need to do all it reasonably can to prevent crime and disorder. However, there is no overriding duty on local authorities to provide or keep lit systems of street lighting to prevent crime.
- England and Wales unless provided by separate order, restricted roads and their associated 30mph speed limits are established by the presence of a “system of street lighting furnished by means of lamps placed but not more than 200 yards apart”.

Fundamentally there are four ways to reduce energy consumption with regards to street lighting

- Switch off street lights and remove lighting from specific locations. This has not been supported politically as there would be a high likelihood of citizen complaints as shown by Local Authorities that have taken this approach. There is a cost associated with decommissioning of street lighting which would need to be taken into consideration which would be in the region of £750-1000 per column. The consideration of duties placed on the Highway Authority means that this solution would not be supported for the strategic road network due to safety concerns and consideration that lighting is already in place.
- The selection of more energy-efficient lamps and equipment, reducing the energy used, whilst keeping the light output at an appropriate level. The introduction of LED technology is the most technologically advanced street lighting system.

- Consideration of the hours public lighting is in operation. As lights may take less time to warm up, there could be an opportunity to revise the start times. This is known as 'trimming'.
- Consideration of the lighting levels during the hours of lighting operation. Light levels may be lowered to acceptable levels at selected locations between selected times. This is known as 'dimming'.

LED lanterns should not need significant maintenance as they have an enhanced life and warranties will be provided for all parts for 10 years. This has not been considered in the cost benefit analysis but it is felt that there will be a saving of £35,000 per annum where work by frontline DLO will be undertaken in other areas – parks owned street lighting, housing owned street lighting and lit signs & bollards.

The LED aspect is rapidly changing technology and the costs of LED units are falling and performance is improving for the cost. The costs of LED aspects are now so low that they are disposable items and have replaced previous lighting technology. Specification will allow for aspect to be changed in the future. A view needs to be open to changing the LED aspect of the lantern as LED effectiveness and efficiency will improve over the next 10 years. The current manufacturers feel that the LED aspect will improve by 15% in the next 10 years. It is difficult to definitively assess the cost benefit but from the market there is an envisaged profile that has been utilised to assess the cost to saving viability. This has the value of an additional saving of £28,748 per annum in year 10 if all the LED aspect was changed. Obviously there is a cost in changing the LED unit that would need to be considered but any required replacement of the LED aspect due to maintenance could promote further improvement if advanced LED aspects were utilised. This saving has not been utilised in the cost benefit analysis as it is unknown at this time and therefore does not represent good financial decision making. However, it is highlighted in this report so Officers are aware of the potential of further savings in the future and that this should be reviewed as LED technology improves.

The remaining energy costs at £266,184 per annum will be further managed via the introduction of a Central Management System. A decision to introduce a Central Management System provides improved opportunities relating to street lighting management, energy savings and SMART-City integration. There is a significant capital outlay for a Central Management System but there are benefits relating to having it introduced.

The Central Management System acts as a metering system for street lighting and payments for energy are based on actual energy consumed rather than on an asset basis (UMSUG code). The payment of energy on an asset basis has slightly higher charges than actual energy consumed as consideration is taken with regards to lantern degradation over time. Further to this there is a 'trimming' aspect where lanterns will only be charged for when lanterns are actually on (switched on by photocell) whereas currently we pay dusk to dawn that is at the furthest extent of when the lanterns would operate. It is felt that savings in the region of 10% would be achieved this would be a saving of £26,618 per annum. The savings have been excluded from the cost benefit analysis.

Asset information is provided via the Central Management System and therefore any faults and failure prediction of lanterns are remotely identifiable. Without this system street lighting faults rely on notification by third parties or the public or dedicated night scouting at regular intervals. Savings of £20,000 per annum has been estimated from removal of administration and the verification of street light faults. To recover a saving for this then alternative work would need to be undertaken for income generation. The savings have been excluded from the cost benefit analysis.

The Central Management System will allow interface with asset management database for sharing and analysing data. This will ensure that performance is monitored and benchmarked. As there is no data at this time there is no information that can assist in reviewing improvements. Therefore, any savings have been excluded from the cost benefit analysis.

