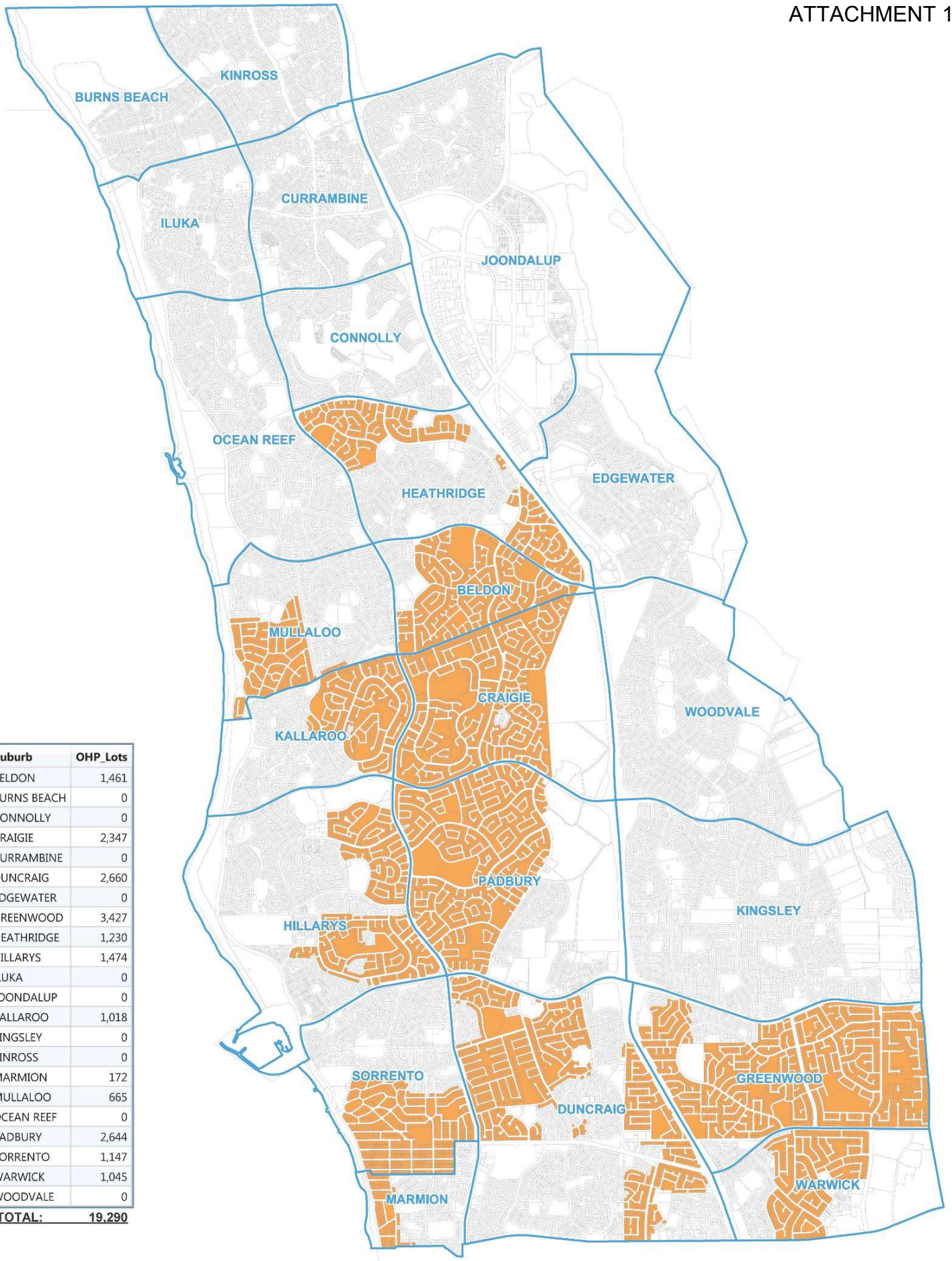


Suburb	OHP_Lots
BELDON	1,461
BURNS BEACH	0
CONNOLLY	0
CRAIGIE	2,347
CURRAMBINE	0
DUNCRAIG	2,660
EDGEWATER	0
GREENWOOD	3,427
HEATHRIDGE	1,230
HILLARYS	1,474
ILUKA	0
JOONDALUP	0
KALLAROO	1,018
KINGSLEY	0
KINROSS	0
MARMION	172
MULLALOO	665
OCEAN REEF	0
PADBURY	2,644
SORRENTO	1,147
WARWICK	1,045
WOODVALE	0
TOTAL:	**19,290**

N

City of Joondalup
Lots with Overhead Power - by suburb

Datum/Projection: GDA 94/MGA Zone 50
Scale (A3): 1: 43,000
Date: 8/4/2015
Compiled: Leanne Goodley

File: OHP_Lots_A3
Folder: I:\AMS\GIS Projects\AdHoc Requests\OHP Lots

LEGEND
Suburbs
Cadastre
Overhead Power (OHP) Lots

City of Joondalup
90 Boas Ave, Joondalup WA 6027
PO Box 21, Joondalup WA 6919
Ph: 08 9400 4000
Fax: 08 9300 1383
info@joondalup.wa.gov.au
www.joondalup.wa.gov.au

Project Name	**Underground power & Street lighting Strategy**
Report	**Financial evaluation (August 2021)**
Project Sponsor	Director Infrastructure Services
Project Manager	Manager Infrastructure Management Services
Joondalup 2022 Key Theme	Quality Urban Environment
HP Records	INT21/28279

VERSION CONTROL

	Date	Author	Details
1	04 Aug 2021	SFA	First draft to IMS, DIS, DCS
2	22 Nov 2021	SFA	Alignment with Council report

CONTENTS

INTRODUCTION

1. INTRODUCTION AND BACKGROUND

1.1 Purpose of paper 1 – Notice of Motion

This report is prepared to assist with the notice of motion approved at Council in August 2020 (C77-08/20):

MOVED Mayor Jacob, SECONDED Cr Fishwick that Council REQUESTS the Chief Executive Officer to submit a report to Council for its consideration on the opportunity and costs for the installation of underground power under the State Underground Power Program in the locality of Duncraig bounded by Lilburne Road, Marmion Avenue, Hepburn Avenue and Warwick Road to fulfil the following objectives:

1 Improve reliability and security of electricity supply for consumers;

2 Enhance streetscapes and visual amenity;

3 Reduce street tree maintenance costs for local governments;

4 Improve street lighting and community safety;

5 Reduce maintenance costs for Western Power.

The Motion was Put and CARRIED (13/0)

There are 1,184 lots within the area prescribed in the notice of motion, and these are subject to financial evaluation in this report. There are 20,120 lots in total with overhead power spread across 15 different suburbs in the southern part of the City. The overall financial impacts of converting all of these 20,120 lots are evaluated in this report.

1.2 Purpose of paper 2 – Convert Western Power street lights to City-owned LED

This report also evaluates the impacts of converting Western Power street lights to city-owned LED, both within the area covered by overhead power and the rest of the city already covered by underground power. There are 14,719 Western Power lights in total that are included in the financial evaluation, these 14,719 lights are on 13,607 poles (some poles in arterial roads have two luminaires).

The City currently spends approximately $3m per year for the street lights - the overall key issue with this analysis is how much can this be reduced, and would the savings be enough to pay back any one-off costs incurred.

The analysis within this report is robust enough to recommend that the City pursue the replacement of Western Power street lights with City-owned LED.

1.3 Out of scope

The following are out of scope for this report

- Costs of conversion agreed with Western Power.
- Responsibilities of the scheme.
- Overall impacts of underground power scheme to Western Power – the evaluation is based on the impacts to the City only.
- Service level issues with Western Power street lights

This report is not a business case, but a financial evaluation based on the current available data at this point in time. A business case would evaluate the non-financial impacts as well as the financial impacts.

1.4 Strategic Financial Plan (SFP) / 5-year Capital Works Program (CWP)

The potential financial impacts to convert to overhead power or replace Western Power street lights are not yet included in the City's SFP or 5-year CWP. This report does not propose that the total impacts of converting all overhead power and Western Power street lights should yet be included in the SFP and 5-year CWP. However there are recommendations at the end that should be considered as part of the 2022 update of the SFP and CWP.

1.5 Whole of life incremental approach

The City applies a whole-of-life approach to all projects and uses a wide number of tools to ensure it is financially sustainable both now and in the future. The ongoing operational impacts are assessed as much as the one-off costs; indeed the recurring impacts are more important than the initial establishment costs. The analysis evaluates options on an incremental basis by comparing to existing operating costs (the baseline).

1.6 Glossary

The following terms are used throughout the report

"Luminaire" – this is the device that produces the light

"*Pole*" – the structure holds the luminaire

"*Installation*" – this refers to either the new installation of poles as part of overhead power schemes or the cost of replacing an existing luminaire or pole

"*Street light*" – generic term that refers to the overall pole and luminaire

1.7 Source of values

Taking account of the large financial impacts of this project, the City has ensured that there is a robust audit trail for the majority of values in the financial model:

- Asset information/quantities are sourced from asset registers
- Capital costs for poles, luminaires and installation from suppliers based on a reasonable sample size (a quantity of 100 in most cases).
- Recurring costs of electricity based on assumed wattage for LED

There are only a few values in the model that are based on assumptions without supporting audit trail and where this is the case this will be explained in the report. Where necessary the City has applied a prudent approach to potential savings that may be achieved with city-owned LED lights.

1.8 Disclaimer

Whilst there is a very strong audit trail for most of the values in the model, this report does not contend that the financial projections will come to pass exactly as stated. The projections are best estimates at this point in time but there is a level of risk and uncertainty in all the projections. The actual costs and income will vary, due to the following:

- Detailed design and specification.
- Capital replacement estimates.

- Costs of power consumption.
- Tender

The financial projections will be updated at each stage of the project so that the confidence of the assumptions improves. At this early stage in the project, the financial estimates for underground power have a high level of uncertainty, but the financial estimates for street light conversion have more certainty.

1.9 Data

There is a wide range of financial data referred to in this document. Data will either be shown in Dollars ($), thousands ('$000s') or where necessary in millions ($m), depending on the size of the values being referred to. All financial tables will be clearly labelled to designate the format.

1.10 Model

The financials are summarised using the City's Project Financial Evaluation Model (Detailed), (01 July 2020).

1.11 Previous model and evaluation

A previous financial evaluation was prepared in April 2021, but the scope was much smaller, only considering the areas currently covered with overhead power. The previous report was described as a "preliminary financial evaluation" with many internal assumptions being made. Since then the scope of the evaluation has increased to the full network and most of the values in the model are supported by a robust audit trail.

2 BUSINESS CASE READY

2.1 Western Power Underground Power Programs

2.1.1 State Underground power Program:

SUPP is a State Government initiative that was set up to convert overhead power underground. Under the current guidelines, Local Government Authorities (LGAs) can nominate areas to be converted. Projects are ranked awarded through competitive rounds similar to a public tender (subject to a budget for each funding round).

For Round Six of the Program, project ranking, and selection was based on a weighted score between zero and 100 points, comprised of:

- Western Power's network priorities contributing up to 50 points to the ranking score of a project.
- local government / community contributions above 50 per cent of total project cost contributing up to 25 points to the project ranking score; and
- results from a community support survey above a threshold of 50 per cent support contributing up to 25 points to the project ranking score.

Projects fall under two categories:

- Major Residential Projects (MRP) – usually around 600 to 1,000 properties in residential areas.
- Local Enhancement Projects (LEP) – small projects such as main streets in country towns, LGAs in the metro area, or areas of historical or heritage significance.

This program was established in 1996, with Round Six occurring in 2015. At present there is no information or plans for further Rounds.

2.1.2 Network Renewal Undergrounding Program Pilot (NRUPP):

Western Power, like all asset managers, will undertake replacement of infrastructure at the end of their useful life. Traditionally, the work involves like-for-like replacement of these assets. The NRUPP scheme creates the opportunity for the replacement of the overhead network with a new underground system instead of a like for like replacement. The cost difference in this program is met by the Local Government Authority (LGA). This program provides LGAs with an opportunity to benefit from the financial investment already available through Western Power's planned works program, allowing delivery of underground power outside of the State Underground power Program.

