TITLE:

ELECTRIC VEHICLE READINESS - Hunter Indoor Sports Centre

BY: David Manahan
DATE:23/05/2025
CLIENT: EJE Architecture
ISSUE: G

REPORT & DESIGN

PREPARED BY:
Electrical Projects Australia Pty Limited
386 Maitland Road
MAYFIELD NSW 2304
02 4967 5999
mail@epa.energy

Table of Contents

INTRODUCTION

Electrical Projects Australia has been commissioned by Basketball Association of Newcastle Limited (BANL) to prepare this report in accordance with the technical requirements of the Secretary's Environmental Assessment Requirements (SEARs), and in support of the State Significant Development Application (SSD- 65595459) for the proposed Hunter Indoor Sport Centre with courts, indoor stadium, amenities and associated civil and landscaping works, at 2 Monash Road and 24 Wallarah Road, New Lambton.

As the adoption of electric vehicles continues to grow at an unprecedented rate, it has become increasingly important for new developments to be designed with adequate charging infrastructure in place. This not only contributes to the long-term sustainability of the development but also provides added value to the stakeholders.

This report will present the comprehensive plan, detailing the necessary electrical infrastructure, specifications, and provisions that will be implemented to ensure compliance with this requirement.

This report must be submitted with the State Significant Development Application. It was produced by a suitably qualified and experienced person (a qualified electrical engineer) and it demonstrates how the development will be EV Ready. This report includes an accurate electrical plan, specifications for any off-street car parking and any power supply requirements.

The electrical plan provided in this report has been prepared in collaboration with certified electrical engineers, who have extensive experience in the design and implementation of EV charging infrastructure and have the required insurance to perform this work. Electrical Projects Australia has reviewed the architectural plans prepared by EJE for the Hunter Indoor Sports centre, and the plan aims to demonstrate a robust and easily executed solution for the integration of EV charging points within the development, ensuring the needs of current and future users are met while promoting sustainable transportation options.

In the following sections of this report, we will discuss the key aspects of the electrical plan, including the overall layout, technical specifications, installation process, and any relevant considerations. Additionally, we will highlight any potential challenges and propose viable solutions to ensure a seamless integration of the EV charging infrastructure into the development project. We believe the design herein strikes a balance between Newcastle Council's DCP 2023 and NCC 2022 part J9D4 and is suitable for a project of this nature.

Refer to drawing: 23376-EV01 E for further details.

WHAT IS A LEVEL 2 ELECTRIC VEHICLE CHARGER

Transport NSW defines Level 2 Electric vehicle charging levels as follows:

	Power	Range added per hour	Charging time	Typical application
Level 1 – single phase (domestic)	2.4-3.7kW	10-20km range / hour	5-16 hours	Home
Level 2 slow – single phase (domestic or public)	7 kW	30-45km range / hour	2-5 hours	Home,work, shopping centres, car parks
Level 2 fast – three-phase (public)	11-22kW	50-130km range / hour	30mins – 2 hours	Urban roadside
Level 3 – fast charge (public)	50kW	250-300km range / hour	20-60 mins	Regional near highways, motorways and key routes
Level 4 – super-fast charge (public)	120kW	400-500km range / hour	20-40 mins	Regional near highways, motorways and key routes
Ultra-fast charge (public)	350kW	1000+ km range / hour	10-15 mins	Highways and motorways

Type 2 (Mennekes) Plug is a type of charging connector used in Australia and many other countries around the world. It is a standardised charging connector that enables electric vehicles (EVs) to be charged from AC power sources.

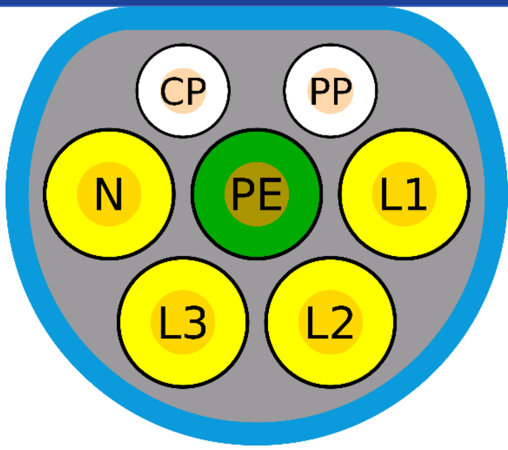
Mode 3 charging is a type of charging protocol that is used with Type 2 charging connectors. It is the most common charging method for AC charging and involves communication between the EV and the charging station to ensure safe and efficient charging.

