ATTACHMENT NO. 1

Request for Quote

1 Town of Bassendean – Street Tree selection for 2019 Planting Season

1.1 Contract Requirements in Brief

The Town of Bassendean is seeking a quote from Arborist's to review the existing streetscape plantings for the suburbs of Ashfield, and Eden Hill. Once completed visit nurseries and recommend best stock available, that achieves the "street tree scope of work" below for the 2019 winter planting season.

Once the selection of trees and condition of trees investigation has been completed, in line with Australian Standard –AS2303;2015, and a trees stock inspection Form (*refer AS 2303:2015 Appendix C*) and tree selection recommendations, for each suburb, is provided to the Towns Parks & Garden Supervisor a purchase order will be issued to purchase the amount of trees that is available within the Town's budget.

This is reasonably straight forward in regards to identifying the tree species, number of trees and if the number of trees will be available from Nurseries in accordance with Australian Standard –AS2303;2015 and a trees stock inspection Form (refer AS 2303:2015 Appendix C) be completed to demonstrate that a required assessment and testing has been undertaken.

1.2 Scope of Work

The Town is seeking a quote for the following works.-

- Form and scale of trees at maturity to provide 70% shade and tree canopy over a large portion of the road reserve:
- Trees have a strong performance record in similar geology and soil condition;
- Root system suitable for planting adjacent to paved areas, building structures and within median islands and roundabouts and minimize impact on utility services;
- Enhance biodiversity with food and habitat for bird life;
- Trees are drought tolerant;
- Resistance to pest and diseases;
- Long lived;
- Not prone to limb shear; and
- Responsive to formative and if required structural pruning.

Please provide a quote for all the above scope of works (item 1.4) of this document (including GST).

1.3 Response to Request for Quote

Please provide your response to Ken Cardy via email (kcardy@bassendean.wa.gov.au) by 5:00pm Tuesday 5 March 2019.

Contractors, submitting a quote, are required to provide the following information

- Company Name:
- Company Address:
- ABN:
- Contact Details:

- One – Two paragraphs explaining your company's experience in this field.

1.4 Price Schedule

Please provide scope of works pricing in table below:

Description (Item Number)	Total Price (Ex. GST)	GST	Total Price (Inc. GST)
1. Total Cost (to include Vehicle Usage, Reporting and incidentals to complete this work no other additional costs will be entertained)).	$	$	$

23rd April 2019

bowden
expertise in urban tree science

Ken Cardy
Manager Asset Services
Town of Bassendean
PO Box 87
BASSENDEAN WA 6934

Dear Ken,

ARBORICULTURAL ASSESSMENT – STREET TREE SELECTION 2019

Please find enclosed the results of the arboricultural assessment undertaken recently for 2019 Street Tree Planting Season.

Where recommendations for remedial arboricultural work have been made, it is imperative that it is undertaken as outlined in the Australian Standard 4373-2007: Pruning of Amenity Trees and/ or Australian Standard 4970-2009: Protection of Trees on Development Sites. It is also strongly advised that any remedial pruning works be undertaken by, or supervised by, a qualified arborist (AQF Level 3 in Arboriculture).

If you have any questions regarding the assessment or if I can be of service to you again in the future, please feel free to contact me.

Yours sincerely,

Brad Bowden
Principal
Bowden Tree Consultancy®

B.Sc. Sustainable Forestry
Dip. Arboriculture & Parks Management
ISA Certified Arborist – Municipal Specialist AU-0020AM & Tree Risk Assessment Qualified (TRAQ)

1.0 Introduction

1.1 Scope of Report

1.2 The purpose of this report is to review the existing street tree audit data (2006) for the suburbs of Ashfield and Eden Hill in the Town of Bassendean and provide species recommendations for the 2019 Street Tree Planting Season. Attributes desired for street tree species include:

- Form and scale of trees at maturity to provide 70% shade and tree canopy over a large portion of the road reserve
- Trees have a strong performance record in similar geology and soil condition
- Root system suitable for planting adjacent to paved areas, building structures and within median islands and roundabouts and minimize impact on utility services
- Enhance biodiversity with food and habitat for bird life
- Trees are drought tolerant
- Resistance to pest and diseases
- Long lived
- Not prone to limb shear
- Responsive to formative and if required structural pruning

1.3 Executive Summary

1.4 The review identified a number of large and medium-sized trees that have been successful throughout Ashfield and Eden Hill, and as such selection of these species should be undertaken to complement existing plantings where a dominant tree species exists. Several large and medium-sized trees that occur in either low numbers in both suburbs at present and which have been successful throughout other locations in Perth have been identified, subsequently resulting in a list of 22 tree species. Each species was then scored against the desired attributes.

1.5 Matching a tree to the site i.e. 'right tree right place' should be the foremost concern when selecting tree species. For this reason, the species have been grouped as suitable for large road reserves/ verges, whilst medium-sized trees will be more suited to smaller verges and/ or where powerlines exist (and managed with ongoing pruning to maintain clearance). Additionally, consideration must be given to tree species diversity to guard against plant specific pest and disease. Of the 10 tree species that scored highest, seven were from the Myrtaceae family of plants; therefore consideration should be given to using a broader range of species from the list.

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2.0 Street Tree Selection

2.1 Ashfield – Existing Street Trees: Top 20

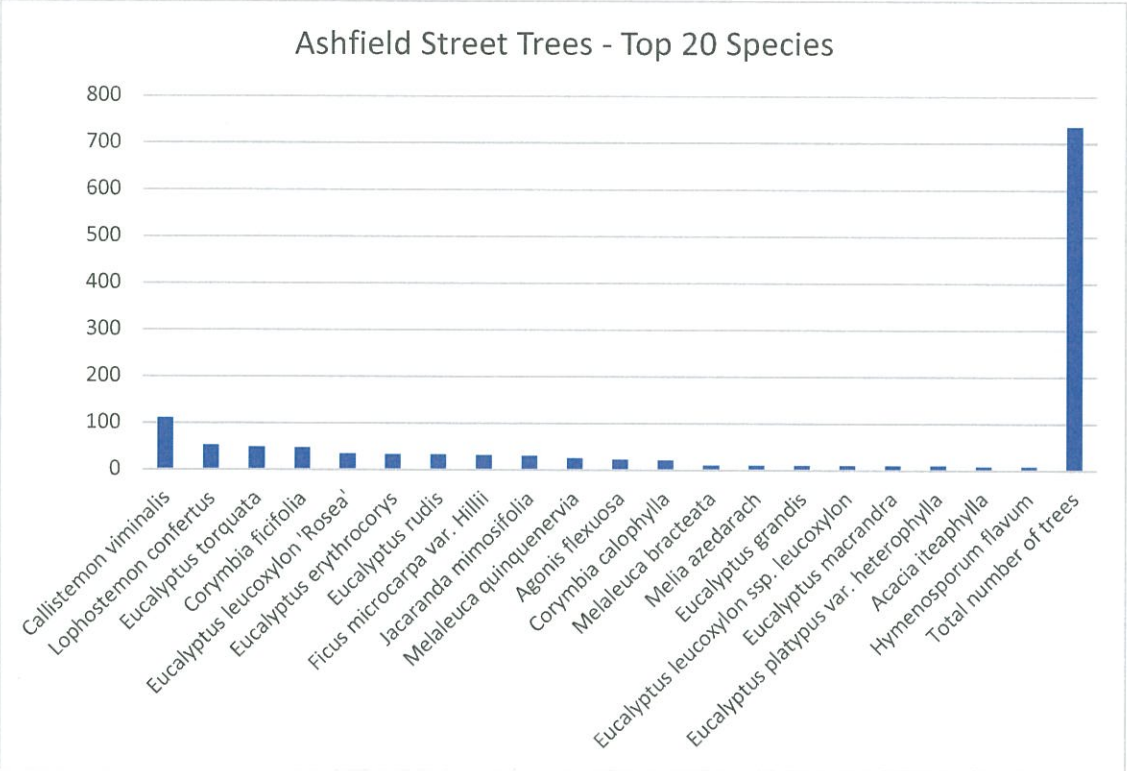

Figure 1. **Review of the 2006 street tree audit data for Ashfield outlining the most common tree species.**

Botanical Name	Common Name	Mature Size	Number of Trees
Callistemon viminalis	weeping bottlebrush	Small	111
Lophostemon confertus	Queensland brush box	Medium	53
Eucalyptus torquata	coral gum	Small	49
Corymbia ficifolia	red flowering gum	Small	48
Eucalyptus leucoxylon 'Rosea'	red-flowered yellow gum	Medium	34
Eucalyptus erythrocorys	red-capped yellow flowering gum	Small	33
Eucalyptus rudis	flooded gum	Large	33
Ficus microcarpa var. *hillii*	Hill's weeping fig	Large	32
Jacaranda mimosifolia	jacaranda	Medium	31
Melaleuca quinquenervia	broad-leaved paperbark	Medium	25
Agonis flexuosa	weeping peppermint	Medium	23
Corymbia calophylla	marri	Large	21
Melaleuca bracteata	black tea tree	Small	11
Melia azedarach	white cedar	Medium	11
Eucalyptus grandis	rose gum	Large	10
Eucalyptus leucoxylon ssp. *leucoxylon*	yellow gum	Medium	10
Eucalyptus macrandra	river yate	Small	10
Eucalyptus platypus var. *heterophylla*	coastal moort	Small	10
Acacia iteaphylla	Flinders Range wattle	Small	8
Hymenosporum flavum	native frangipani	Small	8
Total number of trees			736

Table 1. **Review of the 2006 street tree audit data for Ashfield outlining tree size.**

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2.2 Road Reserve Widths – Ashfield

2.3 A number of road reserve widths were measured using spatial tools (Nearmap) and identified widths that generally ranged from 18-20m. To achieve tree canopy cover over a large portion of the road reserve, the selection of tree species that attain a minimum 10m crown spread at maturity should be used to achieve this requirement i.e. large and/ or medium sized trees.

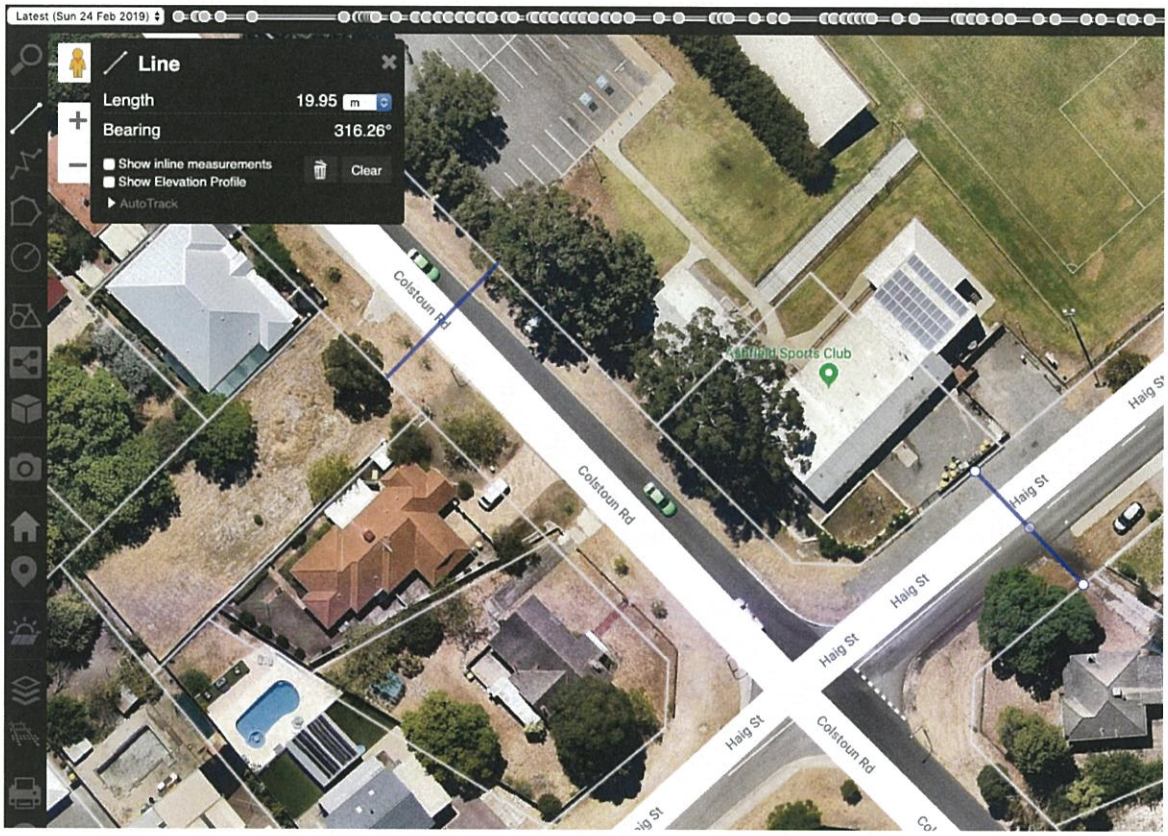

Figure 2. Ashfield aerial photo sample for road reserve widths.

2.4 Potential Street Tree Species List: Ashfield

Large trees for large road reserves

- coral tree (*Erythrina* x *sykesii*)
- Queensland brush box (*Lophostemon confertus)*
- flooded gum (*Eucalyptus rudis)*
- marri (*Corymbia calophylla)*
- firewheel tree (*Stenocarpus sinuatus)*
- spotted gum (*Corymbia maculata)*
- smooth-barked apple (*Angophora costata)*
- London plane tree (*Platanus* x *acerifolia*)
- pin oak (*Quercus palustris)*
- Illawarra flame tree (*Brachychiton acerifolius)*

Medium trees for medium road reserves or under powerlines

- broad-leaved paperbark (*Melaleuca quinquenervia)*
- Queensland brush box (*Lophostemon confertus)*
- red flowered yellow gum (*Eucalyptus leucoxylon* 'Rosea')
- jacaranda (*Jacaranda mimosifolia)*
- weeping peppermint (*Agonis flexuosa*)
- kurrajong (*Brachychiton populneus*)
- orchid tree (*Bauhinia variegata)*
- Chinese elm (*Ulmus parvifolia)*
- Chinese pistachio (*Pistacia chinensis)*
- Japanese zelkova (*Zelkova serrata)*
- yellow bloodwood (*Corymbia eximia)*
- callery pear cvs (*Pyrus calleryana)*

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2.5 Eden Hill – Existing Street Trees: Top 20

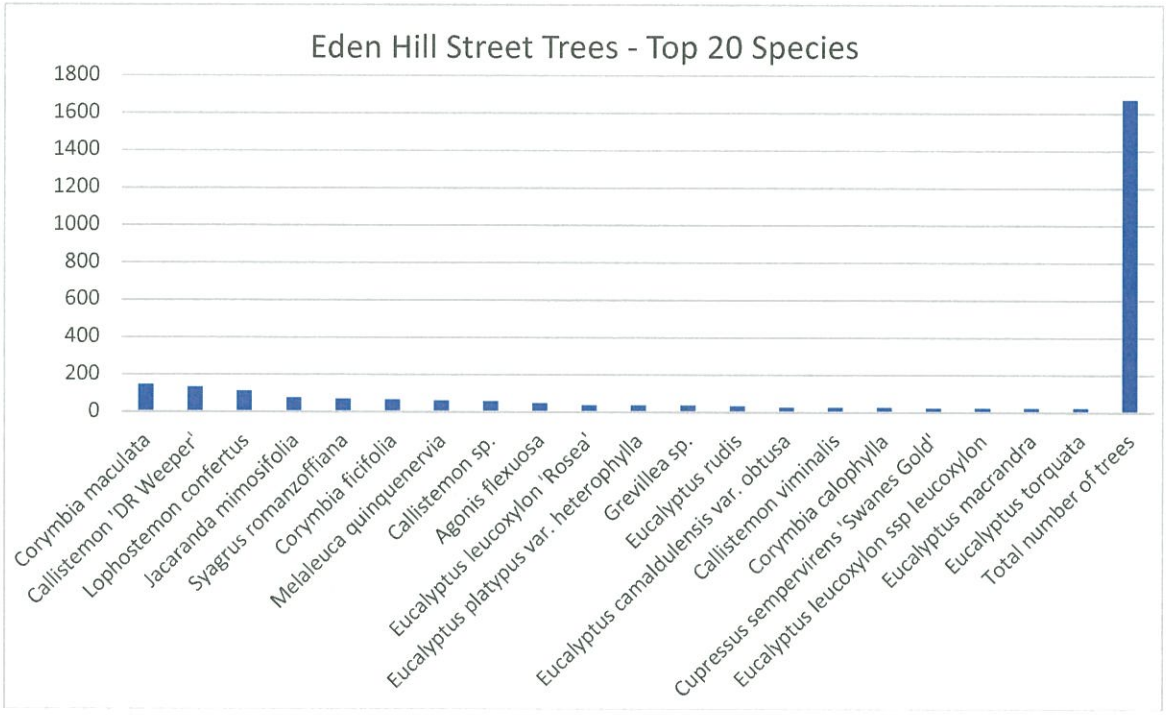

Figure 3. **Review of the 2006 street tree audit data for Eden Hill outlining the most common tree species.**

Botanical Name	Common Name	Mature Size	Number of Trees
Corymbia maculata	spotted gum	Large	144
Callistemon 'DR Weeper'	Dawson River bottlebrush	Small	131
Lophostemon confertus	Queensland brush box	Medium	112
Jacaranda mimosifolia	jacaranda	Medium	75
Syagrus romanzoffiana	cocos palm	Medium	68
Corymbia ficifolia	red-flowering gum	Small	67
Melaleuca quinquenervia	broad-leaved paperbark	Medium	59
Callistemon sp.	bottlebrush	Small	56
Agonis flexuosa	weeping peppermint	Medium	45
Eucalyptus leucoxylon 'Rosea'	red-flowered yellow gum	Medium	35
Eucalyptus platypus var. *heterophylla*	coastal moort	Small	35
Grevillea sp.	grevillea	Medium	35
Eucalyptus rudis	flooded gum	Large	33
Eucalyptus camaldulensis var. *obtusa*	northern river red gum	Large	27
Callistemon viminalis	weeping bottlebrush	Small	26
Corymbia calophylla	marri	Large	25
Cupressus sempervirens 'Swanes Gold'	golden pencil pine	Small	24
Eucalyptus leucoxylon ssp. *leucoxylon*	yellow gum	Medium	23
Eucalyptus macrandra	river yate	Small	22
Eucalyptus torquata	coral gum	Small	22
Total number of trees			1674

Table 2. **Review of the 2006 street tree audit data for Eden Hill outlining tree size.**

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2.6 Road Reserve Widths – Eden Hill

2.7 A number of road reserve widths were measured using spatial tools (Nearmap) and identified widths that generally ranged from 18-20m. To achieve tree canopy cover over a large portion of the road reserve, the selection of tree species that attain a minimum 10m crown spread at maturity should be used to achieve this requirement i.e. large and/ or medium sized trees.

Figure 4. Eden Hill aerial photo sample for road reserve widths.

2.8 Potential Street Tree Species List: Eden Hill

Large trees for large road reserves

- coral tree (*Erythrina x sykesii*)
- Queensland brush box (*Lophostemon confertus)*
- flooded gum (*Eucalyptus rudis)*
- marri (*Corymbia calophylla)*
- Illawarra flame tree (*Brachychiton acerifolius)*
- London plane tree (*Platanus* x *acerifolia*)
- spotted gum (*Corymbia maculata)*
- smooth-barked apple (*Angophora costata)*
- pin oak (*Quercus palustris)*
- firewheel tree (*Stenocarpus sinuatus)*

Medium trees for medium road reserves or under powerlines

- broad-leaved paperbark (*Melaleuca quinquenervia)*
- Queensland brush box (*Lophostemon confertus)*
- red flowered yellow gum (*Eucalyptus leucoxylon* 'Rosea')
- jacaranda (*Jacaranda mimosifolia)*
- weeping peppermint (*Agonis flexuosa*)
- kurrajong (*Brachychiton populneus*)
- orchid tree (*Bauhinia variegata)*
- poinciana *(Delonix regia)*
- Chinese elm (*Ulmus parvifolia)*
- Chinese pistachio (*Pistacia chinensis)*
- Japanese zelkova (*Zelkova serrata)*
- yellow bloodwood (*Corymbia eximia)*
- callery pear cvs (*Pyrus calleryana)*

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2.9 Attribute/ Species Scoring: Tree attributes were scored against potential large and medium-sized tree species, reviewing both existing tree species within Ashfield and Eden Hill and introducing several new species used in lower numbers within the suburbs and as street trees throughout Perth. Scoring system as follows: Attribute/ Species Score - High: 3 Medium: 2 Low: 1 = Total Score (see appendix III).