Western Power have indicated that there are 92 areas within the Perth metropolitan area that would benefit from conversion to underground power, but they have not specified which areas those are. Further, it is likely that the 92 areas straddle across several suburbs and/or straddle across different local government boundaries. The area of Duncraig specified within the Notice of Motion in August 2020 may not be contained in one, or any of the areas that Western Power has prioritised. As mentioned earlier it is vital that the City is able to be as flexible and responsible as possible with any proposals to convert within its boundaries, so this project has established some key parameters to ensure it is business-case ready.

When an area is converted to underground power, Western Power would also replace the street lights and convert them to LED. This conversion is to a standard that is not considered by the City to be as efficient as the City would use (The lighting installed by Western Power is limited in approved specification leading to obtrusive lighting, due to the poor control of light

etc). These, like the pole mounted lights they replaced are paid for in the form of a street lighting tariff by the City for all costs associated with the light.

It is therefore worthwhile for the City to also evaluate the impacts for the City to replace the street lights with its own specification lighting to take responsibility for the maintenance, operation, and replacement thereof, similar to the City Centre. This opportunity has not been tested with Western Power.

2.1.3 Retrospective Undergrounding Projects (RUP):

Retrospective Undergrounding Projects (RUPs) are generally funded directly by Local Government Authorities (LGAs) or land developers. These are often unsuccessful SUPP nominations that have missed out as part of the selection process. In other words, these are self-funded underground power projects.

2.2 Underground power – share of costs

The conversion from overhead power to underground power would involve various works and different contributions from different parties:

- Distribution network contribution – the works required for the overall network and streets. This share would be expected to be paid by Western Power and/or State contribution
- Property connection contribution – the costs for each individual lot to connect their property to the underground power network. These costs are expected to be paid by households and potentially a contribution from the council.

2.3 Business case ready

If Western Power approach the City to propose any one or some of its areas to be converted it is vital that the City is prepared to evaluate the consequences and work proactively with Western Power, and residents, to convert to underground power. If the City is not prepared Western Power and State will just move on to other local governments who are more prepared.

This financial evaluation has been designed to be as flexible as possible and ensure that the City is 'business-case ready' – there are a range of selections (toggles) used in the financial model which ensure that the City is able to quickly evaluate the financial impacts of converting any area to underground power. The toggles available in the financial model are:

- Areas – one whole suburb, part of a suburb or the overall City can be assessed.
- Escalation – can be included or excluded
- Phasing – the implementation costs can be assumed in any one of the next 10 years or spread across any of the 10 years
- Household contribution to underground power conversion can be repaid back to the City either immediately, over five years or 10 years
- Funding % for underground power conversation is split between Western Power, State, Households and City – the % assumptions can easily be changed and flow through to all calculations.

2.4 Areas and supporting tables

There are nine supporting tables broken down by area that are shown at the end of this report. These nine tables will be referred to throughout this report. Each of the 22 suburbs in the City has 2 lines in the model as follows:

- Specific underground power schemes. These may relate to a part of a suburb only e.g. the area covered by the Duncraig Notice of Motion.
- Rest of the suburb

So if we take the suburb of Duncraig for example there are 2,735 lots in total with overhead power in that suburb - 1,184 of those lots are within the area covered by the notice of motion approved by Council. So the Duncraig suburb has been split in two, the 1,184 designated as a separate project package and the remaining 1,551.

As explained earlier, the financial model can be toggled to display the results for any of the areas or the total of all areas.

2.5 Quantities of lots and street lights

The first three tables at the end of the report list the quantities which are used by the remaining tables to cash up the impacts:

- Table 1 summarises the 20,120 lots with underground power spread across 15 suburbs. These values are used in Table 4 and 5 to cash up the impacts of converting these lots to underground power and repayments by households to the City.
- Table 2 summarises the quantity of Western Power street lights, split between the areas, between large and small lights and between the options. These quantities are used by Tables 6 to 9 to estimate the one-off street light costs to the City and the recurring impacts.
- Table 3 separately lists the quantity of large poles only. These have to be separated to assist with the calculations of owning the large poles and replacing/depreciating

3 OPTIONS AND KEY ASSUMPTIONS

3.1 Options

There are four options that have been included in the financial model and compared to the existing 'do nothing' option. The options are explained as follows:

- Option 1 relates to the conversion of overhead power and assumes that Western Power would replace and continue to own the street lights as part of the conversion. This option only includes street lights converted to LED that are included in the areas within the 20,120 lots currently serviced by overhead power.
- Option 2 relates to the conversion of overhead power but assumes that the City would replace and continue to own the street lights as part of the conversion. This includes the same area and quantities as option 1.
- Option 3 relates only to the conversion of Western Power street lights to City-owned street lights in areas currently covered by underground power. So the area and quantities included in option 1 and 2 are excluded from this. This option excludes the overhead power areas completely.
- Option 4 is the sum of Option 2 and 3 and therefore assumes that all street lights are owned by the City and all remaining lots with overhead power are converted to underground power.

The table below summarises the overall key features of each option and shows that Options 1, 2 and 4 would evaluate the conversion of 20,120 lots to underground power. The table also summarises the funding assumptions for underground power for Options 1, 2 and 4 – these % can be easily amended for each business case and the impacts of the City contributing can also be considered (this is included in the sensitivity analysis at end of report).

Options Scope *Electricity provision* / *street light ownership*	**Option 1** Overhead power conversion: WPower owned s-lights	**Option 2** Overhead power conversion: COJ owned Street lights	**Option 3** Underground power areas: COJ owned Street lights	**Option 4** All areas, both OP and UP: COJ owned Street lights
Qty of Households with overhead power lines	20,120	20,120	n/a	20,120
Share of costs for Underground Power 1 City	0% contribution by the City		n/a	0%
2 Western Power	52% contribution indicated in 2020 NRUPP guidelines		n/a	52%
3 State	Only 10% Contribution		n/a	10%
4 Households	Assumed to pay for remaining 38% of the scheme, with assistance from City e.g. repay over 10 years		n/a	38%

3.2 Street lighting responsibilities for each option

The table below summarises the assumed responsibilities for each option. For Option 1, Western Power are assumed to replace the street lights within the overhead power areas and continue to have responsibility for maintenance and depreciation. Meanwhile Options 2, 3 and 4 assume the City take responsibility for some or all of the street lights – for option 2 and 3 which only have a partial replacement to city-owned street lights, the remainder is assumed to be western-power owned.

Options Scope	Option 1	Option 2	Option 3	Option 4
Electricity provision	Overhead power conversion		Underground power areas	All areas, both OP and UP
street light ownership	WPower owned s-lights	COJ owned Street lights	COJ owned Street lights	COJ owned Street lights
LED street lighting				
1 Converted by Western Power as part of Upower conversion, owned by WP	✓			
2 COJ pay for new lights, install, City owned assets, on COJ asset register, City maintains		✓	✓	✓
3 Maintenance of lights and poles - Western Power	✓	✓	✓	
4 Maintenance of lights and poles - COJ		✓	✓	✓

3.3 Street lighting quantities and poles for each option

The table below summarises the quantity of luminaires converted to LED for each option and the remaining lights that are non-LED. All options are based on a total network of 14,719 luminaires and 13,607 poles (some poles have two luminaries. For Option 1 and 2, which only cover the areas covered by overhead power, the quantity of lights converted to LED is 4,816, with the remaining 9,903 as non-LED. For option 3, which only covers the areas currently covered by underground power, there would be conversion of 9,903 and the remaining 4,816 as non-LED. All options need to include the full network so that comparisons can be made to the existing baseline.

Options Scope	Option 1	Option 2	Option 3	Option 4
Electricity provision	Overhead power conversion		Underground power areas	All areas, both OP and UP
street light ownership	WPower owned s-lights	COJ owned Street lights	COJ owned Street lights	COJ owned Street lights
Quantity of LUMINAIRES in scope for each option				
1 LED converted as part of option	4,816		9,903	14,719
2 Remaining non-LED lights - continue to pay Wpower for power/mtce/depn	9,903		4,816	
3 **Total lights in scope for each option (Recurring electricity charges)**	**14,719**		**14,719**	**14,719**
Quantity of POLES in scope for each option				
4 Large	1,359			
5 Small	12,248			
6 **Total**	**13,607**			

3.4 Household contribution

The financial model assumes in all scenarios that the City would initially pay for the household contribution, and that households would repay the City. The model allows for 3 scenarios for repayment from households to the City:

- Immediate repayment
- 5 year repayment
- 10 year repayment

The model has the option of calculating the initial costs to the City to be funded from either Municipal/Reserve funds or from borrowings, the outputs included in this report assume borrowings. In both circumstances the repayment from households to the City matches the exact overall cost to the City i.e. if the City used borrowings to fund the underground power

costs on behalf of households, there would be a cost of interest, this cost is added on to the charges for households – this will be explained in more detail later on.

3.5 Escalation

The model deals with escalation as follows

- Underground power capital costs and repayments by households – no escalation is factored into the model. This is necessary so that the model can ensure that the household repayments to the city match exactly the costs paid by the city. In reality the costs of converting to underground power are likely to escalate in future years, the model can be refreshed each year to take account of the most up-to-date estimate of underground power.
- Street light capital costs – an escalation factor is added, the index used is the "Capital Costs" index from the City's draft 2021 SFP.
- Replacement costs for the street lights are assumed to also escalate on the same basis as capital costs.
- Annual costs of maintenance and utilities (Western Power) – these are assumed to increase by 1.5% more per year than the CPI projections as used in the City's Draft 2021 SFP.
- Annual costs of maintenance and utilities (City owned street lights) – assumed to increase by 1% more than the CPI projections. So this assumption has lower escalation than the Western Power costs, which increases by 1.5% more than CPI, and therefore factors in a benefit for conversion to city-owned lights. This is considered reasonable, because the escalation factors for Western Power street lights are not within the control of the City and may include central overhead costs of the network.

Note that the model also includes a toggle to exclude escalation completely from all items. This report will consider the impacts both excluding escalation and including because there are different outcomes depending on the selection used.

3.6 Period of Evaluation

The model evaluates over a 50 year period. This is considered reasonable taking account of the sizeable one-off costs and the need to factor in the impacts of owning/replacing city-owned street lights.

3.7 Phasing

The financial model has been set up to deal with a range of flexible scenarios, including phasing. The financial model can include calculations which spread the one-off costs over a 10 year period up to 2030-31. There are no readily available assumptions that can be made for the phasing of conversion to underground power for the 20,120 lots or indeed the Duncraig notice of motion so for the time being the model has just allocated all the costs to 2023/24, as shown in the table below.

The key issue with the model for now is to evaluate if there is financial benefit/payback in converting to LED over a 50-year period which may offset the one-off costs, so it is unnecessary at present to overcomplicate the phasing assumptions - these can be considered in future evaluations and at least the model has been set up to deal with this.

Capital Cost Phasing	% split by Year										
	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	**Total**
Underground power			100%								**100%**
COJ Streetlights			100%								**100%**

ESTABLISHMENT PHASE

4 ONE-OFF COSTS – UNDERGROUND POWER

4.1 Underground power – share of costs

The table below summarises the assumptions used for sharing of underground power, for Option 1 and 2 (the assumptions for Option 2 are also relevant for Option 4). The basis of the % allocation is the NRUPP estimate and considered the most realistic as it is based on information provided last year by Western Power. However it must be emphasised that these assumptions have not been agreed by Western Power or State and may not be applicable or proposed in future schemes. Sensitivity analysis at the end of the report evaluates other shares:

- State - there is the potential for the City and other local governments to advocate the state contribute more than 10% which would result in a lower household contribution.
- City - in all options it is assumed that the City contributes ZERO costs towards underground power, but it may be worthwhile for the City to contribute if it gives the scheme a greater chance of being agreed with Western Power AND if there are sufficient savings in operating expenses to pay back the contribution.