In Australia, Type 2 charging connectors are used for both public and private charging infrastructure. They are designed to provide between 7kW to 22 kW of power to the EV, depending on the specific charging station and the capabilities of the vehicle.

Mode 3 charging involves the use of a communication protocol between the EV and the charging station to ensure that the correct amount of power is delivered safely and efficiently. This involves the use of a control pilot wire that sends signals between the EV and the charging station to manage the charging process.

Type 2 charging stations are compatible with most modern EVs, including models from brands such as Tesla, Nissan, BMW, and Audi. To use a Type 2 charging station, an EV driver will need to have a Type 2 charging cable which can be purchased separately, or the Type 2 charger is tethered to the charger.

In summary, Type 2 electric vehicle charging is a widely used standard in Australia that allows EV drivers to charge their vehicles at a faster rate than a standard household socket.

<table>
<tr><th>Type 2 connector</th><th>Type 2, end view of female plug</th></tr>
<tr><td></td><td>
</td></tr>
</table>

INSTALLATION GUIDANCE OF LEVEL 2 ELECTRIC VEHICLE CHRAGING

Appendix P of AS3000 provides guidance on the installation and placement of electric vehicle socket outlets and charging stations in Australia. This summary outlines the recommendations from the Australian Wiring Rules for new Level 2 charging stations.

Maximum Demand:

1. Each connecting point should be used at its full rated current.
2. All connecting points in an installation can be used simultaneously.

Installation:

1. Provide a dedicated circuit for each EV connecting point.
2. Locate socket-outlet or vehicle connector close to the EV parking place.

External Influences:

1. For outdoor installations, equipment should have at least IPX4 protection against water splashes and IP4X protection against solid foreign bodies.
2. Equipment in public areas and car parks should be protected against mechanical damage, with a minimum impact protection of IK07.

Protection Devices:

1. Each connecting point should have its own Type B RCD at minimum with a rated residual operating current not exceeding 30 mA.
2. For IEC 62196 series compliant charging stations, measures against DC fault current should be taken with either a Type B RCD or Type A RCD with additional equipment for disconnection in case of DC fault current above 6 mA.
3. RCDs should disconnect all live conductors.
4. Each connecting point should have individual overcurrent protection with devices complying with AS/NZS 60898, AS/NZS 61009, or AS/NZS 60947 series.
5. Control signals on the protective conductor (PE) should not flow into the fixed electrical installation, and should not impair the functioning of protective devices like RCDs.

Permitted socket-outlets or vehicle connectors:

1. A Type 2 socket-outlet or vehicle connector, compliant with AS IEC 62196-2, for Mode 3 charging only.

EXAMPLE DWELLING MAXIMUM DEMAND

The following maximum demand calculation is based on AS/NZS3000 Table C1 and serves as a reference example only. It is the ultimate responsibility of the project electrician to determine the site's maximum demand accurately. Notably, the amperage for each anticipated Level 2 Electric Vehicle charger is confirmed at 32A three-phase, and for multiple chargers diversification is used to represent the total load demand profile. Once the electrician finalizes the maximum demand calculation, they must include 100% of this value in their overall assessment.

ELECTRICAL PROJECTS AUSTRALIA Pty Limited

Electrical Projects Australia
Maximum Demand1
Commercial - Industrial

Job Number:	23379		
Project:	Newcastle Basketball		
Site:	24 Wallrah Rd & 2 Monash Rd, New Lambton 2305		
Issued By:	DM		
Date:	06.03.24	Revision:	A

