

Project: Richmond Rd M7 Motorway to Townson Road

Phase: Substantial Detailed Design (Review 2 of 2)

Package: Street Lighting

Date of Issue: 2 June 2026

Date for Return: 17 June 2026

Summary

This design package previously (during DCD phase) included the design drawings and design report for the proposed street lighting design and placement of street lights in the Southern Portion of the works.

Changes since previous phase

An additional details sheet has been added to show how the new street lights will typically be dimensioned on the eastern and western sides of Richmond Rd.

Additional new streetlights have been added near the intersection of Richmond Rd and Rooty Hill Road North to provide lighting to the shared user path separately from the vehicle lanes.

Overall, there have been the following changes:

	DCD (previous phase)	SDD (current phase)
Proposed (new)	23	26
Luminaire replacements (existing)	6	6
No change (existing)	55	57
Removal (existing)	27	25

Responses and notes to DSMG feedback from previous phase

"Concerns

- *Should the crossing be allocated to M7 South bound entry ramp and not lit up – Rooty Hill Road has a history of community loss due to poorly lit crossings."*

This concern is noted however the crossing is no longer planned to be included in the project.

List of Documents

DCD Document Reference	DCD Revision	SDD Document Reference	SDD Revision	Document Type	Document Name
RRM7-GEDT-0537-LV-RPT-010001.A.S3.A.01.pdf	A	RRM7-GEDT-0537-LV-RPT-010001.B.S3.B.01	B	Report	Street Lighting – Substantial Detailed Design Report
RRM7-GEDT-0537-LV-DRG-000001.A.S3.A.01.pdf	A	RRM7-GEDT-0537-LV-DRG-000001.B.S3.B.01	B	Drawing	Street Lighting – Cover Sheet
RRM7-GEDT-0537-LV-DRG-000002.A.S3.A.01.pdf	A	RRM7-GEDT-0537-LV-DRG-000002.B.S3.B.01	B	Drawing	Street Lighting – Drawing Index
RRM7-GEDT-0537-LV-DRG-000005.A.S3.A.01.pdf	A	RRM7-GEDT-0537-LV-DRG-000005.B.S3.B.01	B	Drawing	Street Lighting – General Notes
RRM7-GEDT-0537-LV-DRG-000010.A.S3.A.01.pdf	A	RRM7-GEDT-0537-LV-DRG-000010.B.S3.B.01	B	Drawing	Street Lighting – Keyplan
		RRM7-GEDT-0537-LV-DRG-000051.A.S3.A.01.pdf	A	Drawing	Street Lighting – Typical Details
RRM7-GEDT-0537-LV-DRG-000101.A.S3.A.01.pdf	A	RRM7-GEDT-0537-LV-DRG-000101.B.S3.B.01	B	Drawing	Street Lighting Plan Sheet 1
RRM7-GEDT-0537-LV-DRG-000102.A.S3.A.01.pdf	A	RRM7-GEDT-0537-LV-DRG-000102.B.S3.B.01	B	Drawing	Street Lighting Plan Sheet 2
RRM7-GEDT-0537-LV-DRG-000103.A.S3.A.01.pdf	A	RRM7-GEDT-0537-LV-DRG-000103.B.S3.B.01	B	Drawing	Street Lighting Plan Sheet 3
RRM7-GEDT-0537-LV-DRG-000301.A.S3.A.01.pdf	A	RRM7-GEDT-0537-LV-DRG-000301.B.S3.B.01	B	Drawing	Street Lighting – Luminaire Schedule Sheet 1
RRM7-GEDT-0537-LV-DRG-000302.A.S3.A.01.pdf	A	RRM7-GEDT-0537-LV-DRG-000302.B.S3.B.01	B	Drawing	Street Lighting – Luminaire Schedule Sheet 2
RRM7-GEDT-0537-LV-DRG-099999.A.S3.A.01.pdf	A	RRM7-GEDT-0537-LV-DRG-099999.B.S3.B.01	B	Drawing	Street Lighting – Combined Drawings

Review Purpose

Document provided for information only however comments or questions are welcome.

When submitting comments or questions, please provide the document reference number.

Transport for New South Wales

Richmond Road Upgrade (M7 to Townson Road)

Contract number: 24.0000139271.1049

LV01 - Streetlighting - Portion 2 (Southern Section) - Design Report

Design Stage: Substantial Detailed Design

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DOCUMENT CONTROL

Project Authorisation

REPORT DETAILS						
Report title		LV01 - Streetlighting - Portion 2 (Southern Section) - Design Report				
Document number		RRM7-GEDT-0537-LV-RPT-010001				
Status		Substantial Detailed Design	Client	Transport for NSW		
REV	DATE	REVISION DETAILS	AUTHOR	REVIEWER	VERIFIER	APPROVER
A	20/02/2026	Developed Concept Design	Walaa Salah Jassim Al-Hamran	James Abraham	Michael Richards	James Abraham
B	15/04/2026	Substantial Detailed Design	Walaa Salah Jassim Al-Hamran	James Abraham	Michael Richards	James Abraham
CURRENT REVISION		B	LAST ISSUE DATE			15 April 2026

APPROVAL			
Name	Walaa Salah Jassim Al-Hamran	Name	James Abraham
Title	Package Lead	Title	Design Manager

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ABBREVIATIONS / DEFINITIONS

TERM	DESCRIPTION
ACC	Autodesk Construction Cloud
AEP	Annual Exceedance Probability
AGRD	Austrroads Guide to Road Design
AGTM	Austrroads Guide to Traffic Management
AHD	Australian Height Datum
AREF	Addendum REF
AS/NZS	Australian and New Zealand Standard
BNI	Blacktown Native Institute
BSR	Baseline Sustainability Requirements
CADD	Computer Aided Design and Drafting
CDR	Cross Discipline Review
Ch.	Chainage
CoA	Conditions for Approval
Competent	Competent means that a person has been deemed to meet the combination of licenses, qualifications, training and instruction as defined by the Company or by legal requirements for an activity or works
Concept Design	GEA DTI JV Concept Design developed during the RFT phase
Contractor	A person or business which provides goods or services to the Company under terms specified in a contract. GEA DTI JV is the Contractor for the WUC
Correspondence	Correspondence documents refer to letters sent to or received from other entities.
Council	Blacktown Council
Design Team	Aurecon
DCD	Developed Concept Design Stage
D&C	Design and Construct
DE	Digital Engineering
EDMS	Electronic Document Management System
ER	Environmental Representative
FDD	Final Design Documentation
GEA DTI JV	Joint Venture between Gamuda Engineering Australia (GEA) and DT Infrastructure
Head Contract	Contract between Transport for New South Wales and GEA DTI JV for the Richmond Road Upgrade project.
IC	Independent Certifier
IFC	Issue for Construction
ITP	Inspection and Test Plan
ITS	Intelligent Transport System
LGA	Local Government Authority (Blacktown Council)
LiDAR	Light Detection and Ranging
MASH	Manual for Assessing Safety Hardware
M7 Motorway	Westlink M7

TERM	DESCRIPTION
NB	Northbound
NCR	Non-Conformance
NWGA	North West Growth Area
OH	Overhead
O&M	Operations and Maintenance
PDCS	Project Document Control System
PDG	Project Design Group
PE	Proof Engineer
PM	Project Manager
PMP	Project Management Plan
Principal	Transport for NSW (ABN 18 804 236 602)
Project	This Project, Richmond Road upgrade between M7 Motorway and Townson Road, Marsden Park
REF	Review of Environmental Factors
RFI	Request for Information
RFT	Request for Tender
RL	Reduced Level
RRM7	Richmond Road Upgrade (M7 to Townson Road)
RSA	Road Safety Audit
RSW	Reinforced Soil Wall
SB	Southbound
SDD	Substantial Detailed Design
Service	Any service or item of infrastructure, including water, electricity, gas, fuel, telephone, existing drainage, sewerage, railway, airport, stormwater, irrigation, street lighting, CCTV, industrial waste disposal and electronic communications service
SiD	Safety in Design
SME	Subject Matter Expert
SUP	Shared User Path
SWTC	Scope of Works and Technical Criteria (contained in Head Contract Exhibit A)
TCS	Traffic Control Signals
TfNSW	Transport for NSW, The Principal
TL	Test Level
Temporary Works	Any temporary physical structure, appliance or thing used or works done in the carrying out of the Contractor's Activities, but which does not form part of the Project Works or in-service loading. Design for Temporary Works includes design for construction configurations whether the design results in additional works being specified.
VE	Value Engineering
WAE	Works-as-Executed (also referred to as 'As-Built')
WBS	Work Breakdown Structure
WOL	Whole of Life
Workflow	Sequence of tasks or activities

TERM	DESCRIPTION
WSO Co	Westlink M7 Operator
WUC	Works Under Contract

1 INTRODUCTION

1.1 Project description

The Richmond Road Upgrade (M7 to Townson Road) (RRM7 or the Project) is a critical infrastructure initiative designed to support the rapid growth of Sydney's North West Growth Area (NWGA). The NWGA is a planned development encompassing approximately 10,000 hectares and projected to house 250,000 people across 90,000 homes. This growth necessitates significant upgrades to the existing road network to accommodate increased traffic and freight demands.

Richmond Road serves as a vital arterial route connecting Blacktown through Marsden Park Industrial Precincts within the NWGA towards Windsor. While previous stages of the Richmond Road upgrade have been completed, further improvements are essential to address growing congestion and ensure future capacity.

The NSW Government, recognising the need for enhanced connectivity and improved traffic flow, has prioritised this project to achieve several key objectives:

- Easing congestion and improving travel times
- Enhancing traffic flow through key intersections
- Bolstering safety for all road users
- Improving connectivity between residential, commercial, and employment hubs
- Supporting pedestrian and cyclist safety through new shared paths.

These improvements will contribute to greater freight efficiency and support economic growth in the region. Key upgrades include modifications to the M7 Motorway ramp, additional lanes on Richmond Road, and intersection upgrades at various locations, including Rooty Hill Road North.

The project is divided into two separable portions:

- **Portion 1 (Northern Section):** This section extends from just North of the Townson Road junction to south of the intersection with Alderton and Langford Drives. It includes widening Richmond Road from four to six lanes. Construction will commence in October 2025 and will be complete by December 2026
- **Portion 2 (Southern Section):** This section will focus on the construction of a flyover exit ramp from the M7 which crosses over Rooty Hill Road North, the construction of a new road/ pedestrian and bikeway bridge over Bells Creek and the widening of Richmond Road from four to six lanes. It will incorporate additional turning lanes at the Rooty Hill Road junction and will join the southern point of Portion 1. Construction is expected to begin mid-2026 and will be complete before the end of 2028.

In February 2025 TfNSW released an RFT for the Design and Construction of the Project. Gamuda Engineering Australia DT Infrastructure Joint Venture (GEA DTI JV) and Aurecon were the successful parties, and TfNSW executed the contract with GEA DTI JV on 23 October 2025.

An overview of the Project is provided in Figure 1-1.



Figure 1-1 Project site overview

The Project comprises approximately 2.2 km of Main Carriageway between M7 Motorway and Towson Road in Marsden Park. The cross section consists of a six-lane carriageway with three lanes in each direction excluding any auxiliary lanes.

The key features of the project include the following:

- Upgrade of Richmond Road between the M7 Motorway and Townson Road to six lanes (three lanes in each direction). This would include:
 - Road widening between the M7 Motorway and the Alderton Drive / Langford Drive intersection including a new bridge structure over Bells Creek
 - Widening into the median from the Alderton Drive / Langford Drive intersection to about 250 metres north of the Hollinsworth Road / Townson Road intersection
- Building a new flyover bridge from the M7 Motorway Rooty Hill Road North exit ramp to Richmond Road northbound to allow road users to bypass two sets of traffic lights, reducing congestion and queuing onto the motorway allowing uninterrupted flow of traffic
- Upgrades to the intersection of Richmond Road, Hollinsworth Road and Townson Road including:
 - Additional northbound through lane along Richmond Road (providing three through lanes towards Richmond)
 - Additional dedicated right turn lane from Richmond Road southbound onto Hollinsworth Road
 - New left turn slip lane from Hollinsworth Road onto Richmond Road including a pedestrian island and crossing
 - Staged pedestrian crossings across Richmond Road on the north and south sides of the intersection, with a pedestrian refuge in the median.
- Upgrades to the intersection of Richmond Road, Langford Drive and Alderton Drive including:
 - Additional northbound and southbound through lanes along Richmond Road (providing three through lanes in both directions)
 - Staged pedestrian crossings across Richmond Road on the north and south sides of the intersection, with a pedestrian refuge in the median.
- Upgrades to the intersection of Richmond Road, Rooty Hill Road North and the M7 Motorway ramps including:
 - Two dedicated lanes on Richmond Road heading onto the M7 Motorway (southbound entry ramp)
 - Two dedicated southbound through lanes on Richmond Road (towards Blacktown)
 - Additional right turn lane from Richmond Road southbound onto Rooty Hill Road North (providing two dedicated right turn lanes onto Rooty Hill Road North)
 - Relocation of the existing pedestrian crossing on Richmond Road approximately 160 metres south. This would be a new staged pedestrian crossing across Richmond Road, with a pedestrian refuge in the median at the intersection of Richmond Road and the M7 Motorway southbound entry ramp.
- Building a new concrete bridge structure over Bells Creek for the northbound carriageway. This would include:
 - Three northbound travel lanes
 - A shared pedestrian and bike path on the western side, which replaces the existing boardwalk bridge next to the northbound Richmond Road carriageway
- Upgrade works on the existing Bells Creek Bridge which becomes the southbound carriageway of Richmond Road

- Shifting the existing pedestrian and bike path on the western side of Richmond Road to be further west
- Continuing to improve public transport by maintaining the dedicated bus lanes at the intersections.
- Drainage and water quality structures including:
 - Adjustments to the pits and pipes of the existing stormwater network
 - New water quality basin on the east side of Richmond Road
 - Open flooding channel on the eastern side of Richmond Road roughly between the M7 Motorway northbound on-ramp and Bells Creek for flood mitigation purposes.
- Roadside furniture including safety barriers, signage, line marking, lighting and fencing.
- Earthwork cutting, embankments and retaining walls to accommodate the widened road alignment, flyover bridge and open flooding channel.
- Modified formal access to properties along the upgraded sections of Richmond Road.
- Property acquisition including full acquisition of one property and partial acquisition of two properties.
- Rehabilitation of disturbed areas and landscaping.
- Establishment and use of three temporary ancillary facilities during construction.

The project alignment generally runs from south to north and consequently the carriageways are identified as northbound and southbound carriageways. For consistency across the Project, a convention has been adopted to name features on the nearside shoulder of the northbound carriageway as being on the western side of the alignment. Similarly, features on the nearside shoulder of the southbound carriageway are referred to as being on the eastern side of the alignment.

1.2 Description of design package

The purpose of this report is to document the Substantial Detailed Design (SDD) for LV01 Streetlighting - Portion 2 (Southern Section) which focuses on the lighting design and placement of all exterior road lighting assets.

This package includes the following information, specific to the elements of construction:

- Road Lighting
- Shared Path Lighting

1.3 Scope of design package

The report demonstrates how the requirements of the Head Contract and the Scope of Works and Technical Criteria (SWTC) have been met for this design package. Specifically, this design report provides the following information in relation to this design package:

- Basis of design
- Design details
- Safety-in-design
- Constructability considerations
- Operation and maintenance considerations
- Durability requirements
- Compliance
- Environment
- Sustainability

- Items for resolution.

1.3.1 Exclusions

- Electrical wiring will follow the standards of Endeavour Energy and will be reticulated underground in conduit unless required to be overhead to suit the existing arrangement or proposed aerial relocation works. A level 3 ASP design is required for the construction of the streetlight equipment and wiring and must be approved by Endeavour Energy. The electrical design is outside the scope of this package and will be addressed the utilities design package, by others.

1.4 Design submission stage

This report identifies certain aspects of the design development at each submission stage as required by SWTC Appendix C.2, Clause 2.2 (d).

The submission stages are as follows:

- Developed Concept Design (DCD)
 - The Developed Concept Design Stage is the developed Design Documentation for any discrete element or part thereof and is the stage at which the Concept Design has been developed to fully define the project systems, ensure integration with adjoining design elements, adjacent infrastructure interfaces and between associated design disciplines. The Developed Concept Design Stage is the stage at which design will not materially change in relation to the concept and general details that have been developed since the Concept Design
- Substantial Detailed Design (SDD)
 - The Substantial Detailed Design Stage is the fully developed design including proprietary engineering or systems solutions, which includes all the design standards, design reports, specifications, models, calculations and drawings for each design element of the relevant Design Package, and is the stage at which the final design analysis, design details and drawings demonstrate compliance with and satisfaction of all the requirements of the Contract as well as draft O&M requirements for each design element of the relevant Design Package
- Final Design Documentation (FDD)
 - The Final Design Documentation Stage is the final completed integrated and verified design including proprietary engineering solutions, which includes all the design standards and completed design reports including proof engineer's report, specifications, models and calculations, design drawings, Inspection and Test Plans and Verification Checklists and final O&M requirements for each design element of the relevant Design Package.
- Issued for Construction (IFC)
 - The Issued for Construction Design Documentation is the design which the Contractor is entitled to use for construction purposes and incorporates minor amendments to the Final Design Documentation, verified by the Independent Certifier (IC), to address any comments of conditions noted in the IC's signed document

The design is currently at the Substantial Detailed Design (SDD) stage. Future submissions will include:

- Final Design Documentation (FDD)
- Issued for Construction (IFC)

1.5 Design deliverables

The deliverables of this package include the following:

- Design Report (this report)

- Drawings as listed in Appendix A
- A full transcription of the lighting calculation data is provided in Appendix H of this report (Lighting Calculation Summary).

This report should be read in conjunction with the deliverables and drawings listed in Appendix A

2 DESIGN DEVELOPMENT

2.1 Design criteria

The SDD submission is for the LV01 Streetlighting - Portion 2 (Southern Section) meets the requirements of the Head Contract, Scope of Works & Technical Criteria (SWTC) and associated documents, except as noted in section 3.5.

2.1.1 Function and performance criteria

Table 2-1 SWTC requirements for lighting

SWTC REFERENCE	REQUIREMENT
SWTC Appendix B.17	Compliance with AS/NZS 1158 series
SWTC Appendix B.17	Obtrusive lighting assessment in accordance with AS/NZS 4282
SWTC Main Body	Lighting to be provided for all carriageways, ramps, interchanges, intersections, roundabouts and Local Area Works
SWTC Main Body	Compliance with Appendix B.17 and Environmental Documents
SWTC Main Body	Control of obtrusive light spill to residential and sensitive receivers
SWTC Main Body	LED luminaires 2700K–4500K (CIE 1931 compliant)
SWTC Main Body	Minimum 50,000 hours at L70B10
SWTC Main Body	Liaison and approval from relevant Authorities and Councils
SWTC Appendix B.17	Compliance with NSW Public Lighting Code
SWTC Appendix B.17	Compliance with Endeavour Energy Guidelines
SWTC Appendix B.17	Lighting category V3 for Main Carriageways, ramps and interchanges
SWTC Appendix B.17	Maintenance access and whole-of-life considerations

2.1.2 Environmental criteria

The Project has been approved through an REF. The requirements of this REF and other contractual Project environmental requirements have been considered as part of design development.

A summary of compliance with applicable environmental requirements, as set out in the project's Environmental Documents, have been provided. A complete overview of applicable conditions and evidence of compliance also are included in Appendix G.

2.2 Design inputs

Please refer to Table 2-2 for list of contributors to this design package.

Table 2-2: List of package contributors

ENGINEERS	DESIGNER	REVIEWERS	VERIFIERS
Walaa Salah Jassim Al-Hamran	Melvin Dale Torres Sue Hickling	James Abraham	Michael Richards

The specific inputs required to develop this design package are described in the following sections.

2.2.1 Survey

All existing light pole positions have been recorded from the survey of the Site.

2.2.2 Design Loadings

This section is not applicable for this design package

2.2.3 Geotechnical

All proposed light posts supported at grade are mounted on pile footings in accordance with Endeavour Energy standard drawing – Universal foundation Installation Detail (263983)

2.2.4 Traffic

This section is not applicable for this design package

2.2.5 Specialist technical reports

This section is not applicable for this design package

2.2.6 Assumptions

The following assumptions have been made for the development of this design package:

- Existing streetlights poles not impacted by the roadworks can be retained subject to a condition assessment and confirmation of residual design life. Refer design package DY01 for further details.

2.2.7 Key constraints

The key constraints considered in the development of the design are summarised in Table 2-3 below.

Table 2-3: Key constraints

KEY CONSTRAINT	DESCRIPTION	DESIGN IMPACT
Retention of existing infrastructure	The project objective requires existing street lighting poles and luminaires to be retained where practicable to minimise asset removal and replacement.	Limits flexibility in pole spacing, mounting configuration and optical optimisation.
No lighting along flyover ramp	Lighting is not required along the main length of the Northbound Rooty Hill Road Flyover Ramp as it exceeds the trigger length specified in SWTC Appendix B.17 Section 2(b)(viii). Illumination is limited to merge and diverge areas only.	Restricts lighting provision to entry and exit points, requiring careful design at transition zones to maintain safe visual adaptation and compliance at merge/diverge locations.
Mandatory Category V3 compliance	All ramps, merges, diverges and intersections within the work area are required to comply with AS/NZS 1158.1.1 Category V3 lighting performance criteria.	Governs luminaire selection, mounting height, pole spacing, wattage and optical distribution to achieve required illuminance, uniformity and glare control targets.
Clear zone	Lighting pole setbacks must comply with clear zones requirements. Alternatively, an impact absorbing pole can be used within the clear zone.	Constrains pole placement options and may increase bracket length or luminaire output requirements to maintain compliance while remaining outside clear zones.
Approved luminaire product list restrictions	Luminaires must be selected from the current Endeavour Energy Approved Product Lists. Previously	Limits available wattage and optical options; may require higher wattage or alternative fittings to achieve performance compliance within approved product range.

KEY CONSTRAINT	DESCRIPTION	DESIGN IMPACT
	nominated fittings no longer approved required redesign.	

2.2.8 Relevant RFIs

Refer to Table 2-4 below for a summary of relevant RFIs for this design package. For further details refer to the appropriate Teambinder RFI and response.

Table 2-4: Relevant RFIs

TFNSW TRANSMITTAL	SUMMARY OF REQUEST	SUMMARY OF RESPONSE	ACTION
NIL			

2.3 Standards and specifications

2.3.1 Order of precedence

Design requirements are to be in accordance with the SWTC. Unless otherwise expressly stated in the deed and SWTC, in the event of any inconsistency the following order of precedence must apply:

- The SWTC
- Other Appendices excluding:
 - The Codes and Standards in Appendix D.4; and
 - Appendices E.2 to E.11
- The Codes and Standards in Appendix D.4:
 - Section 2 – TfNSW Technical Directions;
 - Section 3 – TfNSW Specifications;
 - Section 4 – TfNSW Codes, Standards, Guidelines and Policies;
 - Section 5 – Austroads Guidelines and Transport Reference Documents;
 - Section 6 – Other Australian, NSW and Industry Documents;
 - Section 7 – Australian and International Codes, Standards and Guidelines; and
 - Section 8 – Other Reference Documents, Codes, Standards and Guidelines
- Appendix E.3 and Appendix E.4;
- Appendix E.2, Appendix E.5 to Appendix E.11;
- Endeavour Energy Lighting Design Guidelines and Manuals- Public Lighting Endeavour Energy; and
- Other agreed reference documents and standards.

For the avoidance of doubt, the requirements of the SWTC must always have a higher order of precedence over any elements of the Contractor's Concept Design or Contractor Specifications, including any qualifying statements or comments contained within the Contractor's Concept Design or Contractor Specifications unless:

- The agreed exceptions in SWTC Appendix B.1 permit and exception; or
- Otherwise approved by the Principal's Representative in writing.

The above is in accordance with the standards listed in the SWTC Main Body, Clause 1.6 (b).

2.3.2 Codes, Standards and Specifications

The following standards and specifications are applicable to this design package.

Table 2-5: Additional Codes, Standards, Technical Publications and Guidelines

REFERENCE	DOCUMENT TITLE
AS/NZS 1158.1.1 2022	Lighting for roads and public space (V Category)
AS/NZS 1158.4 2024	Lighting for roads and public space (Lighting of Pedestrian Crossing)
AS/NZS 1158.3.1 2020	Pedestrian area (Category P) lighting - Performance and design requirements
AS/NZS 4282 2023	Control of the obtrusive effects of outdoor lighting
Endeavour Energy Lighting Design Guidelines and Manuals	Public Lighting Endeavour Energy
TSI- SP-041	Luminaires for Road Lighting by RMS
DOC22 1063464-1 Tab 1	NSW Public lighting code
AS/NZS 1798	Lighting poles and bracket arms – Recommended dimensions
AS/NZS TS 1158.6	Lighting for roads and public spaces, Part 6: Luminaires – Performance

2.4 Interface requirements

The following section details interfaces to the design package.

2.4.1 Related design packages

This report outlines the design, noting that the following design lot(s), while relevant, are addressed under a separate design package as detailed below:

Table 2-6: Related Design Packages

DESIGN PACKAGE / DESIGN LOT	DESCRIPTION	DESIGNED BY AURECON OR OTHER CONSULTANT
BR01	BR01 - Bridge Over Rooty Hill Road North (Flyover Bridge) and Retaining Wall	Aurecon
BR02	BR02 - Bridge Over Bells Creek on Richmond Rd Northbound	Aurecon
BR03	BR03 - Upgrade of Existing Bridge Over Bells Creek	Aurecon
DM01	Site Clearing	Aurecon
DU01	Urban Design and Landscape Plan	DesignInc
DY01	Durability Report	Aurecon
FN01	Road Furniture - Portion 2 (Southern Section)	Aurecon
GE04	Geotechnical Design - Portion 2 (Southern Section)	Aurecon
GN02	Safety In Design Report	Aurecon
LA01	Landscape Design	DesignInc
MS01	Drainage Culverts	Aurecon
MS02	Miscellaneous Structures	Aurecon
PJ01	Property Adjustments - Portion 2 (Southern Section)	Aurecon
PV01	Pavements And Subsurface Drainage - Portion 2 (Southern Section)	Aurecon

DESIGN PACKAGE / DESIGN LOT	DESCRIPTION	DESIGNED BY AURECON OR OTHER CONSULTANT
RW01	Road Works	Aurecon
SD01	Flooding And Hydrology - Portion 2 (Southern Section)	Aurecon
SD02	Drainage Transverse and Longitudinal - Portion 2 (Southern Section)	Aurecon
TT01	Intelligent Transport Systems	Aurecon
TT02	Traffic Control Signals	Aurecon
UT01	Utility Coordination Plan	GEA DTI JV

2.4.2 Key interdisciplinary interfaces

The design has been developed to provide a coordinated, integrated, economic, safe and constructible solution. The key internal interfaces within this design package are summarised in Table 2-7.

Table 2-7: Key internal interfaces

DISCIPLINE / INTERFACE ITEM	CONTROLS IDENTIFIED
Road Geometry & Clear Zones	Pole locations coordinated with road geometry and clear zone requirements.
Road Furniture, ITS & Signage	Lighting coordinated with barriers, gantries, signage and ITS assets to avoid physical clashes and minimise shadowing and glare in accordance with SWTC B.17.
Drainage & Flooding	Pole foundations and underground reticulation coordinated with pits, pipes and culverts to maintain cover and avoid overland flow paths. Assets positioned to avoid flood-prone areas where practicable.
Pavements	Pole foundations coordinated with pavement layer depths to maintain minimum cover and avoid compromising pavement integrity during staging and construction.
Bridges & Structures	Lighting coordinated with geometry, working width clearances and structural elements. Pole placement maintains required clearances and access for maintenance.
Utilities	Lighting conduits and cabling coordinated with existing and proposed utilities to maintain required separations. Level 3 ASP design and Endeavour Energy approvals incorporated.
Traffic Control Signals (TCS)	Lighting at signalised intersections coordinated with signal infrastructure to prevent shadowing and ensure Category V3 compliance.
Landscaping	Lighting design considers future planting to avoid obstruction of luminaires and maintain CPTED principles and sight lines.
Durability	Lighting assets designed in accordance with SWTC Appendix B.13 durability requirements, including corrosion protection, IP65 ratings and a 20-year design life assumption.
Future Castlereagh Connection	Layout developed to minimise relocation requirements associated with future widening works where practicable.
Maintenance Access & Ownership	Asset locations allow safe maintenance access. Ownership allocation aligned with Endeavour Energy and relevant Approved Product Lists.

2.5 Design changes

This section summarises the alterations made to this design package due to variations and evolution of the design during design development.

2.5.1 Concept design to Developed Concept Design (DCD)

Key design changes between the Concept Design and DCD are listed in Table 2-8.

Table 2-8: Differences from Concept Design

KEY CHANGE	DISCUSSION	SUMMARY OF IMPACT ON DURABILITY, PERFORMANCE CRITERIA, DESIGN LOADS, STANDARDS OR MINIMUM OPERATING CONDITIONS
Updating of proposed luminaire	Since RoadLED 200W 4000K is no longer an approved Endeavour Energy product, RoadLED 275W 4000K AERO has been adopted as the proposed alternative to achieve compliance with current Approved Product Lists.	The updated luminaire ensures compliance with authority approval requirements while maintaining Category V3 performance. The change does not adversely impact durability or structural design, as pole loading, IP/IK ratings and maintenance factors remain compliant with SWTC and AS/NZS 1158 requirements.
Optimisation of lighting layout	In order to accommodate changes from the road design, the position and quantity of streetlights were also updated to suit accordingly. Lighting design areas are also identified to confirm compliance with the required illuminance values.	The revised layout maintains compliance with AS/NZS 1158 Category V3 performance requirements. Adjustments to spacing and positioning do not reduce durability or minimum operating conditions and continue to meet clear zone and authority requirements.
Future proofing	Streetlight spacing and offsets were reviewed in accordance with Clause 5.35 (iv) of the SWTC to accommodate the future Castlereagh Connection. Pole locations were optimised to minimise assets within the future road reserve	Improves long-term durability and asset management by reducing potential future relocation works. No adverse impact on lighting performance or compliance with Category V3 requirements. Supports whole-of-life efficiency and minimises future service disruption.
Clear zone	Pole setbacks and clear zones were updated to align with design speed requirements. Alternatively, impact absorbing pole has been specified where site constraints do not allow the pole to be placed outside the clear zone, in accordance with section 7.2.1 of AGRD Part 6 (2024)	Minor adjustments to luminaire selection (higher wattage and luminance output) were required to maintain lighting performance while meeting safety offsets, with no reduction in durability or operational performance.

2.5.2 Developed Concept Design to Substantial Detailed Design (SDD)

Key design changes between the DCD and SDD are listed in Table 2-9.

Table 2-9: Differences from Developed Concept Design

KEY CHANGE	DISCUSSION	SUMMARY OF IMPACT ON DURABILITY, PERFORMANCE CRITERIA, DESIGN LOADS, STANDARDS OR MINIMUM OPERATING CONDITIONS
Update to proposed luminaire for consistent colour temperature	The previously adopted mix of luminaires (3000K and 4000K) for the road lighting at DCD stage has been rationalised to a consistent 3000K colour temperature across the design. The ATS VLED 290W 3000K luminaire has been adopted in lieu of the 275W 4000K AERO to achieve this consistency.	The updated luminaire maintains compliance with authority approval requirements and TfNSW comments, while achieving the required Category V3 performance. There is no adverse impact on durability or structural design, as pole loading, IP/IK ratings, and maintenance factors remain compliant with SWTC and AS/NZS 1158.1.1:2022.
Ramp lighting assessment and compliance	A detailed assessment of ramp lighting conditions, including shadowing and glare, has been undertaken as part of the SDD submission in accordance with AS/NZS 1158.1.1:2022. Where	The assessment confirms compliance with AS/NZS 1158.1.1:2022 and relevant authority requirements, achieving the required performance criteria for safe ramp

KEY CHANGE	DISCUSSION	SUMMARY OF IMPACT ON DURABILITY, PERFORMANCE CRITERIA, DESIGN LOADS, STANDARDS OR MINIMUM OPERATING CONDITIONS
	ramps are influenced by overhead structures, the lighting design and calculations have been refined to minimise shadowing and contrast effects, ensuring consistent and safe visual conditions for road users.	operation. There is no adverse impact on durability or structural design, with lighting equipment, pole loading, and maintenance considerations remaining compliant with applicable standards and project requirements.
Footpath Underpass lighting assessment	Lighting design for footpaths and underpasses beneath bridge structures has been developed in accordance with SWTC Appendix B.17, adopting AS/NZS 1158.3.1:2020 PP2 requirements. The design ensures appropriate illumination levels, uniformity, and glare control to support pedestrian safety, visibility, and user comfort. Comprehensive underpass lighting assessments have been completed as part of the SDD submission to verify compliance. As a result two additional light poles have been added to maintain illumination levels where the footpath / shared path crosses underneath the bridge (Bridge 1)	The adopted lighting categories and verified assessments confirm compliance with relevant standards and authority requirements. Lighting infrastructure, loadings, and maintenance considerations remain consistent with SWTC and AS/NZS 1158.3.1:2020.
Refined obtrusive lighting assessment and removal of glare shield requirement	At DCD stage, a preliminary obtrusive lighting assessment was undertaken in accordance with AS/NZS 4282. Due to the proximity of Pole No. 29 to adjacent residential properties, the proposed design improves light spill relative to existing conditions; however, compliance cannot be confirmed without glare shield photometric data. A revised photometric file incorporating glare control has been requested from the manufacturer to enable assessment. Subject to its receipt and validation, compliance is anticipated. This item remains a design risk pending confirmation.	Compliance with AS/NZS 4282 is anticipated but cannot be confirmed pending glare shield photometric data for Pole No. 29. No impact to durability or structural design is expected. Lighting performance is expected to meet requirements upon validation, with this item remaining a design risk until confirmed.

2.5.3 Substantial Detailed Design to Final Design Documentation (FDD)

Key design changes between SDD and FDD are listed in Table 2-10.

Table 2-10: Differences from Substantial Detailed Design

KEY CHANGE	DISCUSSION	SUMMARY OF IMPACT ON DURABILITY, PERFORMANCE CRITERIA, DESIGN LOADS, STANDARDS OR MINIMUM OPERATING CONDITIONS
N/A for SDD		

2.6 Design Methodology

The lighting design for the Richmond Road Upgrade (Townson Road to M7) has been developed in accordance with SWTC B.17 Lighting and is designed to comply with the AS/NZS 1158 series of standards, together with other relevant standards, codes, and guidelines listed in 2.3.2 of this report.

2.6.1 Design objectives

The road lighting has been designed to achieve the following objectives:

- Retain existing street lighting poles and luminaires where practicable.
- Provide new street lighting poles and luminaires where required to accommodate road widening works.
- Ensure all newly installed luminaires are Endeavour Energy approved LED products.
- Lighting is proposed only at the integration points associated with the Rooty Hill Road Flyover Ramp and will be provided by Endeavour Energy's existing and proposed lighting assets. Specifically, the diverge from Rooty Hill Road will be illuminated by existing Endeavour Energy lighting, and the merge into the Northbound Carriageway (MC10) will be illuminated by proposed new Endeavour Energy lighting.
- No lighting is proposed along the length of the flyover ramp itself, with illumination limited to the entry and exit areas only.
- Consider Sustainability and Whole of Life requirements (refer to section 4.12 of the report)

3 DESIGN OUTCOMES

The following section provides a description of the design solution for the assets, systems and equipment covered by this design package. The design has been developed in accordance with the design criteria nominated in section 2.1. Design calculations for this design package are included in Appendix H.

3.1.1 Road Classifications

The following lighting categories have been adopted for the project, in accordance with SWTC Appendix B.17:

- All interchange ramps, merges, and diverges are illuminated to Category V3.
- All intersections within the work areas are illuminated to Category V3.
- Adjacent local roads are illuminated to Category V3.

Table 3.1 — Values of light technical parameters for Category V lighting

1	2	3	4	5	6	7	8	9	10	11
Lighting subcategory	Light technical parameters									
	For straight sections, curves and intersections						For intersections and other specified locations		For non-SSL luminaires	For SSL luminaires
	Average carriageway luminance ^{a,b} $\bar{L}$ cd.m ⁻² ≥	Overall uniformity ^{c,h} min/avg (U_0) ≥	Longitudinal uniformity ^b (U_L) min/max ≥		Threshold increment ^{d,e} (T_I) ≤	Surround verge illuminance ^b (E_{sv} and E_{vs}) ≥	Point horizontal illuminance ^{a,h} (E_{hs}) ≥	Illuminance (horizontal) uniformity ^d Cat V (U_{L1}) max/min ≤	Upward waste light ratio ^d (UWLR) ≤	Upward waste light ratio ^d (UWLR) ≤
			Australia	New Zealand						
V1	1.50	0.33	0.5	0.3	15	50	15	8	3	1
V2	1.00	0.33	0.5	0.3	15	50	10	8	3	1
V3	0.75	0.33	0.5	0.3	15	50	7.5	8	3	1
V4 ^f	0.50	0.33	0.5	0.3	15	50	5	8	3	1
V5	0.35	0.33	0.5	0.3	15	50	3.5	8	3	1

Figure 3-1: value of Light Technical Parameters for Category V3 Lighting - Table 3.1 of AS/NZS 1158.1.1 2022

3.1.2 Footpath Underpass Classifications

The following lighting categories have been adopted for the project, in accordance with SWTC Appendix B.17:

- Footpaths and underpasses beneath bridge structures have been designed in accordance with AS/NZS 1158.3.1 2020 PP2 requirements to ensure adequate illumination levels, uniformity and minimisation of glare, supporting pedestrian visibility, safety, and user comfort.

Comprehensive underpass assessments have been undertaken as part of design. Refer Appendix H for details.

TABLE 3.4
VALUES OF LIGHT TECHNICAL PARAMETERS
FOR PATHWAYS AND CYCLIST PATHS

1	2	3	4	5
Lighting subcategory	Light technical parameters (LTP)			
	Average horizontal illuminance ^{a,b} ($\bar{E}_h$) lx	Point horizontal illuminance ^{a,h,d} (E_{hs}) lx	Illuminance (horizontal) uniformity ^c Cat. P (U_{H1})	Point vertical illuminance ^{a,h} (E_{vs}) lx
PP1	10	2	5	1
PP2	7	1	5	0.3
PP3	3	0.5	5	0.1
PP4	1.5	0.25	5	0.05 ^e
PP5	0.85	0.14	5	0.02 ^e

Figure 3-2: value of Light Technical Parameters for Category PP2 Lighting - Table 3.4 of AS/NZS 1158.3.1 2020

3.1.3 Ramp Lighting Assessment and Compliance

Lighting is not proposed along the main length of the Northbound Rooty Hill Road Flyover Ramp, as the ramp length exceeds 500 m and does not meet the criteria outlined in SWTC Appendix B17 Section 2(b)(viii), – “between flag lit lane merges and diverges where the length between the end of the merge taper and beginning of the diverge is less than 300m, must comply with category V3 in accordance with AS/NZS 1158.1.1”. Since this ramp exceeds those limits, it does not trigger a requirement to be lit to AS/NZS 1158.1.1 (Category V3).

An assessment of lighting conditions on the ramp has been undertaken as part of the design in accordance with the requirements of AS/NZS 1158.1.1 2022 and AS/NZS 4282:2023, including consideration of veiling luminance, luminance adaptation, and glare to ensure adequate visibility for road users.