Assumptions **Share of costs for Underground Power**		**Option1** Overhead power conversion WPower owned s-lights	**Option2** Overhead power conversion COJ owned Street lights
Western Power	%	52%	52%
State	%	10%	10%
City	%	0%	0%
Households	%	38%	38%
Total	**%**	**100%**	**100%**

4.2 Costs per lot

The table below lists the assumptions for each option and for each entity that may contribute to the cost of underground power, key issues are:

- Option 1 uses $12,000 as an assumption for converting each lot to underground power. Note that this cost is assumed to include the cost of replacing the street lights by Western Power.
- Option 2 is lower than Option 1 because the City would fund separately the cost of street lights. The cost per street light for the City is assumed to be between $4,000 to $5,000 but it is assumed that Western Power would be spending less for each street light and would only reduce the costs by $800 for each lot so for Option 2 an assumed cost of $11,200 per lot ($12,000 less $800).

Assumptions per asset **Cost per lot for Underground Power (excl. COJ lights)**	**Option1** Overhead power conversion WPower owned s-lights	**Option2** Overhead power conversion COJ owned Street lights
Total	**$12,000**	**$11,200**
by Entity		
Western Power	$6,240	$5,824
State	$1,200	$1,120
City	$0	$0
Households	$4,560	$4,256

Table 4 lists the initial one-off costs to the Households for underground power conversion for each area – these are assumed to be paid initially by the City.

5 HOUSEHOLD REPAYMENTS TO CITY

5.1 City funding of household contribution

As explained previously it is assumed that the City would initially pay for the household contribution. This is consistent with how the scheme would be expected to operate, that Western Power would require the City to coordinate payment from the households. The financial evaluation model has assumed that the City would use borrowings to fund the cost, this is a prudent and standard approach so that a cost of interest payments is included within the model. Ideally the City would fund its share of the one-off costs using reserves, but this would still result in cost of finance i.e. lost interest earnings and hence by factoring in borrowings to the model is including an alternative cash expense for funding.

The financial model has assumed a 10 year repayment term, this can be toggled to a 5 year repayment term if necessary, or immediate repayment. The cost of interest is assumed to be passed on to households so that the City is cost-neutral for the underground power component.

5.2 Costs per household

The table below summaries the costs per household, including interest, repayable over a 10 year term, based on a 38% contribution to an overhead power conversion. Although this is an extra burden for household, it would be expected that the house value for lots converting to underground power would increase, although it would be extremely difficult to quantify whether the house values would increase by as much as the cost paid by each household. If households had to contribute more (e.g. 50%), then the cost per household would be $6,000 for Option 1 and $5,600 for Option 2.

Assumptions per asset **Household repayments to City**		**Option1** Overhead power conversion WPower owned s-lights	**Option2** Overhead power conversion COJ owned Street lights
Share of costs for Underground Power			
Households	%	38%	38%
$	$	$4,560	$4,256
Premium for repaying over several years (cost of interest)			
Term of repayment	*Years*	10	10
Premium to be paid on top of principal	%	17%	17%
Cost per household including premium	**$**	**$5,333**	**$4,977**

Table 5 summarises the overall repayments for households by area, a total cost for Option 2 of $100.1m repayable to the City.

5.3 Recovery of costs from household – Service Charges

The City would recover the cost of underground power from households as a service charge, this is permissible under the Local Government Act and is also consistent with how other Councils have administered overhead power conversion schemes. A few issues to note about the service charge process:

- Rates notice – the service charge would be added to the annual rates notice
- Property – the service charge would apply to the property
- Default – the service charge would therefore act in the same way as rates, that the debt would still be payable to the property. So if a homeowner dies for example without the debt being paid, it would still be liable on the estate.

6 ONE-OFF COSTS – STREET LIGHTS

6.1 Street lighting costs per asset

The table below lists the estimated costs per unit for LED lights. The key issues are

- Option 1 (Western Power owned lights) – if Western Power converted the lights to LED, they would pass a charge on to the City.
- Option 2 relates to installation of city-owned LED lights as part of overhead power conversion. The installation costs are high as there would be a lot of one-off groundwork, laying cables, connection, etc.
- Option 3 only relates to the one-off costs in existing underground areas.

As mentioned at the beginning of the report most values in the model are sourced from supplier quotes where possible. The only value in the table below that is an estimate by the City is the cost of $4,000 charged by Western Power for a large LED luminaire, this would only apply to a small quantity.
The cost per luminaire includes $100 for a telecall to allow for smart monitoring.

Street light asset cost	**Option1**	**Option2**	**Option3**	**Option4**
	Overhead power conversion		Underground power areas	All areas, both OP and UP
	WPower owned s-lights	COJ owned Street lights	COJ owned Street lights	COJ owned Street lights
	$	$	$	$
Large				
Pole		$1,129	$1,129	
Luminare	$4,000	$788	$788	
Installation		$3,223	$547	
Small				
Pole		$425	$425	
Luminare	$2,325	$475	$475	
Installation		$2,938	$292	
Total Small	**$2,325**	**$3,838**	**$1,192**	

Note that for Option 3 most of the poles do not need replaced, the City would just need to replace the luminaire, so arguably the costs of poles should not be included. However the financial model has included that cost because Western Power may insist that that there is purchase cost equal to the written-down value of the asset. Western Power have claimed with other Councils (e.g. Cockburn) that there is a write-down cost that needs to be paid – this claim appears tenuous. Indeed if the original cost of the pole was paid by a third party (i.e. developer) then Western Power should not be claiming a cost, other than in those circumstances where they have replaced it.

6.2 Street lighting total costs

Table 6 summarises the costs in $ms for each area and in total, the impacts for each option are:

- Option 1, the costs charged by Western Power for conversion to LED in the overhead power areas only are estimated to be $11.9m
- Option 2, the City to replace only the street lights in the overhead power area is $18.8m
- Option 3, replace only the street lights in the underground area is $13.4m
- Option 4 total impact which is the combination of Option 2 and 3 is $32.2m

So the key issue for the financial evaluation is whether there are sufficient recurring operational savings to pay back the costs above.

Note that if Western Power were to convert the full network to LED and pass on the charges to the City the cost would be $38.3m

6.3 Funding of street lighting capital costs

As per the City's standard approach for financial evaluations, the model assumes that borrowings are used for the one-off costs, so that a cost of interest is factored into the cash flows. In reality the City would seek to use existing reserves where available or potentially set up new reserve, a "City Utilities Reserve", this is subject to further comment in the recommendations.

OPERATING ANALYSIS

7 RECURRING EXPENSES

7.1 Baseline – existing costs

The 2021/22 budget for Western Power street lights is $3,107,222 but this includes costs for street lights that are now fully owned and paid by Main Roads (Marmion Avenue and some of Ocean Reef Road), so the revised baseline is $2,969,679. This has been split between large lights and small lights, with an average cost of a large light estimated by the lighting team as $287 per year and the remaining costs split out to small lights which is an average of $185. Note that these costs paid to Western Power covers the costs of electricity, maintenance and depreciation/replacement.

7.2 Benefits of LED lights – less power

LED lights have significant benefits, both financially and environmentally, because they use less power (wattage) than non-LED lights. The City has evaluated the likely new wattage that it would use for LED lights compared to the existing wattage, this is shown in the table below. So in all circumstances the proposal would be to use less power. Note that for existing luminaires that use 250 wattage, the new wattage would be 140 if the light was on an arterial road, otherwise 65 would be sufficient. Items 1 to 4 in the list below are deemed "large" lights and items 5 to 14 are small.

Wattage conversion from Western Power to LED

No	Current WP Wattage	Large Pole Location	New Wattage
1	250	Arterial	140
2	250	Suburb	65
3	170		100
4	160		100
5	155		65
6	150		65
7	125		23
8	80		23
9	70		23
10	53		23
11	42		23
12	36		23
13	22		17
14	20		17

7.3 Conversion to LED – costs per year (maintenance and power) per asset

The table below summarises the assumptions for recurring costs, excluding depreciation which is covered separately. The key assumptions are:

- Options 1 assumes that Western Power would replace the street lights and continue to own them but that there would be a saving passed on to the City as the new lights would be LED. A saving of 28% per asset is assumed, this has been made with reference to the existing published tariffs by Western Power – there is no guarantee though that Western Power would pass these savings on, the basis of their charges has been, and continues to be, uncertain.
- Power costs for Option 2, 3 and 4 have been calculated on an individual asset basis. Each of the 14,719 luminaires have been assessed at their new proposed wattage as per table

above, and then a cost calculated based on the current tariff. So, for small luminaires the average cost per year is $22 per luminaire and for large luminaires is estimated to be $89 per year.

- Maintenance costs i.e., faults, vandalism, storm damage, etc. The values of $40 for large and $20 for small lights are one of the few values in the model that are based on assumptions without a detailed audit trail or large sample size. These costs are uncertain, the City does not currently have a large sample of LED lights, but does have the following:
  - 32 LED lights at Harbour rise for 2 years only. The average cost per light has been $50 per year, but it should be noted that these are higher specification
  - 28 LED lights at the north car park of Tom Simpson Park. This is a better sample having been there for five years. The average cost is $12 per light per year.

  The key issue with the financial model is that it requires an input of the average costs over the life of the assets (15 years), so if the cost may increase over life this needs factored in. A value of $20 and $40 per light has been made so that the overall maintenance budget appears reasonable – for 14,179 lights this would be a cost per year of over $300,000. This appears a reasonable budget to maintain a network, this would be adequate to employ (or contract) one full-time person with a van and materials. Note that in the early years this cost would probably not be fully required so savings could be set aside into reserve to be required for later years when more may be required.

  The City of Palmerston in the Northern Territory has recently (just over one year ago) replaced all of their 4000+ lights from the utility provider to city-owned LED lights so they will be a useful reference point to discuss the maintenance costs. However the limitation again though is that they only replaced them recently so as the lights are almost new the current costs will not be a reflection of the life cycle costs.

Assumptions per asset **Street light costs per yr (mtce & power)**	**Base** Do nothing	**Option1** Overhead power conversion WPower owned s-lights	**Option2** Overhead power conversion COJ owned Street lights	**Option3** Underground power areas COJ owned Street lights	**Option4** All areas, both OP and UP COJ owned Street lights
Large					
Baseline costs per year per light - WP	$287.00				
Revised cost LED WP		$207			
City LED power cost			$89	$89	$89
City LED maintenance cost			$40	$40	$40
City LED power and mtce			$129	$129	$129
Small					
Baseline costs per year per light - WP	$184.56				
Revised cost LED WP		$133			
City LED power cost			$22	$22	$22
City LED maintenance cost			$20	$20	$20
City LED power and mtce			$42	$42	$42

7.4 Recurring operating costs (maintenance and power) for street lights - summary

Table 7 summaries the recurring operating expenses for each option and by area, the overall totals for each option are

- Baseline $2.97m per year currently paid to Western Power as explained above.
- Option 1 $2.71m per year – this includes savings of 28% of the 4,816 luminaires within the overhead power areas converted to underground power. The remaining 9,903 luminaires are costed at same rate as the existing baseline.

- Option 2 $2.28m per year – costs are a lot lower than option 1 because is assumed the City will achieve higher savings of the 4,816 luminaires converted to LED. Again this only relates to 4,816 luminaires with the other 9,903 costed at existing rates.
- Option 3 $1.53m a lot lower cost as 9,903 luminaires incur a much lower cost and the remaining 4,816 are charged at Western Power rates.
- Option 4 $0.83m – this is the lowest cost as the full network is converted to city-owned with much lower costs than Western Power owned lights. So, from the perspective of the annual cash expenses option 4 has a benefit of over $2m per year compared to the baseline, but this does not factor in the ownership costs (depreciation/replacement).

7.5 Depreciation and replacement of city lights – per asset

The table below lists the assumptions used for Options 2,3 and 4 for the annual depreciation/capital replacement of city-owned street lights. A life of 15 years is assumed for the luminaire and 25 years for the pole (Steel). The annual depreciation costs for the pole and luminaire are simply calculated by dividing the asset cost in previous section with the life.

The installation costs per year that need to be set aside relate to the assumed works required to replace the pole or luminaire, such as traffic management, cherry picker and labour time. So for the small luminaire and pole the value of $87 per year is calculated as follows:

- Luminaire – a cost of $292 was shown earlier for the one-off installation of a LED luminaire, this was based on a supplier quote with seven different work items. Each of the tasks were reviewed as to whether they would be required in 15 years again and all items except cabling would be required so a one-off cost in 15 years' time of $278 is calculated which is approximately $19 per year to set aside.
- Pole – a supplier quoted a cost of $1,700 to replace one pole, which is then divided by 25 years to derive a cost of $68 per year. At first the cost of $1,700 per pole does appear high but this has been subject to validation by other suppliers and review by the City.

