STREET LIGHTING BUSINESS CASE

Project Name:	Street Lighting – LED Lighting and Energy Efficiency
Portfolio:	Communities and Housing
Outcome:	Stockport is a place people want to live
Board SRO:	Caroline Simpson
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1. Executive Summary

1.1. This business case represents a proposal for Stockport Metropolitan Borough Council ("the Council") to undertake a capital investment of approximately £14.649m (including contingency) to implement an LED street lighting scheme (conversion of existing non LED lanterns to LED). Street lighting technology has advanced significantly in the last five years and LED trials across the United Kingdom have proven that the replacement of traditional lighting with new LED equipment offers an opportunity to reduce carbon emissions and achieve operational efficiencies through reduced electricity consumption and lower maintenance costs, with LED equipment having a longer life and lower unit costs compared with existing lamps.

1.2. Both the financial and the wider, more strategic, case for this investment demonstrates significant financial and environmental benefits. Subject to procurement, and based on current energy prices and forecast assumptions, the proposed capital investment is forecast to achieve (unadjusted) financial savings of £12.681m over the cumulative project period and reduce CO_2 emissions by 2,151 tonnes p.a. It is considered that to "do nothing" is likely to be a poor value option in the long term as in this scenario the Council would be faced with increasing energy and maintenance costs as electricity and lamp prices continue to rise.

1.3. The business case is designed to manage increasing energy and maintenance expenditure; the current budgets for street lighting energy and maintenance would need to increase under a "do nothing" or "invest" scenario (including the cost of borrowing), but the increase in budgets would be less if the investment is made. Investing would have a positive impact on the long term financial picture, but will cause a pressure in the Medium Term Financial Plan period (MTFP, 2016/17 to 21/22), which is thought to be

containable. By year five (and when looked at overall) the business case indicates a saving compared to the “do nothing” position.

1.4. The business case assumes that the financing arrangements for the project would be arranged primarily through the Public Works Loan Board (PWLB) at 3%. Potentially a proportion could be funded by SALIX at 0% interest for a fixed period of time (no longer than five years), but this has not been built into this business case. However, a final decision on the financing of the project will need to be made at the next stage once the Council and its partners have decided on their preferred procurement and service delivery option.

1.5. The service delivery arrangements for this project assume that Solutions SK would be the preferred delivery agent, with additional support where required from the Alliance partner Acorn. The supplier would be procured either under the existing AGMA framework or via an open tender. Further work would need to be undertaken by the Council based on advice from legal and procurement as to the preferred way forward.

1.6. In summary the findings suggest that investment in LED street lighting will materially reduce future costs for the Council at a time when local authorities are under increasing financial pressure. Furthermore it will cut carbon emissions, contributing to the Council’s and Greater Manchester’s targets. The reduction in future costs are based on the forecast that energy prices will continue to rise by 5% per annum and that the proposal will reduce expenditure on energy by 33% (see Appendix 2) and maintenance by 9% (It is expected that there will be maintenance savings £0.100m by year three from the areas of “routine bulk change & clean / electrical testing” and also from a forecast reduction in faults on the lighting network as a result of the LED installations. The savings will therefore come from a reduction in the current repair resource and associated materials.). The deliverability of these maintenance reductions are key in delivering the reduction in future costs.

2. Case for Change

2.1. The 2008 Climate Change Act established the world’s first legally binding climate change target. In response the UK Government aims to reduce the UK’s greenhouse gas emissions by at least 80% (from the 1990 baseline) by 2050. One way in which the Government is ensuring this target is met is by setting carbon budgets to limit the amount of greenhouse gases the UK is allowed to emit on an annual basis.

2.2. As a result of the above, Greater Manchester Council (GMC) leaders have agreed a target under which the region’s ten local authorities will work together to reduce emissions by 48 per cent by 2020. Like all other councils, the councils in Greater Manchester are obliged to take part in the Carbon Reduction Commitment Energy Efficiency Scheme so any initiative to reduce emissions will also help to reduce the financial burden with a consequential benefit to local residents. In order to meet the target the councils have to find

effective and efficient ways in which to reduce CO_2 emissions.

2.3. Stockport Council, like other councils across England, has to deal with current and future budget cuts and rising energy prices in addition to the aforementioned carbon emissions targets. This has led to the development of one of the key objectives within the Stockport Council Plan 2016-17, which identifies the need to '*lead local efforts to reduce carbon emissions, including driving the market towards energy efficiency'*. To this end, Council is examining cost reduction strategies in addition to cutting carbon emissions through energy efficiency savings.

2.4. Stockport Council currently spends approximately £1.9m[1] a year on street lighting energy. This is 54% of their overall expenditure on electricity excluding schools. As it currently stands, the Council's street lighting infrastructure is aging, and like many other local authorities, many of the installations are becoming outdated and inefficient. This results in both a higher energy consumption/ cost and increasing maintenance costs. The Council operates a programme to review the structural integrity of its street lighting infrastructure, where necessary maintaining and replacing both the columns and lanterns.

2.5. The existing condition of the street lighting infrastructure is further compounded by the European directives that have recently been translated in to UK law (SI 2007 No.2037). This means that some of the existing equipment that is used to illuminate the highways within Stockport is being phased out of production. Thus to achieve a continuity of service, where these affected lights are used in the borough, they will need to be replaced with other equipment.

2.6. The introduction of modern, low energy LED street lighting is one way in which the Council can both reduce energy costs and future carbon emissions, along with reducing the associated costs of the street lighting maintenance and operations. The relatively recent technological advances associated with LED street lighting has led to a range of improvements including increased lumen output and efficacy, which translates into less energy usage. In addition the costs of individual units have dropped significantly and longer term warranties are being provided as standard. Industry advice indicates that the technology has reached a technological maturity that is unlikely to significantly change in the foreseeable future. As a result the use of LED street lighting is now the preferred option and has been adopted by authorities locally (e.g. Salford) and many others nationally. This is either on a phased approach, full network changes or private finance initiative (PFI).