A Central Management System will allow the opportunity to control street lighting levels remotely from a computer or tablet. This allows street lighting levels to be able to be changed wherever or whenever. This provides opportunities to dim lights to achieve future savings. If 'dimming' proceeded on the basis of reducing energy to lanterns by 50% between midnight and 6am for 50% of the street lights in non-traffic sensitive areas (the same as we currently undertake with residential street lights) there would be a reduction in energy in the region of 20% and this would achieve a saving of £47,913 per annum. The savings have been excluded from the cost benefit analysis.



Equalities Impact Assessment

Policy/Strategy/Project/Procedure/Service/Function Title: Street Lighting

New/Existing/Updating/Amending: Retrofit Lanterns on main highway network to achieve energy savings circa 45 – 50%

Who is responsible for developing and implementing the Policy/Strategy/Project/Procedure/Service/Function?

Name: Chris Jones

Job Title: Electrical Lead

Service Team: Electrical

Service Area: SPHT&T

Assessment Date:

1. What are the objectives of the Policy/Strategy/Project/ Procedure/ Service/Function?

Objective

To achieve predicted energy savings and reduce CO² emissions on the higher street lighting wattages from 90Watt to 250Watt. Having considered a number of alternatives such as dimming existing assets, part night lighting etc. the decision was made to investigate a roll out of LED technology.

This will be achieved by retrofitting existing lanterns to LED equivalents.

Funding

Any loans to fund the capital required will be repaid from the energy savings. The capital investment required will be circa £7m and addresses approximately 14,000 lanterns on the main highway network. It is likely that the works will be carried out over two nine month periods – 7000 units each period. The project is predicted to achieve 45% savings in Energy and Carbon emissions and also significantly reduce maintenance costs.

Management of carbon emissions also has financial benefits for the Authority due to our involvement in the Carbon Reduction Commitment (CRC) Energy Efficiency Scheme. A reduction in carbon emissions indirectly benefits the whole community by contributing towards mitigation of climate change. Our Climate Change Strategy and Environment Strategy set out our approach to reducing carbon emissions and managing the impacts of climate change.

Stakeholder

It is anticipated that whilst there will be no negative differential impact on stakeholders regardless of their protected characteristic, location and time of day / year and ambient light levels; consideration has been made towards a large range of stakeholders including local residents, cyclists, pedestrians, visitors to the local area, commuters, emergency services, bus and taxi operators and other transport operators so as to establish the most suitable lighting provision.

2. Please provide background information on the Policy/Strategy/Project/Procedure/Service/Function and any research done [e.g. service users data against demographic statistics, similar EIAs done etc.]

Cardiff Council is historically committed to providing a sustainable environment for the residents and visitors to the city, seeking to create benefits for all stakeholders. Limited Environmental impact being experienced in relation to changes to street lighting.

Technology Background

LED Street lighting is a fast moving technology and there is recent evidence to suggest there are problems surrounding glare and the CCT (Core Colour Temperature) of the LEDs employed. LEDs are basically a blue light source with a phosphor coating to achieve the white light.

This is an area of concern ie. The amount of “blue rich” light not being filtered out. There is evidence to suggest that the higher most efficient colour temperatures currently being pushed by the large LED companies can effect melatonin levels in humans, effecting sleep patterns.

“Unfortunately, exposure to blue-rich light at night can lead to decreased melatonin secretion in humans. Melatonin is a hormone secreted at night by the pineal gland that helps balance the reproductive, thyroid, and adrenal hormones and regulates the body’s circadian rhythm of sleeping and waking. Lower Melatonin levels have been tenuously linked to increased risk of cancer. “(app 1,2,3)

The evidence also suggests that these “blue rich” LEDs also have an adverse impact on wildlife and the wider general environment.