Standard Used
AS3000:2018 Table C2

Installation Type
Business Premises

Load Group		Description (If Applicable)	No. of Points	Full Load (A)	Diversity	Maximum Demand (A)
A	Lighting					
B (i)	Socket Outlets					
B (ii)	Socket Outlets					
B (iii)	Socket Outlets					
C (i)	Cooking Appliances					
C (ii)	Charging equipment associated with electric vehicles	EV Charger 1		32		32
		EV Charger 2		32		24
		EV Charger 3		32		24
		EV Charger 4		32		24
		EV Charger 5		32		24
		EV Charger 6		32		24
		EV Charger 7		32		24
		EV Charger 8		32		24
		EV Charger 9		32		24
		EV Charger 10		32		24
		EV Charger 11		32		24
		EV Charger 12		32		24
		EV Charger 13		32		24
D	Motors					
E	Lifts					
F (i)	Fuel Dispensing Units (Motors)					
F (ii)	Fuel Dispensing Units (Lighting)					
G	Water Heaters					
H	Welding Machines					
J	X-Ray Equipment					
K	Other Equipment					
Total						320

Phase Balancing (A)			
Phase	Red	White	Blue
R/W/B	32	32	32
R/W/B	24	24	24
R/W/B	24	24	24
R/W/B	24	24	24
R/W/B	24	24	24
R/W/B	24	24	24
R/W/B	24	24	24
R/W/B	24	24	24
R/W/B	24	24	24
R/W/B	24	24	24
R/W/B	24	24	24
R/W/B	24	24	24
R/W/B	24	24	24
Total	320	320	320

Now, incorporate the extra 11-22kW (320A) for the Electric Vehicle Chargers (EVC) into the previously calculated Maximum Demand (MD). This results in a combined example Total Maximum Demand (TMD) as follows:

$$\mathrm{MD} + \mathrm{EVC} = \mathrm{MD} + 320\mathrm{A} = \mathbf{TMD}$$

$$\mathrm{MD} + \mathrm{EVC} = 712\mathrm{A} + 320\mathrm{A} = \mathbf{1032A}$$

ELECTRICAL PROJECTS AUSTRALIA

Electrical Projects Australia
Maximum Demand Summary

Job Number:	23376		
Project:	Newcastle Basketball		
Site:	24 Wallarah Road, New Lambton NSW 2305		
Issued By:	DM		
Date:	06.03.24	Revision:	B

Total Load Diversity (If Required)	

Maximum Demand Load			
Calculation Spreadsheet	Phase Balancing (A)		
	Red	White	Blue
Stage 1 - Light and Power	198.54	198.54	198.54
Stage 1 - Mech	135.39	135.39	135.39
Stage 2 - Light and Power	118.72	118.72	118.72
Stage 2 - Mech	167.00	167.00	167.00
Spare 15%	92.95	92.95	92.95
EV Chargers	320.00	320.00	320.00
Total	1032.59	1032.59	1032.59

OPTION BETWEEN EV CHARGER CONDUIT PATHWAY OR CIRCUIT INSTALLATION

The Hunter Indoor Sports Centre is classified as a class 9b building, with 240 car park spaces. The complex shall have the following:

Option 1: EV CHARGER CIRCUIT CONDUIT PATHWAY

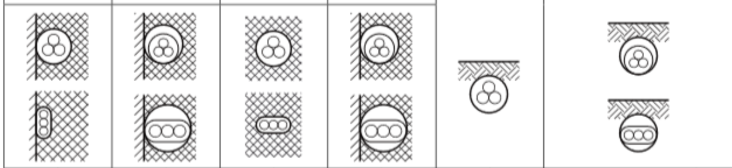
To prepare for a future Electric Vehicle charger installation, we recommend installing a 63mm conduit with draw wire in the slab from each EV distribution board to power pits located around the car park to service 20% of all spaces. This conduit will accommodate up to 2x 10 or 16mmsq 4c+E X-90 XLPE cable running from the EV distribution board (DB-EV) to the charger location. The installing Electrical contractor is responsible for final sizing of cables. Please ensure that the conduit includes no more than two four quarter bends (360degs).

Option 2: EV CHARGER CIRCUIT INSTALLTION

To prepare for Electric Vehicle charger installation, we recommend for current installation of 11-22kW three-phase EV chargers to install 2x 10mmsq 4c+E X-90 XLPE cable running from the EV distribution board (DB-EV) to the charger location if under 50m run length, or 16mmsq 4c+E X-90 XLPE cable if over 50m run length. The installing Electrical contractor is responsible for final sizing of cables. Please ensure that the conduit includes no more than two four quarter bends (360degs). When future EV chargers are installed, locate conduit using tracing wire, dig down to conduit and install a pit next to EV charger location and connect cabling from conduit, through pit into the EV charging station.

