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STATEMENT OF HERITAGE IMPACT

SOLAR LIGHTING

COASTAL WALK PATHWAY, CHRISTISON PARK TO GAP PARK

FEBRUARY 2020

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PLANNERS
URBAN DESIGN
INTERIOR DESIGN
HERITAGE
PROJECT PLANNERS
BUILDING AUDITORS

Head Office - New South Wales

Level 2
5 Wilson Street
PO Box: 934
Newtown NSW 2042 Australia
T 02 9319 3077
E projects@caldiscook.com

Branch Office - Victoria

Suite 209
757 Bourke Street
Docklands VIC 3008 Australia
T 03 9600 3090
E projects@caldiscook.com

Branch Office - Bangkok

Level 5,
259/243-244 Pridipanyong 13,
Prakanon-Nau, Wattana,
Bangkok 10110, Thailand
E projects@caldiscook.com

www.caldiscook.com

AEO 0025
ACN 157 777 065
ABN 39 157 777 065
Nominated Architect: David Cook
Registration No 5086



Transport for NSW
Authorised Engineering
Organisation



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C				
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1. INTRODUCTION

This report has been prepared by CCG Architects Pty Ltd as an assessment of the heritage impacts of proposed works, described in Section 3, 'Development proposal'.

The report is informed by:

- The *Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance*,¹
- *Statements of Heritage Impact*, part of the NSW Heritage Manual,² and
- *Design in Context*, another publication of the former NSW Office of Environment and Heritage.³

1.1 AUTHORSHIP

This report has been prepared by Liam Hogan, Heritage Consultant of CCG Architects Pty Ltd, and reviewed by David Cook, Heritage Architect and Director of CCG Architects Pty Ltd, in accordance with the CCG Architects Pty Ltd's quality assurance program.

1.2 AIM OF REPORT AND METHODOLOGY

This report assesses the heritage impact of the proposed works on the cultural significance. This Heritage Assessment has been prepared in accordance with the guidelines of the *Burra Charter*, and publications constituting the NSW Heritage Office's NSW Heritage Manual, particularly *Statements of Heritage Impact*.⁴

A site visit was made on 13 February 2020.

¹ Australia ICOMOS, *The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance* (Australia ICOMOS, 2013), <http://australia.icomos.org/publications/charters/>.

² NSW Office of Environment and Heritage, *Statements of Heritage Impact* (Heritage Office and Department of Urban Affairs & Planning, 1996), <http://www.environment.nsw.gov.au/resources/heritagebranch/heritage/hmstatementsofhi.pdf>.

³ NSW Office of Environment and Heritage, *Design in Context: Guidelines for Infill Development in the Historic Environment* (NSW Heritage Office, 2005), <http://www.environment.nsw.gov.au/resources/heritagebranch/heritage/DesignInContext.pdf>.

⁴ NSW Office of Environment and Heritage.

1.3 SITE IDENTIFICATION

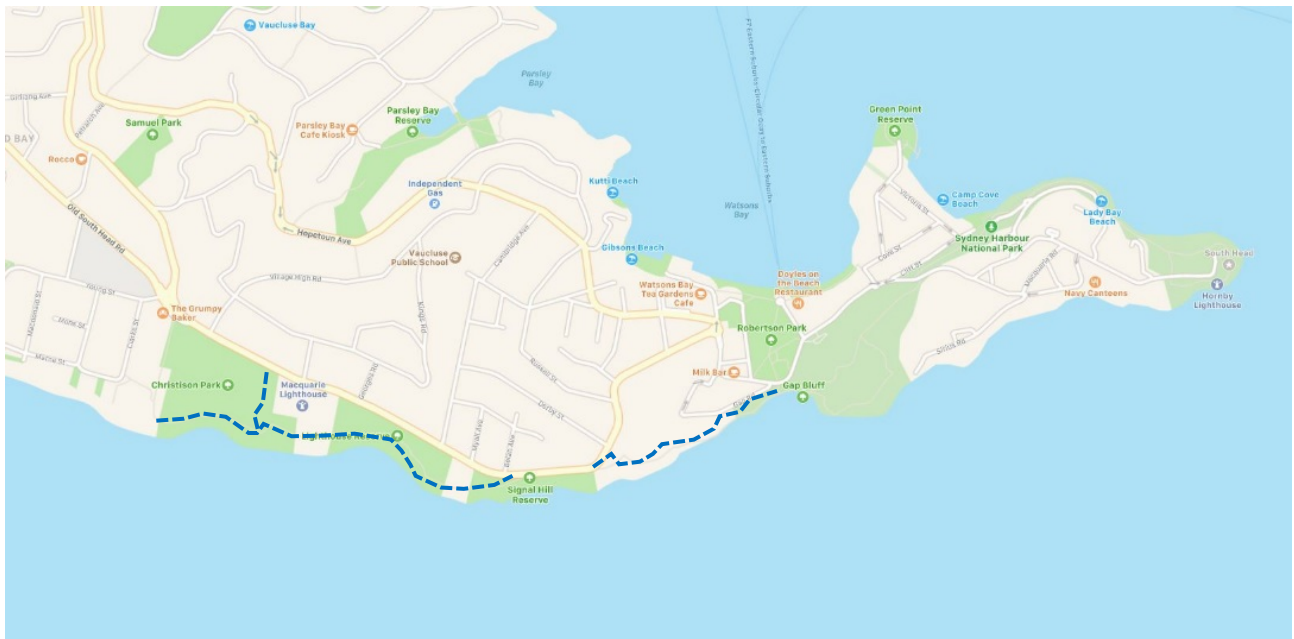


Figure 1: location (Apple Maps). The approximate course of the pathway is indicated in blue

1.4 HERITAGE MANAGEMENT FRAMEWORK AND STATUTORY ENVIRONMENT

In NSW the management and conservation of items of cultural or environmental heritage is governed, amongst other pieces of legislation, by the *Environmental Planning and Assessment Act 1979* and the *Heritage Act 1977*.

The Coastal Walk is an item of heritage significance in its own right, as well as passing through a number of other items of significance.



Figure 2: Heritage items on the route of the Coastal Walk Pathway (Woollahra LEP Heritage Maps HER_004 and HER_005). The approximate course of the pathway is indicated in blue.

The Coastal Walk traverses a number of individual items of cultural significance as well as being of cultural significance in its own right.

The Bicentennial Coastal Cliff Walk is item number I343 on the Woollahra Local Environment Plan (LEP).⁵

The Coastal Walk, from north to south, passes or passes through:

- The Watsons Bay Heritage Conservation Area (C14),
- The Gap Bluff, (within South Head Sydney Harbour National Park),
- The Dunbar Anchor and (separate) rock inscription, which are part of the Dunbar Group of items, a collection of State Heritage significance (item 01675)
- A tramway cutting at Gap Park,
- A monument to Lieutenant G.J. Grieve,
- The Signal Hill battery,
- The South Head Signal Station—tower, building and interiors, retaining wall and fence to Old South Head Road, and
- The Macquarie Lighthouse (an item of state and national heritage significance, item 00677).

1.5 REPORT LIMITATIONS

Except where otherwise noted, this report is limited to the investigation of the European history of the site. Recommendations have been made on the basis of documentary evidence viewed and inspection of the existing fabric.

This report only addresses the relevant heritage planning provisions and does not address general planning or environmental management considerations.

WH&S issues, such as Hazardous Materials, removal, management, or encapsulation, are not part of this assessment.

1.6 ABBREVIATIONS, DEFINITIONS, AND TERMINOLOGY

DCP	Development Control Plan
CMP	Conservation Management Plan
HIA	Heritage Impact Assessment
HCA	Heritage Conservation Area
ICOMOS	International Council on Monuments and Sites
LEP	Local Environment Plan

The conservation terms found throughout this report are based on the terms and definitions adopted by *The Burra Charter*.⁶ *The Burra Charter* forms the basis for cultural conservation with in Australia and is acknowledged by government heritage agencies around Australia. Terms used in this plan are defined below:

Place means site, area, land, landscape, building or other work, group of buildings or other works, and may include components, contents, spaces and views.

Cultural Significance means aesthetic, historic, scientific, social or spiritual value for past, present or future generations. Cultural significance is embodied in

⁵ Woollahra Council, *Local Environmental Plan*, 2014, <https://legislation.nsw.gov.au/#/view/EPL/2015/20/full>.

⁶ Australia ICOMOS, *Burra Charter*.

the place itself, its fabric, setting use, associations, meanings, records, related places and related objects.

Fabric means all the physical material of the place including fixtures, contents and objects.

Conservation means all the processes of looking after a place so as to retain its cultural significance (as listed below).

Maintenance means the continuous protective care of the fabric, and setting of a place, and is to be distinguished from repair. Repair involves restoration or reconstruction.

Integrity (not a *Burra Charter* definition) means the degree to which a place or component of a place retains the form and completeness of its physical fabric, historical associations, use or social attachments that give the place its cultural significance.

Preservation means maintaining the fabric of a place in its existing state and retarding deterioration.

Restoration means returning the existing fabric of a place to a known earlier state by removing accretions or by reassembling existing components without the introduction of new material.

Reconstruction means returning a place to a known earlier state and is distinguished from restoration by the introduction of new material into the fabric.

Adaptation means modifying a place to suit the existing use or a proposed use. [Article 7.2 states regarding use that: a place will have a compatible use]

Compatible use means a use, which respects the cultural significance of a place. Such a use involves no, or minimal impact on cultural significance.

Interpretation means all the ways of presenting the cultural significance of a place.

2. SITE AND CONTEXT

2.1 PHOTOGRAPHS



Figure 3: The Gap, looking south



Figure 4: stairs to The Gap from Watson's Bay



Figure 5: The Gap, looking north



Figure 6: The Gap walkway, looking south



Figure 7: Dunbar memorial



Figure 8: walkway and fence, showing CCTV pole



Figure 9: Second World War gun emplacement



Figure 10: Rock supported with masonry



Figure 11: Second World War gun emplacement



Figure 12: Don Ritchie Grove



Figure 13: memorial to Lieutenant G.J. Grieve



Figure 14: New South Head Road, looking south



Figure 15: Coastal cliff walk sign



Figure 16: Second World War gun emplacement and bunker complex



Figure 17: coastal walk, looking south, showing Macquarie Lighthouse



Figure 18: coastal walk, looking north, showing rocks



Figure 19: coastal walk showing parkland, looking north from near Macquarie Lighthouse



Figure 20: Coastal walk showing vegetation section



Figure 21: Macquarie Lighthouse from the coastal walk



Figure 22: exercise equipment at Christison Park



Figure 23: Christison Park, survey, looking south-west



Figure 24: coastal walk near Christison Park



Figure 25: sculptures at Christison Park, southern end.

2.2 HISTORICAL BACKGROUND

Sydney is part of the traditional lands of the Eora people and is the site of the original invasion and settlement of NSW.

Christison Park, the Macquarie Lighthouse site, Signal Hill, and The Gap are part of the South Head and on the sea side from Watsons Bay, which was known as *kutti* to the Cadigal people.⁷ The suburb takes its name from Robert Watson, who was appointed harbourmaster in 1811, and was appointed the first superintendent of the South Head Lighthouse when it was opened in 1818.⁸

A signal station and warning light were established on South Head in 1790, which guided ships to the mouth of Port Jackson, which could otherwise easily have been missed.⁹ The lighthouse, built between 1816 and 1818, commissioned as part of a public works program by Governor Macquarie and designed by Francis Greenway, became a notable part of drawn or painted Sydney landscapes.¹⁰

South Head is notable for being the location of the *Dunbar* disaster. *Dunbar* was a ship launched in 1854, used as a Crimean War troopship, and used as a passenger ship in the goldrush era. It was wrecked on 20 August 1857 in The Gap, with a loss of 121 out of 122 people on board. It remains one of the worst disasters to have occurred in NSW.

⁷ Robin Derricourt, 'Watsons Bay', in *Dictionary of Sydney* (Sydney: Dictionary of Sydney Trust, 2008), https://dictionaryofsydney.org/entry/watsons_bay.

⁸ E.J. Lea-Scarlett, 'Watson, Robert (1756–1819)', in *Australian Dictionary of Biography* (Canberra: National Centre of Biography, 1967), <http://adb.anu.edu.au/biography/watson-robert-2777>.

⁹ Mary Casey and Tony Lowe, *Archaeological Assessment: Macquarie Lightstation South Head* (Marrickville NSW: Casey & Lowe Pty Ltd, 2005).

¹⁰ Robin Derricourt, 'Macquarie Lighthouse', in *Dictionary of Sydney* (Sydney: Dictionary of Sydney Trust, 2008), https://dictionaryofsydney.org/entry/macquarie_lighthouse.



Figure 26: detail, 'The Sailor Rescued', in A Narrative of the melancholy wreck of the "Dunbar", merchant ship, on the south head of Port Jackson, August 20th, 1857 <http://nla.gov.au/nla.obj-402152076>

Gap Park was established in 1887 as a public recreation area, to preserve the place from residential encroachment. This park, with a fence to The Gap itself, became a notorious site for suicides from the 1860s onwards, as well as many accidental deaths of sightseers, rock fishers, and walkers on the cliffs.¹¹

During the Second World War, South Head was the location for a number of gun emplacements and observation towers, some of which remain in place.

¹¹ Robin Derricourt, 'The Gap', in *Dictionary of Sydney* (Sydney: Dictionary of Sydney Trust, 2008), https://dictionaryofsydney.org/entry/the_gap.