Tree Species	Total Score
Agonis flexuosa	27
Corymbia eximia	27
Angophora costata	26
Eucalyptus leucoxylon 'Rosea'	26
Brachychiton populneus	25
Corymbia calophylla	25
Corymbia maculata	25
Jacaranda mimosifolia	25
Lophostemon confertus	25
Platanus x *acerifolia*	25
Erythrina x sykesii	24
Delonix regia	23
Eucalyptus rudis	23
Melaleuca quinquenervia	23
Quercus palustris	23
Stenocarpus sinuatus	23
Ulmus parvifolia	23
Brachychiton acerifolius	22
Zelkova serrata	22
Bauhinia variegata	21
Pistacia chinensis	21
Pyrus calleryana	19

2.10 Of the 10 tree species that scored highest, seven were from the Myrtaceae family of plants; therefore consideration should be given to using a broader range of species from the list to guard against plant specific pest and disease.

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3.0 Discussion and Recommendations

3.1 Discussion

3.2 Tree root plate: Root plate composition for most tree species consists of a structural root zone and an absorbing root zone, responsible respectively for the stability/ anchorage of the tree and the uptake of water/ mineral solutes from the soil. The soil in the garden areas of adjacent residential properties and also the base of the concrete footpaths is generally of higher nutritional quality and with greater levels of moisture compared with the verge areas (remnant sand) and the compacted road base. With root growth being opportunistic, small diameter roots have the potential to encroach into areas of improved soil and with subsequent growth resulting in the normal thickening of the roots, displacement of adjacent crossover surfacing, asphalt/ road kerbs, and lightly-loaded structures can ensue. Root/ infrastructure conflicts cannot be eliminated: to do so requires constraining rootplate development, which may negatively impact tree stability and reduce tree canopy cover.

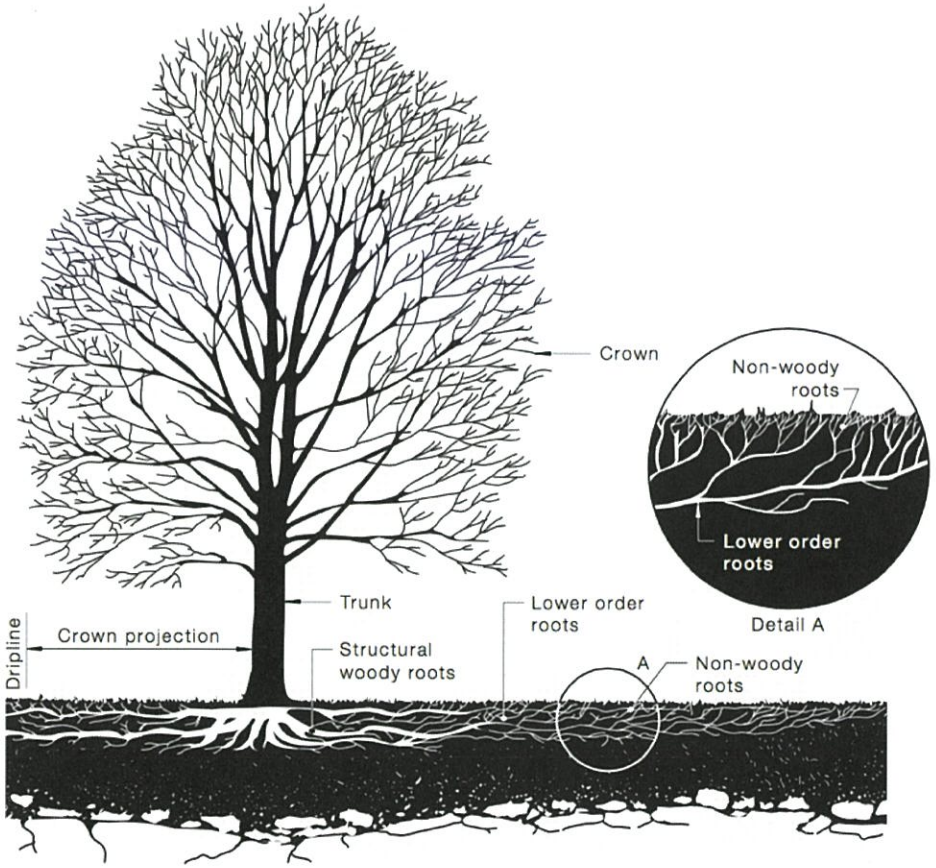

Figure 5. Typical tree structure above and below ground for cultivated urban trees. Source: AS4970-2009: Protection of Trees on Development Sites.

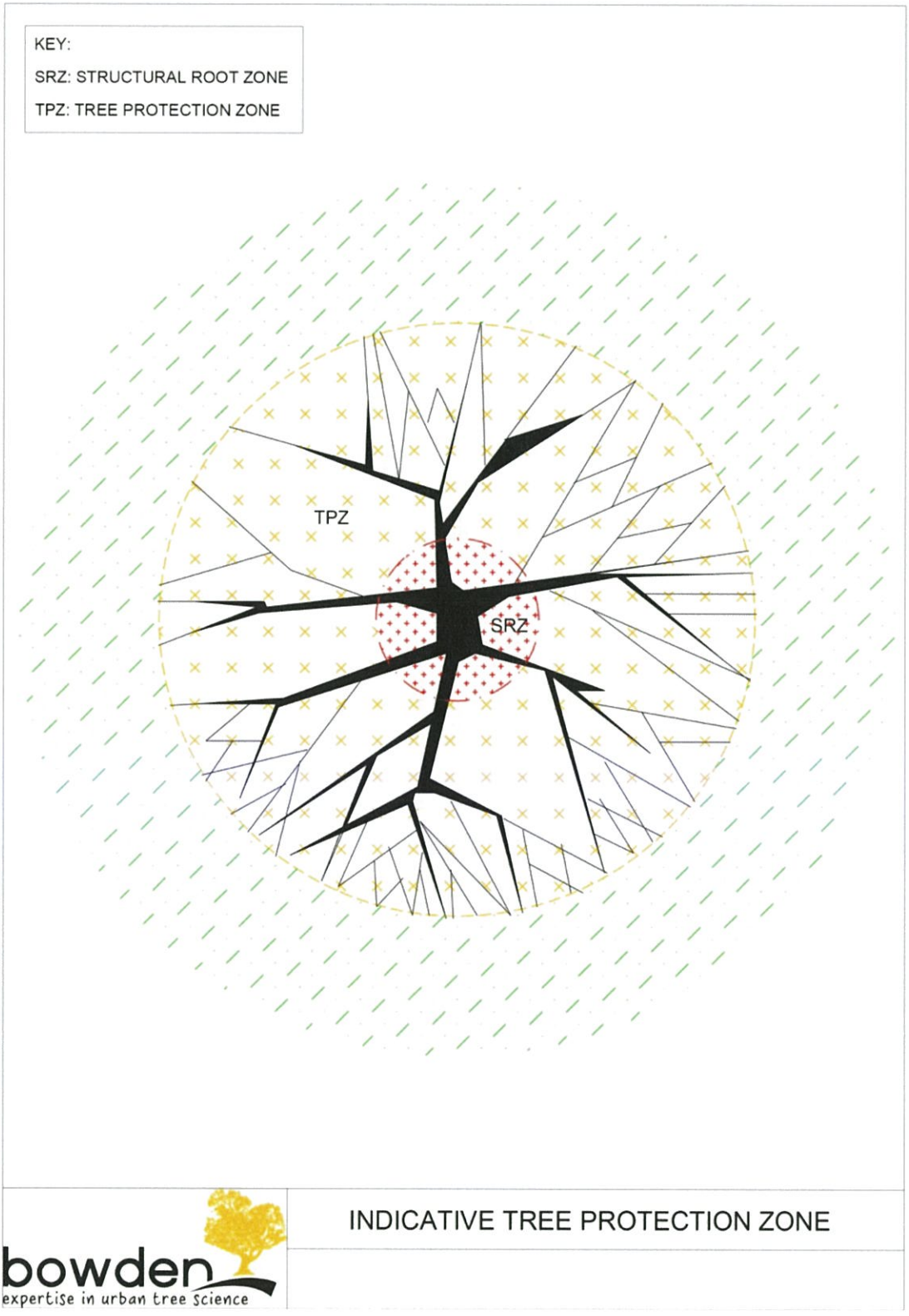

Figure 6. **Indicative rootplate zones outlining the structural root zone (SRZ) that has the large woody roots responsible for tree anchorage and stability, which subsequently taper into the absorbing roots that take up water and nutrients.**

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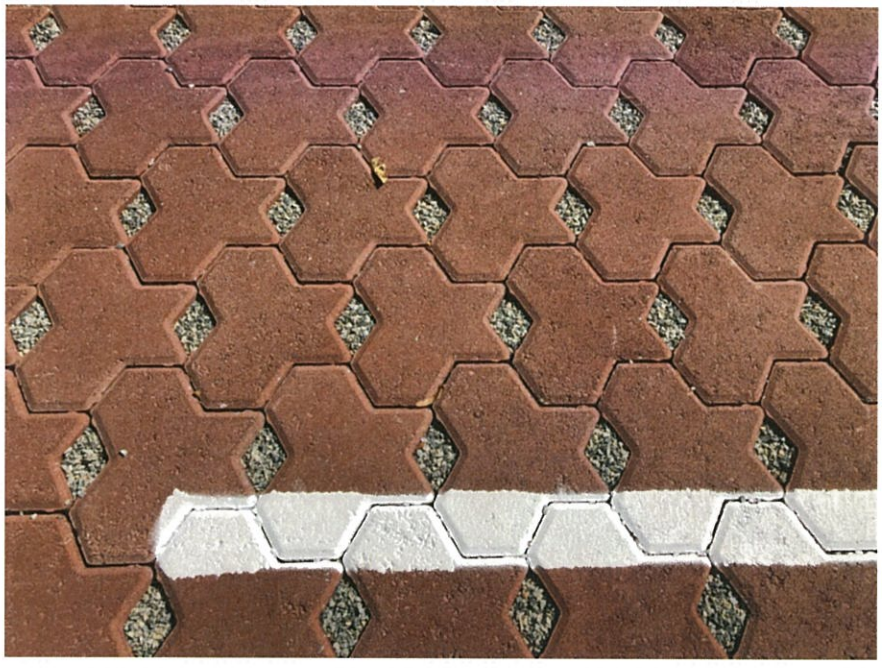
3.3 **Pervious paving:** Attaining a hard surface option that is often required in areas of high pedestrian traffic, can be achieved by utilising pervious paving that allows water infiltration and that improves soil aeration, subsequently improving soil conditions conducive for adequate tree health and growth.



Figures 7 & 8. Example of a pervious paving option to improve soil conditions and subsequent tree health.

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3.4 **Roots and structures:** Structural damage to building foundations and walls can result following the removal of soil moisture. On expansive/ reactive clay soils, trees and vegetation transpire water which can result in soil drying/ desiccation and a subsequent reduction in the soil volume. This often causes subsidence of the soil surface and may result in structural failure. This type of damage is often referred to as indirect damage and occurs on expansive soil types i.e. a clay soil type that shrinks as it dries and is observed by large cracks on the surface of the soil.

3.5 Direct damage to structures involves lightly-loaded structures such as concrete footpaths and single course brick/ block walls. Tree root growth is opportunistic and may develop in areas with suitable levels of soil moisture, organic matter and oxygen. Roots of a very small diameter may pass beneath footpaths and brick walls to source water and nutrients with little initial disturbance to the structure. As root diameter increases through normal secondary thickening however lightly-loaded structures can be displaced and damaged. The likelihood of direct damage to heavily-loaded structures i.e. a dwelling/ building foundation with the entire weight of the building upon it (on sandy soils), is low.

3.6 **Tree benefits:** Mature urban trees confer many benefits including shade and cooler air temperatures, screening (privacy) and noise reduction, built form aesthetic amelioration, energy conservation, mitigation of the urban heat island effect, air quality improvement and oxygen production, carbon uptake/ storage and greenhouse gas reduction, minimisation of storm water run-off and improvement of water quality, fauna habitat and food source. In general, they enhance our built and natural environments with larger trees providing more benefits.

3.7 **Tree risk:** Tree failure is an infrequent occurrence and serious damage, injury or death from tree failure is rare (Lilly *et al*, 2011). Research finds that for Britain, with a population of 60 million people, the risk of any tree causing a fatality is exceedingly small (Ball & Ball-King, 2011). It is impossible to maintain trees completely free of risk and some level of risk must be accepted to experience the benefits that trees provide. The use of 'safe' or 'unsafe' when assessing trees is both imprecise and ambiguous, as a tree cannot be free from defects or potential hazards - such a state is simply unattainable. It is essential to maintain a balance between the benefits and costs of risk reduction, not only financial cost but also the loss of amenity and other tree related benefits.

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3.8 **Small trees:** The review of the road reserve widths identified an 18-20m width for the majority of road reserves. Where a smaller-sized tree is required for narrow verges, median island planting etc. the following species provide options in constrained sites and may require the use of root directors/ barriers and/ or modification of the planting site:

- weeping bottlebrush (*Callistemon viminalis)*
- coral tree (*Eucalyptus torquata)*
- red-flowering gum (*Corymbia ficifolia)*
- red-capped yellow flowering gum *(Eucalyptus erythorcorys*)
- river yate (*Eucalyptus macrandra)*
- native frangipani (*Hymenosporum flavum)*
- Chinese tallow (*Sapium sebiferum)*
- strawberry tree (*Arbutus unedo)*
- purple-leaved plum (*Prunus cerasifera* 'Nigra')
- evergreen ash (*Fraxinus griffithii)*
- weeping red-flowering paperbark (*Melaleuca viridiflora*)
- smooth-barked coolibah (*Eucalyptus victrix)*
- Chinese photinia (*Photinia serrulata)*
- cottonwood (*Hibiscus tiliaceous)*
- crepe myrtle (*Lagerstroemia indica)*

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4.0 Appendix I

4.1 Arboricultural Terminology

4.2 Crown – the leaves and branches of a tree measured from the lowest branch on the trunk to the top of the tree, whilst crown lifting involves pruning of the lower branches to improve clearance for buildings, pedestrians, vehicles etc.

4.3 DBH - diameter of the main trunk, measured at breast height approximately 1.4m above ground level for urban trees.

4.4 Deadwooding – the removal of dead, diseased, broken, or damaged branch wood from the crown of the tree.

4.5 Dripline – the width of the crown of the tree measured by the lateral extent of the foliage, with the crown spread measurement indicating the widest part.

4.6 Fall zone – is the area in which the tree or tree part is likely to fall when it fails, often calculated as 1.5 times the tree height where brittle dead branches etc. may break up and scatter debris.

4.7 First order structural branch – the large branches arising from the trunk that form the main structure of the crown, also referred to as a stem.

4.8 Reduction prune – pruning to reduce/ shorten the length of a branch, back to a lateral branch that is at least one-third the diameter of the branch being removed (whilst retaining internal branches to avoid lion-tailing).

4.9 Root collar – area at the base of the tree were the roots and trunk merge.

4.10 Second order branch – a branch arising from a first order structural branch.

4.11 Targets – an object, person or structure that would be damaged or injured in the event of tree or branch failure is referred to as the target or target area. The hazard evaluation of the target area is relative to the expected use and occupancy of that area.

4.12 Topping and Lopping – deleterious tree height and branch reduction work often at indiscriminate points and generally resulting in weakly-attached regrowth branches prone to failure as subsequent growth occurs.

4.13 Tree Protection Zone (TPZ) – the zone of the root plate most likely to contain roots that are critical for anchorage and stability, as well as the absorbing roots responsible for the uptake of water and nutrients; calculated as trunk diameter (DBH) x 12.

4.14 V-shaped union – ingrown bark from adjacent parts of the tree that are in contact with each other; usually branch forks, acutely-angled branch attachments or basal stems – often a high failure potential.

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5.0 Appendix II

5.1 Author Formal Qualifications

5.2 Bachelor of Science (Sustainable Forestry) – 2012
Edith Cowan University, Joondalup & Murdoch University, Murdoch, WA.

5.3 Diploma of Applied Science (Horticulture) – 2000
Major studies Arboriculture and Parks/ Gardens management
University of Melbourne, Burnley campus, VIC.

5.4 Certificate IV (TAE40110) in Training & Assessment – 2014
Plenty Training, Robina, QLD.

5.5 Certificate of Horticultural Practice – 1994
Challenger TAFE, Murdoch campus, WA.

5.6 Additional Certifications

5.7 ISA Certified Arborist: Municipal Specialist (AU-0020AM) – 2012 (recertified 2018)
International Society of Arboriculture
www.isa-arbor.com/certification/benefits/credentialsExplained.aspx

5.8 ISA Tree Risk Assessment Qualification (TRAQ) – 2013 (recertified 2018)
International Society of Arboriculture
http://www.isa-arbor.com/certification/becomequalified/becomequalified.aspx

5.9 Limitation of Liability

5.10 Bowden Tree Consultancy are tree specialists who use their qualifications, education, knowledge, training, diagnostic tools and experience to examine trees, recommend measures to enhance the beauty and health of trees, and attempt to reduce the risk of living near trees. Clients may choose to accept or disregard the recommendations of this assessment and report.

5.11 Bowden Tree Consultancy cannot detect every condition that could possibly lead to the structural failure of a tree. Trees are living organisms that fail in ways that the arboriculture industry does not fully understand. Conditions are often hidden within trees and below ground. Unless otherwise stated, observations have been visually assessed from ground level. Bowden Tree Consultancy cannot guarantee that a tree will be healthy or a low risk of harm under all circumstances, or for a specified period of time. Likewise, remedial treatments cannot be guaranteed.

5.12 Treatment, pruning and removal of trees may involve considerations beyond the scope of Bowden Tree Consultancy's service, such as property boundaries and ownership, disputes between neighbours, sight lines, landlord-tenant matters and other related incidents. Bowden Tree

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Consultancy cannot take such issues into account unless complete and accurate information is given prior or at the time of the site inspection. Likewise, Bowden Tree Consultancy cannot accept responsibility for the authorisation or non-authorisation of any recommended treatment or remedial measures undertaken.

5.13 In the event that Bowden Tree Consultancy recommends retesting or inspection of trees at stated intervals, or installs any cable/s, bracing systems and support systems, Bowden Tree Consultancy must inspect the system installed at intervals of not greater than 12 months, unless otherwise specified in written reports. It is the client's responsibility to make arrangements with Bowden Tree Consultancy to conduct the re-inspection.

5.14 Trees can be managed, but they cannot be controlled. To live or work near a tree involves a degree of risk. All written reports must be read in their entirety; at no time shall part of the written assessment be referred to unless taken in full context with the whole written report. If this written report is to be used in a court of law, or any other legal situation, Bowden Tree Consultancy must be advised in writing prior to the written assessment being presented in any form to any other party.

5.15 Business Details

5.16 Bowden Tree Consultancy®
ABN: 51925884945
Post Office Box 104 Darlington W.A. 6070
M: 0438 936 679
E: info@bowdentree.com.au
W: www.bowdentree.com.au

5.17 Literature Cited

5.18 Ball, D.J. & Ball-King, L. (2011). *Public Safety and Risk Assessment.* Great Britain: Earthscan

5.19 Lilly, S., Matheny, N. & Smiley, E., (2011). *Best Management Practices - Tree Risk Assessment*, Champaign, IL: International Society of Arboriculture

5.20 Mattheck, C. & Breloer, H. (1994). *The Body Language of Trees - A Handbook for Failure Analysis*. London, England: The Stationery Office.