Electric Vehicle Charger Circuit Cable Sizing

The final cable sizing shall be determined based on the installation method and current ratings outlined in AS/NZS3008.

14	15	16	17	18	19	20	21	22	23	24	25	26	27
Conductor size	Current-carrying capacity, A												
	Thermal insulation								Buried direct		Underground wiring enclosure		
	Partially surrounded by thermal insulation, unenclosed		Partially surrounded by thermal insulation, in a wiring enclosure		Completely surrounded by thermal insulation, unenclosed		Completely surrounded by thermal insulation, in a wiring enclosure						
													
											Cu		
mm²	Cu	Al	Cu	Al	Cu	Al	Cu	Al	Cu	Al	Solid/ Stranded	Flexible	Al
1	12	—	10	—	7	—	6	—	16	—	16	17	—
1.5	15	—	13	—	9	—	8	—	20	—	20	21	—
2.5	21	—	19	—	13	—	12	—	29	—	29	28	—
4	28	—	24	—	18	—	15	—	37	—	37	36	—
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
10	49	—	42	—	31	—	26	—	63	—	63	62	—
16	66	51	55	42	41	32	34	26	110	85	81	79	63
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
35	110	85	91	71	69	53	57	44	172	133	130	127	101
50	134	104	108	84	—	—	—	—	204	159	155	155	120
70	170	132	138	107	—	—	—	—	251	195	193	193	150
95	210	163	167	129	—	—	—	—	302	234	233	226	181
120	245	190	197	153	—	—	—	—	344	267	270	266	210
150	280	218	222	172	—	—	—	—	385	299	304	300	236
185	323	252	257	201	—	—	—	—	435	340	348	339	272
240	383	300	309	242	—	—	—	—	504	395	411	402	322
300	—	—	—	—	—	—	—	—	567	446	463	452	365
400	—	—	—	—	—	—	—	—	640	510	524	537	417
500	—	—	—	—	—	—	—	—	714	577	601	602	485

Electric Vehicle Charger Circuit Protection Allowance

There must be sufficient DIN rail space, 4 pole 18mm within the EV distribution boards capable of accommodating up to 24 type B RCD, that will isolate all active conductors including active and neutral cables.

Electric Vehicle Charger Circuit Electricity Metering

Sufficient space of at least 36mm width of DIN rail per outgoing circuit for individual sub-circuit electricity metering
to record electricity use of electric vehicle charging equipment, and be labelled to indicate the use of the space required is for the future installation of metering equipment within the EV distribution board.

OPTION BETWEEN CAPACITY INCREASE OR EV DEMAND MANAGEMENT

The two options provided aim to address the integration of an electric vehicle (EV) charger into a dwelling's main electrical supply infrastructure. They differ in the extent of charger capacity integration and the approach to managing output of the future Level 2 charger to when the capacity in the complex's main electrical supply infrastructure in available.