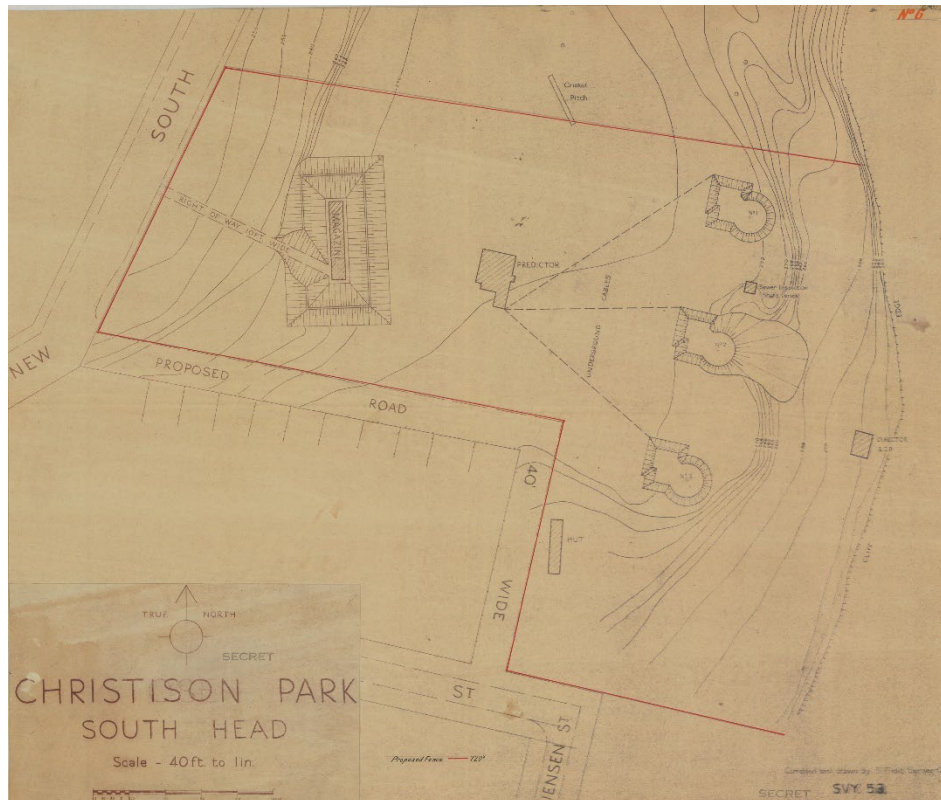


Figure 27: Number 6 - Christian Park South Head [plan 2 of 2 from Christison Park – South Head - fortress record]. 1943. National Archives of Australia.
<https://trove.nla.gov.au/work/237178619>

The Don Ritchie Grove, part of the Coastal Cliff Walk, commemorates Don Ritchie, a Second World War veteran, and resident, who before his death in 2012, would rescue potentially suicidal strangers by talking to them. Don Ritchie was awarded the Medal of the Order of Australia in 2006.¹²

2.3 THEMES

Australian theme	NSW theme	Local theme	Example
1. Tracing the natural evolution of Australia	Environment—naturally evolved	There are two aspects to this theme: (1) Features occurring naturally in the physical environment which have significance independent of human intervention	Coasts and coastal features supporting human activities

¹² Glenda Kwek, 'Death of the Angel of The Gap: The Man Who Saved the Suicidal from Themselves', *Sydney Morning Herald*, 14 May 2012, <https://www.smh.com.au/national/nsw/death-of-the-angel-of-the-gap-the-man-who-saved-the-suicidal-from-themselves-20120514-1ymle.html>.

		(2) Features occurring naturally in the physical environment which have shaped or influenced human life and cultures	
2. Peopling- Peopling the continent	Migration-Activities and processes associated with the resettling of people from one place to another (international, interstate, intrastate) and the impacts of such movements	Free Immigrants in the 19th century-	Signal and lighthouses
3. Economy- Developing local, regional, and national economies	Transport	Activities associated with the moving of people and goods from one place to another, and systems for the provision of such movements	Wharf and shipping history- Maintaining maritime transport routes-Building and maintaining public light houses and stations-
3. Economy- Developing local, regional and national economies	Environment - cultural landscape-Activities associated with the interactions between humans, human societies and the shaping of their physical surroundings	Landscapes of remembrance-	Memorials: Dunbar, Lieutenant Grieve, Don Ritchie Grove
3. Economy- Developing local, regional and national economies	Environment - cultural landscape-Activities associated with the interactions between humans, human societies and the shaping of their physical surroundings	Landscapes of scenic beauty-	Cliff landscape
3. Economy- Developing local, regional and	Events-Activities and processes that mark the consequences of natural and cultural occurrences	Developing local landmarks-	New South Head Road development

national economies			
4. Settlement-Building settlements, towns and cities	Towns, suburbs and villages-Activities associated with creating, planning and managing urban functions, landscapes and lifestyles in towns, suburbs and villages	Gardens - public (parks, reserves)-	Public park
7. Governing-Governing	Defence-Activities associated with defending places from hostile takeover and occupation	Defence	Gun emplacement
8. Culture-Developing cultural institutions and ways of life	Social institutions-Activities and organisational arrangements for the provision of social activities	Cultural and social life-	Walking path
8. Culture-Developing cultural institutions and ways of life	Leisure-Activities associated with recreation and relaxation	Leisure-	Walkway, sporting fields

2.4 STATEMENT OF SIGNIFICANCE

A statement of significance for the Bicentennial Coastal Cliff Walk is provided with the item's State Heritage Inventory listing.

*The site of this Walk has strong historical links to the earliest days of the European Settlement of Australia, and as such has high social and historic significance. The building remnants such as the bunkers and gun emplacements have high social and historic significance as part of the defence systems initiated in the late nineteenth century and at the beginning of the 2nd. World War. The natural vegetation and rock formations have high social and historical significance as part of the history of European development of the Colony of New South Wales. The Signal Station and the Macquarie Lighthouse have aesthetic significance as part of the historic development of the area.*¹³

The coastal cliff walk, particularly its sections near The Gap and Gap Park, are also socially significant in Sydney for association with suicide and self-harm attempts. While not acknowledged in the formal Statements of Significance for any of the places in the vicinity, this is a well-known and long-standing association.

¹³ NSW Office of Environment and Heritage, 'State Heritage Inventory', Search for NSW Heritage, n.d., <http://www.environment.nsw.gov.au/heritageapp/heritagesearch.aspx>
<https://www.environment.nsw.gov.au/heritageapp/ViewHeritageItemDetails.aspx?ID=2710205>.

3. DEVELOPMENT PROPOSAL

It is proposed to install 235 solar bollard lights along pathways from Christison Park to Gap Park, a distance of approximately 1.75km. A project description of greater detail is attached to this document as an appendix.

Each bollard will be approximately 1m high, with two 6m solar post top lights for Gap Park and Don Ritchie Grove. These taller lights are located at steps at the southern end of Gap Park and at steps at the end of Don Ritchie Grove, as bollards are not appropriate to steep staircases.

The objective of the works are to increase night-time use of the park and thus to increase passive community surveillance, as part of a strategy to prevent suicide attempts and self-harm. This is a significant issue in this area.

The installation of the lights will not require wiring as each is solar powered and independent of mains electricity. Each will be installed, according to the requirements of the site, either with a small concrete pad close to the surface, with a footing depth of 200mm, or using stainless steel threaded rods set into rock, and grouted with cement.

The design of the lights focuses the emission of the lights downward onto the path, so as to avoid light pollution of the sky or landscape.



Figure 28: SBL2 Series S model bollard (Source: SBL2 bollard pamphlet)



Figure 29: photomontage of bollards superimposed on The Gap pathway (Source: Woollahra Council)



Figure 30: photomontage of bollards superimposed on a pathway near Macquarie Lighthouse (Source: Woollahra Council)

4. HERITAGE IMPACT ASSESSMENT

4.1 RECOMMENDED MANAGEMENT

No Conservation Management Plan for the Coastal Cliff Walk exists, though 'Recommended Management' is included in the site's entry in the State Heritage Inventory. This is reproduced below.

It is strongly recommended that there be no alterations or modifications to the equipment, relics, natural vegetation and rock formations, or structures included in the area of the Bi-Centennial Coastal Cliff Walk. Maintenance should be restricted to replacing safety fencing and making safe any items included in this area.

A summarised set of recommendations for a 1996 Plan of Management for Christison Park is given in the Macquarie Lightstation Plan of Management:¹⁴

Woollahra Council Plan of Management for Christison Park 1996

The Plan establishes the values and significance of Christison Park and details management issues that need to be addressed. Issues relevant to the Trust's plans for Macquarie Lightstation include:

- *Encourage continuity in signage, landscaping and planting throughout the coastal cliff parks to reinforce links between coastal areas and the Coastal Cliff walk;*
- *Protect and improve views where possible by tree lopping or replacement;*
- *Preserve the Park's skyline;*
- *Maintain protective fencing along the cliff top;*
- *Provide adequate lighting to ensure the safety of park users;*
- *Explore options for improving wheelchair access;*
- *Conserve items of heritage significance in accordance with Woollahra LEP 1995;*
- *Alleviate threats to the survival or condition of heritage items; and*
- *Future plantings should provide park users with some protection from prevailing winds.*

Installation of bollard lighting will increase the safety of the area as described above, by increasing night time use and passive surveillance.

The bollards themselves, at 1m in height, will not affect the skyline of Christison Park or any other part of the Coastal Cliff Walk. The two proposed 6m light poles are to be installed in locations where they will be lower than the skyline, and their installation will also not threaten views.

4.2 ASSESSMENT

The following aspects of the proposal respect or enhance the heritage significance of the item:

- The use of a single-design bollard will clearly signal a unified single walkway and strengthen the continuity of the pathway
- Lighting will increase safe public access to the Cliff Walk and to the parks and land through which it travels.

¹⁴ Sydney Harbour Federation Trust, *Management Plan—Macquarie Lightstation* (Mosman, NSW: Sydney Harbour Federation Trust, 2007).

- The bollards will be low-profile elements in the Cliff Walk and will not detract from the settings of any of the significant items on the route.

The following aspects of the proposal could detrimentally impact on heritage significance:

- Bollard installation will have a physical impact. This will be minor and restricted to the vicinity of the existing asphalted walkway, consisting either of small concrete pads or drilled holes.
- The most serious risk to the significance of the Coastal Cliff Walk, and to the items of individual significance along it, is from light pollution. The Macquarie Light Station is an item of National and State significance. Its position and setting in the landscape and visibility at night is integral to its significance. Light pollution has been minimised in this proposal through:
 - The use of down-lighting bollards,
 - The choice of short, 1m high bollards to protect the skyline,
 - The use of a large number of lower-power lights, rather than a smaller number of high-powered lights, will reduce the overall visual impact.

The following sympathetic solutions have been considered and discounted:

- Doing nothing was considered but would leave the park inadequately lit, and the problem of self-harm unaddressed. This is not a socially acceptable outcome.

4.3 CONCLUSION

The proposal to install small lighting bollards along the length of the Coastal Cliff Walk is an appropriate and low-impact solution to the requirement for lighting. These will have low physical impact and their contribution to light pollution will be minimised.

The proposal is of low impact on cultural significance

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6. **APPENDIX: DEVELOPMENT PROPOSAL DOCUMENTS**



COASTAL WALK PATHWAY SOLAR LIGHTING PROJECT

PROJECT DESCRIPTION

Woollahra Council proposes to install solar bollard lights along the Coastal Walk pathway, a pedestrian pathway, which runs through a series of coastal parks and reserves from Christison Park, Lighthouse Reserve and Signal Hill Reserve, Vacluse, in the south to Gap Park, Watsons Bay, in the north. The total length of the lit pathway would be 1.75km.

The projects objective is to provide improved night time safety and promote increased evening usage as part of a strategy to prevent self-harm in this area, a significant issue for this area.

It is proposed to install 235 x 1m high solar bollard lights in total distributed through the parks and reserves noted above, and 2 x 6m high solar post top lights. The lighting is proposed to meet lighting standard *AS 1158 Lighting for Roads and Public Spaces– Pedestrian sub category P4* and *AS4282 Control of obtrusive effects of outdoor lighting*.

The use of low level bollard lights will both minimise spill light impacting on adjacent residents and nearby heritage listed Macquarie Lighthouse and minimise lighting intrusion on the coastal landscape. Macquarie Lighthouse is situated between Christison Park in the south and Lighthouse Reserve in the north.

Of particular concern is the section of pathway that lies at the rear of the Macquarie Lighthouse property between the Greenway's Retaining Wall* and the cliff top fencing. The length of this section of pathway is 155metres and is 1.8metres wide constructed of asphalt. It is noted that 23 solar bollards are to be located along this section of pathway.

The proposed solar bollard is known as SBL2 model, manufactured by Solar Bollard Lighting Pty Ltd, an Australian company, see Appendix 1. The solar bollard lights are to be set approximately 8.1m apart along the pathway but spacing will vary depending on the nature of the path, i.e. curves require closer set lights, see Appendix 2 for lighting layout of solar bollards along the pathway including Macquarie Lighthouse.

Within the model SBL2 there are 4 variants, each variant used for a particular site condition along the pathway. Of the four variants the light output ranges between 19 and 65 lumens, with wattage between 0.152w and 0.48w. The post top light proposed for Gap Park has a light output of 745 lumens and a wattage of 5.578w.

The bollards are to be set approximately 300mm to centre off the path edge and layout may vary from one side of the path to the other depending on site conditions, i.e. proximity to vegetation and cliff top fences. To prevent persons using the lights as a step to climb over the cliff top fence they will be located away from fences when within 2metres of the fence

The design of the LED lights see the light emitted focused downwards onto the pathway and not upwards so preventing contributing to light pollution.

The construction of the bollards is robust having an IP68 rating as well as an IK10 rating against vandalism. The post is constructed with marine grade aluminium, the light head is Sabic SLX Lexan, the highest UV stabilised polycarbonate available.

Installation will be in varying conditions from turf topped natural ground to exposed sandstone rock so will require a range of construction techniques. No wiring is involved as each unit is autonomous. Each solar bollard light will typically be mounted on a circular concrete pad finishing flush with the surface.

The installation technique may vary according to local site conditions. The depth of the concrete pad is typically 200mm. If rock is close to the surface the bollards will be fixed using 3 x stainless steel threaded rods chemset into the rock and grouted with cement to fill the space between light base and rock.

There are two post top light to be installed, shown in Appendix 3, these will be at the steps at the southern end of Gap Park, and in the Don Ritchie Grove, as it was not feasible to install bollard lights at these locations and achieve P4 lighting standard. Each post top solar light will be required to be mounted on a concrete footing, design subject to engineering design.

Following the completion of the project it is hoped that by encouraging evening use of this stretch of the coastline will in turn both discourage those proposing self-harm as it will seem a less lonely and desolate place with more people actively using it and also encourage the observation and interception of those proposing self-harm.

Appendix 1

Solar Bollard Lighting



Innovation Patent No:
2016102225

SBL2 Series S Model



Solar Powered LED Bollard



The all new SBL2 S Model solar powered LED pole top bollard light is ideal for lighting locations where cyclones/hurricanes/typhoons, tsunamis, tidal surges and generalised flooding is prominent. The sealed self-contained design combined with high quality impact resistant construction with proven market performance makes the SBL2 S Model the perfect asset in high risk areas where continuous lighting is required no matter what situation arises.

KEY FEATURES OF THE SBL2 OVER COMPETITORS & ON-GRID PRODUCTS

- Low cost and quick installation, no trenching, cabling or wiring required
- IP68 Certified (AS/NZS 60529:2004 IPx8, IP4x, IP6x) submersible to 3m depth
- IK10 Certified (IEC 62262:2002) can withstand impact from debris and vandalism
- Isolated from power outages for continuous illumination
- Up to 70% more autonomy than competitors at full power output dusk until dawn

From vandal attack, severe high wind events, flood disasters, monsoonal rain, crashing waves, golf ball size hail or just daily snow coverage, no similar product will out perform our SBL2 S Model Solar LED Bollard pole top light design for durability and continuous performance. Electronic circuit design fully operationally tested in the field from Saudi Arabia to the sub zero snow regions of Canada.