There are three typical levels of LED; (app 4)

Cold White – above 4500Kelvin

Neutral White - 3500 to 4500 Kelvin

Warm White – 2700 to 3000 Kelvin

It is generally accepted that limiting the colour temperature to a “warm” 3000K CCT will remove these issues and also reduce glare to well within the current British Standard. (BS EN 13201-2:2003 – app 5, 6) Although this will reduce the energy saved over the harsher 5000K units by approx. 15%.

Engagement and Investigation

In order to investigate these possible issues further and select the best specification the Authority is presently erecting a “Test Bed” in the area behind City Hall which was considered as indicative of a typical Cardiff location, but one that could safely be used as a test location for all considered lantern types. (App 7, 8) Eight major manufacturers were approached, who offered up lanterns with an identical classification at 3000K CCT to be tested. An independent professional assessment was then carried out to establish from a technological perspective the most suitable and cost effective LED solution for the city.

Further, in November 2015 a number of focus group comprising representatives from the broad community including those from emergency services, local councillors and officers with individually with a range of impairments e.g. mobility and visual / hearing impairments, was escorted around the “Test Bed” in order to assess the human factors and impact / effect of the different LEDs and gain public feedback.

This feedback completed during the focus group “Test Bed” visit comprised of a 3 stage qualitative questionnaire presented to over 25 individuals.

Stage 1 designed to assess the individual’s perceived experience of the lighting in given

defined zones e.g. glare, brightness, spread of light etc.

Stage 2 was a scientific testing of individual's perception of colour interpretation.

And Stage 3 being a legibility test at distance of number plate style holdups.

Furthermore, Cardiff residents were also asked to participate, with invitations being distributed via the Councils local media platform. Again answering the same questionnaire residents had the opportunity to feed back their opinions on the "Test Bed" into the decision making process.

The findings of this investigation will be made public to ensure transparency of decision making prior to the project being rolled out.

3 Assess Impact on the Protected Characteristics

3.1 Age

Will this Policy/Strategy/Project/Procedure/Service/Function have a **differential impact [positive/negative/]** on younger/older people?

	Yes	No	N/A
Up to 18 years	X		
18 - 65 years	X		
Over 65 years	X		

Please give details/consequences of the differential impact, and provide supporting evidence, if any.

It is proposed that adoption of LED street lighting and the improvements in energy efficiency, financial savings to the Local authority and the overall reduction in CO² emissions to the environment will not have a negative differential impact on the protected characteristics.

Indeed it is suggested that through the community based approach to choosing the most appropriate solution and lantern, the use of LED technology will significantly benefit the whole community not only in relation to financial savings, and the overall environmental benefit but also in practical terms. These practical terms will now be outlined in the next section.

What action(s) can you take to address the differential impact?

Good quality Street lighting is integral to the health of a community and its ability to socially interact.

The proposed LED project will have a positive impact on all protected characteristics for the below reasons.

- The human eye sees white light (in a different manner to the old "orange glow" streetlights and in general
- Provides better visual guidance
- Reveals obstacles more clearly
- Allows pedestrians to easier recognise hazards
- Facilitates better pedestrian orientation and wayfinding
- Pedestrians recognise facial features easier which is of benefit in respect of security as well as communications
- Provides a feeling of security

(please see Appendix 9)

Research information used to inform the decision making process have shown that the whiter light nightscape benefits local communities -

- Reduction of street crime and the fear of street crime in residential areas.
- Lighting improvements can decrease crime by up to 30 per cent.
- Stimulating the night time economy and use of public amenities and transport.
- Development of safer routes to school. (app 10)

While research on the effects of improved street lighting on crime rates is not entirely definitive, an analysis of eight different studies found that improved street lighting—either through more lights or brighter lights— reduced crime by an average of 7%. 1 With improved visibility, potential offenders are more exposed and less likely to commit crimes. Enhanced lighting can signal more community investment, pride, and cohesiveness, which also can discourage crime.

There are two main theories of why Improved street lighting may cause a reduction in crime. The first suggests that improved lighting leads to increased surveillance of potential offenders (both by improving visibility, surveillance cameras etc., and by increasing the number of people on the street) and hence to increased deterrence of potential offenders.