5.21 Standards Australia, (2007). *AS4373-2007 Pruning of Amenity Trees*, Sydney: SAI Global

5.22 Standards Australia, (2009). *AS4970-2009 Protection of Trees on Development Sites*, Sydney: SAI Global

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6.0 Appendix III

6.1 Attribute/ Species Scoring

Species / Attributes	*Agonis flexuosa*	*Angophora costata*	*Bauhinia variegata*	*Brachychiton acerifolius*	*Brachychiton populneus*	*Corymbia calophylla*	*Corymbia eximia*	*Corymbia maculata*	*Delonix regia*	*Erythrina x sykesii*	*Eucalyptus leucoxylon 'Rosea'*
Form and scale of trees at maturity to provide 70% shade and tree canopy over a large portion of the road reserve	3	3	2	2	2	3	3	3	3	3	3
Trees have a strong performance record in similar geology and soil condition	3	3	2	2	3	3	3	3	3	3	3
Root system suitable for planting adjacent to paved areas, building structures and within median islands and roundabouts and minimize impact on utility services	3	3	3	3	3	2	3	3	3	3	3
Enhance biodiversity with food and habitat for bird life	3	2	2	2	2	3	3	2	1	1	2
Trees are drought tolerant	3	3	2	2	3	3	3	3	2	3	3
Resistance to pest and diseases	3	3	3	3	3	2	3	2	3	3	3
Long lived	3	3	2	3	3	3	3	3	3	3	3
Not prone to limb shear	3	3	3	3	3	3	3	3	3	2	3
Responsive to formative and if required structural pruning	3	3	2	2	3	3	3	3	2	3	3
Score	**27**	**26**	**21**	**22**	**25**	**25**	**27**	**25**	**23**	**24**	**26**

Table 3: Attribute/ Species Score - High: 3 Medium: 2 Low: 1 = Total Score

Species	*Eucalyptus rudis*	*Jacaranda mimosifolia*	*Lophostemon confertus*	*Melaleuca quinquenervia*	*Pistacia chinensis*	*Platanus x acerifolia*	*Pyrus calleryana*	*Quercus palustris*	*Stenocarpus sinuatus*	*Ulmus parvifolia*	*Zelkova serrata*
Attributes											
Form and scale of trees at maturity to provide 70% shade and tree canopy over a large portion of the road reserve	3	3	3	3	2	3	2	3	2	2	2
Trees have a strong performance record in similar geology and soil condition	3	3	3	3	2	3	2	3	2	3	2
Root system suitable for planting adjacent to paved areas, building structures and within median islands and roundabouts and minimize impact on utility services	2	3	3	2	3	3	3	3	3	3	3
Enhance biodiversity with food and habitat for bird life	3	1	1	2	1	1	1	1	2	1	1
Trees are drought tolerant	2	3	3	3	2	3	2	1	2	3	2
Resistance to pest and diseases	2	3	3	3	3	3	3	3	3	2	3
Long lived	3	3	3	3	2	3	2	3	3	3	3
Not prone to limb shear	2	3	3	2	3	3	2	3	3	3	3
Responsive to formative and if required structural pruning	3	3	3	2	3	3	2	3	3	3	3
Score	**23**	**25**	**25**	**23**	**21**	**25**	**19**	**23**	**23**	**23**	**22**

Table 4: Attribute/ Species Score - High: 3 Medium: 2 Low: 1 = Total Score

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ATTACHMENT NO. 2

SAGE CONSULTING ENGINEERS

ROAD LIGHTING AUDIT REPORT

January 2018

Sage Consulting Engineers Pty Ltd
203 Railway Road
SUBIACO WA 6008
Telephone: (08) 9388 9745
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ROAD LIGHTING AUDIT

REV	DATE	STATUS	AUTHOR	REVIEW
01	6/11/2017	First draft	C.Lawrence	
02	17/11/2017	Final	C.Lawrence	
05	12/2/2018	Costs updated	I.Ahmadyar	

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1. INTRODUCTION

The Town of Bassendean has requested a road lighting audit for an area within 200m of Success Hill Train Station. The area to be audited will include;

- Anzac Terrace
- Seventh Avenue
- Railway Parade
- Thompson Road
- Lamb Street
- Nurstead Avenue
- Lord Street

This Road Lighting Report considers the existing road lighting and compares it with AS/NZS 1158 and MRWA Lighting Design Guidelines for Roadway and Public Safety. This report offers specific recommendations and cost estimates.

2. BASIS

This report is based on the following sources:

- AS/NZS1158.3.1: 2005 Pedestrian area lighting.
- AS/NZS1158.1.1: 2005 Vehicular Traffic Lighting.
- MRWA Lighting Design guideline for Roadway and Public Space
- Site visits in November 2017
- Western Power's current range of road lighting equipment (Distribution Design Catalogue Sections SL and DM).
- MRWA Lighting Design Guidelines for Roadway and Public Safety

The scope of the report included:

- Receive and prepare drawings
- Visit site and record existing street lighting infrastructure.
- Desktop audit using AGI-32 lighting design software
- Site measurements
- Assess compliance with AS/NZS 1158 and Main Roads WA Lighting Guidelines.
- Schedule all the roads and for each road record the existing lighting equipment and note compliance/non-compliance with AS/NZS 1158
- Preliminary design to improve the street lighting and comply with AS1158 and MRWA guidelines.
- Prepare brief Lighting Audit Report providing recommendations and opinions of probable costs for upgrading the street lighting.

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3. EXISTING LIGHTING

The existing street lighting was observed in the following areas:

- Local roads have a combination of 80w MV, 125w MV and 42w CLF Wester Power street lighting mounted on overhead power lines.
- Lord Street have 250w HPS and 125w MV Wester Power street lighting mounted on overhead power lines and steel poles
- The principal shared path have MRWA standard lighting.

4. SITE MEASUREMENTS

Site measurements were performed on the 18th December 2017 at approximately 8pm. Don Yates was informed of the site audit and asked to turn off his private street lighting. He declined to do so and argued the Christmas lighting would influence the readings. The Christmas lighting did not have the intensity to effect the readings.

At the time of the site audit:

- Flood lighting from Bassendean Oval was not operating.
- No moon was present
- Readings were only taken between Nurstead Ave and Guildford Road due to private street lighting effecting north end of Thompson Street.

Readings ranged from 0.01lux to 2.57lux, with an average of 0.7lux. Low measurements as expected were recorded under the Fig tree.

There were a number of previous attempts to conduct site measurement which were cancelled due to Don Yates expressing concerns about the influence of a full moon. For the moon to influence site measurements it needs to be directly overhead to penetrate the tree lined street. This was not the case on previous attempts.

5. MERCURY VAPOUR LAMPS

Mercury vapour lamps are obsolete. They have poor energy efficiency and the mercury content poses occupational and environmental hazards. In 2005, the Australian Greenhouse Gas Office banned them for Category V road lighting. In 2008, the United States banned them. From 2011, Australian Standards did not accept mercury vapour streetlights. During 2015, the European Union will phase out all mercury vapour lamps.

During the course of next year, the supply of mercury vapour lamps for maintenance will diminish. Within a few years, road lighting installation with mercury vapour lamps will not be maintainable.

Western power have introduced an 18w LED to replace the 80W mercury vapour lamp. At this point in time there is no replacement for the 125w mercury vapour lamp

Western Power needs to consider alternative lamp sources to replace mercury vapour lamps.

No other alternative is available at this time. Larger wattage compact fluorescent are available but do not fit into street lights.

6. STANDARDS

Australian Standard AS/NZS1158 is summarised in Appendix B.

AS/NZS 1158.1.1: 2005 covers Category V for freeways and highways. Categories V5 to V1 cover these major roads in ascending rank.

Light-technical parameters for road safety at night should be based on the criteria set out in AS/NZS 1158.1.1: 2005.

AS/NZS 1158.3.1: 2005 covers Category P for pedestrian areas. Categories P5 to P1 cover minor roads. The standard gives twelve categories from P1 to P12 covering a wider range of areas and activities. Categories P5 to P1 cover most minor roads in ascending rank.

Light-technical parameters for the security of the community at night should be based on the criteria set out in AS/NZS 1158.3.1: 2005.

AS/NZS 1158 specifies light levels, or illuminance, as "maintained" illuminance. This is the lighting level at the end of the lighting maintenance cycle. The maintained illuminance is related to the initial illuminance by a "maintenance factor" which takes into account depreciation of the lamp output and dirt on luminaire surfaces. For instance, Category P3 requires 1.75 lux maintained corresponding to 2.5 lux initial with a 70% maintenance factor.

When compared with current British and European standard BS/EN 13201, the North American recommendations, and the South African Standard SABS 098, the requirements of AS/NZS 1158 cannot be considered excessive.

Mainroads Western Australia (MRWA) – Lighting Design Guideline for Roadway and Public Space, specify all P catergory lighting shall be designed in accordance with AS/NZS1158.3.1 with the following specific requirements

Item	Road Element	Design Method	AS/NZS reference
1	Roads in local areas	P3, P4, P5	Table 2.1 of AS/NZS 1158.3.1
2	Pathways including cycle ways	P1, P2, P3, P4	Table 2.2 of AS/NZS 1158.3.1
3	Public Activities excluding carparks	P6, P7, P8	Table 2.3 of AS/NZS 1158.3.1
4	Connecting Elements	P9, P10	Table 2.4 of AS/NZS 1158.3.1
5	Outdoor car parks including roof top car parks	P11, P12	Table 2.5 of AS/NZS 1158.3.1
6	Road train assembly area	P8	Table 2.3 of AS/NZS 1158.3.1

With the additional following requirements:

Main Roads requires P2 Category lighting for Principal Shared Paths (PSPs) to be achieved with the following additional parameters:

a) Typical mounting height for column mounted Pedestrian Light poles shall be 7.0 metres
b) The outreach length for pedestrian lighting is to be 0.0 to 1.5 metres
c) The luminaire's optical assembly shall have an adjustable tilt of not less than +5o from the horizontal, which feature shall be inherent in the luminaire's design.

However, the upcast and any specific luminaire settings required shall be specified in the design.

d) All pedestrian lighting design and installation shall be High Pressure Sodium (HPS) lamps.
e) Point horizontal of no less than 5 lux with vertical Lux to AS1158.3 category P2;
f) At locations where a PSP intersects another Path the horizontal and vertical illuminance shall not be less than 20 lux;
g) At locations of conflict and high pedestrian usage such as rail stations point horizontal and vertical illuminance of no less than 20 lux shall be achieved;
h) Desirable pole setback should be 1.0m from edge of path;
i) Vegetation in the vicinity of lighting is to be removed/pruned so as proposed lighting levels are maintained.
j) Regular maintenance requirements for vegetation should be mentioned under design report.
k) Spillage lighting level (roadway lighting only, not commercial lighting etc) and reflectivity of any walls or surfaces in the vicinity of the lighting is to be included in lighting calculations
l) Minimum lighting category for PSP under pass lighting is P10 in accordance with AS/NZS 1158.3.1:2005.
m) It is required to comply with V3 Category lighting requirements where a PSP intersects a road in accordance with AS/NZS 1158.1.1 2005

Main Roads provide roadway and pathway lighting on urban freeways, highways and control of access roads with high traffic volumes (traffic lights) and principal Shared Paths to travel safely at night. **They do not have control or implement lighting standards on local roads.**

The principal shared path on the northern side on the train line is under MRWA control and would comply with MRWA guidelines.

7. RECOMMENDATIONS

MRWA requirement for point horizontal of no less than 5 lux with a vertical Lux to AS1158.3 Cat P2 is intended for principal share parths, not residential streets. We believe a minimum point horizontal of 5 lux is excessive for a residetial street and what you would expect for a shopping mall.
Western Power do not have any lighting equipment in their range that can achieve this standard when installed on exisitng over head power poles.

Referring to the table in Appendix C (AS/NZS 1158.3.1 Pedestrian area lighting), we would recommend complying with AS/NZS 1158.3.3 Cat P3 on all roads in the 200m radius vicinity of the trian station. This is based on:

- Activity – medium
- Risk of crime – low - medium
- Need to enhance prestige – medium

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Seventh Avenue complies with AS/NZS 1158.3.3 Cat P3.

Thompson Road fails to comply with AS/NZS 1158.3.3 Cat P3 due to the large fig tree located on the corner of Thonpson and Lamb Street. The rest of Thompson Road measured, meets AS/NZS 1158.3.3 Cat P3. Due to community concerns it may be appropriate to increace these roads to AS/NZS 1158.3.3 Cat P2 and include vertical illuminance for facial recongnition

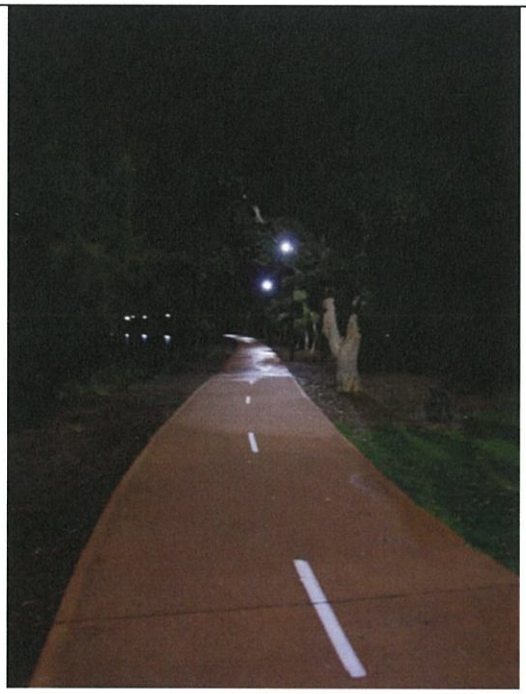
Increasing the lighting above category P3 (i.e. category P2) may cause light spill onto abutting properties. Spill light will cause more community disagreement. Consultation with residents on Thompson Road and Seventh Ave would be advised before increasing the lighting levels.

The most important criteria to meet when designing pedestrian street lighting is the vertical illumininance. Good vertical illuminance allows and person to identify detail, such as approaching poeple. MRWA requirements and AS/NZS 1158.3.1 P2 both specify a point vertical illuminance of 0.7lux.

This would satisfy concerned residents in the effected area.

Some examples of P2 category lighting:

- Lake Monger path lighting, Town of Cambridge
- Copley Park, City of Belmont



Lake Monger

To achieve AS/NZS 1158.3.1 P2 using Western Power equipment we would need to install 150W MH roadsters on every overhead power pole.

Alternatively, private LED street lighting could be installed on the other side of the road and the Western Power street lighting removed. This would allow for better light control to limit spill light and redude energy costs.

The Fig tree will need to be considered when designing and installing new street lighting to avoid the existing non compliance propblems. Mounting heights adjacent the tree will need to be reduced to effectivley light the area.

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APPENDIX A

SCHEDULE OF OBSERVATIONS & COST ESTIMATES

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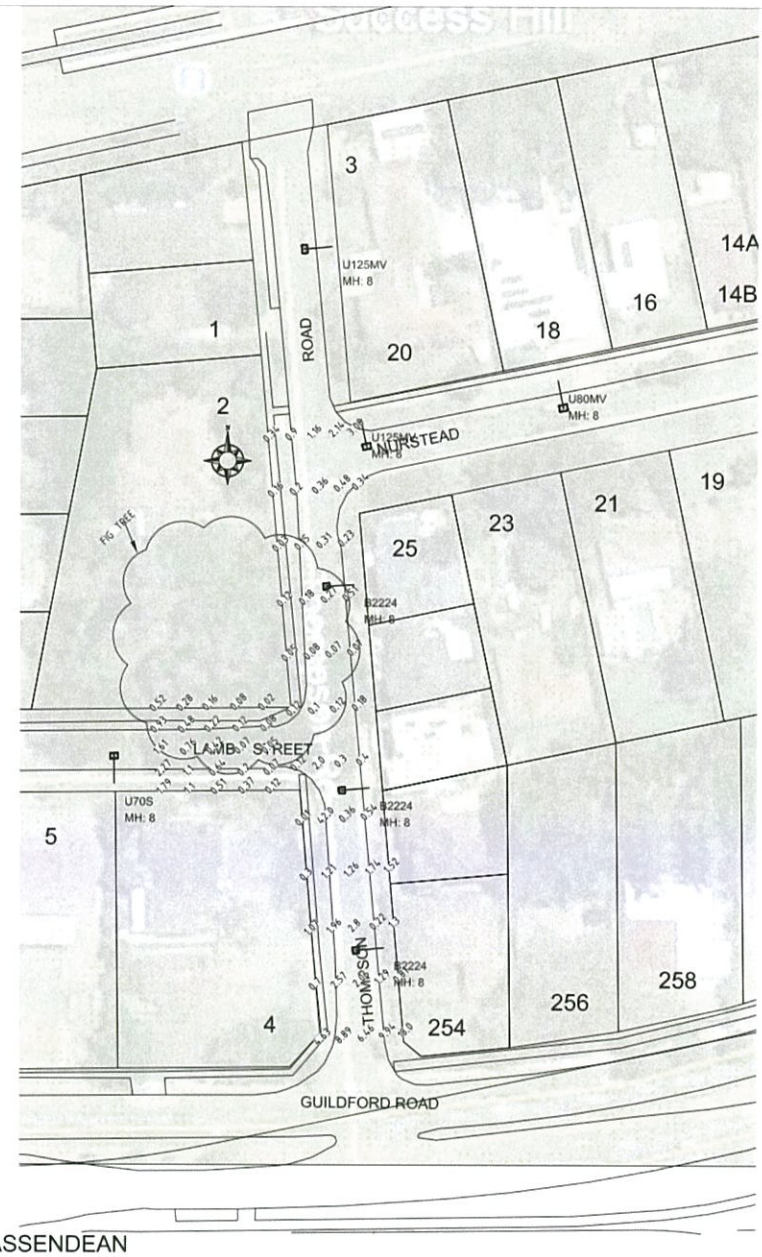
SITE MEASUREMENTS



2657 - SUCCESS HILL BASSENDEAN
ROAD LIGHTING AUDIT
THOMPSON ROAD
Fig. 1

Drn: I.A.
Date: JAN 2018
Scale: 1:1000 @ A4

AS/NZS ISO 9001:2008
Certificate No. 9000 254

Sage Consulting Engineers Pty. Ltd.
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0 10m 20m 30m 40m 50m
SCALE 1:1000 @ A4

SCHEDULE OF OBSERVATIONS

No.	Street Name	Length	AS/NZS 1158	Existing Lighting	Complies
1	Anzac Terrace	300	P3	2 x 80W MV, 1 x 80W MV B2224, 1 x 125W MV, 1 x 42W CFL	No
2	Seventh Avenue	180	P3	1 x 80W MV, 2 x 80W MV B2224	Yes
3	Railway Parade	350	P3	3 x 80W MV, 2 x 80W MV B2224, 1 x 125W MV	No
4	Thompson Road	180	P3	2 x 80W MV, 1 x 125W MV	No ①
5	Lamb Street	250	P3	2 x 70W HPS, 1 x 125W MV, 1 x 42W CFL	No
6	Nurstead Avenue	270	P3	2 x 80W MV, 1 x 125W MV, 1 x 42W CFL	No
7	Lord Street	190	V3	3 x 250W HPS,1 x 125W MV	No

① Non-compliance under Fig tree

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SCHEDULE OF COST ESTIMATES – WESTERN POWER

AS/NZS 1158.3.3 Cat P3 on all roads

No.	Street Name	Length	AS/NZS 1158	Recommendation	Cost
1	Anzac Terrace	300	P3	Install 4 additional WP 18W led on existing overhead line pole	$ 12 000 - $ 24 000
2	Seventh Avenue	180	P3	Retain existing street lighting and request Western Power to clean and re-lamp	$ 18 000
3	Railway Parade	350	P3	Install 3 additional WP 18W led on existing overhead line pole	$ 9 000 - $18,000
4	Thompson Road	180	P3	Retain existing street lighting and request Western Power to clean and re-lamp. Reduce mounting height under Fig tree	$ 2000
5	Lamb Street	250	P3	Install 4 additional WP 18W led on existing overhead line pole	$ 12 000 - $ 24 000
6	Nurstead Avenue	270	P3	Install 3 additional WP 18W led on existing overhead line pole	$ 9 000 - $ 18 000
7	Lord Street	190	V3	Install 250W HPS @ 50m spacing's	$ 48,000.00
				Total	$ 90 000 - $132 000

Cost Basis:

- 250W HPS 12.5m steel pole $ 12 000
- 150W MH mounted on existing O/H line $ 3 000 - $ 6000
- Replace existing $ 500
- Does not include bulk Western Power replacement of 18W LED not covered in recommendation

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AS/NZS 1158.3.3 Cat P2 on Thompson Road and Seventh Avenue.