Option 1: Full Electric Car Charger Capacity Integration

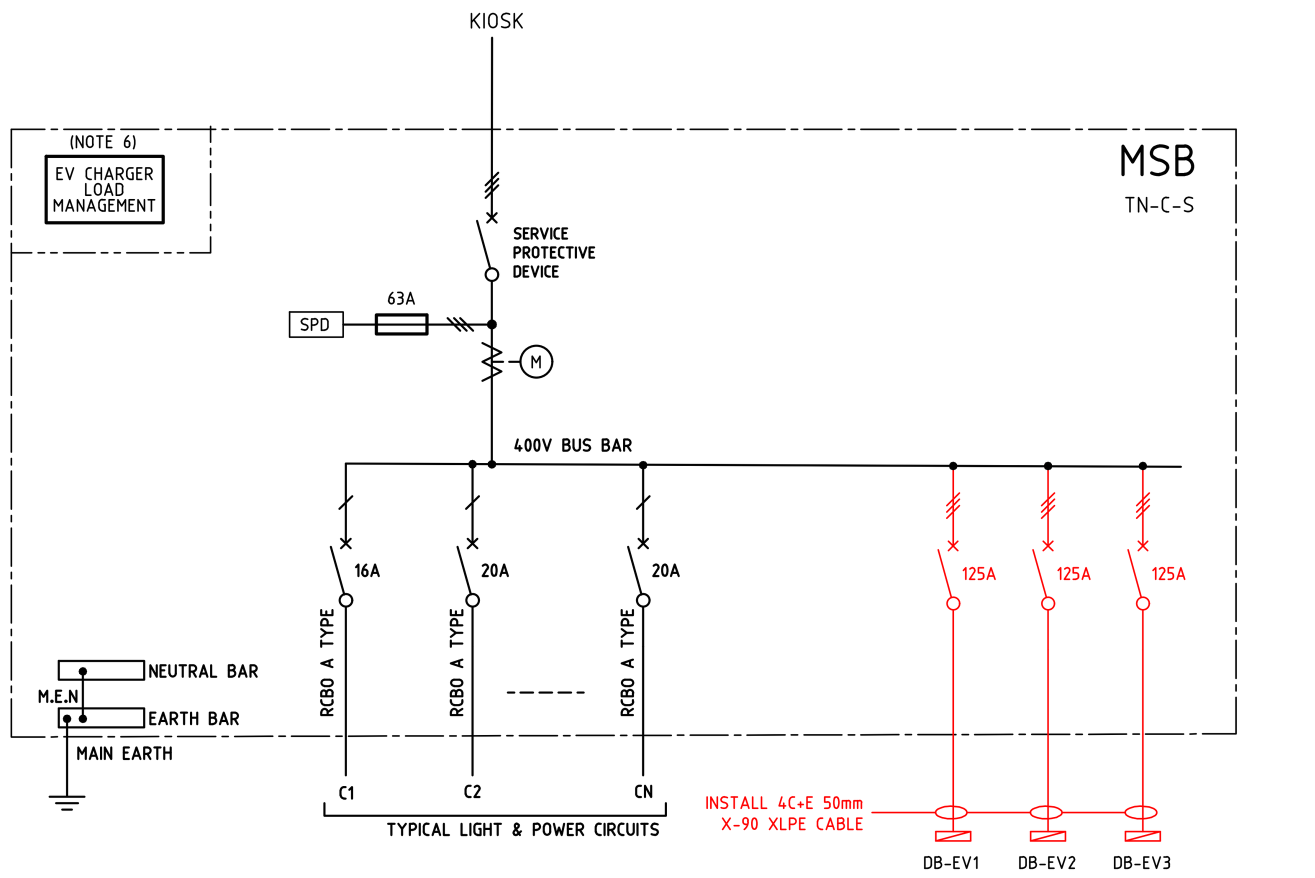
This option involves integrating the full capacity of the EV charger into the dwelling's maximum electrical demand. By adding 100% of each charger's capacity (320A with diversification) which includes additional capacity for the three-phase service main and consumer mains, the electrical infrastructure will be able to support the EV charger's full load without the need for demand management. This approach requires upgrading the consumer mains and service mains to handle the increased load, with a recommended rating of 320A three phase to be added to the complex's maximum demand calculation.