TECHNICAL SPECIFICATIONS

Overview

■ Dome Material	SABIC SLX Lexan (Highest UV Stabilised PC available)
■ Housing Material	LG LUPOY (UV Stabilised)
■ Internal Materials	STAREX ASA
■ LED Chips	8 x 5mm Piranha LED Super Bright
	- Asymmetrical Light Distribution 4300K +/- (Natural White) / 3000K (Warm White)
	- Symmetrical Light Distribution 4300K +/- (Natural White) / 3000K (Warm White)
■ Voltage	3.2V (ELV Intrinsically safe no UL certification required for USA)
■ Operate Temp	-30°C ~ +60°C ambient (runs safely up to 100°C)
■ Maintenance	Annual clean and polish for peak performance
■ Warranty	7 Years (subject to SBL Warranty T&C's)
■ Certifications	- IP68 (AS/NZS 60529:2004 IPx8, IP4x, IP6x) - IK10 (IEC 62262:2002) - Photometric (IESNA LM-79-08) - Hazardous Area/CE/RCM (T.B.T)
■ Weight	Net Weight 3kg (6.6lbs)

Solar Module

■ Wattage	5w Mono-Crystalline
■ Vmp (V)	5V
■ Imp (A)	1 Amp
■ Design Life	10 Years @ 100%

Battery

■ Type	3.2V 17Ah Cylindrical LiFePo4
■ Cycles	3700 (expected minimum)
■ Design Life	10 Years + (expected minimum)

Electronics

■ Design Life	10 Years + (expected minimum)
■ Runtime	Dusk until Dawn full power
■ On/Off	Solar Panel Voltage



Poles (25um anodised standard or powder coated)

■ Material	6106 T6 Aluminium Marine Grade
■ Grade	High Tensile / Light Weight
■ Durability	High Corrosion Resistance
■ Collar	25um Anodised
■ Hardware	Security Bolts 4 x M6 - 316 SS



Can Submerge



Vandal Resistant



No Power Bills



Simple & Low Install Cost



Clean Energy Lighting



Minimal Maintenance



Install Yourself

Solar Bollard Lighting

www.solarbollardlighting.com

sales@solarbollardlighting.com






+61 7 39103888

SBL2-000ANW22022019

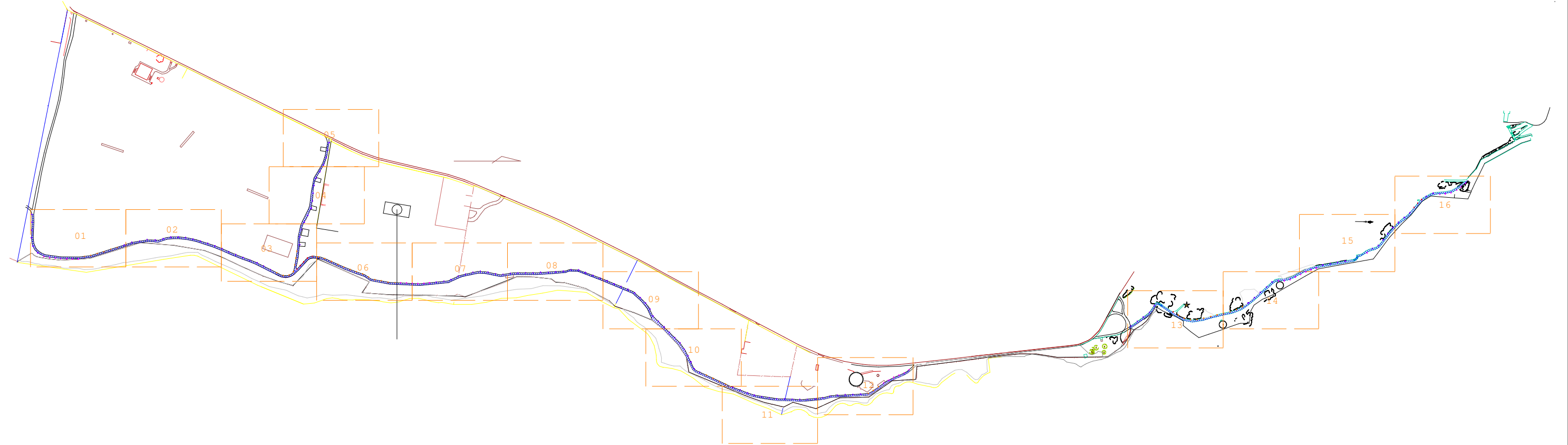
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Appendix 2

Coastal Walk Pathway Lighting Design, see separate pdf document.

Luminaire Schedule									
Symbol	Qty	Label	Description	MH	Tilt	Arrangement	Watts	Lumens	LLF
	9	B40	SBL2-040ANW	1.0m	0°	SINGLE	0.152	19	0.800
	34	B80	SBL2-080ANW	1.0m	0°	SINGLE	0.262	34	0.800
	44	B120	SBL2-120ANW	1.0m	0°	SINGLE	0.359	48	0.800
	128	B160	SBL2-160ANW	1.0m	0°	SINGLE	0.48	65	0.800
	2	SL5	AVERO 5.6W TYPE 2ME	6.0m	0°	SINGLE	5.578	745	0.800

Calculation Summary						
Label	CalcType	Units	Avg	Max	Min	Max/Avg
PATHWAY 01 Eh	Illuminance	Lux	1.82	13.84	0.14	7.60
PATHWAY 02 Eh	Illuminance	Lux	1.89	12.36	0.14	6.54



NOTES

THE LIGHT TECHNICAL PARAMETERS COMPLY WITH THE RECOMMENDATIONS OF ASNZS 1158.3.1 LIGHTING FOR PATHWAYS SUBCATEGORY 1.

VERTICAL ILLUMINANCE LEVELS (IF/WHERE APPLICABLE) ARE MEASURED AT 1.5M ABOVE GROUND LEVEL.

CALCULATIONS SHOWN ARE BASED ON THE INFORMATION PROVIDED TO ORCA SOLAR LIGHTING BY THE CUSTOMER.






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PHOTOMETRIC DATA IS SUPPLIED BY LUMINAIRE MANUFACTURER, SOFTWARE USED FOR CALCULATIONS IS AGI32.

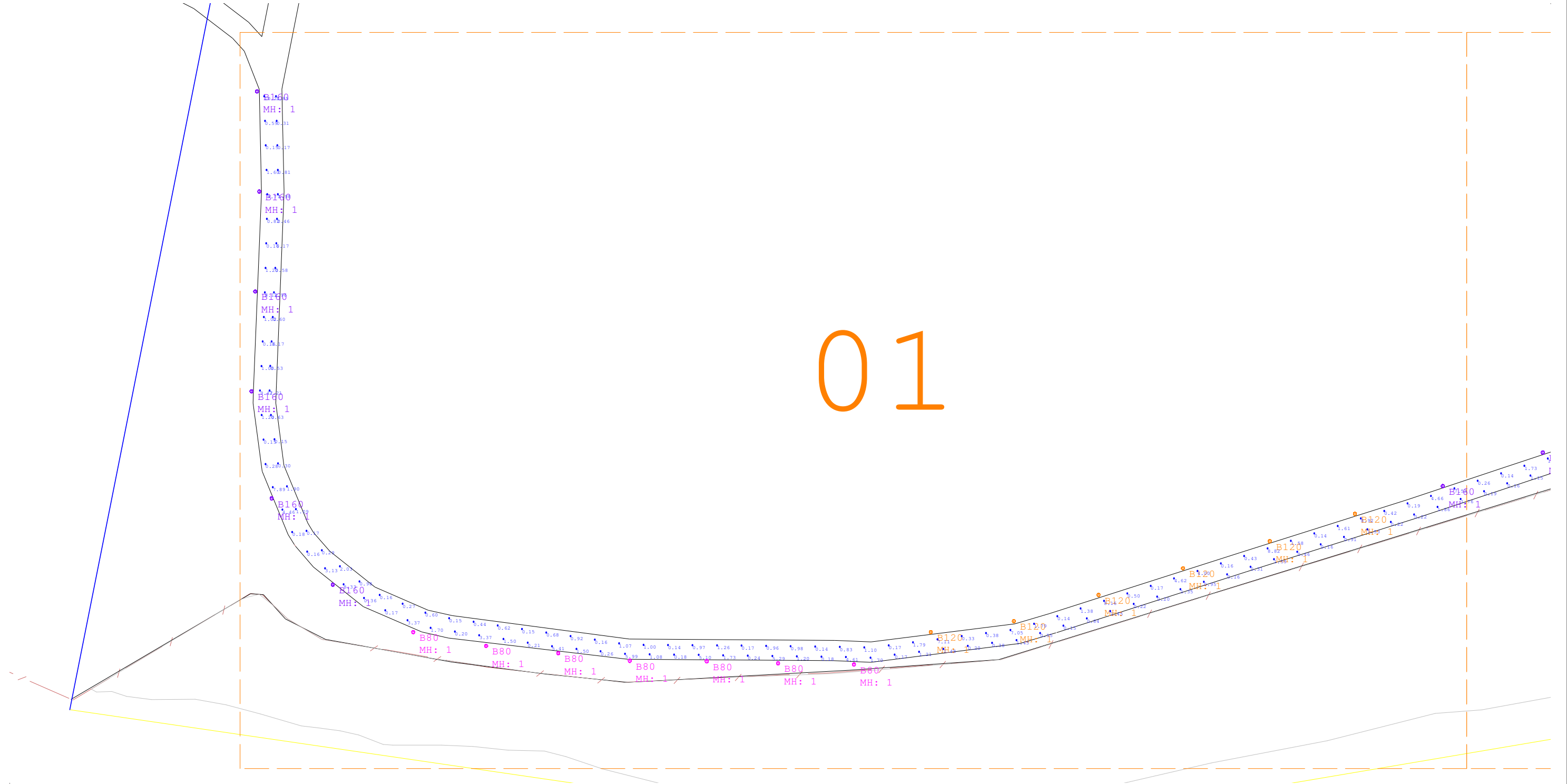
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REV	DATE	DESCRIPTION	DESIGN VERIFICATION		WOOLLAHRA PATHWAY			A3
0		PRELIMINARY	Illumination results shown on this lighting design are based on the project parameters provided to Orca Solar Lighting used in conjunction with the luminaire information tested under laboratory conditions. Actual project conditions differing from these parameters may affect field results. Customer is responsible for verifying compliance with any applicable standards		APPLICATION: PATHWAY			
					ASNZS 1158.3.1 CATEGORY P4			
					DATE	SCALE	SHEET	
					18/09/2019	N.T.S	00 / 16	



Luminaire Schedule									
Symbol	Qty	Label	Description	MH	Tilt	Arrangement	Watts	Lumens	LLF
	9	B40	SBL2-040ANW	1.0m	0°	SINGLE	0.152	19	0.800
	34	B80	SBL2-080ANW	1.0m	0°	SINGLE	0.262	34	0.800
	44	B120	SBL2-120ANW	1.0m	0°	SINGLE	0.359	48	0.800
	128	B160	SBL2-160ANW	1.0m	0°	SINGLE	0.48	65	0.800
	2	SL5	AVERO 5.6W TYPE 2ME	6.0m	0°	SINGLE	5.578	745	0.800

Calculation Summary						
Label	CalcType	Units	Avg	Max	Min	Max/Avg
PATHWAY 01 Eh	Illuminance	Lux	1.82	13.84	0.14	7.60
PATHWAY 02 Eh	Illuminance	Lux	1.89	12.36	0.14	6.54



NOTES

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VERTICAL ILLUMINANCE LEVELS (IF/WHERE APPLICABLE) ARE MEASURED AT 1.5M ABOVE GROUND LEVEL.

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

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REV	DATE	DESCRIPTION	DESIGN VERIFICATION		WOOLLAHRA PATHWAY			A3
0		PRELIMINARY	Illumination results shown on this lighting design are based on the project parameters provided to Orca Solar Lighting used in conjunction with the luminaire information tested under laboratory conditions. Actual project conditions differing from these parameters may affect field results. Customer is responsible for verifying compliance with any applicable standards		APPLICATION: PATHWAY			
					ASNZS 1158.3.1 CATEGORY P4			
					DATE	SCALE	SHEET	
					18/09/2019	N.T.S	01 / 16	



Luminaire Schedule									
Symbol	Qty	Label	Description	MH	Tilt	Arrangement	Watts	Lumens	LLF
	9	B40	SBL2-040ANW	1.0m	0°	SINGLE	0.152	19	0.800
	34	B80	SBL2-080ANW	1.0m	0°	SINGLE	0.262	34	0.800
	44	B120	SBL2-120ANW	1.0m	0°	SINGLE	0.359	48	0.800
	128	B160	SBL2-160ANW	1.0m	0°	SINGLE	0.48	65	0.800
	2	SL5	AVERO 5.6W TYPE 2ME	6.0m	0°	SINGLE	5.578	745	0.800