No.	Street Name	Length	AS/NZS 1158	Recommendation	Cost	Priority
1	Anzac Terrace	300	P3	Install 4 additional WP 18W led on existing overhead line pole	$ 12 000 - $ 24 000	5
2	Seventh Avenue	180	P2	Replace all with 150W MH and install additional 150W MH on all overhead line poles	$ 5 000 - $ 8 000	2
3	Railway Parade	350	P3	Install 3 additional WP 18W led on existing overhead line pole	$ 9 000 - $18,000	3
4	Thompson Road	180	P2	Replace all with 150W MH and install additional 150W MH on all overhead line poles	$ 5 000 - $ 8,000	1
5	Lamb Street	250	P3	Install 4 additional WP 18W led on existing overhead line pole	$ 12 000 - $ 24 000	4
6	Nurstead Avenue	270	P3	Install 3 additional WP 18W led on existing overhead line pole	$ 9 000 - $ 18 000	6
7	Lord Street	190	V3	Install 250W HPS @ 50m spacing's	$ 48,000.00	9
				Total	$120 000 - $192 000	

Cost Basis:

- 250W HPS 12.5m steel pole $ 12 000
- 150W MH mounted on existing O/H line $ 3 000 - $ 6000
- Replace existing $ 500
- Does not include bulk Western Power replacement of 18W LED not covered in recommendation

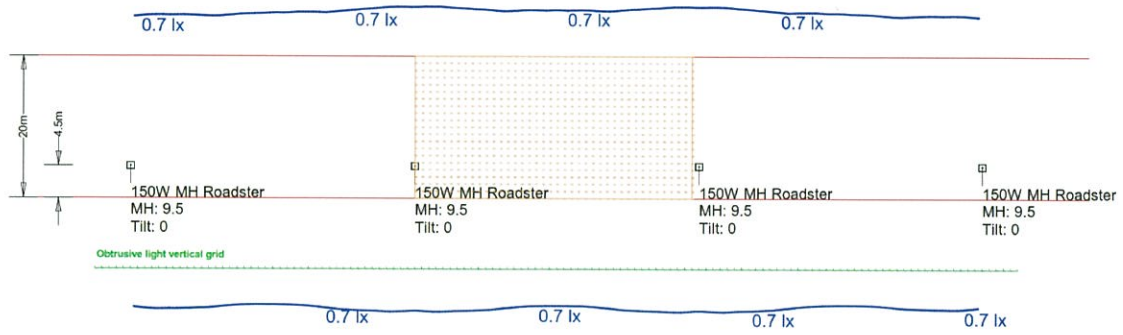
APPENDIX B

LIGHTING DESIGN OPTIONS

AS/NZS 1158.3.1 P2

Success Hill, Bassendean
Road reserve 20m - samples

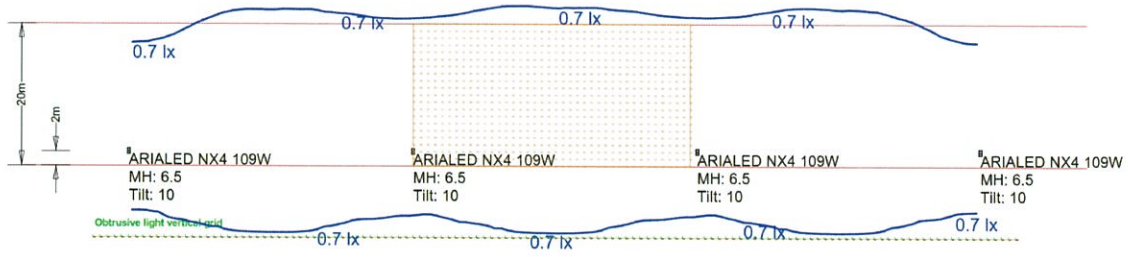
OPTION 1 - Roadster 150W Metal Halide
WP Overhead Line Poles
MH=9.5m
Arm=2.5m
Tilt - 0 degrees



Luminaire Schedule								
Project: OPT 1								
Symbol	Qty	Label	Arrangement	Total Lamp Lumens	LLF	Description	Arm	Lum. Watts
	4	150W MH Roadster	SINGLE	11500	0.800	SLA Roadster MH150D - 201016	2.5	150

Calculation Summary						
Project: OPT 1						
Label	CalcType	Units	Avg	Max	Min	Max/Avg
Evp 1 - obtrusive light	Illuminance	Lux	N.A.	2.81	1.67	N.A.
Horizontal grid Eh1 @ 0m GL	Illuminance	Lux	5.91	15.98	1.55	2.70
Vertical grid Ev1 @ 1.5m AGL	Illuminance	Lux	N.A.	9.10	0.71	N.A.

OPTION 2 - ARIALED
New Steel Poles
MH=6.5m
Arm=0m (post-top)
Tilt - 10 degrees



Luminaire Schedule								
Project: OPT 2								
Symbol	Qty	Label	Arrangement	Total Lamp Lumens	LLF	Description	Arm	Lum. Watts
	4	ARIALED NX4 109W	SINGLE	13097	0.800	ARIALED - SL-050N2D6PEB0A00 - 050 NX4 219C 4000K	0	109

Calculation Summary						
Project: OPT 2						
Label	CalcType	Units	Avg	Max	Min	Max/Avg
Evp 2 - obtrusive light	Illuminance	Lux	N.A.	0.28	0.11	N.A.
Horizontal grid Eh2 @ 0m GL	Illuminance	Lux	9.58	38.16	0.75	3.98
Vertical grid Ev2 @ 1.5m AGL	Illuminance	Lux	N.A.	21.95	1.52	N.A.

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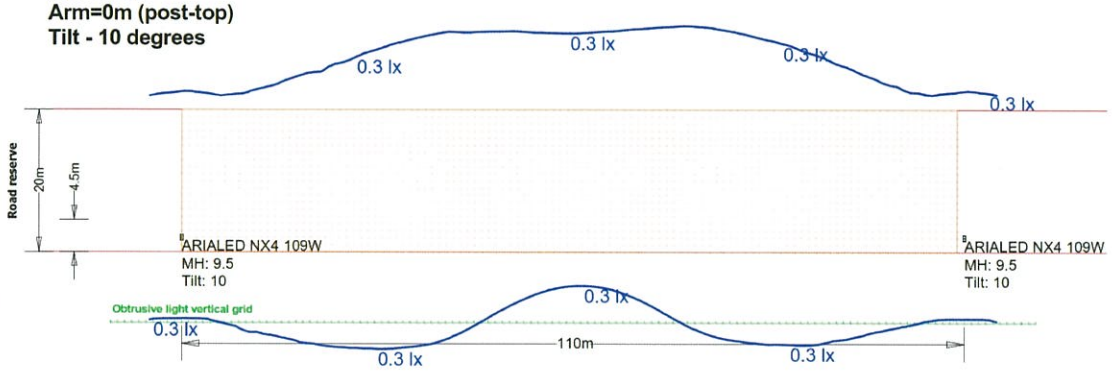
AS/NZS 1158.3.1 P3

Success Hill, Bassendean
Road reserve 20m - sample spacing
AS/NZS 1158.3.1 - P3 category

ARIALED
New Steel Poles
MH=6.5m
Arm=0m (post-top)
Tilt - 10 degrees



Luminaire Schedule								
Project: OPT 1								
Symbol	Qty	Label	Arrangement	Total Lamp Lumens	LLF	Description	Arm	Lum. Watts
→	2	ARIALED NX4 109W	SINGLE	13097	0.800	ARIALED - SL-050N2D6PEB0A00 - 050 NX4 219C 4000K	0	109

Calculation Summary							
Project: OPT 1							
Label	CalcType	Units	Avg	Max	Min	Max/Avg
Evp 1 - obtrusive light	Illuminance	Lux	N.A.	1.22	0.19	N.A.
Horizontal grid Eh1 @ 0m GL	Illuminance	Lux	3.08	17.51	0.41	5.69

APPENDIX C

LIGHTING STANDARDS

AS/NZS 1158.3.1: 2005 - ROADLIGHTING- Pedestrian Area Lighting
AS/NZS 1158.1.1: 2005 - ROADLIGHTING- Vehicular Traffic Lighting

AS/NZS 1158.3.1:2005 Pedestrian area lighting

Roads & Pathways:

Lighting Category ❷		P1 ❸	P2 ❸	P3	P4	P5	P6	P7	P8
Type of Road or Pathway		MIXED VEHICLE & PEDESTRIAN TRAFFIC Pedestrian or cycle orientated pathways, e.g. footpaths, including along arterial roads, walkway, lanes, park paths, cycle paths (P1 to P4 apply) Collector roads or non-arterial roads which collect and distribute traffic in an area, as well as serving abutting properties Local roads or streets used primarily for access to abutting properties including residential properties. Common area, forecourts of cluster housing					GENERALLY PEDESTRIAN MOVEMENT ONLY • Areas primarily for pedestrian use, e.g. city, town, suburban centres, including outdoor shopping precincts, malls, open arcades, town squares, civic centres MIXED PEDESTRIAN & VEHICLE TRAFFIC • Transport terminals and interchanges, service areas		(similar to P1)
Selection Criteria ❶ ❸	Activity	n/a	High	Med	Low	Low	Ped only N/A Mixed - High	Med	Low
	Risk of crime	High	Med	Low local roads - Med	Low	Low	High	Med	Low
	Need to enhance prestige	n/a	High	Med	n/a	n/a	High	Med	n/a
Light Technical Parameters									
Maintained Average Horizontal Illuminance (lux)		7	3.5	1.75	0.85	0.5	21	14	7
Maintained Horizontal; Illuminance (lux)		2	0.7	0.3	0.14	0.07	7	4	2
Maximum Horizontal Illuminance Uniformity E_{max}/E_{ave} (U_p)		10	10	10	10	10	10	10	10
Maintained Vertical Illuminance ❹ (E_v) lux		2	0.7	0.3❺	n/a	n/a	7	4	2

Connecting Elements and Outdoor Car Parks:

Lighting Category	P9	P10	P11a	P11b	P11c	P12
Type of Road or Pathway	Steps, ramps, footbridges, pedestrian ways.	Subways, including associated ramps or steps ❻	Parking spaces, aisles and circulation roadways ❼			Parking spaces for people with disabilities ❼
Night time vehicle or pedestrian movements	N/A	N/A	High	Medium	Low	N/A
Night time occupancy			>75%	>25%, <75%	<25%	
Risk of crime			High	Medium	Low	
Light Technical Parameters						
Maintained average horizontal Illuminance (lux) Eh	Same as for highest lighting Category applying to adjacent connected areas but, where forming part of a road or pathway, to not less than Category P8	35	14	7	3.5	-
Maintained horizontal; Illuminance (lux)		17.5	3	1.5	0.7	>14 & >Eh
Maximum horizontal Illuminance Uniformity E_{max}/E_{ave} (U_p)		10	10	10	10	-
Maintained vertical Illuminance ❹ (E_v) lux		17.5	3	1.5	-	-

Notes:

❶ The highest level of selection criteria that is deemed appropriate for the road or pathway will determine the applicable lighting Category.
❷ P3, P4 & P5 apply across the whole road reserve. P1 & P2 apply only to the formed footpath
❸ Where there are good vertical reflecting surfaces alongside the pathway, the next lower lighting Category may be selected
❹ Applies at 1.5m above the surface of the area.
❺ The vertical illuminance requirement for Category P3 applies to pathways not local roads
❻ Subway walls should have a light colour
❼ Luminaires should be located to highlight obstruction and hazards. For indoor car parks refer to AS1680.2.1

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AS/NZS 1158.1.1: 2005 - ROAD LIGHTING - Vehicular Traffic Lighting

Lighting Category	V1	V2	V3		V4	V5
APPLICATIONS Note: for all applications the upward waste light ratio should not exceed 6%	Arterial or main roads in central and regional activity centres of capital and major provincial cities, and other areas with major abutting traffic generators	Arterial roads that predominantly carry through traffic from one region to another, forming principal avenues of communication for traffic movements with major abutting traffic generators	Arterial roads that predominantly carry through traffic from one region to another, forming principal avenues of communication for traffic movements	Freeways, motorways and expressways consisting of divided highways for through traffic with no access for traffic between interchanges and with grade separation at all intersections	Sub-arterial or principal roads which connect arterial or main roads to areas of development within a region, or which carry traffic directly from one part of a region to another part.	
Light Technical Parameters						
Minimum Average Luminance L(cd/m^2) (maintained)	1.5	1.0	0.75		0.5	0.35
Min Overall Uniformity U_o	0.33	0.33	0.33		0.33	0.33
Min Longitudinal Uniformity Ul	0.5	0.5	0.5		0.5	0.5
Max Threshold Increment TI(%)	20	20	20		20	20
Min Surround Illuminance ES (%)	50	50	50		50	50
At Intersections - Min Point horizontal Illuminance E_{min}, lux (maintained)	15	10	7.5		5	3.5
Max Illuminance Uniformity E_{max}/E_{min}	8	8	8		8	8
Max Upward Waste Light Ratio %	3	3	3		3	3

Notes on reflectance characteristics
R1 = light diffuse road (e.g. concrete)
R2 = diffuse & specular (e.g. asphalt with artificial brightener in aggregate)
R3 = slightly specular, typical highways and MRWA design standard
R4 = mostly specular, very smooth texture

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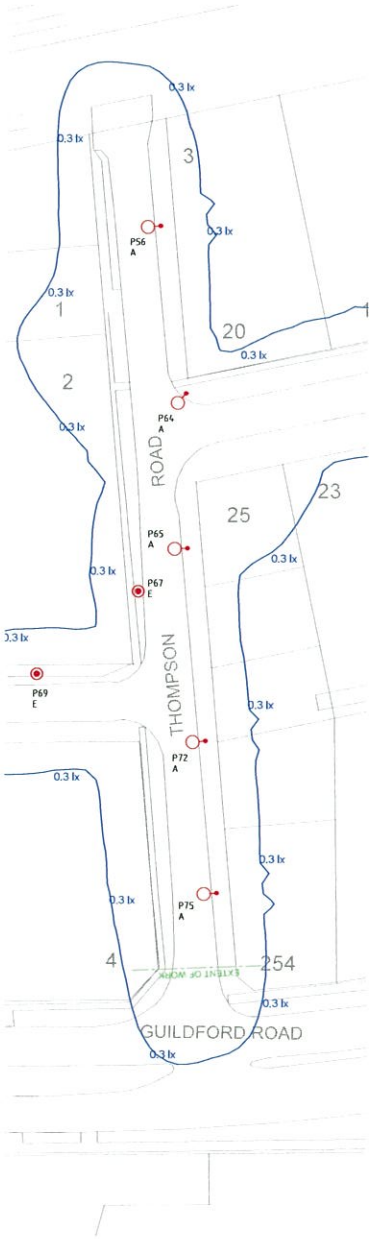
DESIGN NOTE
LIGHTING DESIGN TO AS/NZS1158.3.1
CATEGORY P3 (LOCAL ROADS).

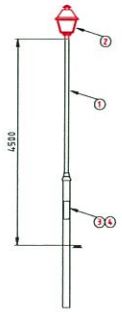
0 5000 10000 20000 30000
Full Size 1:500 , Half Reduction 1:1000 - SCALE (mm)

ALL DIMENSIONS ARE IN MILLIMETRES
DRAWN IN ACCORDANCE WITH AS1100-1992
DO NOT SCALE
THIRD ANGLE PROJECTION

N



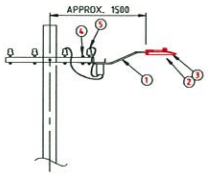
SITE PLAN
SCALE 1:500 @ A1



4.5 METRE BORDEAUX POLE
(SCALE 1 : 100)

BILL OF MATERIALS DM103_1B_EBY

ITEM	STOCK NUMBER	DESCRIPTION	QTY
1.	EW0146	POLE 4.5m, BORDEAUX EBONY/BLACK	1
2.	HL6331	LUMINAIRE KENSINGTON 17W EBONY/BLACK	1
2.	HL5557	PE CELL	1
3	GF1300	FUSE CARTRIDGE 10AMP	1
4	HZ0132	SL FUSE BOX	1



MINOR ROAD XARM ON WOOD POLE
NOT TO SCALE

BILL OF MATERIALS (SL2-42)

ITEM	STOCK NUMBER	DESCRIPTION	QTY
1.	CB0424	BRACKET	1
2.	HL6231	LUMINAIRE-WITH LAMP & PE CELL FITTED	1
3.	GF0550	FUSE CARTRIDGE 10A	1
3.	GF1801	FUSE HOLDER 100A	1
4.	AB4567	ø12 BOLT 150 LONG WITH NUT	1
5.	FC0110	CLAMP ALUM. 16mm	2

SCOPE OF WORK

1. SUPPLY & INSTALL STREETLIGHTING POLES & LUMINAIRES IN COMPLIANCE WITH AS/NZS1158
2. SUPPLY & INSTALL CABLING INCLUDING TRENCHING & BACKFILLING, UNDER ROAD BORE CABLE WHERE POSSIBLE.
3. PROTECT THE WORKS, INCLUDING SIGNAGE, BARRICADES, TEMPORARY WALKWAYS etc.
4. COMPLETE ELECTRICAL WORKS IN COMPLIANCE WITH THE OFFICE OF ENERGY'S 'GUIDELINES FOR ELECTRICITY TRANSMISSION & DISTRIBUTION WORK IN WESTERN AUSTRALIA'.
5. COMPLETE ELECTRICAL WORKS IN A SAFE MANNER & SAFETY TO THE PUBLIC IN COMPLIANCE WITH WORKSAFE WESTERN AUSTRALIA.
6. PROVIDE TRAFFIC MANAGEMENT.
7. INSPECT, TEST & COMMISSION STREETLIGHTS, INFORM CLIENT OF COMMISSIONING.
8. PROVIDE ELECTRONIC AND HARD COPIES OF 'RECORD' DRAWING SHOWING AS-CONSTRUCTED STATUS OF WORKS.
9. DESIGNED TO AS/NZS1158.3.1 SUBCATEGORY P3 (LOCAL ROADS).
10. COORDINATE WITH TOWN OF BASSENDEAN TO TRIM VEGETATION, WHERE NECESSARY.

LEGEND

SYMBOL	DESCRIPTION	LUMINAIRE	MANUFACTURER
P A	NEW LUMINAIRE - ROADGRACE ON EXISTING OVERHEAD WOOD POWER POLE	1 x 36W LED ROADGRACE BRP711 LED40NW 36W P500 II DWP3 42-60	PHILIPS (SYGNIFY)
P B	NEW LUMINAIRE - ROADGRACE ON 6.5m STANDARD STEEL POLE (SINGLE OUTREACH)	1 x 36W LED ROADGRACE BRP711 LED40NW 36W P500 II DWP3 42-60	PHILIPS (SYGNIFY)
P C	NEW LUMINAIRE - ROADFLAIR ON EXISTING OVERHEAD WOOD POWER POLE	1 x 80W LED ROADFLAIR BRP391 LED96NW 80W 220-240V DWV	PHILIPS (SYGNIFY)
P D	NEW LUMINAIRE - ROADFLAIR ON 10.5m STANDARD STEEL POLE (SINGLE OUTREACH)	1 x 80W LED ROADFLAIR BRP391 LED96NW 80W 220-240V DWV	PHILIPS (SYGNIFY)
P E	NEW LUMINAIRE - KENSINGTON ON 4.5m BOURDEUX STEEL POLE	1 x 17W LED KENSINGTON	SYLVANIA (GERARD LIGHTING)

POLE LOCATIONS

POLE #	EASTING	NORTHING
56	EXISTING	EXISTING
64	EXISTING	EXISTING
65	EXISTING	EXISTING
67	401273.751	6470038.425
72	EXISTING	EXISTING
75	EXISTING	EXISTING

PLEASE CALL BEFORE YOU DIG 1100

WARNING
CONTRACTOR TO CONFIRM THE LOCATION OF ALL SERVICES PRIOR TO COMMENCEMENT OF WORKS.

WARNING

BEWARE OF UNDERGROUND SERVICES

The locations of underground services are approximate only and their exact position should be proven on site. No guarantee is given that all existing services are shown.

BEWARE OF OVERHEAD POWER LINES

Minimum clearances for Streetlight Pole/ Luminaire to Overhead Power Lines
Low Voltage - 3m
High Voltage - 3m
Extra High Voltage - 8m
COMPLY WITH AS/NZS7000 CLEARANCES

A1	ISSUE	REVISION	DATE	CHECKED	ISSUE	REVISION	DATE	CHECKED

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Home by the Swan
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Email. mail@bassendean.wa.gov.au

ELECTRICAL SERVICES
SUCCESS HILL, BASSENDEAN
THOMPSON ROAD
LIGHTING LAYOUT

DESIGNED	DRAWN	CHECKED
A.P.	A.P.	C.L.
DATE 29/01/19	SCALE 1:500 @A1	

AS/NZS ISO 9001:2008
Certificate No. 9000 254

PROJECT No. 2738
DRAWING No. E3
SHEET 3 OF 11

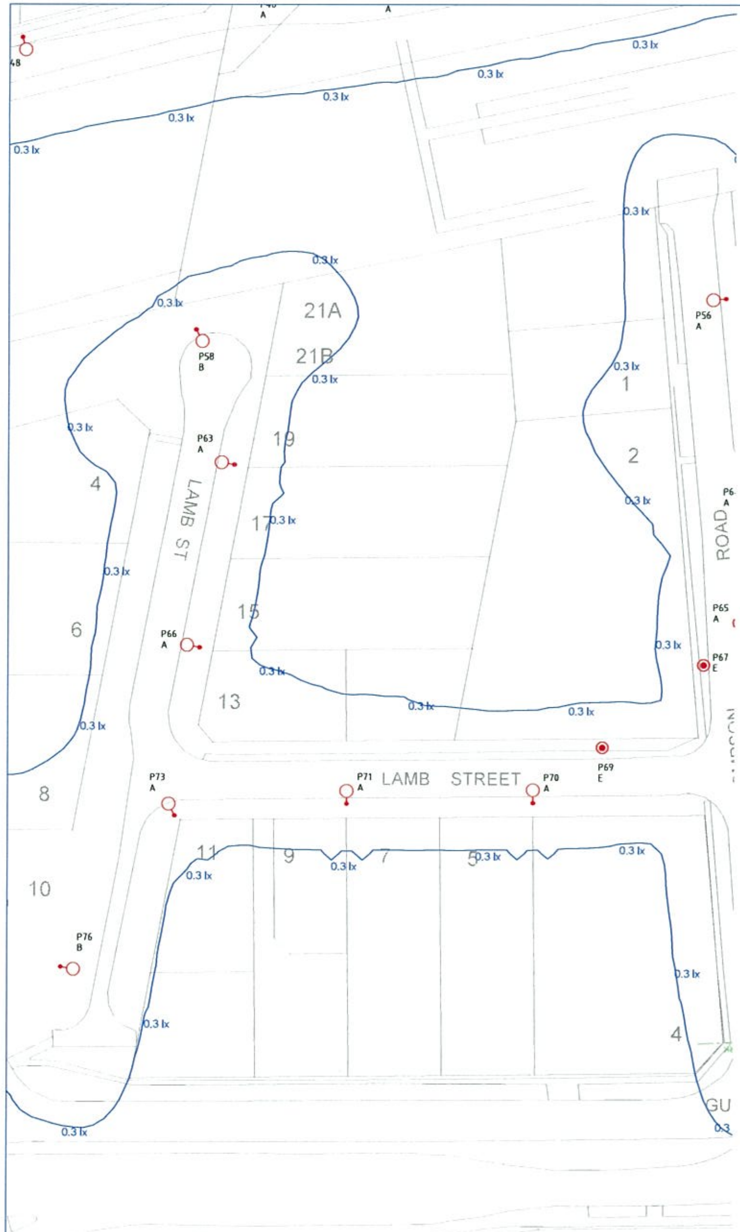
DESIGN NOTE
LIGHTING DESIGN TO AS/NZS1158.3.1
CATEGORY P3 (LOCAL ROADS).