2.7. This development and maturity of the technology, combined with the fact the relative costs of LED lighting has fallen, makes the equipment suitable for

[1] Source: 2015/ 16 invoice from the SMBC energy supplier

use within Stockport. Furthermore it will result in a consistent set of street lighting infrastructure, in that it will be the same type and condition, which means the infrastructure will all adhere to the same standards.

2.8. It is anticipated that the introduction of LED street lighting will also result in a reduction of maintenance costs, notably the reactive maintenance costs, currently approximately £1.3m a year, which are incurred as a result of faults and failures. However, the reactive budget also includes routine maintenance operation, for example electrical testing and attending to electrical supply issues. The increased lifespan of LED lights, approximately 23 years compared to 3 to 6 years with the traditional lamps, along with the fact that there are a limited number of other components that could fail within the life of the LED units, means that savings will be made through less reactive repairs. In addition the cost of lamps / other elements linked to existing conventional lighting (used on the majority of our roads) is increasing and becoming less available as technology develops. Modern LED lights will reach a point of full illumination in a shorter time than the existing sodium based lights. There will be no change in the period of full illumination on the streets. The LED lights do not require a warm up period.

2.9. An 'invest to save' project was identified, which would see the implementation of LED street lighting on all highways and public rights of way across the borough. This would involve replacing all appropriate street lighting with new LED units, resulting in energy efficiency savings and therefore financial savings in energy costs, maintenance reduction costs and lower carbon emissions.

2.10. The project will contribute to reducing the Stockport Carbon Footprint through significant carbon reductions in both street lighting energy use and maintenance operations i.e. a reduction in vehicle journeys checking and replacing lanterns, translating into both fuel savings and fewer replacement components which supports Stockport Council's ability to achieve the overall strategic carbon reduction required by 2020.

2.11. This business case considers the replacement of the Council's current street lighting with an LED replacement initiative and effectively compares this to the current "Do nothing" scenario. The Do nothing scenario assumes that lanterns are replaced on a like for like basis when the lighting installations have failed, or reached the end of their life.

3. Project Objectives and Benefits

3.1. The key objectives of this project are as follows:

- **Reduce energy consumption of street lighting, reducing energy costs and to minimise the exposure to future energy price increases**. Currently 54% of Stockport Council's electricity usage is consumed by street lighting.

- **Reduce carbon emissions to contribute to Stockport's overall 2020 target**.
- **Reduce ongoing maintenance requirements and hence revenue costs**. Maintenance would become more simplified, due to the use of a limited suite of LED lanterns as opposed to the numerous different types at present, which would make individual lantern replacements more effective.
- To maintain the highway assets in the most economically and environmentally sustainable long-term manner.

3.2. In addition, modern and well-designed street lighting can provide further community benefits including:-

- Allowing more effective use of CCTV systems at night;
- Reducing the fear of street crime;
- Promoting cycling & walking through lighter night time streets; and
- Improved service provision through an improved quality of lighting, reduction of obtrusive lighting and outages.

3.3. The key project objectives and associated benefits are summarised in the following table.

Table 3.1: Summary of Project Objectives and Associated Benefits

What do we want to achieve?	How will we know whether we've achieved this?	How will we measure this?	When will we achieve this?
Objective	**Benefit**	**Metric / Methodology**	**Timescale**
Reduce the energy consumption of street lighting	**Monitor the annual invoiced energy consumption associated with street lighting**	**kWh of energy consumption invoiced/ associated with street lighting**	**On a proportional basis to the rolled out programme, one full calendar year after 100% implementation**
Reduce carbon emissions associated with street lighting	**As energy consumption declines, carbon emissions will reduce accordingly**	**kWh of energy consumption invoiced/ associated with street lighting – and the associated carbon emissions**	**On a proportional basis to the rolled out programme, one full calendar year after 100% implementation**
Reduce maintenance requirements associated with street lighting	**Reduced number of reactive maintenance repairs**	**Monitor the annual number of reactive maintenance repairs due to faulty lighting**	**On a proportional basis to the rolled out programme, one full calendar year after 100% implementation**

4. Scope

4.1. This project will focus on replacing all non-LED standard street lanterns (i.e. not decorative street lanterns) within the Borough with new LED lanterns. The investment in new lanterns alone cannot realise the full objectives of the project. In order to ensure that the completed scheme achieves the required lighting levels for the type of road, a design process will need to be undertaken. It is currently assumed that this will result in approximately 10% of existing columns being relocated. In order to refine this number for the

Final Business Case submission, a design exercise will be carried out by a manufacturer for four selected Ward areas including, Heatons North, Reddish South, Manor, Bramhall South (the 2017/18 HIP footway areas). Prior to delivery, this will need to be supplemented with a further three wards to deliver the main element of the programme over a 3 year period.

4.2. Stockport is moving towards a 'one network' approach to highways maintenance and as such parks and Public Rights of Way will fall within the highways maintenance remit. As this change is in its infancy currently, detailed asset and energy information does not exist for the parks but does for the Public Rights of Way. This 'one network' approach will require efficiency savings, since the maintenance budget is not expected to increase.

4.3. The planned capital maintenance budget currently provides for the replacement of columns which have reached the end of their life. All columns in the borough are structurally inspected at an agreed frequency depending on their age and the previous test results. If the column deteriorates to a certain state, the inspection regime moves to every three years and finally to an annual inspection before the column will be replaced or repaired. Currently Council replace or repair approximately 2-3% of columns per year due to failure or deterioration, at an existing cost of £560,000 p.a.

4.4. Within SMBC, a 'lifecycle model' is currently being prepared to profile the required replacement investment for failing columns, and to understand if there is any benefit to co-ordinating the columns categorised within the three year inspections with the proposed LED replacement programme . The preliminary findings from the 'lifecycle model' study indicate that bringing forward the replacement/ repair of columns to coincide with the LED replacement programme would not deliver good value for money. The Council's current replacement approach, with the works occurring based on the conditional survey reports, is still considered to be the most cost efficient approach of managing the replacement of columns, even with the proposed LED replacement programme.

4.5. Furthermore, consideration was given to the potential situation whereby a column requires replacing in the short term, following the completion of the proposed LED replacement programme. This would not result in additional costs being incurred, since the 'new' LED lanterns could be transferred from the old column to the new column relatively easily. Indeed, rather than additional costs being incurred, there would be some economies of scale, since the wiring and switch gear will have been renewed as part of the LED replacement programme.