The ramp has been assessed for glare affecting the ramp roadway users due to the proposed new lighting installation on Richmond Road. As the ramp is unlit, the glare on the ramp from the surrounding lighting installations is required to comply with the Threshold Increment (TI) requirements of AS/NZS 4282.

Calculations for TI require the adaptation luminance (L_{ad}) level for the ramp to be determined. This value is dependent on the area where the lighting system affecting the unlit ramp is installed and the environmental zone applicable to that area.

The environmental zone for Richmond Road has been determined to be A3 – Medium district brightness due to it being an illuminated roadway through a suburban area, in accordance with AS/NZS 4282:2023, Table 3.1.

Table 3.1 — Environmental zones

Environmental zones	Ambient light conditions	Descriptions/ Examples
A0	Intrinsically dark	UNESCO Starlight Reserve. IDA: Dark Sky Parks, Reserves or Sanctuaries Major optical observatories Other accreditations for dark sky places for example astrotourism, heritage value, astronomical importance, wildlife/ecosystem protection Lighting for safe access may be required
A1	Dark	Relatively uninhabited rural areas (including terrestrial, marine, aquatic and coastal areas) Generally roadways without streetlighting through rural areas
A2	Low district brightness	Sparsely inhabited rural and semi-rural areas Generally roadways without streetlighting through suburban, rural or semi-rural areas other than intersections
A3	Medium district brightness	Suburban areas in towns and cities Generally roadways with streetlighting through suburban, rural or semi-rural areas
A4	High district brightness	Town and city centres and other commercial areas Residential areas abutting commercial areas Industrial and Port areas Transport Interchanges
TV	High district brightness	Vicinity of major sport and event stadiums during TV broadcasts
NOTE Zones A0 and A1 would normally have a minimum area of 50 ha.(0.5 km ²). There may be smaller environmentally sensitive areas.		

Figure 3-3 Environmental Zone classification - Table 3.1 of AS/NZS 4282:2023

For an unlit roadway, the value of L_{ad} is determined from AS/NZS 4282:2023, Table 3.2. For an environmental zone of A3 the default L_{ad} is 1 cd/m². This value has been used for the calculation of TI on the ramp. The maximum allowable TI in zone A3 is 20%.

The ramp has been assessed for glare using the TI requirements of AS/NZS 1158.1.1:2022, Table 3.1, which details a maximum allowable TI of 15% on roadways, as it is the more stringent requirement of the two standards.

Table 3.2 — Light technical parameter limits

Zones	Maximum vertical illuminance (E_v) lux		Threshold increment (TI)		Upward Light Ratio
	Non-curve	Curve	Maximum TI %	Default Adaptation level (L_{ad}) cd/m ²	Maximum ULR _S or ULR _L
A0	0 ^a	0.0	N/A	N/A	0.00
A1	2	0.1	20	0.1	0.00
A2	5	1	20	0.2 ^b	0.01
A3	10	2	20	1	0.02
A4	25	5	20	5	0.03
TV	N/A	N/A	20	10	0.08

^a For A0, E_v shall be as close to zero as practicable without impacting safety considerations.
^b For an internally illuminated sign in a A2 zone, $L_{ad} \leq 0.25$ cd/m²

Figure 3-4 Light technical parameters - Table 3.2 of AS/NZS 4282:2023

The calculations on the ramp demonstrate that the ramp is compliant with the threshold increment requirements for AS/NZS 4282:2023, Environmental Zone A3 and AS/NZS 1158.1.1:2022 (15%) detailed above. Refer Appendix H for details.

3.1.4 Ownership

All lighting assets not nominated as TfNSW assets will be governed by the relevant local council authority (i.e. Blacktown City Council) and maintained by Endeavour Energy. All Endeavour Energy lighting assets have been selected from the Endeavour Energy Asset Material Register.

3.1.5 Exclusions

The following exclusions to the streetlighting design apply for the Project:

- Lighting will not be provided along the main length of the Northbound Rooty Hill Road Flyover Ramp due to its length exceeding 500 m, in accordance with SWTC Appendix B17 Section 2, (b)(viii) – “between flag lit lane merges and diverges where the length between the end of the merge taper and beginning of the diverge is less than 300m, must comply with category V3 in accordance with AS/NZS 1158.1.1”. Since this ramp exceeds those limits, it does not trigger a requirement to be lit to AS/NZS 1158.1.1 (Category V3).

3.2 Design details

3.2.1 Luminaire Type

The nominated luminaires for the new road LED lighting are the following approved fittings: RoadLED 205W Aero and ATS VLED 290W, both of which meet the following requirements:

- Correlated colour temperature of 3000K.
- Minimum ingress protection rating of IP65.
- Endeavour Energy stock code 1000009088 approved list.

The nominated luminaire for the new footpath underpass LED lighting is the following approved fitting: StreetLED3 24W 3K FTB PBN7 AERO, which meet the following requirements:

- Correlated colour temperature of 3000K.

- Minimum ingress protection rating of IP65.
- Endeavour Energy stock code 1000009058 approved list.

The selected luminaires listed on the Endeavour Energy Approved Products List under the V1 category. While V3-category luminaires were initially reviewed from the Endeavour Energy approved list, the available V3 fittings did not provide sufficient output to achieve compliance with the required lighting performance for this design. Accordingly, an alternative approved luminaire was selected to achieve compliance with the nominated lighting category.

3.2.2 Proposed Light Poles

The lighting design adopts impact-absorbing poles for streetlights owned and maintained by Endeavour Energy. The lighting design for the proposed light poles at the roads has been developed based on the following parameters:

- Lighting columns at a height of 10.5m and 12m.
- Bracket arms with a length of 4.5 m.

The lighting design for the proposed light poles at the footpath underpass has been developed based on the following parameters:

- Lighting columns at a height of 7.5m
- Bracket arms with a length of 3 m.

3.2.2.1 Clear zones

Lighting pole setbacks have been determined based on the design speed environment, with the following minimum set backs:

- 6.5 m applied for roads with a V80 km/h design speed
- 7.5 m applied for roads with a V90 km/h design speed..

Where roadside barriers such as guardrails or concrete barriers are present, the applicable setback based on the barrier working width has been adopted. Where site constraints do not allow poles to be placed outside the clear zone or shielded by a safety barrier, impact absorbing poles have been nominated, in accordance with section 7.2.1 of AGRD Part 6 (2024).

In areas adjacent to shared paths and cycleways, lighting poles should be located at least 300mm from the shared path edge to the face of the pole for minimum bicycle clearances.

3.2.3 Luminaire Maintenance Factor and Lifetime:

The Maintenance Factor (MF) for this lighting design has been determined using the recommendations stipulated in AS/NZS 1158.1.1. The Lamp Lumen Maintenance Factor (LLMF) has been nominated as 0.90 (or L90) at 88,000 hrs based on the lumen depreciation values as provided by the luminaire manufacturer.

- The LDD considers the likely accumulation of dust, particles and other debris. An LMF of 0.95 and 36 month luminaire cleaning cycle has been adopted based of AS/NZS 1158.1.1:2022 requirements.

Environmental zone	LDD factor Cleaning frequency			
	36 months	48 months	60 months	72 months
Urban and rural	0.95	0.94	0.93	0.92

Figure 3-5: The luminaire dirt depreciation factor (LDD) as per Clause 3.4.2 of AS/NZS 1158.1.1 2022

- A Lamp Survival Factor (LSF) at 50,000 hrs of 1.00 has been adopted. This is because unlike traditional light sources, LED light sources generally do not experience 'catastrophic failure' but are subject to luminous depreciation alone.
- In this instance $LLMF \times LDD \times LSF = 0.90 \times 0.95 \times 1.00 = 0.855 = MF$
- A MF of 0.8 has been adopted for the calculations as Endeavour Energy specifies a maximum allowable MF of 0.8.
- As luminaires can be expected to operate for approximately 4,380 per year, based on 12 hours operation per day, this lighting design will demonstrate compliance for the full length of this period, of 20 years. It is recommended that the luminaires be wholly replaced or refurbished with new control gear and light sources at every 20-year interval.

3.2.4 Proposed Infrastructure

New public lighting infrastructure is proposed where existing assets are removed or where additional lighting is required to satisfy current design compliance and safety requirements. This includes the installation of new LED luminaires at Ch.300 – Ch. 1100.

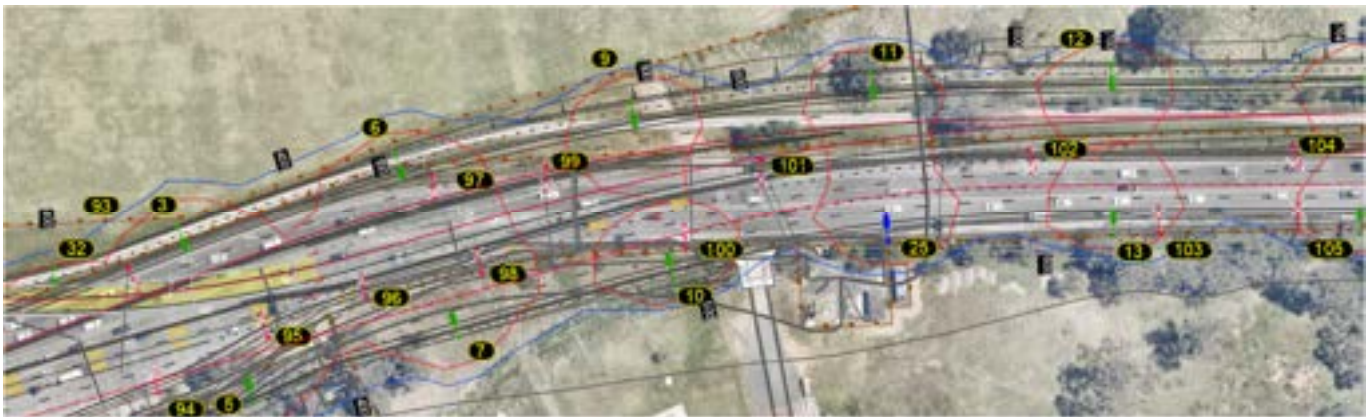


Figure 3-6: Proposed new LED lighting infrastructure

3.2.5 Existing Infrastructure to be Removed

A number of existing lighting assets are rendered redundant due to the proposed road realignment. These assets are not compatible with the revised geometry and are identified for removal as part of the project scope. This includes streetlights along the southbound carriageway of Richmond Road and at the intersection.

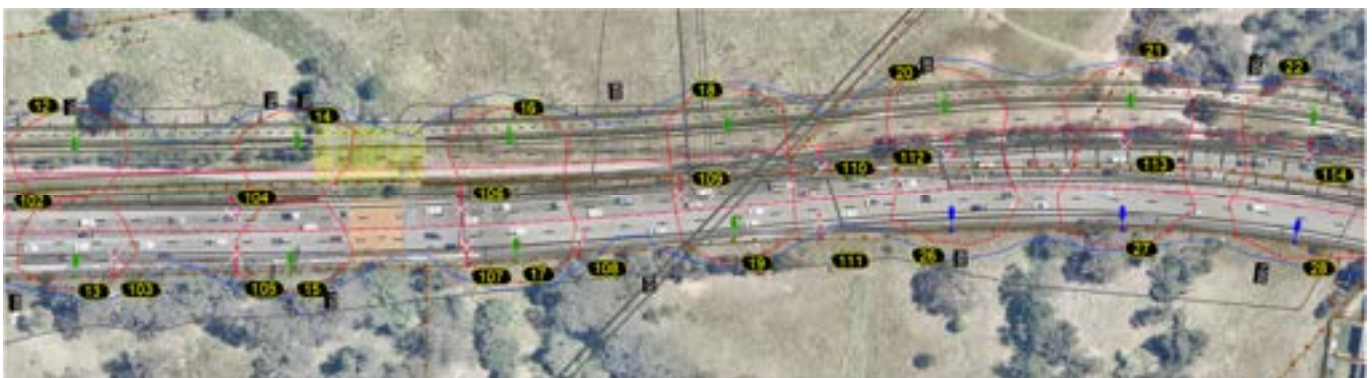


Figure 3-7: Existing lighting infrastructure proposed to be removed

3.2.6 Retained Infrastructure

Some existing lighting assets within the Richmond Road M7 have been nominated for retention in order to minimise the extent of asset removal and replacement. The retention strategy adopts a principle of retaining existing street lighting poles and luminaires where practicable.

The assessments indicate that these retained lighting assets appear to meet current standards and are fit for purpose at this stage. However, it is acknowledged that ongoing maintenance and inspections by the responsible maintaining authorities will be necessary to ensure continued safe operation.

It is noted that the retention strategy is subject to a condition assessment and confirmation of residual design life. Refer design package DY01 for further details.

Retention strategy includes:

- retention of the existing pole with replacement of the luminaire with a new LED fitting; and
- retention of both the existing pole and luminaire.

The project scope includes retention of selected existing lighting infrastructure. Some of the luminaires proposed to remain are High Pressure Sodium (HPS) fittings, which are being progressively phased out due to environmental considerations and broader industry transition towards LED technology. While these luminaires may no longer appear on current approved product lists, their replacement is outside the current project scope. It is noted, however, that future authority requirements may necessitate upgrades to LED luminaires.

It is also noted that some existing streetlight poles proposed for retention are located within the clear zone of the revised carriageway alignment. These locations reflect legacy installation conditions that pre-date current road geometry and setback criteria. Any required relocation or modification of these poles would be subject to further review and agreement with the relevant authority and is considered outside the current project scope.

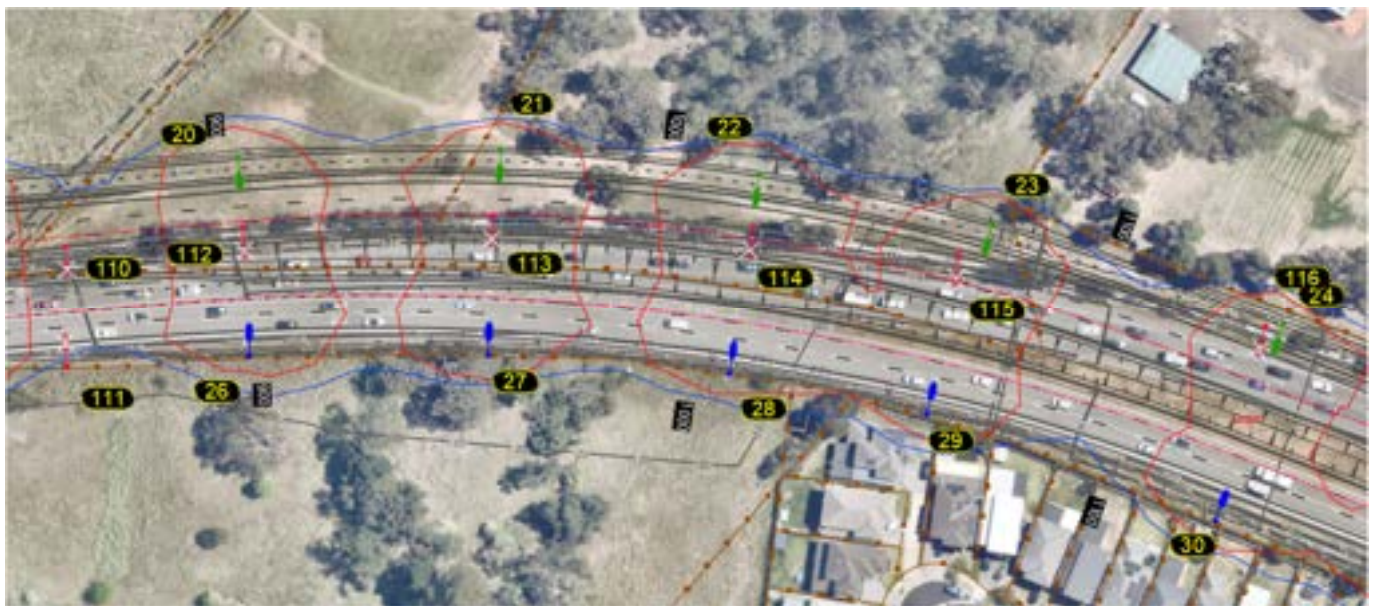


Figure 3-8: Existing lighting infrastructure proposed to be retained

3.3 Analysis results

3.3.1 Software

All lighting calculations have been undertaken in compliance with the AS/NZS 1158 series of standards to assess horizontal and vertical illuminance (used for PP2 underpass and footpath), as well as luminance and uniformity requirements. The calculations were performed using AGi32 and PerfectLite lighting design software, with design development, review, and coordination undertaken in Autodesk AutoCAD 2023.

3.3.1.1 Straight Sections (Luminance and Uniformity Assessment)

PerfectLite calculations were undertaken to determine appropriate light pole spacing for the straight road sections to achieve compliance with the nominated Category V3 lighting requirements.

3.3.1.2 Intersections (Illuminance Assessment)

AGI32 calculations were performed for the intersections to demonstrate compliance with the nominated V3 lighting category. The assessment includes the intersection surrounds, as well as diverging and merging lanes.

3.3.2 Obtrusive Light Assessment

Lighting has been designed in consideration of AS/NZS 4282 – *Control of the Obtrusive Effects of Outdoor Lighting*, which provides guidance on managing light spill, glare, and sky glow to maintain obtrusive effects within acceptable limits. An obtrusive light assessment has been undertaken in accordance with SWTC Appendix B17 as part of the design. In accordance with AS/NZS 4282 Table 4.1, the project is classified as a V-zone lighting environment, with a curfew limit of 4 lux.

Table 4.1 — Public lighting zones

Public lighting zones	Ambient light conditions	Description
V	Traffic routes	Residences near Major Roadways with streetlighting (e.g. subcategory V public lighting scheme as per AS/NZS 1158.1.1)
R1	Local roads with significant setback	Residences near Local roads with streetlighting (e.g. subcategory PR public lighting scheme as per AS/NZS 1158.3.1) where the window line is greater than 10 m from the property boundary
R2	Local roads	Residences near Local roads with streetlighting (e.g. subcategory PR public lighting scheme as per AS/NZS 1158.3.1) where the window line is at or less than 10 m from the property boundary
R3	Roundabout or local area traffic management device	Residences near roundabouts or local area traffic management device with streetlighting (e.g. subcategory PR public lighting scheme as per AS/NZS 1158.3.1) where the window line is at or less than 10 m from the property boundary
RX	Pedestrian crossing	Residences near a pedestrian crossing with lighting (e.g. a subcategory PX public lighting scheme as per AS/NZS 1158.4) where the window line is at or less than 10 m from the property boundary

Figure 3-9: AS/NZS 4282 Table 4.1, public lighting zones

Table 4.2 — Public lighting — Maximum values of light technical parameters

Zones	Maximum vertical illuminance (E_v) lux		Threshold increment (TI)		Upward light ratio
	Non-curfew	Curfew	Maximum TI %	Default Adaptation level (L_{ad}) cd/m ²	Maximum ULR
V	N/A	4	As specified in AS/NZS 1158.1.1		
R1	N/A	1	20	0.1	As specified in AS/NZS 1158.3.1
R2	N/A	2	20	0.1	
R3	N/A	4	20	0.1	
RX	N/A	4	As specified in AS/NZS 1158.4		

Figure 3-10: AS/NZS 4282 Table 4.2, V zone obtrusive light spillage curfew limit (lux)

An obtrusive lighting assessment has been undertaken in accordance with AS/NZS 4282 as part of the design for the residential areas abutting the roadway. The assessment confirms that spill lighting complies with the Public Lighting Zone V limit for curfew hours of 4 lux for all areas, with the exception of a small area adjacent to Pole No.

29 due to the pole abutting the property boundary and the residence being approximately 1.5m behind the property boundary.

For this location, a glare shield has been incorporated into the proposed lighting equipment to mitigate/ reduce the impact of the lighting on the residence. Relocation of the pole is outside the project scope, as the works involve upgrading existing HPS luminaires to LED, while maintaining current pole positions.

Due to existing services in the area, Pole No 29 cannot be relocated further away from the property boundary, without relocating additional underground services.

Notwithstanding this constraint, the proposed LED upgrade, even without the additional glare shield installed, provides an overall improvement in obtrusive lighting performance when compared to the obtrusive lighting results obtained for the existing HPS installation.

In accordance with AS/NZS 1158.1.1:2022 Table 3.1 (Note e), the threshold increment (glare) of the proposed LED installation does not exceed that of the existing HPS installation.

Additionally, in line with SWTC B.17 Clause (d), where street lighting is modified, the final lighting design achieves a standard equal to or better than the pre-existing arrangement.

The selected luminaire, complete with the glare shield configuration is available on the Endeavour Energy approved product list.

3.4 Review and verification

This submission has been subject to the following internal design verification and reviews:

- Internal verification
- Cross discipline review
- Contractor review
- Proof engineering / independent checking (optional)

Comments from external reviewers are included in Table 3-1 (IC, TfNSW and other stakeholders), together with the designer responses.

Table 3-1: Design review and verification summary

ITEM	DESIGN STAGE	REVIEWER	STATUS OF APPROVAL
Internal Verification	DCD	Michael Richards - Aurecon	Confirmed
Cross Disciplinary Review	DCD	Aurecon and GEA DTI JV	Confirmed
External Review	DCD	TfNSW, IC and other stakeholders	Confirmed
Internal Verification	SDD	Michael Richards - Aurecon	Confirmed
Cross Disciplinary Review	SDD	Aurecon and GEA DTI JV	Confirmed
External Review	SDD	TfNSW, IC and other stakeholders	Pending

3.4.1 Proof Engineering / Independent Checking Engineering Assessment

This section is not applicable for this design package.

3.5 Compliance

A compliance tracking process has been developed and implemented to ensure ongoing compliance with the design requirements stipulated in the project SWTC and Environmental Documents as defined in the Head Contract. This process is embedded within the design development process and workflow, with an SWTC and

Environmental and Sustainability compliance register established to ensure the design is consistent with the approved project.

The registers are periodically reviewed and subject to amendments in accordance with developments in the detailed design process, design inputs, project criteria and interface requirements.

3.5.1 Scope of Works and Technical Criteria

This design package is compliant to the SWTC and Head Contract requirements, except as noted in Table 3-2. Potential non-compliances are noted in Table 3-3 and will be resolved prior to the Final Design Documentation submission.

Design Compliance to the SWTC clauses relevant to this design package are provided in Appendix F.

Table 3-2: Agreed non-conformances

DETAILS OF NON-CONFORMANCE	REASON FOR NON-CONFORMANCE	PROPOSED ACTION
Nil		

Table 3-3: Potential non-conformances (to be confirmed at FDD)

DETAILS OF NON-CONFORMANCE	REASON FOR NON-CONFORMANCE	PROPOSED ACTION	STATUS (ACCEPTED / AGREED)
Existing poles within clear zone on Richmond Road southbound carriageway	Existing poles form part of retained infrastructure strategy. Relocation would result in significant rework, additional cost and service disruption. Current locations reflect legacy installation conditions that do not fully align with clear zone criteria.	Raise a concession to TfNSW. It is noted that existing hazards on Richmond Road southbound carriageway is a conditional agreed exception. Refer Item C7 Table B.1-2 of SWTC Appendix B.1	Pending Reference: Tier 5 - CN 01884:2026

3.5.2 Environmental & Planning Approval Compliance

The Environmental compliance register in Appendix G is provided in accordance with the compliance assessment criteria as listed in Table 3-4.

Table 3-4: Key Compliance Design Criteria

STATUS	DESCRIPTION
Compliant	The intent and all specific requirements of the consent condition have been met.
Non-compliant	The intent of one or more specific requirements of the consent condition or management measure has not been met.
TBD	Conformance with a condition of the consent is not yet determined, with compliance to be confirmed at a subsequent design submission stage.

3.5.3 Model Verification

Model verification has been undertaken in accordance with the Digital Engineering Management Plan for the Project. Ongoing verification and checks will be undertaken throughout the design development process to ensure a 3d model is developed that is consistent with SWTC Appendix C.8 and Head Contract requirements.

4 DESIGN CONSIDERATIONS

4.1 Safety in Design

The Safety in Design (SiD) process is required to satisfy relevant WHS Legislation and Head Contract requirements (including Clause 5.2 of the SWTC).

The SiD workshop was held in-person on 3/02/2026 and was attended by TfNSW, GEA DTI JV, Aurecon and other relevant stakeholders to identify the relevant risks in the Project. The SiD register is presented in Appendix C of this design report.

Table 4-1 below provides a summary of the key risks identified in the SiD workshop that are relevant to this package of Works.

Table 4-1: Key SiD Hazards and Controls

HAZARD DESCRIPTION	CONTROLS IDENTIFIED
Struck by errant vehicles and/or injury to Shared Path users when maintaining street lighting	Implementation of appropriate Traffic Guidance Scheme where work is being performed within the traffic corridor Implement of Electrical Isolation Procedures including application of Lock Out Tag Out arrangements
Falling Objects and Mobile Plant Operations when performing maintenance of street lights	Access to poles via truck-mounted EWP only (no climbing) and clearance (at least 2m) between pole and ramp. Workers using truck mounted EWP hold High Risk Work Licence, are harnessed to the workbox and have exclusion established for use of the EWP
Electrocution when performing maintenance of luminaires	Implement of Electrical Isolation Procedures including application of Lock Out Tag Out arrangements RCD protection provided on lighting circuits
Lack of maintenance strategy for inspection of street lights	Low maintenance luminaires being specified in all street lights Maintenance and Access Strategy developed to identify access paths/arrangements and safety controls assumed in design for inspecting and maintenance of street lights. Refer to package RW01 for maintenance strategy

4.2 Crime Prevention Through Environmental Design

The lighting design has been developed in consideration of Crime Prevention Through Environmental Design (CPTED) principles to enhance public safety and perceived security within the project works. In compliance with SWTC Appendix B.17 Section s which specifies that all lighting design must consider CPTED principles in the development of lighting required for the Project Works, the proposed street lighting supports natural surveillance by providing appropriate illumination at footpaths, intersections, merge/diverge lanes and other conflict points to improve visibility and recognition.

Lighting layouts have been coordinated to minimise areas of shadowing and visual obstruction, particularly adjacent to bridges and shared paths. Luminaire selection, mounting height and optical distribution have been selected to achieve the required lighting category performance under AS/NZS 1158 while avoiding excessive glare and uncontrolled light spill in accordance with SWTC requirements.

4.3 Road Safety Audits

In addition to the SiD workshops, two Road Safety Audits have been carried out on the design at Developed Concept Design and Substantial Detailed Design. No specific findings in the RSA related to streetlighting. Refer to RSA report provided in the roadworks design package RW01

4.4 Constructability

The installation proposal has lighting equipment mounted predominately on the verges of the embankments of the main alignment. Pole positions located in the batter slopes have localised batter widenings to allow for inspection personnel to safely access electrical equipment. Working at height will be required on all installations.

4.5 Asset management

Asset Documentation is as per the GEA DTI JV Digital Execution Plan and the Aurecon Digital Engineering Management Plan. Refer to relevant asset data deliverables for this package. These comprise the digital models, the asset tagging register and clash detection report.

4.6 Operations and maintenance

The operations, maintenance, and decommissioning requirements have been considered in the development of this design package and are outlined in the following sections. The outcomes presented here to demonstrate the design complies with the Head Contract O&M requirements, will be incorporated into the O&M Manuals which will be provided separately from the Design Documentation.

Generally, the maintenance strategy for streetlights will be as follows:

- Access via shared path on the western side of Richmond Road
- Access via the nearside shoulder on the eastern side of Richmond Road
- Maintenance access to existing streetlights on Rooty Hill Road North and M7 entry / exit ramps will be as per the current existing arrangement

4.7 Disaster recovery

This section is not applicable for this design package

4.8 Future proofing

4.8.1 Future Castlereagh Connection

In accordance with Clause 5.35 (iv) of SWTC Main Body, the streetlight design provides the following provisions to accommodate the future Castlereagh connection:

- Optimise the spacing of the streetlights to minimise the number of assets within the future Castlereagh road reserve

This approach future-proofs the lighting infrastructure by minimising the need for rework, asset relocation, or service disruption should the Castlereagh connection proceed at a later stage.

4.9 Durability

All assets designed as part of this package are in accordance with the minimum design life specified in SWTC B17 and as per the Durability Report .

The minimum design life for the various elements and equipment is summarised in the table below.

Table 4-2: Design Life Requirements

ASSET ITEM	MINIMUM DESIGN LIFE (YEARS)
Lighting poles	50 years
LED luminaires	20 years

4.10 Design Life

The Design Life is the duration for which an asset is engineered to fulfill its intended function without requiring replacement, refurbishment, or significant maintenance. Assets comprise both Asset Items and Asset Sub-Items, which can be further categorised into Asset Elements and Asset Types for efficient asset management.

According to SWTC, the minimum design life for lighting and electrical equipment is 20 years. Our proposed luminaires adhere to this requirement, ensuring alignment with the specified strategy.

4.11 Environment

A summary of compliance with the environmental requirements applicable for this package as set out in the project's Environmental Documents is provided below. A complete overview of applicable conditions and evidence of compliance is included in Appendix G.

4.11.1 Cultural heritage impacts

The design has been developed to ensure that the activities of the Contractor have a minimal impact on the existing cultural and aboriginal heritage sites, in compliance with the Aboriginal Heritage Impact Permit (AHIP) specific to the area.

4.11.2 Biodiversity

A Fauna passage is proposed at Bells Creeks under Bridge 2. Lighting is proposed to be placed as far as possible, within the mid-span distance allowed for this section of road. No additional requirements for this crossing have been specified.

4.11.3 Drainage

All lighting has been designed and coordinated to avoid culverts. Any outstanding clashes with drainage infrastructure has been addressed as part of the SDD development.

4.12 Sustainability

SWTC Appendix D.05 outlines the General Sustainability Requirements and Baseline Sustainability Requirements for the project. TfNSW D&C G40 Clause 4 outlines the requirements to reuse and/or dispose trees for local land services.

The RRM7 Sustainability Requirements and the Contractors Nominated Targets are presented in Table 4-3 below

Table 4-3: RRM7 Sustainability and Baseline Sustainability Requirements

Category	Requirement
Overall greenhouse gas	30% reduction in greenhouse gas emissions
Climate change	Adaptation options to treat all 'very high' and 'high' climate risks are implemented such that there are no 'very high' and 'high' residual risks
Concrete	All concrete is to be sourced from members of Cement Concrete & Aggregates Australia or similar association as agreed with GDJV.
	Minimum 25% supplementary cementitious material (SCM) replacement in all concrete mix designs
Asphalt	15% reclaimed asphalt pavement (RAP) is to be used in all asphalt mixes
	5% recycled crushed glass to be used in all suitable asphalt mixes
Aggregate	Minimum 20% recycled and reused material as bedding or drainage medium
	Minimum 40% recycled content in SMZ layers
	10% crushed concrete in all pavement base and subbase materials to TfNSW D&C 3051
Waste	100% usable spoil to be reused on site as a priority, otherwise recycled and reused offsite

4.12.1 Design optimisation / Whole of Life

The design has been optimised and coordinated with various engineering disciplines to ensure an integrated, economic, safe, and constructible solution that complies with the SWTC.

A summary of the key outcomes in the design to reduce the whole of life costs of the Project are noted below, as follows:

Table 4-4: Design optimisation / Whole of Life

Whole of life category	Design Measure	Outcome / benefit
Energy & Carbon	Improving the energy efficiency of the nominated new streetlights by modifying to a current LED type.	Reduced carbon emissions LED streetlights have the benefit of: - Improving the efficacy of the luminaire and the overall power loads. - Reducing the maintenance activities required over the 20-year life of the lighting installation
Environment & Biodiversity	Where practical, the existing streetlights have been retained as part of the Project. Refer to section 3.2.6 for further details.	Reduced impact on the environment and biodiversity
Climate Resilience	The lighting design is limited to the area specified in SWTC Appendix B.17 Where practical, the existing streetlights have been retained as part of the Project. Refer to section 3.2.6 for further details. Improving the energy efficiency of the nominated new streetlights by modifying to a current LED type.	Increased climate change resilience with reduced carbon emissions and built environment
Resource Efficiency (materials & waste)	The lighting design is limited to the area specified in SWTC Appendix B.17 Where practical, the existing streetlights have been retained as part of the Project. Refer to section 3.2.6 for further details.	Reduced usage of materials and resources
Durability & Maintainability	Where practical, the existing streetlights have been retained as part of the Project. Refer to section 3.2.6 for further details.	Reuse existing infrastructure

4.13 Predicted Effects

This section is not applicable for this design package

4.14 Noise and vibration

This section is not applicable for this design package.

4.15 Instrumentation and monitoring

This section is not applicable for this design package.

4.16 Decommissioning

Existing streetlights to be decommissioned as part of the Project is discussed in section 3.2.5 of the design report.

5 Items For Resolution

5.1 'Hold' schedule

The following areas of the design are currently on 'Hold' for this design package.

Table 5-1: Items on Hold

HOLD	ITEMS ON HOLD	STATUS
Nil		

5.2 Outstanding items

The following outstanding items in Table 5-2 are to be resolved during the development of the subsequent design stage.

Table 5-2: Outstanding items

ITEM	DESCRIPTION	STATUS
Utilities interface and clash detection	Final confirmation of underground service locations is required to validate conduit routes, pole foundation locations and required separations in accordance with utility authority standards.	Completed
Road furniture	Final verification of pole offsets relative to safety barriers, signage structures and ITS assets is required following completion of detailed road furniture design.	Completed

5.3 Consultation requirements with Third Parties

Nil. The consultation with utility authorities will be undertaken as part of the utilities design package submission.

5.4 Design risks and opportunities

5.4.1 Design risks

Obtrusive lighting assessment for Streetlight No.29

The retention of existing streetlight poles as discussed in section 3.2.6 is subject to the results on the conditional assessment and confirmation of residual design life. Refer design package DY01 for further details.

Furthermore, the photometric file equipped with a glare shield has been requested from the manufacturer Sylvania to confirm the obtrusive lighting assessment for Pole No. 29 on Richmond Road southbound carriageway. This file is currently unavailable and is being developed by the manufacturer for this project.

Due to the proximity of Pole No. 29 to adjacent residential properties and its current positioning, the proposed design achieves an improvement in light spill compared to the existing condition. The upgrade from existing HPS luminaires to LED results in an overall improvement in lighting performance relative to the existing installation. In accordance with AS/NZS 1158.1.1:2022 Table 3.1 (Clause e), the threshold increment does not exceed that of the existing installation and is in line with SWTC B.17 Clause (d), where street lighting is modified, the final lighting achieves a standard equal to or better than the pre-existing arrangement.

However, compliance with the obtrusive lighting requirement cannot yet be demonstrated in the absence of the glare shield photometric data. Accordingly, this item is identified as a design risk pending receipt and confirmation of the required photometric file.

Non-conformance of Diverge Area #2

Lighting assessment of the diverge areas along Westlink M7 was undertaken in accordance with the V-category requirements under AS/NZS 1158.1.1. Of the three diverge areas assessed, Diverge Area No. 2 at Ch.100 was identified as marginally non-compliant with the V3 illuminance requirement. Assessment confirmed this is due to

existing streetlighting infrastructure, the upgrade of which is outside the current project scope. While out of scope, this has been flagged for awareness.

The calculated minimum illuminance level is 7.2 lux, which is marginally below the required 7.5 lux.

5.4.2 Design opportunities

There are no further identified opportunities to record.

Appendix A

Design Documents List

DRAWING NUMBER	DRAWING TITLE	REVISION
RRM7-GEDT-0537-LV-DRG-000001	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD – STREET LIGHTING - COVER SHEET	B
RRM7-GEDT-0537-LV-DRG-000002	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - STREET LIGHTING - DRAWING INDEX	B
RRM7-GEDT-0537-LV-DRG-000005	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - STREET LIGHTING – GENERAL NOTES	B
RRM7-GEDT-0537-LV-DRG-000010	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - STREET LIGHTING - KEYPLAN	B
RRM7-GEDT-0537-LV-DRG-000051	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - STREET LIGHTING – TYPICAL DETAILS	B
RRM7-GEDT-0537-LV-DRG-000101	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - STREET LIGHTING - PLAN	B
RRM7-GEDT-0537-LV-DRG-000102	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - STREET LIGHTING - PLAN	B
RRM7-GEDT-0537-LV-DRG-000103	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - STREET LIGHTING - PLAN	B
RRM7-GEDT-0537-LV-DRG-000301	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - STREET LIGHTING - LUMINAIRE SCHEDULE	B
RRM7-GEDT-0537-LV-DRG-000302	RICHMOND ROAD UPGRADE - M7 TO TOWNSON ROAD - STREET LIGHTING - LUMINAIRE SCHEDULE	B

Appendix B

Consolidated Comments Register

Comments received on the design submissions till date (including designer responses) are provided in this Appendix.