The installation costs for large poles are based on an extrapolation of the small poles/luminaries. Note that the financial evaluation assumes that the cashflow impacts match the annual depreciation expense. In reality of course the cashflow would only arise as assets are replaced but it is worthwhile to just assume an annual cash flow impact, this is consistent with the City's application of an asset renewal reserve where cash is set aside annually.

Assumptions per asset **Depn/Replacement - COJ Street lights**	**Option1**	**Option2**	**Option3**	**Option4**
	Overhead power conversion		Underground power areas	All areas, both OP and UP
	WPower owned s-lights	COJ owned Street lights	COJ owned Street lights	COJ owned Street lights
	$s	*$s*	*$s*	*$s*
Depreciation per asset per year - Large				
Pole		$45	$45	$45
Luminare		$53	$53	$53
Installation - Pole		$76	$76	$76
Installation - Luminare		$22	$22	$22
Depreciation per asset per year - Small				
Pole		$17	$17	$17
Luminare		$32	$32	$32
Installation		$87	$87	$87
Depreciation per asset per y		**$135**	**$135**	**$135**

7.6 Depreciation and replacement of city lights – summary

Table 8 summarises the annual depreciation for the options which assume City-owned LED lights, the overall totals for each option are

- Option 2 $0.65m per year, this is based on the conversion of those poles and luminaires only in the areas currently covered by overhead power.
- Option 3 $1.35m per year, this is based on a larger quantity, the areas currently serviced by underground power.
- Option 4 $2.01m cost per year for the full network. So, this cost almost eradicates the annual cash saving explained in earlier paragraph of maintenance and power.

7.7 Tree pruning

One of the benefits of removing overhead power lines is that tree pruning becomes easier, and a financial saving may be achieved. An extensive review of the costs/benefits of converting to underground power was prepared in 2011 and evaluated the savings in tree pruning. The savings were minimal and therefore no assumption has been included in the financial model.

8 RECURRING INCOME

8.1 Carbon credits - assumptions

Information has been provided to the City that under options 2,3 and 4 the City could be eligible for a carbon credit of $15 for each carbon credit. For each luminaire converted it is assumed there would be a 28% contribution to a carbon credit so the 14,791 luminaires may generate 4,088 carbon credits. The credits are assumed to generate income for 7 years. The third party would require $3 per carbon credit to administer this, so the net benefit is $12 per asset per credit, as listed below.

Assumptions per asset **Carbon credits - Yr 01**	**(B) COJ owned streetlights**		
	Option4 Worse(B)	*Option5* Realistic(B) *NRUPP estimate*	*Option6* Best(B) *Higher state contribution*
Credit received per streetlight per year	$12	$12	$12
Number of years credits received	7	7	7
Total	**$84**	**$84**	**$84**

8.2 Carbon credits - summary

Table 9 summaries the overall impacts for Option 2, 3 and 4. The impacts are relatively minor in comparison to the other factors in the model.

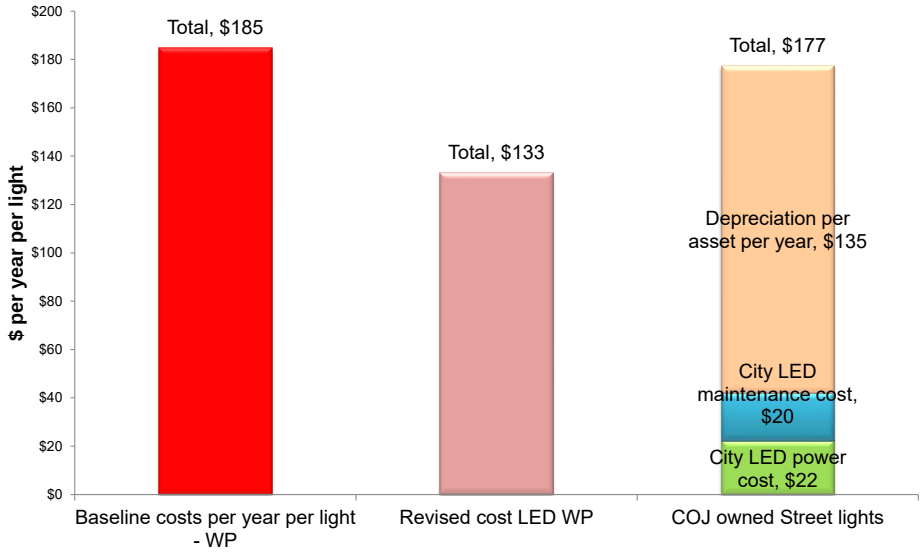
SUMMARY IMPACTS

9 OPERATING ANALYSIS

9.1 Street lights annual costs – excluding escalation

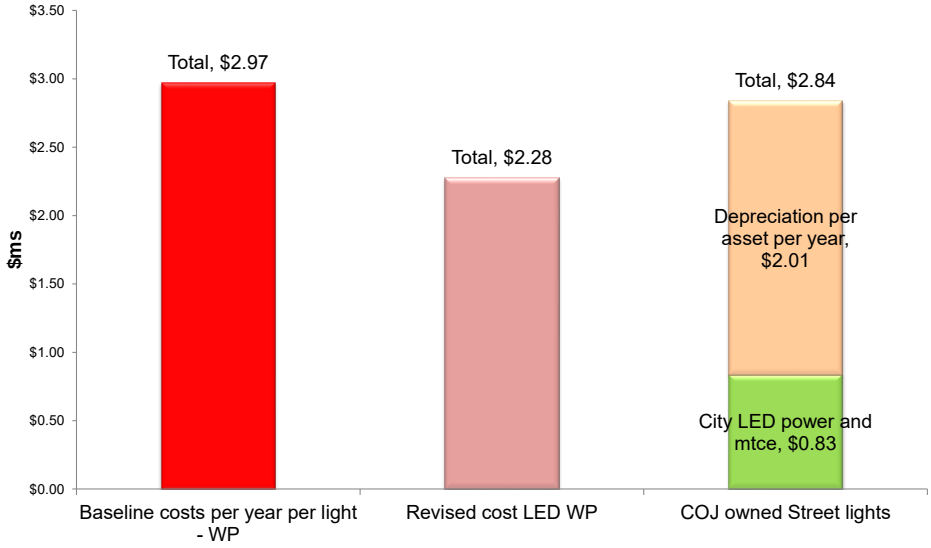
The graph below summarises the annual costs per SMALL pole/luminaire which brings together all of the recurring impacts in today's dollars. For lights owned and operated by Western Power there is currently one overall cost that includes power, maintenance, and replacement but for city-owned street lights there would be separate costs for each element. The graph indicates that a city-owned street light in today's dollars would only provide an $8 benefit compared to the existing charges.

Street light costs per year - Small - ONE Light at Today's dollars



The graph below then summaries the overall costs to the City, in today's dollars, for each assumption. So for City-owned lights if fully converted the total cost would be $2.84m which is $0.13m less than the existing baseline.

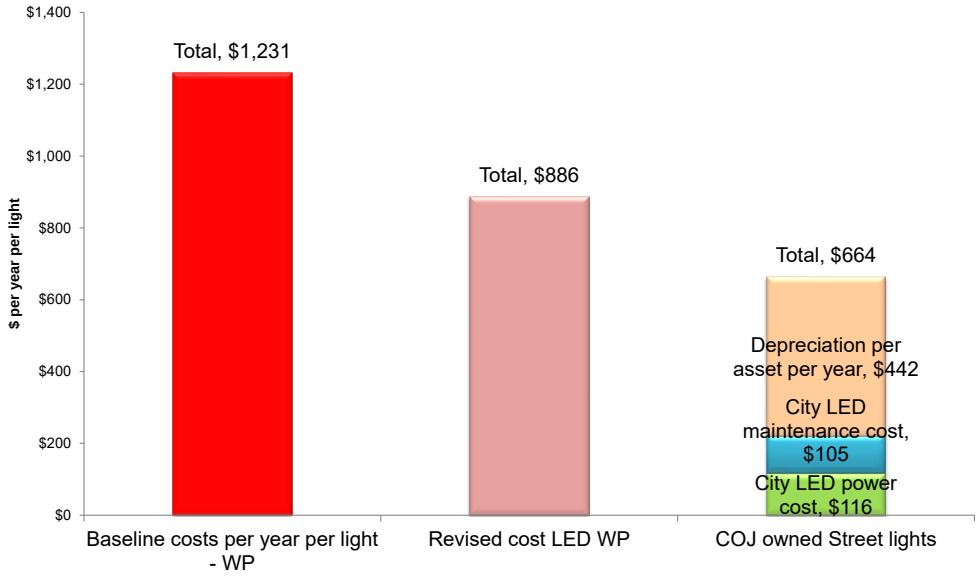
Street light costs per year - Annual Costs TOTAL Network



9.2 Street lights annual costs – including escalation

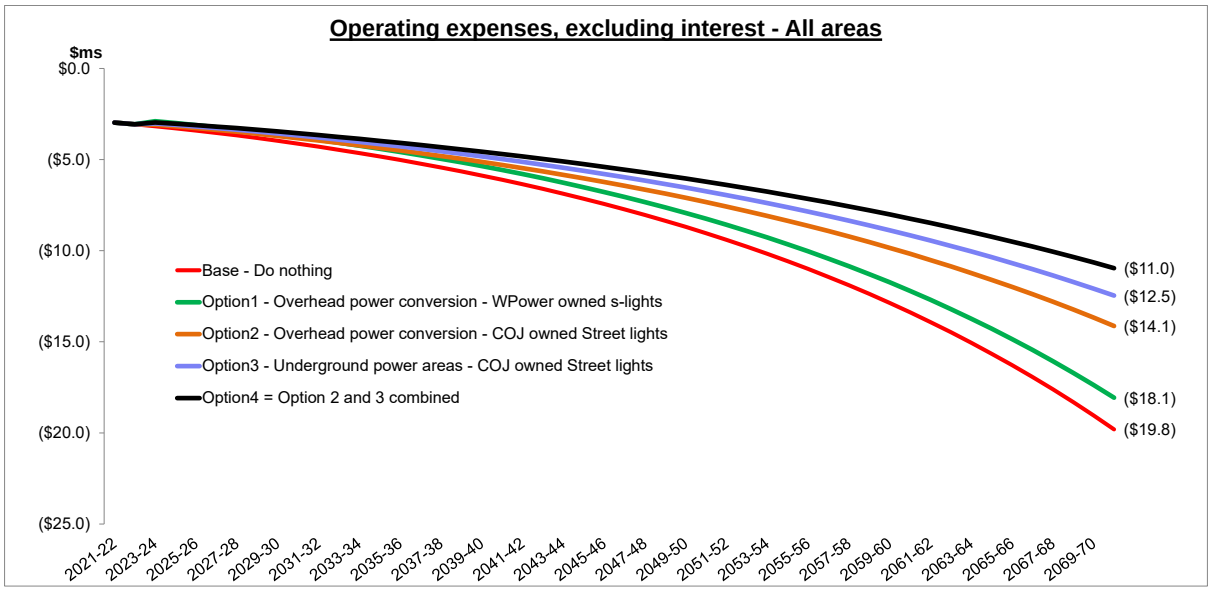
The graphs above are in today's dollars and indicates very little difference between the existing charges and the potential costs for city-owned street lights. However one of the critical assumptions in the model is escalation, as explained earlier it is assumed that Western Power will increase their charges by 0.5% more than the escalation incurred by the City. This 0.5% difference may appear to be a relatively minor difference but after 50 years the cumulative impact is significant and has a major bearing on the outcomes. The graph below shows the recurring charges including escalation at year 50 and shows the difference per asset is $567.

Street light costs per year - Small - ONE Light at Year 50



9.3 Operating impacts by year

The graphs below summarise the recurring costs per year excluding interest and shows that Option 4 increases much more slowly than the other options because of the assumed escalation rates.