Calculation Summary						
Label	CalcType	Units	Avg	Max	Min	Max/Avg
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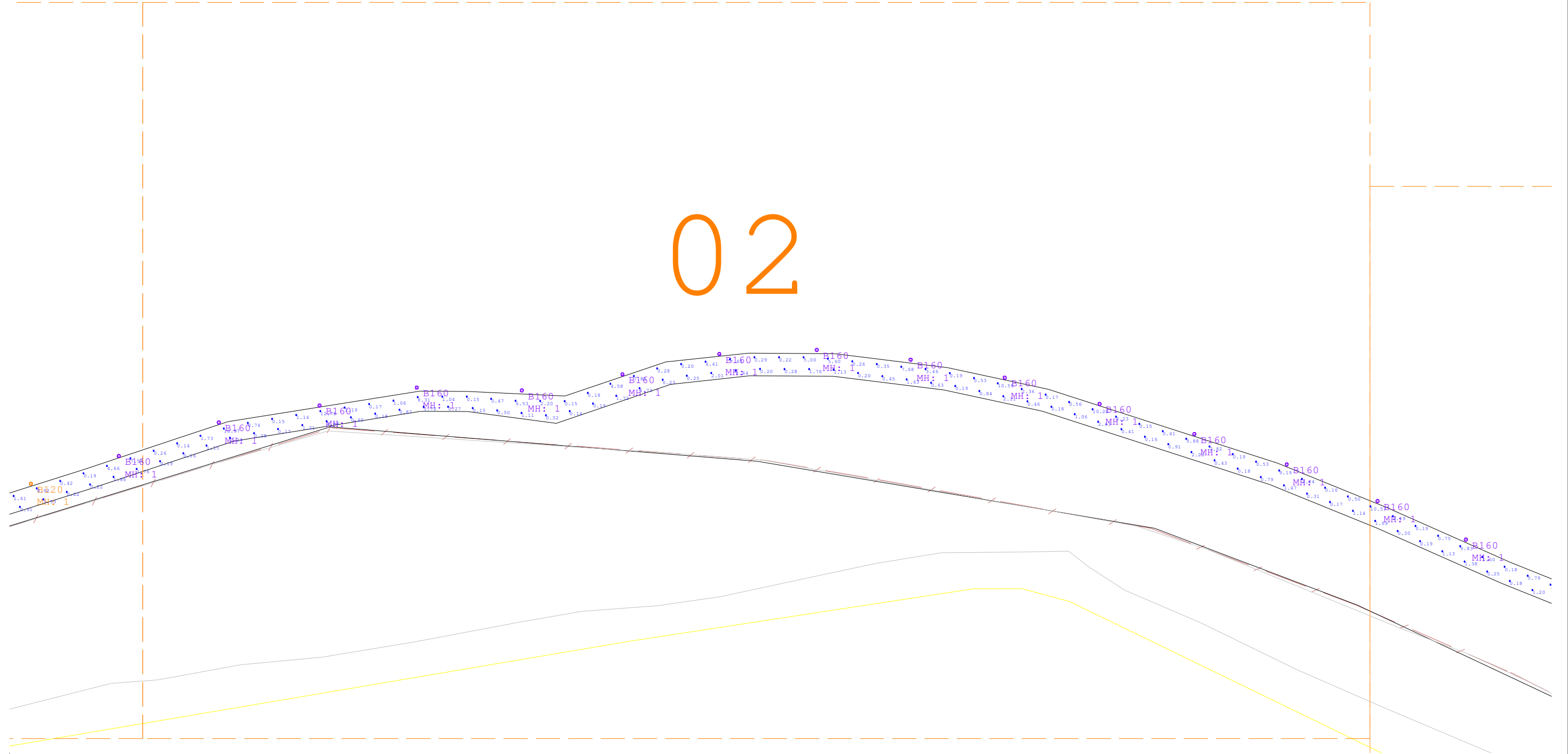
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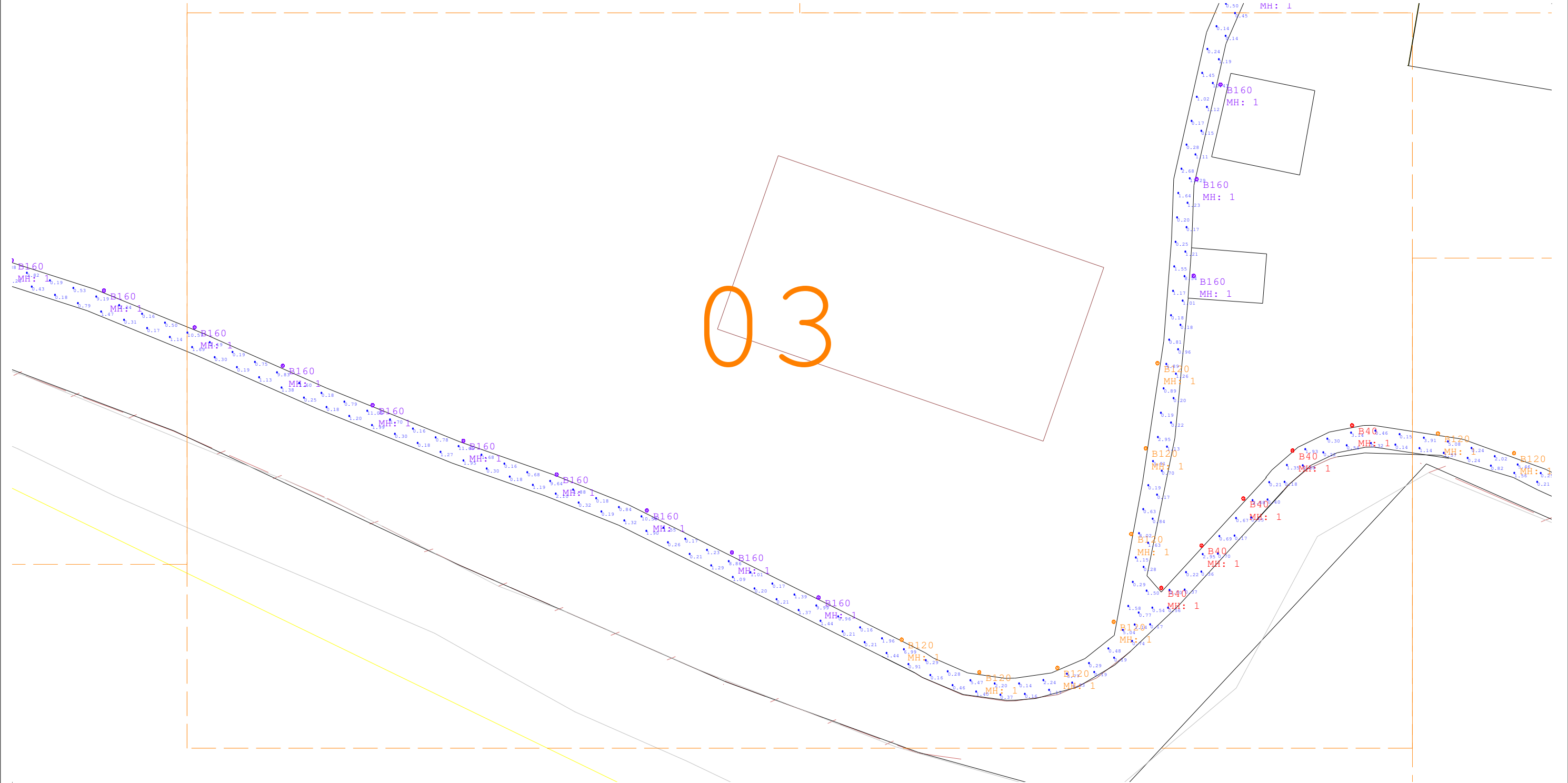


REV	DATE	DESCRIPTION	DESIGN VERIFICATION		WOOLLAHRA PATHWAY			A3
0		PRELIMINARY	Illumination results shown on this lighting design are based on the project parameters provided to Orca Solar Lighting used in conjunction with the luminaire information tested under laboratory conditions. Actual project conditions differing from these parameters may affect field results. Customer is responsible for verifying compliance with any applicable standards		APPLICATION: PATHWAY			
					ASNZS 1158.3.1 CATEGORY P4			
					DATE	SCALE	SHEET	
					18/09/2019	N.T.S	02 / 16	



Luminaire Schedule									
Symbol	Qty	Label	Description	MH	Tilt	Arrangement	Watts	Lumens	LLF
	9	B40	SBL2-040ANW	1.0m	0°	SINGLE	0.152	19	0.800
	34	B80	SBL2-080ANW	1.0m	0°	SINGLE	0.262	34	0.800
	44	B120	SBL2-120ANW	1.0m	0°	SINGLE	0.359	48	0.800
	128	B160	SBL2-160ANW	1.0m	0°	SINGLE	0.48	65	0.800
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Calculation Summary						
Label	CalcType	Units	Avg	Max	Min	Max/Avg
PATHWAY 01 Eh	Illuminance	Lux	1.82	13.84	0.14	7.60
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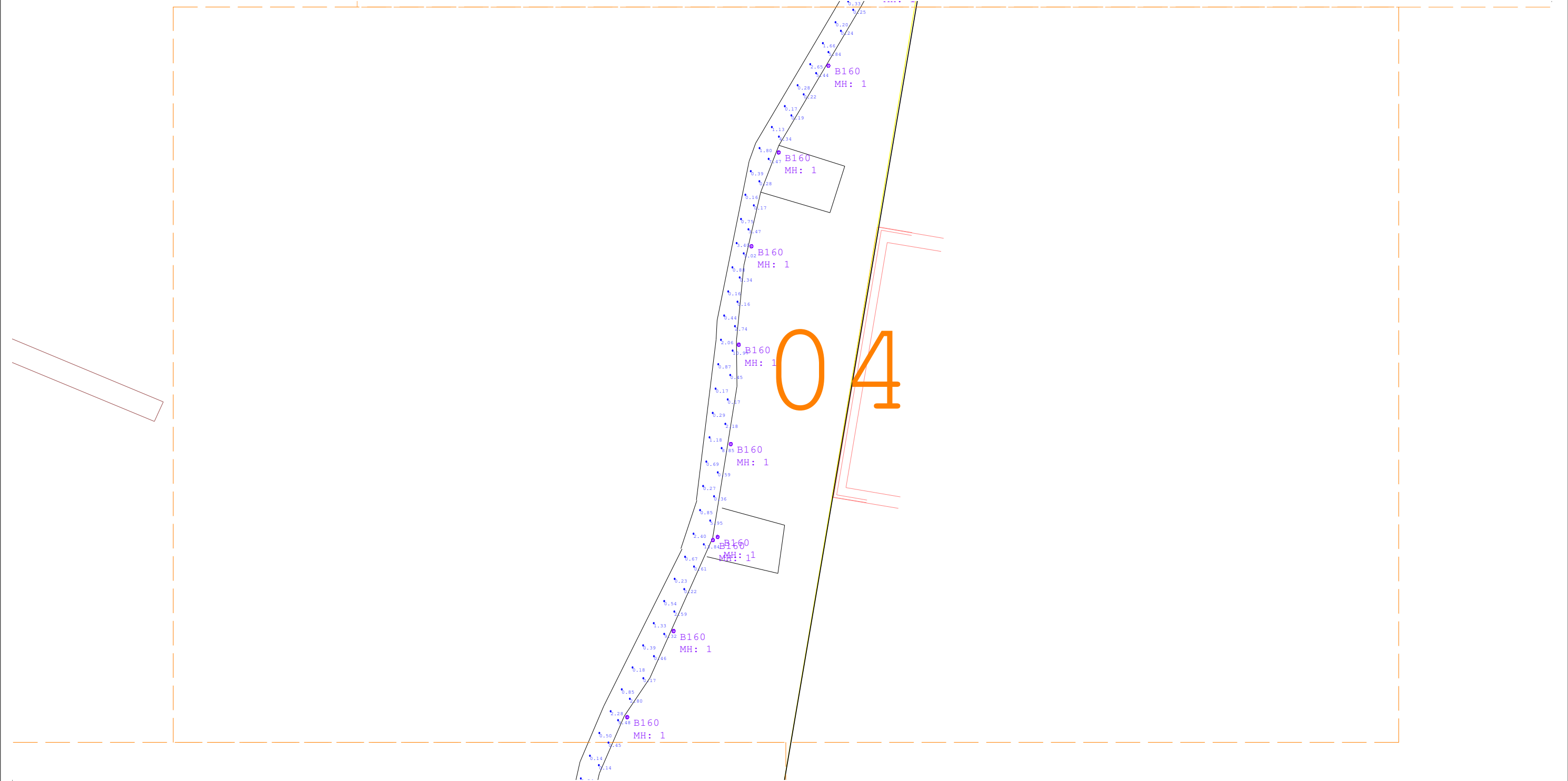
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REV	DATE	DESCRIPTION	DESIGN VERIFICATION		WOOLLAHRA PATHWAY			A3
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					ASNZS 1158.3.1 CATEGORY P4			
					DATE	SCALE	SHEET	
					18/09/2019	N.T.S	03 / 16	



Luminaire Schedule									
Symbol	Qty	Label	Description	MH	Tilt	Arrangement	Watts	Lumens	LLF
	9	B40	SBL2-040ANW	1.0m	0°	SINGLE	0.152	19	0.800
	34	B80	SBL2-080ANW	1.0m	0°	SINGLE	0.262	34	0.800
	44	B120	SBL2-120ANW	1.0m	0°	SINGLE	0.359	48	0.800
	128	B160	SBL2-160ANW	1.0m	0°	SINGLE	0.48	65	0.800
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Calculation Summary						
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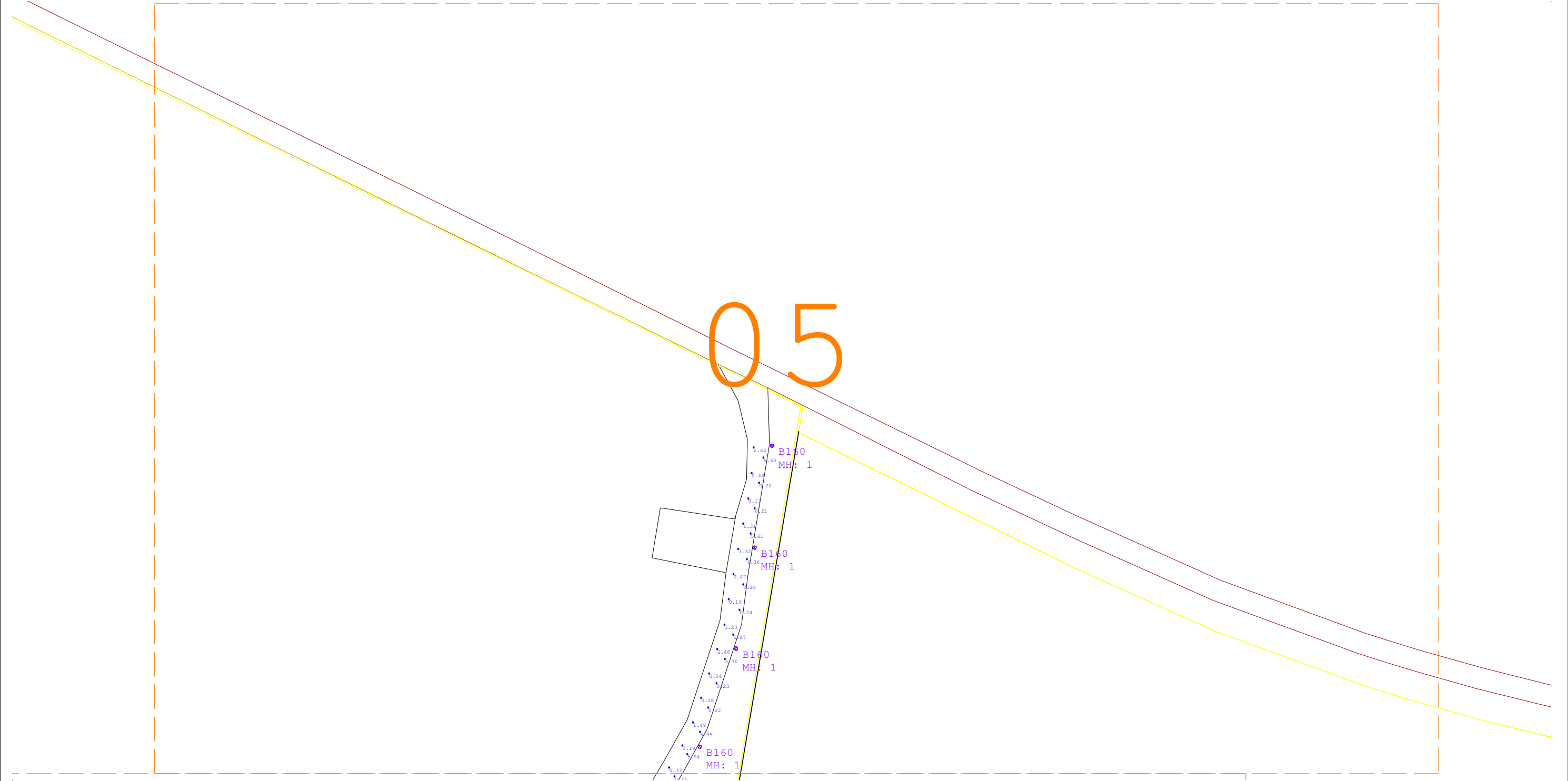
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					ASNZS 1158.3.1 CATEGORY P4			
					DATE	SCALE	SHEET	
					18/09/2019	N.T.S	04 / 16	