APPENDIX NO.	APPENDIX DESCRIPTION
B.1	TfNSW & IC comments register



Design review register

Project name and number	P-057464 Richmond Road Widening (M7 to Trossman Road)			Reviewer organisation	TINSW (IC, BMCC)
Project description	Richmond Road Widening (M7 to Trossman Road)			Designer organisation	GDVU (Aurecon)
Design review coordinator	Matthew FERREIRA (TINSW) / Colin Tan (IC)			Contract or deed reference	
JOS reference number	[JOS2] (Drawings - RRMF-GEDT-0537-LV-RPT-010001)				
Project type	Road	EDM system	Team/finder	EDM reference number	RRMF-GEDT-TX-000017
				Review version number and date	2.0 (16-04-2026)

Item reference number	Design review stage	Design discipline	Package (if applicable)	Document #, drawing #, model # or GUID	Document title	Reference		Organisation	Reviewer's name	Comment date	Deed Reference	Comments by the reviewer		Response by the designer or delivery partner			Acceptance by the reviewer							
						Section #	Page # para #, Figure #, table #					Priority	Comment classification	Respondent's name	Respondent's organisation	Respondent's discipline	Response or action for resolution	Potential concession identified?	Proposed for closure?	Current response date	Reviewer's name	Has the comment been addressed?	Reviewer's comments on acceptance	Date of acceptance
1	DCD	Lighting	LV-01	RRMF-GEDT-0537-LV-DRG-00009	RRMF - GEDT - LV01 - STREET LIGHTING - GENERAL NOTES			IC	Vas PAPA-GEORGIO U	04/03/26		General	Please include the year of the AS1788 standard that has been referenced to.	Walea Al-Hammam	Aurecon	Lighting	Noted. AS/NZS 1158.1:1 2022 was used in the design. Year and version to be included in the drawing (04/03/2026).	No	Proposed	11/03/2026	V PAPA-GEORGIO	Proposed	Comment addressed subject to updates on revised design documentation.	
2	DCD	Lighting	LV-01	RRMF-GEDT-0537-LV-DRG-00010	RRMF - GEDT - LV01 - STREET LIGHTING - PLAN - SHEET 01 OF 03			IC	Vas PAPA-GEORGIO U	04/03/26	B17 2 b), B17.3.	Medium	Clarification	James Abraham	Aurecon	General	Comment to clarify: Changes have been shown on the drawings.	No	Yes	11/03/2026	V PAPA-GEORGIO	Yes	No further action required.	14/04/2026
3	DCD	Lighting	LV-01	RRMF-GEDT-0537-LV-DRG-00010	RRMF - GEDT - LV01 - STREET LIGHTING - PLAN - SHEET 01 OF 03			IC	Vas PAPA-GEORGIO U	04/03/26	B17 2 b), B17.3.	Medium	Clarification	James Abraham	Aurecon	General	The scope of works to the south of Roddy Hill Road intersection is limited to mill and re-sheet only. The following adjustments are necessary: - removal of on-road cycle lane on the northbound carriageway - reduce the existing lanes by 200mm (from 3.3m to 3.1m). The existing traffic strategy and geometry along Richmond Road is consistent with the widening. Relocation of the existing streetlights at this location is consistent with the tender solution and upgrading existing luminaires at this location is outside the scope of works. It is noted that the existing streetlights and luminaires provides a compliant lux rating required by the SWTC. Refer Appendix F of the design report.	No	Yes	11/03/2026	V PAPA-GEORGIO	Yes	CT 14/04/2026 - This comment was discussed during the client-led workshop, and it was to be noted. The comment is closed. However, we note that TINSW should review the responses. Further scope of works are required.	
4	DCD	Lighting	LV-01	RRMF-GEDT-0537-LV-DRG-00010	RRMF - GEDT - LV01 - STREET LIGHTING - PLAN - SHEET 01 OF 03			IC	Vas PAPA-GEORGIO U	04/03/26	B17 1 f), B17 2 b), B17 3	High	Non-conformance (blankets)	James Abraham	Aurecon	General	No lighting is provided on the Roddy Hill Road North Flyover. The design is compliant with Section 2 b) (vi) of SWTC Appendix B.17 and is therefore not a non-conformance to the SWTC. This has been further clarified in section 3.1.4 of the design report.	No	Yes	11/03/2026	V PAPA-GEORGIO	Yes	No further action required.	14/04/2026
5	DCD	Lighting	LV-01	RRMF-GEDT-0537-LV-DRG-00010	RRMF - GEDT - LV01 - STREET LIGHTING - PLAN - SHEET 01 OF 03			IC	Vas PAPA-GEORGIO U	04/03/26	B17 2 b), B17.3.	Medium	Clarification	Walea Al-Hammam	Aurecon	Lighting	The design provides adequate light levels (including stopping sight distance). The alignment of the flyover will be straight, therefore no compression on the light lines. Furthermore, the horizontal and vertical geometry do not rely on streetlighting to be provided on the flyover bridge and is consistent with AS/NZS Part 3 (05/21).	No	Proposed	11/03/2026	V PAPA-GEORGIO	Proposed	Comment addressed subject to assessment results included within design documentation and passing acceptable limits.	
6	DCD	Lighting	LV-01	RRMF-GEDT-0537-LV-DRG-00010	RRMF - GEDT - LV01 - STREET LIGHTING - PLAN - SHEET 01 OF 03			IC	Vas PAPA-GEORGIO U	04/03/26	B17 3 b)	High	Non-conformance (blankets)	James Abraham	Aurecon	General	Under: Pole No. 58 is designated as being removed. Refer to the design drawing and the legend sheet.	No	Yes	11/03/2026	V PAPA-GEORGIO	Yes	No further action required.	14/04/2026
7	DCD	Lighting	LV-01	RRMF-GEDT-0537-LV-DRG-00010	RRMF - GEDT - LV01 - STREET LIGHTING - PLAN - SHEET 01 OF 03			IC	Vas PAPA-GEORGIO U	04/03/26	AS/NZS 1158.1:1 Figure 4.4	Medium	Non-conformance (blankets)	Walea Al-Hammam	Aurecon	Lighting	It is noted that there is an existing overhead located close to the existing M7 toll gantry which will be shown for completeness and demonstrate the design is covered by the existing streetlight system. The calculation grids will be updated accordingly to include the area along change 0-100 on the road stage of submission.	No	Proposed	06/03/2026	V PAPA-GEORGIO	Proposed	Acceptable subject to inclusion of updated calculation lighting grids.	
8	DCD	Lighting	LV-01	RRMF-GEDT-0537-LV-DRG-00010	RRMF - GEDT - LV01 - STREET LIGHTING - PLAN - SHEET 02 OF 03			IC	Vas PAPA-GEORGIO U	04/03/26	B17 2.	Medium	Clarification	Walea Al-Hammam	Aurecon	Lighting	The side road near SLR 77 is driveway for a private property. Therefore, a dedicated lighting and calculation grids required as the adjacent streetlights cover the required luminaire level for the carriageway.	No	Yes	10/03/2026	V PAPA-GEORGIO	Yes	No further action required for this item.	14/04/2026
9	DCD	Lighting	LV-01	RRMF-GEDT-0537-LV-DRG-00010	RRMF - GEDT - LV01 - STREET LIGHTING - PLAN - SHEET 02 OF 03			IC	Vas PAPA-GEORGIO U	04/03/26	B17 2.	Medium	Clarification	James Abraham	Aurecon	General	The working width for guardrail is 1.85m. A typical detail for the lighting pole arrangement behind guardrail will be included in the SDC submission.	No	Proposed	11/03/2026	V PAPA-GEORGIO	Proposed	Subject to updated design documentation.	
10	DCD	Lighting	LV-01	RRMF-GEDT-0537-LV-DRG-00010	RRMF - GEDT - LV01 - STREET LIGHTING - PLAN - SHEET 02 OF 03			IC	Vas PAPA-GEORGIO U	04/03/26	B17 2.	Low	Observation	James Abraham	Aurecon	General	Lighting within the median has not been proposed in consideration of maintenance access.	No	Yes	11/03/2026	V PAPA-GEORGIO	Yes	No further action required.	14/04/2026
11	DCD	Lighting	LV-01	RRMF-GEDT-0537-LV-DRG-00010	RRMF - GEDT - LV01 - STREET LIGHTING - LUMINAIRE SCHEDULE - SHEET 01 OF 02			IC	Vas PAPA-GEORGIO U	04/03/26	B17 5.	Medium	Clarification	Walea Al-Hammam	Aurecon	Lighting	Noted. Post-DCD submission, the objective assessment has been undertaken and backdrop shields are not required at any locations on the Project. This assessment will be included in the SDC submission of the design report.	No	Proposed	11/03/2026	V PAPA-GEORGIO	Proposed	Subject to updated design documentation.	
12	DCD	Lighting	LV-01	RRMF-GEDT-0537-LV-DRG-00010	RRMF - GEDT - LV01 - STREET LIGHTING - LUMINAIRE SCHEDULE - SHEET 01 OF 02			IC	Vas PAPA-GEORGIO U	04/03/26	B17 5.	Low	Observation	Walea Al-Hammam	Aurecon	Lighting	The streetlight poles have been standardised as far as reasonably practicable with two pole heights: 10.5m and 12m.	No	Yes	11/03/2026	V PAPA-GEORGIO	Yes	No further action required.	14/04/2026
13	DCD	Lighting	LV-01	RRMF-GEDT-0537-LV-DRG-00010	RRMF - GEDT - LV01 - STREET LIGHTING - LUMINAIRE SCHEDULE - SHEET 01 OF 02			IC	Vas PAPA-GEORGIO U	04/03/26	B17 5.	Medium	Clarification	Walea Al-Hammam	Aurecon	Lighting	The 12m mounting height has been used at locations where the carriageway extends out for auxiliary lanes and turning lanes. This optimisation has allowed the design to provide a consistent spacing between lightpoles.	No	Yes	11/03/2026	V PAPA-GEORGIO	Yes	No further action required.	14/04/2026
14	DCD	Lighting	LV-01	RRMF-GEDT-0537-LV-DRG-00010	RRMF - GEDT - LV01 - STREET LIGHTING - LUMINAIRE SCHEDULE - SHEET 01 OF 02			IC	Vas PAPA-GEORGIO U	04/03/26	B17 5.	Low	Observation	Walea Al-Hammam	Aurecon	Lighting	This comment is a duplicate of item #11.	No	Yes	11/03/2026	V PAPA-GEORGIO	Yes	No further action required.	14/04/2026
15	DCD	Lighting	LV-01	RRMF-GEDT-0537-LV-DRG-00010	RRMF - GEDT - LV01 - STREET LIGHTING - LUMINAIRE SCHEDULE - SHEET 01 OF 02			IC	Vas PAPA-GEORGIO U	04/03/26	-	Low	Observation	James Abraham	Aurecon	General	Comment unclear. This seems to be a statement other than a technical review comment.	No	Yes	11/03/2026	V PAPA-GEORGIO	Yes	No further action required.	14/04/2026
16	DCD	Lighting	LV-01	RRMF-GEDT-0537-LV-RPT-010001	RRMF - GEDT - LV01 - STREET LIGHTING - DESIGN REPORT			IC	Vas PAPA-GEORGIO U	04/03/26	B17 1 f) (i)	Medium	Clarification	Walea Al-Hammam	Aurecon	Lighting	AS/NZS 1158.1:1 2022 was used in the design. The design report including the LTPs will be updated accordingly.	No	Proposed	11/03/2026	V PAPA-GEORGIO	Proposed	Subject to updated design documentation.	
17	DCD	Lighting	LV-01	RRMF-GEDT-0537-LV-RPT-010001	RRMF - GEDT - LV01 - STREET LIGHTING - DESIGN REPORT			IC	Vas PAPA-GEORGIO U	04/03/26	B17 1 f) (i)	High	Clarification	Walea Al-Hammam	Aurecon	Lighting	AS/NZS 1158.1:1 2022 was used as a reference for the design. The design report including the LTPs will be updated accordingly.	No	Proposed	11/03/2026	V PAPA-GEORGIO	Proposed	Subject to updated design documentation.	
18	DCD	Lighting	LV-01	RRMF-GEDT-0537-LV-RPT-010001	RRMF - GEDT - LV01 - STREET LIGHTING - DESIGN REPORT			IC	Vas PAPA-GEORGIO U	04/03/26	B17 1 f) (i)	Medium	Clarification	James Abraham	Aurecon	General	The lighting category for shared paths is PP2 in accordance with Clause 5 (i) of SWTC Appendix B.17. For the majority of the shared path alignment on the western side, this category of lighting is met by the streetlights provided for the road carriageway.	No	Proposed	11/03/2026	V PAPA-GEORGIO	Proposed	Subject to updated design documentation.	
19	DCD	Lighting	LV-01	RRMF-GEDT-0537-LV-RPT-010001	RRMF - GEDT - LV01 - STREET LIGHTING - DESIGN REPORT			IC	Vas PAPA-GEORGIO U	04/03/26	B17 1 f) (i)	Medium	Clarification	James Abraham	Aurecon	General	The lighting category for shared paths located between bridges must comply with category PP2, in accordance with Clause 4.5 (i) of SWTC Appendix B.17. Lighting for the carriageway may provide sufficient light to meet the shared path requirement or a secondary lighting will be proposed to meet the requirement. This will be investigated in the next stage of design.	No	Yes	11/03/2026	V PAPA-GEORGIO	Yes	No further action required.	14/04/2026
20	DCD	Lighting	LV-01	RRMF-GEDT-0537-LV-RPT-010001	RRMF - GEDT - LV01 - STREET LIGHTING - DESIGN REPORT			IC	Vas PAPA-GEORGIO U	04/03/26	B17 1 f) (i)	Medium	Clarification	James Abraham	Aurecon	General	It is noted that the existing streetlights and luminaires provides a compliant lux rating required by the SWTC. Refer Appendix F of the design report.	No	Yes	11/03/2026	V PAPA-GEORGIO	Yes	No further action required.	14/04/2026
21	DCD	Lighting	LV-01	RRMF-GEDT-0537-LV-RPT-010001	RRMF - GEDT - LV01 - STREET LIGHTING - DESIGN REPORT			IC	Vas PAPA-GEORGIO U	04/03/26	B17 1 f) (i)	Medium	Clarification	Walea Al-Hammam	Aurecon	Lighting	Calculation summary for intersection derivation AGI output. Refer Appendix E of the design report. A table summary is also provided in the design report (refer pg. 32 of the pdf).	No	Proposed	11/03/2026	V PAPA-GEORGIO	Proposed	Subject to updated design documentation.	

Item reference number	Design review stage	Design discipline	Package (if applicable)	Document #, drawing #, model # or GUID	Document title	Reference		Organisation	Reviewer's name	Comment date	Dead Reference	Comments by the reviewer				Response by the designer or delivery partner							Acceptance by the reviewer			
						Section #	Page #, para #, figure #, table #					Comment details	Priority	Comment classification	Respondor's name	Respondor's organisation	Respondor's discipline	Response or action for resolution	Potential concession identified?	Proposed for closure?	Current response date	Reviewer's name	Has the comment been addressed?	Reviewer's comments on acceptance	Date of acceptance	
22	DCD	Lighting	LV-01	RRMF-GEOT-0537-LV-RPT-01001	RRMF-GEOT-LV01-STREET LIGHTING-DESIGN REPORT			IC	Vas PAPA-GEORGIO U	04/03/26	B17.1.1(f)	No section could be found in the design report which discusses the criteria for the design of the lighting. Please include this in an updated version of the design report.	Medium	Clarification	Walea Al-Hamran	Aurecon	Lighting	Noted. Underpage assessment would be included in the next stage of detailed design submission. This would include the assessment for S1P.	No	Pending	11/03/2026	V Papegeorgiou	Pending	Subject to updated design documentation.		
23	DCD	Lighting	LV-01	RRMF-GEOT-0537-LV-RPT-01001	RRMF-GEOT-LV01-STREET LIGHTING-DESIGN REPORT			IC	Vas PAPA-GEORGIO U	04/03/26	B17.1.1(f)	Appendix H- Design Calculations Chapter (H, D, E, D) Where are the locations of these? Provide a change of position to substantiate where these are located and if these are all of the appropriate diverges on the project.	Medium	Clarification	Walea Al-Hamran	Aurecon	Lighting	Noted. Design calculation for diverges to be updated to include information on the specific area and change of the diverging lanes, as well as dimensioned set-out.	No	Pending	11/03/2026	V Papegeorgiou	Pending	Subject to updated design documentation.		
24	DCD	Lighting	LV-01	RRMF-GEOT-0537-LV-RPT-01001	RRMF-GEOT-LV01-STREET LIGHTING-DESIGN REPORT			IC	Vas PAPA-GEORGIO U	04/03/26	B17.1.1(f)	Dimensional area showing compliance with AS1158 is also required here. Either provide a scale or dimensions to include this.	Medium	Clarification	Walea Al-Hamran	Aurecon	Lighting	Agreed. Scale and dimensions will be included in the SCD submission.	No	Pending	11/03/2026	V Papegeorgiou	Pending	Subject to updated design documentation.		
25	DCD	Lighting	LV-01	RRMF-GEOT-0537-LV-RPT-01002	RRMF-GEOT-LV01-STREET LIGHTING-DESIGN REPORT			IC	Vas PAPA-GEORGIO U	04/03/27	B17.1.1(f)	Dimensional area showing compliance with AS1158 is also required here. Either provide a scale or dimensions to include this.	Medium	Clarification	Walea Al-Hamran	Aurecon	Lighting	Agreed. Scale and dimensions will be included in the SCD submission.	No	Pending	11/03/2026	V Papegeorgiou	Pending	Subject to updated design documentation.		
26	DCD	Lighting	LV-01	RRMF-GEOT-0537-LV-RPT-01003	RRMF-GEOT-LV01-STREET LIGHTING-DESIGN REPORT			IC	Vas PAPA-GEORGIO U	04/03/28	B17.1.1(f)	Dimensional area showing compliance with AS1158 is also required here. Either provide a scale or dimensions to include this.	Medium	Clarification	Walea Al-Hamran	Aurecon	Lighting	Agreed. Scale and dimensions will be included in the SCD submission.	No	Pending	11/03/2026	V Papegeorgiou	Pending	Subject to updated design documentation.		
27	DCD	Street Lighting	LV-001	RRMF-GEOT-0537-LV-RPT-01001	LV01-Streetlighting-Portion 2 (Southern Section)-Design Report	Clause 3.1.1		TNSW	Guy Paton	06/03/2026	AS/NZS 1158.1.1 Table 3.1	Clause 3.1.1 shows Table 2.2 from AS/NZS 1158.1.1:2005. This is incorrect as Table 3.1 AS/NZS 1158.1.1:2022 is the current design version. When was the contract for this project signed? If it was signed before the issue of the 2022 standard, then the 2005 standard will be applicable.	Low	Clarification	Walea Al-Hamran	Aurecon	Lighting	AS/NZS 1158.1.1:2022 was used as a reference for the design. The design report including the LTPs will be updated accordingly in next stage of design.	No	Pending	11/03/2026	(Select an option)	Pending	Subject to updated design documentation.		
28	DCD	Street Lighting	LV-001	RRMF-GEOT-0537-LV-DRG-000102	MRS37-RICHMOND ROAD RICHMOND ROAD UPGRADE MP TO TOWNSON ROAD STREET LIGHTING PLAN	Sheet 2 Change 001		TNSW	Guy Paton	06/03/2026	AS/NZS 1158.1.1 Figure 4.2 (b)	Diverge point at change 001 does not appear to comply with AS/NZS 1158.1.1 category V3 minimum requirements. Noted that diverge 2 in Design Report Appendix H shows compliance for this diverge point, however the line marking on the layout diagram makes the beginning of the diverge point unclear.	Medium	Non-conformance (standards)	Walea Al-Hamran	Aurecon	Lighting	Diverge point at Ch. 600 is compliant with AS/NZS 1158.1.1 category V3 minimum requirements. Agreed. Scale and dimensions will be included in the SCD submission.	No	Pending	11/03/2026	(Select an option)	Pending	Subject to updated design documentation.		
29	DCD	Street Lighting	LV-001	RRMF-GEOT-0537-LV-DRG-999999	MRS37-RICHMOND ROAD RICHMOND ROAD UPGRADE MP TO TOWNSON ROAD STREET LIGHTING PLAN	General		TNSW	Guy Paton	06/03/2026		Please remove unnecessary line marking from layout diagrams. The nature of the marking, including line markings proposed for removal, makes the proposed line marking hard to determine.	Low	Clarification	James Abraham	Aurecon	General	The line marking is part of the base survey file which shows the existing Richmond Road carriageway. Reviewer to confirm whether the base survey file showing all the existing features of the roadway is to be removed for this package. Note: This item was discussed with Ken (TNSW) in the comment close out meeting held on 24/03/2026 and it was agreed that all the information shown on the DCD drawings is relevant. It was agreed no change is required to the drawings in response to this comment.	No	Pending	11/03/2026	(Select an option)	Pending	Subject to updated design documentation. This needs to be confirmed however we are assuming that the existing base line marking survey needs to be removed.		
30	DCD	Street Lighting	LV-001	RRMF-GEOT-0537-LV-DRG-000301	MRS37-RICHMOND ROAD RICHMOND ROAD UPGRADE MP TO TOWNSON ROAD STREET LIGHTING PLAN	Lighting Schedule		TNSW	Guy Paton	06/03/2026		What is the pole type for pole 20? Please list in the lighting schedule.	Low	Clarification	Walea Al-Hamran	Aurecon	Lighting	Noted. The pole is to be impact absorbing. Will be shown in the SCD submission.	No	Pending	11/03/2026	(Select an option)	Pending	Subject to updated design documentation.		
31	DCD	Street Lighting	LV-001	RRMF-GEOT-0537-LV-DRG-000102	MRS37-RICHMOND ROAD RICHMOND ROAD UPGRADE MP TO TOWNSON ROAD STREET LIGHTING PLAN	Layout Diagram		TNSW	Guy Paton	06/03/2026		Pole 3 is shown behind barrier, however, it is listed as impact absorbing in the lighting schedule. Poles located behind barrier are typically standard rigid columns.	Low	Clarification	Walea Al-Hamran	Aurecon	Lighting	Noted. However, for consistency across the Project, impact absorbing has been specified. Opportunity to relocate rigid columns are minimal (namely two poles only No. 3 and 29).	No	Yes	11/03/2026	(Select an option)	Subject to acceptance by TNSW	Subject to acceptance by TNSW		
32	DCD	Street Lighting	LV-001	RRMF-GEOT-0537-LV-RPT-01001	LV01-Streetlighting-Portion 2 (Southern Section)-Design Report	Clause 3.2.2.1		TNSW	Guy Paton	06/03/2026		Please modify the text reference to Clause 3.2.2.1 to clarify that lighting poles should be located at least 100mm from the nearest path edge to the face of the pole for minimum bicycle clearance. Otherwise, it may be confused for the centre of the pole.	Low	Clarification	Walea Al-Hamran	Aurecon	Lighting	Noted. Design report to be updated accordingly.	No	Pending	11/03/2026	(Select an option)	Pending	Subject to updated design documentation.		
33	DCD	Street Lighting	LV-001	RRMF-GEOT-0537-LV-DRG-000101	MRS37-RICHMOND ROAD RICHMOND ROAD UPGRADE MP TO TOWNSON ROAD STREET LIGHTING PLAN	Sheet 1 Change 01		TNSW	Guy Paton	06/03/2026	AS/NZS 1158.1.1 Figure 4.4	The gore area for the flyover bridge does not appear to comply with AS/NZS 1158.1.1 Figure 4.4 minimum requirements. 10/03/2026 Call: Ken: IC notes that this non-conformance is similar to IC Comment Item 7. This response can therefore reference Item 7 and be repeated here.	Medium	Non-conformance (standards)	Walea Al-Hamran	Aurecon	Lighting	It is noted that there is an existing streetlight located close to the existing M7 toll gantry which will be shown for completeness and demonstrate the diverge is covered by the existing streetlight system. The calculation grids will be updated accordingly to include the gore area along change 0-100 on the road stage of submission.	No	Pending	11/03/2026	(Select an option)	Pending	Subject to updated design documentation.		
34	DCD	Street Lighting	LV-001	RRMF-GEOT-0537-LV-RPT-01001	LV01-Streetlighting-Portion 2 (Southern Section)-Design Report	Table 2-3		TNSW	Guy Paton	06/03/2026		Noted that flyover bridge lighting is not proposed as it is longer than 300m, however, due to reduced sight line distances and carriageway width, lighting should be considered from a TNSW safety perspective. For example, the MARS interchange flyovers have lighting and are longer than 300m, at a major busy interchange, similar to this. Note that lighting should be a TNSW asset on the bridge as defined in TCO0008.	High	Clarification	James Abraham	Aurecon	General	Refer to Item 44. No lighting is provided on the flyover. The design is compliant with Section 2 (b) (vi) of SWTC Appendix B.17 and is therefore not a non-conformance to the SWTC. This has been further clarified in section 3.1.4 of the design report. The design provides adequate sight lines (including shopping sight distance). The alignment of the flyover is a straight, therefore no compression on the sight-line. Furthermore, the horizontal and vertical geometry do not rely on streetlighting to be provided on the flyover bridge and is compliant with ASRD Part 3 (2021). Note: This item was discussed with Ken (TNSW) in the comment closeout session held on 24/03/2026. It was agreed that streetlighting is not required on the flyover bridge which is compliant with the SWTC. There are no sight distance non-conformances or features in the road design that rely on streetlighting. Nevertheless, an assessment will be undertaken in the SCD to investigate whether streetlights on Richmond Road create a 'shading effect' for the vehicles on the flyover bridge, which may result in an adverse safety outcome.	No	Yes	11/03/2026	(Select an option)	Subject to acceptance by TNSW	Subject to acceptance by TNSW		
35	DCD	Street Lighting	LV-001	RRMF-GEOT-0537-LV-RPT-01001	LV01-Streetlighting-Portion 2 (Southern Section)-Design Report	Table 2-8		TNSW	Guy Paton	06/03/2026		Noted that there is no 4000x200W LED luminaires in the Endorsement Energy approved asset list, however the mixing of 3000x and 4000x LED luminaires is not recommended. Can consistent colour temperature be achieved for the entire project?	Medium	Clarification	Walea Al-Hamran	Aurecon	Lighting	Agreed. The luminaires will be updated to provide a consistent 3000K colour temperature.	No	Pending	11/03/2026	(Select an option)	Pending	Subject to updated design documentation.		
36	DCD	Street Lighting	LV-001	RRMF-GEOT-0537-LV-DRG-999999	MRS37-RICHMOND ROAD RICHMOND ROAD UPGRADE MP TO TOWNSON ROAD STREET LIGHTING PLAN	General		TNSW	Guy Paton	06/03/2026		Please provide straight road spacing calculations and curve reduction, create with the next submission - confirming compliance with category V3 minimum requirements.	Medium	Clarification	Walea Al-Hamran	Aurecon	Lighting	Agreed. These will be provided in the SCD submission. The spacing is compliant with the requirements.	No	Pending	11/03/2026	(Select an option)	Pending	Subject to updated design documentation.		

Appendix C

Safety in Design

Register

Appendix D

Durability Assessment

Not applicable

Appendix E

Geotechnical Input

Not applicable

Appendix F

SWTC Compliance Register

Requirements Traceability Verification Matrix (RTVM)

LV-01 - Street Lighting - Portion 2 (Southern Section)

DOORS ID	Source Document	Section	Preamble	Description	Design Package Number	Design Package Name	LV-01 - Design Compliance status	Design Reference
1204242	SWTC Main Body			(vi) provision of adjustments to pavement markings, signs, sign support systems, traffic control signals and street lighting in Local Area Works areas;	BR-03, FN-01, LV-01	BR-03 - Upgrade of Existing Bridge over Bells Creek FN-01 - Road Furniture - Portion 2 (Southern Section) LV-01 - Street Lighting - Portion 2 (Southern Section)	Compliant	Report Section 2.4.2 – Key Interdisciplinary Interfaces
1204972	SWTC Main Body			a) Lighting must be provided for all roads including the Carriageways, interchanges, ramps, intersections, roundabouts and Local Areas.	BR-03, LV-01	BR-03 - Upgrade of Existing Bridge over Bells Creek LV-01 - Street Lighting - Portion 2 (Southern Section)	Compliant	Report Section 3 Design Outcomes and Design Calculations (Appendix H)
1204973	SWTC Main Body			b) All lighting must comply with the requirements of Appendix B.17 and the Environmental Documents.	BR-03, LV-01	BR-03 - Upgrade of Existing Bridge over Bells Creek LV-01 - Street Lighting - Portion 2 (Southern Section)	Compliant	Appendix G - Environmental & Planning Approval Compliance Register
1204974	SWTC Main Body			c) The design of lighting must ensure that light spillage into residential and commercial properties and other sensitive areas is avoided.	BR-03, LV-01	BR-03 - Upgrade of Existing Bridge over Bells Creek LV-01 - Street Lighting - Portion 2 (Southern Section)	Pending	Report Section 3.3.2 Obtrusive Light Assessment
1204975	SWTC Main Body			d) Where existing street lighting is modified, the final lighting must not result in a standard of lighting less than that existing prior to the modifications and must comply with AS/NZS 1158 (Lighting for roads and public spaces).	BR-03, LV-01	BR-03 - Upgrade of Existing Bridge over Bells Creek LV-01 - Street Lighting - Portion 2 (Southern Section)	Compliant	Report Section 3 Design Outcomes.
1204976	SWTC Main Body			e) All light sources, excluding signage, must have a colour range of between 2700 K to 4500 K in accordance to CIE-1931.	BR-03, LV-01	BR-03 - Upgrade of Existing Bridge over Bells Creek LV-01 - Street Lighting - Portion 2 (Southern Section)	Compliant	Report Section 3.2.1 (Luminaire Type)
1204977	SWTC Main Body			f) All LED light sources must have minimum lamp light of 50,000 hours at L70B10.	BR-03, LV-01	BR-03 - Upgrade of Existing Bridge over Bells Creek LV-01 - Street Lighting - Portion 2 (Southern Section)	Compliant	Report Section 3.2.3 Luminaire Maintenance Factor and Lifetime
1204978	SWTC Main Body	5.29.2	Lighting for Roads in Local Areas	Lighting for Roads in Local Areas	BR-03, LV-01	BR-03 - Upgrade of Existing Bridge over Bells Creek LV-01 - Street Lighting - Portion 2 (Southern Section)	NA	General statement noted
1204979	SWTC Main Body			a) Lighting must be provided for roads in Local Areas that are affected by the Project Works and Temporary Works.	BR-03, LV-01	BR-03 - Upgrade of Existing Bridge over Bells Creek LV-01 - Street Lighting - Portion 2 (Southern Section)	Compliant	Report Section 3 Design Outcomes and Design Calculations (Appendix H)
1204980	SWTC Main Body			b) Lighting for roads in Local Areas must be designed and installed by the Contractor to be compatible with existing lighting systems and standards.	BR-03, LV-01	BR-03 - Upgrade of Existing Bridge over Bells Creek LV-01 - Street Lighting - Portion 2 (Southern Section)	Compliant	Report Section 3.2 (Design Details)
1204981	SWTC Main Body			c) Lighting design and construction must comply with the requirements of relevant Authorities, including local councils, and the Contractor must liaise with the relevant Authorities and local councils to ensure acceptance of the lighting design.	BR-03, LV-01	BR-03 - Upgrade of Existing Bridge over Bells Creek LV-01 - Street Lighting - Portion 2 (Southern Section)	Compliant	Report Section 3.1.4 (ownership)
1205048	SWTC Main Body			(vi) ensuring that streetlighting is adequately spaced to avoid potential clashes with Castlereagh Interchange structures;	BR-03, LV-01	BR-03 - Upgrade of Existing Bridge over Bells Creek LV-01 - Street Lighting - Portion 2 (Southern Section)	Compliant	Report Section 2.4.2 – Key Interdisciplinary Interfaces
1207436	SWTC B.17 Lighting	1	Overview	Overview	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	NA	General statement noted
1207437	SWTC B.17 Lighting	1.1	General	General	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	NA	General statement noted
1207438	SWTC B.17 Lighting			a) This Appendix B.17 defines the requirements for lighting for the Temporary Works and Project Works.	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	NA	General statement noted
1207439	SWTC B.17 Lighting			b) Lighting provided as part of the Project Works will be controlled and maintained by the Principal, Westlink M7 or relevant Authority.	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	Compliant	Report Section 2.3.2 Codes, Standards and Specifications
1207440	SWTC B.17 Lighting			c) The Project Works interface with multiple arterial, regional and local roads.	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	Compliant	Report Section 2.4.2 – Key Interdisciplinary Interfaces
1207441	SWTC B.17 Lighting			d) The Contractor must design, construct, install, test and commission lighting that:	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	NA	General statement noted

DOORS ID	Source Document	Section	Preamble	Description	Design Package Number	Design Package Name	LV-01 - Design Compliance status	Design Reference
1207442	SWTC B.17 Lighting			(i) integrates existing and new lighting infrastructure; and	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	Compliant	Report Sections 3.2.4 – Proposed Infrastructure, 3.2.5 – Existing Infrastructure to be Removed, and 3.2.6 – Retained Infrastructure.
1207443	SWTC B.17 Lighting			(ii) is coordinated with the ITS, signage and electrical infrastructure for the Project, including connecting ramps, interchanges and intersections.	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	Compliant	Report Section 2.4.2 – Key Interdisciplinary Interfaces.
1207444	SWTC B.17 Lighting			e) During construction the Contractor must maintain existing lighting levels or where the existing lighting is impacted by the Contractor's Activities, provide the equivalent lighting level in accordance with the requirements in AS/NZS1158.	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	NA	Refer temporary works packages
1207445	SWTC B.17 Lighting			f) All roads and facilities, must be lit in accordance with the requirements of:	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	NA	General statement noted
1207446	SWTC B.17 Lighting			(i) AS/NZS1158 series Lighting for Roads and Public Spaces;	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	Compliant	Report Section 2.3.2 Codes, Standards and Specifications
1207447	SWTC B.17 Lighting			(ii) TfNSW Specification TS 03295.2 (D&C R151);	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	Compliant	Report Section 2.3.2 Codes, Standards and Specifications and Report Section 3 Design Outcome
1207448	SWTC B.17 Lighting			(iii) TfNSW Specification TS 03359.2 (3851);	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	Compliant	Report Section 2.3.2 Codes, Standards and Specifications
1207449	SWTC B.17 Lighting			(iv) NSW Public Lighting Code;	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	Compliant	Report Section 2.3.2 Codes, Standards and Specifications
1207450	SWTC B.17 Lighting			(v) Endeavour Energy Lighting Design Guidelines and Manuals; and	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	Compliant	Report Section 2.3.2 Codes, Standards and Specifications
1207451	SWTC B.17 Lighting			(vi) TD 00008:2023 – Design and asset ownership of new road lighting on TfNSW roads and infrastructure.	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	Compliant	Report Section 2.3.2 Codes, Standards and Specifications
1207452	SWTC B.17 Lighting			g) The new lighting must extend on the existing lighting provided on the Main Carriageway, ramps, local roads (Alderton Drive, Langford Drive, Townson Road and Hollingsworth Road) and existing pedestrian paths and shared paths and integrate with that lighting. The extent of lighting integration must be approved by the Principal's Representative.	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	Compliant	Report Section 3.1.4 (ownership)
1207453	SWTC B.17 Lighting			h) The Contractor must provide new lighting and equipment for the Project Works.	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	Compliant	Report Section 3 Design Outcome and Design Drawing Package LV01
1207454	SWTC B.17 Lighting			i) All new luminaires must:	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	NA	General statement noted
1207455	SWTC B.17 Lighting			(i) be the TfNSW approved LED type, complying with TfNSW Specification TS 03956 (TSI-SP-041), for all lighting operated and maintained by the Principal or Westlink M7; or	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	Compliant	General statement noted
1207456	SWTC B.17 Lighting			(ii) be the Endeavour Energy approved luminaire type for all lighting operated and maintained by Council.	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	Compliant	Report Section 3.1.4 (ownership)
1207457	SWTC B.17 Lighting			j) All new TfNSW LED luminaire must have provision for retrofitting an external shield, or alternative masking methods, on the boundary side of the luminaire, to limit obtrusive light and luminaire brightness to residential properties.	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	Pending	Report Section 3.3.2 Obtrusive Light Assessment
1207458	SWTC B.17 Lighting			k) Any shielding, or alternative masking methods to limit obtrusive lighting, must be assessed using NATA certified IES/CIE files for the luminaire. Retrofitting of shields, or alternative masking methods, to the roadway side of the luminaires is unacceptable.	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	Pending	Report Section 3.3.2 Obtrusive Light Assessment
1207459	SWTC B.17 Lighting			l) The Contractor must assess and mitigate all obtrusive light impacts due to the Project Works, Temporary Works or the Contractor's Activities. The design of lighting must ensure that light spillage into residential and commercial properties and other sensitive receivers is limited and in accordance with AS/NZS 4282:2019 and the Environmental Documents. The Design Documentation must include the obtrusive lighting assessment and identify all sensitive existing and proposed residential areas.	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	Pending	Report Section 3.3.2 Obtrusive Light Assessment
1207460	SWTC B.17 Lighting			m) The lighting design must be coordinated with the ITS devices and static signposting to minimise the effects of shadows on road carriageways from devices, signs, gantries and bridges.	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	Pending	Report Section 3.3.2 Obtrusive Light Assessment
1207461	SWTC B.17 Lighting			n) The Contractor's integrated design for maintenance of lighting and other facilities must provide for the efficient maintenance of lighting and all other facilities (including landscaping, bridges, other structures), include safe, efficient and cost-effective access, minimise traffic and public disruption and address whole of life costs.	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	Compliant	Report Section 3.2.3 Luminaire Maintenance Factor and Lifetime
1207462	SWTC B.17 Lighting			o) All light fittings including vandal proof fittings must be easy to replace.	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	NA	General statement noted
1207463	SWTC B.17 Lighting			p) Existing light poles, rag bolt assemblies and cabling may be re-used, provided they are in a structurally sound, safe and compliant condition to meet a further service life of 20 years.	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	Compliant	Report Section 3.2.6 Retained Infrastructure
1207464	SWTC B.17 Lighting			q) Where the existing lighting and associated infrastructure is damaged by the Contractor's Activities, replacement of the equipment must meet the requirements of this Appendix B.17.	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	NA	GDJV requirement

DOORS ID	Source Document	Section	Preamble	Description	Design Package Number	Design Package Name	LV-01 - Design Compliance status	Design Reference
1207465	SWTC B.17 Lighting			r) The lighting design must be delivered in accordance with the Contractor's construction staging.	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	NA	Refer to temporary works packages
1207466	SWTC B.17 Lighting			s) All lighting design must consider Crime Prevention Through Environmental Design (CPTED) principles in the development of all lighting required for the Project Works.	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	Compliant	Refer to report Section 4.2 – Crime Prevention Through Environmental Design
1207467	SWTC B.17 Lighting	1.2	Electrical for lighting	Electrical for lighting	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	NA	General statement noted
1207468	SWTC B.17 Lighting			a) All TfNSW owned lighting to be connected to a metered switchboard, in accordance with the TfNSW Standard Drawing series TS 00131 (R0600). The TfNSW owned lighting cable must be installed in the dedicated lighting conduit.	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	NA	Refer to utilities packages
1207469	SWTC B.17 Lighting			b) The design of the metered switchboard must be coordinated with the ITS and traffic signal electrical services.	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	NA	Refer to utilities packages
1207470	SWTC B.17 Lighting			c) Metered switchboards must be powered from a local point of supply provided by the relevant electricity supply Authority (Endeavour Energy).	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	NA	Refer to utilities packages
1207471	SWTC B.17 Lighting			d) The Contractor must liaise with the relevant electricity supply Authority (Endeavour Energy) and undertake all necessary design and construction of the local point of supply.	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	NA	Refer to utilities packages
1207472	SWTC B.17 Lighting			e) TfNSW lighting must be switched with a photoelectric cell that is mounted at the switchboard, in accordance with TfNSW Standard Drawing TS 02534 (R0600-05). Also refer to TfNSW Standard Drawing TS 02529 (R0600-01) for single line diagram schematic.	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	NA	Refer to utilities packages
1207473	SWTC B.17 Lighting			f) All switchboards must be installed in positions that allow for safe and efficient access by maintenance personnel 24 hours, 7 days per week.	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	NA	Refer to utilities packages
1207474	SWTC B.17 Lighting			g) Placement of new street lighting columns should avoid flood prone areas.	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	Pending	Noted
1207475	SWTC B.17 Lighting			h) All wiring, except that internal to poles, must be underground and must be installed in accordance with AS/NZS3000 and any further requirements of relevant Authorities.	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	NA	Refer to utilities packages
1207476	SWTC B.17 Lighting			i) The Contractor must use heavy duty rigid conduits complying with AS/NZS2053, with the exception that a flexible corrugated duct may be used from the base of poles to adjacent cable pits.	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	NA	Refer to utilities packages
1207477	SWTC B.17 Lighting			j) All electrical works within new electrical switchboards must comply with AS/NZS3000.	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	NA	Refer to utilities packages
1207478	SWTC B.17 Lighting			k) Electrical design of the electricity supply Authority owned and Council (Blacktown City Council) owned lighting must be carried out in accordance with relevant Authority's guidelines and standards.	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	NA	Refer to utilities packages
1207479	SWTC B.17 Lighting	2	Main Carriageways, State roads, ramps and interchanges	Main Carriageways, State roads, ramps and interchanges	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	NA	General statement noted
1207480	SWTC B.17 Lighting			a) Lighting for Main Carriageways, State roads, ramps and interchanges must be provided in accordance with:	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	NA	General statement noted
1207481	SWTC B.17 Lighting			(i) section 2 b) to d) of this Appendix B.17;	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	Compliant	Report Section 3 Design Outcomes and Design Drawing LV01 package
1207482	SWTC B.17 Lighting			(ii) TfNSW Specification TS 03295.2 (D&C R151); and	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	Compliant	Report Section 2.3.2 Codes, Standards and Specifications
1207483	SWTC B.17 Lighting			(iii) AS/NZS1158.	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	Compliant	Report Section 3 Design Outcomes and Design Drawing LV01 package
1207484	SWTC B.17 Lighting			b) As a minimum, lighting must be provided on the Main Carriageways, State roads and ramps at the following locations:	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	NA	General statement noted
1207485	SWTC B.17 Lighting			(i) all interchanges with the Main Carriageways and State roads;	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	Compliant	Report Section 3 Design Outcome
1207486	SWTC B.17 Lighting			(ii) all intersections of Main Carriageways and State roads	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	Compliant	Report Section 3 Design Outcome
1207487	SWTC B.17 Lighting			(iii) intersections of Main Carriageways and State roads with other roads, where traffic volumes are greater than 1,000 vehicles per day;	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	Compliant	Report Section 3 Design Outcomes and Design Drawing LV01 package
1207488	SWTC B.17 Lighting			(iv) intersections of Main Carriageways and State roads with other roads where the volume of heavy vehicle right turns, to and from the road exceeds 50 total movements during night time hours;	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	Compliant	Report Section 3 Design Outcomes and Design Drawing LV01 package
1207489	SWTC B.17 Lighting			(v) intersections of Main Carriageways with roads where:	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	NA	General statement noted
1207490	SWTC B.17 Lighting			A. the percentage of residents in the local population surrounding the intersection that are over the age of 55 exceeds 30 percent, as indicated in the most recent census data for Local Government areas;	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	Compliant	Report Section 3 Design Outcomes and Design Drawing LV01 package
1207491	SWTC B.17 Lighting			B. traffic volumes on the roads are greater than 300 vehicles per day;	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	Compliant	Report Section 3 Design Outcomes and Design Drawing LV01 package