The second suggests that improved lighting promotes community investment in the area and that the area is improving, leading to increased community pride, community cohesiveness, and informal social control.

Improved street lights can make a community feel safer. They allow safer operation of vehicles and bicycles at night, reduce accidents, and assist traffic flow.

Better light can also promote the night time operation of businesses and increase pedestrian street use after dark, all of which leads to a more active, enhanced neighbourhood. (app 11)

It is envisaged the improved lighting will have a positive impact on social cohesion e.g. attendance at community groups such as WI, scouts, church, day centres, sports clubs etc.

It is recognised that in many instances the location of lighting is a consideration. As such this will be monitored as new lighting might be included in schemes, so as to alleviate any unforeseen differential impacts that may arise.

3.2 Disability

Will this Policy/Strategy/Project/Procedure/Service/Function have a **differential impact [positive/negative]** on disabled people?

	Yes	No	N/A
Hearing Impairment	x		
Physical Impairment	x		
Visual Impairment	x		
Learning Disability	x		
Long-Standing Illness or Health Condition	x		
Mental Health	x		
Substance Misuse	x		
Other	x		

Please give details/consequences of the differential impact, and provide supporting evidence, if any.

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- Provides a feeling of security

(please see Appendix 9)

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- Lighting improvements can decrease crime by up to 30 per cent.
- Stimulating the night time economy and use of public amenities and transport.
- Development of safer routes to school. (app 10)
The impact on community safety has two core dimensions: prevented crime and the impact on fear of crime.
- People with visual or mobility impairments may find the improved street lighting helpful in assisting them to navigate and avoid hazards, as such, there is a potentially positive impact on risk of falling and accessibility.
- People with disabilities may feel less vulnerable to crime as a result of improved lighting, but much depends on the specific circumstances as well as other
- Deaf and hearing impaired individuals who lip read will benefit from improved lighting as they will be better able to distinguish facial features, lip read and see sign language at times of diminished light. This will improved communications and opportunities for social interaction for this community.
- factors such as localised crime rates, policing and quality of public spaces. (app 12)
- There may be potential for an increase in ‘hate crime’ against people with physical or learning disabilities as they will be more easily identified in the community. (app 13)

- Improved lighting will help alleviate carers fears about lower levels of lighting when attending a relative or service user late at night/early in the morning.
- Improved lighting will it is suggested lead to an improved recognition of any potential hazards in the walkway e.g. risen curbs, loose pavers etc. this reducing any potential harm from slips trips or falls.

It is recognised that in many instances the location of lighting is a consideration. As such this will be monitored as new lighting might be included in schemes, so as to alleviate any unforeseen differential impacts that may arise.

3.3 Gender Reassignment

Will this Policy/Strategy/Project/Procedure/Service/Function have a **differential impact [positive/negative]** on transgender people?

	Yes	No	N/A
Transgender People (People who are proposing to undergo, are undergoing, or have undergone a process [or part of a process] to reassign their sex by changing physiological or other attributes of sex)	x		

Please give details/consequences of the differential impact, and provide supporting evidence, if any.

It is proposed that adoption of LED street lighting and the improvements in energy efficiency, financial savings to the Local authority and the overall reduction in CO² emissions to the environment will not have a negative differential impact on the protected characteristics.

Indeed it is suggested that through the community based approach to choosing the most appropriate solution and lantern, the use of LED technology will significantly benefit the whole community not only in relation to financial savings, and the overall environmental benefit but also in practical terms. These practical terms will now be outlined in the next section.

The Transgender community may feel less vulnerable to “hate crime” as a result of improved lighting, but much depends on the specific circumstances as well as other factors such as crime rates, policing and quality of public spaces.

What action(s) can you take to address the differential impact?

Good quality Street lighting is integral to the health of a community and its ability to socially interact.

The proposed LED project will have a positive impact on all protected characteristics for the below reasons.