10 TOTAL 50-YEAR CASH FLOWS

10.1 Total 50-year cash flows

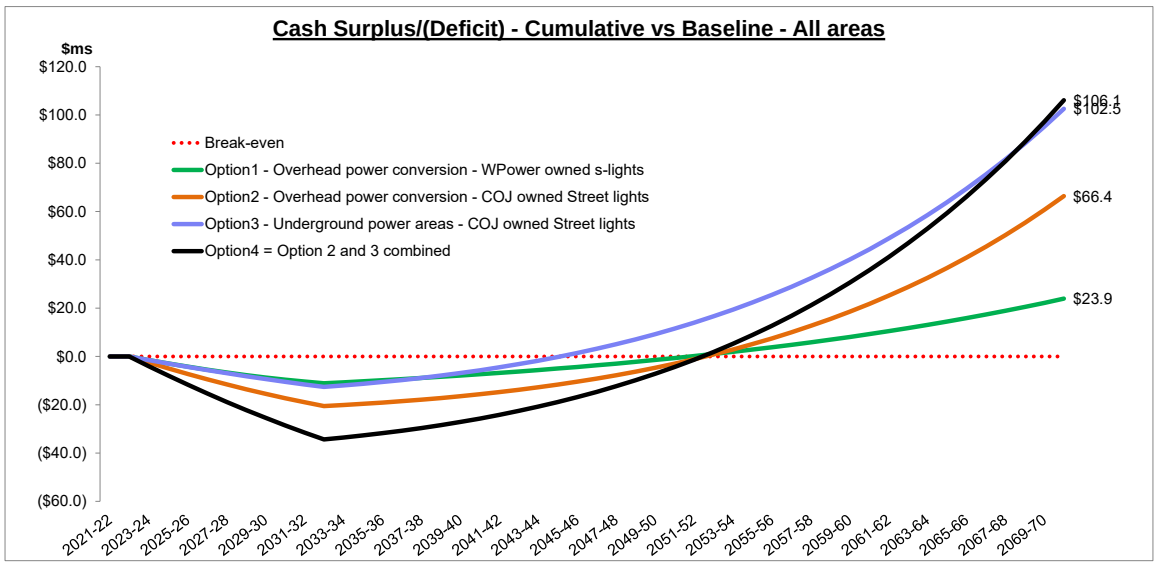
The table below summarises the overall impacts over a 50 year impact of the four options, the baseline and also compares each option versus the baseline. The values include escalation. The key outcomes are

- Do Nothing option assumes the City would pay $442.8m over 50 years for the existing non-LED street lights. So this is based on $2.97 per year for 50 years plus escalation.
- Establishment cost relates only to the one-off cost of the street light conversion, including interest. The costs of overhead power conversion (excluding the street light element) result in a net zero impact because the households repay fully the City the one-off costs plus interest, whilst the City is currently assumed to make 0% contribution to the overhead power conversion.
- Option 3 Establishment costs of $16.2m is less than half of the overall costs for Option 4 of $39.1m even though Option 3 represents approximately 2/3 of the overall lighting network. The reason for this disparity is that Option 4 includes $22.8m costs for the conversion of lighting in overhead power areas, which is a much higher one-off cost per asset.
- The net establishment costs are relatively minor compared to the recurring impacts.
- Operating cash expenses are only $111.1m for Option 4, approximately 1/4 of the cost if we continue to pay Western Power. However there would be a new burden of depreciation/replacement of $186.8m.
- Option 4 appears only slightly better of $3.6m than Option 3 and has a longer payback of 32 years. On that basis it may appear that Option 3 would be preferable but the recurring savings of option 4 are much better and would provide better outcomes after 50 years as is shown on the graph in next paragraph.

Cashflow Summary Total including inflation		Base	Option1	Option2	Option3	Option4
		Do nothing	Overhead power conversion		Underground power areas	All areas, both OP and UP
			WPower owned s-lights	COJ owned Street lights	COJ owned Street lights	COJ owned Street lights
Establishment						
One-off Costs to City	*$ms*		($104.1)	($105.2)	($13.9)	($119.0)
Household repayment to City	*$ms*		$107.3	$100.1		$100.1
Net Funding Required	*$ms*		$3.2	($5.0)	($13.9)	($18.9)
Borrowings	*$ms*		$104.1	$105.2	$13.9	$119.0
Repayments	*$ms*		($104.1)	($105.2)	($13.9)	($119.0)
Interest on Borrowings	*$ms*		($17.6)	($17.8)	($2.4)	($20.2)
Establishment Cost	***$ms***		**($14.4)**	**($22.8)**	**($16.2)**	**($39.1)**
Recurring Impacts						
Operating Cash Expenses	*$ms*	($442.8)	($404.4)	($292.7)	($198.3)	($111.1)
Operating Income	*$ms*			$0.1	$0.2	$0.3
Depn/Replacement	*$ms*			($60.9)	($125.9)	($186.8)
Recurring Impacts Total	***$ms***	**($442.8)**	**($404.4)**	**($353.5)**	**($324.0)**	**($297.6)**
Cash Surplus/(Deficit) - Cumulative	*$ms*	($442.8)	($418.9)	($376.4)	($340.2)	($336.7)
vs Baseline	***$ms***		**$23.9**	**$66.4**	**$102.5**	**$106.1**
Payback (Years)	***Years***		**31**	**32**	**25**	**32**

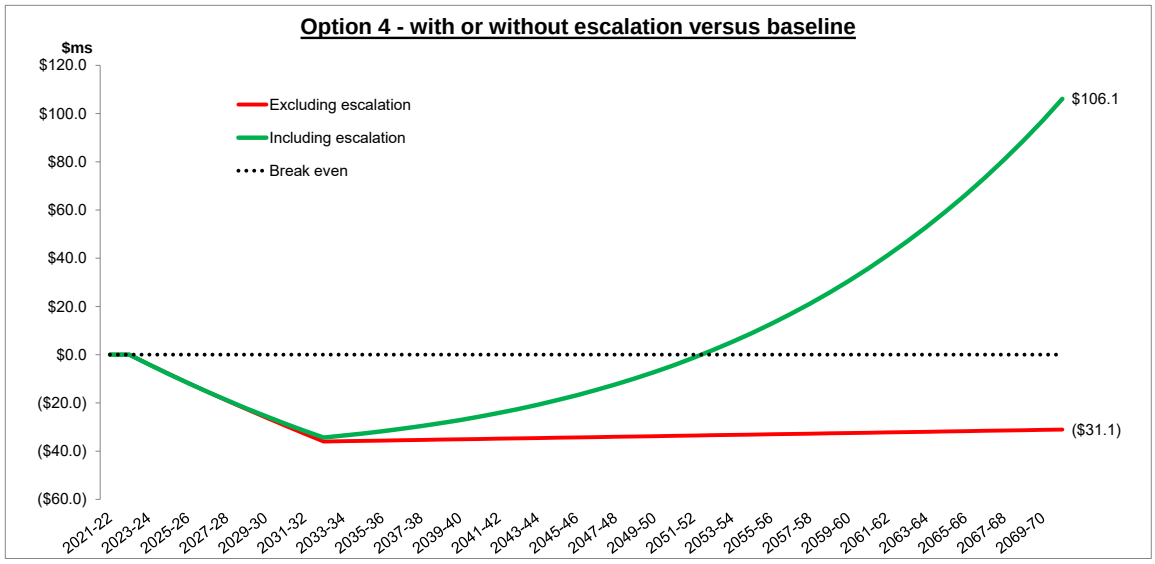
10.2 Cumulative cash flows by year

The graph below show the cash flows on a cumulative basis for each of the options, including escalation. The outcomes at the end of the 50-years are the same values as the values highlighted in green in the table above. The graph demonstrates that Option 4 is the better option overall (albeit with longer payback) because it has a steeper increase/benefit than option 3. Note that each of the graphs have an initial decline which is the initial establishment cost spread out over a number of years in the form of loan, and then once the loan is repaid the options show a positive upward trend.



10.3 Impacts excluding escalation

The financial model has assumed that the rate of escalation would be higher (0.5% more) for Western Power charges compared to the costs of city-owned street lights. This is a key consideration because the initial comparison of recurring charges for each option has relatively small difference between city-owned street lights versus the existing charges, but over time the difference will get bigger. Indeed Option 4 is only a favourable option because of the escalation difference, if the rate of escalation for Option 4 was the same as the baseline then option 4 would not be favourable. The graph below shows the cumulative impacts of option 4 versus the baseline including and excluding escalation.



11 RISKS, OPPORTUNITIES AND SENSITIVITY ANALYSIS

11.1 Risks and opportunities list

As indicated throughout the report, there is a strong audit trail for most values in the model, but whilst the audit trail is strong there still remains a high level of risk AND opportunity because in reality each of the assumptions will vary for one reason or another. It is therefore important to consider the impacts on the overall outcome if one or more of the key assumptions vary, which this section will address. The key financial risks and opportunities are:

- Capital costs for street lights and/or conversion to underground power could increase due to market conditions, detailed design, or escalation is more than anticipated. Likewise there is a potential for reduced capital costs e.g. competitive tender process.
- Opportunity for scale could reduce many of the cost assumptions – most assumptions are based on a quote for 100 or less poles/luminaires but the network consists of thousands of assets.
- Lower contribution to underground power by Western Power and/or State, which requires a higher contribution from households and/or a contribution from the City.
- City maintains a stance of zero contribution to an underground power scheme and as a result Western Power give it a lower priority and implement schemes in other areas.
- City taking ownership of street lights – legal/contractual issues or refusal by Western Power or a cost that the City has to pay for the remaining useful life of the old assets.
- Benefits of lower street light costs not passed on by Western Power (option 1)
- Benefits of LED of city-owned street lights not achieved, due to unforeseen tariff costs or unforeseen maintenance costs.
- Life of luminaire could be longer than 15 years and if it was 25 years would be the same as the pole and therefore the installation/replacement costs would reduce significantly.

11.2 Sensitivity Analysis – List of variables and range

For the purposes of sensitivity analysis it is therefore important to evaluate the items that could have the biggest impact if the eventual outcome was significantly different. The following four cost items for Option 4 are evaluated in more detail with a low and high outcome and steps in between. The items evaluated and the range of outcomes considered are:

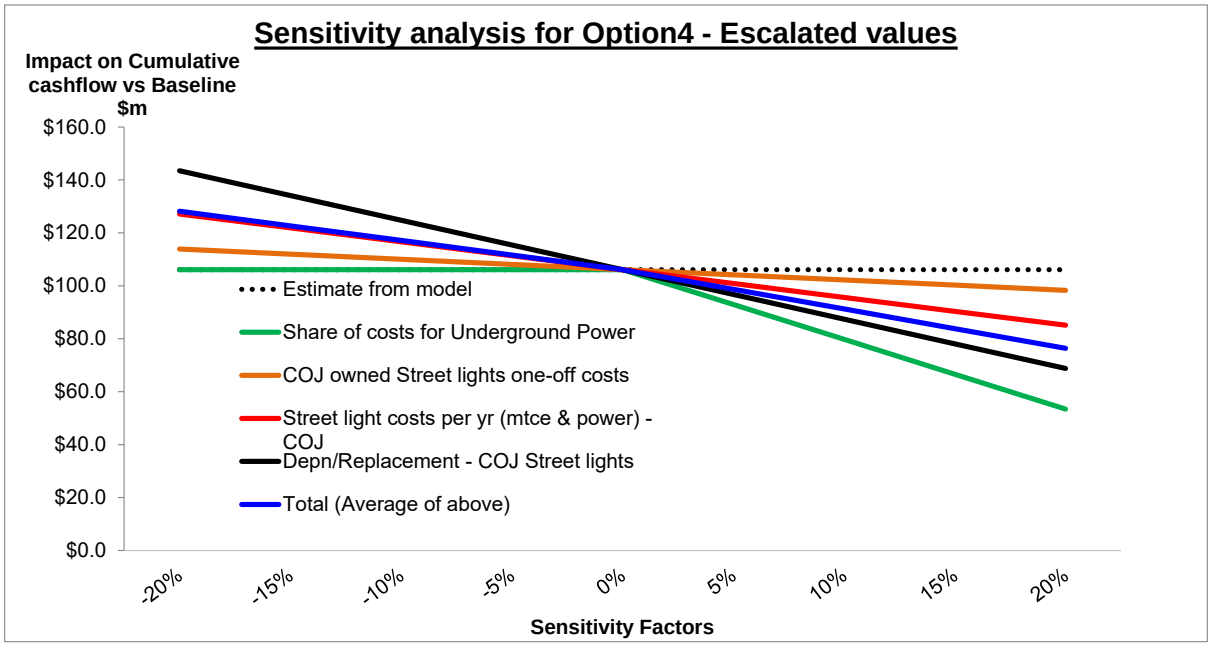
- Share of costs for Underground power (excluding street lighting). All options currently assume a zero contribution from the City, except for the costs of street lights. If the City contributed up to 20% then this would cost $45.1m
- One-off costs for City-owned street lights. Option 4 assumes a cost of $32.1m, if this were 20% lower it could be $25.8m or if 20% higher it could be $38.6m
- Recurring cost per year for maintenance and power. The current estimate in the model is $835k but a 20% variation could increase or decrease that by $167k
- Depreciation for all of the street lights is assumed to be just over $2m for Option 4 and a 20% variation either way would equate to $400k.