4.6. It is currently estimated that the existing capital maintenance budget of £0.560m p.a. (in 2016 prices) is sufficient to undertake column replacement/ repairs until 2030. Furthermore, within this timeframe the number of columns requiring replacing or repair are unlikely to significantly exceed the existing 2-

3% p.a. Post 2030, the column replacement cost component of the capital maintenance budget is forecast to increase given the relative age of the columns at this point in time.

4.7. The LED replacement project offers the potential to offset any additional maintenance costs incurred when the PROW and Parks networks are incorporated into existing highways network and asset maintenance programmes.

4.8. The proposal allows for the inclusion of time switch control of lighting in Parks where access is restricted at night or impact on the environment is high. This will enable the operational control of lighting where this is considered to be appropriate. The aim is to minimise the impact of lighting on the environment. Other environmental impact assessments will be carried out as part of the lighting installation e.g. Bat activity which is recorded on the Council's GIS register and liaison will continue with Greater Manchester Ecology Unit'.

There will be limitations on the selected colour temperature of the new LED lighting to minimise the impact of the new installation. The LED units will provide a more controlled direct light source

4.9. The following table summarises which items have been included within the financial case for this project.

Table 4.1: Items Included within the Financial Case

Item	Included within scope
LED Renewal – Adopted Highways & Public Rights of Way	Yes (except lanterns already converted to LED)
Re-design – Adopted Highways & Public Rights of Way	Yes (assume 10% will be redesigned)

4.10. The following additional items, totalling £5.838m, are those which could be incorporated into the existing highways network and asset maintenance programme under the 'one network' approach. It is noted that these costs are indicative only, and include a 10% contingency. At the present time these costs have been excluded from the 'core' business case that has been presented within this report, and have been presented as an option.

Table 4.2: Additional Items within the 'One Network' Approach

Item	Description	Units	Indicative Costs
1	**LED lantern renewal – Parks – surfaced parks and roads in parks**	Assumed 250 lantern changes required	**£82,500**
Poles/ Bollards/ Other			
2	Centre Island Poles – Change to new Centre Island Poles where appropriate or alternatively install LED illumination using existing poles: Including feeder fitting and haldo pillar for transformer for low voltage supply and saw cutting carriageway.	225	£1.1m
3	Traffic Island Bollards – Remove mains powered illuminated bollards including disconnections and replace with Flexi / Solar bollards: Includes island reinstatement / adjustment and electricals etc.	969	£605,000
4	Viaduct – Change from discharge lighting with standard control gear to LED with appropriate light colour temperature to illuminate the structure: Inclusive of fitting, crane hire, Network Rail supervision, Highways England approval etc	108	£137,500
5	Churches - Change from standard control gear and discharge lighting to LED fitting including accommodation work	27	£5,500
6	Bulkheads – Change from Fluorescent lighting with standard control to LED lamps / fittings in subways	236	£137,500
	Poles/ Bollards/ Other sub-total		**£1,985,500**
Illuminated Signs			
7	Internally illuminated sign change only Change fluorescent lighting to LED with new sign	2,404 (90% of 2,671)	£1.2m
8	Internally illuminated sign, pole and transfer as above including replacement pole with excavation, electrical transfer and reinstatement.	267 (10% of 2,671)	£357,500
9	Externally illuminated sign only HS route Change external fluorescent lighting to new LED unit	198 (90% of 220)	£44,000
10	Externally illuminated sign, pole and transfer HS route as above including replacement pole and sign.	22 (10% of 220)	£27,500
	Illuminated Signs sub-total		**£1,629,000**
Decorative Lighting			
11a	Decorative lighting – A6, District Centres, Hillgate, Market Place, Town Centre Area Modification of existing column where	A6 Urbis Saturn Bowls (307)	£880,000 (some modification of the existing columns

	appropriate to facilitate a side entry LED replacement lantern. Change of lamps to LED with gear tray where appropriate or replace with new lantern.	Urbis Gema Off (82)	assumed)
11b	Decorative lighting – A6, District Centres, Hillgate, Market Place, Town Centre Area Modification of existing column where appropriate to facilitate a side entry LED replacement lantern. Change of lamps to LED with gear tray where appropriate or replace with new lantern.	Sepale (128) side entry LED Gladstone FP (89) Windsor Authority (151)	£330,000
	Decorative Lighting sub-total		**£1,210,000**
	Two-year programme resources		**£400,000**
	Contingency (10%)		**£531,000**
	TOTAL		**£5.838m**

5. Proposed Delivery Model(s)

5.1. In relation to the purchase of the lighting equipment, the Council is proposing to either access the AGMA procurement framework, or run a procurement exercise in order to source a suitable supplier. Further legal and procurement advice needs to be taken in order to decide on the preferred supply arrangement.

5.2. Initial discussions with the Alliance partner Solutions SK, has highlighted some capacity to deliver the capital works under this project, with additional support available from the Alliance partner Acorn where required. It is recognised that the design work requires a different set of skills from traditional maintenance work. The proposal for the initial design work (four wards) is to use a materials distributor through the existing procurement framework. This will guide us further on the model and the operational programming links with other projects e.g. HIP.

6. Investment Profile

6.1. Capital cost

6.2. The Council has forecast the capital cost of the projects to replace their current 33,241 street lights with LED units as shown in the tables below. These are summarised in 2016 prices.

Table 6.1 LED Street Lighting Implementation Costs

Item	Cost
LED cost per unit	£175
Installation cost per unit[1]	£55
Gross installation cost for 33,241 lanterns	£7,645,430

Street re-design costs[2]	£4,986,150
Traffic Management, material handling & storage[3]	£36,000
Development fee (inc. design & project management)[4]	£650,000
Sub-total	£13,317,580
Contingency @ 10% of implementation costs[5]	£1,331,758
TOTAL	£14,649,338

Note: 1) The estimated installation cost per unit includes an additional element for isolation cut-out and electrical check.
2) It is assumed that 10% of all lanterns being replaced will involve a new column due to street re-design.
3) Assumed £6,000 traffic management and £6,000 handling/ storage costs for each year of implementation
4) This includes the additional staff resource costs for a Street Lighting Project to oversee the implementation. In addition it includes costs to part fund existing roles including the Network Asset Manager, an apprentice, lighting officer, designer costs and programming assistance.
5) A 10% contingency has been applied to the implementation costs to reflect the level of detail/ uncertainty in the estimates, which are assumed to be incurred in 2016 prices.