DOORS ID	Source Document	Section	Preamble	Description	Design Package Number	Design Package Name	LV-01 - Design Compliance status	Design Reference
1207492	SWTC B.17 Lighting			(vi) all roundabouts on the Main Carriageways;	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	NA	No roundabouts in Portion 2 works
1207493	SWTC B.17 Lighting			(vii) all lane merges and diverges; and	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	Compliant	Report Section 3 Design Outcomes and Design Drawing LV01 package
1207494	SWTC B.17 Lighting			(viii) between flag lit lane merges and diverges where the length between the end of the merge taper and beginning of the diverge is less than 300m, must comply with category V3 in accordance with AS/NZS 1158.1.1.	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	Compliant	Report Section 3 Design Outcomes and Design Drawing LV01 package
1207495	SWTC B.17 Lighting			c) Lighting must be provided at the intersections of all ramps to or from the Main Carriageways and /or State roads and arterial, regional or local roads.	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	Compliant	Report Section 3 Design Outcomes and Design Drawing LV01 package
1207496	SWTC B.17 Lighting			d) Lighting at locations on the Main Carriageways, State roads, ramps and interchanges must comply with category V3 in accordance with AS/NZS 1158.1.1.	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	Compliant	Report Section 3 Design Outcome
1207497	SWTC B.17 Lighting	3	Bridges	Bridges	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	NA	General statement noted
1207498	SWTC B.17 Lighting			a) Lighting on bridge structures must be from the side of the deck with the poles aligned behind the bridge rail so that they are clear of the working width as defined in SWTC Appendix B.2 and Austroads Guide to Road Design including TfNSW Supplements, SWTC Appendix B.2 (Geometric and Road Design Requirements) and SWTC Appendix B.11 (Urban Design).	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	NA	No lighting proposed on the bridge structures
1207499	SWTC B.17 Lighting			b) The lighting pole locations must be coordinated with the structural design for bridges and elevated structures and all other aspects of the Project Works.	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	NA	No lighting proposed on the bridge structures
1207500	SWTC B.17 Lighting			c) All lights including feature lighting that are located under or within structures (for example, feature lighting) must be accessible for maintenance and replacement.	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	Compliant	Refer to design drawings LV01 package
1207501	SWTC B.17 Lighting			d) Lighting must be installed on the underside of bridges where required for local roads, walkways, cycle paths, public spaces and public transport facilities as per TD 00008:2023.	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	NA	Not required as per TD 00008:2023
1207502	SWTC B.17 Lighting	4	Local Area Works	Local Area Works	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	NA	General statement noted
1207503	SWTC B.17 Lighting	4.1	General	General	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	NA	General statement noted
1207504	SWTC B.17 Lighting			a) Lighting design and construction for local roads must comply with the requirements of relevant Authorities, including Councils.	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	Compliant	Report Section 3.1.4 (ownership)
1207505	SWTC B.17 Lighting			b) The Contractor must obtain written approval of the lighting design from the relevant Authorities, including Councils, for all lighting in Local Area Works Areas.	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	Compliant	Report Section 3.1.4 (ownership)
1207506	SWTC B.17 Lighting			c) Lighting must be designed and constructed to be compatible with existing lighting systems and standards.	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	Compliant	Report Section 3 Design Outcome
1207507	SWTC B.17 Lighting	4.2	Local roads	Local roads	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	NA	General statement noted
1207508	SWTC B.17 Lighting			a) Lighting local roads must be provided at the following locations:	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	NA	General statement noted
1207509	SWTC B.17 Lighting			(i) at interchanges and intersections with the Project Works that require lighting in accordance with section 2 of the is Appendix B.17;	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	Compliant	Report Section 3 Design Outcome
1207510	SWTC B.17 Lighting			(ii) all roundabouts on local roads. Lighting of roundabouts associated with interchanges must comply with the requirements for lighting of the Project Works in section 2 of the is Appendix B.17; and	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	NA	No roundabouts in Portion 2 works
1207511	SWTC B.17 Lighting			(iii) at intersections of the connections with local roads, where the traffic volume on the local roads is between 300 and 1,000 vehicles per day, flag lighting must be provided in accordance with section 3.5.2 (b) of AS/NZS1158.1.1 and TfNSW Specification TS 03295.2 (D&C R151).	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	Compliant	Report Section 3 Design Outcome
1207512	SWTC B.17 Lighting			b) Where existing street lighting is modified, the final lighting must not result in a level and standard of lighting less than that existing prior to the modifications.	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	Compliant	Report Section 3 Design Outcome
1207513	SWTC B.17 Lighting			c) If an existing local road intersection is relocated, then the final lighting of the Project Works must not result in a standard of lighting less than that which existed at the existing intersection.	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	NA	No existing local road intersection is being relocated as part of the Project
1207514	SWTC B.17 Lighting			d) Lighting connected to the relevant electricity supply Authority network must comply with the relevant electricity supply Authority's standards.	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	NA	Refer to utilities packages
1207515	SWTC B.17 Lighting	4.3	Other facilities	Other facilities	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	NA	General statement noted
1207516	SWTC B.17 Lighting			a) Lighting must be provided for Bus Stop's in accordance with AS/NZS 1158.3.1 and Disability Discrimination Act (DDA) requirements.	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	NA	No bus stops in Portion 2 works
1207517	SWTC B.17 Lighting			b) Lighting for carparks must comply with category PC3 of AS/NZS1158.3.1.	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	Compliant	Report Section 3 Design Outcome
1207518	SWTC B.17 Lighting			c) Lighting for active transport pathways located beneath bridges must comply with category PP2 of AS/NZS1158.3.1.	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	Compliant	Report Section 3 Design Outcome

DOORS ID	Source Document	Section	Preamble	Description	Design Package Number	Design Package Name	LV-01 - Design Compliance status	Design Reference
1207519	SWTC B.17 Lighting			d) Lighting design and construction must comply with the current requirements of relevant Authorities, including Council.	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	Compliant	Report Section 2.3.2 Codes, Standards and Specifications
1207520	SWTC B.17 Lighting			e) The Contractor must demonstrate consultation in the Design Documentation and obtain written approval of the lighting design from the relevant Authorities and Councils.	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	NA	Refer to utilities packages
1207521	SWTC B.17 Lighting			f) Where existing street lighting is modified, the final lighting must not result in a standard of lighting less than that existing prior to the modifications and must comply with AS/NZS 1158 series.	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	Compliant	Report Section 3 Design Outcome
1207522	SWTC B.17 Lighting			g) Lighting connected to the relevant electricity supply Authority network must comply with the relevant electricity supply Authority's standards.	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	NA	Refer to utilities packages
1207523	SWTC B.17 Lighting	5	Active transport facilities	Active transport facilities	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	NA	General statement noted
1207524	SWTC B.17 Lighting			a) Active transport facilities must be illuminated for use 24 hours of the day in accordance with the:	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	NA	Report Section 3 Design Outcome
1207525	SWTC B.17 Lighting			(i) Austroads - Guide to Road Design - Part 6A;	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	Compliant	General statement noted
1207526	SWTC B.17 Lighting			(ii) AS/NZS 1158.3.1 category PP2;	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	Compliant	General statement noted
1207527	SWTC B.17 Lighting			(iii) AS/NZS 1158 Lighting for roads and public spaces set;	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	Compliant	Report Section 3 Design Outcome
1207528	SWTC B.17 Lighting			(iv) AS/NZS 4282 Control of the obtrusive effects of outdoor lighting; and	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	Pending	Report Section 3.3.2 Obtrusive Light Assessment
1207529	SWTC B.17 Lighting			(v) TfNSW Supplements to Austroads.	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	Compliant	Report Section 2.3.2 Codes, Standards and Specifications
1207530	SWTC B.17 Lighting			b) Safe maintenance access for pedestrian and cyclist pathway lighting and associated equipment must be considered in the design.	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	Compliant	Refer to Appendix H of the RW01 package for maintenance strategy for lighting assets
1207531	SWTC B.17 Lighting			c) Light fittings must be vandal-proof in accordance with SA/SNZ 1158.6.	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	Compliant	Report Section 3 Design Outcome
1207532	SWTC B.17 Lighting			d) Active transport underpass lighting must comply with category PE1 of AS/NZS1158.3.1.	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	Compliant	Report Section 3 Design Outcome
1207533	SWTC B.17 Lighting			e) Active transport bridges and pedestrian stairways must comply with category PE2 of AS/NZS1158.3.1.	LV-01	LV-01 - Street Lighting - Portion 2 (Southern Section)	Compliant	Report Section 3 Design Outcome

Appendix G

Environmental & Planning Approval Compliance Register

RRM7-GEDT-0537-PM-REG-000004 Environmental & Planning Approval Compliance Register						LV01	
No.	Impact	Environmental safeguards	Responsibility	Timing	Consultant	Compliant?	Notes
GEN4	General - design	During detailed design, further modelling and design review will be undertaken to determine if it is feasible to maintain the signalised pedestrian crossing on the northern side of the Richmond Road and Rooty Hill Road North intersection. This would include potentially removing the proposed new pedestrian crossing to provide access at the M7 Motorway southbound entry ramp if the existing crossing is reinstated.	Transport /Contractor	Detailed design	Aurecon	N/A	Refer to the alternative pedestrian crossing study technical memorandum (ref. RRM7-GEDT-0537-GN-MEM-000001) for the results of the traffic assessment.
H14	Design changes	If the design and/or modelling is revised during detailed design, an additional environmental assessment would be required to evaluate any changes in impacts.	Contractor	Detailed design	Aurecon	Yes	No major design changes have occurred that require additional environmental assessment.
B2	Removal of native vegetation	Native vegetation removal would be minimised through detailed design and during construction.	Transport /Contractor	Detailed design /Construction	GDJV, Aurecon	Yes	Works within project boundary. Clearing impacts assessed as part of DM01.
B9	Removal of threatened fauna habitat	Threatened fauna habitat removal would be minimised through detailed design and during construction.	Transport /Contractor	Detailed design /Construction	GDJV, Aurecon	Yes	Works within project boundary. Clearing impacts assessed as part of DM01.
S1	Sustainability	Integrate sustainability requirements/ initiatives/ opportunities identified in the Sustainability Plan (Stantec, 2024b) into future design.	Contractor	Detailed design	GDJV, Aurecon	Yes	Existing streetlight infrastructure is retained as much as possible and new additions/replacements are minimised.

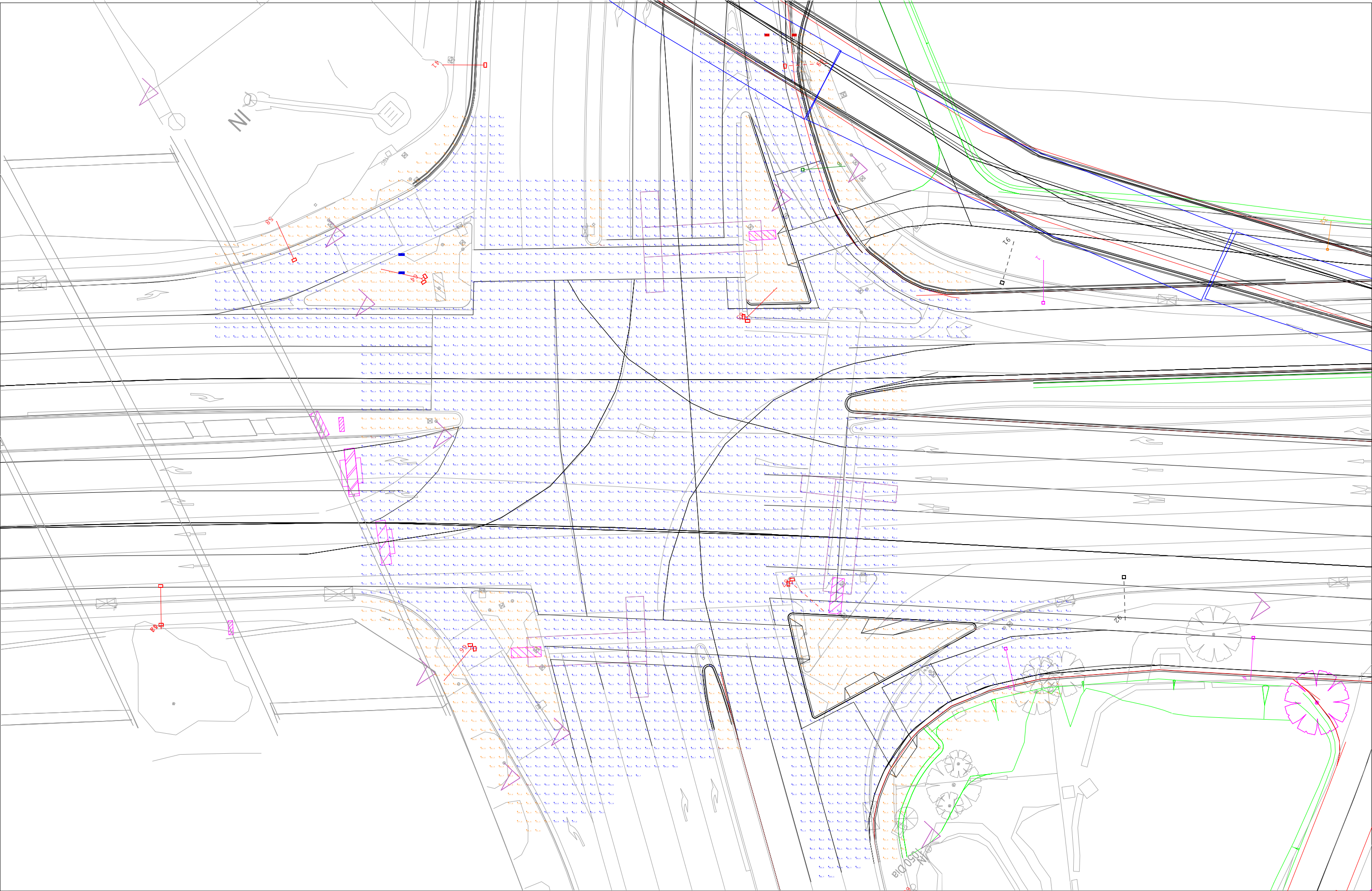
Appendix H

Design Calculations

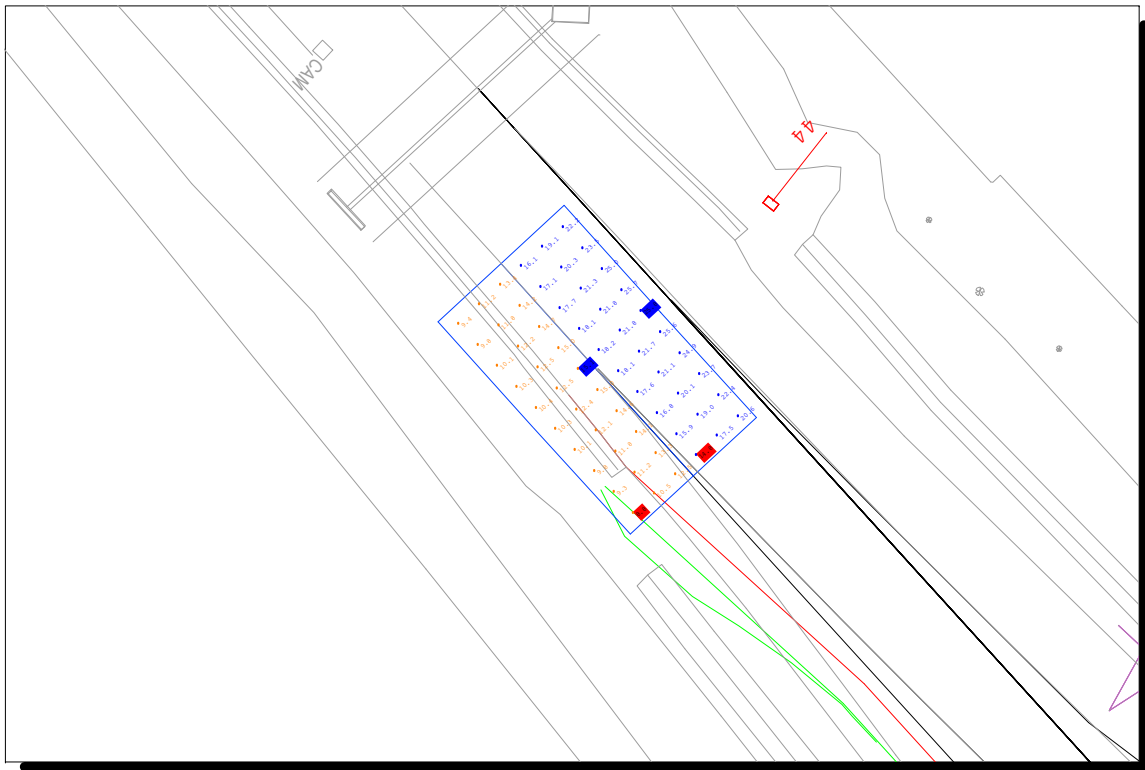


CLIENT		REV	DATE	REVISION DETAILS	APPROVAL	DRAWN	DESIGNER	PROJECT	TITLE	SIZE
		A	20/02/2026	ISSUED FOR DCD	M.R		M. TORRES	RICHMOND ROAD UPGRADE TOWNSON RD. TO M7	LIGHTING CALCULATIONS CALCULATION LOCATION PLAN	A3
		B	24/04/2026	ISSUED FOR SDD	M.R.		APPROVED			
						CHECKED M.RICHARDS	J. ABRAHAM			REV B

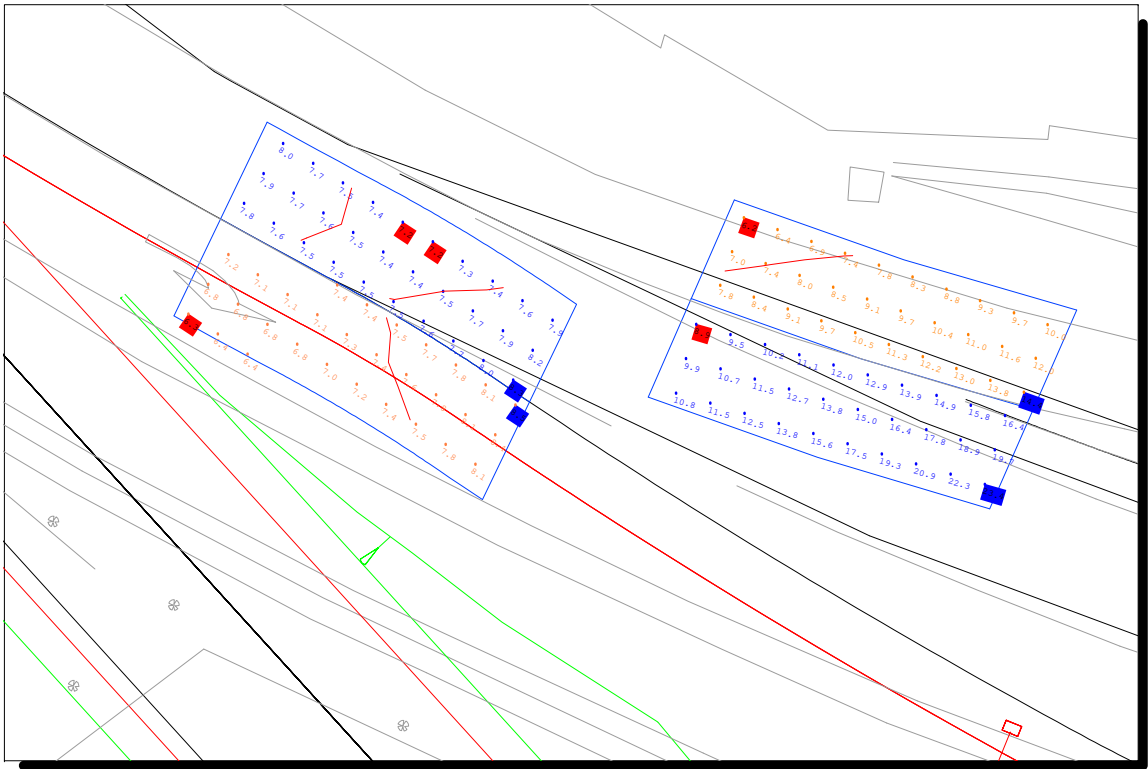
Calculation Summary						
Label	CalcType	Units	Avg	Max	Min	Max/Min
Diverge 01	Illuminance	Lux	20.45	25.8	14.8	1.74
Diverge 01_Surround	Illuminance	Lux	11.95	15.1	8.8	1.72
Diverge 02	Illuminance	Lux	7.63	8.3	7.2	1.15
Diverge 02_Surround	Illuminance	Lux	7.36	8.5	6.3	1.35
Diverge 03	Illuminance	Lux	14.65	23.4	8.9	2.63
Diverge 03_Surround	Illuminance	Lux	9.52	14.4	6.2	2.32
Diverge 04	Illuminance	Lux	33.12	45.1	23.6	1.91
Diverge 04_Surround	Illuminance	Lux	26.84	32.9	19.1	1.72
Diverge 05	Illuminance	Lux	42.12	74.9	30.7	2.44
Diverge 05_Surround	Illuminance	Lux	53.13	105.6	34.1	3.10
Diverge 06	Illuminance	Lux	11.54	14.3	9.7	1.47
Diverge 06_Surround	Illuminance	Lux	10.82	13.2	9.3	1.42
Diverge 07	Illuminance	Lux	11.14	11.6	10.5	1.10
Diverge 07_Surround	Illuminance	Lux	10.95	11.5	10.2	1.13
Diverge 08	Illuminance	Lux	8.90	10.7	7.8	1.37
Diverge 08_Surround	Illuminance	Lux	7.31	7.6	6.7	1.13
Diverge 09	Illuminance	Lux	16.40	19.9	12.5	1.59
Diverge 09_Surround	Illuminance	Lux	11.77	13.8	10.0	1.38
Richmond Road Intersection	Illuminance	Lux	46.17	128.0	16.4	7.80
Richmond Road Intersection_Surround	Illuminance	Lux	55.15	133.4	16.8	7.94



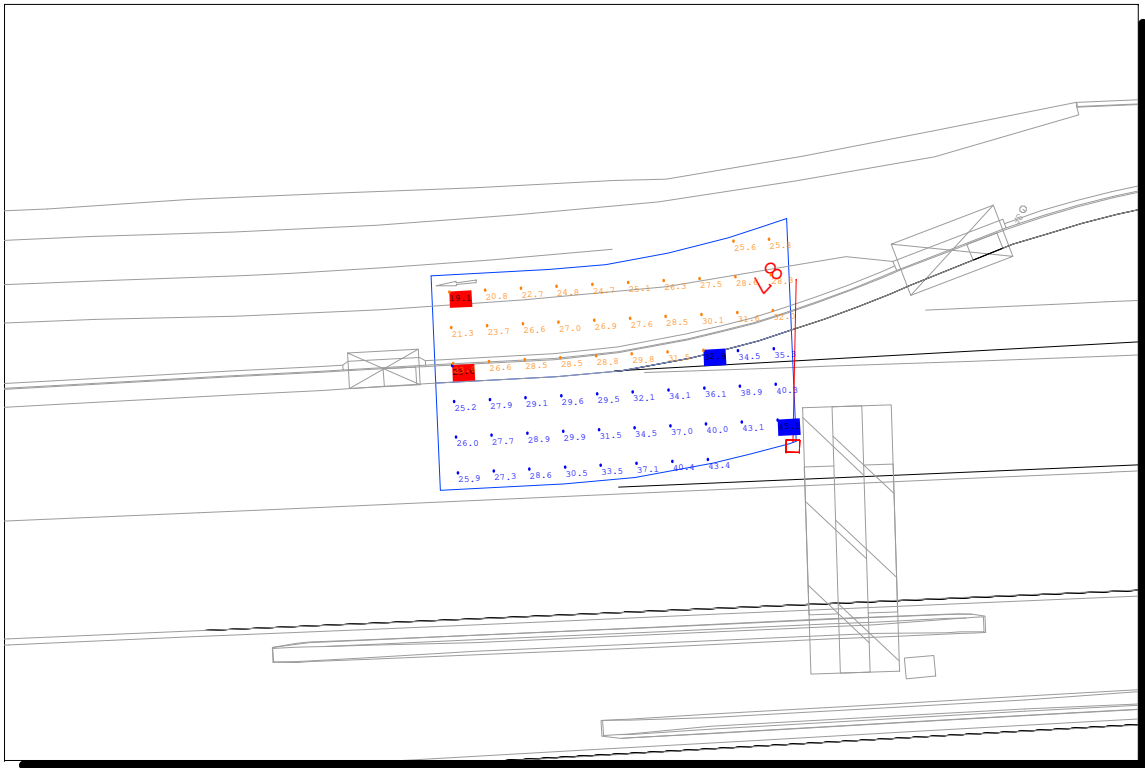
 www.aurecongroup.com	CLIENT	REV	DATE	REVISION DETAILS	APPROVAL	DRAWN	DESIGNER	PROJECT	TITLE	SIZE
		A	20/02/2026	ISSUED FOR DCD	M.R		M. TORRES	RICHMOND ROAD UPGRADE TOWNSON RD. TO M7	LIGHTING CALCULATIONS RICHMOND ROAD INTERSECTION	A3 REV B
		B	24/04/2026	ISSUED FOR SDD	M.R.	CHECKED	APPROVED			
						M.RICHARDS	J. ABRAHAM			



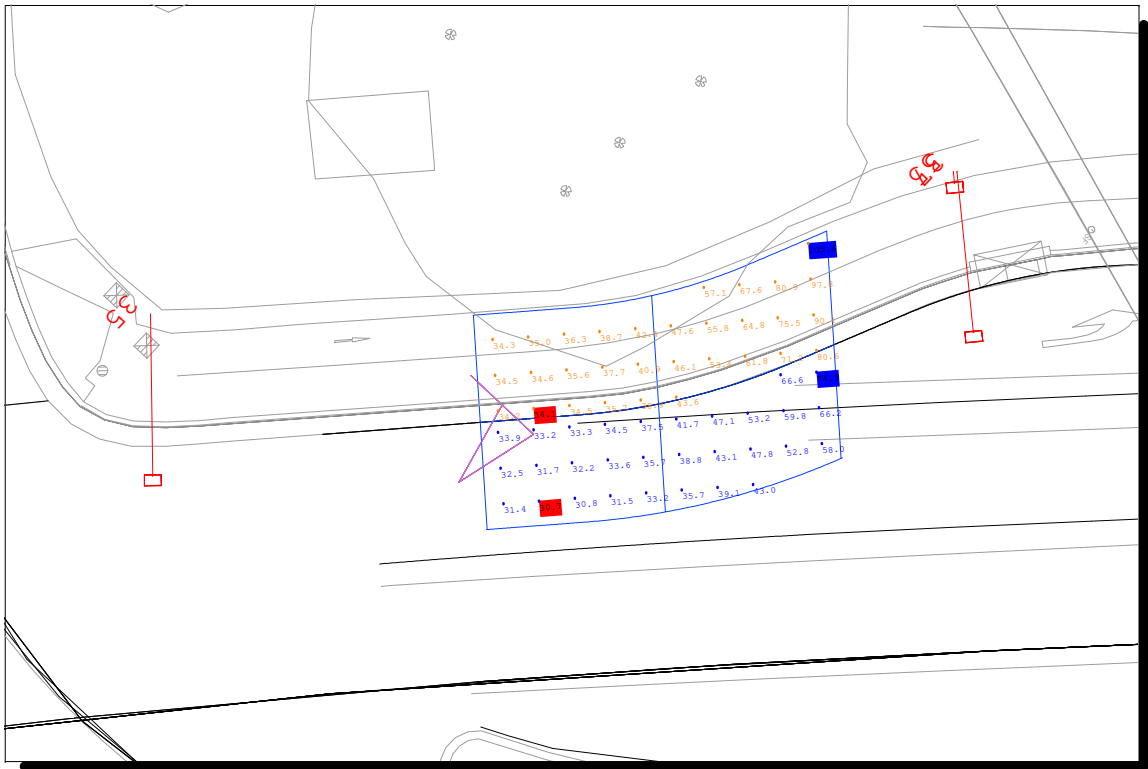
DIVERGE 01



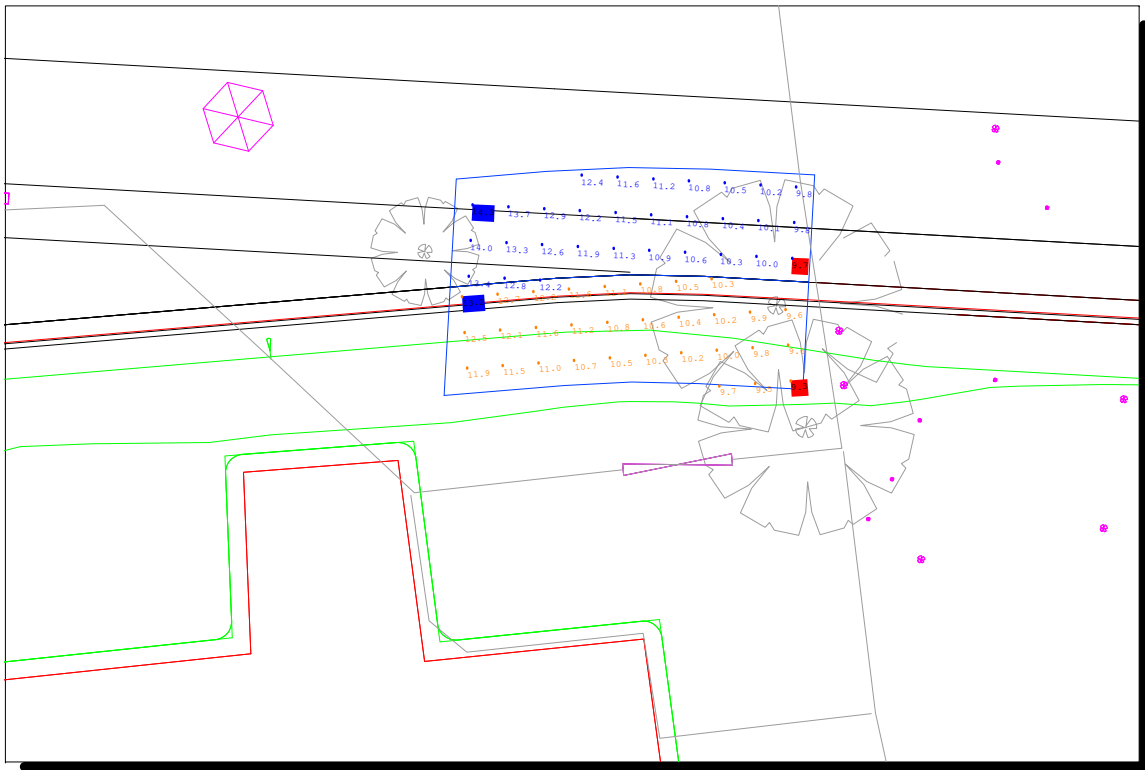
DIVERGE 02 & 03



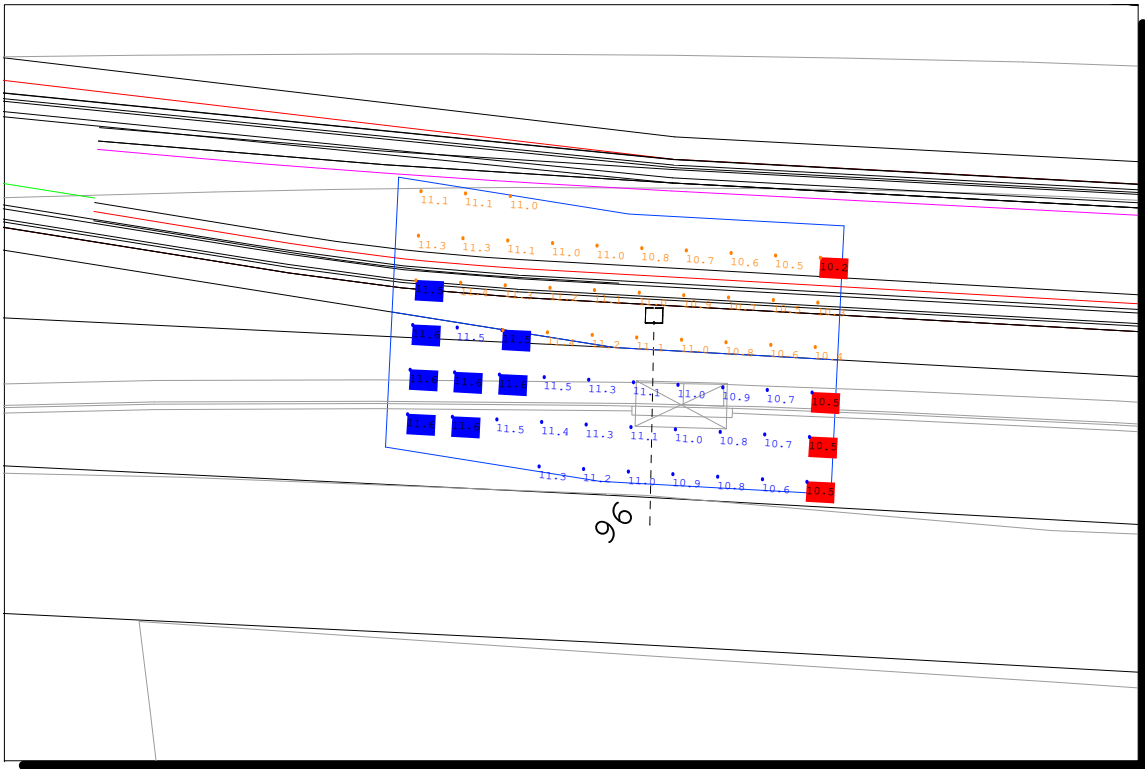
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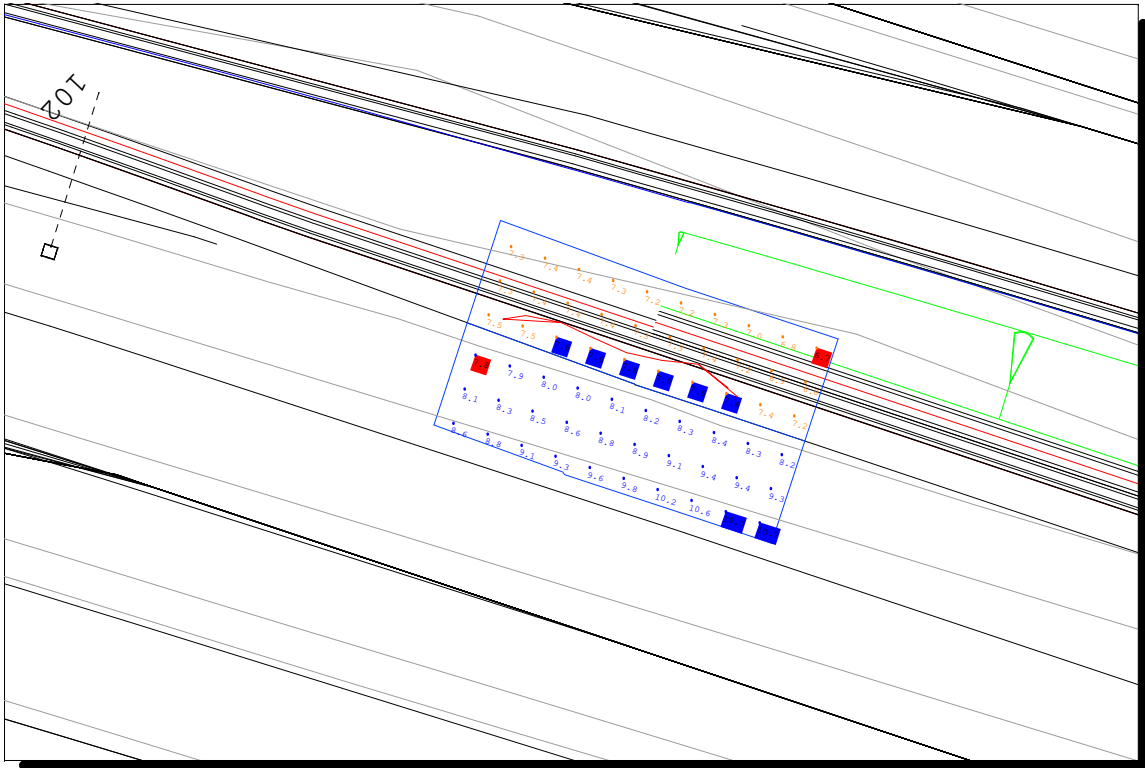
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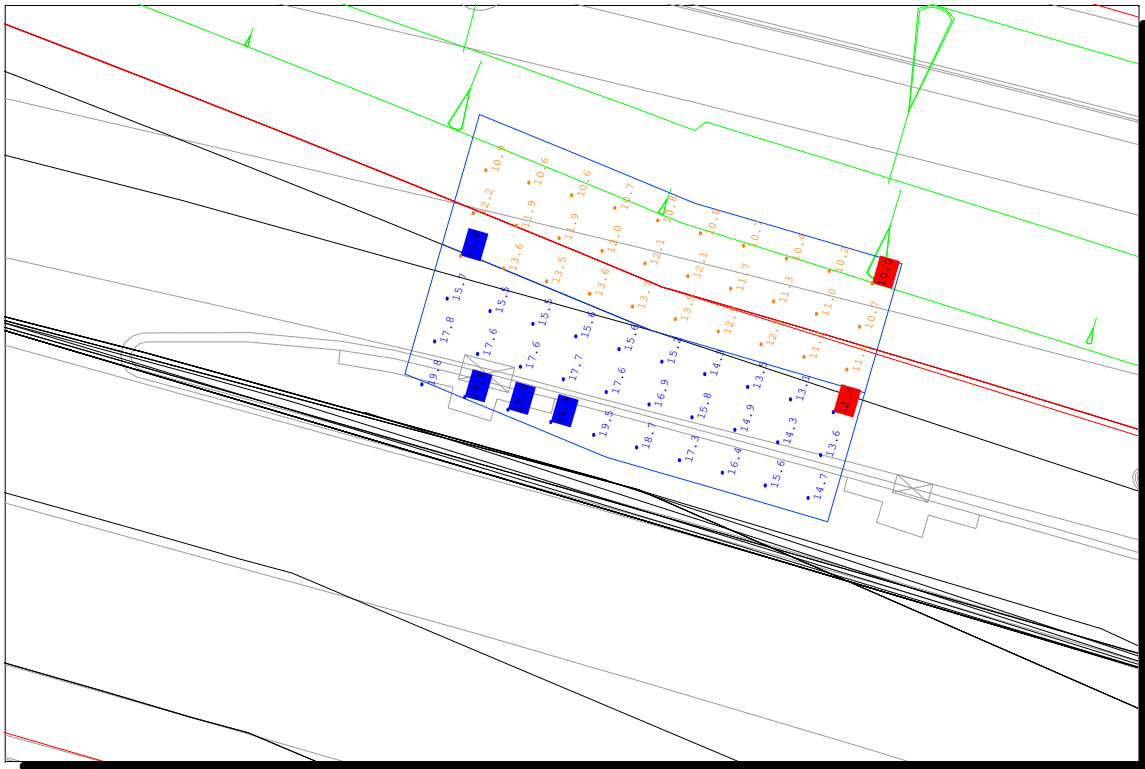
DIVERGE 06