0 5000 10000 20000 30000
Full Size 1:500 , Half Reduction 1:1000
SCALE (mm)

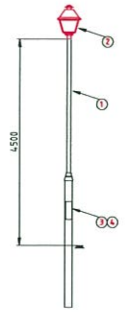
ALL DIMENSIONS ARE IN MILLIMETRES
DRAWN IN ACCORDANCE WITH AS1100-1992
DO NOT SCALE

THIRD ANGLE PROJECTION

N



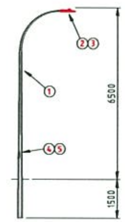
SITE PLAN
SCALE 1:500 @ A1



4.5 METRE BORDEAUX POLE
(SCALE 1 : 100)

BILL OF MATERIALS DM103_1B_EBY

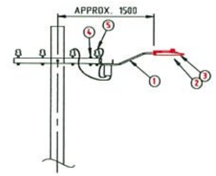
ITEM	STOCK NUMBER	DESCRIPTION	QTY
1.	CW0146	POLE 4.5m, BORDEAUX EBONY/BLACK	1
2.	HL6331	LUMINAIRE KENSINGTON 17W EBONY/BLACK	1
2.	HL5557	PE CELL	1
3	GF1300	FUSE CARTRIDGE 10AMP	1
4	HZ0132	SL FUSE BOX	1



6.5 METRE POLE WITH 1.5 METRE OUTREACH
(SCALE 1 : 100)

BILL OF MATERIALS SL8_3L

ITEM	STOCK NO.	DESCRIPTION	QTY
1	CW0255	POLE 6.5m SL STEEL POLE	1
2	HL6306	LED LUMINAIRE WITH 8m CABLE	1
2	HL5557	NEMA BASE PE CELL	1
3	HZ0132	SL FUSE BOX	1
4	GF1300	FUSE CARTRIDGE 10AMP	1



MINOR ROAD XARM ON WOOD POLE
NOT TO SCALE

BILL OF MATERIALS (SL2-42)

ITEM	STOCK NUMBER	DESCRIPTION	QTY
1.	CB0424	BRACKET	1
2.	HL6231	LUMINAIRE-WITH LAMP & PE CELL FITTED	
3.	GF0550	FUSE CARTRIDGE 10A	1
3.	GF1801	FUSE HOLDER 100A	1
4.	AB4567	Ø12 BOLT 150 LONG WITH NUT	1
5.	FC0110	CLAMP ALUM. 16mm	2

SCOPE OF WORK

1. SUPPLY & INSTALL STREETLIGHTING POLES & LUMINAIRES IN COMPLIANCE WITH AS/NZS1158
2. SUPPLY & INSTALL CABLING INCLUDING TRENCHING & BACKFILLING. UNDER ROAD BORE CABLE WHERE POSSIBLE.
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8. PROVIDE ELECTRONIC AND HARD COPIES OF 'RECORD' DRAWING SHOWING AS-CONSTRUCTED STATUS OF WORKS.
9. DESIGNED TO AS/NZS1158.3.1 SUBCATEGORY P3 (LOCAL ROADS).
10. COORDINATE WITH TOWN OF BASSENDEAN TO TRIM VEGETATION, WHERE NECESSARY.

POLE LOCATIONS

POLE #	EASTING	NORTHING
58	401175.064	6470103.225
63	EXISTING	EXISTING
66	EXISTING	EXISTING
69	401254.107	6470022.352
70	EXISTING	EXISTING
71	EXISTING	EXISTING
73	EXISTING	EXISTING
76	401149.136	6469979.446

LEGEND

SYMBOL	DESCRIPTION	LUMINAIRE	MANUFACTURER
P# A	NEW LUMINAIRE - ROADGRACE ON EXISTING OVERHEAD WOOD POWER POLE	1 x 36W LED ROADGRACE BRP711 LED40NW 36W PSDD II DWP3 42-60	PHILIPS (SYGNIFY)
P# B	NEW LUMINAIRE - ROADGRACE ON 6.5m STANDARD STEEL POLE (SINGLE OUTREACH)	1 x 36W LED ROADGRACE BRP711 LED40NW 36W PSDD II DWP3 42-60	PHILIPS (SYGNIFY)
P# C	NEW LUMINAIRE - ROADFLAIR ON EXISTING OVERHEAD WOOD POWER POLE	1 x 80W LED ROADFLAIR BRP391 LED96NW 80W 220-240V DWV	PHILIPS (SYGNIFY)
P# D	NEW LUMINAIRE - ROADFLAIR ON 10.5m STANDARD STEEL POLE (SINGLE OUTREACH)	1 x 80W LED ROADFLAIR BRP391 LED96NW 80W 220-240V DWV	PHILIPS (SYGNIFY)
P# E	NEW LUMINAIRE - KENSINGTON ON 4.5m BOURDEUX STEEL POLE	1 x 17W LED KENSINGTON	SYLVANIA (GERARD LIGHTING)

PERTH ONE CALL SYSTEM
DIAL 1100
DIAL BEFORE YOU DIG

WARNING
CONTRACTOR TO CONFIRM THE LOCATION OF ALL SERVICES PRIOR TO COMMENCEMENT OF WORKS.

WARNING

BEWARE OF UNDERGROUND SERVICES

The locations of underground services are approximate only and their exact position should be proven on site. No guarantee is given that all existing services are shown.

BEWARE OF OVERHEAD POWER LINES

Minimum clearances for Streetlight Pole/Luminaire to Overhead Power Lines
Low Voltage - 1m
High Voltage - 3m
Extra High Voltage - 6m
COMPLY WITH AS/NZS7000 CLEARANCES

A1	ISSUE	REVISION	DATE	CHECKED	ISSUE	REVISION	DATE	CHECKED

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Home by the Swan

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ELECTRICAL SERVICES
SUCCESS HILL, BASSENDEAN
LAMB STREET
LIGHTING LAYOUT

DESIGNED	DRAWN	CHECKED
A.P.	A.P.	C.L.
DATE 29/01/19	SCALE 1:500 @A1	

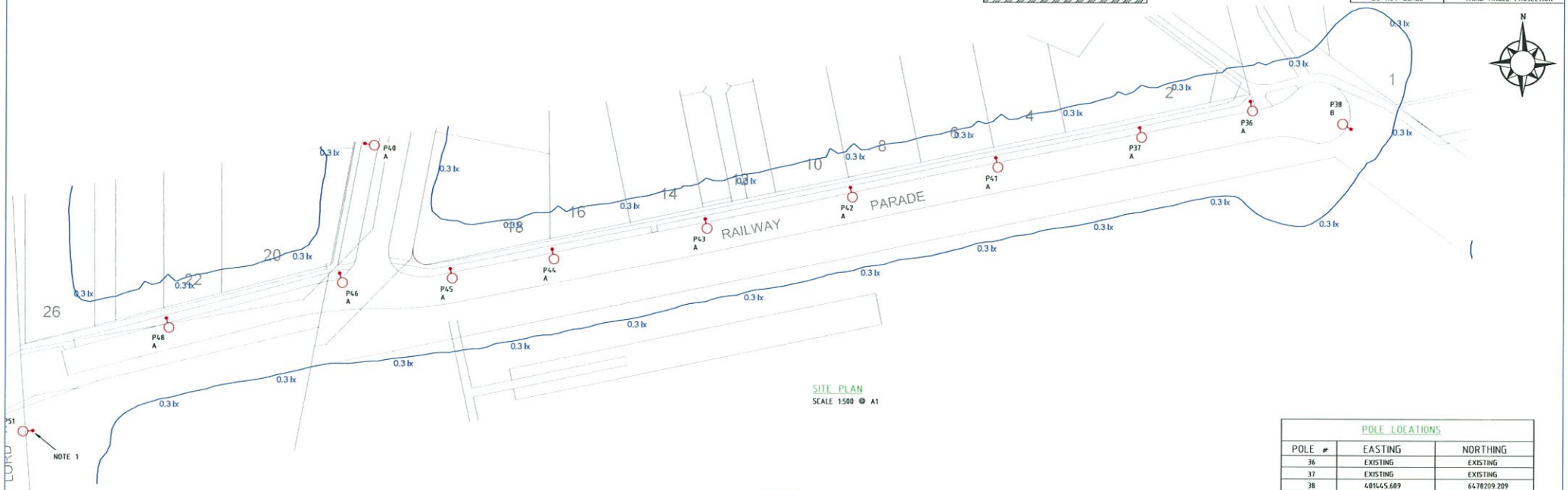
AS/NZS ISO 9001:2008
Certificate No. 9000 254

PROJECT No. 2738
DRAWING No. E4
SHEET 4 OF 11

DESIGN NOTE
LIGHTING DESIGN TO AS/NZS1158.3.1
CATEGORY P3 (LOCAL ROADS).

0 5000 10000 20000 30000
Full Size 1:500 : Half Reduction 1:1000
SCALE (mm)

ALL DIMENSIONS ARE IN MILLIMETRES
DRAWN IN ACCORDANCE WITH AS1100-1992
DO NOT SCALE
THIRD ANGLE PROJECTION



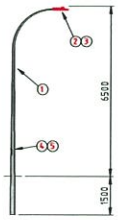
SITE PLAN
SCALE 1:500 @ A1

POLE LOCATIONS

POLE #	EASTING	NORTHING
36	EXISTING	EXISTING
37	EXISTING	EXISTING
38	401445.609	6478209.209
41	EXISTING	EXISTING
42	EXISTING	EXISTING
43	EXISTING	EXISTING
44	EXISTING	EXISTING
45	EXISTING	EXISTING
46	EXISTING	EXISTING
48	EXISTING	EXISTING

LEGEND

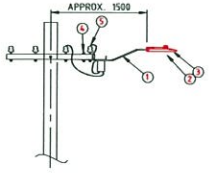
SYMBOL	DESCRIPTION	LUMINAIRE	MANUFACTURER
P✔ A	NEW LUMINAIRE - ROADGRACE ON EXISTING OVERHEAD WOOD POWER POLE	1 x 36W LED ROADGRACE BRP711 LED40NW 36W PSOO II DWP3 42-60	PHILIPS (SYGNIFY)
P✔ B	NEW LUMINAIRE - ROADGRACE ON 6.5m STANDARD STEEL POLE (SINGLE OUTREACH)	1 x 36W LED ROADGRACE BRP711 LED40NW 36W PSOO II DWP3 42-60	PHILIPS (SYGNIFY)
P✔ C	NEW LUMINAIRE - ROADFLAIR ON EXISTING OVERHEAD WOOD POWER POLE	1 x 80W LED ROADFLAIR BRP391 LED96NW 80W 220-240V DWV	PHILIPS (SYGNIFY)
P✔ D	NEW LUMINAIRE - ROADFLAIR ON 10.5m STANDARD STEEL POLE (SINGLE OUTREACH)	1 x 80W LED ROADFLAIR BRP391 LED96NW 80W 220-240V DWV	PHILIPS (SYGNIFY)
P✔ E	NEW LUMINAIRE - KENSINGTON ON 4.5m BOURDEUX STEEL POLE	1 x 17W LED KENSINGTON	SYLVANIA (GERARD LIGHTING)



6.5 METRE POLE WITH 1.5 METRE OUTREACH
(SCALE 1 : 100)

BILL OF MATERIALS SL8.3L

ITEM	STOCK NO.	DESCRIPTION	QTY
1	CW0255	POLE 6.5m SL STEEL POLE	1
2	HL6306	LED LUMINAIRE WITH 8m CABLE	1
2	HL5557	NEMA BASE PE CELL	1
3	HZ0132	SL FUSE BOX	1
4	GF1300	FUSE CARTRIDGE 10AMP	1



MINOR ROAD XARM ON WOOD POLE
NOT TO SCALE

BILL OF MATERIALS (SL2-42)

ITEM	STOCK NUMBER	DESCRIPTION	QTY
1.	CB0424	BRACKET	1
2.	HL6231	LUMINAIRE-WITH LAMP & PE CELL FITTED	1
3.	GF0550	FUSE CARTRIDGE 10A	1
3.	GF1801	FUSE HOLDER 100A	1
4.	AB4567	ø12 BOLT 150 LONG WITH NUT	1
5.	FE0110	CLAMP ALUM. 16mm	2

SCOPE OF WORK

1. SUPPLY & INSTALL STREETLIGHTING POLES & LUMINAIRES IN COMPLIANCE WITH AS/NZS1158
2. SUPPLY & INSTALL CABLING INCLUDING TRENCHING & BACKFILLING, UNDER ROAD BORE CABLE WHERE POSSIBLE.
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8. PROVIDE ELECTRONIC AND HARD COPIES OF 'RECORD' DRAWING SHOWING AS-CONSTRUCTED STATUS OF WORKS.
9. DESIGNED TO AS/NZS1158.3.1 SUBCATEGORY P3 (LOCAL ROADS).
10. COORDINATE WITH TOWN OF BASSENDEAN TO TRIM VEGETATION, WHERE NECESSARY.

WARNING
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WARNING

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BEWARE OF OVERHEAD POWER LINES

Minimum clearances for Streetlight Pole/ Luminaire to Overhead Power Lines
Low Voltage - 1m
High Voltage - 3m
Extra High Voltage - 6m
COMPLY WITH AS/NZS7000 CLEARANCES

A1	ISSUE	REVISION	DATE	CHECKED	ISSUE	REVISION	DATE	CHECKED

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ELECTRICAL SERVICES
SUCCESS HILL, BASSENDEAN
RAILWAY PARADE
LIGHTING LAYOUT

DESIGNED	DRAWN	CHECKED
A.P.	A.P.	C.L.
DATE: 29/01/19	SCALE: 1:500 @A1	

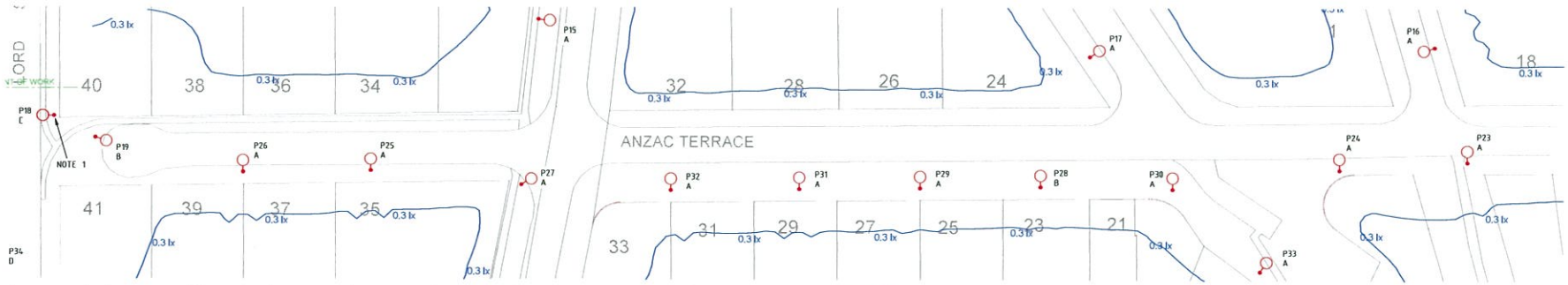
AS/NZS ISO 9001:2008
Certificate No. 9000 254

PROJECT No. 2738
DRAWING No. E5
SHEET 5 OF 11

DESIGN NOTE
LIGHTING DESIGN TO AS/NZS1158.3.1
CATEGORY P3 (LOCAL ROADS).

0 5000 10000 20000 30000
Full Size 1:500 : Half Reduction 1:1000
SCALE (mm)

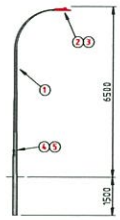
ALL DIMENSIONS ARE IN MILLIMETRES
DRAWN IN ACCORDANCE WITH AS1100-1992
DO NOT SCALE
THIRD ANGLE PROJECTION



SITE PLAN
SCALE 1:500 @ A1

POLE LOCATIONS

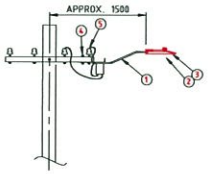
POLE #	EASTING	NORTHING
19	401112.255	6470287.569
20	401562.815	6470283.984
21	EXISTING	EXISTING
22	EXISTING	EXISTING
23	EXISTING	EXISTING
24	EXISTING	EXISTING
25	EXISTING	EXISTING
26	EXISTING	EXISTING
28	401320.160	6470277.063
29	EXISTING	EXISTING
30	EXISTING	EXISTING
31	EXISTING	EXISTING
32	EXISTING	EXISTING



6.5 METRE POLE WITH 1.5 METRE OUTREACH
(SCALE 1 : 100)

BILL OF MATERIALS SL8.3L

ITEM	STOCK NO.	DESCRIPTION	QTY
1	CW0255	POLE 6.5m SL STEEL POLE	1
2	HL6306	LED LUMINAIRE WITH 8m CABLE	1
2	HL5557	NEMA BASE PE CELL	1
3	HZ0132	SL FUSE BOX	1
4	GF1300	FUSE CARTRIDGE 10AMP	1



MINOR ROAD XARM ON WOOD POLE
NOT TO SCALE

BILL OF MATERIALS (SL2-42)

ITEM	STOCK NUMBER	DESCRIPTION	QTY
1.	CB0424	BRACKET	1
2.	HL6231	LUMINAIRE-WITH LAMP & PE CELL FITTED	1
3.	GF0550	FUSE CARTRIDGE 10A	1
3.	GF1801	FUSE HOLDER 10A	1
4.	AB4567	Ø12 BOLT 150 LONG WITH NUT	1
5.	FC0110	CLAMP ALUM. 16mm	2

LEGEND

SYMBOL	DESCRIPTION	LUMINAIRE	MANUFACTURER
P# A	NEW LUMINAIRE - ROADGRACE ON EXISTING OVERHEAD WOOD POWER POLE	1 x 36W LED ROADGRACE BRP711 LED40NW 36W PSOD II DWP3 42-60	PHILIPS (SYGNIFY)
P# B	NEW LUMINAIRE - ROADGRACE ON 6.5m STANDARD STEEL POLE (SINGLE OUTREACH)	1 x 36W LED ROADGRACE BRP711 LED40NW 36W PSOD II DWP3 42-60	PHILIPS (SYGNIFY)
P# C	NEW LUMINAIRE - ROADFLAIR ON EXISTING OVERHEAD WOOD POWER POLE	1 x 80W LED ROADFLAIR BRP391 LED96NW 80W 220-240V DWV	PHILIPS (SYGNIFY)
P# D	NEW LUMINAIRE - ROADFLAIR ON 10.5m STANDARD STEEL POLE (SINGLE OUTREACH)	1 x 80W LED ROADFLAIR BRP391 LED96NW 80W 220-240V DWV	PHILIPS (SYGNIFY)
P# E	NEW LUMINAIRE - KENSINGTON ON 4.5m BOURDEUX STEEL POLE	1 x 17W LED KENSINGTON	SYLVANIA (GERARD LIGHTING)

SCOPE OF WORK

1. SUPPLY & INSTALL STREETLIGHTING POLES & LUMINAIRES IN COMPLIANCE WITH AS/NZS1158.
2. SUPPLY & INSTALL CABLING INCLUDING TRENCHING & BACKFILLING. UNDER ROAD BORE CABLE WHERE POSSIBLE.
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A1	ISSUE	REVISION	DATE	CHECKED	ISSUE	REVISION	DATE	CHECKED

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TOWN OF BASSENDEAN
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BASSENDEAN W.A. 6934
Tel. (08) 9377 8000
Fax (08) 9279 4257
Email: mail@bassendean.wa.gov.au

ELECTRICAL SERVICES
SUCCESS HILL, BASSENDEAN
ANZAC TCE
LIGHTING LAYOUT

DESIGNED	DRAWN	CHECKED
A.P.	A.P.	C.L.
DATE: 29/01/19	SCALE: 1:500 @A1	

AS/NZS ISO 9001:2008
Certificate No. 9000 254

PROJECT No. 2738
DRAWING No. E6
SHEET 6 OF 11

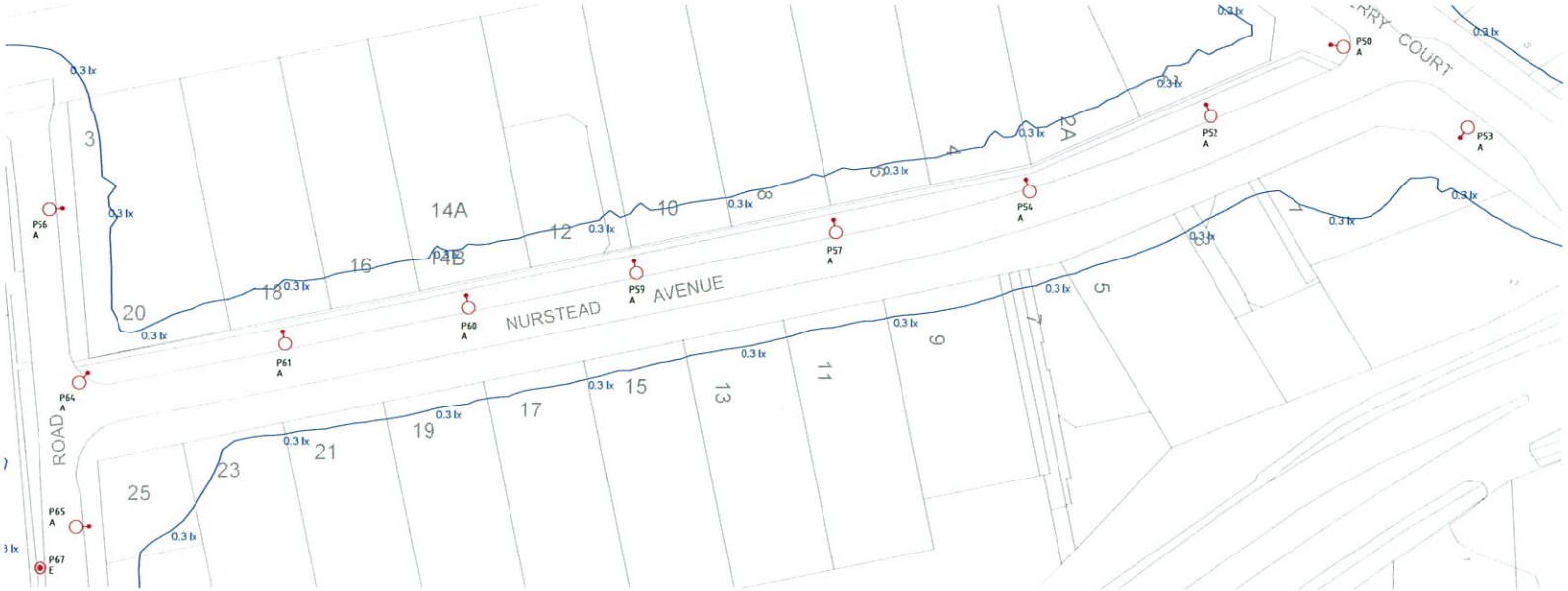
DESIGN NOTE
LIGHTING DESIGN TO AS/NZS1158.3.1
CATEGORY P3 (LOCAL ROADS).