Table 6.2 Capital Cost Assumptions for the LED Street Lighting Implementation Scheme

Capital Cost Assumptions	Cost
Annual borrowing	
Year 1 (33% of required capital)[1]	£4,882,624
Year 2 (33% of required capital)[2]	£4,882,624
Year 3 (33% of required capital)[3]	£4,882,624
Total borrowing	£14,649,338
Borrowing term	23 years for each draw down
Interest rate	3.00
Interest cost	£5,840,396
TOTAL COST OF Borrowing	£20,489,734

Note: 1, 2 & 3) Implementation costs are assumed to be split equally for each year of implementation, in 2016 prices

6.3. As noted above, the expected total cost of capital for implementing the LED replacement street lighting scheme in Stockport is estimated to be £20,489,734.

6.4. For this outline case, the following assumptions have been used:

- The implementation will begin in 2017.
- The LED lamps will be implemented over a three year period, with one third of the replacements completed in Year One, one third in Year Two, with the remaining third in Year Three.
- During Year One a third of the lamps will be replaced with LEDs, however the energy saving benefits will not be realised until Year Two. For this reason, it is assumed that 0% of energy savings are achieved in Year One, 11% in Year Two, 22% in Year Three and 33% thereafter.
- As per energy savings, the reactive maintenance savings are realised in proportion to the LED implementation, with the savings realised one year after implementation. Therefore 0% of reactive maintenance savings are achieved in Year One, 2.8% in Year Two, 5.6% in Year Three and 8.3% thereafter.
- Energy prices will increase annually by 5%[2] and usage will remain static.
- The current Medium Term Financial Plan assumes moderate increases in Maintenance costs associated for staff and fuel price increases.
- The capital financing requirement is assumed to be drawn down over three years. The period of each drawn down loan will be 23 years, amounting to a cumulative project period of 26 years.
- Interest rate of 3% which is the PWLB rate plus a contingency for any upward interest rate movement and repayments made annually.

6.5. Total Savings

6.6. The main benefit of the proposed scheme is the reduction in future energy and maintenance costs as a result of replacing the existing street lights with LED.

[2] Updated energy and emissions projections 2015, Dept of Energy and Climate Change (Nov 2015).

6.7. The asset database has been reviewed and the actual consumption of the current lighting units has been calculated and compared with the forecast consumption following delivery of the project. The top section of Appendix 2 summarises the estimates for the main scheme, which is forecast to reduce the energy consumption associated with Stockport's street lighting by approximately 33% when compared to the existing situation This reduction is forecast to reduce the current annual CO_2 emission levels from the 6,435 tonnes per annum that are currently emitted to 4,284 tonnes with LEDs.

6.8. It is anticipated that the introduction of LED street lighting will also result in a reduction of reactive maintenance costs by 8.3% (approximately £100,000 of the existing £1.282m p.a. maintenance budget) per annum. This reduction in reactive maintenance costs are envisaged due to the longer life (and the subsequent reduced need to inspect and replace old/ failed lighting equipment) and lower unit cost of LEDs. This will need to be agreed and confirmed with the provider of maintenance services e.g. SSK.

6.9. The total (unadjusted) cost savings, over the project period is shown below.

Table 6.3 Total Cost Savings Associated with the LED Street Lighting Implementation Scheme

Area of Cost Saving	Saving with LED lanterns
Energy costs	£32,067,619
CRC emissions	£0
Reactive maintenance	£1,102,692
TOTAL SAVINGS	£33,170,311

6.10. A summary of the unadjusted total costs and savings that are forecast to be accrued over the project period are provided in the following table.

Table 6.4 Summary of Total Costs and Savings Accrued with the LED Street Lighting Implementation Scheme

Summary	Total Savings/ Costs
Total Saving	£33,170,311
Total Capital Cost	20,489,735
Net Saving	£12,680,576

6.11. Applying a 3.5% discount rate, these total project costs and savings are presented in 2016 monetary values and prices as follows.

Table 6.5 Summary of Discounted Costs and Savings Accrued with the LED Street Lighting Implementation Scheme

Summary	Total Savings/ Costs in 2016 Prices & Values
Total Saving	£19,446,206
Total Capital Cost	£12,995,126
NPV	£6,451,080

BCR	1.5

6.12. The forecast street lighting unadjusted budget, with and without the LED project can be seen in **Appendix 2** of this document. This highlights that there are savings against the "do nothing" scenario. In year 5 the unadjusted savings / cost avoidance amount to year 5 £0.007m; in year 20 £0.875m; and in year 26 £1.778m. These are the net savings, i.e. the saving offset by borrowing repayments. The saving before borrowing repayments would be year 5 £0.898m; year 20 £1.766m; year 26 £2.076m.

6.13. However, these savings are not cashable savings (from the service budgets) as the comparison is between projected costs of two scenarios, not a comparison between the available budget and the costs after investment.

6.14. The table below shows an (unadjusted) comparison to the available budget.

Table 6.6 Budgetary Comparison

Budget Item	**Cost in £'000s (unadjusted values)**		
	Year 5	**Year 20**	**Year 26**
Energy Budget 16/17	1,886	1,886	1,886
Maintenance Budget 16/17	1,281	1,281	1,281
Total Budget	**3,167**	**3,167**	**3,167**
Total cost "do nothing"	3,617	6,302	8,031
Variance to budget (+ve = pressure)	**450**	**3,135**	**4,864**
Total cost after investment (including borrowing repayments)	3,610	5,428	6,253
Variance to budget (+ve = pressure)	**443**	**2,261**	**3,086**

6.15. This highlights that the investment has a positive impact and reduces the unadjusted financial pressure at year 26 from £4.864m to £3,086m

6.16. <u>The One Network Approach</u>

6.17. The impact of including all electrical items as previously referenced within Table 4.2 of this report, such that they would also be converted to using LED lanterns, thereby effectively incorporating them into the existing highways network and asset maintenance programme and working towards the 'one network' approach.