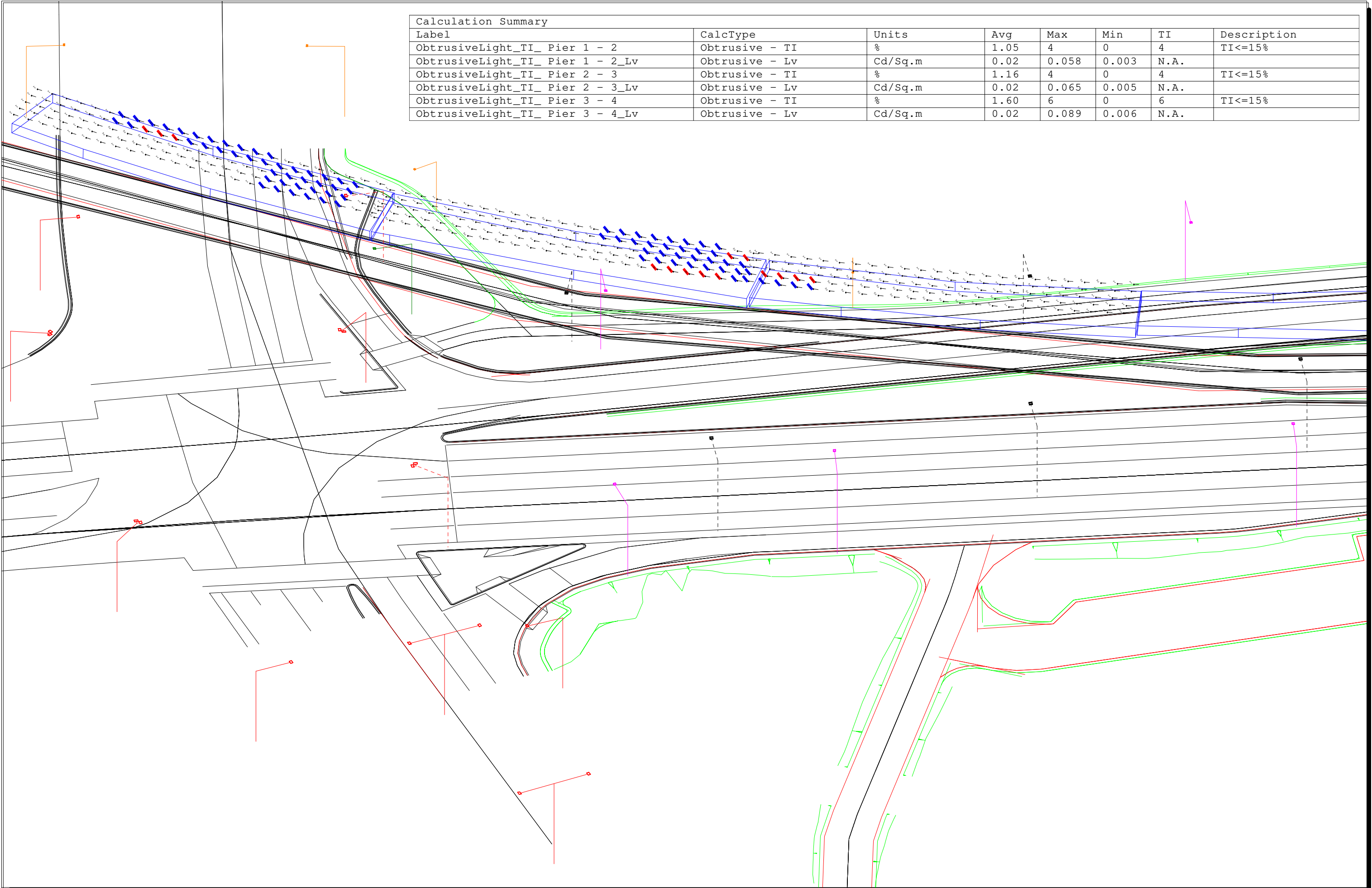
DIVERGE 07



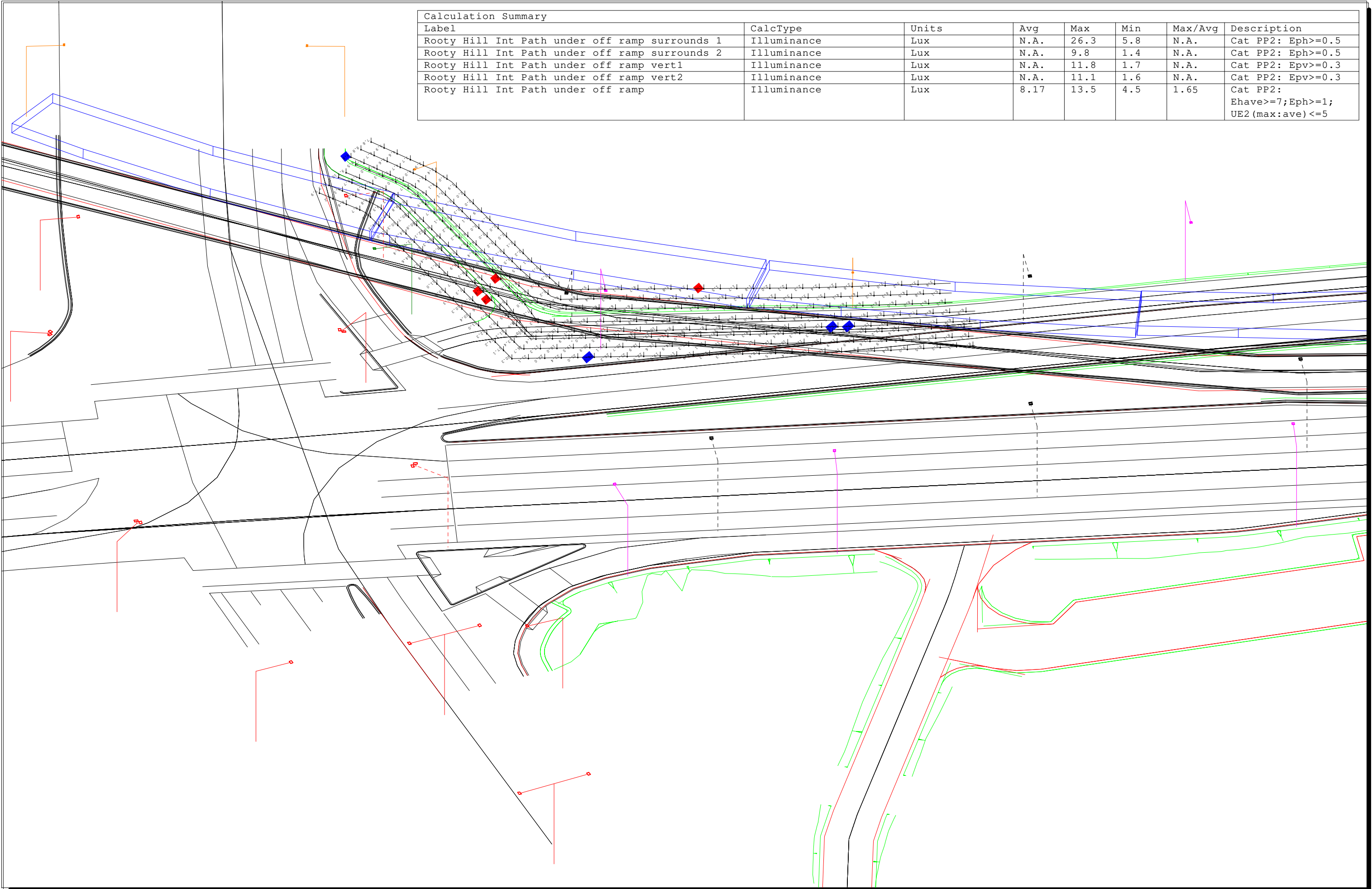
DIVERGE 08



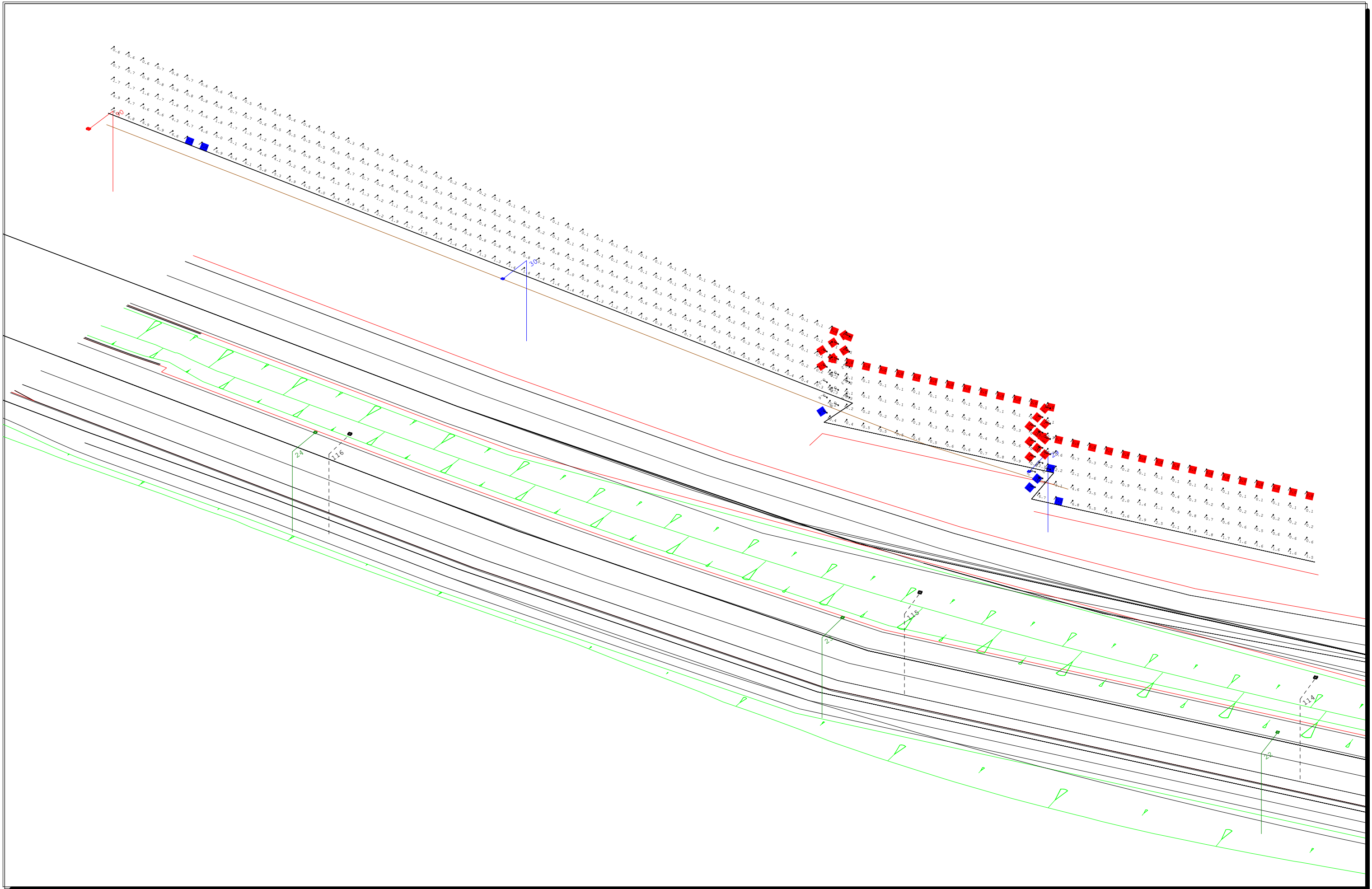
DIVERGE 09



Calculation Summary							
Label	CalcType	Units	Avg	Max	Min	TI	Description
ObtrusiveLight_TI_ Pier 1 - 2	Obtrusive - TI	%	1.05	4	0	4	TI<=15%
ObtrusiveLight_TI_ Pier 1 - 2_Lv	Obtrusive - Lv	Cd/Sq.m	0.02	0.058	0.003	N.A.	
ObtrusiveLight_TI_ Pier 2 - 3	Obtrusive - TI	%	1.16	4	0	4	TI<=15%
ObtrusiveLight_TI_ Pier 2 - 3_Lv	Obtrusive - Lv	Cd/Sq.m	0.02	0.065	0.005	N.A.	
ObtrusiveLight_TI_ Pier 3 - 4	Obtrusive - TI	%	1.60	6	0	6	TI<=15%
ObtrusiveLight_TI_ Pier 3 - 4_Lv	Obtrusive - Lv	Cd/Sq.m	0.02	0.089	0.006	N.A.	



Calculation Summary							
Label	CalcType	Units	Avg	Max	Min	Max/Avg	Description
Rooty Hill Int Path under off ramp surrounds 1	Illuminance	Lux	N.A.	26.3	5.8	N.A.	Cat PP2: Eph>=0.5
Rooty Hill Int Path under off ramp surrounds 2	Illuminance	Lux	N.A.	9.8	1.4	N.A.	Cat PP2: Eph>=0.5
Rooty Hill Int Path under off ramp vert1	Illuminance	Lux	N.A.	11.8	1.7	N.A.	Cat PP2: Epv>=0.3
Rooty Hill Int Path under off ramp vert2	Illuminance	Lux	N.A.	11.1	1.6	N.A.	Cat PP2: Epv>=0.3
Rooty Hill Int Path under off ramp	Illuminance	Lux	8.17	13.5	4.5	1.65	Cat PP2: Ehave>=7;Eph>=1; UE2 (max:ave) <=5



CLIENT	REV	DATE	REVISION DETAILS	APPROVAL	DRAWN	DESIGNER	PROJECT	TITLE	SIZE
	A	20/02/2026	ISSUED FOR DCD	M.R	M.RICHARDS	M. TORRES	RICHMOND ROAD UPGRADE TOWNSON RD. TO M7	LIGHTING CALCULATIONS OBTRUSIVE LIGHTING ASSESSMENT RESIDENTIAL AREA AT RICHMOND RD.	A3
	B	24/04/2026	ISSUED FOR SDD	M.R.		APPROVED			REV
						J. ABRAHAM			B

Obtrusive Light - Compliance Report

AS/NZS 4282:2023, V - Residences Near Traffic Routes, Curfew
Filename: RRM7 Lighting
21/04/2026 12:47:02 am

Illuminance

Maximum Allowable Value: 4 Lux

Calculations Tested (5):

Calculation Label	Test Results	Max. Illum.	
ObtrusiveLight_1_Ill_Seg1	FAIL	7.0	
ObtrusiveLight_1_Ill_Seg2	PASS	1.6	
ObtrusiveLight_1_Ill_Seg3	PASS	1.0	
ObtrusiveLight_1_Ill_Seg4	PASS	0.3	
ObtrusiveLight_1_Ill_Seg5	FAIL	7.2	

Failed Meter Locations (34):

Calculation Label	Lux	Meter Coords
ObtrusiveLight_1_Ill_Seg1	4.1	300321.593, 6266170.392, 4.5
ObtrusiveLight_1_Ill_Seg1	4.3	300320.966, 6266184.378, 4.5
ObtrusiveLight_1_Ill_Seg1	4.5	300321.772, 6266166.396, 2.5
ObtrusiveLight_1_Ill_Seg1	4.6	300321.503, 6266172.39, 4.5
ObtrusiveLight_1_Ill_Seg1	4.6	300321.145, 6266180.382, 4.5
ObtrusiveLight_1_Ill_Seg1	4.6	300320.877, 6266186.376, 4.5
ObtrusiveLight_1_Ill_Seg1	4.6	300320.787, 6266188.374, 4.5
ObtrusiveLight_1_Ill_Seg1	4.7	300321.056, 6266182.38, 4.5
ObtrusiveLight_1_Ill_Seg1	4.7	300320.698, 6266190.372, 4.5
ObtrusiveLight_1_Ill_Seg1	4.9	300321.682, 6266168.394, 2.5
ObtrusiveLight_1_Ill_Seg1	4.9	300321.414, 6266174.388, 4.5
ObtrusiveLight_1_Ill_Seg1	4.9	300320.608, 6266192.37, 4.5
ObtrusiveLight_1_Ill_Seg1	5.0	300321.235, 6266178.384, 4.5
ObtrusiveLight_1_Ill_Seg1	5.1	300321.324, 6266176.386, 4.5
ObtrusiveLight_1_Ill_Seg1	5.3	300321.593, 6266170.392, 2.5
ObtrusiveLight_1_Ill_Seg1	5.8	300321.503, 6266172.39, 2.5
ObtrusiveLight_1_Ill_Seg1	6.1	300321.414, 6266174.388, 2.5
ObtrusiveLight_1_Ill_Seg1	6.4	300321.324, 6266176.386, 2.5
ObtrusiveLight_1_Ill_Seg1	6.4	300320.608, 6266192.37, 2.5
ObtrusiveLight_1_Ill_Seg1	6.6	300320.966, 6266184.378, 2.5
ObtrusiveLight_1_Ill_Seg1	6.8	300320.698, 6266190.372, 2.5
ObtrusiveLight_1_Ill_Seg1	6.9	300321.235, 6266178.384, 2.5
ObtrusiveLight_1_Ill_Seg1	6.9	300320.877, 6266186.376, 2.5
ObtrusiveLight_1_Ill_Seg1	6.9	300320.787, 6266188.374, 2.5
ObtrusiveLight_1_Ill_Seg1	7.0	300321.145, 6266180.382, 2.5
ObtrusiveLight_1_Ill_Seg1	7.0	300321.056, 6266182.38, 2.5
ObtrusiveLight_1_Ill_Seg5	4.5	300324.471, 6266055.329, 2.5
ObtrusiveLight_1_Ill_Seg5	4.6	300323.369, 6266059.174, 4.5
ObtrusiveLight_1_Ill_Seg5	4.8	300322.266, 6266063.019, 4.5
ObtrusiveLight_1_Ill_Seg5	5.1	300322.817, 6266061.096, 4.5
ObtrusiveLight_1_Ill_Seg5	5.5	300323.92, 6266057.251, 2.5
ObtrusiveLight_1_Ill_Seg5	6.7	300322.266, 6266063.019, 2.5
ObtrusiveLight_1_Ill_Seg5	6.8	300323.369, 6266059.174, 2.5
ObtrusiveLight_1_Ill_Seg5	7.2	300322.817, 6266061.096, 2.5

LIGHTING SCHEDULE															
LOCATION							LUMINAIRE				POLE AND FOOTING TYPE				
POLE NO	MODEL	EASTING	NORTHING	MOUNTING HEIGHT (m)	OUTREACH (m)	ARRANGEMENT	MANUFACTURER	WATTAGE	ORIENT	TILT	FOUNDATION TYPE	POLE TYPE	PRODUCT NUMBER	ASSET OWNER	STATUS
1	ATS VLED 290W 3k	300654.619	6265382.579	12	4.5	SINGLE	ALDRIDGE TRAFFIC SYSTEMS	284	43	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL10IAR-3953-86	ENDEAVOUR ENERGY	PROPOSED
2	ATS VLED 290W 3k	300691.033	6265412.452	10.5	4.5	SINGLE	ALDRIDGE TRAFFIC SYSTEMS	284	235	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL85IAR-3952-86	ENDEAVOUR ENERGY	PROPOSED
3	ATS VLED 290W 3k	300602.078	6265432.213	12	4.5	SINGLE	ALDRIDGE TRAFFIC SYSTEMS	284	44	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL10IAR-3953-86	ENDEAVOUR ENERGY	PROPOSED
4	ATS VLED 290W 3k	300672.579	6265430.503	12	4.5	SINGLE	ALDRIDGE TRAFFIC SYSTEMS	284	220	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL10IAR-3953-86	ENDEAVOUR ENERGY	PROPOSED
5	ATS VLED 290W 3k	300635.787	6265472.690	12	4.5	SINGLE	ALDRIDGE TRAFFIC SYSTEMS	284	220	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL10IAR-3953-86	ENDEAVOUR ENERGY	PROPOSED
6	ATS VLED 290W 3k	300561.698	6265476.195	12	4.5	SINGLE	ALDRIDGE TRAFFIC SYSTEMS	284	42	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL10IAR-3953-86	ENDEAVOUR ENERGY	PROPOSED
7	ATS VLED 290W 3k	300600.530	6265512.985	12	4.5	SINGLE	ALDRIDGE TRAFFIC SYSTEMS	284	221	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL10IAR-3953-86	ENDEAVOUR ENERGY	PROPOSED
8	RoadLED 205W 3k Aero	300661.969	6265359.717	10.5	4.5	SINGLE	SYLVANIA-SCHREDER	205	318	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL85IAR-3952-86	ENDEAVOUR ENERGY	PROPOSED
9	RoadLED 205W 3k Aero	300521.491	6265529.21	10.5	4.5	SINGLE	SYLVANIA-SCHREDER	205	36	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL85IAR-3952-86	ENDEAVOUR ENERGY	PROPOSED
10	RoadLED 205W 3k Aero	300561.104	6265560.48	10.5	4.5	SINGLE	SYLVANIA-SCHREDER	205	220	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL85IAR-3952-86	ENDEAVOUR ENERGY	PROPOSED
11	RoadLED 205W 3k Aero	300486.368	6265586.601	10.5	4.5	SINGLE	SYLVANIA-SCHREDER	205	30	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL85IAR-3952-86	ENDEAVOUR ENERGY	PROPOSED
12	RoadLED 205W 3k Aero	300456.905	6265646.382	10.5	4.5	SINGLE	SYLVANIA-SCHREDER	205	25	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL85IAR-3952-86	ENDEAVOUR ENERGY	PROPOSED
13	RoadLED 205W 3k Aero	300499.877	6265666.6	10.5	4.5	SINGLE	SYLVANIA-SCHREDER	205	205	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL85IAR-3952-86	ENDEAVOUR ENERGY	PROPOSED
14	RoadLED 205W 3k Aero	300426.661	6265710.749	10.5	4.5	SINGLE	SYLVANIA-SCHREDER	205	25	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL85IAR-3952-86	ENDEAVOUR ENERGY	PROPOSED
15	RoadLED 205W 3k Aero	300471.088	6265728.562	10.5	4.5	SINGLE	SYLVANIA-SCHREDER	205	205	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL85IAR-3952-86	ENDEAVOUR ENERGY	PROPOSED
16	RoadLED 205W 3k Aero	300397.678	6265771.35	10.5	4.5	SINGLE	SYLVANIA-SCHREDER	205	28	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL85IAR-3952-86	ENDEAVOUR ENERGY	PROPOSED
17	RoadLED 205W 3k Aero	300437.440	6265792.37	10.5	4.5	SINGLE	SYLVANIA-SCHREDER	205	209	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL85IAR-3952-86	ENDEAVOUR ENERGY	PROPOSED
18	RoadLED 205W 3k Aero	300365.415	6265832.675	10.5	4.5	SINGLE	SYLVANIA-SCHREDER	205	28	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL85IAR-3952-86	ENDEAVOUR ENERGY	PROPOSED
19	RoadLED 205W 3k Aero	300402.418	6265852.422	10.5	4.5	SINGLE	SYLVANIA-SCHREDER	205	207	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL85IAR-3952-86	ENDEAVOUR ENERGY	PROPOSED
20	RoadLED 205W 3k Aero	300331.342	6265893.064	10.5	4.5	SINGLE	SYLVANIA-SCHREDER	205	29	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL85IAR-3952-86	ENDEAVOUR ENERGY	PROPOSED
21	RoadLED 205W 3k Aero	300305.019	6265946.795	10.5	4.5	SINGLE	SYLVANIA-SCHREDER	205	21	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL85IAR-3952-86	ENDEAVOUR ENERGY	PROPOSED
22	RoadLED 205W 3k Aero	300285.758	6266002.5	10.5	4.5	SINGLE	SYLVANIA-SCHREDER	205	16	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL85IAR-3952-86	ENDEAVOUR ENERGY	PROPOSED
23	RoadLED 205W 3k Aero	300274.163	6266055.293	10.5	4.5	SINGLE	SYLVANIA-SCHREDER	205	10	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL85IAR-3952-86	ENDEAVOUR ENERGY	PROPOSED
24	RoadLED 205W 3k Aero	300267.625	6266124.891	10.5	4.5	SINGLE	SYLVANIA-SCHREDER	205	6	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL85IAR-3952-86	ENDEAVOUR ENERGY	PROPOSED
25	RoadLED 205W 3k Aero	300527.110	6265610.29	10.5	4.5	SINGLE	SYLVANIA-SCHREDER	205	210	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	-	ENDEAVOUR ENERGY	LUMINAIRE REPLACEMENT
26	RoadLED 205W 3k Aero	300371.310	6265914.17	10.5	4.5	SINGLE	SYLVANIA-SCHREDER	205	205	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	-	ENDEAVOUR ENERGY	LUMINAIRE REPLACEMENT
27	RoadLED 205W 3k Aero	300348.690	6265963.42	10.5	4.5	SINGLE	SYLVANIA-SCHREDER	205	203	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	-	ENDEAVOUR ENERGY	LUMINAIRE REPLACEMENT
28	RoadLED 205W 3k Aero	300329.820	6266015.01	10.5	4.5	SINGLE	SYLVANIA-SCHREDER	205	195	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	-	ENDEAVOUR ENERGY	LUMINAIRE REPLACEMENT
29	RoadLED 205W 3k Aero	300319.650	6266059.7	10.5	4.5	SINGLE	SYLVANIA-SCHREDER	205	192	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	-	ENDEAVOUR ENERGY	LUMINAIRE REPLACEMENT
30	RoadLED 205W 3k Aero	300314.540	6266129.27	10.5	4.5	SINGLE	SYLVANIA-SCHREDER	205	184	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	-	ENDEAVOUR ENERGY	LUMINAIRE REPLACEMENT
31	StreetLED3 24W 3K Aero	300642.957	6265349.87	7.5	3	SINGLE	SYLVANIA-SCHREDER	24	337	5	ENDEAVOUR ENERGY	RIGID	IE55BENT-86	ENDEAVOUR ENERGY	PROPOSED
32	StreetLED3 24W 3K Aero	300629.998	6265402.577	7.5	3	SINGLE	SYLVANIA-SCHREDER	24	36	5	ENDEAVOUR ENERGY	RIGID	IE55BENT-86	ENDEAVOUR ENERGY	PROPOSED
33	Rexel Optispan 250W equivalent	300785.500	6265235.29	10.5	4.5	SINGLE	REXEL	284	76	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
34	Rexel Optispan 250W equivalent	300761.330	6265238.34	10.5	4.5	SINGLE	REXEL	284	325	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
35	Rexel Optispan 250W equivalent	300776.690	6265261.14	10.5	4.5	SINGLE	REXEL	284	44	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
36	Rexel Optispan 250W equivalent	300813.890	6265269.69	10.5	4.5	SINGLE	REXEL	284	217	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
37	Rexel Optispan 250W equivalent	300758.350	6265274.84	10.5	4.5	SINGLE	REXEL	284	49	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
38	Rexel Optispan 250W equivalent	300793.330	6265295.7	10.5	4.5	SINGLE	REXEL	284	222	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
39	Rexel Optispan 250W equivalent	300734.300	6265297.12	10.5	4.5	SINGLE	REXEL	284	47	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
40	Rexel Optispan 250W equivalent	300774.750	6265315.71	10.5	4.5	SINGLE	REXEL	284	225	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
41	Rexel Optispan 250W equivalent	300684.000	6265320.09	10.5	4.5	SINGLE	REXEL	284	133	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
42	Rexel Optispan 250W equivalent	300749.990	6265339.83	10.5	4.5	SINGLE	REXEL	284	224	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
43	Rexel Optispan 250W equivalent	300655.090	6265350.61	10.5	4.5	SINGLE	REXEL	284	317	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
44	Rexel Optispan 250W equivalent	300640.459	6265019.879	10.5	3	SINGLE	REXEL	284	5	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
45	Rexel Optispan 250W equivalent	300640.180	6265074.18	10.5	3	SINGLE	REXEL	284	5	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
46	Rexel Optispan 250W equivalent	300645.240	6265118.63	10.5	3	SINGLE	REXEL	284	201	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
47	Rexel Optispan 250W equivalent	300601.180	6265150.39	10.5	3	SINGLE	REXEL	284	41	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
48	Rexel Optispan 250W equivalent	300585.850	6265168.22	10.5	3	SINGLE	REXEL	284	41	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
49	Rexel Optispan 250W equivalent	300608.470	6265179.29	10.5	3	SINGLE	REXEL	284	222	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
50	Rexel Optispan 250W equivalent	300566.100	6265190.08	10.5	3	SINGLE	REXEL	284	52	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
51	Rexel Optispan 250W equivalent	300548.290	6265200.08	10.5	3	SINGLE	REXEL	284	61	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
52	Rexel Optispan 250W equivalent	300565.770	6265215.23	10.5	3	SINGLE	REXEL	284	224	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
53	Rexel Optispan 250W equivalent	300734.360	6265297.11	6	0.3	TWIN	REXEL	284	48	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
54	Rexel Optispan 250W equivalent	300750.020	6265339.85	6	0.3	TWIN	REXEL	284	224	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
55	Rexel Optispan 250W equivalent	300758.430	6265274.77	6	0.3	SINGLE	REXEL	284	49	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
56	Rexel Optispan 250W equivalent	300774.780	6265315.7	6	0.3	SINGLE	REXEL	284	223	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
57	Rexel Optispan 400W equivalent	300874.450	6265205.28	10.5	4.5	SINGLE	REXEL	400	226	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING

LIGHTING SCHEDULE															
LOCATION							LUMINAIRE				POLE AND FOOTING TYPE				
POLE NO	MODEL	EASTING	NORTHING	MOUNTING HEIGHT (m)	OUTREACH (m)	ARRANGEMENT	MANUFACTURER	WATTAGE	ORIENT	TILT	FOUNDATION TYPE	POLE TYPE	PRODUCT NUMBER	ASSET OWNER	STATUS
58	Rexel Optispan 400W equivalent	300708.920	6265318.54	10.5	4.5	SINGLE	REXEL	400	68	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
59	Rexel Optispan 400W equivalent	300745.150	6265395.56	10.5	4.5	SINGLE	REXEL	400	149	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
60	Rexel Optispan 400W equivalent	300714.590	6265419.5	10.5	4.5	SINGLE	REXEL	400	327	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
61	Rexel Optispan 400W equivalent	300727.400	6265411	12	4.5	BACK TO BACK	REXEL	400	149	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
62	Rexel Optispan 400W equivalent	300744.940	6265439.73	12	4.5	BACK TO BACK	REXEL	400	151	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
63	Rexel Optispan 400W equivalent	300764.280	6265466.7	12	4.5	BACK TO BACK	REXEL	400	144	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
64	Rexel Optispan 400W equivalent	300703.614	6265331.657	10.5	4.5	TWIN	REXEL	400	120	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
65	Rexel Optispan 400W equivalent	300676.770	6265363.38	10.5	4.5	TWIN	REXEL	400	358	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
66	Rexel Optispan 400W equivalent	300732.960	6265366.26	10.5	4.5	TWIN	REXEL	400	183	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
67	Rexel Optispan 400W equivalent	300699.020	6265391.26	10.5	4.5	TWIN	REXEL	400	272	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
68	RoadLED MIDI 120W 4K STD 221201PH	300454.710	6265143.65	10.5	4.5	SINGLE	SYLVANIA-SCHREDER	120	136	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
69	RoadLED MIDI 120W 4K STD 221201PH	300434.510	6265160.38	10.5	4.5	SINGLE	SYLVANIA-SCHREDER	120	319	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
70	RoadLED MIDI 120W 4K STD 221201PH	300480.400	6265169.92	10.5	4.5	SINGLE	SYLVANIA-SCHREDER	120	135	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
71	RoadLED MIDI 120W 4K STD 221201PH	300503.980	6265190.28	10.5	4.5	SINGLE	SYLVANIA-SCHREDER	120	133	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
72	RoadLED MIDI 120W 4K STD 221201PH	300458.230	6265190.87	10.5	4.5	SINGLE	SYLVANIA-SCHREDER	120	318	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
73	RoadLED MIDI 120W 4K STD 221201PH	300528.850	6265208.71	10.5	4.5	SINGLE	SYLVANIA-SCHREDER	120	101	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
74	RoadLED MIDI 120W 4K STD 221201PH	300481.300	6265216.95	10.5	4.5	SINGLE	SYLVANIA-SCHREDER	120	315	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
75	RoadLED MIDI 120W 4K STD 221201PH	300507.910	6265239.77	10.5	4.5	SINGLE	SYLVANIA-SCHREDER	120	306	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
76	RoadLED MIDI 120W 4K STD 221201PH	300578.430	6265243.2	10.5	4.5	SINGLE	SYLVANIA-SCHREDER	120	125	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
77	RoadLED MIDI 120W 4K STD 221201PH	300836.200	6265243.22	10.5	4.5	SINGLE	SYLVANIA-SCHREDER	120	223	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
78	RoadLED MIDI 120W 4K STD 221201PH	300530.450	6265256.17	10.5	4.5	SINGLE	SYLVANIA-SCHREDER	120	307	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
79	RoadLED MIDI 120W 4K STD 221201PH	300601.930	6265259.68	10.5	4.5	SINGLE	SYLVANIA-SCHREDER	120	125	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
80	RoadLED MIDI 120W 4K STD 221201PH	300557.300	6265275.33	10.5	4.5	SINGLE	SYLVANIA-SCHREDER	120	305	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
81	RoadLED MIDI 120W 4K STD 221201PH	300626.290	6265276.84	10.5	4.5	SINGLE	SYLVANIA-SCHREDER	120	128	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
82	RoadLED MIDI 120W 4K STD 221201PH	300580.650	6265291.73	10.5	4.5	SINGLE	SYLVANIA-SCHREDER	120	306	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
83	RoadLED MIDI 120W 4K STD 221201PH	300655.610	6265297.87	10.5	4.5	SINGLE	SYLVANIA-SCHREDER	120	128	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
84	RoadLED MIDI 120W 4K STD 221201PH	300606.200	6265310.27	10.5	4.5	SINGLE	SYLVANIA-SCHREDER	120	304	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
85	RoadLED MIDI 120W 4K STD 221201PH	300633.260	6265329.36	10.5	4.5	SINGLE	SYLVANIA-SCHREDER	120	305	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
86	RoadLED MIDI 120W 4K STD 221201PH	300560.740	6265230.84	10.5	4.5	TWIN	SYLVANIA-SCHREDER	120	125	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
87	Roadster S250C - 98100	300858.880	6265188.67	10.5	4.5	SINGLE	SYLVANIA-SCHREDER	250	42	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
88	Roadster S250C - 98100	300813.190	6265227.48	10.5	4.5	SINGLE	SYLVANIA-SCHREDER	250	45	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
89	Roadster S400C - 98382	300264.370	6266182.37	10.5	4.5	SINGLE	SYLVANIA-SCHREDER	400	2	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
90	Roadster S400C - 98382	300310.150	6266184.18	10.5	4.5	SINGLE	SYLVANIA-SCHREDER	400	183	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
91	Roadster S400C - 98382	300655.350	6265378.82	10.5	4.5	SINGLE	SYLVANIA-SCHREDER	400	27	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING TO BE REMOVED
92	Rexel Optispan 400W equivalent	300677.150	6265415.99	10.5	4.5	SINGLE	REXEL	400	225	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING TO BE REMOVED
93	Rexel Optispan 400W equivalent	300620.820	6265421.45	10.5	4.5	SINGLE	REXEL	400	45	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING TO BE REMOVED
94	Rexel Optispan 400W equivalent	300648.910	6265443.42	10.5	4.5	SINGLE	REXEL	400	225	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING TO BE REMOVED
95	Rexel Optispan 400W equivalent	300622.430	6265464.76	10.5	4.5	SINGLE	REXEL	400	225	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING TO BE REMOVED
96	Rexel Optispan 400W equivalent	300601.330	6265485.32	10.5	4.5	SINGLE	REXEL	400	222	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING TO BE REMOVED
97	Rexel Optispan 400W equivalent	300562.580	6265487.32	10.5	4.5	SINGLE	REXEL	400	33	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING TO BE REMOVED
98	Rexel Optispan 400W equivalent	300581.790	6265511.29	10.5	4.5	SINGLE	REXEL	400	215	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING TO BE REMOVED
99	Rexel Optispan 400W equivalent	300547.360	6265515.34	10.5	4.5	SINGLE	REXEL	400	24	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING TO BE REMOVED
100	Roadster S400C - 98382	300552.470	6265560.15	10.5	4.5	SINGLE	REXEL	400	209	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING TO BE REMOVED
101	Roadster S400C - 98382	300521.100	6265569.01	10.5	4.5	SINGLE	SYLVANIA-SCHREDER	400	25	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING TO BE REMOVED
102	Rexel Optispan 400W equivalent	300487.630	6265635.39	10.5	4.5	SINGLE	REXEL	400	26	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING TO BE REMOVED
103	Rexel Optispan 400W equivalent	300494.120	6265677.62	10.5	4.5	SINGLE	REXEL	400	204	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING TO BE REMOVED
104	Rexel Optispan 400W equivalent	300456.480	6265701.36	10.5	4.5	SINGLE	REXEL	400	26	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING TO BE REMOVED
105	Roadster S400C - 98382	300477.050	6265712.43	10.5	4.5	SINGLE	SYLVANIA-SCHREDER	400	204	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING TO BE REMOVED
106	Rexel Optispan 400W equivalent	300424.920	6265767.1	10.5	4.5	SINGLE	REXEL	400	27	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING TO BE REMOVED
107	Rexel Optispan 400W equivalent	300444.680	6265778.35	10.5	4.5	SINGLE	REXEL	400	206	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING TO BE REMOVED
108	Rexel Optispan 400W equivalent	300427.070	6265809.67	10.5	4.5	SINGLE	REXEL	400	208	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING TO BE REMOVED
109	Rexel Optispan 400W equivalent	300391.790	6265828.56	10.5	4.5	SINGLE	REXEL	400	28	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING TO BE REMOVED
110	Roadster S400C - 98382	300365.760	6265865.74	10.5	4.5	SINGLE	SYLVANIA-SCHREDER	400	28	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING TO BE REMOVED
111	Roadster S400C - 98382	300390.530	6265877.43	10.5	4.5	SINGLE	SYLVANIA-SCHREDER	400	209	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING TO BE REMOVED
112	Roadster S400C - 98382	300345.200	6265900.65	10.5	4.5	SINGLE	SYLVANIA-SCHREDER	400	28	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING TO BE REMOVED
113	Roadster S400C - 98382	300319.240	6265951.21	10.5	4.5	SINGLE	SYLVANIA-SCHREDER	400	22	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING TO BE REMOVED
114	Roadster S400C - 98382	300297.160	6266006.14	10.5	4.5	SINGLE	SYLVANIA-SCHREDER	400	17	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING TO BE REMOVED