- The human eye sees white light (in a different manner to the old “ orange glow” streetlights and in general
- Provides better visual guidance
- Reveals obstacles more clearly
- Allows pedestrians to easier recognise hazards
- Facilitates better pedestrian orientation and wayfinding
- Pedestrians recognise facial features easier which is of benefit in respect of

security as well as communications

- Provides a feeling of security

(please see Appendix 9)

Research information used to inform the decision making process have shown that the whiter light nightscape benefits local communities -

- Reduction of street crime and the fear of street crime in residential areas.
- Lighting improvements can decrease crime by up to 30 per cent.
- Stimulating the night time economy and use of public amenities and transport.
- Development of safer routes to school. (app 10)
- Improved lighting will it is suggested lead to an improved recognition of any potential hazards in the walkway e.g. risen curbs, loose pavers etc. this reducing any potential harm from slips trips or falls.

While research on the effects of improved street lighting on crime rates is not entirely definitive, an analysis of eight different studies found that improved street lighting—either through more lights or brighter lights— reduced crime by an average of 7%. 1 With improved visibility, potential offenders are more exposed and less likely to commit crimes. Enhanced lighting can signal more community investment, pride, and cohesiveness, which also can discourage crime.

There are two main theories of why Improved street lighting may cause a reduction in crime. The first suggests that improved lighting leads to increased surveillance of potential offenders (both by improving visibility, surveillance cameras etc., and by increasing the number of people on the street) and hence to increased deterrence of potential offenders.

The second suggests that improved lighting promotes community investment in the area and that the area is improving, leading to increased community pride, community cohesiveness, and informal social control.

Improved street lights can make a community feel safer. They allow safer operation of vehicles and bicycles at night, reduce accidents, and assist traffic flow.

Better light can also promote the night time operation of businesses and increase pedestrian street use after dark, all of which leads to a more active, enhanced neighbourhood. (app 11)

It is envisaged the improved lighting will have a positive impact on social cohesion e.g. attendance at community groups such as WI, scouts, church, day centres, sports clubs etc.

It is recognised that in many instances the location of lighting is a consideration. As such this will be monitored as new lighting might be included in schemes, so as to alleviate any unforeseen differential impacts that may arise.

3.4. Marriage and Civil Partnership

Will this Policy/Strategy/Project/Procedure/Service/Function have a **differential impact** [positive/negative] on marriage and civil partnership?

	Yes	No	N/A
Marriage			x

Civil Partnership			x
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Please give details/consequences of the differential impact, and provide supporting evidence, if any.
<p>No differential impact has been identified that may have a direct effect on the protected characteristic of marriage or civil partnership. This will be monitored and addressed if any are identified.</p> <p>It is proposed that adoption of LED street lighting and the improvements in energy efficiency, financial savings to the Local authority and the overall reduction in CO² emissions to the environment will not have a negative differential impact on the protected characteristics.</p> <p>Indeed it is suggested that through the community based approach to choosing the most appropriate solution and lantern, the use of LED technology will significantly benefit the whole community not only in relation to financial savings, and the overall environmental benefit but also in practical terms. These practical terms will now be outlined in the next section.</p>
What action(s) can you take to address the differential impact?
Not Applicable

3.5 Pregnancy and Maternity

Will this Policy/Strategy/Project/Procedure/Service/Function have a **differential impact [positive/negative]** on pregnancy and maternity?

	Yes	No	N/A
Pregnancy	x		
Maternity	x		

Please give details/consequences of the differential impact, and provide supporting evidence, if any.
<p>It is proposed that adoption of LED street lighting and the improvements in energy efficiency, financial savings to the Local authority and the overall reduction in CO² emissions to the environment will not have a negative differential impact on the protected characteristics.</p> <p>Indeed it is suggested that through the community based approach to choosing the most appropriate solution and lantern, the use of LED technology will significantly benefit the whole community not only in relation to financial savings, and the overall environmental benefit but also in practical terms. These practical terms will now be outlined in the next section.</p>
What action(s) can you take to address the differential impact?
In addition to the considerations already identified

Those who may be identify within the protected characteristic of pregnancy and maternity; will it is expected benefit from LED lighting in the following ways:-

- Feel less vulnerable to crime as a result of improved lighting, resulting in a positive impact on travel to services related to their characteristic e.g. access maternity unit/hospital care.
- Improved lighting will it is suggested lead to an improved recognition of any potential hazards in the walkway e.g. risen curbs, loose pavers etc. this reducing any potential harm from slips trips or falls.