Luminaire Schedule									
Symbol	Qty	Label	Description	MH	Tilt	Arrangement	Watts	Lumens	LLF
	9	B40	SBL2-040ANW	1.0m	0°	SINGLE	0.152	19	0.800
	34	B80	SBL2-080ANW	1.0m	0°	SINGLE	0.262	34	0.800
	44	B120	SBL2-120ANW	1.0m	0°	SINGLE	0.359	48	0.800
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
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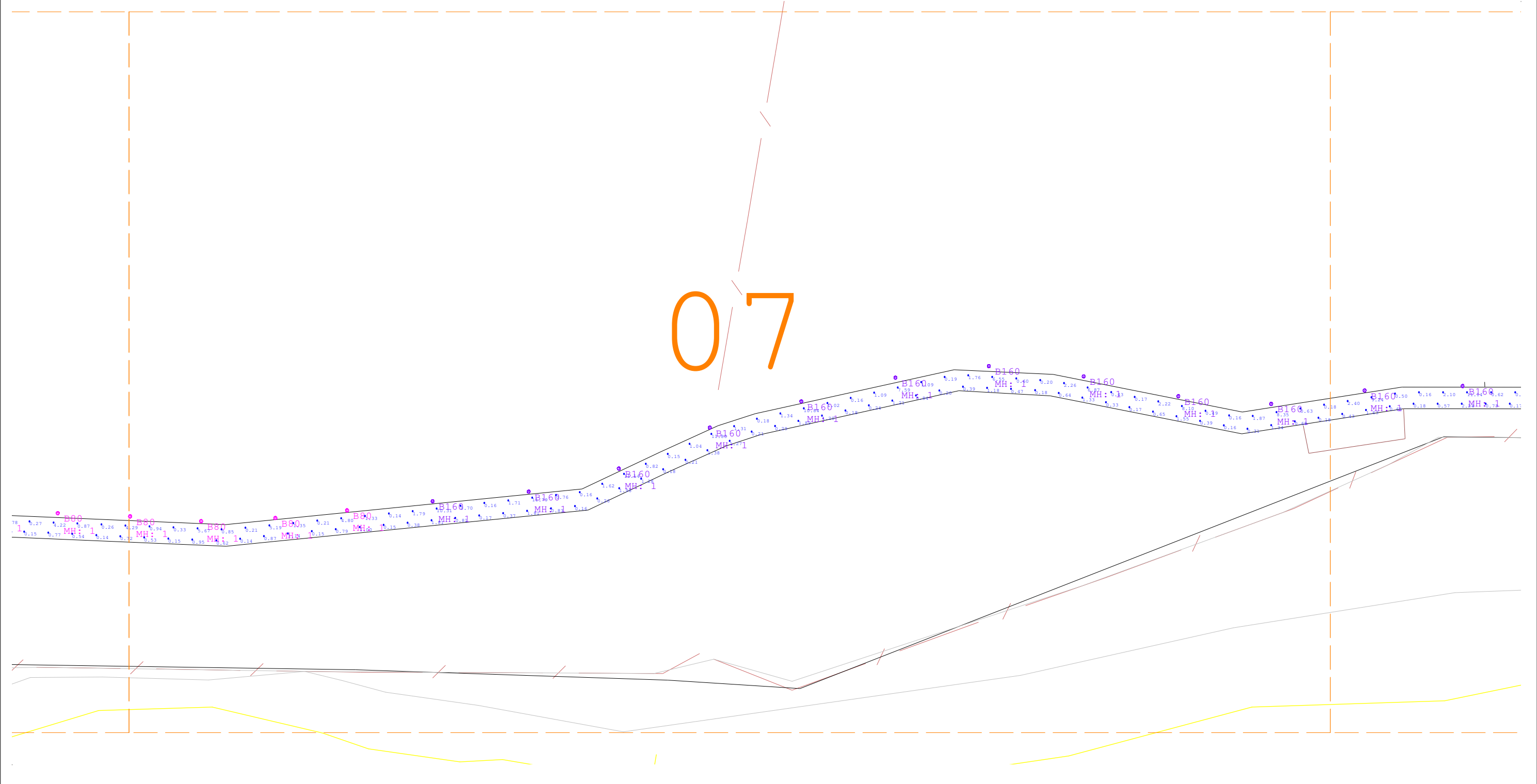
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0		PRELIMINARY	Illumination results shown on this lighting design are based on the project parameters provided to Orca Solar Lighting used in conjunction with the luminaire information tested under laboratory conditions. Actual project conditions differing from these parameters may affect field results. Customer is responsible for verifying compliance with any applicable standards.	APPLICATION: PATHWAY			
				ASNZS 1158.3.1 CATEGORY P4			
				DATE	SCALE	SHEET	
				18/09/2019	N.T.S	05 / 16	



Luminaire Schedule									
Symbol	Qty	Label	Description	MH	Tilt	Arrangement	Watts	Lumens	LLF
	9	B40	SBL2-040ANW	1.0m	0°	SINGLE	0.152	19	0.800
	34	B80	SBL2-080ANW	1.0m	0°	SINGLE	0.262	34	0.800
	44	B120	SBL2-120ANW	1.0m	0°	SINGLE	0.359	48	0.800
	128	B160	SBL2-160ANW	1.0m	0°	SINGLE	0.48	65	0.800
	2	SL5	AVERO 5.6W TYPE 2ME	6.0m	0°	SINGLE	5.578	745	0.800

Calculation Summary						
Label	CalcType	Units	Avg	Max	Min	Max/Avg
PATHWAY 01 Eh	Illuminance	Lux	1.82	13.84	0.14	7.60
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
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REV	DATE	DESCRIPTION	DESIGN VERIFICATION	WOOLLAHRA PATHWAY			A3
0		PRELIMINARY	Illumination results shown on this lighting design are based on the project parameters provided to Orca Solar Lighting used in conjunction with the luminaire information tested under laboratory conditions. Actual project conditions differing from these parameters may affect field results. Customer is responsible for verifying compliance with any applicable standards.	APPLICATION: PATHWAY			
				ASNZS 1158.3.1 CATEGORY P4			
				DATE	SCALE	SHEET	
				18/09/2019	N.T.S	07 / 16	



Luminaire Schedule									
Symbol	Qty	Label	Description	MH	Tilt	Arrangement	Watts	Lumens	LLF
	9	B40	SBL2-040ANW	1.0m	0°	SINGLE	0.152	19	0.800
	34	B80	SBL2-080ANW	1.0m	0°	SINGLE	0.262	34	0.800
	44	B120	SBL2-120ANW	1.0m	0°	SINGLE	0.359	48	0.800
	128	B160	SBL2-160ANW	1.0m	0°	SINGLE	0.48	65	0.800
	2	SL5	AVERO 5.6W TYPE 2ME	6.0m	0°	SINGLE	5.578	745	0.800

Calculation Summary						
Label	CalcType	Units	Avg	Max	Min	Max/Avg
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NOTES

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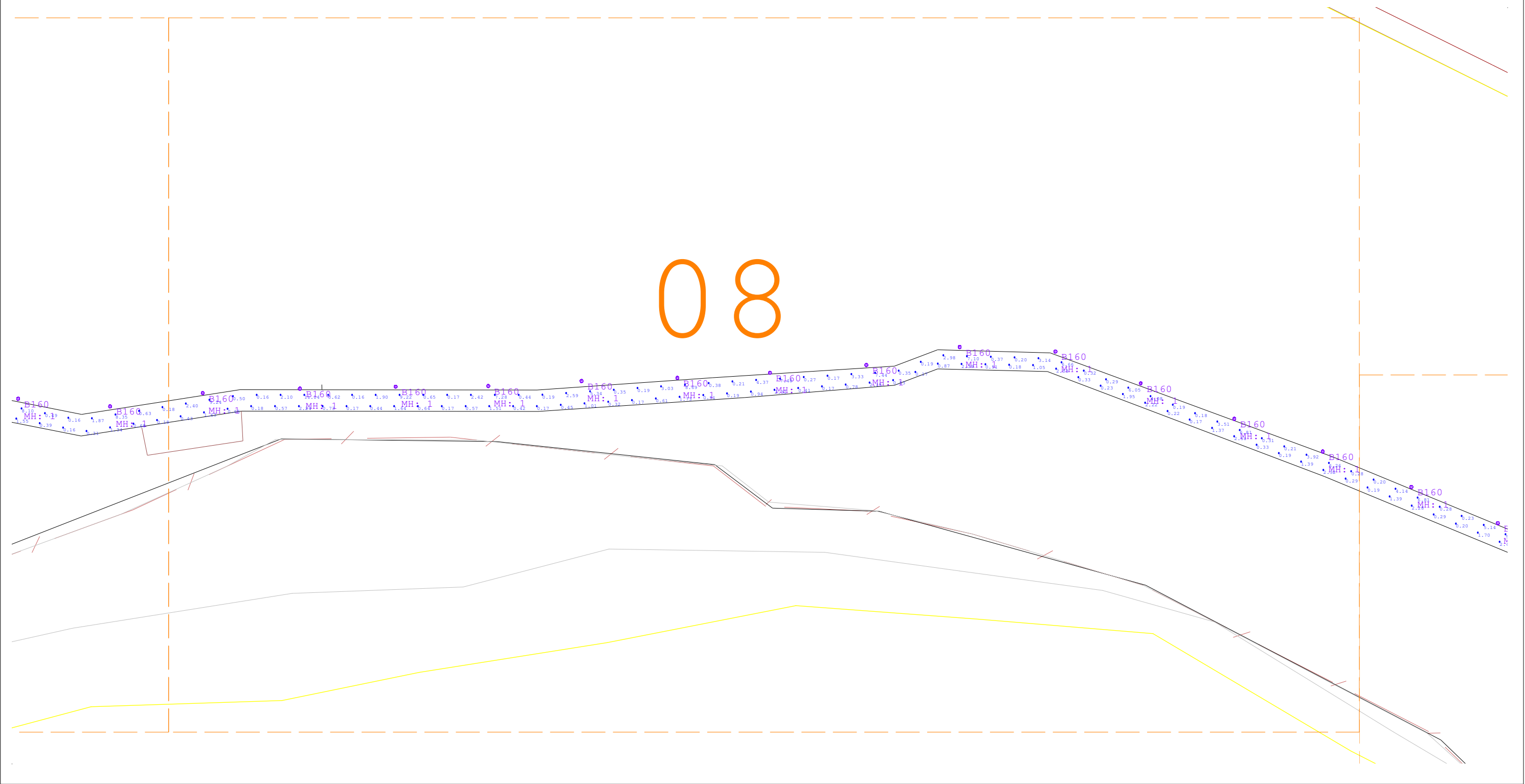
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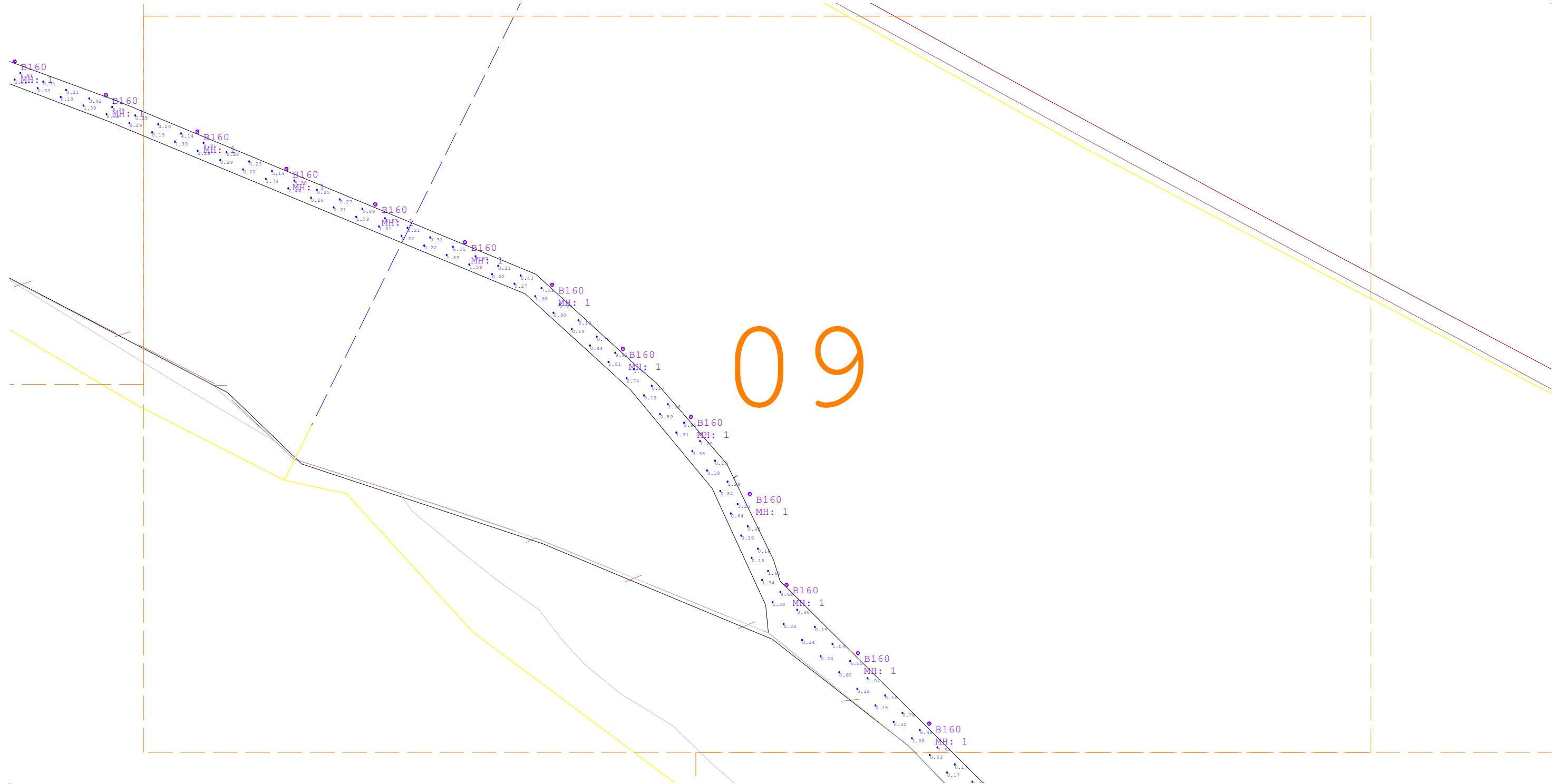
CALCULATIONS ARE SUBJECT TO ACCURACIES AND TOLERANCES NOMINATED IN AUSTRALIAN AND NEW ZEALAND STANDARDS AS/NZS 3827.2:1998.