LIGHTING SCHEDULE															
LOCATION							LUMINAIRE				POLE AND FOOTING TYPE				
POLE NO	MODEL	EASTING	NORTHING	MOUNTING HEIGHT (m)	OUTREACH (m)	ARRANGEMENT	MANUFACTURER	WATTAGE	ORIENT	TILT	FOUNDATION TYPE	POLE TYPE	PRODUCT NUMBER	ASSET OWNER	STATUS
115	Roadster S400C - 98382	300283.610	6266051.21	10.5	4.5	SINGLE	SYLVANIA-SCHREDER	400	17	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING TO BE REMOVED
116	Roadster S400C - 98382	300269.740	6266121.42	10.5	4.5	SINGLE	SYLVANIA-SCHREDER	400	9	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING TO BE REMOVED

Luminaire Demand Schedule					
Proposed Luminaire Model	Qty	LLF	Lumens	Luminaire Watts	Total Watts
ATS VLED 290W 3k	7	0.8	31264	284	1988
RoadLED 205W 3k Aero	23	0.8	25001	205	4715
StreetLED3 24W 3K Aero	2	0.8	3337	24.4	48.8
Total Load Demand for proposed new streetlights				6751.8	

Aurecon Australia`

RESULTS FOR RUNNING SAASTAN WITH NOMINATED SPACINGS
[AUSTRALIA MODE]

Job name: Richmond Rd. Lighting Layout

Luminaire Reference Number: 4111
Luminaire Description: V290WT5FT-3000K
Lamp Wattage & Type: 31265 lms
Light Source: LED
Stores Code: Luminous Flux: 31.26 Klms
Upcast Angle: 5 Degrees Arrangement: 4 Single-Opposite
Mounting Height: 12 m Maintenance Factor: 0.8
Overhang 1st Row: 4 m Overhang 2nd Row:-26 m
Outreach Size: 4.5 Outreach Size: 4.5
Road Surface: CIE R3
Traffic Flow: One Way ---->

Lighting Category: V3

Carriageway Width: 20 m

Spacing (m)	Traffic Direct- ion	Lbar (>=0.75) or(>=0.83)	Uo (>=0.33) (>=0.31)	Ul (>=0.5) "	UWLR (=<3) "	TI (=<20) "	Es1 (>=50) "	Es2 (>=50) "	Comply with V3
50.00	Normal	1.21	0.51	0.80	.10	14.89	77.17	93.36	YES
51.00	Normal	1.19	0.50	0.79	.10	14.98	77.44	93.34	YES
52.00	Normal	1.16	0.50	0.77	.10	15.06	77.35	93.34	YES
53.00	Normal	1.14	0.50	0.76	.10	15.14	77.30	93.38	YES
54.00	Normal	1.12	0.50	0.75	.10	15.22	77.24	93.34	YES
55.00	Normal	1.10	0.50	0.74	.10	15.33	77.17	93.36	YES

Lighting Category: V3

Carriageway Width: 21 m

Spacing (m)	Traffic Direct- ion	Lbar (>=0.75) or(>=0.83)	Uo (>=0.33) (>=0.31)	Ul (>=0.5) "	UWLR (=<3) "	TI (=<20) "	Es1 (>=50) "	Es2 (>=50) "	Comply with V3
50.00	Normal	1.18	0.50	0.80	.10	14.81	77.18	93.88	YES
51.00	Normal	1.15	0.49	0.79	.10	14.90	77.45	93.87	YES
52.00	Normal	1.13	0.49	0.77	.10	14.98	77.37	93.86	YES
53.00	Normal	1.11	0.48	0.77	.10	15.06	77.32	93.87	YES
54.00	Normal	1.09	0.48	0.76	.10	15.14	77.26	93.84	YES
55.00	Normal	1.07	0.48	0.74	.10	15.24	77.19	93.88	YES

Lighting Category: V3

Carriageway Width: 22 m

Spacing (m)	Traffic Direct- ion	Lbar (>=0.75) or(>=0.83)	Uo (>=0.33) (>=0.31)	Ul (>=0.5) "	UWLR (=<3) "	TI (=<20) "	Es1 (>=50) "	Es2 (>=50) "	Comply with V3
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50.00	Normal	1.15	0.49	0.79	.10	14.70	77.19	94.69	YES
51.00	Normal	1.12	0.48	0.79	.10	14.78	77.45	94.69	YES
52.00	Normal	1.10	0.48	0.77	.10	14.86	77.37	94.74	YES
53.00	Normal	1.08	0.47	0.76	.10	14.94	77.33	94.73	YES
54.00	Normal	1.06	0.47	0.76	.10	15.02	77.27	94.71	YES
55.00	Normal	1.04	0.47	0.75	.10	15.13	77.20	94.69	YES

Lighting Category: V3

Carriageway Width: 23 m

Spacing (m)	Traffic Direct- ion	Lbar (≥ 0.75) or(≥ 0.83)	Uo (≥ 0.33) (≥ 0.31)	Ul (≥ 0.5) "	UWLR (≤ 3) "	TI (≤ 20) "	Es1 (≥ 50) "	Es2 (≥ 50) "	Comply with V3
50.00	Normal	1.12	0.48	0.79	.10	14.57	77.20	95.41	YES
51.00	Normal	1.09	0.47	0.78	.10	14.64	77.45	95.50	YES
52.00	Normal	1.07	0.48	0.76	.10	14.72	77.37	95.49	YES
53.00	Normal	1.06	0.45	0.76	.10	14.80	77.33	95.40	YES
54.00	Normal	1.04	0.46	0.75	.10	14.88	77.28	95.42	YES
55.00	Normal	1.02	0.46	0.74	.10	14.98	77.20	95.41	YES

Lighting Category: V3

Carriageway Width: 24 m

Spacing (m)	Traffic Direct- ion	Lbar (≥ 0.75) or(≥ 0.83)	Uo (≥ 0.33) (≥ 0.31)	Ul (≥ 0.5) "	UWLR (≤ 3) "	TI (≤ 20) "	Es1 (≥ 50) "	Es2 (≥ 50) "	Comply with V3
50.00	Normal	1.09	0.47	0.79	.10	14.42	77.20	95.91	YES
51.00	Normal	1.07	0.47	0.78	.10	14.51	77.45	96.02	YES
52.00	Normal	1.05	0.47	0.76	.10	14.57	77.37	96.04	YES
53.00	Normal	1.03	0.44	0.76	.10	14.65	77.33	95.91	YES
54.00	Normal	1.01	0.44	0.75	.10	14.73	77.27	95.94	YES
55.00	Normal	.99	0.45	0.73	.10	14.82	77.21	95.91	YES

Lighting Category: V3

Carriageway Width: 25 m

Spacing (m)	Traffic Direct- ion	Lbar (≥ 0.75) or(≥ 0.83)	Uo (≥ 0.33) (≥ 0.31)	Ul (≥ 0.5) "	UWLR (≤ 3) "	TI (≤ 20) "	Es1 (≥ 50) "	Es2 (≥ 50) "	Comply with V3
50.00	Normal	1.06	0.46	0.78	.10	14.26	77.19	96.40	YES
51.00	Normal	1.04	0.46	0.77	.10	14.34	77.45	96.43	YES
52.00	Normal	1.02	0.46	0.76	.10	14.40	77.37	96.41	YES
53.00	Normal	1.00	0.43	0.75	.10	14.48	77.32	96.31	YES
54.00	Normal	.99	0.43	0.74	.10	14.56	77.27	96.36	YES
55.00	Normal	.97	0.43	0.73	.10	14.65	77.20	96.40	YES

NOTES: 1) Where 'Normal' &/or 'Oncoming' lines are shown, compliance with the nominated Category, at a particular spacing, is only applicable when there is a 'Yes' on each line i.e. ANY 'No' indicates failure at that spacing.
2) Calculations use the original SAASTAN software

Aurecon Australia`

RESULTS FOR RUNNING SAASTAN WITH NOMINATED SPACINGS
[AUSTRALIA MODE]

Job name: Richmond Rd. Lighting Layout

Luminaire Reference Number: 4111
Luminaire Description: V290WT5FT-3000K
Lamp Wattage & Type: 31265 lms
Light Source: LED
Stores Code: Luminous Flux: 31.26 Klms
Upcast Angle: 5 Degrees Arrangement: 4 Single-Opposite
Mounting Height: 12 m Maintenance Factor: 0.8
Overhang 1st Row:-0.5 m Overhang 2nd Row:-35 m
Outreach Size: 4.5 Outreach Size: 4.5
Road Surface: CIE R3
Traffic Flow: One Way ---->

Lighting Category: V3

Carriageway Width: 9 m

Spacing (m)	Traffic Direct- ion	Lbar (>=0.75) or(>=0.83)	Uo (>=0.33) (>=0.31)	Ul (>=0.5) "	UWLR (=<3) "	TI (=<20) "	Es1 (>=50) "	Es2 (>=50) "	Comply with V3
65.00	Normal	1.12	0.46	0.62	.10	14.59	91.36	89.80	YES
66.00	Normal	1.10	0.46	0.60	.10	14.58	91.23	89.73	YES
67.00	Normal	1.09	0.46	0.59	.10	14.67	91.24	89.73	YES
68.00	Normal	1.07	0.46	0.58	.10	14.77	91.29	89.90	YES
69.00	Normal	1.06	0.46	0.58	.10	15.02	91.35	89.88	YES
70.00	Normal	1.04	0.46	0.57	.10	15.14	91.36	89.80	YES

Lighting Category: V3

Carriageway Width: 10 m

Spacing (m)	Traffic Direct- ion	Lbar (>=0.75) or(>=0.83)	Uo (>=0.33) (>=0.31)	Ul (>=0.5) "	UWLR (=<3) "	TI (=<20) "	Es1 (>=50) "	Es2 (>=50) "	Comply with V3
65.00	Normal	1.07	0.45	0.63	.10	14.73	91.41	91.52	YES
66.00	Normal	1.06	0.45	0.62	.10	14.83	91.28	91.52	YES
67.00	Normal	1.04	0.45	0.61	.10	14.81	91.30	91.53	YES
68.00	Normal	1.03	0.45	0.60	.10	14.91	91.34	91.67	YES
69.00	Normal	1.01	0.45	0.59	.10	15.16	91.40	91.63	YES
70.00	Normal	1.00	0.45	0.59	.10	15.29	91.41	91.52	YES

NOTES: 1) Where 'Normal' &/or 'Oncoming' lines are shown, compliance with the nominated Category, at a particular spacing, is only applicable when there is a 'Yes' on each line i.e. ANY 'No' indicates failure at that spacing.
2) Calculations use the original SAASTAN software

Aurecon Australia`

RESULTS FOR RUNNING SAASTAN WITH NOMINATED SPACINGS
[AUSTRALIA MODE]

Job name: Richmond Rd. Lighting Layout

Luminaire Reference Number: 8111
Luminaire Description: RoadLED 205W 3K Aero
Lamp Wattage & Type: - use 25001 lms
Light Source: LED
Stores Code: Luminous Flux: 25.001 Klms
Upcast Angle: 5 Degrees Arrangement: 4 Single-Opposite
Mounting Height: 10.5 m Maintenance Factor: 0.8
Overhang 1st Row:-1 m Overhang 2nd Row:-23 m
Outreach Size: 4.5 Outreach Size: 4.5
Road Surface: CIE R3
Traffic Flow: One Way ---->

Lighting Category: V3

Carriageway Width: 10 m

Spacing (m)	Traffic Direct- ion	Lbar (≥ 0.75) or(≥ 0.83)	Uo (≥ 0.33) (≥ 0.31)	U1 (≥ 0.5) "	UWLR (≤ 3) "	TI (≤ 20) "	Es1 (≥ 50) "	Es2 (≥ 50) "	Comply with V3
65.00	Normal	1.04	0.43	0.72	.03	14.08	103.92	88.34	YES
66.00	Normal	1.03	0.44	0.70	.03	14.16	103.90	88.37	YES
67.00	Normal	1.01	0.44	0.69	.03	14.26	103.91	88.31	YES
68.00	Normal	1.00	0.44	0.68	.03	14.34	103.90	88.32	YES
69.00	Normal	.98	0.44	0.67	.03	14.41	103.92	88.36	YES
70.00	Normal	.97	0.43	0.65	.03	14.50	103.92	88.34	YES
71.00	Normal	.96	0.43	0.64	.03	14.58	103.93	88.35	YES
72.00	Normal	.94	0.43	0.63	.03	14.67	103.91	88.32	YES
73.00	Normal	.93	0.43	0.61	.03	14.76	103.91	88.35	YES
74.00	Normal	.92	0.43	0.59	.03	14.87	103.92	88.36	YES
75.00	Normal	.90	0.42	0.58	.03	14.96	103.92	88.34	YES

Lighting Category: V3

Carriageway Width: 11 m

Spacing (m)	Traffic Direct- ion	Lbar (≥ 0.75) or(≥ 0.83)	Uo (≥ 0.33) (≥ 0.31)	U1 (≥ 0.5) "	UWLR (≤ 3) "	TI (≤ 20) "	Es1 (≥ 50) "	Es2 (≥ 50) "	Comply with V3
65.00	Normal	1.00	0.42	0.71	.03	13.72	104.07	87.89	YES
66.00	Normal	.99	0.43	0.70	.03	13.79	104.05	87.89	YES
67.00	Normal	.97	0.43	0.70	.03	13.89	104.07	87.86	YES
68.00	Normal	.95	0.43	0.69	.03	13.96	104.06	87.86	YES
69.00	Normal	.94	0.43	0.68	.03	14.03	104.08	87.91	YES
70.00	Normal	.93	0.43	0.67	.03	14.11	104.07	87.89	YES
71.00	Normal	.91	0.43	0.65	.03	14.19	104.09	87.87	YES
72.00	Normal	.90	0.43	0.65	.03	14.29	104.07	87.87	YES

73.00	Normal	.89	0.43	0.63	.03	14.36	104.07	87.89	YES
74.00	Normal	.88	0.43	0.62	.03	14.47	104.08	87.91	YES
75.00	Normal	.86	0.42	0.60	.03	14.55	104.07	87.89	YES

Lighting Category: V3

Carriageway Width: 12 m

Spacing (m)	Traffic Direct- ion	Lbar (≥ 0.75) or(≥ 0.83)	Uo (≥ 0.33) (≥ 0.31)	Ul (≥ 0.5) "	UWLR (≤ 3) "	TI (≤ 20) "	Es1 (≥ 50) "	Es2 (≥ 50) "	Comply with V3
=====									
65.00	Normal	.96	0.42	0.70	.03	13.38	104.20	87.42	YES
66.00	Normal	.95	0.42	0.69	.03	13.45	104.19	87.18	YES
67.00	Normal	.93	0.42	0.69	.03	13.54	104.20	87.36	YES
68.00	Normal	.92	0.42	0.68	.03	13.61	104.19	87.36	YES
69.00	Normal	.90	0.42	0.67	.03	13.68	104.21	87.43	YES
70.00	Normal	.89	0.42	0.66	.03	13.75	104.20	87.43	YES
71.00	Normal	.88	0.42	0.65	.03	13.83	104.22	87.18	YES
72.00	Normal	.86	0.42	0.65	.03	13.92	104.20	87.37	YES
73.00	Normal	.85	0.42	0.63	.03	13.99	104.20	87.40	YES
74.00	Normal	.84	0.42	0.61	.03	14.07	104.21	87.43	YES
75.00	Normal	.83	0.42	0.60	.03	14.17	104.20	87.43	YES

Lighting Category: V3

Carriageway Width: 13 m

Spacing (m)	Traffic Direct- ion	Lbar (≥ 0.75) or(≥ 0.83)	Uo (≥ 0.33) (≥ 0.31)	Ul (≥ 0.5) "	UWLR (≤ 3) "	TI (≤ 20) "	Es1 (≥ 50) "	Es2 (≥ 50) "	Comply with V3
=====									
65.00	Normal	.92	0.40	0.69	.03	12.99	104.30	86.94	YES
66.00	Normal	.91	0.40	0.68	.03	13.08	104.27	86.69	YES
67.00	Normal	.89	0.41	0.68	.03	13.16	104.31	86.88	YES
68.00	Normal	.88	0.41	0.67	.03	13.23	104.30	86.89	YES
69.00	Normal	.87	0.41	0.66	.03	13.29	104.31	86.95	YES
70.00	Normal	.86	0.41	0.66	.03	13.36	104.30	86.95	YES
71.00	Normal	.84	0.41	0.65	.03	13.44	104.30	86.70	YES
72.00	Normal	.83	0.41	0.64	.03	13.52	104.30	86.90	YES
73.00	Normal	.82	0.41	0.63	.03	13.59	104.31	86.93	YES
74.00	Normal	.81	0.41	0.61	.03	13.66	104.31	86.95	YES
75.00	Normal	.80	0.41	0.60	.03	13.76	104.30	86.95	YES

Lighting Category: V3

Carriageway Width: 14 m

Spacing (m)	Traffic Direct- ion	Lbar (≥ 0.75) or(≥ 0.83)	Uo (≥ 0.33) (≥ 0.31)	Ul (≥ 0.5) "	UWLR (≤ 3) "	TI (≤ 20) "	Es1 (≥ 50) "	Es2 (≥ 50) "	Comply with V3
=====									
65.00	Normal	.89	0.39	0.68	.03	12.60	104.39	86.65	YES
66.00	Normal	.87	0.39	0.67	.03	12.67	104.33	86.46	YES
67.00	Normal	.86	0.40	0.67	.03	12.75	104.36	86.60	YES
68.00	Normal	.85	0.40	0.66	.03	12.83	104.37	86.60	YES
69.00	Normal	.84	0.40	0.66	.03	12.89	104.39	86.64	YES
70.00	Normal	.82	0.40	0.65	.03	12.96	104.39	86.65	YES
71.00	Normal	.81	0.38	0.64	.03	13.03	104.37	86.47	YES
72.00	Normal	.80	0.39	0.63	.03	13.11	104.36	86.61	YES

73.00	Normal	.79	0.39	0.62	.03	13.18	104.37	86.63	YES
74.00	Normal	.78	0.40	0.61	.03	13.24	104.39	86.64	YES
75.00	Normal	.77	0.40	0.60	.03	13.33	104.39	86.65	YES

Lighting Category: V3

Carriageway Width: 15 m

Spacing (m)	Traffic Direct- ion	Lbar (≥ 0.75) or(≥ 0.83)	Uo (≥ 0.33) (≥ 0.31)	U1 (≥ 0.5) "	UWLR (≤ 3) "	TI (≤ 20) "	Es1 (≥ 50) "	Es2 (≥ 50) "	Comply with V3
=====									
65.00	Normal	.86	0.38	0.69	.03	12.21	104.44	86.63	YES
66.00	Normal	.84	0.38	0.68	.03	12.27	104.38	86.62	YES
67.00	Normal	.83	0.39	0.67	.03	12.35	104.41	86.62	YES
68.00	Normal	.82	0.39	0.66	.03	12.41	104.42	86.61	YES
69.00	Normal	.80	0.39	0.66	.03	12.47	104.44	86.64	YES
70.00	Normal	.79	0.39	0.65	.03	12.54	104.44	86.64	YES
71.00	Normal	.78	0.35	0.64	.03	12.62	104.41	86.63	YES
72.00	Normal	.77	0.35	0.63	.03	12.69	104.41	86.63	YES
73.00	Normal	.76	0.36	0.62	.03	12.75	104.42	86.64	YES
74.00	Normal	.75	0.36	0.61	.03	12.81	104.43	86.64	YES
75.00	Normal	.74	0.37	0.60	.03	12.87	104.44	86.64	NO

Lighting Category: V3

Carriageway Width: 16 m

Spacing (m)	Traffic Direct- ion	Lbar (≥ 0.75) or(≥ 0.83)	Uo (≥ 0.33) (≥ 0.31)	U1 (≥ 0.5) "	UWLR (≤ 3) "	TI (≤ 20) "	Es1 (≥ 50) "	Es2 (≥ 50) "	Comply with V3
=====									
65.00	Normal	.83	0.35	0.70	.03	11.85	104.48	86.96	YES
66.00	Normal	.81	0.36	0.70	.03	11.91	104.43	86.95	YES
67.00	Normal	.80	0.36	0.69	.03	11.98	104.45	86.95	YES
68.00	Normal	.79	0.36	0.68	.03	12.04	104.45	86.92	YES
69.00	Normal	.78	0.36	0.67	.03	12.09	104.47	86.96	YES
70.00	Normal	.77	0.31	0.66	.03	12.15	104.48	86.96	NO
71.00	Normal	.75	0.31	0.64	.03	12.24	104.46	86.94	NO
72.00	Normal	.74	0.32	0.63	.03	12.31	104.45	86.96	NO
73.00	Normal	.73	0.32	0.62	.03	12.37	104.45	86.96	NO
74.00	Normal	.72	0.32	0.61	.03	12.42	104.47	86.96	NO
75.00	Normal	.71	0.32	0.60	.03	12.48	104.48	86.96	NO

Lighting Category: V3

Carriageway Width: 17 m

Spacing (m)	Traffic Direct- ion	Lbar (≥ 0.75) or(≥ 0.83)	Uo (≥ 0.33) (≥ 0.31)	U1 (≥ 0.5) "	UWLR (≤ 3) "	TI (≤ 20) "	Es1 (≥ 50) "	Es2 (≥ 50) "	Comply with V3
=====									
65.00	Normal	.80	0.33	0.70	.03	11.44	104.50	87.62	YES
66.00	Normal	.78	0.34	0.71	.03	11.50	104.47	87.56	YES
67.00	Normal	.77	0.34	0.71	.03	11.56	104.49	87.59	YES
68.00	Normal	.76	0.34	0.70	.03	11.61	104.49	87.56	YES
69.00	Normal	.75	0.34	0.69	.03	11.66	104.50	87.61	YES
70.00	Normal	.74	0.28	0.68	.03	11.72	104.50	87.62	NO
71.00	Normal	.73	0.30	0.66	.03	11.78	104.50	87.56	NO
72.00	Normal	.72	0.30	0.65	.03	11.85	104.49	87.60	NO

73.00	Normal	.71	0.29	0.63	.03	11.92	104.50	87.61	NO
74.00	Normal	.70	0.30	0.62	.03	11.98	104.50	87.61	NO
75.00	Normal	.69	0.30	0.61	.03	12.04	104.50	87.63	NO

=====

NOTES: 1) Where 'Normal' &/or 'Oncoming' lines are shown, compliance with the nominated Category, at a particular spacing, is only applicable when there is a 'Yes' on each line i.e. ANY 'No' indicates failure at that spacing.

2) Calculations use the original SAASTAN software

PleVcat - Vers 5.09 (Built: 10/ 4/13) Run: 22/ 4/2026 at 09:32:04

Aurecon Australia`

RESULTS FOR RUNNING SAASTAN WITH NOMINATED SPACINGS
[AUSTRALIA MODE]

Job name: Richmond Rd. Lighting Layout

Luminaire Reference Number: 8111
Luminaire Description: RoadLED 205W 3K Aero
Lamp Wattage & Type: - use 25001 lms
Light Source: LED
Stores Code: Luminous Flux: 25.001 Klms
Upcast Angle: 5 Degrees Arrangement: 4 Single-Opposite
Mounting Height: 10.5 m Maintenance Factor: 0.8
Overhang 1st Row:-1 m Overhang 2nd Row:-32 m
Outreach Size: 4.5 Outreach Size: 4.5
Road Surface: CIE R3
Traffic Flow: One Way ---->

Lighting Category: V3

Carriageway Width: 7 m

Spacing (m)	Traffic Direct- ion	Lbar (≥ 0.75) or(≥ 0.83)	Uo (≥ 0.33) (≥ 0.31)	U1 (≥ 0.5) "	UWLR (≤ 3) "	TI (≤ 20) "	Es1 (≥ 50) "	Es2 (≥ 50) "	Comply with V3
65.00	Normal	1.17	0.43	0.68	.03	14.44	104.48	80.21	YES
66.00	Normal	1.15	0.42	0.67	.03	14.51	104.43	80.25	YES
67.00	Normal	1.13	0.42	0.66	.03	14.64	104.45	80.28	YES
68.00	Normal	1.12	0.42	0.64	.03	14.74	104.45	80.26	YES
69.00	Normal	1.10	0.41	0.62	.03	14.84	104.47	80.25	YES
70.00	Normal	1.08	0.41	0.60	.03	14.95	104.48	80.22	YES
71.00	Normal	1.07	0.40	0.58	.03	15.04	104.46	80.27	YES
72.00	Normal	1.05	0.40	0.56	.03	15.17	104.45	80.27	YES
73.00	Normal	1.04	0.39	0.55	.03	15.28	104.45	80.26	YES
74.00	Normal	1.02	0.38	0.53	.03	15.38	104.47	80.25	YES
75.00	Normal	1.01	0.38	0.52	.03	15.49	104.48	80.22	YES

Lighting Category: V3

Carriageway Width: 8 m

Spacing (m)	Traffic Direct- ion	Lbar (≥ 0.75) or(≥ 0.83)	Uo (≥ 0.33) (≥ 0.31)	U1 (≥ 0.5) "	UWLR (≤ 3) "	TI (≤ 20) "	Es1 (≥ 50) "	Es2 (≥ 50) "	Comply with V3
65.00	Normal	1.11	0.41	0.70	.03	14.36	104.50	80.50	YES
66.00	Normal	1.09	0.41	0.69	.03	14.44	104.47	80.50	YES
67.00	Normal	1.07	0.41	0.67	.03	14.56	104.49	80.51	YES
68.00	Normal	1.06	0.41	0.65	.03	14.66	104.49	80.53	YES
69.00	Normal	1.04	0.40	0.63	.03	14.76	104.50	80.53	YES
70.00	Normal	1.03	0.40	0.61	.03	14.86	104.50	80.50	YES
71.00	Normal	1.01	0.39	0.59	.03	14.95	104.50	80.51	YES
72.00	Normal	1.00	0.39	0.57	.03	15.10	104.49	80.52	YES

73.00	Normal	.98	0.38	0.56	.03	15.21	104.50	80.53	YES
74.00	Normal	.97	0.38	0.54	.03	15.31	104.50	80.53	YES
75.00	Normal	.96	0.38	0.53	.03	15.41	104.50	80.50	YES

Lighting Category: V3

Carriageway Width: 9 m

Spacing (m)	Traffic Direct- ion	Lbar (≥ 0.75) or(≥ 0.83)	Uo (≥ 0.33) (≥ 0.31)	U1 (≥ 0.5) "	UWLR (≤ 3) "	TI (≤ 20) "	Es1 (≥ 50) "	Es2 (≥ 50) "	Comply with V3
65.00	Normal	1.06	0.38	0.70	.03	14.21	104.54	80.09	YES
66.00	Normal	1.04	0.39	0.69	.03	14.29	104.51	80.21	YES
67.00	Normal	1.02	0.39	0.68	.03	14.41	104.53	80.11	YES
68.00	Normal	1.01	0.39	0.66	.03	14.49	104.53	80.14	YES
69.00	Normal	.99	0.39	0.65	.03	14.59	104.54	80.14	YES
70.00	Normal	.98	0.38	0.62	.03	14.69	104.54	80.09	YES
71.00	Normal	.97	0.38	0.60	.03	14.78	104.54	80.20	YES
72.00	Normal	.95	0.38	0.59	.03	14.90	104.52	80.12	YES
73.00	Normal	.94	0.38	0.57	.03	15.00	104.53	80.14	YES
74.00	Normal	.92	0.37	0.55	.03	15.10	104.54	80.14	YES
75.00	Normal	.91	0.37	0.54	.03	15.21	104.54	80.10	YES

Lighting Category: V3

Carriageway Width: 10 m

Spacing (m)	Traffic Direct- ion	Lbar (≥ 0.75) or(≥ 0.83)	Uo (≥ 0.33) (≥ 0.31)	U1 (≥ 0.5) "	UWLR (≤ 3) "	TI (≤ 20) "	Es1 (≥ 50) "	Es2 (≥ 50) "	Comply with V3
65.00	Normal	1.01	0.36	0.70	.03	13.96	104.57	79.14	YES
66.00	Normal	.99	0.37	0.68	.03	14.04	104.53	79.25	YES
67.00	Normal	.98	0.37	0.68	.03	14.15	104.56	79.14	YES
68.00	Normal	.96	0.37	0.67	.03	14.25	104.56	79.17	YES
69.00	Normal	.95	0.37	0.65	.03	14.32	104.57	79.18	YES
70.00	Normal	.94	0.37	0.63	.03	14.42	104.57	79.14	YES
71.00	Normal	.92	0.37	0.62	.03	14.51	104.56	79.24	YES
72.00	Normal	.91	0.37	0.61	.03	14.63	104.55	79.15	YES
73.00	Normal	.90	0.36	0.59	.03	14.73	104.56	79.17	YES
74.00	Normal	.88	0.36	0.57	.03	14.82	104.57	79.18	YES
75.00	Normal	.87	0.36	0.56	.03	14.92	104.57	79.14	YES

Lighting Category: V3

Carriageway Width: 11 m

Spacing (m)	Traffic Direct- ion	Lbar (≥ 0.75) or(≥ 0.83)	Uo (≥ 0.33) (≥ 0.31)	U1 (≥ 0.5) "	UWLR (≤ 3) "	TI (≤ 20) "	Es1 (≥ 50) "	Es2 (≥ 50) "	Comply with V3
65.00	Normal	.97	0.35	0.70	.03	13.59	104.60	77.88	YES
66.00	Normal	.95	0.35	0.69	.03	13.67	104.55	77.97	YES
67.00	Normal	.94	0.36	0.68	.03	13.77	104.58	77.89	YES
68.00	Normal	.92	0.35	0.67	.03	13.86	104.58	77.91	YES
69.00	Normal	.91	0.35	0.66	.03	13.94	104.60	77.94	YES
70.00	Normal	.90	0.35	0.65	.03	14.03	104.59	77.89	YES
71.00	Normal	.88	0.36	0.63	.03	14.11	104.59	77.96	YES
72.00	Normal	.87	0.36	0.63	.03	14.22	104.58	77.89	YES

73.00	Normal	.86	0.36	0.61	.03	14.31	104.59	77.91	YES
74.00	Normal	.85	0.35	0.59	.03	14.40	104.60	77.94	YES
75.00	Normal	.84	0.35	0.58	.03	14.49	104.59	77.89	YES

=====

NOTES: 1) Where 'Normal' &/or 'Oncoming' lines are shown, compliance with the nominated Category, at a particular spacing, is only applicable when there is a 'Yes' on each line i.e. ANY 'No' indicates failure at that spacing.

2) Calculations use the original SAASTAN software

PleVcat - Vers 5.09 (Built: 10/ 4/13) Run: 22/ 4/2026 at 09:34:57

Appendix I

Road Safety Audit

Refer section 4.2 of the design report

Appendix J

Authority Approvals

Walaa Salah Jassim Al-Hamran

From: Patel, Arpita <arpita.patel@valmont.com>
Sent: Thursday, 5 February 2026 9:50 AM
To: Walaa Salah Jassim Al-Hamran
Cc: Melvin Dale Torres; Mark Joseph Bermas; James Abraham
Subject: RE: Urgent – Technical Data Request for Endeavour Energy Impact Absorbing Columns
Attachments: GA2295 - IE45PCS32-86.pdf; GA616- IESL10IAR-3953-86.pdf; GA615 - IESL85IAR-3952-86.pdf

[External email] This email was sent from outside Aurecon. Do not click links or open attachments unless you were expecting the email and know that the content is safe.

Hi Walaa,

Please find enclosed drawings for the Endeavour Energy Impact Absorbing poles and curved outreach.

Thank you,

Kind Regards,
Arpita Patel
Internal Sales Coordinator



INGAL EPS

A Valmont Company
358 Cormack Road, Wingfield, SA 5014
PH: +61 8 8169 2350 OPT #2 | Email: arpita.patel@valmont.com

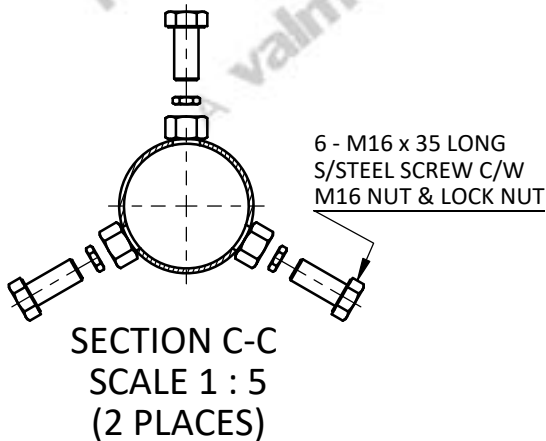
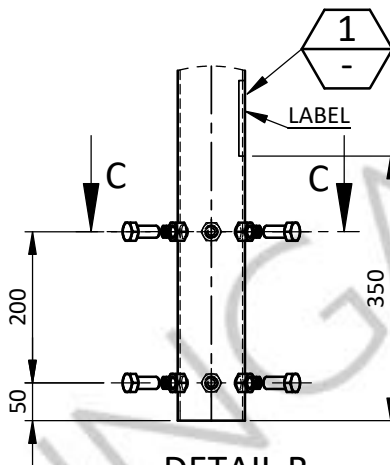
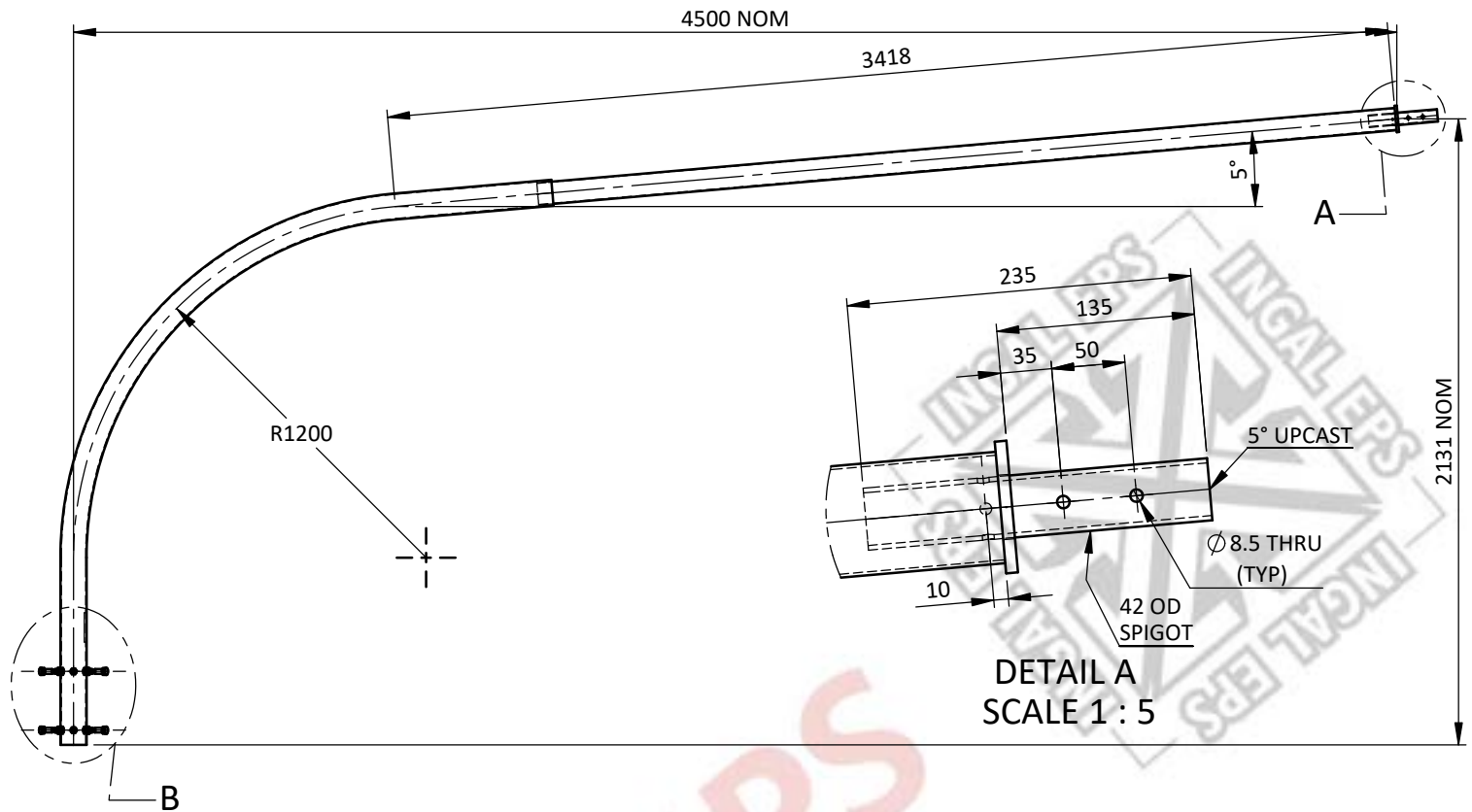
NOTE: Due to the Chinese New Year Holiday period, the deliver times for Orders from 22nd Dec 2025 to 23rd Feb 2026 will be 15-16 weeks from drawing approval.

Please send all sales enquiries and orders to your relevant state:

EPSQLDSales@valmont.com | EPSNSWSales@valmont.com
EPSVICSales@valmont.com | EPSSASales@valmont.com
EPSWASales@valmont.com | EPSNTSales@valmont.com

From: Walaa Salah Jassim Al-Hamran <Walaa.AlHamran@aurecongroup.com>
Sent: Wednesday, 4 February 2026 8:57 AM
To: Patel, Arpita <arpita.patel@valmont.com>
Cc: Melvin Dale Torres <MelvinDale.Torres@aurecongroup.com>; Mark Joseph Bermas <MarkJoseph.Bermas@aurecongroup.com>; James Abraham <James.Abraham@aurecongroup.com>
Subject: RE: Urgent – Technical Data Request for Endeavour Energy Impact Absorbing Columns

Hi Arpita,
I'm just following up on this. Could you also confirm whether these poles are approved by Endeavour Energy? given they are the asset owner in the area of works.