Option 2: Partial Integration with Future Demand Management

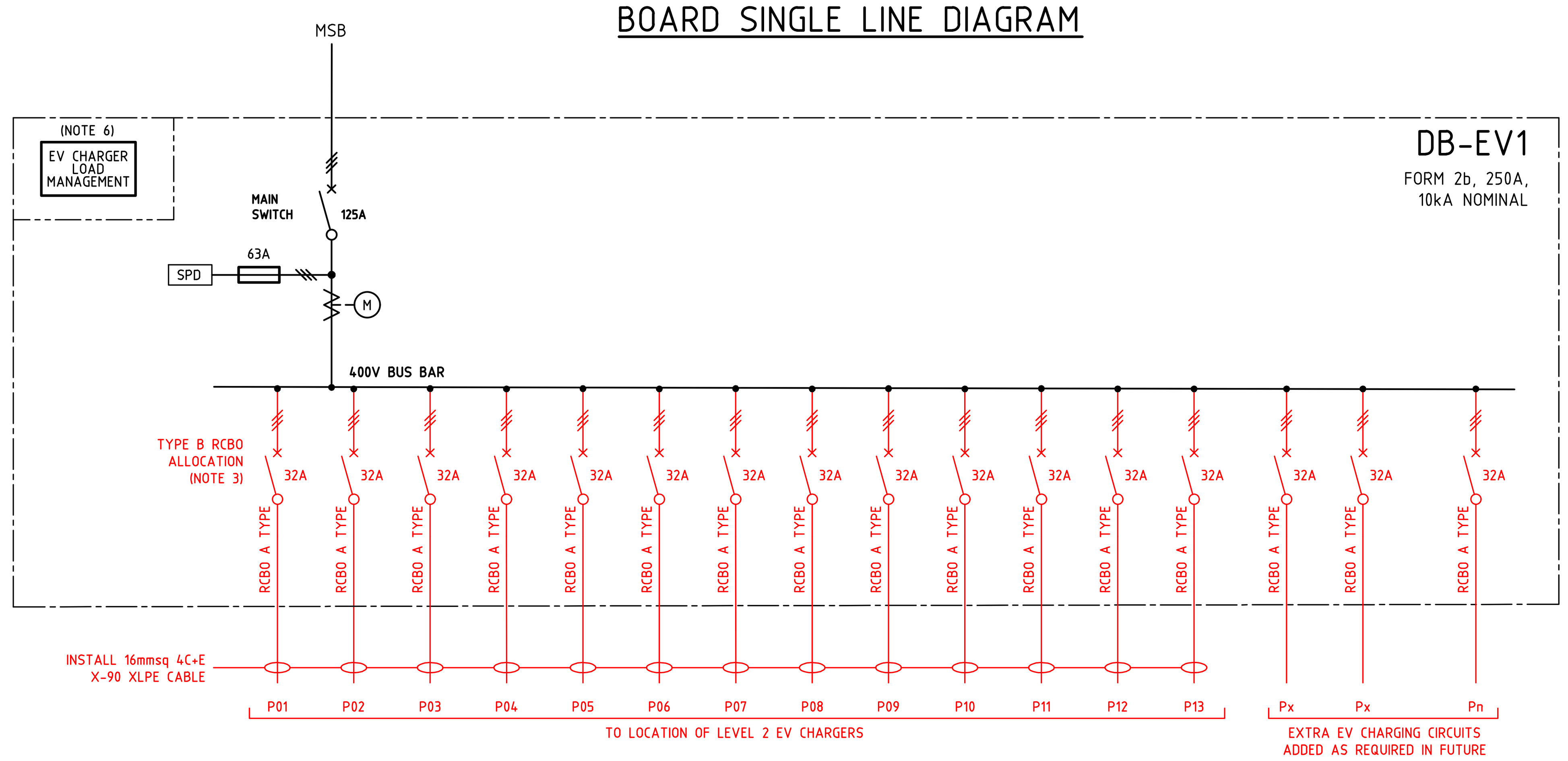
This option is a more flexible approach in case the full capacity for future EV charger cannot be integrated into the building's electrical system. Instead, a separate Cat6 communications cable (50mm min separation of LV cables), and spare conduit is installed between the main switchboard (MSB) and the EV charging location. This option also includes providing for a future EV Distribution Board, allowing for the future implementation of a demand management system for the EV charger. This system would help manage the electrical load when the charger is in use. Additionally, this option must ensure there is enough space for future current sensors to be added to the building consumer mains on the load side of the main switch. These sensors will monitor and help manage the electrical load more efficiently.

At present for the Newcastle Basketball development the 13x 11-22kW EV chargers that are proposed to be installed are able to be 100% accommodated by the site's supply, and electrical circuitry is provided to support the installation of up to a level 2 fast – three-phase 11-22kW EV charger to 20% of car park spaces, but if in the future additional EV chargers are to be installed on the site and the load starts to exceed the supply capacity, demand management will be necessary. The design presented in 23376-EV01 aims to balance the requirements of Newcastle Council's DCP 2023 and NCC 2022 part J9D4 in a realistic manner, with future expansion of the EV charging capabilities at the site being possible.