6.18. The assumed costs for incorporating these items, in 2016 prices, are summarised in Table 6.7. As per the street lighting element of the business case assessment, these costs include an additional 10% project contingency and the increased project management costs (assumed at

£200,000 p.a.) associated with the implementation of the additional items over a two year period.

Table 6.7 Additional Item Costs Assuming One Network Approach

Item	Description	Capital Costs (inc. 10% project contingency)	Interest	Total
1	Parks	98,146	45,755	143,901
2	Centre Island Poles	1,308,615	610,068	1,918,683
3	Bollards	719,738	335,537	1,055,275
4	Viaduct	163,577	76,258	239,835
5	Churches	6,543	3,050	9,593
6	Bulkheads	163,577	76,258	239,835
7 - 10	Illuminated Signs	1,937,940	903,455	2,841,394
11a & b	Decorative Lighting	1,439,477	671,074	2,110,551
Total		**5,837,613**	**2,721,456**	**8,559,069**

6.19. The revised energy consumption for each additional item was calculated, assuming the utilisation of LED lanterns. The reduction in energy consumption, and associated cost savings were profiled over a 26 year period, in order to be consistent with the core business case. The asset database has been reviewed and the actual consumption of the current lighting units has been calculated and compared with the forecast consumption following delivery of the additional items. The bottom section of Appendix 2 summarises the estimates for the additional items, which are forecast to reduce the energy consumption associated with Stockport's street lighting by a further 12.5% of the existing total street lighting energy usage. The following assumptions were adopted:

- The implementation will begin in Year Four, following the completion of the 'core' package'.
- The additional item LED lamps will be implemented over a two year period, with 50% of the replacements completed in Year Four and 50% in Year Five.
- Although half of the additional item lamps will be replaced with LEDs in Year Four, the associated energy saving benefits will not be realised until Year Five. For this reason, it is assumed that 0% of additional items energy savings are achieved in Year Four, 50% are achieved in Year Five, with 100% achieved in Year Six and thereafter.
- Energy prices will increase annually by 4% and usage will remain static.
- No maintenance cost savings have been included within this sensitivity test.
- The loan is assumed to be drawn down over two years, with each year borrowing 50% of the implementation costs. The period of each drawn down loan will be 23 years.
- Interest rate of 3% which is the PWLB rate plus a contingency for upward increases in interest rates and repayments made annually.

6.20. As any reduction in associated maintenance costs was not included within the sensitivity test, the savings are wholly attributable to a reduction in energy consumption. A 3.5% discount rate was applied, such that the total additional item project costs and savings are presented in 2016 monetary values and prices as follows.

Table 6.8 Summary of Discounted Costs and Savings Accrued with the Additional Items included within the LED Street Lighting Implementation Scheme

Item	Description	Total borrowing Cost	Total Savings	NPV	BCR
1	Parks	£91,266	£194,704	£102,809	2.2
2	Centre Island Poles	£1,216,879	£92,088	-£1,124,791	0.1
3	Bollards	£669,283	£938,664	£269,381	1.4
4	Viaduct	£152,110	£80,249	-£71,861	0.5
5	Churches	£6,084	£61,009	£54,924	10.0
6	Bulkheads	£152,110	£782,872	£630,762	5.2
7 - 10	Illuminated Signs	£1,802,087	£3,458,652	£165,6565	1.9
11a & b	Decorative Lighting	£1,338,567	£976,832	-£361,734	0.7
	Sub-total	**£5,428,385**	**£6,584,440**	**£1,156,055**	**1.2**
	Main Scheme	*£12,995,126*	*£19,446,206*	*£6,451,080*	*1.5*
	Total	**£18,423,511**	**£26,030,646**	**£7,607,135**	**1.4**

6.21. Whilst maintenance savings are not included in the calculations the replacement of these assets would have been required as part of a normal maintenance programme.

7. Implementation Plan

7.1. An initial implementation programme has been developed which covers the period from the start of the business case development through to the completion of delivery. The table below highlights the key milestones during this period. It should be noted that the programme will be further developed as the ECI and procurement elements progress further.

Table 7.1 Summary of Project Milestones (Main Scheme Only)

Phase	Milestones	Start Date	Forecast Completion Date
Outline Business Case	Outline Business Case document prepared and submitted for internal approvals	01/09/16	21/12/16
Procurement	Procurement advice from STAR	22/12/16	09/01/17
	Sign up to YPO (or similar) framework to procure materials	14/02/17	21/02/17
	Photocell Procurement (switch regime & quantity)	17/01/17	14/02/17
	Design period (initial 7 Wards)	30/01/17	27/07/17
	ECI with SSK (Installation provider) inc. scoping &	17/01/17	31/03/17

	operational planning (Year 1)		
	ECI with approved ICP new/transferred connections (Year 1)	27/02/17	28/07/17
	Agree equipment order and delivery period (Year 1)	31/05/17	28/07/17
	Confirmation of forecast spend profile to SMBC Finance with actual for Year 1	30/05/17	30/07/17
Delivery	Delivery of Year 1 Work	31/07/17	31/07/18
	Completion of delivery programme (Main Lantern Retrofit Scheme)	26/07/21	26/07/21

7.2. The key to achieving the delivery timescales is confirmation that the preferred procurement route can be achieved which involves the specification and the type of each lantern based on the design work. If a full OJEU compliant tender is required then the whole programme will be put back at least 12 months and will also require considerable officer resource.

7.3. The other main element to achieve the delivery timescales is obtaining accurate and timely designs to enable material orders to be issued with re-design work to be planned to ensure effective delivery.

7.4. In order to adhere to these key milestones, it was assumed that the implementation team would consist of three operational gangs, including transport and fitting. This would require further confirmation at the programming stage as to date no formal or detailed discussions/ agreements have been reached with SSK.