STOCK No. = GA2295

MAX. LOAD KN

TYPE No. = MAJOR

MANUF. DATE = MM/YY

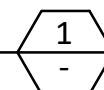
MASS kg = 36

HEIGHT REACH = 4.5 S



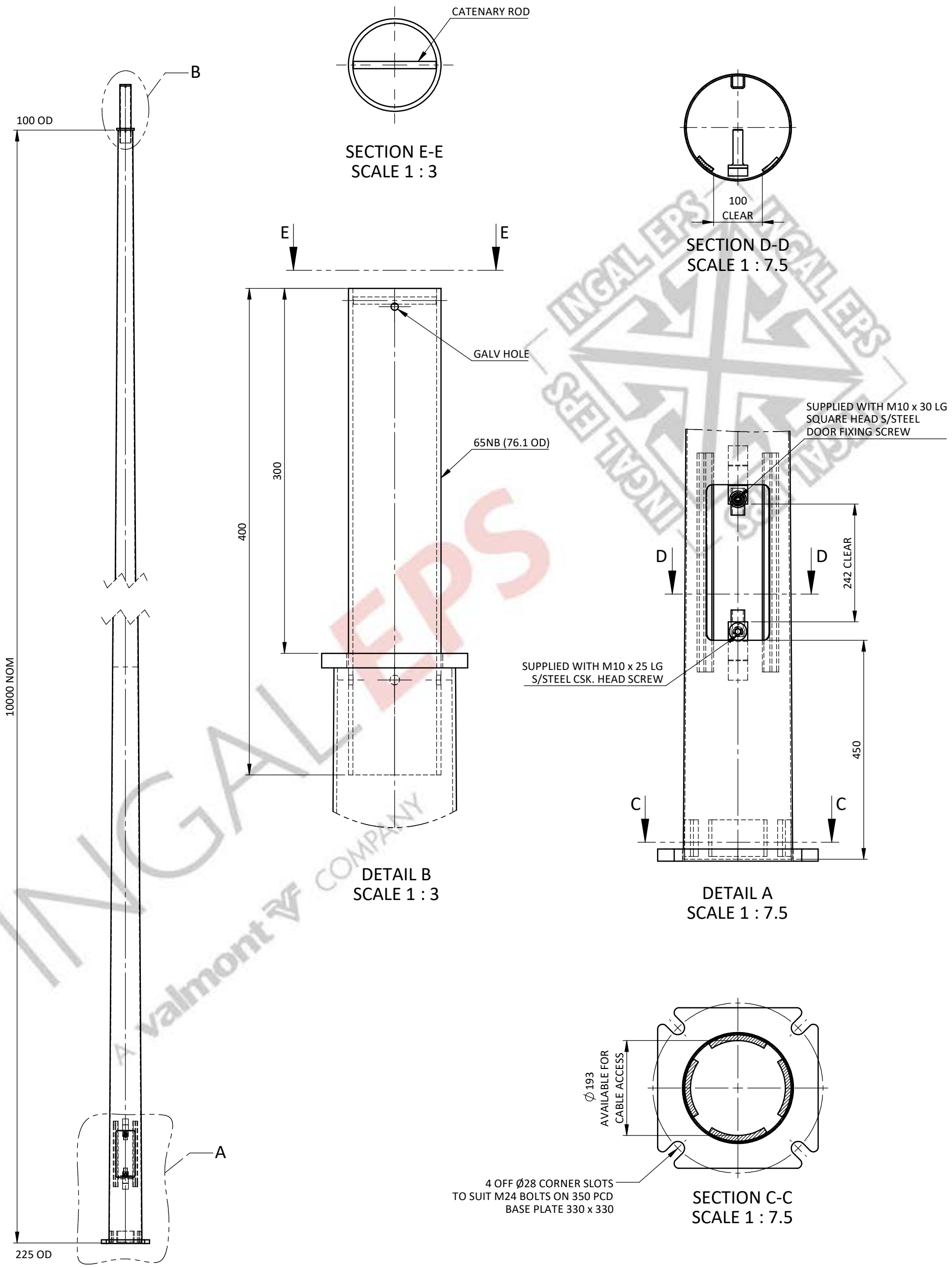
LABEL MARKING DETAILS
STAMP OR VIBRO-HETCH

DETAIL
SCALE 1:2



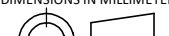
FOR ASSEMBLY & DETAIL REFER C41767Z / AD3109

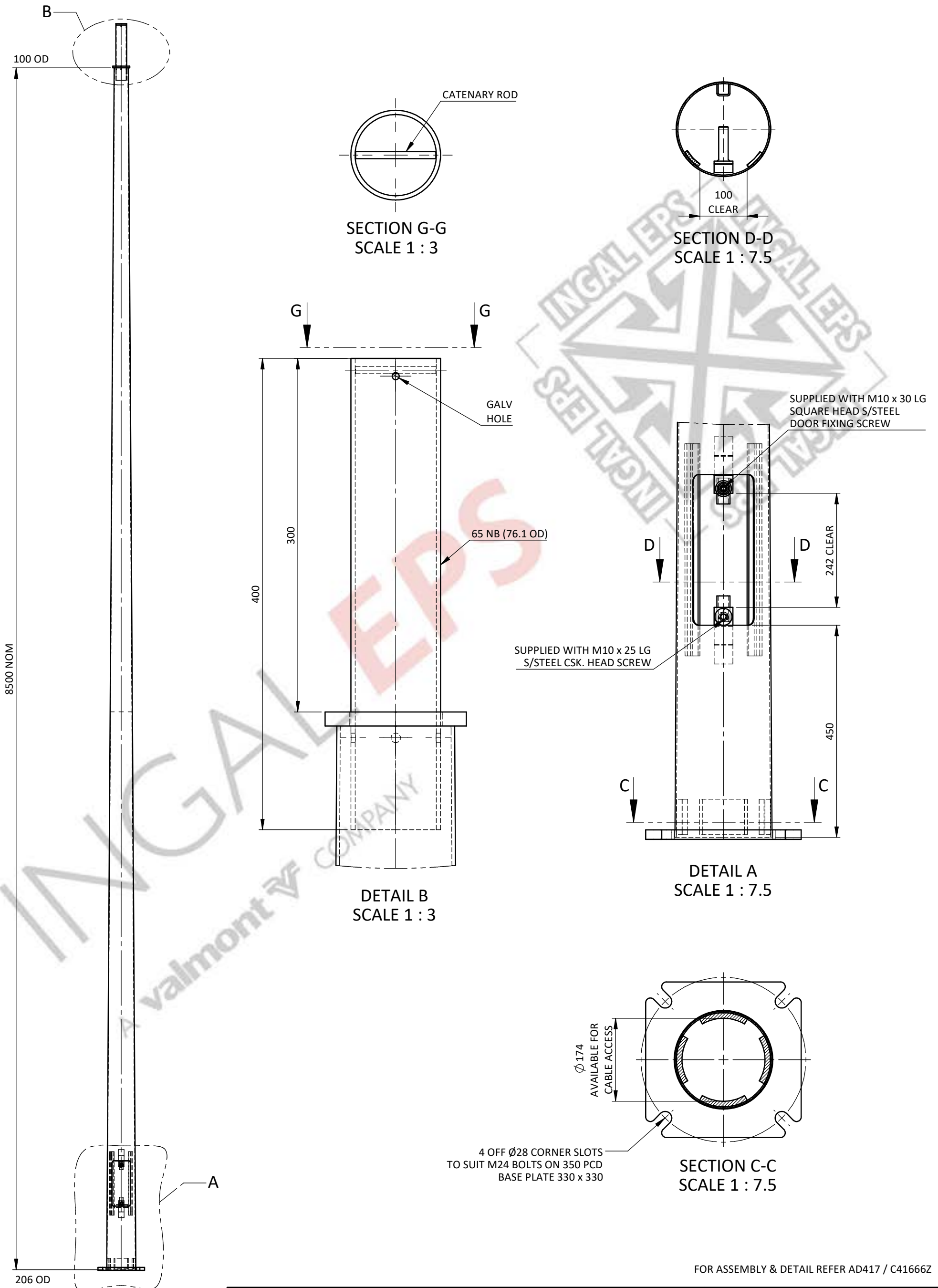
PRODUCT WEIGHT 36 kg	CUSTOMER APPROVAL DATE	COPYRIGHT THIS DOCUMENT PRODUCED BY INGAL EPS MUST NOT BE COPIED, TRACED, REPRODUCED, OR LENT WITHOUT WRITTEN CONSENT	INGAL EPS	PRODUCT NUMBER IE45PCS32-86																														
<table border="1"> <tr> <th>REV</th><th>DATE</th><th>DESCRIPTION</th><th>BY</th><th>CHKD</th></tr> <tr> <td>4</td><td>28/05/20</td><td>SPIGOT MODIFIED</td><td>FQT</td><td></td></tr> <tr> <td>3</td><td>07/10/14</td><td>LOCAL FABRICATION DRAWING No. ADDED</td><td>SKP</td><td>OT</td></tr> <tr> <td>2</td><td>29/04/14</td><td>FABRICATION DRAWING No. ADDED</td><td>SKP</td><td>OT</td></tr> <tr> <td>1</td><td>17/05/13</td><td>ISSUED FOR CONSTRUCTION</td><td>SKP</td><td>OT</td></tr> <tr> <td>0</td><td>21/04/08</td><td>ISSUED FOR CONSTRUCTION</td><td>SKP</td><td>CJJ</td></tr> </table>	REV	DATE	DESCRIPTION	BY	CHKD	4	28/05/20	SPIGOT MODIFIED	FQT		3	07/10/14	LOCAL FABRICATION DRAWING No. ADDED	SKP	OT	2	29/04/14	FABRICATION DRAWING No. ADDED	SKP	OT	1	17/05/13	ISSUED FOR CONSTRUCTION	SKP	OT	0	21/04/08	ISSUED FOR CONSTRUCTION	SKP	CJJ		DIMENSIONS IN MILLIMETERS DO NOT SCALE	GENERAL ARRANGEMENT OF 4.5m x 2.1m SINGLE PIPE OUTREACH WITH 42 OD x 135 LONG SPIGOT TO SUIT 76 OD x 300 LONG POLE TOP SPIGOT	DRAWING NUMBER GA2295 SHEET NUMBER SHEET 1 OF 1
REV	DATE	DESCRIPTION	BY	CHKD																														
4	28/05/20	SPIGOT MODIFIED	FQT																															
3	07/10/14	LOCAL FABRICATION DRAWING No. ADDED	SKP	OT																														
2	29/04/14	FABRICATION DRAWING No. ADDED	SKP	OT																														
1	17/05/13	ISSUED FOR CONSTRUCTION	SKP	OT																														
0	21/04/08	ISSUED FOR CONSTRUCTION	SKP	CJJ																														
CUSTOMER NAME / PROJECT ENDEAVOUR ENERGY / MAJOR ROAD OUTREACH	CHECKED BY CJJ	DATE 21/04/08	DATE 21/04/08	DRAWN BY S.K.PONNAMBATH																														
			SCALE 1:25	CAD FILE No. GA2295_DRG																														

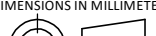


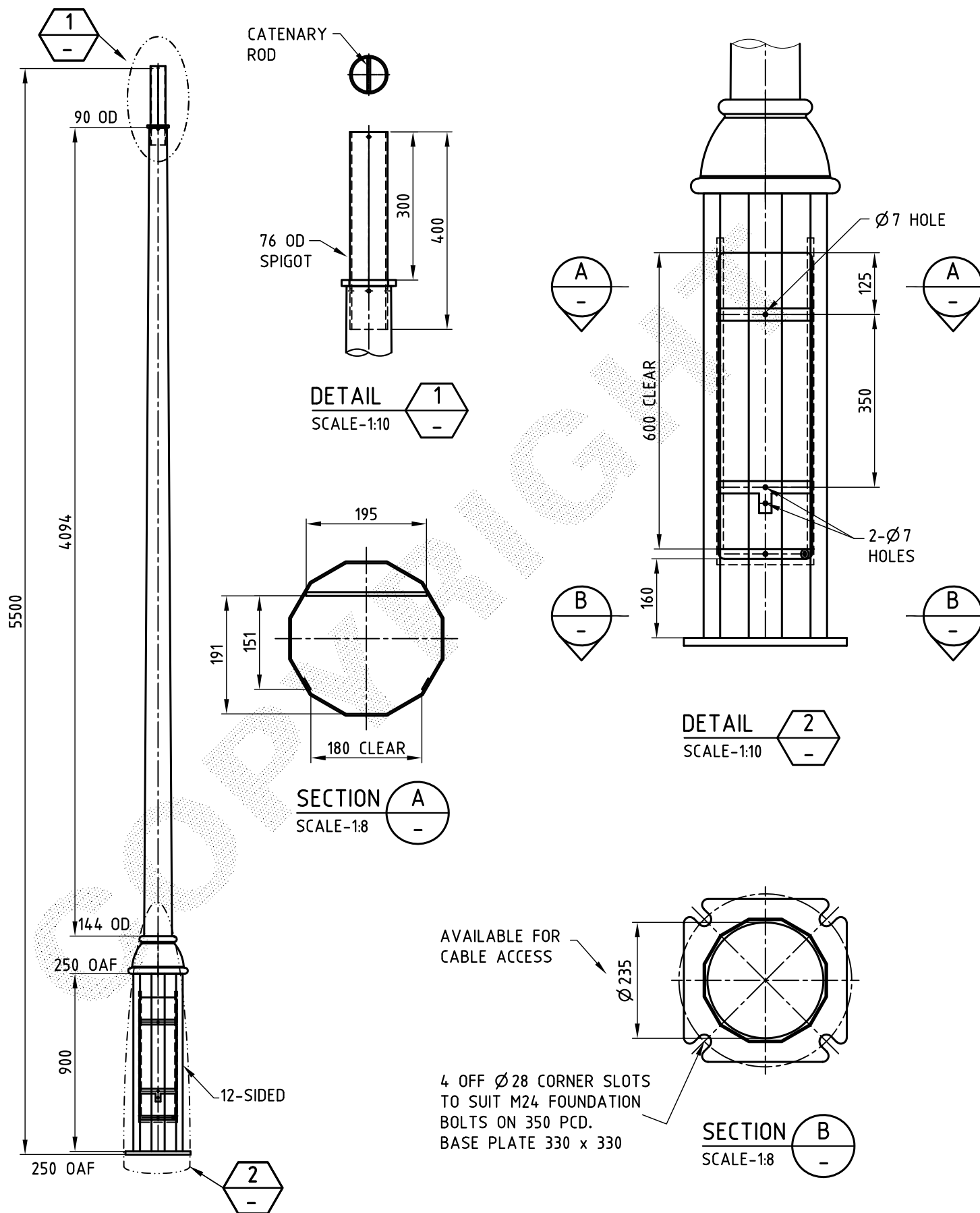
FOR ASSEMBLY & DETAIL REFER AD418 / C41825Z

FOR GENERAL NOTES APPLICABLE TO
THIS DRAWING REFER GA1

PRODUCT WEIGHT 145 kg		CUSTOMER APPROVAL				COPYRIGHT THIS DOCUMENT PRODUCED BY INGAL EPS MUST NOT BE COPIED, TRACED, REPRODUCED, OR LENT WITHOUT WRITTEN CONSENT		INGAL EPS		PRODUCT NUMBER IESL10IAR-3953-86			
		DATE											
3	17/05/20	SPIGOT MODIFIED	RMM					ASSEMBLY & DETAIL OF TAPERED ROUND POLE 10.0m IMPACT ABSORBING 242 x 100 CLEAR ACCESS DOOR BASE PLATE MOUNTED		DRAWING NUMBER GA616			
2	07/10/14	AD NUMBER ADDED	SKP	SKP	SHEET NUMBER								
1	06/03/14	REISSUED FOR CONSTRUCTION	LG	CQZ	SHEET 1 OF 1								
0	13/07/06	ISSUED FOR CONSTRUCTION	R.S	CJJ									
REV	DATE	DESCRIPTION	BY	CHKD	A3	DO NOT SCALE							
CUSTOMER NAME / PROJECT INTEGRAL ENERGY					CHECKED BY CJJ	DATE 13/07/06	DATE 13/07/06	DRAWN BY R.STANLEY		SCALE 1:25	CAD FILE No. GA616_DRG		



PRODUCT WEIGHT 119 kg		CUSTOMER APPROVAL			COPYRIGHT THIS DOCUMENT PRODUCED BY INGAL EPS MUST NOT BE COPIED, TRACED, REPRODUCED, OR LENT WITHOUT WRITTEN CONSENT			INGAL EPS		PRODUCT NUMBER IESL85IAR-3952-86		
		DATE										
					DIMENSIONS IN MILLIMETERS			ASSEMBLY & DETAIL OF TAPERED ROUND POLE 8.5m IMPACT ABSORBING 242 x 100 CLEAR ACCESS DOOR BASE PLATE MOUNTED				
3	17/05/20	SPIGOT MODIFIED		RMM								
2	07/10/14	AD NUMBER ADDED		SKP	SKP							
1	06/03/14	REISSUED FOR CONSTRUCTION		LG	CQZ							
0	13/07/06	ISSUED FOR CONSTRUCTION		R.S	CJJ							
REV	DATE	DESCRIPTION		BY	CHKD	A3	DO NOT SCALE					
CUSTOMER NAME / PROJECT INTEGRAL ENERGY							CHECKED BY CJJ	DATE 13/07/06	DATE 13/07/06	DRAWN BY R.STANLEY	SCALE 1:25	CAD FILE No. GA615_DRG



FOR ASSEMBLY & DETAIL REFER C42771Z

PRODUCT WEIGHT 81 kg		CUSTOMER APPROVAL DATE		COPYRIGHT THIS DOCUMENT PRODUCED BY INGAL EPS MUST NOT BE COPIED, TRACED, REPRODUCED, OR LENT WITHOUT WRITTEN CONSENT		INGAL EPS		PRODUCT NUMBER IE55BENT-86	
1	26/05/20	SPIGOT MODIFIED	FQT			GENERAL ARRANGEMENT OF 5.5m POLE WITH 76 OD x 300 LG SPIGOT 600 x 180 CLEAR ACCESS DOOR BASE PLATE MOUNTED		DRAWING NUMBER GA10792	
0	26/06/16	ISSUED FOR CONSTRUCTION	YANG YY					SHEET NUMBER	
REV	DATE	DESCRIPTION	BY	CHKD		DO NOT SCALE			
CUSTOMER NAME / PROJECT					CHECKED BY	DATE	DRAWN BY	SCALE	CAD FILE No
					YY	26/06/16	YANG	1:20	GA10792

Could you also confirm whether the proposed poles are frangible impact-absorbing types?

Thank you

Regards

Walaa Salah Jassim Al-Hamran

Senior Electrical Engineer, Aurecon

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DISCLAIMER

From: Walaa Salah Jassim Al-Hamran

Sent: Wednesday, 4 February 2026 8:53 AM

To: Arpita.Patel@valmont.com

Cc: Melvin Dale Torres <MelvinDale.Torres@aurecongroup.com>; Mark Joseph Bermas <MarkJoseph.Bermas@aurecongroup.com>

Subject: FW: Urgent – Technical Data Request for Endeavour Energy Impact Absorbing Columns

Hi Arpita,

Yes, those are exactly the ones I was referring to.

I would greatly appreciate it if you could please provide the details as requested in the email.

Thank you

Regards

Walaa Salah Jassim Al-Hamran

Senior Electrical Engineer, Aurecon

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DISCLAIMER

From: Patel, Arpita <Arpita.Patel@valmont.com>

Sent: Tuesday, 3 February 2026 3:41 PM

To: Walaa Salah Jassim Al-Hamran <Walaa.AlHamran@aurecongroup.com>

Subject: RE: Urgent – Technical Data Request for Endeavour Energy Impact Absorbing Columns

[External email] This email was sent from outside Aurecon. Do not click links or open attachments unless you were expecting the email and know that the content is safe.

Hi Walaa,

I would appreciate it if you could please confirm that you are looking for the ULT base reactions for the attached poles.

Thank you,

Kind Regards,

Arpita Patel

Internal Sales Coordinator

INGAL EPS

A Valmont Company

358 Cormack Road, Wingfield, SA 5014

PH: +61 8 8169 2350 OPT #2 | Email: arpita.patel@valmont.com

NOTE: Due to the Chinese New Year Holiday period, the deliver times for Orders from 22nd Dec 2025 to 23rd Feb 2026 will be 15-16 weeks from drawing approval.

Please send all sales enquiries and orders to your relevant state:

EPSQLDSales@valmont.com | EPSNSWSales@valmont.com

EPSVICSales@valmont.com | EPSSASales@valmont.com

EPSWASales@valmont.com | EPSNTSales@valmont.com

From: Walaa Salah Jassim Al-Hamran <Walaa.AlHamran@aurecongroup.com>

Sent: Tuesday, 3 February 2026 2:06 PM

To: Patel, Arpita <Arpita.Patel@valmont.com>; Loader, Wolfgang <Wolfgang.Loader@valmont.com>

Cc: Melvin Dale Torres <MelvinDale.Torres@aurecongroup.com>; Mark Joseph Bermas

<MarkJoseph.Bermas@aurecongroup.com>; DL.AUS.EPS - NSW Sales <nswsales@ingaleps.com.au>; DL.AUS.EPS -

NSW Sales <EPSNSWSales@valmont.com>

Subject: Urgent – Technical Data Request for Endeavour Energy Impact Absorbing Columns

Hi Arpita,

I'm an Electrical Engineer in Aurecon Sydney and I'm seeking some technical information on Endeavour Energy columns, which I was hoping you could assist with.

Could you please provide the shear, moment, and service load data for the 12m and 10.5 m impact-absorbing columns, each with a 4.5 m outreach configuration? These columns are proposed to support an Endeavour-approved RoadLED AERO luminaire (205 W, 4000 K).

This information is required for an urgent project associated with the Richmond Road M7 works and a prompt response would be greatly appreciated.

If you're not the right person to assist, please feel free to forward this request to whoever would be best placed to help.

Thank you in advance for your assistance.

Regards

Walaa Salah Jassim Al-Hamran

Senior Electrical Engineer, Aurecon

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Cammeraygal Country

Level 11, 73 Miller Street North Sydney Australia 2060



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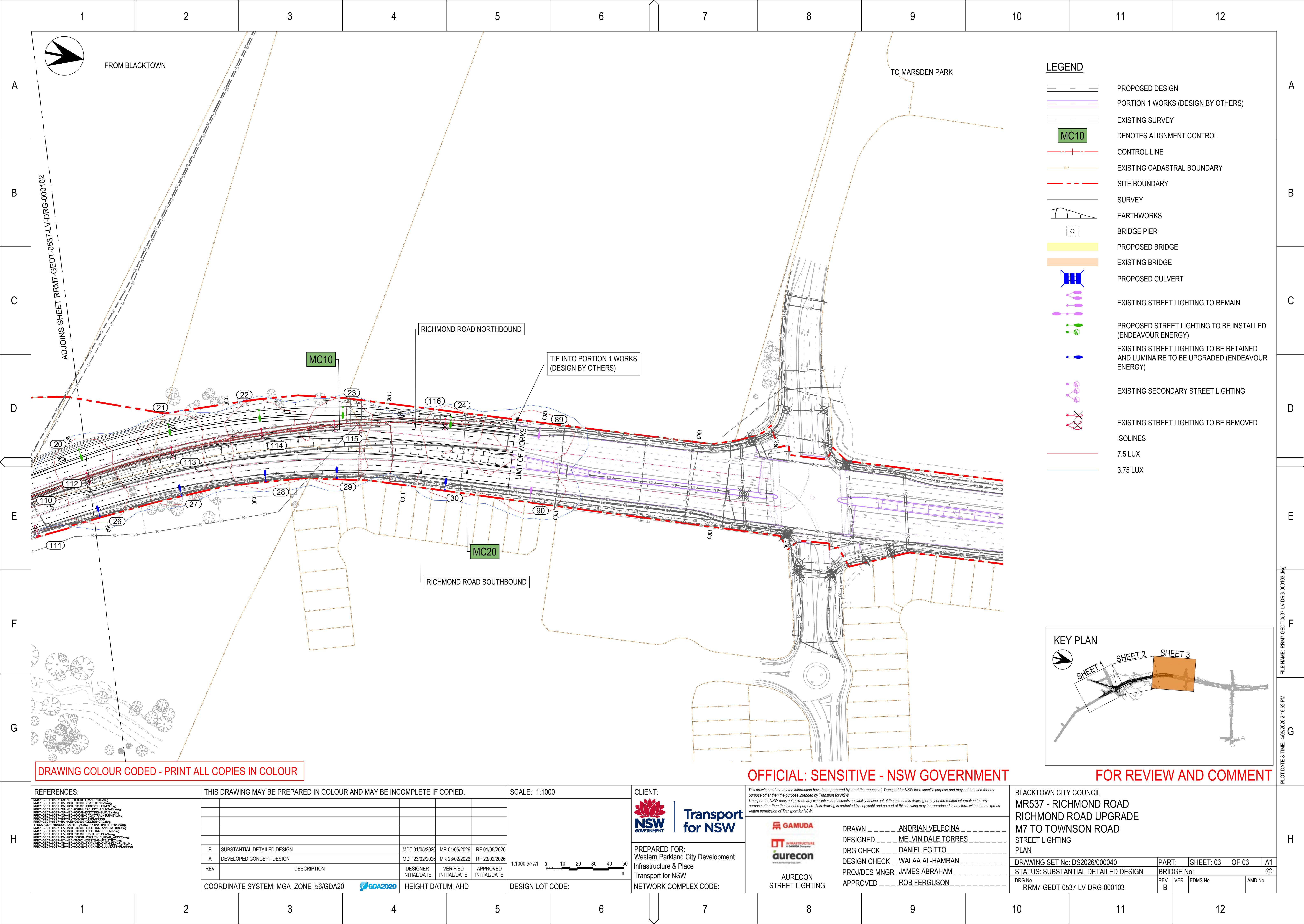
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Appendix K Proof Engineering Review

Not applicable

	1	2	3	4	5	6	7	8	9	10	11	12					
A	LIGHTING SCHEDULE																A
	LOCATION							LUMINAIRE				POLE AND FOOTING TYPE					
	POLE NO	MODEL	EASTING	NORTHING	MOUNTING HEIGHT (m)	OUTREACH (m)	ARRANGEMENT	MANUFACTURER	MODEL	WATTAGE	ORIENT	TILT	FOUNDATION TYPE	POLE TYPE	PRODUCT NUMBER	ASSET OWNER	STATUS
	59	Rexel Optispan 400W equivalent	300745.150	6265395.56	10.5	4.5	SINGLE	REXEL		400	149	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
	60	Rexel Optispan 400W equivalent	300714.590	6265419.5	10.5	4.5	SINGLE	REXEL		400	327	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
	61	Rexel Optispan 400W equivalent	300727.400	6265411	12	4.5	BACK TO BACK	REXEL		400	149	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
	62	Rexel Optispan 400W equivalent	300744.940	6265439.73	12	4.5	BACK TO BACK	REXEL		400	151	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
	63	Rexel Optispan 400W equivalent	300764.280	6265466.7	12	4.5	BACK TO BACK	REXEL		400	144	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
	64	Rexel Optispan 400W equivalent	300703.614	6265331.657	10.5	4.5	TWIN	REXEL		400	120	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
	65	Rexel Optispan 400W equivalent	300676.770	6265363.38	10.5	4.5	TWIN	REXEL		400	358	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
	66	Rexel Optispan 400W equivalent	300732.960	6265366.26	10.5	4.5	TWIN	REXEL		400	183	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
	67	Rexel Optispan 400W equivalent	300699.020	6265391.26	10.5	4.5	TWIN	REXEL		400	272	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
	68	RoadLED MIDI 120W 4K STD 221201PH	300454.710	6265143.65	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		120	136	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
	69	RoadLED MIDI 120W 4K STD 221201PH	300434.510	6265160.38	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		120	319	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
	70	RoadLED MIDI 120W 4K STD 221201PH	300480.400	6265169.92	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		120	135	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
	71	RoadLED MIDI 120W 4K STD 221201PH	300503.980	6265190.28	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		120	133	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
	72	RoadLED MIDI 120W 4K STD 221201PH	300458.230	6265190.87	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		120	318	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
	73	RoadLED MIDI 120W 4K STD 221201PH	300528.850	6265208.71	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		120	101	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
	74	RoadLED MIDI 120W 4K STD 221201PH	300481.300	6265216.95	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		120	315	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
	75	RoadLED MIDI 120W 4K STD 221201PH	300507.910	6265239.77	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		120	306	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
	76	RoadLED MIDI 120W 4K STD 221201PH	300578.430	6265243.2	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		120	125	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
	77	RoadLED MIDI 120W 4K STD 221201PH	300836.200	6265243.22	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		120	223	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
	78	RoadLED MIDI 120W 4K STD 221201PH	300530.450	6265256.17	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		120	307	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
	79	RoadLED MIDI 120W 4K STD 221201PH	300601.930	6265259.68	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		120	125	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
	80	RoadLED MIDI 120W 4K STD 221201PH	300557.300	6265275.33	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		120	305	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
	81	RoadLED MIDI 120W 4K STD 221201PH	300626.290	6265276.84	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		120	128	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
	82	RoadLED MIDI 120W 4K STD 221201PH	300580.650	6265291.73	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		120	306	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
	83	RoadLED MIDI 120W 4K STD 221201PH	300655.610	6265297.87	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		120	128	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
	84	RoadLED MIDI 120W 4K STD 221201PH	300606.200	6265310.27	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		120	304	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
	85	RoadLED MIDI 120W 4K STD 221201PH	300633.260	6265329.36	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		120	305	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
	86	RoadLED MIDI 120W 4K STD 221201PH	300560.740	6265230.84	10.5	4.5	TWIN	SYLVANIA-SCHREDER		120	125	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
	87	Roadster S250C - 98100	300858.880	6265188.67	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		250	42	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
	88	Roadster S250C - 98100	300813.190	6265227.48	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		250	45	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
	89	Roadster S400C - 98382	300264.370	6266182.37	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		400	2	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
	90	Roadster S400C - 98382	300310.150	6266184.18	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		400	183	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING
	91	Roadster S400C - 98382	300655.350	6265378.82	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		400	27	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING TO BE REMOVED
	92	Rexel Optispan 400W equivalent	300677.150	6265415.99	10.5	4.5	SINGLE	REXEL		400	225	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING TO BE REMOVED
	93	Rexel Optispan 400W equivalent	300620.820	6265421.45	10.5	4.5	SINGLE	REXEL		400	45	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING TO BE REMOVED
	94	Rexel Optispan 400W equivalent	300648.910	6265443.42	10.5	4.5	SINGLE	REXEL		400	225	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING TO BE REMOVED
	95	Rexel Optispan 400W equivalent	300622.430	6265464.76	10.5	4.5	SINGLE	REXEL		400	225	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING TO BE REMOVED
	96	Rexel Optispan 400W equivalent	300601.330	6265485.32	10.5	4.5	SINGLE	REXEL		400	222	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING TO BE REMOVED
	97	Rexel Optispan 400W equivalent	300562.580	6265487.32	10.5	4.5	SINGLE	REXEL		400	33	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING TO BE REMOVED
	98	Rexel Optispan 400W equivalent	300581.790	6265511.29	10.5	4.5	SINGLE	REXEL		400	215	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING TO BE REMOVED
	99	Rexel Optispan 400W equivalent	300547.360	6265515.34	10.5	4.5	SINGLE	REXEL		400	24	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING TO BE REMOVED
	100	Roadster S400C - 98382	300552.470	6265560.15	10.5	4.5	SINGLE	REXEL		400	209	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING TO BE REMOVED
	101	Roadster S400C - 98382	300521.100	6265569.01	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		400	25	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING TO BE REMOVED
	102	Rexel Optispan 400W equivalent	300487.630	6265635.39	10.5	4.5	SINGLE	REXEL		400	26	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING TO BE REMOVED
	103	Rexel Optispan 400W equivalent	300494.120	6265677.62	10.5	4.5	SINGLE	REXEL		400	204	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING TO BE REMOVED
	104	Rexel Optispan 400W equivalent	300456.480	6265701.36	10.5	4.5	SINGLE	REXEL		400	26	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING TO BE REMOVED
	105	Roadster S400C - 98382	300477.050	6265712.43	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		400	204	5	ENDEAV				

	1	2	3	4	5	6	7	8	9	10	11	12						
A	LIGHTING SCHEDULE																	A
	LOCATION						LUMINAIRE						POLE AND FOOTING TYPE					
	POLE NO	MODEL	EASTING	NORTHING	MOUNTING HEIGHT (m)	OUTREACH (m)	ARRANGEMENT	MANUFACTURER	MODEL	WATTAGE	ORIENT	TILT	FOUNDATION TYPE	POLE TYPE	PRODUCT NUMBER	ASSET OWNER	STATUS	
B	1	ATS VLED 290W 3k	300654.619	6265382.579	12	4.5	SINGLE	ALDRIDGE TRAFFIC SYSTEMS		284	43	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL10IAR-3953-86	ENDEAVOUR ENERGY	PROPOSED	
	2	ATS VLED 290W 3k	300691.033	6265412.452	10.5	4.5	SINGLE	ALDRIDGE TRAFFIC SYSTEMS		284	235	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL85IAR-3952-86	ENDEAVOUR ENERGY	PROPOSED	
	3	ATS VLED 290W 3k	300602.078	6265432.213	12	4.5	SINGLE	ALDRIDGE TRAFFIC SYSTEMS		284	44	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL10IAR-3953-86	ENDEAVOUR ENERGY	PROPOSED	
	4	ATS VLED 290W 3k	300672.579	6265430.503	12	4.5	SINGLE	ALDRIDGE TRAFFIC SYSTEMS		284	220	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL10IAR-3953-86	ENDEAVOUR ENERGY	PROPOSED	
	5	ATS VLED 290W 3k	300635.787	6265472.690	12	4.5	SINGLE	ALDRIDGE TRAFFIC SYSTEMS		284	220	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL10IAR-3953-86	ENDEAVOUR ENERGY	PROPOSED	
	6	ATS VLED 290W 3k	300561.698	6265476.195	12	4.5	SINGLE	ALDRIDGE TRAFFIC SYSTEMS		284	42	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL10IAR-3953-86	ENDEAVOUR ENERGY	PROPOSED	
	7	ATS VLED 290W 3k	300600.530	6265512.985	12	4.5	SINGLE	ALDRIDGE TRAFFIC SYSTEMS		284	221	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL10IAR-3953-86	ENDEAVOUR ENERGY	PROPOSED	
	8	RoadLED 205W 3k Aero	300661.969	6265359.717	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		205	318	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL85IAR-3952-86	ENDEAVOUR ENERGY	PROPOSED	
	9	RoadLED 205W 3k Aero	300521.491	6265529.21	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		205	36	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL85IAR-3952-86	ENDEAVOUR ENERGY	PROPOSED	
	10	RoadLED 205W 3k Aero	300561.104	6265560.48	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		205	220	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL85IAR-3952-86	ENDEAVOUR ENERGY	PROPOSED	
	11	RoadLED 205W 3k Aero	300486.368	6265586.601	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		205	30	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL85IAR-3952-86	ENDEAVOUR ENERGY	PROPOSED	
	12	RoadLED 205W 3k Aero	300456.905	6265646.382	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		205	25	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL85IAR-3952-86	ENDEAVOUR ENERGY	PROPOSED	
	13	RoadLED 205W 3k Aero	300499.877	6265666.6	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		205	205	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL85IAR-3952-86	ENDEAVOUR ENERGY	PROPOSED	
C	14	RoadLED 205W 3k Aero	300426.661	6265710.749	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		205	25	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL85IAR-3952-86	ENDEAVOUR ENERGY	PROPOSED	
	15	RoadLED 205W 3k Aero	300471.088	6265728.562	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		205	205	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL85IAR-3952-86	ENDEAVOUR ENERGY	PROPOSED	
	16	RoadLED 205W 3k Aero	300397.678	6265771.35	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		205	28	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL85IAR-3952-86	ENDEAVOUR ENERGY	PROPOSED	
	17	RoadLED 205W 3k Aero	300437.440	6265792.37	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		205	209	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL85IAR-3952-86	ENDEAVOUR ENERGY	PROPOSED	
	18	RoadLED 205W 3k Aero	300365.415	6265832.675	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		205	28	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL85IAR-3952-86	ENDEAVOUR ENERGY	PROPOSED	
	19	RoadLED 205W 3k Aero	300402.418	6265852.422	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		205	207	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL85IAR-3952-86	ENDEAVOUR ENERGY	PROPOSED	
	20	RoadLED 205W 3k Aero	300331.342	6265893.064	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		205	29	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL85IAR-3952-86	ENDEAVOUR ENERGY	PROPOSED	
	21	RoadLED 205W 3k Aero	300305.019	6265946.795	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		205	21	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL85IAR-3952-86	ENDEAVOUR ENERGY	PROPOSED	
	22	RoadLED 205W 3k Aero	300285.758	6266002.5	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		205	16	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL85IAR-3952-86	ENDEAVOUR ENERGY	PROPOSED	
	23	RoadLED 205W 3k Aero	300274.163	6266055.293	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		205	10	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL85IAR-3952-86	ENDEAVOUR ENERGY	PROPOSED	
	24	RoadLED 205W 3k Aero	300267.625	6266124.891	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		205	6	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL85IAR-3952-86	ENDEAVOUR ENERGY	PROPOSED	
	25	RoadLED 205W 3k Aero	300527.110	6265610.29	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		205	210	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	-	ENDEAVOUR ENERGY	LUMINAIRE REPLACEMENT	
	26	RoadLED 205W 3k Aero	300371.310	6265914.17	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		205	205	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	-	ENDEAVOUR ENERGY	LUMINAIRE REPLACEMENT	
D	27	RoadLED 205W 3k Aero	300348.690	6265963.42	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		205	203	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	-	ENDEAVOUR ENERGY	LUMINAIRE REPLACEMENT	
	28	RoadLED 205W 3k Aero	300329.820	6266015.01	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		205	195	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	-	ENDEAVOUR ENERGY	LUMINAIRE REPLACEMENT	
	29	RoadLED 205W 3k Aero	300319.650	6266059.7	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		205	192	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	-	ENDEAVOUR ENERGY	LUMINAIRE REPLACEMENT	
	30	RoadLED 205W 3k Aero	300314.540	6266129.27	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		205	184	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	-	ENDEAVOUR ENERGY	LUMINAIRE REPLACEMENT	
	31	StreetLED3 24W 3K Aero	300642.957	6265349.87	7.5	3	SINGLE	SYLVANIA-SCHREDER		24	337	5	ENDEAVOUR ENERGY	RIGID	IE55BENT-86	ENDEAVOUR ENERGY	PROPOSED	
	32	StreetLED3 24W 3K Aero	300629.998	6265402.577	7.5	3	SINGLE	SYLVANIA-SCHREDER		24	36	5	ENDEAVOUR ENERGY	RIGID	IE55BENT-86	ENDEAVOUR ENERGY	PROPOSED	
	33	Rexel Optispan 250W equivalent	300785.500	6265235.29	10.5	4.5	SINGLE	REXEL		284	76	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING	
	34	Rexel Optispan 250W equivalent	300761.330	6265238.34	10.5	4.5	SINGLE	REXEL		284	325	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING	
	35	Rexel Optispan 250W equivalent	300776.690	6265261.14	10.5	4.5	SINGLE	REXEL		284	44	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING	
	36	Rexel Optispan 250W equivalent	300813.890	6265269.69	10.5	4.5	SINGLE	REXEL		284	217	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING	
	37	Rexel Optispan 250W equivalent	300758.350	6265274.84	10.5	4.5	SINGLE	REXEL		284	49	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING	
	38	Rexel Optispan 250W equivalent	300793.330	6265295.7	10.5	4.5	SINGLE	REXEL		284	222	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING	
	39	Rexel Optispan 250W equivalent	300734.300	6265297.12	10.5	4.5	SINGLE	REXEL		284	47	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING	
40	Rexel Optispan 250W equivalent	300774.750	6265315.71	10.5	4.5	SINGLE	REXEL		284	225	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING		
E	41	Rexel Optispan 250W equivalent	300684.000	6265320.09	10.5	4.5	SINGLE	REXEL		284	133	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING	
	42	Rexel Optispan 250W equivalent	300749.990	6265339.83	10.5	4.5	SINGLE	REXEL		284	224	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING	
	43	Rexel Optispan 250W equivalent	300655.090	6265350.61	10.5	4.5	SINGLE	REXEL		284	317	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING	
	44	Rexel Optispan 250W equivalent	300640.459	6265019.879	10.5	3	SINGLE	REXEL		284	5	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING	
	45	Rexel Optispan 250W equivalent	300640.180</															