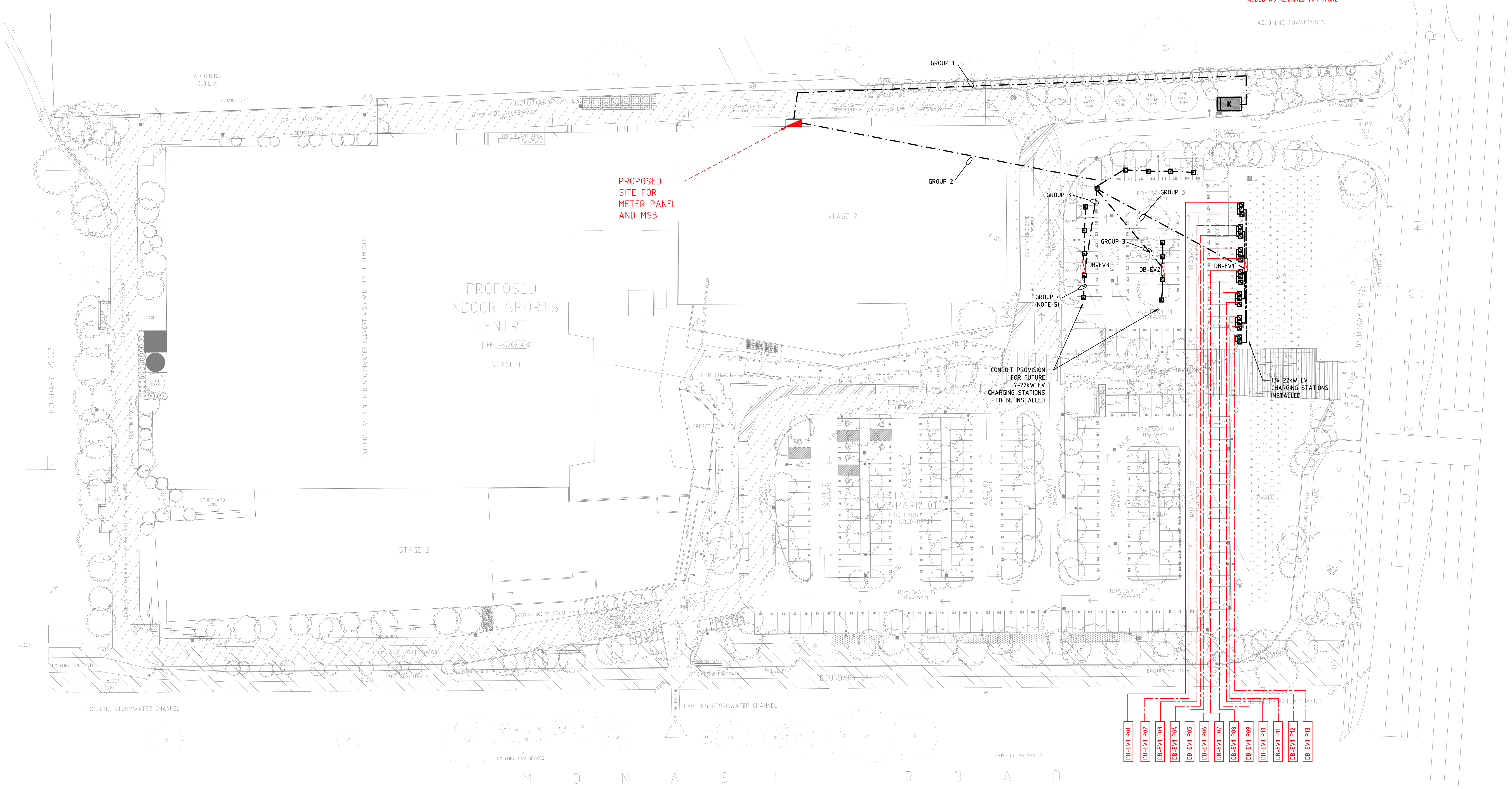
MAIN SWITCHBOARD SINGLE LINE DIAGRAM



TYPICAL EV CHARGER DISTRIBUTION BOARD SINGLE LINE DIAGRAM



LOCATION PLAN



CONDUIT GROUPS

GROUP 1	- 4 x 125mmsq HDUPVC CONDUIT
GROUP 2	- 3 x 125mmsq HDUPVC CONDUIT - 3 x 50mmsq COMMS CONDUIT
GROUP 3	- 1 x 80mmsq HDUPVC CONDUIT - 1 x 40mmsq COMMS CONDUIT
GROUP 4	- 1 x 63mmsq HDUPVC CONDUIT - 1 x 25mmsq COMMS CONDUIT