0 5000 10000 20000 30000
Full Size 1:500 , Half Reduction 1:1000
SCALE (mm)

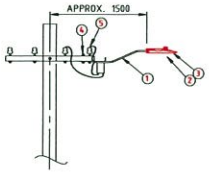
ALL DIMENSIONS ARE IN MILLIMETRES
DRAWN IN ACCORDANCE WITH AS1100-1992
DO NOT SCALE

THIRD ANGLE PROJECTION

N



SITE PLAN
SCALE 1:500 @ A1



MINOR ROAD XARM ON WOOD POLE
NOT TO SCALE

BILL OF MATERIALS (SL2-42)

ITEM	STOCK NUMBER	DESCRIPTION	QTY
1.	CB0424	BRACKET	1
2.	HL6231	LUMINAIRE-WITH LAMP & PE CELL FITTED	1
3.	GF0550	FUSE CARTRIDGE 10A	1
3.	GF1801	FUSE HOLDER 100A	1
4.	AB4567	ø12 BOLT 150 LONG WITH NUT	1
5.	FC0110	CLAMP ALUM. 16mm	2

LEGEND

SYMBOL	DESCRIPTION	LUMINAIRE	MANUFACTURER
P A	NEW LUMINAIRE - ROADGRACE ON EXISTING OVERHEAD WOOD POWER POLE	1 x 36W LED ROADGRACE BRP711 LED40NW 36W PSOO II DWP3 42-60	PHILIPS (SYGNIFY)
P B	NEW LUMINAIRE - ROADGRACE ON 6.5m STANDARD STEEL POLE (SINGLE OUTREACH)	1 x 36W LED ROADGRACE BRP711 LED40NW 36W PSOO II DWP3 42-60	PHILIPS (SYGNIFY)
P C	NEW LUMINAIRE - ROADFLAIR ON EXISTING OVERHEAD WOOD POWER POLE	1 x 80W LED ROADFLAIR BRP391 LED96NW 80W 220-240V DWV	PHILIPS (SYGNIFY)
P D	NEW LUMINAIRE - ROADFLAIR ON 10.5m STANDARD STEEL POLE (SINGLE OUTREACH)	1 x 80W LED ROADFLAIR BRP391 LED96NW 80W 220-240V DWV	PHILIPS (SYGNIFY)
P E	NEW LUMINAIRE - KENSINGTON ON 4.5m BOURDEUX STEEL POLE	1 x 17W LED KENSINGTON	SYLVANIA (GERARD LIGHTING)

POLE LOCATIONS

POLE #	EASTING	NORTHING
50	EXISTING	EXISTING
52	EXISTING	EXISTING
54	EXISTING	EXISTING
57	EXISTING	EXISTING
59	EXISTING	EXISTING
60	EXISTING	EXISTING
61	EXISTING	EXISTING

SCOPE OF WORK

1. SUPPLY & INSTALL STREETLIGHTING POLES & LUMINAIRES IN COMPLIANCE WITH AS/NZS1158
2. SUPPLY & INSTALL CABLING INCLUDING TRENCHING & BACKFILLING. UNDER ROAD BORE CABLE WHERE POSSIBLE.
3. PROTECT THE WORKS, INCLUDING SIGNAGE, BARRICADES, TEMPORARY WALKWAYS etc.
4. COMPLETE ELECTRICAL WORKS IN COMPLIANCE WITH THE OFFICE OF ENERGY'S 'GUIDELINES FOR ELECTRICITY TRANSMISSION & DISTRIBUTION WORK IN WESTERN AUSTRALIA'.
5. COMPLETE ELECTRICAL WORKS IN A SAFE MANNER & SAFETY TO THE PUBLIC IN COMPLIANCE WITH WORKSAFE WESTERN AUSTRALIA.
6. PROVIDE TRAFFIC MANAGEMENT.
7. INSPECT, TEST & COMMISSION STREETLIGHTS. INFORM CLIENT OF COMMISSIONING.
8. PROVIDE ELECTRONIC AND HARD COPIES OF 'RECORD' DRAWING SHOWING AS-CONSTRUCTED STATUS OF WORKS.
9. DESIGNED TO AS/NZS1158.3.1 SUBCATEGORY P3 (LOCAL ROADS).
10. COORDINATE WITH TOWN OF BASSENDEAN TO TRIM VEGETATION, WHERE NECESSARY.

WARNING
CONTRACTOR TO CONFIRM THE LOCATION OF ALL SERVICES PRIOR TO COMMENCEMENT OF WORKS.

WARNING

BEWARE OF UNDERGROUND SERVICES

The locations of underground services are approximate only and their exact position should be proven on site. No guarantee is given that all existing services are shown.

BEWARE OF OVERHEAD POWER LINES

Minimum clearances for Streetlight Pole/ Luminaire to Overhead Power Lines
Low Voltage - 3m
High Voltage - 3m
Extra High Voltage - 6m
COMPLY WITH AS/NZS7000 CLEARANCES

ISSUE	REVISION	DATE	CHECKED	ISSUE	REVISION	DATE	CHECKED
A1							

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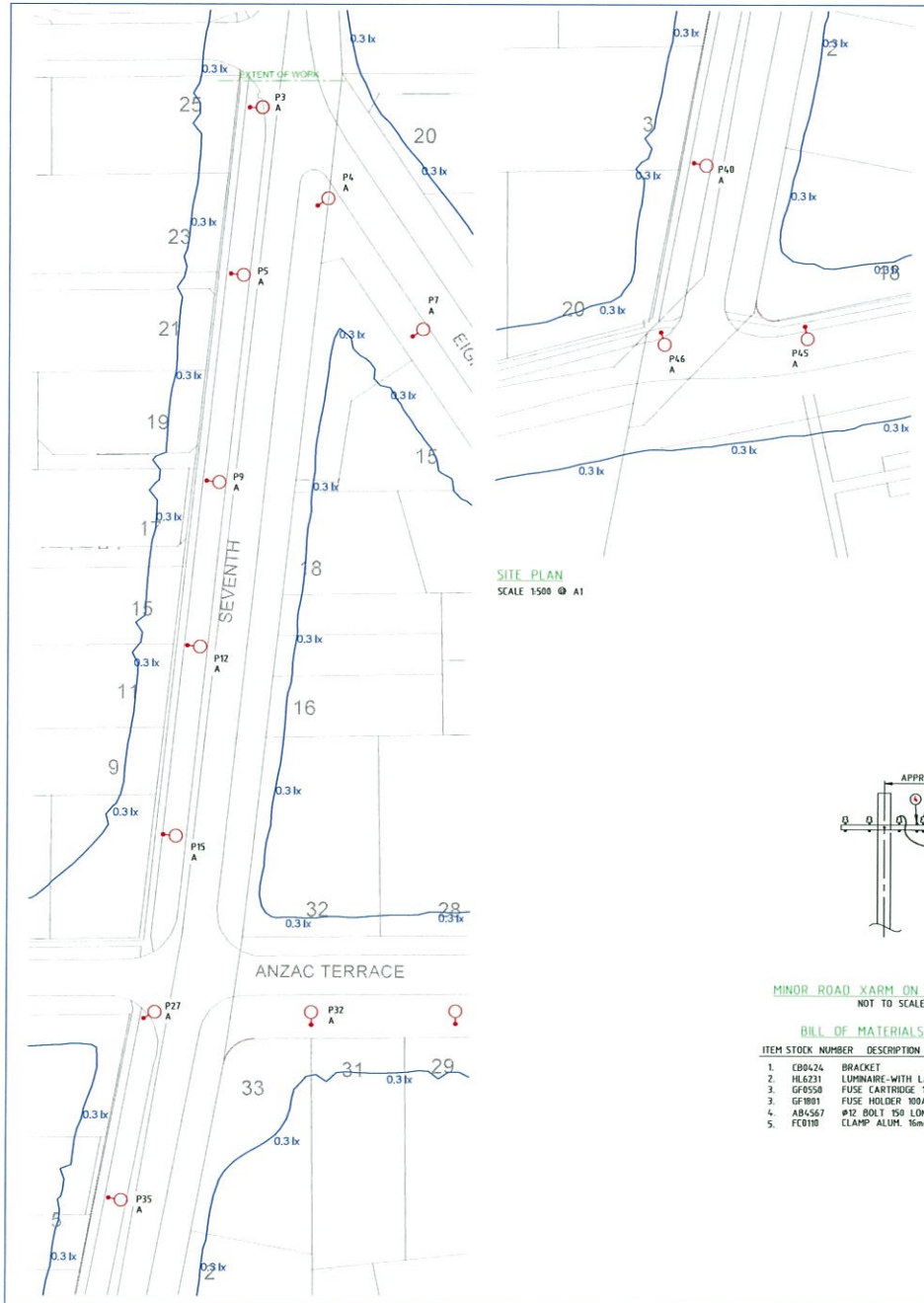
ELECTRICAL SERVICES
SUCCESS HILL, BASSENDEAN
NURSTEAD AVENUE
LIGHTING LAYOUT

DESIGNED	DRAWN	CHECKED
A.P.	A.P.	C.L.
DATE: 29/01/19	SCALE: 1:500 @A1	

AS/NZS ISO 9001:2008
Certificate No. 9000 254

PROJECT No. 2738
DRAWING No. E7
SHEET 7 OF 11



SITE PLAN
SCALE 1:500 @ A1

DESIGN NOTE
LIGHTING DESIGN TO AS/NZS1158.3.1
CATEGORY P3 (LOCAL ROADS).

0 5000 10000 20000 30000
Full Size 1:500 : Half Reduction 1:1000
SCALE (mm)

ALL DIMENSIONS ARE IN MILLIMETRES
DRAWN IN ACCORDANCE WITH AS1100-1992
DO NOT SCALE
THIRD ANGLE PROJECTION

N

LEGEND

SYMBOL	DESCRIPTION	LUMINAIRE	MANUFACTURER
P# A	NEW LUMINAIRE - ROADGRACE ON EXISTING OVERHEAD WOOD POWER POLE	1 x 36W LED ROADGRACE BRP711 LED40NW 36W PSOO II DWP3 42-60	PHILIPS (SYGNIFY)
P# B	NEW LUMINAIRE - ROADGRACE ON 6.5m STANDARD STEEL POLE (SINGLE OUTREACH)	1 x 36W LED ROADGRACE BRP711 LED40NW 36W PSOO II DWP3 42-60	PHILIPS (SYGNIFY)
P# C	NEW LUMINAIRE - ROADFLAIR ON EXISTING OVERHEAD WOOD POWER POLE	1 x 80W LED ROADFLAIR BRP391 LED96NW 80W 220-240V DWV	PHILIPS (SYGNIFY)
P# D	NEW LUMINAIRE - ROADFLAIR ON 10.5m STANDARD STEEL POLE (SINGLE OUTREACH)	1 x 80W LED ROADFLAIR BRP391 LED96NW 80W 220-240V DWV	PHILIPS (SYGNIFY)
P# E	NEW LUMINAIRE - KENSINGTON ON 4.5m BOURDEUX STEEL POLE	1 x 17W LED KENSINGTON	SYLVANIA (GERARD LIGHTING)

SCOPE OF WORK

1. SUPPLY & INSTALL STREETLIGHTING POLES & LUMINAIRES IN COMPLIANCE WITH AS/NZS1158.
2. SUPPLY & INSTALL CABLING INCLUDING TRENCHING & BACKFILLING, UNDER ROAD BORE CABLE WHERE POSSIBLE.
3. PROTECT THE WORKS, INCLUDING SIGNAGE, BARRICADES, TEMPORARY WALKWAYS etc.
4. COMPLETE ELECTRICAL WORKS IN COMPLIANCE WITH THE OFFICE OF ENERGY'S 'GUIDELINES FOR ELECTRICITY TRANSMISSION & DISTRIBUTION WORK IN WESTERN AUSTRALIA'.
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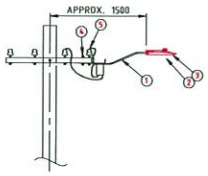
7. INSPECT, TEST & COMMISSION STREETLIGHTS. INFORM CLIENT OF COMMISSIONING.
8. PROVIDE ELECTRONIC AND HARD COPIES OF 'RECORD' DRAWING SHOWING AS-CONSTRUCTED STATUS OF WORKS.
9. DESIGNED TO AS/NZS1158.3.1 SUBCATEGORY P3 (LOCAL ROADS).
10. COORDINATE WITH TOWN OF BASSENDEAN TO TRIM VEGETATION, WHERE NECESSARY.



MINOR ROAD XARM ON WOOD POLE
NOT TO SCALE

BILL OF MATERIALS (SL2-42)

ITEM	STOCK NUMBER	DESCRIPTION	QTY
1.	CB0424	BRACKET	1
2.	HL6231	LUMINAIRE-WITH LAMP & PE CELL FITTED	1
3.	GF0558	FUSE CARTRIDGE 10A	1
3.	GF1801	FUSE HOLDER 100A	1
4.	AB4567	ø12 BOLT 150 LONG WITH NUT	1
5.	FC0110	CLAMP ALUM. 16mm	2

POLE LOCATIONS

POLE #	EASTING	NORTHING
3	EXISTING	EXISTING
5	EXISTING	EXISTING
9	EXISTING	EXISTING
12	EXISTING	EXISTING
15	EXISTING	EXISTING
27	EXISTING	EXISTING
35	EXISTING	EXISTING
40	EXISTING	EXISTING

BEFORE YOU DIG CALL 1100 BEFORE YOU DIG

WARNING
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WARNING

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Low Voltage - 1m
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Extra High Voltage - 6m
COMPLY WITH AS/NZS7000 CLEARANCES

A1	ISSUE	REVISION	DATE	CHECKED	ISSUE	REVISION	DATE	CHECKED

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ELECTRICAL SERVICES
SUCCESS HILL, BASSENDEAN
SEVENTH AVENUE
LIGHTING LAYOUT

DESIGNED	DRAWN	CHECKED
A.P.	A.P.	C.L.
DATE 29/01/19	SCALE 1:500 @A1	

AS/NZS ISO 9001:2008
Certificate No. 9000 254

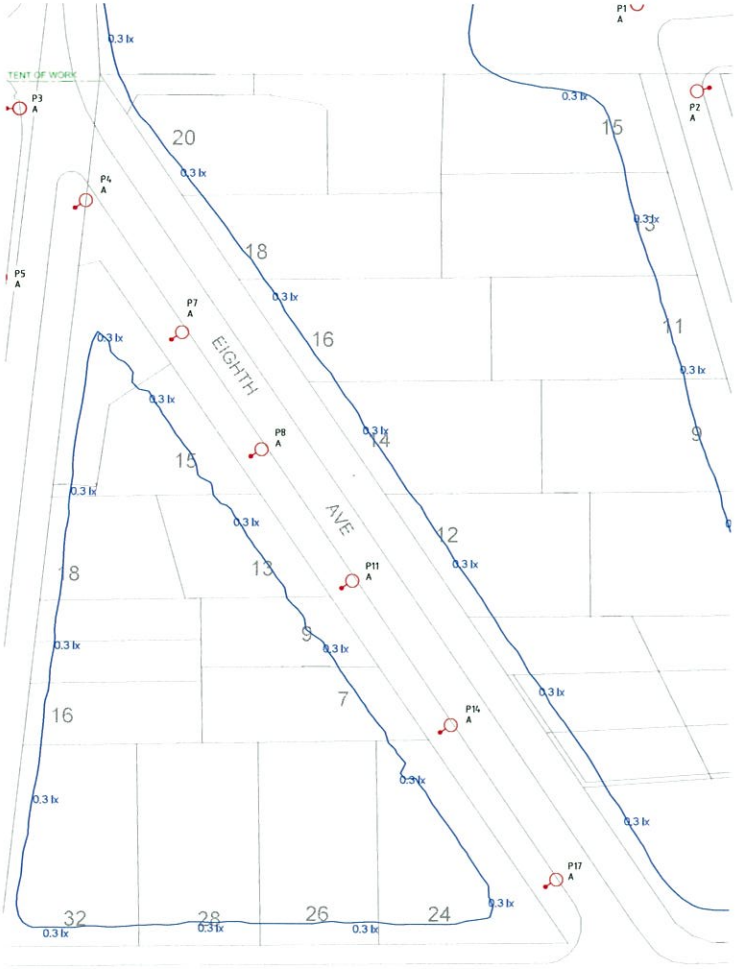
PROJECT No. 2738
DRAWING No. E8
SHEET 8 OF 11

DESIGN NOTE
LIGHTING DESIGN TO AS/NZS1158.3.1
CATEGORY P3 (LOCAL ROADS).