3.6 Race

Will this Policy/Strategy/Project//Procedure/Service/Function have a **differential impact [positive/negative]** on the following groups?

	Yes	No	N/A
White	x		
Mixed / Multiple Ethnic Groups	x		
Asian / Asian British	x		
Black / African / Caribbean / Black British	x		
Other Ethnic Groups	x		

Please give details/consequences of the differential impact, and provide supporting evidence, if any.

Community safety is an important issue for all including people from minority ethnic backgrounds, with prevention of street crime and racially motivated crime being Particularly relevant.

It is proposed that adoption of LED street lighting and the improvements in energy efficiency, financial savings to the Local authority and the overall reduction in CO² emissions to the environment will not have a negative differential impact on the protected characteristics.

As such it is suggested that through the community based approach to choosing the most appropriate solution and lantern, the use of LED technology will significantly benefit the whole community not only in relation to financial savings, and the overall environmental benefit but also in practical terms. These practical terms will now be outlined in the next section.

What action(s) can you take to address the differential impact?

Good quality Street lighting is integral to the health of a community and its ability to socially interact.

The proposed LED project will have a positive impact on all protected characteristics for the below reasons.

- The human eye sees white light (in a different manner to the old “ orange glow” streetlights and in general
- Provides better visual guidance
- Reveals obstacles more clearly
- Allows pedestrians to easier recognise hazards
- Facilitates better pedestrian orientation and wayfinding
- Pedestrians recognise facial features easier which is of benefit in respect of security as well as communications

- Provides a feeling of security (please see Appendix 9)

Research information used to inform the decision making process have shown that the whiter light nightscape benefits local communities -

- Reduction of street crime and the fear of street crime in residential areas.
- Lighting improvements can decrease crime by up to 30 per cent.
- Stimulating the night time economy and use of public amenities and transport.
- Development of safer routes to school. (app 10)

While research on the effects of improved street lighting on crime rates is not entirely definitive, an analysis of eight different studies found that improved street lighting—either through more lights or brighter lights— reduced crime by an average of 7%. 1 With improved visibility, potential offenders are more exposed and less likely to commit crimes. Enhanced lighting can signal more community investment, pride, and cohesiveness, which also can discourage crime.

There are two main theories of why Improved street lighting may cause a reduction in crime. The first suggests that improved lighting leads to increased surveillance of potential offenders (both by improving visibility, surveillance cameras etc., and by increasing the number of people on the street) and hence to increased deterrence of potential offenders.

The second suggests that improved lighting promotes community investment in the area and that the area is improving, leading to increased community pride, community cohesiveness, and informal social control.

Improved street lights can make a community feel safer. They allow safer operation of vehicles and bicycles at night, reduce accidents, and assist traffic flow. Better light can also promote the night time operation of businesses and increase pedestrian street use after dark, all of which leads to a more active, enhanced neighbourhood. (app 11)

It is envisaged the improved lighting will have a positive impact on social cohesion e.g. attendance at community groups such as WI, scouts, church, day centres, sports clubs etc.

It is recognised that in many instances the location of lighting is a consideration. As such this will be monitored as new lighting might be included in schemes, so as to alleviate any unforeseen differential impacts that may arise.

3.7 Religion, Belief or Non-Belief

Will this Policy/Strategy/Project/Procedure/Service/Function have a **differential impact [positive/negative]** on people with different religions, beliefs or non-beliefs?

	Yes	No	N/A
Buddhist	X		
Christian	X		
Hindu	X		
Humanist	X		

Jewish	X		
Muslim	X		
Sikh	X		
Other	x		

Please give details/consequences of the differential impact, and provide supporting evidence, if any.