Sensitivity analysis for Option4 Items to analyse	Values (Today's dollars) Value in Model *$000s*	Low -20% *$000s*	High 20% *$000s*
1 Share of costs for Underground Power	($0)	($0)	($45,069)
2 COJ owned Street lights one-off costs	($32,190)	($25,752)	($38,628)
3 Street light costs per yr (mtce & power) - COJ	($835)	($668)	($1,001)
4 Depn/Replacement - COJ Street lights	($2,005)	($1,604)	($2,406)

11.3 Sensitivity Analysis – including escalation

Following on from above the four sensitivity factors have been evaluated in steps of 5% variation from a 20% reduction to a 20% increase. The impacts are calculated on the overall cumulative impacts versus the baseline (i.e. the $101.6m benefit for Option 4) and shown on the graph below.

This indicates that the Depreciation costs could result in the highest benefit if they were 20% lower, this is because this is a recurring impact and over 50 years has a bigger impact than one-off cost items. On the negative side if the cost assumptions were 20% worse off, all outcomes would still be positive (unless all four items combined were 20% worse off than assumed in the model).



11.4 City to contribute to underground power?

The financial analysis has indicated that in all scenarios there would be a financial benefit to the City in converting to underground power, because of the assumption that there would be recurring savings in street lights due to LED and because the City did not contribute anything towards underground power. The analysis therefore indicates that it would be financially viable to contribute a portion of the costs for underground power as long as it would be guaranteed to receive a reduction in charges.

The maximum % that the City could contribute to underground power for Option 4 (the full network) and achieve a break-even position after 50 years is 40% - whilst it is useful to be

aware of this, this is an excessive share for the City to consider when most of the cost should be borne by Western Power and the State.

11.5 Risks and opportunities – other considerations

In addition to the evaluation above there are other risks and opportunities for the project:

- Community batteries
- Footpaths enhanced/replaced at same time as the conversion
- Interest-free loans provided to Households to encourage take-up and ensure that over 50% give approval.
- Western power charges are much higher (60% to 70%) for ad hoc work such as moving street lights or new street lights so the continued reliance on Western Power continues to provide risk of excessive costs.
- Solar panels may eventually be used to store power and power street lights.
- Grants may be available to support the one-off costs (Clean Energy). This will be pursued at a later stage. Note that the recurring impacts in the model have a much larger impact than the one-off impacts so the availability of grants is highly unlikely to have a significant bearing on the financial outcomes. Indeed the availability of grants can often be used as a means to justify a project when in whole-of-life terms it has little impact.

12 DUNCRAIG NOTICE OF MOTION

12.1 Summary of Lots, Lights and Poles for Duncraig Suburb

All of the tables at the end of this report break down the values used in the model for the Duncraig Notice of motion and all other suburbs. This section will summarise the key outcomes. The Duncraig suburb is broken down as follows:

- 1,184 lots in the notice of motion area, a further 1,577 in the rest of the suburb
- 276 street lights in the notice of motion area and 19 large poles

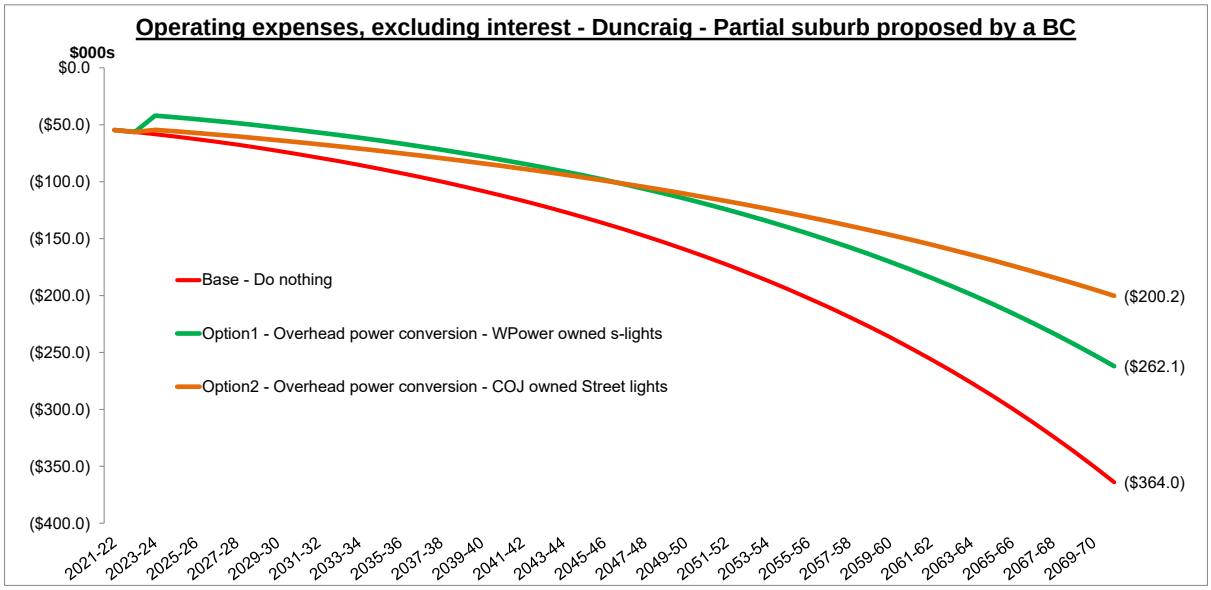
12.2 Overhead power conversion – costs to households

The costs for overhead power conversion are estimated to be:

- $5.4m for Option 1 for the notice of motion area and $5.0m for option 2
- Repayments to the City over a 10 year period would be $6.3m and $5.9m respectively

12.3 Operating expenses (excluding depreciation)

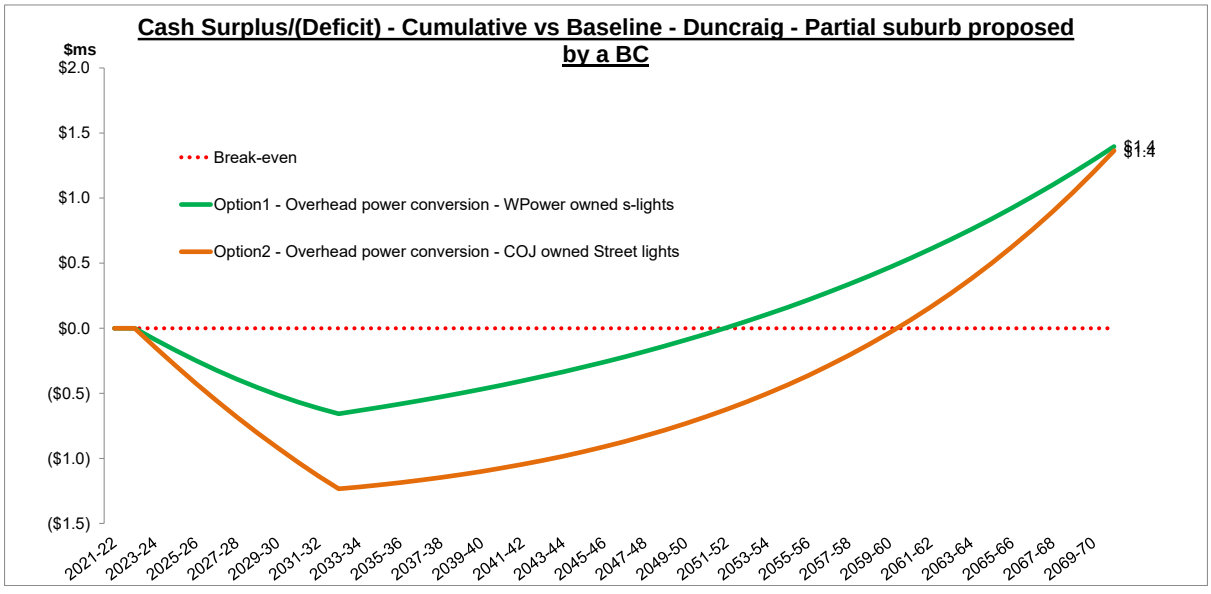
The graph below summarises the estimated operating expenses for the Duncraig notice of motion area, only the base option, Option 1 and Option 2 are relevant for this analysis. Option 3 is not relevant because there are no underground areas in the Duncraig notice of motion just overhead lines and therefore Option 4 is also irrelevant. The graph demonstrates the same outcomes as the overall City analysis that City-owned street lights have the best outcome for recurring cash expenses (excluding depreciation)



12.4 Total 50-year cash flow

The table and graph below show the overall 50-year impact for the Duncraig Notice of Motion area.

Cashflow Summary Total including inflation		Base	Option1	Option2
		Do nothing	Overhead power conversion	
			WPower owned s-lights	COJ owned Street lights
Establishment				
One-off Costs to City	*$ms*		($6.1)	($6.2)
Household repayment to City	*$ms*		$6.3	$5.9
Net Funding Required	*$ms*		$0.2	($0.3)
Borrowings	*$ms*		$6.1	$6.2
Repayments	*$ms*		($6.1)	($6.2)
Interest on Borrowings	*$ms*		($1.0)	($1.0)
Establishment Cost	***$ms***		**($0.9)**	**($1.3)**
Recurring Impacts				
Operating Cash Expenses	*$ms*	($8.1)	($5.9)	($2.0)
Operating Income	*$ms*			$0.0
Depn/Replacement	*$ms*			($3.5)
Recurring Impacts Total	***$ms***	**($8.1)**	**($5.9)**	**($5.5)**
Cash Surplus/(Deficit) - Cumulative	*$ms*	($8.1)	($6.7)	($6.8)
vs Baseline	***$ms***		**$1.4**	**$1.4**
Payback (Years)	***Years***		**31**	**40**



13 SUMMARY

13.1 Key Outcomes of preliminary financial evaluation

The City currently spends approximately $3m per year for the street lights - the overall key issue with this analysis is how much can this be reduced, and would the savings be enough to pay back any one-off costs incurred? The key observations that can be made at this early stage is that savings with city-owned LED lights are likely and that a contribution to underground power may be financially viable. This project has the opportunity to improve operating results and is exactly the type of project the City should be prioritising, putting reserves to better use and reducing operating expenses.

Based on the outcomes above there are SIX key recommendations:

13.2 Recommendation 1 – City-owned LED lights should be pursued

The City should vigorously pursue the ownership of city-owned LED street lights so as to maximise the financial benefits and have control over service levels. The City must advocate at all levels to pursue this.

13.3 Recommendation 2 – City should not rule out contribution to Overhead Power

The City has assumed a contribution to the scheme but only in relation to the street lighting element and has assumed a 0% contribution for the other elements. A zero contribution to underground power may initially appear financially preferable, but this stance may result in a lower priority for a conversion and not proceeding. A zero contribution may be also be a sub-optimal financial outcome because the City is unable to achieve the benefits of converting to LED. A contribution by the City will also lower the burden for households and would help achieve over 50% of households in an area approving. If the City is not proactive in this area and just left the conversion to Western Power, it would take a very long time to convert (20,120 lights is approximately $240m).

13.4 Recommendation 3 – City Utilities Reserve to be set up

The City at present has an operating deficit but excluding depreciation has a positive operating cashflow. The City is able to set aside funds each year to the Asset Renewal Reserve (renewal of existing assets) and Strategic Asset Reserve (large, new infrastructure). In addition the proceeds from sale of land at Tamala Park are transferred into a separate reserve each year, and by June 2021 it is estimated that there will be approximately $17.9m in the “Sale of Tamala Park Land Reserve”.