REV	DATE	DESCRIPTION	DESIGN VERIFICATION	<div>Orca</div> <div>SOLAR LIGHTING</div>	WOOLLAHRA PATHWAY			A3
0		PRELIMINARY	ILLUMINATION RESULTS SHOWN ON THIS LIGHTING DESIGN ARE BASED ON THE PROJECT PARAMETERS PROVIDED TO ORCA SOLAR LIGHTING USED IN CONJUNCTION WITH THE LUMINAIRE INFORMATION TESTED UNDER LABORATORY CONDITIONS. ACTUAL PROJECT CONDITIONS DIFFERING FROM THESE PARAMETERS MAY AFFECT FIELD RESULTS. CUSTOMER IS RESPONSIBLE FOR VERIFYING COMPLIANCE WITH ANY APPLICABLE STANDARDS.					
				APPLICATION: PATHWAY				
				ASNZS 1158.3.1 CATEGORY P4				
				DATE	SCALE	SHEET		
				18/09/2019	N.T.S	08 / 16		

Luminaire Schedule									
Symbol	Qty	Label	Description	MH	Tilt	Arrangement	Watts	Lumens	LLF
	9	B40	SBL2-040ANW	1.0m	0°	SINGLE	0.152	19	0.800
	34	B80	SBL2-080ANW	1.0m	0°	SINGLE	0.262	34	0.800
	44	B120	SBL2-120ANW	1.0m	0°	SINGLE	0.359	48	0.800
	128	B160	SBL2-160ANW	1.0m	0°	SINGLE	0.48	65	0.800
	2	SL5	AVERO 5.6W TYPE 2ME	6.0m	0°	SINGLE	5.578	745	0.800

Calculation Summary						
Label	CalcType	Units	Avg	Max	Min	Max/Avg
PATHWAY 01 Eh	Illuminance	Lux	1.82	13.84	0.14	7.60
PATHWAY 02 Eh	Illuminance	Lux	1.89	12.36	0.14	6.54



NOTES

THE LIGHT TECHNICAL PARAMETERS COMPLY WITH THE RECOMMENDATIONS OF AS/NZS 1158.3.1 LIGHTING FOR PATHWAYS SUBCATEGORY 1.

VERTICAL ILLUMINANCE LEVELS (IF/WHERE APPLICABLE) ARE MEASURED AT 1.5M ABOVE GROUND LEVEL.

CALCULATIONS SHOWN ARE BASED ON THE INFORMATION PROVIDED TO ORCA SOLAR LIGHTING BY THE CUSTOMER.






CUSTOMER IS TO ASSUME RESPONSIBILITY OF CONFIRMING THE CALCULATED ILLUMINANCE LEVELS ARE APPROPRIATE INCLUDING ANY COMPLIANCE WITH ANY APPLICABLE STANDARDS.

PHOTOMETRIC DATA IS SUPPLIED BY LUMINAIRE MANUFACTURER, SOFTWARE USED FOR CALCULATIONS IS AGI32.

CALCULATIONS ARE SUBJECT TO ACCURACIES AND TOLERANCES NOMINATED IN AUSTRALIAN AND NEW ZEALAND STANDARDS AS/NZS 1158.3.1:2019 AND AS/NZS 3827.2:1998.

REV	DATE	DESCRIPTION	DESIGN VERIFICATION	WOOLLAHRA PATHWAY		
0		PRELIMINARY	Illumination results shown on this lighting design are based on the project parameters provided to Orca Solar Lighting used in conjunction with the luminaire information tested under laboratory conditions. Actual project conditions differing from these parameters may affect field results. Customer is responsible for verifying compliance with any applicable standards	A3		
				APPLICATION: PATHWAY		
				ASNZS 1158.3.1 CATEGORY P4		
				DATE	SCALE	SHEET
				18/09/2019	N.T.S	09 / 16



Luminaire Schedule									
Symbol	Qty	Label	Description	MH	Tilt	Arrangement	Watts	Lumens	LLF
	9	B40	SBL2-040ANW	1.0m	0°	SINGLE	0.152	19	0.800
	34	B80	SBL2-080ANW	1.0m	0°	SINGLE	0.262	34	0.800
	44	B120	SBL2-120ANW	1.0m	0°	SINGLE	0.359	48	0.800
	128	B160	SBL2-160ANW	1.0m	0°	SINGLE	0.48	65	0.800
	2	SL5	AVERO 5.6W TYPE 2ME	6.0m	0°	SINGLE	5.578	745	0.800

Calculation Summary						
Label	CalcType	Units	Avg	Max	Min	Max/Avg
PATHWAY 01 Eh	Illuminance	Lux	1.82	13.84	0.14	7.60
PATHWAY 02 Eh	Illuminance	Lux	1.89	12.36	0.14	6.54

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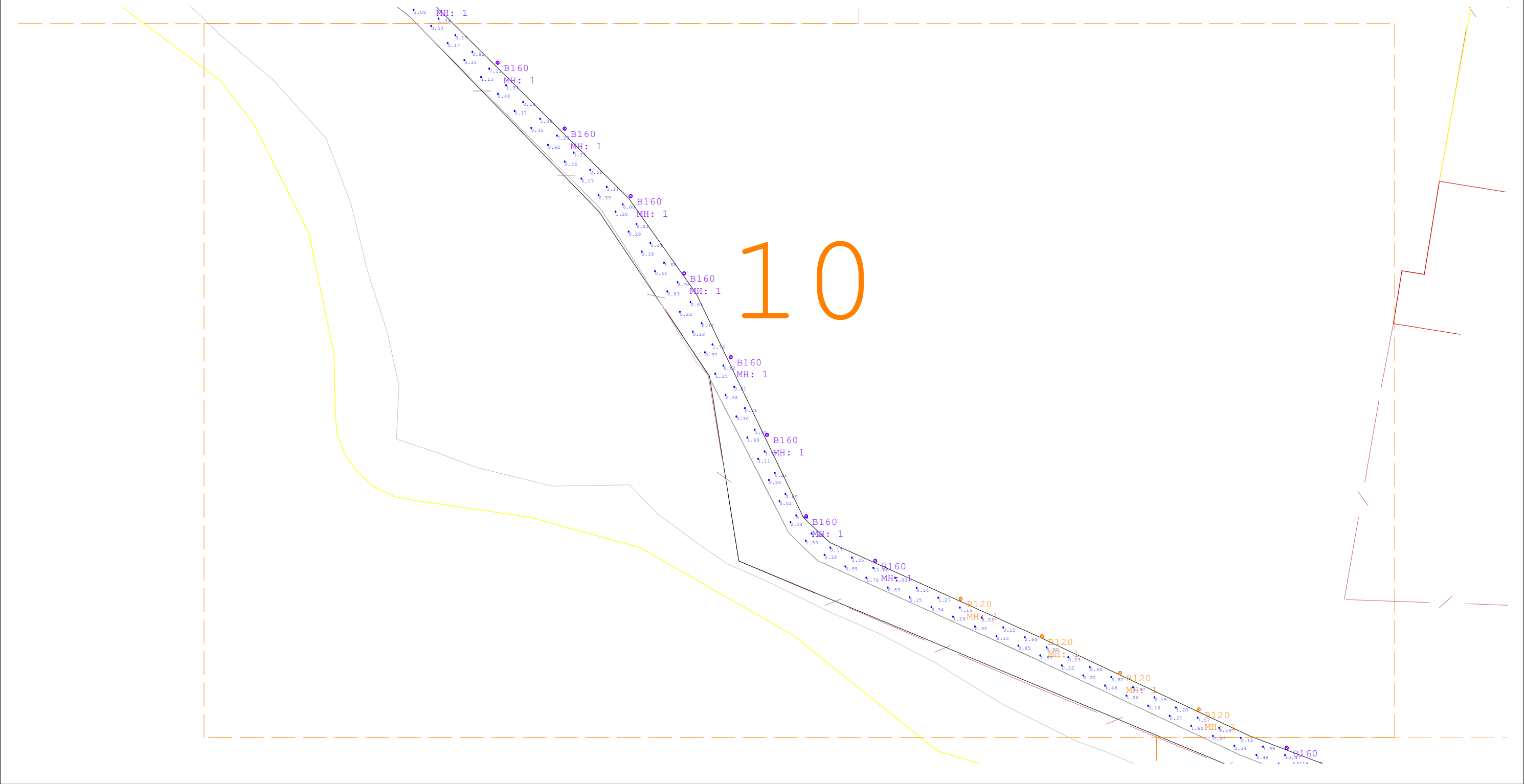
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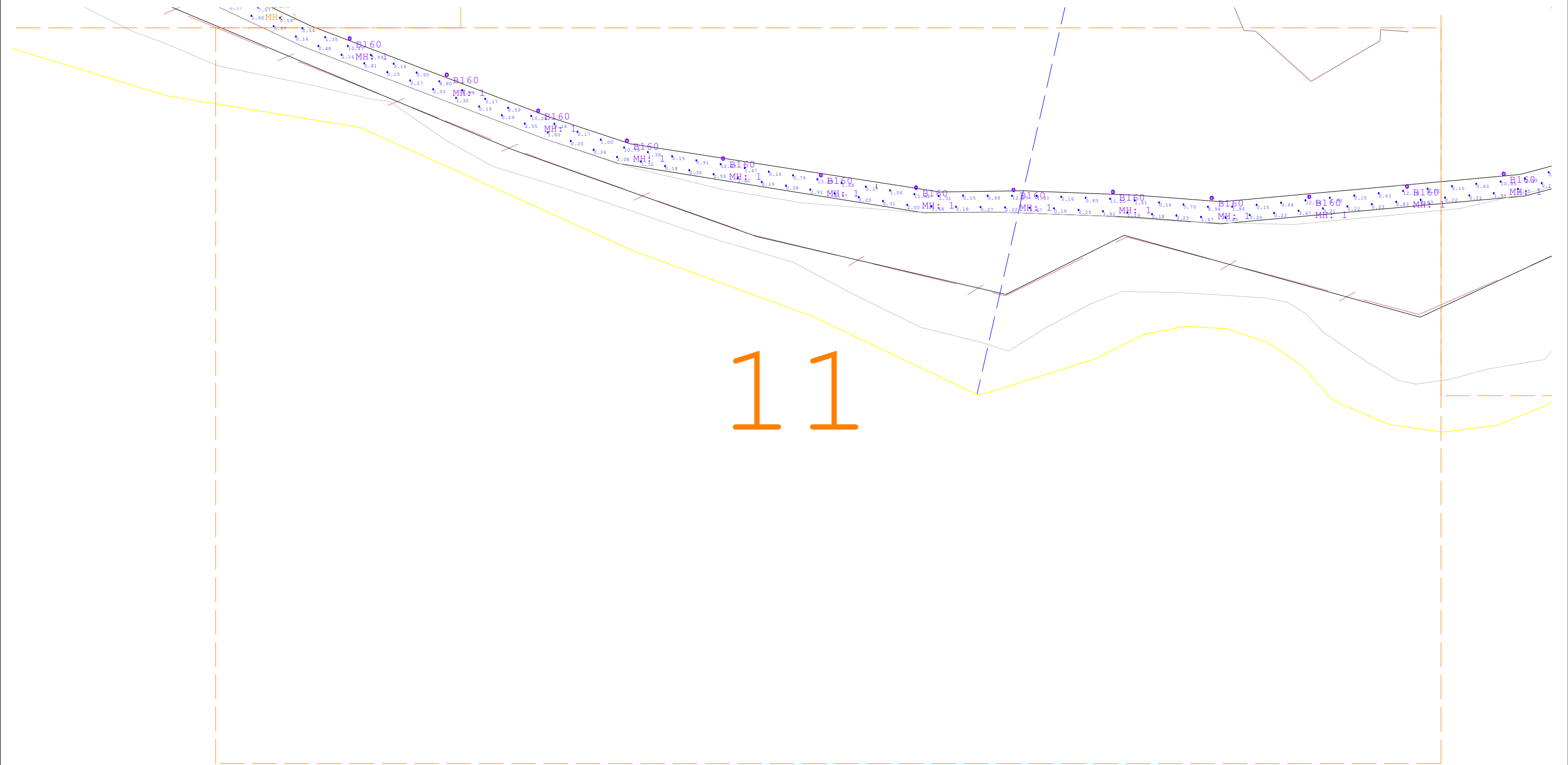


REV	DATE	DESCRIPTION	DESIGN VERIFICATION	WOOLLAHRA PATHWAY			A3
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				AS/NZS 1158.3.1 CATEGORY P4			
				DATE	SCALE	SHEET	
				18/09/2019	N.T.S	10 / 16	



Luminaire Schedule									
Symbol	Qty	Label	Description	MH	Tilt	Arrangement	Watts	Lumens	LLF
	9	B40	SBL2-040ANW	1.0m	0°	SINGLE	0.152	19	0.800
	34	B80	SBL2-080ANW	1.0m	0°	SINGLE	0.262	34	0.800
	44	B120	SBL2-120ANW	1.0m	0°	SINGLE	0.359	48	0.800
	128	B160	SBL2-160ANW	1.0m	0°	SINGLE	0.48	65	0.800
	2	SL5	AVERO 5.6W TYPE 2ME	6.0m	0°	SINGLE	5.578	745	0.800