People may feel less vulnerable to crime as a result of improved lighting, and it is recognised that this is particularly relevant to faith communities who may be at risk of hate crime e.g. anti-Semitism, Islamophobia, but much depends on the specific circumstances as well as other factors such as crime rates, policing and quality of public spaces

It is proposed that adoption of LED street lighting and the improvements in energy efficiency, financial savings to the Local authority and the overall reduction in CO² emissions to the environment will not have a negative differential impact on the protected characteristics.

As such it is suggested that through the community based approach to choosing the most appropriate solution and lantern, the use of LED technology will significantly benefit the whole community not only in relation to financial savings, and the overall environmental benefit but also in practical terms. These practical terms will now be outlined in the next section.

What action(s) can you take to address the differential impact?

Good quality Street lighting is integral to the health of a community and its ability to socially interact.

The proposed LED project will have a positive impact on all protected characteristics for the below reasons.

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- Pedestrians recognise facial features easier which is of benefit in respect of security as well as communications
- Provides a feeling of security

(please see Appendix 9)

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- Reduction of street crime and the fear of street crime in residential areas.
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- Stimulating the night time economy and use of public amenities and transport.
- Development of safer routes to school. (app 10)

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likely to commit crimes. Enhanced lighting can signal more community investment, pride, and cohesiveness, which also can discourage crime.

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It is envisaged the improved lighting will have a positive impact on social cohesion e.g. attendance at community groups such as WI, scouts, church, day centres, sports clubs etc.

It is recognised that in many instances the location of lighting is a consideration. As such this will be monitored as new lighting might be included in schemes, so as to alleviate any unforeseen differential impacts that may arise.

3.8 Sex

Will this Policy/Strategy/Project/Procedure/Service/Function have a **differential impact [positive/negative]** on men and/or women?

	Yes	No	N/A
Men	x		
Women	x		

Please give details/consequences of the differential impact, and provide supporting evidence, if any.

All genders will enjoy the benefits of improved lighting as outlined in previous sections however, it is anticipated that women may feel safer when in public areas during the hours of darkness, due to improved LED lighting and its associated benefits.

It is proposed that adoption of LED street lighting and the improvements in energy efficiency, financial savings to the Local authority and the overall reduction in CO² emissions to the environment will not have a negative differential impact on the protected characteristics.

Indeed it is suggested that through the community based approach to choosing the most appropriate solution and lantern, the use of LED technology will significantly benefit the whole community not only in relation to financial savings, and the overall

environmental benefit but also in practical terms.

What action(s) can you take to address the differential impact?

Please see

3.9 Sexual Orientation

Will this Policy/Strategy/Project/Procedure/Service/Function have a **differential impact [positive/negative]** on the following groups?

	Yes	No	N/A
Bisexual	X		
Gay Men	X		
Gay Women/Lesbians	X		
Heterosexual/Straight	x		

Please give details/consequences of the differential impact, and provide supporting evidence, if any.

In general those who may be considered within this protected characteristic group may feel less vulnerable to “hate crime” as a result of improved lighting.

It is proposed that adoption of LED street lighting and the improvements in energy efficiency, financial savings to the Local authority and the overall reduction in CO² emissions to the environment will not have a negative differential impact on the protected characteristics.

Indeed it is suggested that through the community based approach to choosing the most appropriate solution and lantern, the use of LED technology will significantly benefit the whole community not only in relation to financial savings, and the overall environmental benefit but also in practical terms. These practical terms will now be outlined in the next section.

What action(s) can you take to address the differential impact?

Good quality Street lighting is integral to the health of a community and its ability to socially interact.

The proposed LED project will have a positive impact on all protected characteristics for the below reasons.

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(please see Appendix 9)

Research information used to inform the decision making process have shown that the whiter light nightscape benefits local communities -

- Reduction of street crime and the fear of street crime in residential areas.
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- Stimulating the night time economy and use of public amenities and transport.
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While research on the effects of improved street lighting on crime rates is not entirely definitive, an analysis of eight different studies found that improved street lighting—either through more lights or brighter lights— reduced crime by an average of 7%. 1 With improved visibility, potential offenders are more exposed and less likely to commit crimes. Enhanced lighting can signal more community investment, pride, and cohesiveness, which also can discourage crime.