LEGEND

- METER PANEL & M.S.B
- ELECTRIC VEHICLE DISTRIBUTION BOARD
- DBA L01 — DISTRIBUTION BOARD / CIRCUIT NUMBER
- ELECTRIC VEHICLE CIRCUIT
- HDUPVC CONDUIT
- 22kW 32A TYPE 2 EV CHARGER - SCHNEIDER EVLINK PRO AC OR SIMILAR
- POWER PIT
- ISOLATOR SWITCH
- CIRCUIT BREAKER
- RCD — RESIDUAL CURRENT DEVICE
- METERING

NOTES

1. DRAWING TO BE READ IN CONJUNCTION WITH BUILDING DESIGN ELEVATIONS/SECTIONS AND FURNITURE LAYOUTS.
2. REFER TO EV READINESS REPORT FOR FURTHER DETAILS.
3. TYPE A RCBO MAY BE USED IF APPROPRIATE EQUIPMENT THAT ENSURES DISCONNECTION OF THE SUPPLY IN CASE OF A D.C FAULT CURRENT ABOVE 6mA IS ALSO USED. THE RCBO MUST DISCONNECT BOTH LIVE CONDUCTORS.
4. TO INSTALL FUTURE EV CHARGERS EACH PARKING SPACE HAS THE CAPABILITY TO INSTALL UP TO A LEVEL 2 FAST - THREE-PHASE 22kW EV CHARGER, BY RUNNING CONDUIT FROM THE AVAILABLE PITS TO THE PROPOSED EV CHARGER LOCATION. FUTURE THREE-PHASE 22kW EV CHARGERS WILL REQUIRE 16mm 4C+E X-90 XLPE CABLE. INSTALLING ELECTRICAL CONTRACTOR WILL BE RESPONSIBLE FOR FINAL SIZING OF CABLES.
5. ALL CONDUITS BETWEEN EV CHARGING DISTRIBUTION BOARDS DB-EVx AND PITS OR EV CHARGERS ARE TO BE GROUP 4.
6. EV CHARGERES TO BE LOAD LIMITED USING EV CHARGER LOAD MANAGEMENT DEVICE SUCH AS SCHNIEDER EVLINK ECOSTRUXURE CHARGING EXPERT OR SIMILAR. COMMS CONNECTION WITH CAT6 CABLE TO BE PROVIDED BETWEEN CHARGERS AND DISTRIBUTION BOARDS.

REV	REVISION DETAILS	BY	APP.	DATE
E	REVISED SSDA ISSUE	GE	JC	23.05.25
D	REVISED STAGE 2 DESIGN	DM	JC	10.04.24
C	NCC COMPLIANT REVISION	DM	JC	08.04.24
B	REVISED SSDA ISSUE	GE	JC	13.03.24
A	PRELIMINARY ISSUE	DM	JC	06.03.24

SCALE BAR 1:500

0 5 10 15 20 25m

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN

Completion of the Drawing Status is evidence that the design has been verified as conforming to the requirements of the Project Quality Plan

DRAWING STATUS	Reviewed By:	Signature	Date
Preliminary	JC	JC	06.03.24
For Information Only			
For Approval			
For Tender			
For Construction			

DESIGNED BY:
ELECTRICAL PROJECTS AUSTRALIA
386 MAITLAND ROAD
MAYFIELD NSW 2304
02 4967 5999
MAIL@EPA.ENERGY

PROJECT: HUNTER INDOOR SPORTS CENTRE

CLIENT: EJE ARCHITECTURE

LOCATION: 24 WALLARAH RD & 2 MONASH RD, NEW LAMBTON NSW 2305

DRAWING: ELECTRIC VEHICLE CHARGER DESIGN PLAN VIEW

DATE: 23.02.24 DRAWN: SP

SCALE: 1:500@A1 DESIGN: JC

PROJECT No. 23376 DRAWING No: EV01 ISSUE: E