Therefore the City has financial capacity to support Underground Power schemes in some form and has the capacity also to replace all Western-Power street lights with city-owned street lights. It is therefore proposed to establish a new reserve at June 2022 called the “City Utilities Reserve” which can be used to contribute to infrastructure related to utilities. It is recommended that $5m seed money is established in the reserve with the $5m being transferred from the Sale of Tamala Park reserve. The reserve can be used to pay the household component of underground power schemes, and then the reserve would receive the funds as they are paid back by households. The operational savings that arise from utility schemes, such as LED street lights, can then be transferred to the reserve each year and help to fund new schemes. These initiatives would therefore make better use of the City’s cash reserves, improved environmental benefits and provide operational savings which reduce the burden of rate increases.

The creation of the City Utilities Reserve would also demonstrate intent to households for overhead power conversion schemes and intent to State and Western Power to support schemes.

13.5 Recommendation 4 – Business Case to evaluate converting one area to smart-metered LED street lights as a trial, pause and evaluate

It is further proposed that the City prepares a business case to evaluate the conversion to LED street lights of one whole area that is currently serviced by underground power. After the works are completed, there should be a pause of one year and then a detailed post-implementation review of the impacts. No further conversions should be completed until the review is completed. If the results of the conversion are proven, then this should be the indicator to convert all remaining non-LED lights within a reasonable timeframe. A trail could of course only proceed if agreed with Western Power.

13.6 Recommendation 5 – Business Case to evaluate converting one area from overhead power to underground power including the conversion to city-owned smart-metered LED street lights as a trial, pause and evaluate

It is further proposed that the City prepares a business case to evaluate the conversion of one whole area currently serviced by overhead power. After the works are completed, there should be a pause of one year and then a detailed post-implementation review of the impacts. No further conversions should be completed until the review is completed.

13.7 Recommendation 6 – New or relocated Street lights to Australian Standards must be separately justified

The financial model has assumed that if the city took over all the street lights it would be the same quantity of poles and lights as currently used by Western Power. The City would be keen to ensure the lighting network is in accordance with Australian standards, there are some concerns that there are areas in the city where inadequate light is provided either because the poles are located too far apart from each other or are located in poor locations. If the city took over the network, they would be keen to ensure that lighting is improved where necessary so this could involve either relocating existing poles or installing more poles. There is no data available to indicate the overall potential quantity of new lights or relocated lights. Those potential costs are not part of this evaluation and should be separately evaluated and justified. In other words if the city did agree with western power to take over some or all of the lighting to achieve the benefits outlined in this case this does not automatically mean that the City can then install additional lights or relocate them. The annual capital works program should not be used either as a budget to install new lights or relocate, there needs to be separate justification.

13.8 SFP

As mentioned above, it is proposed to create a new reserve as part of the next budget process in 2022. The costs of converting one whole suburb should also be factored into the next update of the SFP. However it is not proposed to include costs of converting other suburbs or for overhead power until further investigation is undertaken with Western Power and a business case is prepared (this report is not a business case).

13.9 Other considerations for the Project

There are other key non-financial considerations:

- Economic benefits (jobs) of overhead power schemes
- Service to community can be directly controlled better with city-owned lights
- Continue to enhance/review financial assumptions e.g. with other local governments.
- Environmental benefits of LED

TABLES

Table 1 – Lots with Overhead Power

Quantities spread between Specific schemes & the rest of suburb	Lots with overhead power	
	Qty	*%*
Partial suburb proposed by a BC		
Duncraig	1,184	6%
Remaining part of suburb		
Beldon	1,476	7%
Burns Beach		
Connolly		
Craigie	2,416	12%
Currambine		
Duncraig	1,577	8%
Edgewater		
Greenwood	3,479	17%
Heathridge	1,221	6%
Hillarys	1,530	8%
Iluka		
Joondalup		
Kallaroo	1,096	5%
Kingsley	82	0%
Kinross		
Marmion	206	1%
Mullaloo	759	4%
Ocean Reef		
Padbury	2,718	14%
Sorrento	1,285	6%
Warwick	1,055	5%
Woodvale	36	0%
Total	**20,120**	**100%**

Table 2 – Quantity of Street lights

Quantities spread between specific schemes & the rest of suburb	**Street lights**				
	Overhead power conversion		Underground power areas		All areas, both OP and UP
	Street lights in OP areas (large)	Street lights in OP areas (small)	Street lights in UP areas (large)	Street lights in UP areas (small)	
Partial suburb proposed by a BC					
Duncraig	35	241			276
Remaining part of suburb					
Beldon	34	310	12	42	398
Burns Beach			27	512	539
Connolly			107	288	395
Craigie	52	540	24	8	624
Currambine			183	534	717
Duncraig	35	321	121	606	1,083
Edgewater			86	371	457
Greenwood	92	796	81	88	1,057
Heathridge	9	309	38	292	648
Hillarys	34	386	115	417	952
Iluka			74	156	230
Joondalup			367	485	852
Kallaroo	6	211	99	212	528
Kingsley			109	972	1,081
Kinross			99	562	661
Marmion	2	46	36	135	219
Mullaloo	17	140	56	288	501
Ocean Reef			120	616	736
Padbury	37	625	93	163	918
Sorrento	24	268	82	307	681
Warwick	42	204	51	110	407
Woodvale			72	687	759
Total	**419**	**4,397**	**2,052**	**7,851**	**14,719**

Table 3 – Quantity of Large Poles

Quantities spread between specific schemes & the rest of suburb	Large Pole		
	Overhead power conversion	Underground power areas	All areas, both OP and UP
Partial suburb proposed by a BC			
Duncraig	19		19
Remaining part of suburb			
Beldon	19	7	25
Burns Beach		15	15
Connolly		59	59
Craigie	29	13	42
Currambine		101	101
Duncraig	19	67	86
Edgewater		47	47
Greenwood	51	45	95
Heathridge	5	21	26
Hillarys	19	63	82
Iluka		41	41
Joondalup		202	202
Kallaroo	3	54	58
Kingsley		60	60
Kinross		54	54
Marmion	1	20	21
Mullaloo	9	31	40
Ocean Reef		66	66
Padbury	20	51	72
Sorrento	13	45	58
Warwick	23	28	51
Woodvale		40	40
Total	**230**	**1,129**	**1,359**

Table 4 – Household contribution for Underground power conversion paid by City

Household contr'n to UPower scheme, paid by City			**Option1**	**Option2**
			Overhead power conversion	
Suburb / scheme	Lots with overhead power		WPower owned s-lights	COJ owned Street lights
	Qty	%	*$ms*	*$ms*
Partial suburb proposed by a BC				
Duncraig	1,184		$5.4	$5.0
Remaining part of suburb				
Beldon	1,476	7%	$6.7	$6.3
Burns Beach		7%		
Connolly		7%		
Craigie	2,416	7%	$11.0	$10.3
Currambine		7%		
Duncraig	1,577	7%	$7.2	$6.7
Edgewater		7%		
Greenwood	3,479	7%	$15.9	$14.8
Heathridge	1,221	7%	$5.6	$5.2
Hillarys	1,530	7%	$7.0	$6.5
Iluka		7%		
Joondalup		7%		
Kallaroo	1,096	7%	$5.0	$4.7
Kingsley	82	7%	$0.4	$0.3
Kinross		7%		
Marmion	206	7%	$0.9	$0.9
Mullaloo	759	7%	$3.5	$3.2
Ocean Reef		7%		
Padbury	2,718	7%	$12.4	$11.6
Sorrento	1,285	7%	$5.9	$5.5
Warwick	1,055	7%	$4.8	$4.5
Woodvale	36	7%	$0.2	$0.2
All areas	**20,120**	**161%**	**$91.7**	**$85.6**

Table 5 – Household repayments to City

Household repayments to City			**Option1** Overhead power conversion	**Option2**
	Lots with overhead power		WPower owned s-lights	COJ owned Street lights
Suburb / scheme	Qty	%	*$ms*	*$ms*
Partial suburb proposed by a BC				
Duncraig	1,184		$6.3	$5.9
Remaining part of suburb				
Beldon	1,476	7%	$7.9	$7.3
Burns Beach		7%		
Connolly		7%		
Craigie	2,416	7%	$12.9	$12.0
Currambine		7%		
Duncraig	1,577	7%	$8.4	$7.8
Edgewater		7%		
Greenwood	3,479	7%	$18.6	$17.3
Heathridge	1,221	7%	$6.5	$6.1
Hillarys	1,530	7%	$8.2	$7.6
Iluka		7%		
Joondalup		7%		
Kallaroo	1,096	7%	$5.8	$5.5
Kingsley	82	7%	$0.4	$0.4
Kinross		7%		
Marmion	206	7%	$1.1	$1.0
Mullaloo	759	7%	$4.0	$3.8
Ocean Reef		7%		
Padbury	2,718	7%	$14.5	$13.5
Sorrento	1,285	7%	$6.9	$6.4
Warwick	1,055	7%	$5.6	$5.3
Woodvale	36	7%	$0.2	$0.2
All areas	**20,120**	**161%**	**$107.3**	**$100.1**

Table 6 – Street light one-off costs

LED Street lights one-off costs	**Option1**	**Option2**	**Option3**	**Option4**
	Overhead power conversion		Underground power areas	All areas, both OP and UP
	WPower owned s-lights	COJ owned Street lights	COJ owned Street lights	COJ owned Street lights
Suburb / scheme	*$ms*	*$ms*	*$ms*	*$ms*
Partial suburb proposed by a BC				
Duncraig	$0.7	$1.1		$1.1
Remaining part of suburb				
Beldon	$0.9	$1.3	$0.1	$1.4
Burns Beach			$0.7	$0.7
Connolly			$0.6	$0.6
Craigie	$1.5	$2.3	$0.1	$2.4
Currambine			$1.0	$1.0
Duncraig	$0.9	$1.4	$1.0	$2.4
Edgewater			$0.6	$0.6
Greenwood	$2.2	$3.5	$0.3	$3.7
Heathridge	$0.8	$1.2	$0.4	$1.7
Hillarys	$1.0	$1.6	$0.7	$2.4
Iluka			$0.3	$0.3
Joondalup			$1.3	$1.3
Kallaroo	$0.5	$0.8	$0.4	$1.3
Kingsley			$1.4	$1.4
Kinross			$0.9	$0.9
Marmion	$0.1	$0.2	$0.2	$0.4
Mullaloo	$0.4	$0.6	$0.5	$1.1
Ocean Reef			$1.0	$1.0
Padbury	$1.6	$2.6	$0.4	$2.9
Sorrento	$0.7	$1.1	$0.5	$1.7
Warwick	$0.6	$1.0	$0.2	$1.2
Woodvale			$1.0	$1.0
All areas	**$11.9**	**$18.8**	**$13.4**	**$32.2**

Table 7 – Recurring operating street light costs

Street light costs per yr (mtce & power)	**Base** Do nothing	**Option1** Overhead power conversion WPower owned s-lights *$ms*	**Option2** Overhead power conversion COJ owned Street lights *$ms*	**Option3** Underground power areas COJ owned Street lights *$ms*	**Option4** All areas, both OP and UP COJ owned Street lights *$ms*
Partial suburb proposed by a BC					
Duncraig	$0.05	$0.04	$0.01	$0.05	$0.01
Remaining part of suburb					
Beldon	$0.08	$0.06	$0.03	$0.07	$0.02
Burns Beach	$0.10	$0.10	$0.10	$0.03	$0.03
Connolly	$0.08	$0.08	$0.08	$0.03	$0.03
Craigie	$0.12	$0.09	$0.04	$0.12	$0.03
Currambine	$0.15	$0.15	$0.15	$0.05	$0.05
Duncraig	$0.22	$0.20	$0.16	$0.11	$0.06
Edgewater	$0.09	$0.09	$0.09	$0.03	$0.03
Greenwood	$0.21	$0.16	$0.08	$0.19	$0.06
Heathridge	$0.12	$0.11	$0.08	$0.08	$0.03
Hillarys	$0.19	$0.17	$0.13	$0.11	$0.05
Iluka	$0.05	$0.05	$0.05	$0.02	$0.02
Joondalup	$0.19	$0.19	$0.19	$0.07	$0.07
Kallaroo	$0.11	$0.10	$0.08	$0.06	$0.03
Kingsley	$0.21	$0.21	$0.21	$0.05	$0.05
Kinross	$0.13	$0.13	$0.13	$0.04	$0.04
Marmion	$0.04	$0.04	$0.04	$0.02	$0.01
Mullaloo	$0.10	$0.09	$0.08	$0.05	$0.03
Ocean Reef	$0.15	$0.15	$0.15	$0.04	$0.04
Padbury	$0.18	$0.15	$0.09	$0.14	$0.05
Sorrento	$0.14	$0.12	$0.09	$0.08	$0.04
Warwick	$0.08	$0.07	$0.05	$0.06	$0.03
Woodvale	$0.15	$0.15	$0.15	$0.04	$0.04
All areas	**$2.97**	**$2.71**	**$2.28**	**$1.53**	**$0.83**