Calculation Summary						
Label	CalcType	Units	Avg	Max	Min	Max/Avg
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
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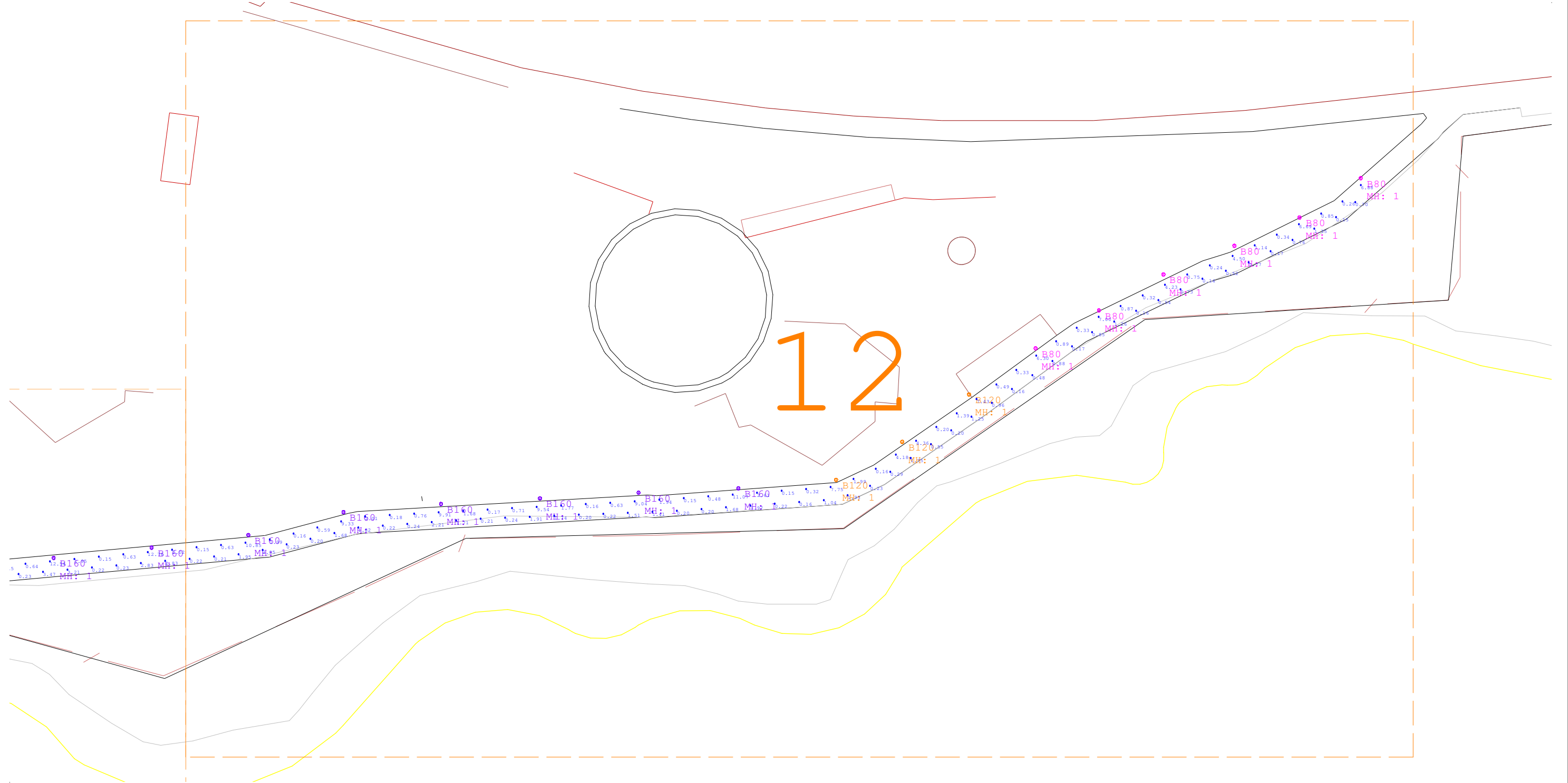
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				ASNZS 1158.3.1 CATEGORY P4			
				DATE	SCALE	SHEET	
				18/09/2019	N.T.S	11 / 16	



Luminaire Schedule									
Symbol	Qty	Label	Description	MH	Tilt	Arrangement	Watts	Lumens	LLF
	9	B40	SBL2-040ANW	1.0m	0°	SINGLE	0.152	19	0.800
	34	B80	SBL2-080ANW	1.0m	0°	SINGLE	0.262	34	0.800
	44	B120	SBL2-120ANW	1.0m	0°	SINGLE	0.359	48	0.800
	128	B160	SBL2-160ANW	1.0m	0°	SINGLE	0.48	65	0.800
	2	SL5	AVERO 5.6W TYPE 2ME	6.0m	0°	SINGLE	5.578	745	0.800

Calculation Summary						
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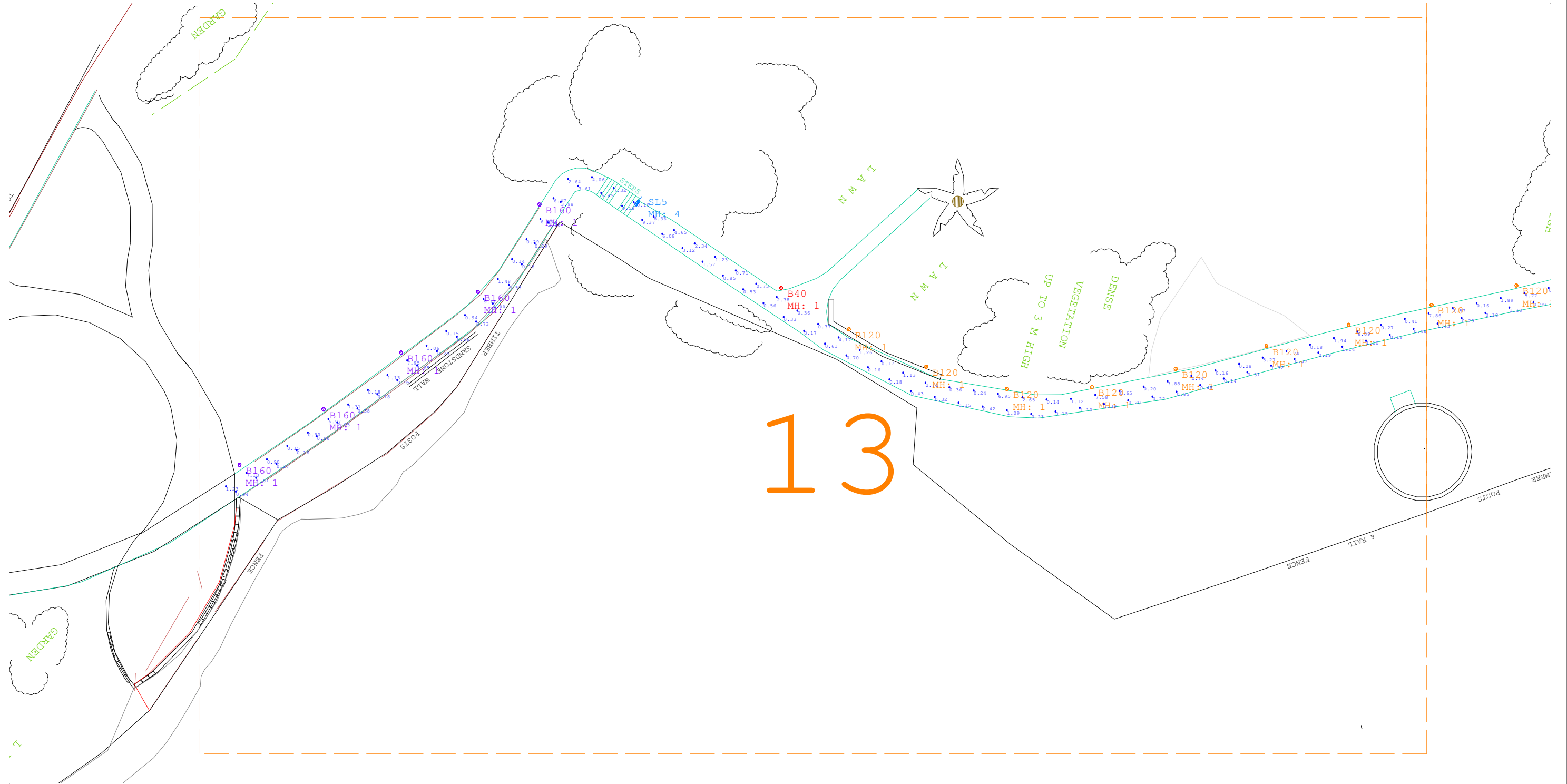
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				APPLICATION: PATHWAY		
				AS/NZS 1158.3.1 CATEGORY P4		
				DATE	SCALE	SHEET
				18/09/2019	N.T.S	12 / 16



Luminaire Schedule									
Symbol	Qty	Label	Description	MH	Tilt	Arrangement	Watts	Lumens	LLF
	9	B40	SBL2-040ANW	1.0m	0°	SINGLE	0.152	19	0.800
	34	B80	SBL2-080ANW	1.0m	0°	SINGLE	0.262	34	0.800
	44	B120	SBL2-120ANW	1.0m	0°	SINGLE	0.359	48	0.800
	128	B160	SBL2-160ANW	1.0m	0°	SINGLE	0.48	65	0.800
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				AS/NZS 1158.3.1 CATEGORY P4			
				DATE	SCALE	SHEET	
				18/09/2019	N.T.S	13 / 16	



Luminaire Schedule									
Symbol	Qty	Label	Description	MH	Tilt	Arrangement	Watts	Lumens	LLF
	9	B40	SBL2-040ANW	1.0m	0°	SINGLE	0.152	19	0.800
	34	B80	SBL2-080ANW	1.0m	0°	SINGLE	0.262	34	0.800
	44	B120	SBL2-120ANW	1.0m	0°	SINGLE	0.359	48	0.800
	128	B160	SBL2-160ANW	1.0m	0°	SINGLE	0.48	65	0.800
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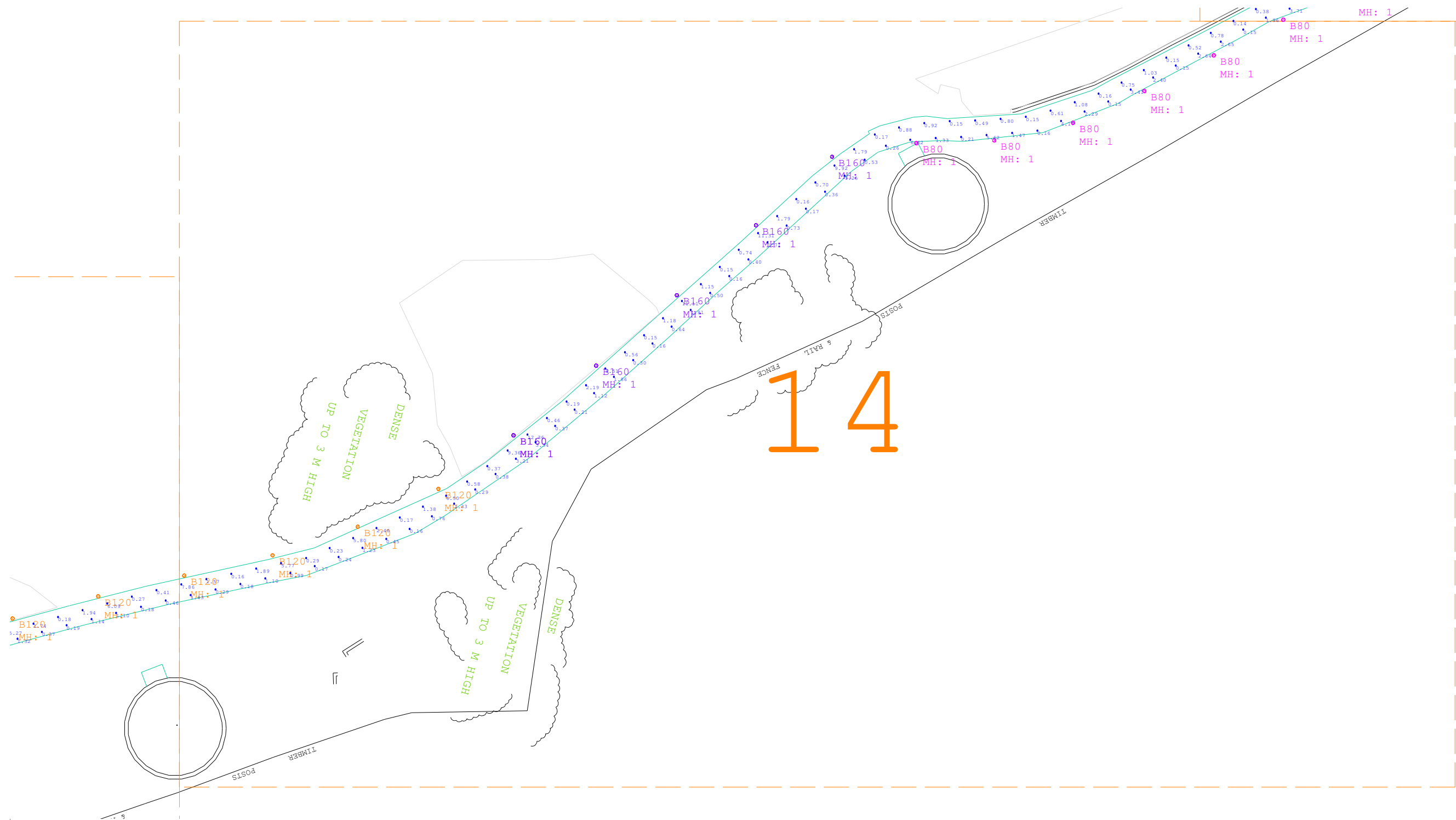
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
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				ASNZS 1158.3.1 CATEGORY P4			
				DATE	SCALE	SHEET	
				18/09/2019	N.T.S	14 / 16	



Luminaire Schedule									
Symbol	Qty	Label	Description	MH	Tilt	Arrangement	Watts	Lumens	LLF
	9	B40	SBL2-040ANW	1.0m	0°	SINGLE	0.152	19	0.800
	34	B80	SBL2-080ANW	1.0m	0°	SINGLE	0.262	34	0.800
	44	B120	SBL2-120ANW	1.0m	0°	SINGLE	0.359	48	0.800
	128	B160	SBL2-160ANW	1.0m	0°	SINGLE	0.48	65	0.800
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Label	CalcType	Units	Avg	Max	Min	Max/Avg
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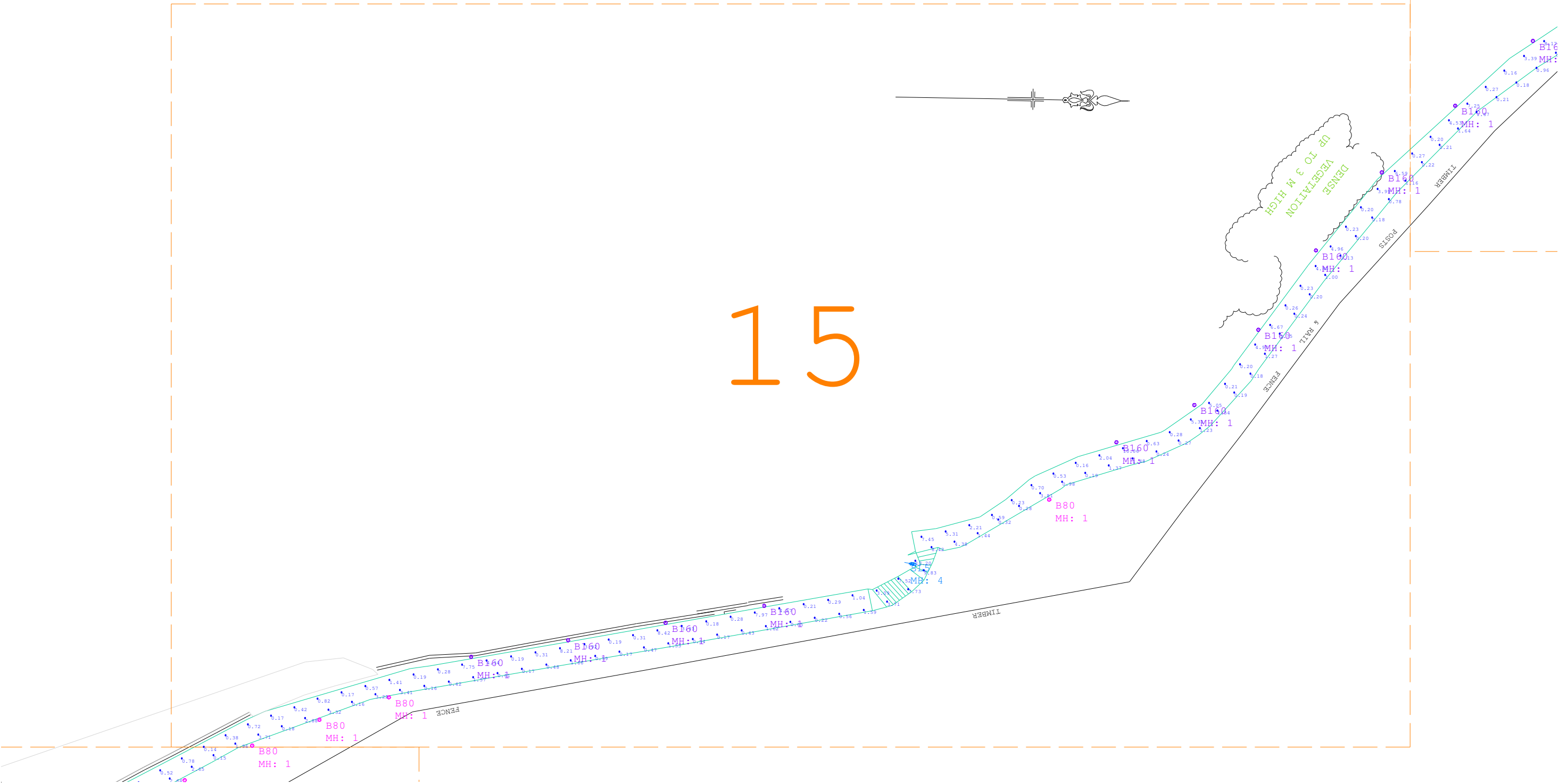
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				DATE	SCALE	SHEET	
				18/09/2019	N.T.S	15 / 16	