0 5000 10000 20000 30000
Full Size 1:500 Half Reduction 1:1000
SCALE (mm)

ALL DIMENSIONS ARE IN MILLIMETRES
DRAWN IN ACCORDANCE WITH AS1100-1992
DO NOT SCALE
THIRD ANGLE PROJECTION

N



ANZAC TERRACE

SITE PLAN
SCALE 1:500 @ A1

LEGEND

SYMBOL	DESCRIPTION	LUMINAIRE	MANUFACTURER
P# A	NEW LUMINAIRE - ROADGRACE ON EXISTING OVERHEAD WOOD POWER POLE	1 x 36W LED ROADGRACE BRP711 LED40NW 36W PSOO II DWP3 42-60	PHILIPS (SYGNIFY)
P# B	NEW LUMINAIRE - ROADGRACE ON 6.5m STANDARD STEEL POLE (SINGLE OUTREACH)	1 x 36W LED ROADGRACE BRP711 LED40NW 36W PSOO II DWP3 42-60	PHILIPS (SYGNIFY)
P# C	NEW LUMINAIRE - ROADFLAIR ON EXISTING OVERHEAD WOOD POWER POLE	1 x 80W LED ROADFLAIR BRP391 LED96NW 80W 220-240V DWV	PHILIPS (SYGNIFY)
P# D	NEW LUMINAIRE - ROADFLAIR ON 10.5m STANDARD STEEL POLE (SINGLE OUTREACH)	1 x 80W LED ROADFLAIR BRP391 LED96NW 80W 220-240V DWV	PHILIPS (SYGNIFY)
P# E	NEW LUMINAIRE - KENSINGTON ON 4.5m BOURDEUX STEEL POLE	1 x 17W LED KENSINGTON	SYLVANIA (GERARD LIGHTING)

SCOPE OF WORK

1. SUPPLY & INSTALL STREETLIGHTING POLES & LUMINAIRES IN COMPLIANCE WITH AS/NZS1158
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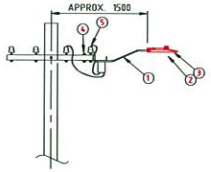
POLE LOCATIONS

POLE #	EASTING	NORTHING
4	EXISTING	EXISTING
7	EXISTING	EXISTING
8	EXISTING	EXISTING
11	EXISTING	EXISTING
14	EXISTING	EXISTING
17	EXISTING	EXISTING
33	EXISTING	EXISTING



MINOR ROAD XARM ON WOOD POLE
NOT TO SCALE

BILL OF MATERIALS (SL2-42)

ITEM	STOCK NUMBER	DESCRIPTION	QTY
1.	CB0424	BRACKET	1
2.	HL6231	LUMINAIRE-WITH LAMP & PE CELL FITTED	1
3.	GF0558	FUSE CARTRIDGE 10A	1
3.	GF1001	FUSE HOLDER 100A	1
4.	AB4567	Ø12 BOLT 150 LONG WITH NUT	1
5.	FC0110	CLAMP ALUM. 16mm	2

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COMPLY WITH AS/NZS7000 CLEARANCES

A1	ISSUE	REVISION	DATE	CHECKED	ISSUE	REVISION	DATE	CHECKED

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A.C.N. 082 955 217

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Home by the Swan
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Fax (08) 9279 4257
Email mail@bassendean.wa.gov.au

ELECTRICAL SERVICES
SUCCESS HILL, BASSENDEAN
EIGHTH AVENUE
LIGHTING LAYOUT

DESIGNED	DRAWN	CHECKED
A.P.	A.P.	C.L.
DATE: 29/01/19	SCALE: 1:500 @A1	

AS/NZS ISO 9001:2008
Certificate No. 9000 254

PROJECT No. 2738
DRAWING No. E9
SHEET 9 OF 11

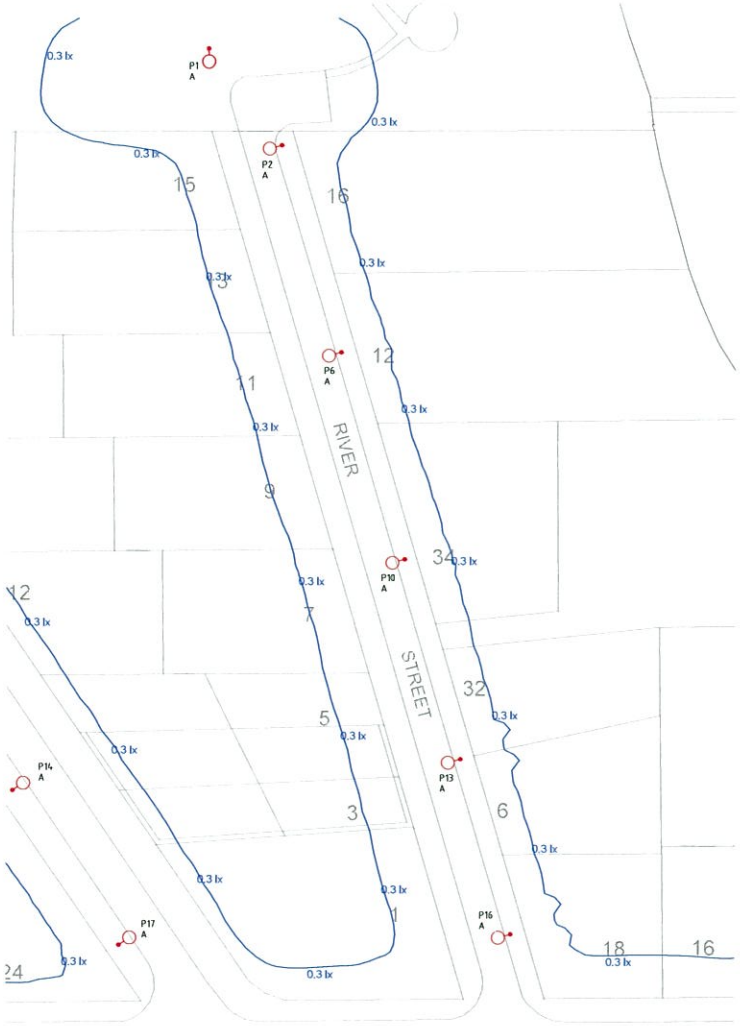
DESIGN NOTE
LIGHTING DESIGN TO AS/NZS1158.3.1
CATEGORY P3 (LOCAL ROADS).

0 5000 10000 20000 30000
Full Size 1:500 : Half Reduction 1:1000
SCALE (mm)

ALL DIMENSIONS ARE IN MILLIMETRES
DRAWN IN ACCORDANCE WITH AS1100-1992
DO NOT SCALE

THIRD ANGLE PROJECTION

N



SITE PLAN
SCALE 1:500 @ A1

LEGEND

SYMBOL	DESCRIPTION	LUMINAIRE	MANUFACTURER
P# A	NEW LUMINAIRE - ROADGRACE ON EXISTING OVERHEAD WOOD POWER POLE	1 x 36W LED ROADGRACE BRP711 LED40NW 36W PSOO II DWP3 42-60	PHILIPS (SYGNIFY)
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P# C	NEW LUMINAIRE - ROADFLAIR ON EXISTING OVERHEAD WOOD POWER POLE	1 x 80W LED ROADFLAIR BRP391 LED96NW 80W 220-240V DWV	PHILIPS (SYGNIFY)
P# D	NEW LUMINAIRE - ROADFLAIR ON 10.5m STANDARD STEEL POLE (SINGLE OUTREACH)	1 x 80W LED ROADFLAIR BRP391 LED96NW 80W 220-240V DWV	PHILIPS (SYGNIFY)
P# E	NEW LUMINAIRE - KENSINGTON ON 4.5m BOURDEUX STEEL POLE	1 x 17W LED KENSINGTON	SYLVANIA (GERARD LIGHTING)

SCOPE OF WORK

1. SUPPLY & INSTALL STREETLIGHTING POLES & LUMINAIRES IN COMPLIANCE WITH AS/NZS1158
2. SUPPLY & INSTALL CABLING INCLUDING TRENCHING & BACKFILLING, UNDER ROAD BORE CABLE WHERE POSSIBLE.
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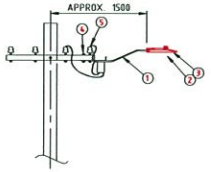
POLE LOCATIONS

POLE #	EASTING	NORTHING
1	EXISTING	EXISTING
2	EXISTING	EXISTING
6	EXISTING	EXISTING
10	EXISTING	EXISTING
13	EXISTING	EXISTING
16	EXISTING	EXISTING



MINOR ROAD XARM ON WOOD POLE
NOT TO SCALE

BILL OF MATERIALS (SL2-42)

ITEM	STOCK NUMBER	DESCRIPTION	QTY
1.	CB0424	BRACKET	1
2.	HL6231	LUMINAIRE-WITH LAMP & PE CELL FITTED	1
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5.	FC0110	CLAMP ALUM. 16mm	2

DIAL BEFORE YOU DIG 1100

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COMPLY WITH AS/NZS7000 CLEARANCES

A1	ISSUE	REVISION	DATE	CHECKED	ISSUE	REVISION	DATE	CHECKED

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Home by the Swan

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Email: mail@bassendean.wa.gov.au

ELECTRICAL SERVICES
SUCCESS HILL, BASSENDEAN
RIVER STREET
LIGHTING LAYOUT

DESIGNED	DRAWN	CHECKED
A.P.	A.P.	C.L.
DATE: 29/01/19	SCALE: 1:500 @A1	

AS/NZS ISO 9001:2008
Certificate No. 9000 254

PROJECT No. 2738
DRAWING No. E10
SHEET 10 OF 11

DESIGN NOTE
LIGHTING DESIGN TO AS/NZS1158.3.1
CATEGORY P3 (LOCAL ROADS).

0 5000 10000 20000 30000
Full Size 1:500 Half Reduction 1:1000
SCALE (mm)

ALL DIMENSIONS ARE IN MILLIMETRES
DRAWN IN ACCORDANCE WITH AS1100-1992
DO NOT SCALE
THIRD ANGLE PROJECTION

SITE PLAN
SCALE 1:500 @ A1

LEGEND

SYMBOL	DESCRIPTION	LUMINAIRE	MANUFACTURER
P# A	NEW LUMINAIRE - ROADGRACE ON EXISTING OVERHEAD WOOD POWER POLE	1 x 36W LED ROADGRACE BRP711 LED40NW 36W PSOO II DWP3 42-60	PHILIPS (SYGNIFY)
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P# C	NEW LUMINAIRE - ROADFLAIR ON EXISTING OVERHEAD WOOD POWER POLE	1 x 80W LED ROADFLAIR BRP391 LED96NW 80W 220-240V DWV	PHILIPS (SYGNIFY)
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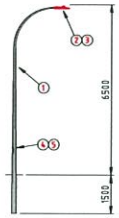
P# E	NEW LUMINAIRE - KENSINGTON ON 4.5m BOURDEUX STEEL POLE	1 x 17W LED KENSINGTON	SYLVANIA (GERARD LIGHTING)

POLE LOCATIONS

POLE #	EASTING	NORTHING
47	401499.075	6470163.279
53	EXISTING	EXISTING
55	401590.835	6470114.898

SCOPE OF WORK

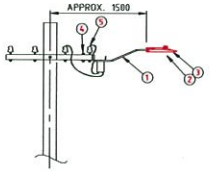
1. SUPPLY & INSTALL STREETLIGHTING POLES & LUMINAIRES IN COMPLIANCE WITH AS/NZS1158
2. SUPPLY & INSTALL CABLING INCLUDING TRENCHING & BACKFILLING, UNDER ROAD BORE CABLE WHERE POSSIBLE.
3. PROTECT THE WORKS, INCLUDING SIGNAGE, BARRICADES, TEMPORARY WALKWAYS etc.
4. COMPLETE ELECTRICAL WORKS IN COMPLIANCE WITH THE OFFICE OF ENERGY'S 'GUIDELINES FOR ELECTRICITY TRANSMISSION & DISTRIBUTION WORK IN WESTERN AUSTRALIA'.
5. COMPLETE ELECTRICAL WORKS IN A SAFE MANNER & SAFETY TO THE PUBLIC IN COMPLIANCE WITH WORKSAFE WESTERN AUSTRALIA.
6. PROVIDE TRAFFIC MANAGEMENT.
7. INSPECT, TEST & COMMISSION STREETLIGHTS. INFORM CLIENT OF COMMISSIONING.
8. PROVIDE ELECTRONIC AND HARD COPIES OF 'RECORD' DRAWING SHOWING AS-CONSTRUCTED STATUS OF WORKS.
9. DESIGNED TO AS/NZS1158.3.1 SUBCATEGORY P3 (LOCAL ROADS).
10. COORDINATE WITH TOWN OF BASSENDEAN TO TRIM VEGETATION, WHERE NECESSARY.



6.5 METRE POLE WITH 1.5 METRE OUTREACH
(SCALE 1 : 100)

BILL OF MATERIALS SL8.3L

ITEM	STOCK NO.	DESCRIPTION	QTY
1	CW0255	POLE 6.5m SL STEEL POLE	1
2	HL6306	LED LUMINAIRE WITH 8m CABLE	1
2	HL5557	NEMA BASE PE CELL	1
3	HZ0132	SL FUSE BOX	1
4	GF1300	FUSE CARTRIDGE 10AMP	1



MINOR ROAD XARM ON WOOD POLE
NOT TO SCALE

BILL OF MATERIALS (SL2-42)

ITEM	STOCK NUMBER	DESCRIPTION	QTY
1.	CB0424	BRACKET	1
2.	HL6231	LUMINAIRE-WITH LAMP & PE CELL FITTED	1
3.	GF0550	FUSE CARTRIDGE 10A	1
4.	GF1801	FUSE HOLDER 100A	1
4.	AB4567	ø12 BOLT 150 LONG WITH NUT	1
5.	FC0110	CLAMP ALUM. 16mm	2

WARNING
CONTRACTOR TO CONFIRM THE LOCATION OF ALL SERVICES PRIOR TO COMMENCEMENT OF WORKS.

WARNING

BEWARE OF UNDERGROUND SERVICES

The locations of underground services are approximate only and their exact position should be proven on site. No guarantee is given that all existing services are shown.

BEWARE OF OVERHEAD POWER LINES

Minimum clearances for Streetlight Pole/ Luminaire to Overhead Power Lines
Low Voltage - 3m
High Voltage - 3m
Extra High Voltage - 6m
COMPLY WITH AS/NZS7000 CLEARANCES

ISSUE	REVISION	DATE	CHECKED
A1			

ISSUE	REVISION	DATE	CHECKED

SAGE CONSULTING ENGINEERS Pty. Ltd.
203 RAILWAY ROAD SUBIACO W.A. 6008
TEL: (08) 9388 9745
FAX: (08) 9388 9256
Email: msage@iinet.net.au
A.C.N. 082 955 217

© Copyright of this drawing is vested in: SAGE CONSULTING ENGINEERS and the contents are solely for the use of the client and Project identified on this drawing.

TOWN OF BASSENDEAN
Home by the Swan
P.O.BOX 87
BASSENDEAN W.A 6934
Tel. (08) 9377 6000
Fax: (08) 9279 4257
Email: mail@bassendean.wa.gov.au

ELECTRICAL SERVICES
SUCCESS HILL, BASSENDEAN
EARLSFERRY COURT
LIGHTING LAYOUT

DESIGNED	DRAWN	CHECKED
A.P.	A.P.	C.L.
DATE: 29/01/19	SCALE: 1:500 @A1	

AS/NZS ISO 9001:2008
Certificate No. 9000 254

PROJECT No. 2738
DRAWING No. E11
SHEET 11 OF 11

Your reference: 8UGL73 Thompson-E3

Request reference: MP183301

11 March 2019

Town of Bassendean
PO Box 87
BASSENDEAN WA 6934

Attention: Mr David Dwyer

Dear Mr Dwyer,

THOMPSON RD BASSENDEAN
WESTERN POWER REF: MP183301

Western Power wishes to advise that we have completed the design work for your request and we are pleased to provide you with this quote for your consideration.

The included design drawing MP183301 contains:

- Western Power's scope of work
- Specific items you must complete before we can start work
- Any other specific items you must consider or action

On acceptance of this quote you are agreeing to abide by all conditions identified on the design drawing and the Terms and Conditions accepted on your application form.

QUOTE

Overhead Construction	$7,452.32
Underground Construction	$6,162.03
Commissioning	$941.66
Non Network Work	$4,078.32
Switching	$317.76
Work Packaging/Prelim Site Inspection	$1,741.91
Total (GST not applicable)	**$20,694.00**
Plus recovery of tax on capital contribution 13.9%	**$2,876.00**
Total (GST not applicable)	**$23,570.00**

westernpower

363 Wellington Street Perth 6000
GPO Box L921 Perth WA 6842
westernpower.com.au

t 13 10 87
f (08) 9225 2660
TTY 1800 13 13 51
TIS 13 14 50
Electricity Networks Corporation
ABN: 18 540 492 861

HOW TO PROCEED

If you wish to proceed with this project please complete and return the attached Acceptance within 60 calendar days.

Please note the following important points:

- If we do not receive the Acceptance from you within 60 calendar days, this quote expires and your request will be cancelled.

- Please note, cancellation fees are payable for all projects that do not proceed and Western Power will invoice you for costs associated with developing your quote.

ANY QUESTIONS?

If you have any questions, please telephone our Customer Service Centre on 13 10 87 during business hours.

Yours faithfully

Manager
Customer Projects

encl: Acceptance
Site contact sheet

Your reference: 8UGL73 Thompson-E3

Request reference: MP183301

QUOTE ACCEPTANCE

Project	THOMPSON RD BASSENDEAN WA 6054
Western Power Reference	MP183301
Quote Date	11 March 2019
Amount Payable (GST not applicable)	$23,570.00

Please submit the completed form to: https://westernpower.com.au/contact-us/ ensuring the Customer Details are correct. Any changes to this invoice will incur a $550.00 (inc. GST) re-issue fee.

CUSTOMER DETAILS (for invoice purposes)

Name: _____

Company Name: _____

Address: _____

_____

_____

Phone No: _____

I hereby request Western Power to proceed with the above project, as per Western Power's standard terms and conditions and agree to pay the amount as outlined above.

Signature: _____ Date: _____

Please select your preferred payment option:

☐ EFT ☐ Post invoice ☐ Cheque attached

☐ Email invoice to: _____

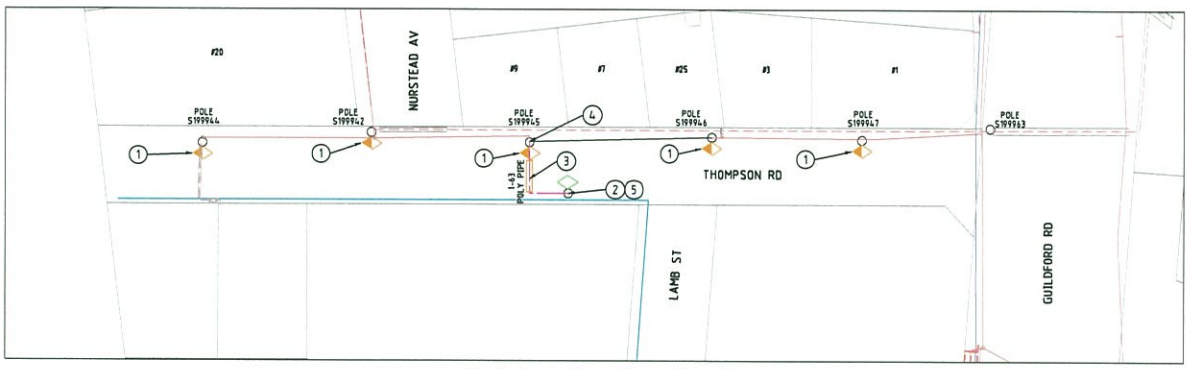
SITE CONTACT DETAILS

(Please return with your Quote Acceptance form)

I hereby authorise the following person to be contacted by Western Power in regards to any site information required:

Western Power reference:	
Site address:	
Name of authorised person (please print):	
Title eg. Electrical Contractor:	
Phone:	
Email:	

Signature_____ Date:_____



1:500 10 5 0 10 20 30 40

SITE LOCATION

LEGEND

LV-SL CABLES
CN4.5 - 240mm2 (4x3c)
CN4 - 185mm2 (4x3c)
CN3 - 120mm2 (4x3c)
CN2 - 25mm2 (4x3c)
CN1 - 16mm2 SL (4c)
40 C PILOT
EXISTING LV CABLES (SIZE AND TYPE INDICATED)

STREET LIGHTS EXISTING
42W CFL, 80W MV, 125W MV, 70W HPS, 150W HPS, 250W HPS, 250W HPS AERODROME, 70W MH, 150W MH, 250W MH, 1L LED, 2L LED, 3L LED, 4L LED, 5L LED, 6L LED
LEGEND DEFINES TYPE & WATTAGE - NOT COLOUR

PILLARS / PITS / ETC
MINI (WORKING END), UNIVERSAL, MINI, LINK, UMS PIT, UTILITIES PIT, 100/200AMP CUTOUT, CONDUIT / POLY PIPE, CABLE MARKER U/G, Serviced Undaered De-energised Let

AERIAL CONDUCTORS AND POLES
NEW POLE (ANY TYPE AS INDICATED)
EXISTING POLE (ANY TYPE AS INDICATED)
EXISTING AERIAL CONDUCTORS (SIZE AND TYPE INDICATED)

WESTERN POWER SCOPE OF WORK

1. REPLACE EXISTING STREET LIGHT WITH NEW 36W LED ON POLES S199942, S199944, S199945, S199946 AND S199947.
   CU: SL2 X 5
   DCSH: S02-1
2. INSTALL NEW EBONY COLOR DECORATIVE 4.5m BORDEAUX POLE ON CUSTOMER'S PEGGED LOCATION.
   INSTALL 17W LED LUMINAIRE.
   CU: DM103_1 X 1, DM8_1_EBY
3. INSTALL NEW 16SL CABLE FROM EXISTING POLE S199945 TO NEW STREET LIGHT POLE.
   CU: CN41 X 40m, CN54 X 2, CN73 X 3
4. TERMINATE NEW 16SL CABLE TO POLE S199945.
   CU: LU51 X 1
5. TERMINATE NEW 16SL CABLE TO NEW STREET LIGHT POLE.
6. ENVIRONMENTAL FILTER CHECKED
   NO ENVIRONMENTAL ISSUES IDENTIFIED IN IMMEDIATE WORKING AREAS. NEARBY POTENTIAL ENVIRONMENTAL RISK AREAS ARE INDICATED ON ENVIRONMENTAL DRAWING. (DO NOT ENTER OR IMPACT WITHOUT WESTERN POWER APPROVAL. CONTACT CUSTOMER IF ANY CONCERN ARISE ABOUT ENVIRONMENTAL ISSUE.)
   1. ABORIGINAL HERITAGE SITES.
   2. MUNICIPAL INVENTORY.
   3. ACID SULFATE SOILS HIGH RISK WITH 500m BUFFER.