Impact Planning

Table 7.2 Summary of Impact Planning (Main Scheme Only)

Phase	Phase and Headline Activity Description	Potential Impact
Outline Business Case	Internal approvals take longer than anticipated	The programme will be put back further into 17/18 which will impact on the HIP programme and also the workload planning for SSK.
Procurement	The preferred single source route through the YPO Framework is not approved and an open tender through OJEU is required.	The programme will be put back at least 12 months (resulting in a likely Summer 2018 start) which will impact on the HIP programme and also the workload planning for SSK. There will also need to be more officer input to prepare and evaluate the tenders.

8. Stakeholder, Consultation and Engagement

8.1. At this stage it is not proposed to undertake any public consultation on the proposed scheme, rather it is envisaged to be subject to Council's Scrutiny Committee review.

8.2. The National Highways & Transport Survey Public Satisfaction Survey (NHTS) is undertaken annually by those authorities within England who wish to participate. The surveys query randomly selected residents on a variety of transport services/ provisions within their local area. The results enable

individual authorities to understand how their services are perceived by residents, and how this compares nationally to other authorities. The results of this survey, which include the level of satisfaction with the street lighting provision, may be used to monitor any potential changes in satisfaction levels following the implementation of the proposed scheme.

9. Interfaces, Interdependencies and Constraints

9.1. This project covers the full geographical extent of the borough and as such has interfaces with a number of different projects, including:

- Highways Improvement Programme (HIP)
- Town Centre Access Package (TCAP)
- A6MARR

10. Risk

10.1. Risk Management Arrangements

10.2. The project will be subject to standard SMBC governance, through the Council's Planning/ Area Committee/ Executive Councillor process. This will include the development of a full risk register, including the risk 'owner' to monitor and mitigate risks.

10.3. Risk Matrix

10.4. Outlined within the table below are the headline risks that have been identified for the project at this stage. An overview of the proposed project controls/ mitigating actions identified to address each risk is included.

Table 10.1 Summary of Key Risks and Potential Impacts

Risk ID No.	Risk and Potential Impact	Project Controls (this includes controls in place or those that will be put in place)
1	Public objection regarding use of LED lighting	Communications team in place at earliest opportunity.
2	Lighting designs are not available to inform delivery of the project or to order materials	Initial contact to be made with main distributor from the AGMA framework. Costs & timescales to be determined.
3	LED lanterns are inadequate resulting in need to procure a new supplier part way through the implementation phase.	Preference to procure through AGMA framework allows access to known suppliers and equipment has been trialled and tested. Specifying model as part of the procurement process would assist if AGMA framework is not appropriate.
4	Delivery resource insufficient	Contractor discussions (ECI) needed early in the process in advance of delivery.
5	Inaccurate programming of work elements leads to overall programme delays	Delivery programme being developed early in the project development stage and will be refined during ECI discussions and additional stakeholder liaison.
6	Lead in time for lantern delivery longer than anticipated	Early agreement on procurement process. Early discussions with the preferred supplier and confirmation of programme requirements.
7	3rd party (Jones Lighting) for transfers/ connections not working to programme	ECI with all contractors will seek to reduce peaks and troughs in workload to allow better resource allocation by contractors.
8	Potential variance to investment cost – the project specification has not yet gone out to tender.	The risk has attempted to be mitigated by the expertise of the services expertise to advise on the most likely price for the equipment involved. Depending on the tender outcome, the project benefits should be re-assessed to ensure the business case still provides a sound basis to proceed.
9	Potential variance to cost of implementation (by SSK)	The estimated costing has been established with colleagues from SSK based on this programme.
10	Cost of borrowing could vary to the assumption in the model.	A conservative interest rate of 3% has been used for modelling purposes. This is significantly above the current PWLB rates and therefore should provide sufficient contingency. Potentially there may be an option to borrow a portion of the funding using SALIX which would be at 0%. This has not been factored in to the figures in the business case.
11	Replacement costs in the future – if these are higher than modelled, any maintenance saving would be reduced.	This will be monitored through the project. This is a small component of the maintenance saving.
12	That the projected energy savings do not materialise as modelled.	The energy variances from using the different type of lamp have been based on an assessment of the energy usage of lamps for each of the asset categories in the street lighting database. (see appendix 3) The estimated rise in energy prices has been based on a prudent assumption compared to government guidance.
13	Technological changes	The Lamps specification will enable some future proofing via the ability to change control mechanisms and add additional features. While the technology is constantly changing there is no reason to believe that these LED lamps are not an appropriate choice.

10.5. The risk of not undertaking the project will be the cost increases associated with increased energy and maintenance costs.

APPENDIX 1 - Forecast street lighting (unadjusted) budget – with and without the LED project

		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
		2017/18	18/19	19/20	20/21	21/22	22/23	23/24
Energy	5.0%	1,955,878	2,053,672	2,156,355	2,264,173	2,377,382	2,496,251	2,621,064
Maintenance	£8k p.a.	1,208,000	1,216,000	1,224,000	1,232,000	1,240,000	1,248,000	1,256,000
Total forecast cost under 'do nothing'	£	**3,163,878**	**3,269,672**	**3,380,355**	**3,496,173**	**3,617,382**	**3,744,251**	**3,877,064**
Project impact : Energy	33.4%	- 228,840	- 480,564	- 756,888	- 794,732	- 834,469	- 876,192	
Project impact : Maintenance	8.3%	- 33,778	- 68,000	- 102,667	- 103,333	- 104,000	- 104,667	
Project impact : Borrowing costs	3.0% 14.65m	296,931	593,863	890,794	890,794	890,794	890,794	
Energy		1,955,878	1,824,832	1,675,792	1,507,286	1,582,650	1,661,782	1,744,872
Maintenance		1,208,000	1,182,222	1,156,000	1,129,333	1,136,667	1,144,000	1,151,333
Borrowing costs		-	296,931	593,863	890,794	890,794	890,794	890,794
Forecast costs if Project completed	£	**3,163,878**	**3,303,986**	**3,425,655**	**3,527,413**	**3,610,111**	**3,696,577**	**3,786,999**
+ve = Net enhancement / -ve = worsening		- 34,314	- 45,299	- 31,240	7,271	47,674	90,064	

		Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14
		24/25	25/26	26/27	27/28	28/29	29/30	30/31
Energy		2,752,117	2,889,723	3,034,209	3,185,919	3,345,215	3,512,476	3,688,100
Maintenance		1,264,000	1,272,000	1,280,000	1,288,000	1,296,000	1,304,000	1,312,000
Total forecast cost under 'do nothing'	£	**4,016,117**	**4,161,723**	**4,314,209**	**4,473,919**	**4,641,215**	**4,816,476**	**5,000,100**
Project impact : Energy		- 920,002	- 966,002	- 1,014,302	- 1,065,017	- 1,118,268	- 1,174,181	- 1,232,890
Project impact : Maintenance		- 105,333	- 106,000	- 106,667	- 107,333	- 108,000	- 108,667	- 109,333
Project impact : Borrowing costs		890,794	890,794	890,794	890,794	890,794	890,794	890,794
Energy		1,832,115	1,923,721	2,019,907	2,120,902	2,226,947	2,338,295	2,455,209
Maintenance		1,158,667	1,166,000	1,173,333	1,180,667	1,188,000	1,195,333	1,202,667
Borrowing costs		890,794	890,794	890,794	890,794	890,794	890,794	890,794
Forecast costs if Project completed	£	**3,881,576**	**3,980,515**	**4,084,035**	**4,192,363**	**4,305,742**	**4,424,422**	**4,548,670**
Net enhancement / (worsening)		134,541	181,207	230,174	281,556	335,473	392,054	451,429

		Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Year 21
		31/32	32/33	33/34	34/35	35/36	36/37	37/38
Energy		3,872,505	4,066,130	4,269,436	4,482,908	4,707,054	4,942,406	5,189,527
Maintenance		1,320,000	1,328,000	1,336,000	1,344,000	1,352,000	1,360,000	1,368,000
Total forecast cost under 'do nothing'	£	**5,192,505**	**5,394,130**	**5,605,436**	**5,826,908**	**6,059,054**	**6,302,406**	**6,557,527**
Project impact : Energy		- 1,294,535	- 1,359,261	- 1,427,225	- 1,498,586	- 1,573,515	- 1,652,191	- 1,734,800
Project impact : Maintenance		- 110,000	- 110,667	- 111,333	- 112,000	- 112,667	- 113,333	140,848
Project impact : Borrowing costs		890,794	890,794	890,794	890,794	890,794	890,794	890,794
Energy		2,577,970	2,706,868	2,842,212	2,984,322	3,133,539	3,290,215	3,454,726
Maintenance		1,210,000	1,217,333	1,224,667	1,232,000	1,239,333	1,246,667	1,508,848
Borrowing costs		890,794	890,794	890,794	890,794	890,794	890,794	890,794
Forecast costs if Project completed	£	**4,678,764**	**4,814,996**	**4,957,673**	**5,107,117**	**5,263,666**	**5,427,676**	**5,854,368**
+ve = Net enhancement / -ve = worsening		513,740	579,134	647,764	719,791	795,387	874,730	703,158

		Year 22	Year 23	Year 24	Year 25	Year 26	Totals
		38/39	39/40	40/41	41/42	42/43	
Energy		5,449,003	5,721,453	6,007,526	6,307,902	6,623,297	
Maintenance		1,376,000	1,384,000	1,392,000	1,400,000	1,408,000	
Total forecast cost under 'do nothing'	£	**6,825,003**	**7,105,453**	**7,399,526**	**7,707,902**	**8,031,297**	
Project impact : Energy		- 1,821,540	- 1,912,617	- 2,008,248	- 2,108,661	- 2,214,094	-32,067,619
Project impact : Maintenance		140,181	139,514	138,848	138,181	137,514	- 1,102,692
Project impact : Borrowing costs		890,794	890,794	890,794	593,863	298,396	20,489,735
Energy		3,627,463	3,808,836	3,999,277	4,199,241	4,409,203	
Maintenance		1,516,181	1,523,514	1,530,848	1,538,181	1,545,514	
Borrowing costs		890,794	890,794	890,794	593,863	298,396	
Forecast costs if Project completed	£	**6,034,438**	**6,223,144**	**6,420,919**	**6,331,285**	**6,253,114**	
+ve = Net enhancement / -ve = worsening		790,565	882,309	978,606	1,376,617	1,778,183	12,680,576

APPENDIX 2 – Expected reduction in annual Kilowatt Hour usage resulting from the main scheme and from the extras.