Luminaire Schedule									
Symbol	Qty	Label	Description	MH	Tilt	Arrangement	Watts	Lumens	LLF
	9	B40	SBL2-040ANW	1.0m	0°	SINGLE	0.152	19	0.800
	34	B80	SBL2-080ANW	1.0m	0°	SINGLE	0.262	34	0.800
	44	B120	SBL2-120ANW	1.0m	0°	SINGLE	0.359	48	0.800
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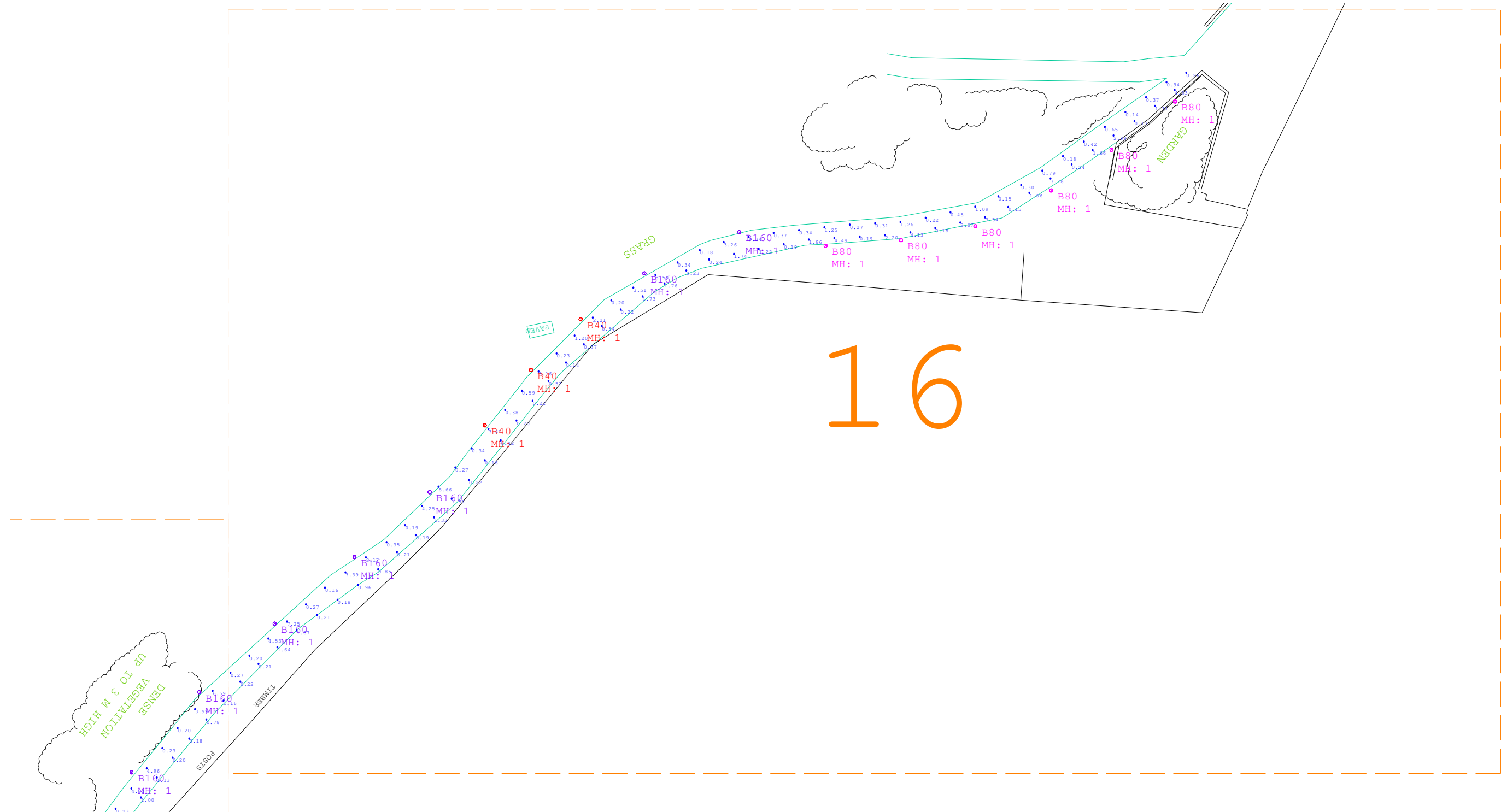
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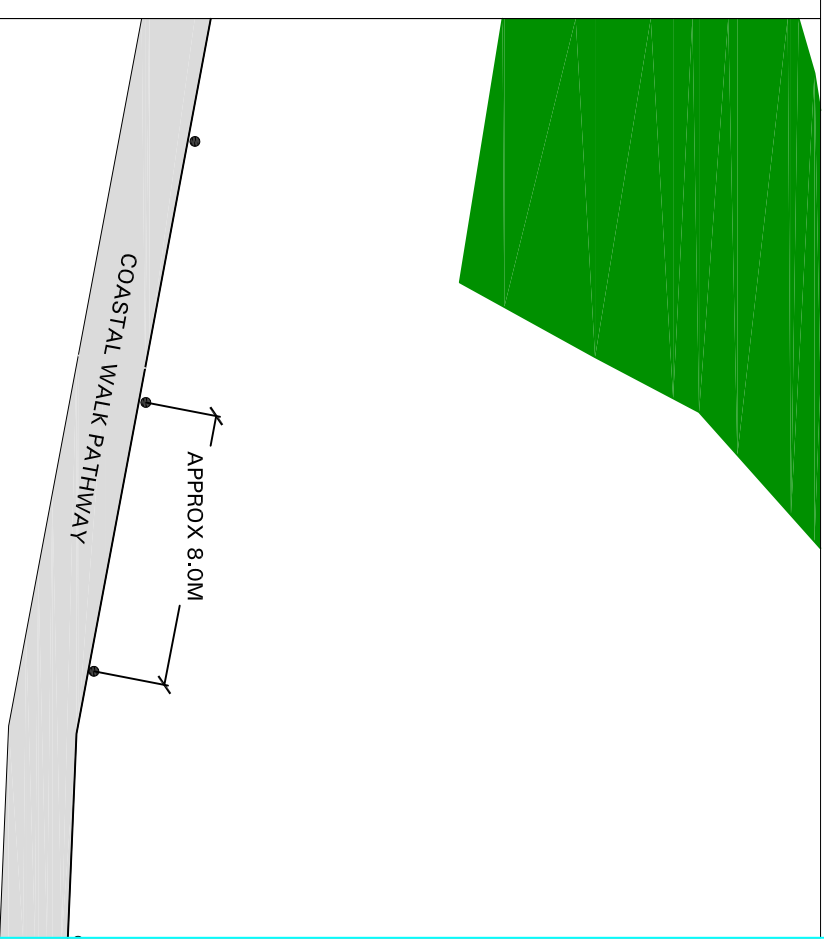
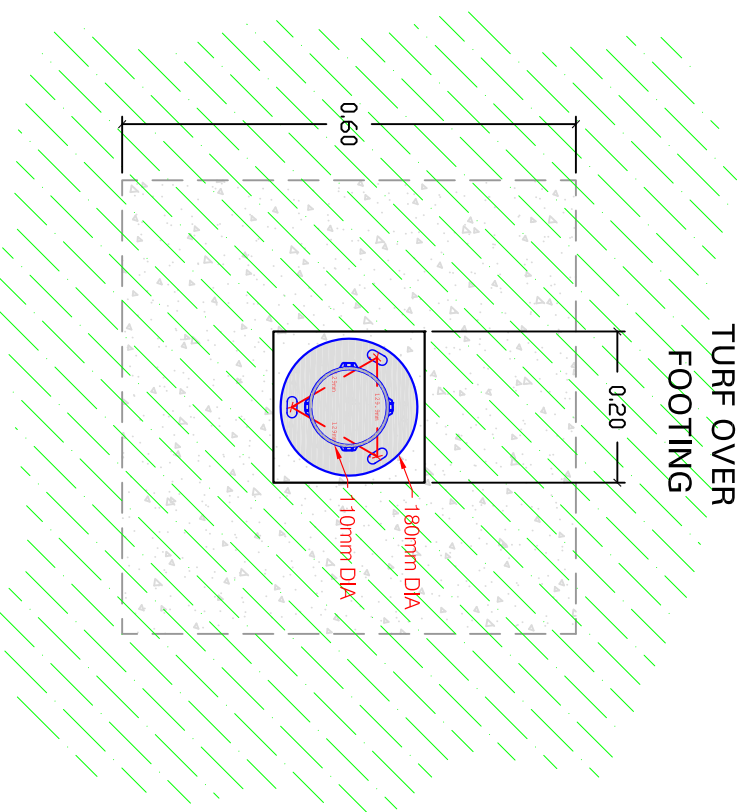
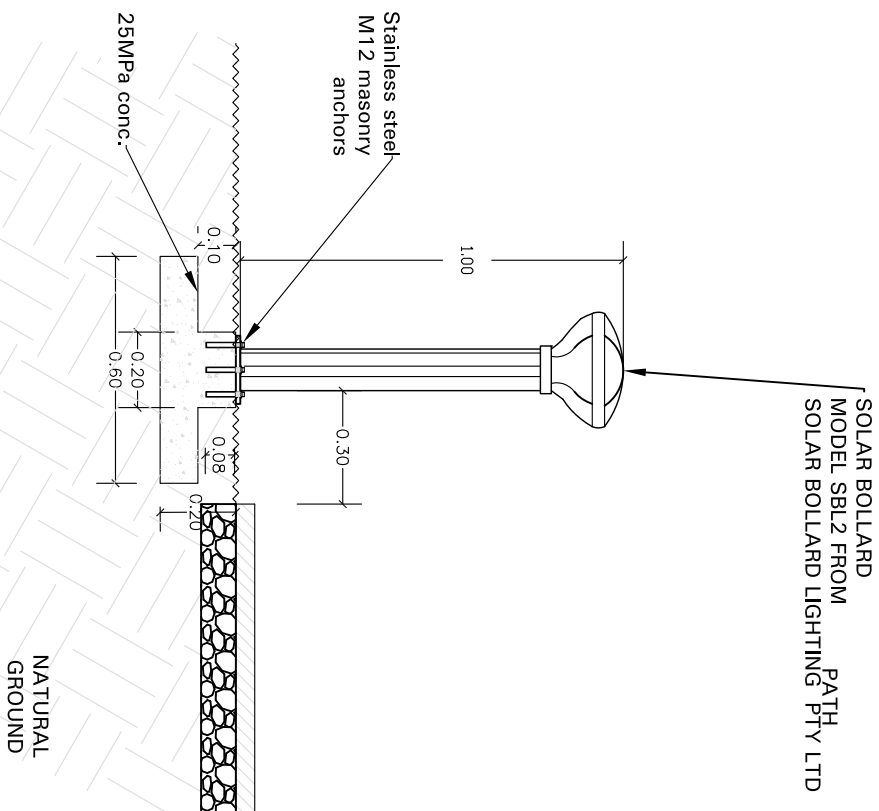


REV	DATE	DESCRIPTION	DESIGN VERIFICATION		WOOLLAHRA PATHWAY			A3
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					DATE	SCALE	SHEET	
					18/09/2019	N.T.S	16 / 16	





- BOLLARD LOCATIONS TO BE ADJUSTED TO AVOID TREE ROOTS AND EXISTING SHRUBS AND PERENNIALS.
- NO TRENCHING, CABLING OR WIRING REQUIRED.
- EXCAVATED MATERIAL TO BE DISPOSED OF SITE.
- SOLAR BOLLARDS TO OPERATE ALL NIGHT FROM DUSK TO DAWN.
- BOLLARD SPACING CONFORMS TO AS/NZS 1158.3.1 P4 CATEGORY.
- HAS ASYMMETRICAL (180 DEGREE) LIGHT OPTIC.
- EXTREMELY VANDAL RESISTANT IK10 CERTIFIED
- DESIGNED AND MADE IN AUSTRALIA TO THE HIGHEST COMMERCIAL QUALITY.
- DOME MATERIAL - SABIC SLX LEXAN (HIGHEST UV STABILISED PC AVAILABLE)
- RELIABLE ALL NIGHT LIGHT WITH 5 – 8 NIGHTS BATTERY BACK-UP.
- VERY CORROSION RESISTANT MARINE GRADE ALUMINIUM CONSTRUCTION (TRANSPORT & MAIN ROADS OLD USE THEM EXTENSIVELY FOR JETTIES & PONTOONS).



POST FIXING METHOD DETAIL
CONCRETE FOOTING WITH MASONRY ANCHORS
Scale 1:20

PLAN VIEW OF BASE PLATE
AND FOOTING
Scale 1:10 @A3

BOLLARD SETOUT DETAIL
Scale 1:200 @A3

[illegible]