Transport for NSW

BLACKTOWN CITY COUNCIL

MR537 - RICHMOND ROAD

RICHMOND ROAD UPGRADE

M7 TO TOWNSON ROAD

STREET LIGHTING

DETAILED DESIGN



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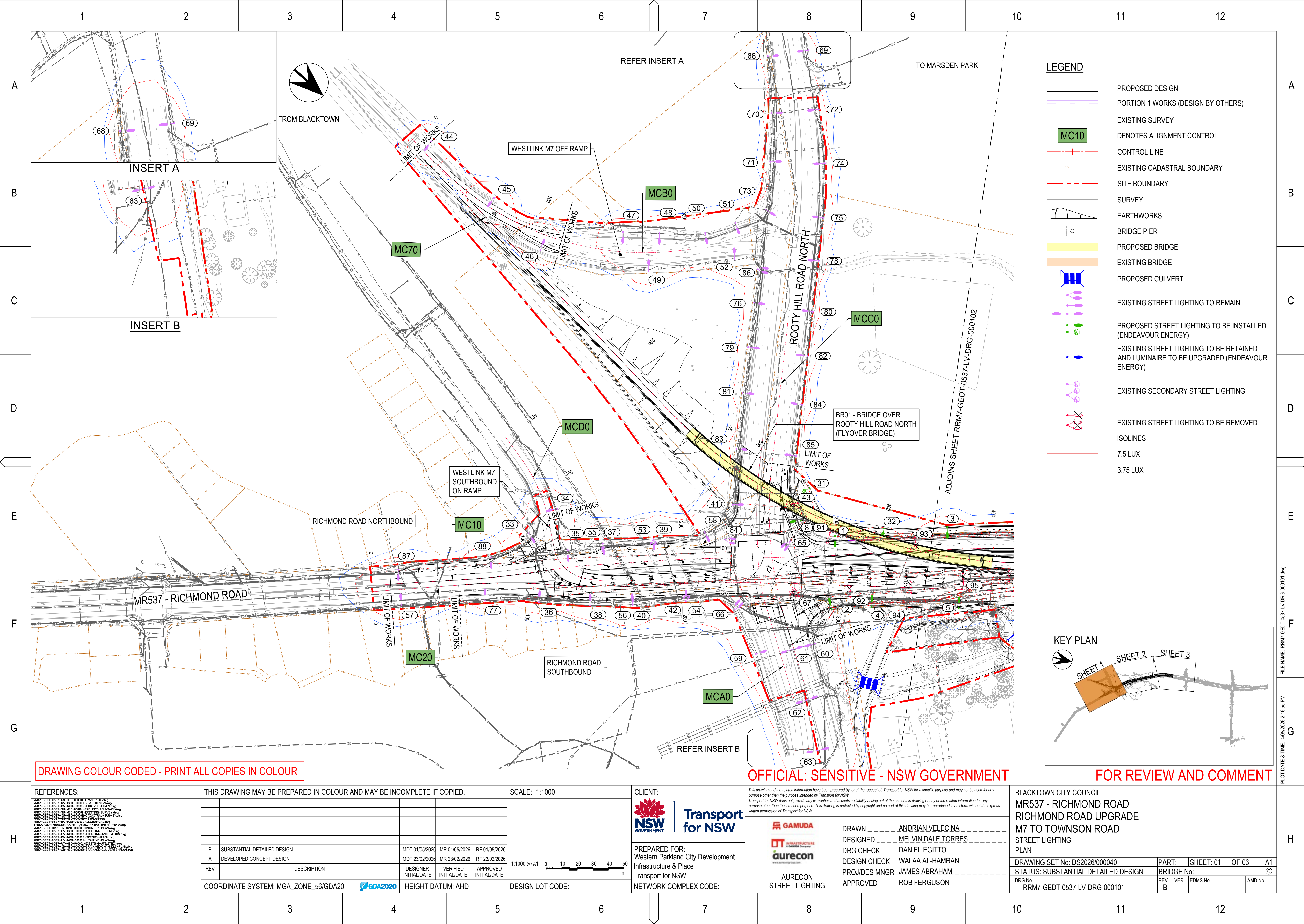
FOR REVIEW AND COMMENT

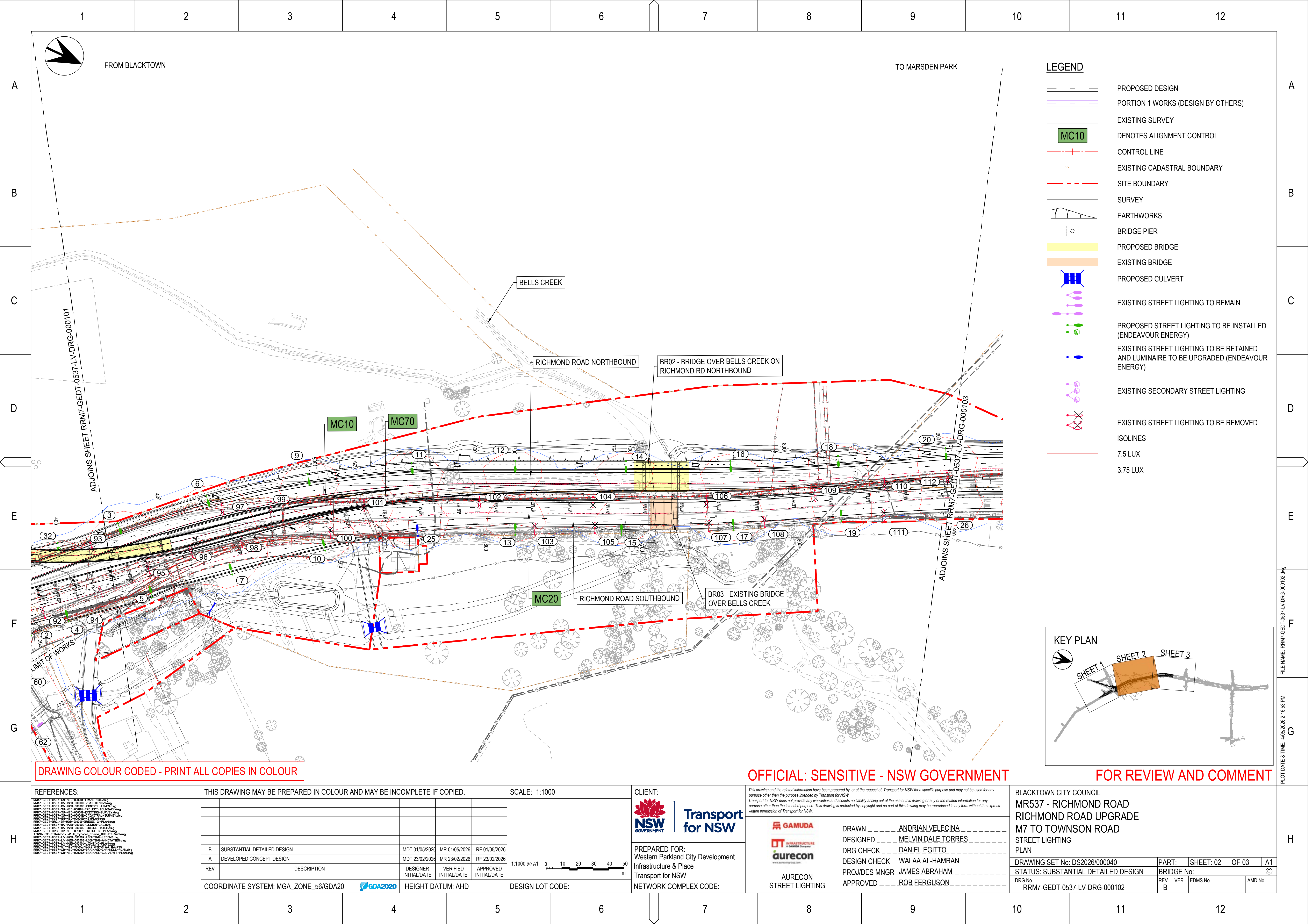
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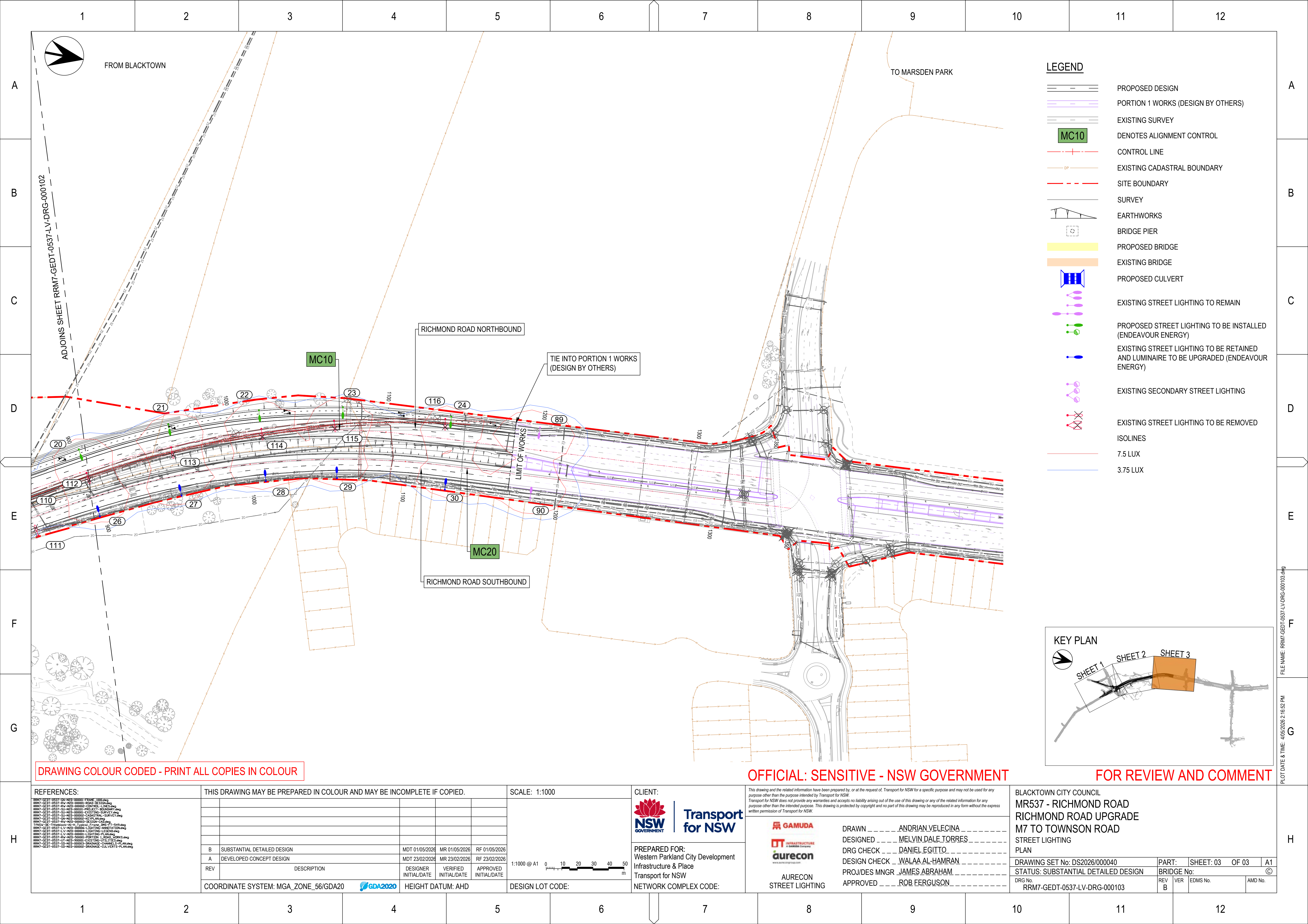
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A	GENERAL NOTES 1. ALL COORDINATES ARE TO GEOCENTRIC DATUM OF AUSTRALIA 1994 (GDA2020) COORDINATE SYSTEM WITHIN MAP GRID 56, AND HEIGHTS ARE RELATIVE TO THE AUSTRALIAN HEIGHT DATUM 71 (AHD). 2. LIGHTING DESIGN HAS BEEN UNDERTAKEN IN ACCORDANCE TO AS/NZS 1158 ROAD LIGHTING SERIES. 3. ALL MATERIALS AND WORKMANSHIP IS TO BE IN ACCORDANCE WITH THE RELEVANT ENDEAVOUR ENERGY INSTALLATION GUIDELINES AND METHODOLOGIES DOCUMENT LCI 0001. 4. FOR DETAILS ON TYPICAL SETBACKS REFER TO THE TYPICAL CROSS SECTIONS PROVIDED IN THE ROAD WORKS (RW) PACKAGE. 5. ALL CALCULATIONS HAVE BEEN UNDERTAKEN IN AGI32 V20.6 AND PERFECT LITE V5.09. 6. DESIGN INFORMATION NOT PART OF THE LIGHTING DESIGN PACKAGE THAT ARE PRESENTED ON THESE DRAWINGS IS INDICATIVE ONLY. FOR DETAILS OF THE OTHER DESIGNS, REFER TO THE DESIGN PACKAGES IN TABLE 1. TABLE 1 <table><tr><th>DESIGN PACKAGE</th><th>DESCRIPTION</th></tr><tr><td>BR01</td><td>BR01 - BRIDGE OVER ROOTY HILL ROAD NORTH (FLYOVER BRIDGE) AND RETAINING WALL</td></tr><tr><td>BR02</td><td>BR02 - BRIDGE OVER BELLS CREEK ON RICHMOND RD NORTHBOUND</td></tr><tr><td>BR03</td><td>BR03 - UPGRADE OF EXISTING BRIDGE OVER BELLS CREEK</td></tr><tr><td>DM01</td><td>SITE CLEARING</td></tr><tr><td>DU01</td><td>URBAN DESIGN AND LANDSCAPE PLAN</td></tr><tr><td>DY01</td><td>DURABILITY REPORT</td></tr><tr><td>FN01</td><td>ROAD FURNITURE - PORTION 2 (SOUTHERN SECTION)</td></tr><tr><td>GE01</td><td>GEOTECHNICAL INVESTIGATION PLAN</td></tr><tr><td>GE03</td><td>GEOTECHNICAL INTERPRETATIVE REPORT</td></tr><tr><td>GE04</td><td>GEOTECHNICAL DESIGN - PORTION 2 (SOUTHERN SECTION)</td></tr><tr><td>GN02</td><td>SAFETY IN DESIGN REPORT</td></tr><tr><td>LA01</td><td>LANDSCAPE DESIGN</td></tr><tr><td>MS01</td><td>DRAINAGE CULVERTS</td></tr><tr><td>MS02</td><td>MISCELLANEOUS STRUCTURES</td></tr><tr><td>NV01</td><td>OPERATIONAL NOISE AND VIBRATION REPORT</td></tr><tr><td>PJ01</td><td>PROPERTY ADJUSTMENTS - PORTION 2 (SOUTHERN SECTION)</td></tr><tr><td>PV01</td><td>PAVEMENTS AND SUBSURFACE DRAINAGE - PORTION 2 (SOUTHERN SECTION)</td></tr><tr><td>SD01</td><td>FLOODING AND HYDROLOGY - PORTION 2 (SOUTHERN SECTION)</td></tr><tr><td>SD02</td><td>DRAINAGE TRANSVERSE AND LONGITUDINAL - PORTION 2 (SOUTHERN SECTION)</td></tr><tr><td>TP01</td><td>TRAFFIC MODELLING</td></tr><tr><td>TT01</td><td>INTELLIGENT TRANSPORT SYSTEMS</td></tr><tr><td>TT02</td><td>TRAFFIC CONTROL SIGNALS</td></tr><tr><td>TW01</td><td>TRAFFIC STAGING (CAT1)</td></tr><tr><td>TW02</td><td>BR01 - FLYOVER TEMPORARY GIRDER SUPPORT (CAT1)</td></tr><tr><td>UT01</td><td>UTILITY COORDINATION PLAN</td></tr></table> ELECTRICAL NOTES 1. NO ELECTRICAL DESIGNS HAVE BEEN PRESENTED WITHIN THIS DRAWING PACKAGE. 2. ALL INSTALLATIONS SHALL FORM PART OF THE ENDEAVOUR ENERGY NETWORK AND MUST BE UNDERTAKEN BY AN ASP3 LEVEL ELECTRICAL ENGINEER POST FINAL SUBMISSION.													DESIGN PACKAGE	DESCRIPTION	BR01	BR01 - BRIDGE OVER ROOTY HILL ROAD NORTH (FLYOVER BRIDGE) AND RETAINING WALL	BR02	BR02 - BRIDGE OVER BELLS CREEK ON RICHMOND RD NORTHBOUND	BR03	BR03 - UPGRADE OF EXISTING BRIDGE OVER BELLS CREEK	DM01	SITE CLEARING	DU01	URBAN DESIGN AND LANDSCAPE PLAN	DY01	DURABILITY REPORT	FN01	ROAD FURNITURE - PORTION 2 (SOUTHERN SECTION)	GE01	GEOTECHNICAL INVESTIGATION PLAN	GE03	GEOTECHNICAL INTERPRETATIVE REPORT	GE04	GEOTECHNICAL DESIGN - PORTION 2 (SOUTHERN SECTION)	GN02	SAFETY IN DESIGN REPORT	LA01	LANDSCAPE DESIGN	MS01	DRAINAGE CULVERTS	MS02	MISCELLANEOUS STRUCTURES	NV01	OPERATIONAL NOISE AND VIBRATION REPORT	PJ01	PROPERTY ADJUSTMENTS - PORTION 2 (SOUTHERN SECTION)	PV01	PAVEMENTS AND SUBSURFACE DRAINAGE - PORTION 2 (SOUTHERN SECTION)	SD01	FLOODING AND HYDROLOGY - PORTION 2 (SOUTHERN SECTION)	SD02	DRAINAGE TRANSVERSE AND LONGITUDINAL - PORTION 2 (SOUTHERN SECTION)	TP01	TRAFFIC MODELLING	TT01	INTELLIGENT TRANSPORT SYSTEMS	TT02	TRAFFIC CONTROL SIGNALS	TW01	TRAFFIC STAGING (CAT1)	TW02	BR01 - FLYOVER TEMPORARY GIRDER SUPPORT (CAT1)	UT01	UTILITY COORDINATION PLAN	A																							
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A	LIGHTING SCHEDULE																	A
	LOCATION						LUMINAIRE						POLE AND FOOTING TYPE					
	POLE NO	MODEL	EASTING	NORTHING	MOUNTING HEIGHT (m)	OUTREACH (m)	ARRANGEMENT	MANUFACTURER	MODEL	WATTAGE	ORIENT	TILT	FOUNDATION TYPE	POLE TYPE	PRODUCT NUMBER	ASSET OWNER	STATUS	
B	1	ATS VLED 290W 3k	300654.619	6265382.579	12	4.5	SINGLE	ALDRIDGE TRAFFIC SYSTEMS		284	43	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL10IAR-3953-86	ENDEAVOUR ENERGY	PROPOSED	
	2	ATS VLED 290W 3k	300691.033	6265412.452	10.5	4.5	SINGLE	ALDRIDGE TRAFFIC SYSTEMS		284	235	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL85IAR-3952-86	ENDEAVOUR ENERGY	PROPOSED	
	3	ATS VLED 290W 3k	300602.078	6265432.213	12	4.5	SINGLE	ALDRIDGE TRAFFIC SYSTEMS		284	44	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL10IAR-3953-86	ENDEAVOUR ENERGY	PROPOSED	
	4	ATS VLED 290W 3k	300672.579	6265430.503	12	4.5	SINGLE	ALDRIDGE TRAFFIC SYSTEMS		284	220	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL10IAR-3953-86	ENDEAVOUR ENERGY	PROPOSED	
	5	ATS VLED 290W 3k	300635.787	6265472.690	12	4.5	SINGLE	ALDRIDGE TRAFFIC SYSTEMS		284	220	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL10IAR-3953-86	ENDEAVOUR ENERGY	PROPOSED	
	6	ATS VLED 290W 3k	300561.698	6265476.195	12	4.5	SINGLE	ALDRIDGE TRAFFIC SYSTEMS		284	42	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL10IAR-3953-86	ENDEAVOUR ENERGY	PROPOSED	
	7	ATS VLED 290W 3k	300600.530	6265512.985	12	4.5	SINGLE	ALDRIDGE TRAFFIC SYSTEMS		284	221	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL10IAR-3953-86	ENDEAVOUR ENERGY	PROPOSED	
	8	RoadLED 205W 3k Aero	300661.969	6265359.717	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		205	318	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL85IAR-3952-86	ENDEAVOUR ENERGY	PROPOSED	
	9	RoadLED 205W 3k Aero	300521.491	6265529.21	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		205	36	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL85IAR-3952-86	ENDEAVOUR ENERGY	PROPOSED	
	10	RoadLED 205W 3k Aero	300561.104	6265560.48	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		205	220	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL85IAR-3952-86	ENDEAVOUR ENERGY	PROPOSED	
	11	RoadLED 205W 3k Aero	300486.368	6265586.601	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		205	30	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL85IAR-3952-86	ENDEAVOUR ENERGY	PROPOSED	
	12	RoadLED 205W 3k Aero	300456.905	6265646.382	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		205	25	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL85IAR-3952-86	ENDEAVOUR ENERGY	PROPOSED	
	13	RoadLED 205W 3k Aero	300499.877	6265666.6	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		205	205	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL85IAR-3952-86	ENDEAVOUR ENERGY	PROPOSED	
C	14	RoadLED 205W 3k Aero	300426.661	6265710.749	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		205	25	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL85IAR-3952-86	ENDEAVOUR ENERGY	PROPOSED	
	15	RoadLED 205W 3k Aero	300471.088	6265728.562	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		205	205	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL85IAR-3952-86	ENDEAVOUR ENERGY	PROPOSED	
	16	RoadLED 205W 3k Aero	300397.678	6265771.35	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		205	28	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL85IAR-3952-86	ENDEAVOUR ENERGY	PROPOSED	
	17	RoadLED 205W 3k Aero	300437.440	6265792.37	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		205	209	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL85IAR-3952-86	ENDEAVOUR ENERGY	PROPOSED	
	18	RoadLED 205W 3k Aero	300365.415	6265832.675	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		205	28	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL85IAR-3952-86	ENDEAVOUR ENERGY	PROPOSED	
	19	RoadLED 205W 3k Aero	300402.418	6265852.422	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		205	207	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL85IAR-3952-86	ENDEAVOUR ENERGY	PROPOSED	
	20	RoadLED 205W 3k Aero	300331.342	6265893.064	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		205	29	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL85IAR-3952-86	ENDEAVOUR ENERGY	PROPOSED	
	21	RoadLED 205W 3k Aero	300305.019	6265946.795	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		205	21	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL85IAR-3952-86	ENDEAVOUR ENERGY	PROPOSED	
	22	RoadLED 205W 3k Aero	300285.758	6266002.5	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		205	16	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL85IAR-3952-86	ENDEAVOUR ENERGY	PROPOSED	
	23	RoadLED 205W 3k Aero	300274.163	6266055.293	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		205	10	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL85IAR-3952-86	ENDEAVOUR ENERGY	PROPOSED	
	24	RoadLED 205W 3k Aero	300267.625	6266124.891	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		205	6	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	IESL85IAR-3952-86	ENDEAVOUR ENERGY	PROPOSED	
	25	RoadLED 205W 3k Aero	300527.110	6265610.29	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		205	210	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	-	ENDEAVOUR ENERGY	LUMINAIRE REPLACEMENT	
	26	RoadLED 205W 3k Aero	300371.310	6265914.17	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		205	205	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	-	ENDEAVOUR ENERGY	LUMINAIRE REPLACEMENT	
D	27	RoadLED 205W 3k Aero	300348.690	6265963.42	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		205	203	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	-	ENDEAVOUR ENERGY	LUMINAIRE REPLACEMENT	
	28	RoadLED 205W 3k Aero	300329.820	6266015.01	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		205	195	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	-	ENDEAVOUR ENERGY	LUMINAIRE REPLACEMENT	
	29	RoadLED 205W 3k Aero	300319.650	6266059.7	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		205	192	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	-	ENDEAVOUR ENERGY	LUMINAIRE REPLACEMENT	
	30	RoadLED 205W 3k Aero	300314.540	6266129.27	10.5	4.5	SINGLE	SYLVANIA-SCHREDER		205	184	5	ENDEAVOUR ENERGY	IMPACT ABSORBING	-	ENDEAVOUR ENERGY	LUMINAIRE REPLACEMENT	
	31	StreetLED3 24W 3K Aero	300642.957	6265349.87	7.5	3	SINGLE	SYLVANIA-SCHREDER		24	337	5	ENDEAVOUR ENERGY	RIGID	IE55BENT-86	ENDEAVOUR ENERGY	PROPOSED	
	32	StreetLED3 24W 3K Aero	300629.998	6265402.577	7.5	3	SINGLE	SYLVANIA-SCHREDER		24	36	5	ENDEAVOUR ENERGY	RIGID	IE55BENT-86	ENDEAVOUR ENERGY	PROPOSED	
	33	Rexel Optispan 250W equivalent	300785.500	6265235.29	10.5	4.5	SINGLE	REXEL		284	76	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING	
	34	Rexel Optispan 250W equivalent	300761.330	6265238.34	10.5	4.5	SINGLE	REXEL		284	325	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING	
	35	Rexel Optispan 250W equivalent	300776.690	6265261.14	10.5	4.5	SINGLE	REXEL		284	44	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING	
	36	Rexel Optispan 250W equivalent	300813.890	6265269.69	10.5	4.5	SINGLE	REXEL		284	217	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING	
	37	Rexel Optispan 250W equivalent	300758.350	6265274.84	10.5	4.5	SINGLE	REXEL		284	49	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING	
	38	Rexel Optispan 250W equivalent	300793.330	6265295.7	10.5	4.5	SINGLE	REXEL		284	222	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING	
	39	Rexel Optispan 250W equivalent	300734.300	6265297.12	10.5	4.5	SINGLE	REXEL		284	47	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING	
40	Rexel Optispan 250W equivalent	300774.750	6265315.71	10.5	4.5	SINGLE	REXEL		284	225	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING		
E	41	Rexel Optispan 250W equivalent	300684.000	6265320.09	10.5	4.5	SINGLE	REXEL		284	133	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING	
	42	Rexel Optispan 250W equivalent	300749.990	6265339.83	10.5	4.5	SINGLE	REXEL		284	224	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING	
	43	Rexel Optispan 250W equivalent	300655.090	6265350.61	10.5	4.5	SINGLE	REXEL		284	317	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING	
	44	Rexel Optispan 250W equivalent	300640.459	6265019.879	10.5	3	SINGLE	REXEL		284	5	5	ENDEAVOUR ENERGY	-	-	EXISTING OWNERSHIP	EXISTING	
	45	Rexel Optispan 250W equivalent	300640.180															

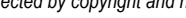
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A	GENERAL NOTES 1. ALL COORDINATES ARE TO GEOCENTRIC DATUM OF AUSTRALIA 1994 (GDA2020) COORDINATE SYSTEM WITHIN MAP GRID 56, AND HEIGHTS ARE RELATIVE TO THE AUSTRALIAN HEIGHT DATUM 71 (AHD). 2. LIGHTING DESIGN HAS BEEN UNDERTAKEN IN ACCORDANCE TO AS/NZS 1158 ROAD LIGHTING SERIES. 3. ALL MATERIALS AND WORKMANSHIP IS TO BE IN ACCORDANCE WITH THE RELEVANT ENDEAVOUR ENERGY INSTALLATION GUIDELINES AND METHODOLOGIES DOCUMENT LCI 0001. 4. FOR DETAILS ON TYPICAL SETBACKS REFER TO THE TYPICAL CROSS SECTIONS PROVIDED IN THE ROAD WORKS (RW) PACKAGE. 5. ALL CALCULATIONS HAVE BEEN UNDERTAKEN IN AGI32 V20.6 AND PERFECT LITE V5.09. 6. DESIGN INFORMATION NOT PART OF THE LIGHTING DESIGN PACKAGE THAT ARE PRESENTED ON THESE DRAWINGS IS INDICATIVE ONLY. FOR DETAILS OF THE OTHER DESIGNS, REFER TO THE DESIGN PACKAGES IN TABLE 1. TABLE 1 <table><tr><th>DESIGN PACKAGE</th><th>DESCRIPTION</th></tr><tr><td>BR01</td><td>BR01 - BRIDGE OVER ROOTY HILL ROAD NORTH (FLYOVER BRIDGE) AND RETAINING WALL</td></tr><tr><td>BR02</td><td>BR02 - BRIDGE OVER BELLS CREEK ON RICHMOND RD NORTHBOUND</td></tr><tr><td>BR03</td><td>BR03 - UPGRADE OF EXISTING BRIDGE OVER BELLS CREEK</td></tr><tr><td>DM01</td><td>SITE CLEARING</td></tr><tr><td>DU01</td><td>URBAN DESIGN AND LANDSCAPE PLAN</td></tr><tr><td>DY01</td><td>DURABILITY REPORT</td></tr><tr><td>FN01</td><td>ROAD FURNITURE - PORTION 2 (SOUTHERN SECTION)</td></tr><tr><td>GE01</td><td>GEOTECHNICAL INVESTIGATION PLAN</td></tr><tr><td>GE03</td><td>GEOTECHNICAL INTERPRETATIVE REPORT</td></tr><tr><td>GE04</td><td>GEOTECHNICAL DESIGN - PORTION 2 (SOUTHERN SECTION)</td></tr><tr><td>GN02</td><td>SAFETY IN DESIGN REPORT</td></tr><tr><td>LA01</td><td>LANDSCAPE DESIGN</td></tr><tr><td>MS01</td><td>DRAINAGE CULVERTS</td></tr><tr><td>MS02</td><td>MISCELLANEOUS STRUCTURES</td></tr><tr><td>NV01</td><td>OPERATIONAL NOISE AND VIBRATION REPORT</td></tr><tr><td>PJ01</td><td>PROPERTY ADJUSTMENTS - PORTION 2 (SOUTHERN SECTION)</td></tr><tr><td>PV01</td><td>PAVEMENTS AND SUBSURFACE DRAINAGE - PORTION 2 (SOUTHERN SECTION)</td></tr><tr><td>SD01</td><td>FLOODING AND HYDROLOGY - PORTION 2 (SOUTHERN SECTION)</td></tr><tr><td>SD02</td><td>DRAINAGE TRANSVERSE AND LONGITUDINAL - PORTION 2 (SOUTHERN SECTION)</td></tr><tr><td>TP01</td><td>TRAFFIC MODELLING</td></tr><tr><td>TT01</td><td>INTELLIGENT TRANSPORT SYSTEMS</td></tr><tr><td>TT02</td><td>TRAFFIC CONTROL SIGNALS</td></tr><tr><td>TW01</td><td>TRAFFIC STAGING (CAT1)</td></tr><tr><td>TW02</td><td>BR01 - FLYOVER TEMPORARY GIRDER SUPPORT (CAT1)</td></tr><tr><td>UT01</td><td>UTILITY COORDINATION PLAN</td></tr></table> ELECTRICAL NOTES 1. NO ELECTRICAL DESIGNS HAVE BEEN PRESENTED WITHIN THIS DRAWING PACKAGE. 2. ALL INSTALLATIONS SHALL FORM PART OF THE ENDEAVOUR ENERGY NETWORK AND MUST BE UNDERTAKEN BY AN ASP3 LEVEL ELECTRICAL ENGINEER POST FINAL SUBMISSION.													DESIGN PACKAGE	DESCRIPTION	BR01	BR01 - BRIDGE OVER ROOTY HILL ROAD NORTH (FLYOVER BRIDGE) AND RETAINING WALL	BR02	BR02 - BRIDGE OVER BELLS CREEK ON RICHMOND RD NORTHBOUND	BR03	BR03 - UPGRADE OF EXISTING BRIDGE OVER BELLS CREEK	DM01	SITE CLEARING	DU01	URBAN DESIGN AND LANDSCAPE PLAN	DY01	DURABILITY REPORT	FN01	ROAD FURNITURE - PORTION 2 (SOUTHERN SECTION)	GE01	GEOTECHNICAL INVESTIGATION PLAN	GE03	GEOTECHNICAL INTERPRETATIVE REPORT	GE04	GEOTECHNICAL DESIGN - PORTION 2 (SOUTHERN SECTION)	GN02	SAFETY IN DESIGN REPORT	LA01	LANDSCAPE DESIGN	MS01	DRAINAGE CULVERTS	MS02	MISCELLANEOUS STRUCTURES	NV01	OPERATIONAL NOISE AND VIBRATION REPORT	PJ01	PROPERTY ADJUSTMENTS - PORTION 2 (SOUTHERN SECTION)	PV01	PAVEMENTS AND SUBSURFACE DRAINAGE - PORTION 2 (SOUTHERN SECTION)	SD01	FLOODING AND HYDROLOGY - PORTION 2 (SOUTHERN SECTION)	SD02	DRAINAGE TRANSVERSE AND LONGITUDINAL - PORTION 2 (SOUTHERN SECTION)	TP01	TRAFFIC MODELLING	TT01	INTELLIGENT TRANSPORT SYSTEMS	TT02	TRAFFIC CONTROL SIGNALS	TW01	TRAFFIC STAGING (CAT1)	TW02	BR01 - FLYOVER TEMPORARY GIRDER SUPPORT (CAT1)	UT01	UTILITY COORDINATION PLAN	A	B	C	D	E	F	G	H											
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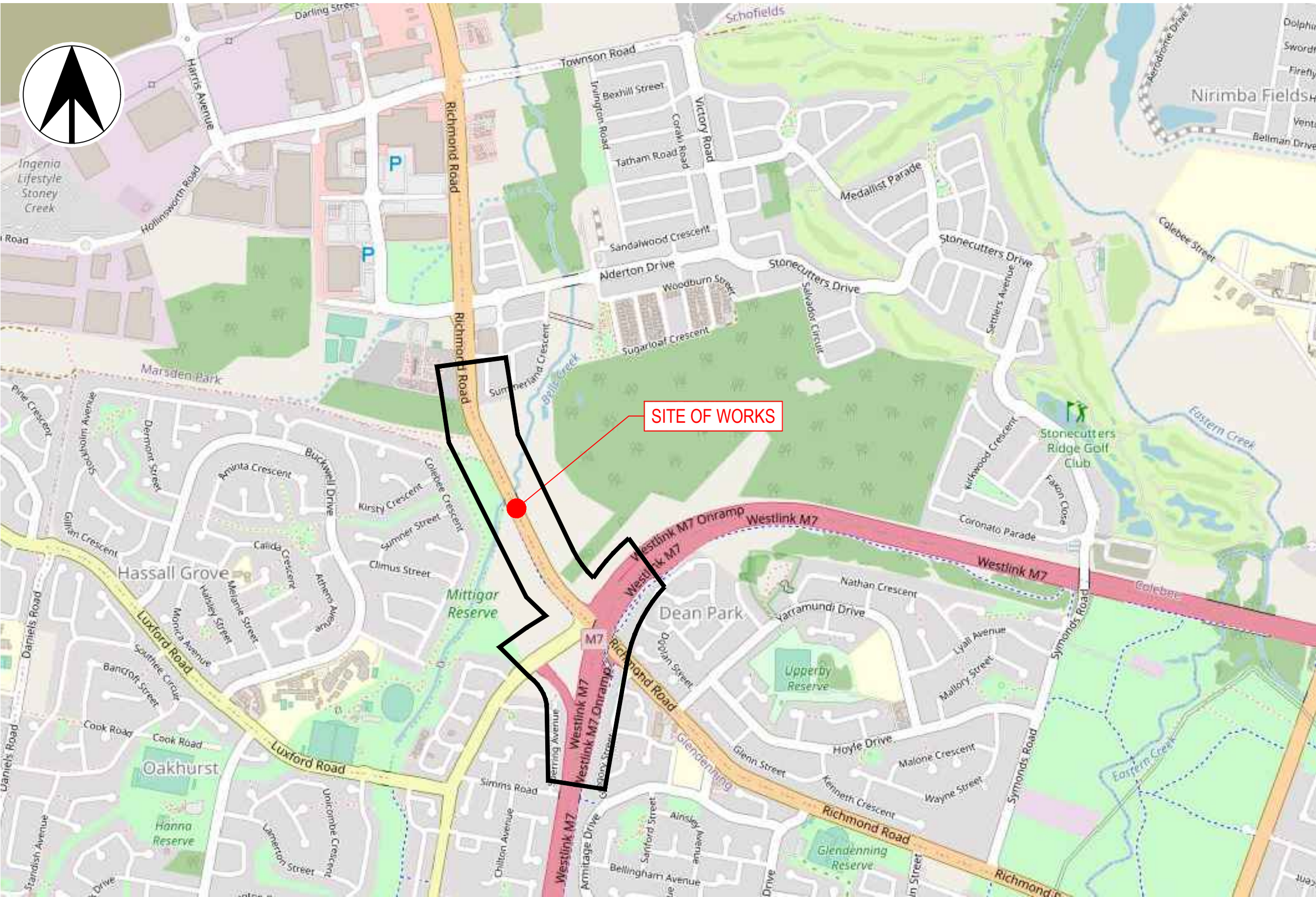
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B	SUBSTANTIAL DETAILED DESIGN				MDT 01/05/2026	MR 01/05/2026	RF 01/05/2026						
A	DEVELOPED CONCEPT DESIGN				MDT 23/02/2026	MR 23/02/2026	RF 23/02/2026						
REV	DESCRIPTION				DESIGNER INITIAL/DATE	VERIFIED INITIAL/DATE	APPROVED INITIAL/DATE						
COORDINATE SYSTEM: MGA_ZONE_56/GDA20							HEIGHT DATUM: AHD		DESIGN LOT CODE:				

BLACKTOWN CITY COUNCIL					
MR537 - RICHMOND ROAD					
RICHMOND ROAD UPGRADE					
M7 TO TOWNSON ROAD					
STREET LIGHTING					
COVER SHEET					
DRAWING SET No: DS2026/000040			PART:	SHEET: 01 OF 01	A1
STATUS: SUBSTANTIAL DETAILED DESIGN			BRIDGE No: ©		
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RRM7-GEDT-0537-LV-DRG-000001	B				



FILE NAME: RRM7-GEDT-0537-LV-DRG-000001.dwg

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