Potential energy savings : analysis of SMBC street lamp asset database

Savings from the main scheme				Current					Proposed					Savings	
Unit type	unitidentity	typeoflamp	Rating	Wattage draw (a)	No. of lamps (b)	c KiloWatts (a x b) /1000	Hrs p.a. (d)	kWh p.a. (c x d)	Wattage draw	No. of lamps	Revised KW	Hrs p.a.	kWh p.a.	kWh p.a.	£ p.a. @ £0.1136
L	Street Light	CDO-TT/SON	400	449	30	13.5	4,300	57,921	265	30	8.0	4,300	34,185	23,736	2,696
L	Street Light	CDO-TT/SON	250	265	894	236.9	4,300	1,018,713	138	894	123.4	4,300	530,500	488,213	55,461
L	Street Light	SOX	135	190	4	0.8	4,300	3,268	114	4	0.5	4,300	1,961	1,307	148
L	Street Light	CDO-TT/SON	150	180	104	18.7	4,300	80,496	114	104	11.9	4,300	50,981	29,515	3,353
L	Street Light	CDO-TT/SON	150	159	1,364	216.9	4,300	932,567	114	1364	155.5	4,300	668,633	263,934	29,983
L	Street Light	CDO-TT/SON	150	155	1,667	258.4	4,300	1,111,056	114	1667	190.0	4,300	817,163	293,892	33,386
L	Street Light	Cosmopolis	140	152	646	98.2	4,300	422,226	114	646	73.6	4,300	316,669	105,556	11,991
L	Street Light	SOX	90	130	965	125.5	4,300	539,435	64	965	61.8	4,300	265,568	273,867	31,111
L	Street Light	CDO-TT/SON	100	123	350	43.1	4,300	185,115	84	350	29.4	4,300	126,420	58,695	6,668
L	Street Light	SOX	90	122	1,057	129.0	4,300	554,502	64	1057	67.6	4,300	290,886	263,616	29,947
L	Street Light	CDO-TT/SON	100	107	173	18.5	4,300	79,597	84	173	14.5	4,300	62,488	17,110	1,944
L	Street Light	Cosmopolis	90	97	2,123	205.9	4,300	885,503	84	2123	178.3	4,300	766,828	118,676	13,482
L	Street Light	CDO-TT/SON	70	90	2,543	228.9	4,300	984,141	52	2543	132.2	4,300	568,615	415,526	47,204
L	Street Light	CDO-TT/SON	70	80	2,038	163.0	4,300	701,072	52	2038	106.0	4,300	455,697	245,375	27,875
L	Street Light	CDO-TT/SON	70	79	163	12.9	4,300	55,371	52	163	8.5	4,300	36,447	18,924	2,150
L	Street Light	SOX	55	77	855	65.8	4,300	283,091	36	855	30.8	4,300	132,354	150,737	17,124
L	Street Light	SOX	55	74	3,564	263.7	4,300	1,134,065	36	3564	128.3	4,300	551,707	582,358	66,156
L	Street Light	Cosmopolis	60	68	465	31.6	4,300	135,966	36	465	16.7	4,300	71,982	63,984	7,269
L	Street Light	SOX	35	65	5,077	330.0	4,300	1,419,022	24	5077	121.8	4,300	523,946	895,075	101,681
L	Street Light	SOX	55	59	11	0.6	4,300	2,791	36	11	0.4	4,300	1,703	1,088	124
L	Street Light	SOX	35	58	8,412	487.9	4,300	2,097,953	34	8412	286.0	4,300	1,229,834	868,118	98,618
	Street Light	Cosmopolis	45	49	666	32.6	4,300	140,326	36	666	24.0	4,300	103,097	37,229	4,229
L	Street Light	PLT	42	47	28	1.3	4,300	5,659	36	28	1.0	4,300	4,334	1,324	150
L	Street Light	PLT	36	44	34	1.5	4,300	6,433	24	34	0.8	4,300	3,509	2,924	332
L	Street Light	SOX	35	39	8	0.3	4,300	1,342	34	8	0.3	4,300	1,170	172	20
					33,241	2,985.5		**12,837,629**	A		1,771		**7,616,676**	**5,220,953**	**593,100**
						Invoiced kWh p.a.		**15,618,092**	Z	**Saving (% of invoiced kWh p.a.)**			**33.4%**	X/Z	**5,220,953**	X
Savings from the extras																
P	Parks	Son	70	90	250	22.5	4,100	92,250	34	250	8.5	4,100	34,850	57,400	6,521
I	Island Globes	Son	70	90	176	15.8	4,100	64,944	49	176	8.6	4,100	35,358	29,586	3,361
I	Island Globes	PLS	11	16	43	0.7	8,760	6,027	49	43	2.1	4,100	8,639	- 2,612	- 297
I	Island Globes	Sox	35	65	4	0.3	4,100	1,066	49	4	0.2	4,100	804	262	30
B	Bollard	Fluorescent	13	18	22	0.4	8,760	3,469	0	11	-	-	-	3,469	394
B	Bollard	PLS	11	16	1,956	31.3	8,760	274,153	0	978	-	-	-	274,153	31,144
F	Viaduct Lighting	Son	150	180	72	13.0	2,093	27,125	45	72	3.2	2,093	6,781	20,344	2,311
F	Viaduct Lighting	Son	70	90	36	3.2	2,093	6,781	45	36	1.6	2,093	3,391	3,391	385
C	Churches	Son	250	301	27	8.1	4,100	33,321	138	27	3.7	4,100	15,277	18,044	2,050
BH	Bulkheads	Fluorescent	58	71	472	33.5	8,760	293,565	30	236	7.1	8,760	62,021	231,544	26,303
S	Illuminated Sign	Fluorescent	40	50	46	2.3	8,760	20,148	20	23	0.5	4,100	1,886	18,262	2,075
S	Illuminated Sign	Fluorescent	20	31	352	10.9	8,760	95,589	9	176	1.6	4,100	6,494	89,095	10,121
S	Illuminated Sign	Fluorescent	15	25	3,820	95.5	8,760	836,580	9	1,910	17.2	4,100	70,479	766,101	87,029
S	Illuminated Sign	PLL	9	16	6	0.1	8,760	841	9	6	0.1	4,100	221	620	70
S	Illuminated Sign	Fluorescent	8	14	826	11.6	8,760	101,301	6	413	2.5	4,100	10,160	91,141	10,354
S	Illuminated Sign	PLS	7	12	666	8.0	8,760	70,010	9	333	3.0	4,100	12,288	57,722	6,557
L	Decorative Lighting 11a	CDOTT	250	265	307	81.4	4,100	333,556	138	307	42.4	4,100	173,701	159,855	18,160
L	Decorative Lighting 11a	Cosmopolis	140	152	82	12.5	4,100	51,102	114	82	9.3	4,100	38,327	12,776	1,451
L	Decorative Lighting 11b	CDOTT	250	265	128	33.9	4,100	139,072	138	128	17.7	4,100	72,422	66,650	7,571
L	Decorative Lighting 11b	Son	150	155	89	13.8	4,100	56,560	114	89	10.1	4,100	41,599	14,961	1,700
L	Decorative lighting 11b	Son	70	90	151	13.6	4,100	55,719	34	151	5.1	4,100	21,049	34,670	3,938
					9,531	412.3		**2,563,178**	B		144.5		**615,746**	**1,947,432**	221,228
						Invoiced kWh p.a.		**15,618,092**	Z	**Saving (% of invoiced kWh p.a.)**			**12.5%**	Y/Z	**1,947,432**	Y
						Modelled kWh p.a.		**15,400,807**	A+B	difference to SMBC's total annual street lighting invoices is only 1.4%						
Total saving						**Invoiced kWh p.a.**		**15,618,092**	Z	**Saving (% of invoiced kWh p.a.)**			**45.9%**	(X+Y)/Z	**7,168,385**	X+Y