Table 8 – Depreciation for street lights

Depn/Replacement - COJ Street lights	**Option1**	**Option2**	**Option3**	**Option4**
	Overhead power conversion		Underground power areas	All areas, both OP and UP
	WPower owned s-lights	COJ owned Street lights	COJ owned Street lights	COJ owned Street lights
Suburb / scheme	*$ms*	*$ms*	*$ms*	*$ms*
Partial suburb proposed by a BC				
Duncraig		$0.04		$0.04
Remaining part of suburb				
Beldon		$0.05	$0.01	$0.05
Burns Beach			$0.07	$0.07
Connolly			$0.05	$0.05
Craigie		$0.08	$0.00	$0.08
Currambine			$0.10	$0.10
Duncraig		$0.05	$0.10	$0.15
Edgewater			$0.06	$0.06
Greenwood		$0.12	$0.02	$0.14
Heathridge		$0.04	$0.04	$0.09
Hillarys		$0.06	$0.07	$0.13
Iluka			$0.03	$0.03
Joondalup			$0.12	$0.12
Kallaroo		$0.03	$0.04	$0.07
Kingsley			$0.15	$0.15
Kinross			$0.09	$0.09
Marmion		$0.01	$0.02	$0.03
Mullaloo		$0.02	$0.05	$0.07
Ocean Reef			$0.10	$0.10
Padbury		$0.09	$0.04	$0.12
Sorrento		$0.04	$0.05	$0.09
Warwick		$0.03	$0.02	$0.06
Woodvale			$0.10	$0.10
All areas		**$0.65**	**$1.35**	**$2.01**

Table 9 – Carbon credits income

Carbon Credits Income	**Option1**	**Option2**	**Option3**	**Option4**
	Overhead power conversion		Underground power areas	All areas, both OP and UP
	WPower owned s-lights	COJ owned Street lights	COJ owned Street lights	COJ owned Street lights
Suburb / scheme	*$ms*	*$ms*	*$ms*	*$ms*
Partial suburb proposed by a BC				
Duncraig		$0.0		$0.0
Remaining part of suburb				
Beldon		$0.0	$0.0	$0.0
Burns Beach			$0.0	$0.0
Connolly			$0.0	$0.0
Craigie		$0.0	$0.0	$0.0
Currambine			$0.0	$0.0
Duncraig		$0.0	$0.0	$0.0
Edgewater			$0.0	$0.0
Greenwood		$0.0	$0.0	$0.0
Heathridge		$0.0	$0.0	$0.0
Hillarys		$0.0	$0.0	$0.0
Iluka			$0.0	$0.0
Joondalup			$0.0	$0.0
Kallaroo		$0.0	$0.0	$0.0
Kingsley			$0.0	$0.0
Kinross			$0.0	$0.0
Marmion		$0.0	$0.0	$0.0
Mullaloo		$0.0	$0.0	$0.0
Ocean Reef			$0.0	$0.0
Padbury		$0.0	$0.0	$0.0
Sorrento		$0.0	$0.0	$0.0
Warwick		$0.0	$0.0	$0.0
Woodvale			$0.0	$0.0
All areas		**$0.1**	**$0.2**	**$0.3**

Project Name	**Underground power & Street light Strategy**
Report	**Project Philosophy & Parameters**
Project Sponsor	Director Infrastructure Services
Project Manager	Manager Infrastructure Management Services
HP Records	INT21/27485

BACKGROUND

Notice of Motion August 2020
This project has arisen after Notice of Motion at August 2020 Council Meeting to evaluate a specific area of Duncraig. That specific area does need to be evaluated but firstly the City needs to have an overall strategy.

PHILOSOPHY / PROJECT VISION

Strategic Community Plan
There are three strategic initiatives within the City's Strategic Community Plan that are relevant to this project as listed below

Theme	Objective	Strategic Initiative
Quality Urban Environment	Quality built outcomes	Buildings and landscaping are suitable for the immediate environment and reflect community values
Financial Sustainability	Major project delivery	Effectively prioritise major capital projects to facilitate long-term financial sustainability
Financial Sustainability	Effective management	Seek out efficiencies and regional collaborations to reduce service delivery costs

Vision and Purpose of Project

Vision:

"***Underground Power to be installed in specified areas where is it supported by the majority of homeowners, financially sustainable and justified with a robust business case. The City will strive to maximise the financial and operational benefits of smart-metered LED street lights throughout the City.***"

The purpose of this project is to

1. STRATEGY / POSITION for the City to be developed and agreed by Council
2. BUSINESS CASE READY – ensure that the city has established the key parameters and financial model to react quickly to any proposed scheme by Western Power.
3. PROJECT IMPLEMENTED and objectives monitored

Ideally the City will strive to

I. Underground power - convert ALL households with overhead power lines (20,120 lots) to underground.
II. Street lighting – replace ALL Western Power street lights throughout the City with smart-metered LED lights and take responsibility for ownership, maintenance and replacement.

Key Reference Documents

The report in 2011 titsmart-metered LED ***Inquiry into State Underground Power Program Cost Benefit Study*** is the overarching document in the state for future projects. This intimates that the one-off costs funded by ratepayers/local government should be at least 50%, ideally 75% to 90%.

OUTCOMES & PROJECT DELIVERABLES

- Electricity Supply – improve reliability and security of supply for consumers
- Maintenance Costs of electricity – reduced, providing benefits to Western Power which can help substantiate the contribution to the project
- Streetscapes – visual amenity enhanced by removing overhead power lines
- Tree maintenance – reduced costs for the City (minimal)
- Street lighting – improved lighting which will improve community safety
- One-off costs by City – minimised or ideally no contribution required from the City
- Household contribution and approval – cost clearly identified in advance, with no unexpected costs. Majority of households give approval to the project
- Social & Economic Return on Investment identified – employment opportunities would be expected to be significant and will be estimated.
- Business case ready
- Benefits of project – critical success factors identified, including measurement criteria and monitored. Each project to have its own Project Implementation Review.
- Additional infrastructure opportunities – evaluation of other infrastructure assets (e.g. paths, lighting, roads) that may be worth replacing/upgrading at same time.

The project objectives are summarised below:

No	Objective	Success Criteria	Measurement
1	Convert to Underground Power As many lots as possible converted from overhead power to underground power	Quantity of lots converted. There is no timeframe established for this objective, it is outside of the City's control.	There are 20,120 lots still with overhead power. The City's asset management systems keep track of the lots with overhead power or underground power.
2	Smart-metered LED street lights owned by the City As many non-smart-metered LED street lights as possible converted to smart-metered LED, including the areas converted to underground power and those areas already with underground power. Ideally the City would prefer to install, own, and operate their own smart-metered LED street lights as part of the conversion.	i) Quantity of street lights converted to smart-metered LED. ii) Recurring financial benefit versus baseline (which should be achieved even if Western Power retain ownership)	There are 4,816 non-smart-metered LED street lights within the areas with overhead power. There are 14,719 non-smart-metered LED street lights in total owned by Western Power throughout the City. The City's asset management systems keep track of the street lights that are smart-metered LED and owned either by Western Power or the City. The financial systems will monitor the recurring costs of street lights.
3	Financial Sustainability The installation of underground power and conversion of street lights to smart-metered LED should provide a positive financial outcome to the City, or worse case break-even. Ideally the City will not make any contribution to the conversion of overhead power, other than the cost of city-owned street lights. #1	i) Operating Surplus - Recurring impacts, including depreciation, should be positive, when compared to the existing operating impacts ii) One-off costs – this will include proposed street light costs and potentially a contribution to overhead power iii) Cashflow: The 50-year cashflow impacts, which combine both the operating impacts and the one-off costs, are zero or positive when compared to the baseline	Business Case will evaluate the incremental operational impact versus the Do nothing option: o Estimated recurring power and maintenance costs of smart-metered LED street lights versus current costs of non-smart-metered LED street lights o New Depreciation if the City owns the street lights o New maintenance costs. o One-off costs to the city.

No	Objective	Success Criteria	Measurement
4	Social & Economic Return on Investment (SROI) The project would be expected to achieve significant benefits in proportion to the costs.	Benefits Cost Ratio of at least 2 i.e. for each dollar invested, there is a $2 benefit	This will be measured using standard SROI techniques, identifying all triple-line benefits (Social, Economic and Environmental).
5	Householder Approval Majority of households in proposed area approve.	Formal approval from at least 50% of the households. The 50% relates to ALL households in the proposed area, not just 50% of respondents.	Written/Electronic approval of the householders to the fixed contribution agreed with Western Power. The contribution must be accurately identified and fixed as part of the approval process. It is assumed that the City initially pay for the Household contribution and households repay to the City. At least 2 options provided by the City for households to pay. e.g. repay to the City over a 5-year or 10-year basis.

#1 It is not proposed to have a separate financial objective relating to the one-off costs e.g. for the City to have minimal or zero contribution towards the costs of underground power.

Objective number 3 (Financial Sustainability) is an all encompassing financial measure that takes account of one-off costs, external funding, recurring impacts and overall payback. If there was a separate objective that seeks to limit the City contribution that may inhibit the achievement of other objectives i.e. to convert lots, social/economic benefits and to achieve an overall financial benefit through recurring savings.

Nevertheless the City needs to strive to achieve a reasonable balance by being open-minded about the development of business cases and any potential contribution to underground power and any potential reserve funds should not necessarily be openly offered but should be available if necessary .

OPTIONS

Any future business case to evaluate underground power conversion must be robust and evaluate a minimum of three options which may comprise of one or more of the following:

- Do Nothing
- Implement Underground Power in all households within the specified area, with Western Power owned street lights
- Implement Underground Power with city-owned street lights.
- City capital contribution either zero or some other specified sum
- Alternative funding options for the City and for households (borrowings, reserves)

- Timescales for implementation – there may be different options for implementation depending on capacity, affordability

There may also be separate business cases to evaluate only the conversion of Western Power owned street lights to smart-metered city-owned LED street lights.

PROJECT DEPENDENCIES

The feasibility and implementation of underground power is dependent on a wide number of other factors and projects as follows:

- State funding/program – availability of program
- Criteria prescribed by state
- Submissions by other local government which may rank higher than the City's.
- Economic factors which influence the affordability for households to agree to their contribution
- Housing Opportunity Areas
- Other major developments in the area
- City have responsibility for overseeing the project to convert to underground power.

DEVELOPMENT PARAMETERS

Governance

- Project Management Framework will be used:
- Reports provided to the Major Projects & Finance Committee at key stages of the project.
- City is responsible for the development of the business case, and seeking approval form households but Western Power are responsible for the implementation
- Consistency with adopted Council strategies and plans e.g. City Centre Structure Plan.

Resources

- In-house resource will be used as much as possible to complete the Business Case
- In-house resource will be used to initiate and obtain responses from households

Sustainability Considerations

- Achievement of best practice in environmentally sustainable design principles whilst maintaining an aesthetically acceptable streetscape

Financial Management

The Strategic Financial Plan is the guiding document used by the City to assess affordability of major projects and confirm funding. There is currently no capital expenditure or reserve funding included for this project. When a business case is prepared for underground power an assessment will be made as to the affordability of the City contribution (if any). If the business case is approved by Council, the funds required will be set aside in the next update of the Strategic Financial Plan (which is updated annually). The City should consider the establishment of a "City Utilities Reserve" to support future schemes.