There are two main theories of why Improved street lighting may cause a reduction in crime. The first suggests that improved lighting leads to increased surveillance of potential offenders (both by improving visibility, surveillance cameras etc., and by increasing the number of people on the street) and hence to increased deterrence of potential offenders.

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Improved street lights can make a community feel safer. They allow safer operation of vehicles and bicycles at night, reduce accidents, and assist traffic flow.

Better light can also promote the night time operation of businesses and increase pedestrian street use after dark, all of which leads to a more active, enhanced neighbourhood. (app 11)

It is envisaged the improved lighting will have a positive impact on social cohesion e.g. attendance at community groups such as WI, scouts, church, day centres, sports clubs etc.

It is recognised that in many instances the location of lighting is a consideration. As such this will be monitored as new lighting might be included in schemes, so as to alleviate any unforeseen differential impacts that may arise.

3.10 Welsh Language

Will this Policy/Strategy/Project/Procedure/Service/Function have a **differential impact [positive/negative]** on Welsh Language?

	Yes	No	N/A
Welsh Language	x		

Please give details/consequences of the differential impact, and provide supporting evidence, if any.

It is proposed that adoption of LED street lighting and the improvements in energy efficiency, financial savings to the Local authority and the overall reduction in

CO² emissions to the environment will not have a negative differential impact on the protected characteristics.

Indeed it is suggested that through the community based approach to choosing the most appropriate solution and lantern, the use of LED technology will significantly benefit the whole community not only in relation to financial savings, and the overall environmental benefit but also in practical terms. These practical terms will now be outlined in the next section.

What action(s) can you take to address the differential impact?

It is envisaged the improved lighting will have a generally positive impact on social cohesion e.g. attendance at community groups such as WI, scouts, church, day centres, sports centres, pubs and clubs etc.

This in turn should have a positive impact on the Welsh speaking community and media in relation to making all forms of evening travel easier to attend events, adult evening classes etc.

4. Consultation and Engagement

What arrangements have been made to consult/engage with the various Equalities Groups?

As outlined in section 2, the Authority has engaged and will continue to engage with a wide range of community groups focusing around the “LED Test Bed” constructed on King Edward 7th Ave and Museum Place in October 2015 as well as the broader consideration as may be implemented.

As a location King Edward 7th Ave and Museum Place was specifically chosen for easy pedestrian and vehicular access and is geographically central as well as being a typical example of a street scape within Cardiff.

5. Summary of Actions [Listed in the Sections above]

Groups	Actions
Age	Please see specific protected characteristic
Disability	Please see specific protected characteristic
Gender Reassignment	Please see specific protected characteristic
Marriage & Civil Partnership	Please see specific protected characteristic
Pregnancy & Maternity	Please see specific protected characteristic
Race	Please see specific protected characteristic
Religion/Belief	Please see specific protected characteristic
Sex	Please see specific protected characteristic
Sexual Orientation	Please see specific protected characteristic
Welsh Language	Please see specific protected characteristic
Generic Over-Arching [applicable to all the above groups]	Please see specific protected characteristic

6. Further Action

Any recommendations for action that you plan to take as a result of this Equality Impact Assessment (listed in Summary of Actions) should be included as part of your Service Area’s Business Plan to be monitored on a regular basis.

7. Authorisation

The Template should be completed by the Lead Officer of the identified Policy/Strategy/Project/Function and approved by the appropriate Manager in each Service Area.

Completed By : Chris Jones	Date:
Designation: Lead Officer	25 th May 2016
Approved By: Gary Brown	6 th June 2016
Designation: Operational Manager	
Service Area: City Operations - Electrical	

For further information or assistance, please contact the Citizen Focus Team on 029 2087 3059 or email citizenfocus@cardiff.gov.uk