CUSTOMER SCOPE OF WORK

(A) THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE WESTERN AUSTRALIAN DISTRIBUTION CONNECTIONS MANUAL.

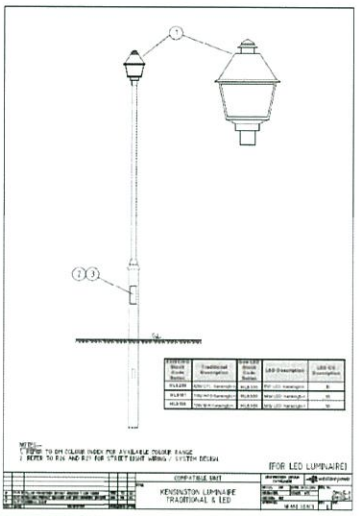
(B) CUSTOMER TO PEG THE POSITION OF NEW STREETLIGHTS IN ACCORDANCE WITH AS1158 AND SPECIFIC REQUIREMENTS FROM LGA AND/OR ROAD AUTHORITY AT NO COST TO WESTERN POWER.

(C) CUSTOMER IS RESPONSIBLE TO PRUNE THE TREE IF REQUIRED AT NO COST TO WESTERN POWER.

(D) CUSTOMER IS RESPONSIBLE FOR IDENTIFYING THE ENVIRONMENTAL ISSUE AT WESTERN POWER CONSTRUCTION SITE. CUSTOMER IS ALSO RESPONSIBLE FOR MANAGING AND MITIGATING ENVIRONMENTAL ISSUE IF REQUIRED PRIOR TO COMMENCE WORK AT NO COST TO WESTERN POWER.

(E) IF NOISE MANAGEMENT PLAN IS REQUIRED BY LOCAL GOVERNMENT AUTHORITY, ADDITIONAL COST MAY APPLY.

SPECIFIC NOTE TO CONSTRUCTION MANAGER
POLES S199944 AND S199946 ARE UNSERVICEABLE.
CM TO CONTACT DESIGNER IF POLE REPLACEMENT REQUIRE.



CRITICAL SERVICES IN VICINITY OF WORKS

APPROVED FOR CONSTRUCTION

RESTORATION & REINSTATEMENT REQUIREMENTS

RESTORATION & REINSTATEMENT REQUIRED FOR THIS PROJECT TO BE COMPLETED AS PER THE RESTORATION AND REINSTATEMENT SPECIFICATION FOR LOCAL GOVT'S IN WA. THE CONSTRUCTION MANAGER IS RESPONSIBLE FOR ALL RESTORATION AND REINSTATEMENT (R&R) FORMALLY ACCEPTED BY WESTERN POWER OR LOCAL GOVT AUTHORITY AS APPROPRIATE. SEE FIELD INSTRUCTION 221.

CUSTOMER CONTACT DETAILS
COMPANY NAME: Town of Bassendean
CONTACT: DAVID DWYER TEL: 9377 9011

Rev.	REVISIONS	DRN	DATE	FILE REFERENCE DETAILS
				HAZARD MANAGEMENT REGISTER: EDM 47729875
A	APPROVED FOR CONSTRUCTION	D.P.	03/19	SAFETY IN DESIGN DM# 47734813

REPLACE 5 X STREET LIGHT AND INSTALL 1 NEW STREET LIGHT POLE

THOMPSON RD BASSENDEAN

NETWORK VOLTAGE: 415V

westernpower

DESIGNER: NETWORK CONNECTION SERVICE
TEL: 13 10 87
DATE: 03/19
SCALE: AS SHOWN @ A2
QED REF: Lat. - 31°54'04" S Long. - 115°57'22" E

DRAWING NUMBER
MP183301
SHEET 1 OF 1
REV: A ORIGINAL SIZE - A2

Electricity Networks Corporation
ABN 18 540 492 861
Locked Bag 2520 Perth WA 6001

Enquiries
13 10 87
National Relay Service
1800 13 13 51
TIS 13 14 50
Interpreter services

enquiry@westernpower.com.au
westernpower.com.au

FAQ Quote cost explanations

What does Underground Construction mean?

Underground construction relates to the installation of ground mounted assets (e.g. pillars, transformers, switchgear etc.) and underground cabling.

What does overhead construction mean?

Overhead construction relates to any work on overhead lines and associated pole top assets.

What is Non Network Work?

Non-Network work can best be described as all the tasks required in order to get a project to the point of construction, and in some cases to restore the site to its previous condition. It may include such tasks as :

- Underground service location
- GIS updating
- Pre-job planning / scheduling
- Crew travel (not including switching crew)
- Removal / reinstatement
- Traffic management

What is switching?

It involves attending site to scope and assess requirements, preparation of a switching plan in conjunction with the network control centre, notifying all customers who will be impacted by the outage, actioning the switching plan and all associated travel.

What is Testing?

Before a new piece of equipment can be connected to the network, it needs to be tested after installation to ensure that it has been installed correctly and are safe to energise. Equipment to be tested includes ground mounted pillars, transformers and underground cables.

Why have I been charged for Travel?

The cost of travel is calculated from the nearest depot that delivers your project. Some country depots are only set up for operational and maintenance purposes and might not be able to deliver customer funded works.

What is work Packaging/Prelim Site Inspection?

These costs are associated with ordering the materials required for the project, scheduling the work and ensuring crew availability, and managing the project from the point of customer payment all the way through to completion.

What is Customer Service Work?

- Metering installation.
- Consumer mains cable termination.

The lot being supplied is considered as unserviced as there is no existing low voltage network in close proximity to the lot.
For more information, please refer to the Western Power website –

https://westernpower.com.au/industry/distribution-low-voltage-connection-headworks-scheme-dlvchs/

Why did you charge me full cost?

Your project was not eligible for the DLVCHS (see link above for more information). Relocation and subdivision works are full cost works.

How many hours?

Each task that Western Power crews or contractors need to perform to deliver the project have been allocated a certain number of hours to complete. These hours are based on the likely time needed to carry out the work but can vary depending on the site and the conditions on the day of construction.

Your reference: UCNG54 Nurstead Ave

Request reference: MP183372

05 April 2019

Town of Bassendean
PO Box 87
BASSENDEAN WA 6934

Attention: Mr David Dwyer

Dear Mr Dwyer,

NURSTEAD AVE BASSENDEAN
WESTERN POWER REF: MP183372

Western Power wishes to advise that we have completed the design work for your request and we are pleased to provide you with this quote for your consideration.

The included design drawing MP183372 contains:

- Western Power's scope of work
- Specific items you must complete before we can start work
- Any other specific items you must consider or action

On acceptance of this quote you are agreeing to abide by all conditions identified on the design drawing and the Terms and Conditions accepted on your application form.

QUOTE

Overhead Construction	$10,489.00
Underground Construction	$905.95
Non Network Work	$2,566.36
Switching	$505.30
Work Packaging/Prelim Site Inspection	$511.39
Total (GST not applicable)	**$14,978.00**
Plus recovery of tax on capital contribution 13.9%	**$2,082.00**
Total (GST not applicable)	**$17,060.00**

westernpower

363 Wellington Street Perth 6000
GPO Box L921 Perth WA 6842
westernpower.com.au

t 13 10 87
f (08) 9225 2660
TTY 1800 13 13 51
TIS 13 14 50
Electricity Networks Corporation
ABN: 18 540 492 861

ANY QUESTIONS?

If you have any questions, please telephone our Customer Service Centre on 13 10 87 during business hours.

Yours faithfully

Manager
Customer Projects

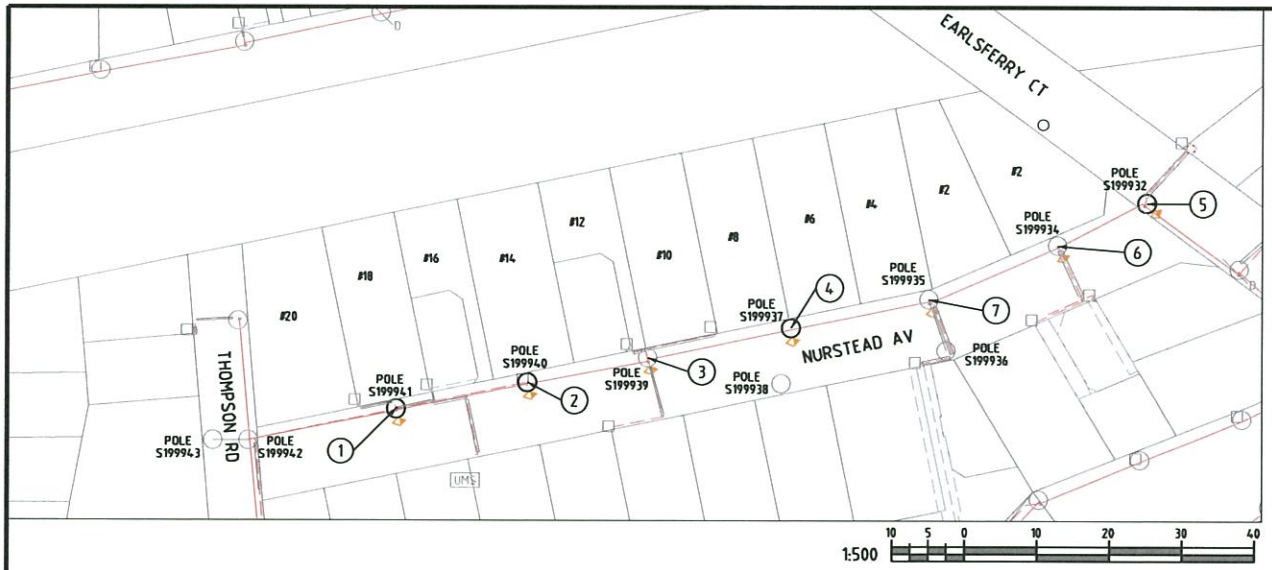
Site Contact Details

(Please upload a completed copy during your online acceptance)

I hereby authorise the following person to be contacted by Western Power in regard to any site information required:

Western Power reference:	
Site address:	
Name of authorised person (please print):	
Title eg. Electrical Contractor:	
Phone:	
Email:	

Signature_____ Date:_____



SITE LOCATION

LEGEND

LV-SL CABLES

- CN45 - 240mm2 (1x3c)
- CN44 - 185mm2 (1x3c)
- CN43 - 120mm2 (1x3c)
- CN42 - 25mm2 (1x3c)
- CN41 - 16mm2 SL (1c)
- 48 C PILOT
- EXISTING LV CABLES (SIZE AND TYPE INDICATED)

STREET LIGHTS

EXISTING

- 42W CFL
- 80W MV
- 125W MV
- 70W HPS
- 150W HPS
- 250W HPS
- 250W HPS AERODROME
- 70W MH
- 150W MH
- 250W MH
- 1L LED
- 2L LED
- 3L LED
- 4L LED
- 5L LED
- 6L LED

LEGEND DEFINES TYPE & WATTAGE - NOT COLOUR

PILLARS / PITS / ETC

- MDHI (WORKING END)
- UNIVERSAL
- MDHI
- LINK
- UMS PIT
- UTILITIES PIT
- 100/200AMP CUTOUT
- CONDUIT / POLY PIPE
- CABLE MARKER U/G
- Serviced Unlocated De-energised Lot

AERIAL CONDUCTORS AND POLES

- NEW POLE (ANY TYPE AS INDICATED)
- EXISTING POLE (ANY TYPE AS INDICATED)
- HV LV EXISTING AERIAL CONDUCTORS (SIZE AND TYPE INDICATED)

WESTERN POWER SCOPE OF WORK

1. REPLACE EXISTING POLE S199941 WITH NEW 9.5m/5KN POLE.
   INSTALL NEW LV INTERMEDIATE CROSS ARM.
   INSTALL NEW 36W LED STREET LIGHT.
   INSTALL NEW 2 X 25LV CABLE AT POLE BASE, STRAIGHT JOINT WITH EXISTING 25LV CABLE AND TERMINATE NEW 25LV CABLE TO POLE.
   RE-TERMINATE EXISTING 2 X SERVICE MAINS.
   CU: PO2 X 1, LV1 X 1, CN27 X 4, SL2_L3 X 1, CN42 X 30m, CN73 X 6, LU8 X 2, LU51 X 2
   NON CU: CB0204 X 1, FC0161 X 8
   DCSH: R13-3, L1, S02-1, U19-1

2. REPLACE EXISTING POLE S199940 WITH NEW 9.5m/5KN POLE.
   INSTALL NEW LV INTERMEDIATE CROSS ARM.
   INSTALL NEW 36W LED STREET LIGHT.
   INSTALL NEW 25LV CABLE AT POLE BASE, STRAIGHT JOINT WITH EXISTING 25LV CABLE AND TERMINATE NEW 25LV CABLE TO POLE.
   RE-TERMINATE EXISTING 4 X SERVICE MAINS.
   CU: PO2 X 1, LV1 X 1, CN27 X 4, SL2_L3 X 1, CN42 X 15m, CN73 X 3, LU8 X 1, LU51 X 1
   NON CU: CB0204 X 2, FC0161 X 16
   DCSH: R13-3, L1, S02-1, U19-1

3. REPLACE EXISTING LV CROSS ARM WITH NEW LV CROSS ARM ON POLE S199939.
   REPLACE EXISTING STREET LIGHT WITH NEW 36W LED STREET LIGHT.
   RE-TERMINATE EXISTING 25LV CABLE.
   RE-TERMINATE EXISTING SERVICE MAINS.
   CU: LV1 X 1, CN27 X 4, SL2_L3 X 1
   NON CU: CB0204 X 1, FC0161 X 8
   DCSH: L1, S02-1

4. REPLACE EXISTING POLE S199937 WITH NEW 9.5m/5KN POLE.
   INSTALL NEW LV CROSS ARM.
   INSTALL NEW 36W LED STREET LIGHT.
   RE-TERMINATE EXISTING 5 X OVERHEAD SERVICE MAINS.
   CU: PO2 X 1, LV1 X 1, CN27 X 4, SL2_L3 X 1
   NON CU: CB0204 X 2, FC0161 X 20
   DCSH: R13-3, L1, S02-1

5. REPLACE EXISTING POLE S199932 WITH NEW 9.5m/5KN POLE.
   INSTALL NEW 2 X LV TERMINATION XARM.
   INSTALL NEW 36W LED STREET LIGHT.
   RE-TERMINATE EXISTING 2 STAY WIRE.
   RE-TERMINATE EXISTING SERVICE MAIN.
   INSTALL NEW 25LV CABLE AT POLE BASE, STRAIGHT JOINT WITH EXISTING 25LV CABLE AND TERMINATE NEW 25LV CABLE TO POLE.
   CU: PO2 X 1, LV5 X 2, CN13 X 8, CN9 X 8, CN69 X 8, SL3_L3 X 1, CN42 X 15m, CN73 X 3, LU8 X 1, LU51 X 1, ST1 X 2
   NON CU: CB0204 X 1, FC0161 X 4
   DCSH: R13-3, L1, S02-1, U19-1

6. INSTALL NEW 36W LED ON EXISTING POLE S199934.
   CU: SL2_L3 X 1
   DCSH: S02-1

7. REPLACE EXISTING STREET STREET LIGTH WITH NEW 36W LED ON EXISTING POLE S199935.
   CU: SL2_L3 X 1
   DCSH: S02-1

8. ENVIRONMENTAL FILTER CHECKED
   NO ENVIRONMENTAL ISSUES IDENTIFIED IN IMMEDIATE WORKING AREAS. NEARBY POTENTIAL ENVIRONMENTAL RISK AREAS ARE LISTED BELOW. (DO NOT ENTER OR IMPACT WITHOUT WESTERN POWER APPROVAL)
   - ABORIGINAL HERITAGE SITES.
   - MUNICIPAL INVENTORY.
   - RAIL NOTIFICATION ZONES.

CUSTOMER SCOPE OF WORK

(A) THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE WESTERN AUSTRALIAN DISTRIBUTION CONNECTIONS MANUAL.

(B) CUSTOMER IS RESPONSIBLE FOR IDENTIFYING THE ENVIRONMENTAL ISSUE AT WESTERN POWER CONSTRUCTION SITE. CUSTOMER IS ALSO RESPONSIBLE FOR MANAGING AND MITIGATING ENVIRONMENTAL ISSUE IF REQUIRED PRIOR TO COMMENCE WORK AT NO COST TO WESTERN POWER.

(C) IF NOISE MANAGEMENT PLAN IS REQUIRED BY LOCAL GOVERNMENT AUTHORITY, ADDITIONAL COST MAY APPLY.

SPECIFIC NOTE TO CONSTRUCTION MANAGER
SOME POLES ARE LABEL AS UNSERVICEABLE OR MAY NOT SAFE TO WORK ON IT.
CM TO ASSESS THE POLE CONDITION ON SITE AND
CONTACT DESIGNER IF POLE REPLACEMENT REQUIRED.

APPROVED FOR CONSTRUCTION

CRITICAL SERVICES IN VICINITY OF WORKS

RESTORATION & REINSTATEMENT REQUIREMENTS

RESTORATION & REINSTATEMENT REQUIRED FOR THIS PROJECT TO BE COMPLETED AS PER THE RESTORATION AND REINSTATEMENT SPECIFICATION FOR LOCAL GOV'TS IN WA. THE CONSTRUCTION MANAGER IS RESPONSIBLE FOR ALL RESTORATION AND REINSTATEMENT UNTIL FORMALLY ACCEPTED BY WESTERN POWER OR LOCAL GOV'T AUTHORITY AS APPROPRIATE. SEE FIELD INSTRUCTION 2.21.

CUSTOMER CONTACT DETAILS

COMPANY NAME: Town of Bassendean
CONTACT: DAVID DWYER TEL: 9377 9011

Rev.	REVISIONS	DRN	DATE	FILE REFERENCE DETAILS
A	APPROVED FOR CONSTRUCTION	D.P.	03/19	HAZARD MANAGEMENT REGISTER: EDM 47869080
				SAFETY IN DESIGN DM#: 47868889

REPLACE 4 X STREET LIGHT AND INSTALL 3 X NEW STREET LIGHT

NURSTEAD AVE BASSENDEAN

NETWORK VOLTAGE: 415V

westernpower

DESIGNER: NETWORK CONNECTION SERVICE	DRAWING NUMBER
TEL: 13 10 87	MP183372
DATE: 03/19 SCALE: AS SHOWN @ A2	SHEET 1 OF 1
GEO REF: Lat. - 31°54'04" S Long. - 115°57'22" E	REV: A ORIGINAL SIZE - A2

FAQs

Quote cost explanations

What does Underground Construction mean?

Underground construction relates to the installation of ground mounted assets (e.g. pillars, transformers, switchgear etc.) and underground cabling.

What does overhead construction mean?

Overhead construction relates to any work on overhead lines and associated pole top assets.

What is Non Network Work?

Non-Network work can best be described as all the tasks required in order to get a project to the point of construction, and in some cases to restore the site to its previous condition. It may include such tasks as :

- Underground service location
- GIS updating
- Pre-job planning / scheduling
- Crew travel (not including switching crew)
- Removal / reinstatement
- Traffic management

What is switching?

It involves attending site to scope and assess requirements, preparation of a switching plan in conjunction with the network control centre, notifying all customers who will be impacted by the outage, actioning the switching plan and all associated travel.

What is Testing?

Before a new piece of equipment can be connected to the network, it needs to be tested after installation to ensure that it has been installed correctly and are safe to energise. Equipment to be tested includes ground mounted pillars, transformers and underground cables.

Why have I been charged for Travel?

The cost of travel is calculated from the nearest depot that delivers your project. Some country depots are only set up for operational and maintenance purposes and might not be able to deliver customer funded works.

What is work Packaging/Prelim Site Inspection?

These costs are associated with ordering the materials required for the project, scheduling the work and ensuring crew availability, and managing the project from the point of customer payment all the way through to completion.

What is Customer Service Work?

- Metering installation.
- Consumer mains cable termination.

The lot being supplied is considered as unserviced as there is no existing low voltage network in close proximity to the lot.
For more information, please refer to the Western Power website –

https://westernpower.com.au/industry/distribution-low-voltage-connection-headworks-scheme-dlvchs/

Why did you charge me full cost?

Your project was not eligible for the DLVCHS (see link above for more information). Relocation and subdivision works are full cost works.

How many hours?

Each task that Western Power crews or contractors need to perform to deliver the project have been allocated a certain number of hours to complete. These hours are based on the likely time needed to carry out the work but can vary depending on the site and the conditions on the day of construction.