

# **Integrated Water Cycle Management Strategy**

**MOD 31 BG1 & BG2 Heat Recovery,  
Northern Carpark & Ancillary Plant**

For

**Manildra Group**

**Site address**

Part lot 241/1130535, part lot 243/1309444, part lot  
1/1305953DP, 160 & 171 Bolong Road, Bomaderry

**Date**

26/08/2025

**Project Reference:** 131353



## Copyright Statement

© Allen Price Pty Ltd 2025

Other than as permitted by the Copyright Act 1968, no part of this report may be reproduced, transmitted, stored in a retrieval system or adapted in any form or by any means (electronic, mechanical, photocopying, recording or otherwise) without written permissions. Enquiries should be addressed to Allen Price Pty Ltd.

The document may only be used for the purposes for which it was commissioned. Unauthorised use of this document in any form whatsoever is prohibited. Allen Price Pty Ltd assumes no responsibility where the document is used for purposes other than those for which it was commissioned.

This report has been prepared on behalf of and for the exclusive use of the Client, and is subject to and issued in connection with the provisions of the agreement between Allen Price Pty Ltd and the Client. Allen Price Pty Ltd accepts no liability or responsibility whatsoever for, or in respect of any use of or reliance upon this report by any third party.

**Nowra Office: 75 Plunkett Street, Nowra NSW 2541 • PO Box 73, Nowra 2541**

Kiama Office: 1/28 Bong Bong Street, Kiama NSW 2533

Wollongong Office: Suite 1, Level 2, 83-85 Market Street, Wollongong NSW 2500

**Tel** 02 4421 6544 • **email** consultants@allenprice.com.au

**ABN** 62 609 045 972

***Liability limited by a scheme approved under Professional Standards Legislation***



## **PREPARED BY**

Allen Price  
Land and Development Consultants

75 Plunkett Street  
NOWRA NSW 2541

1/28 Bong Bong Street  
KIAMA NSW 2533

Suite 1 Level 2  
83-85 Market Street  
WOLLONGONG NSW 2500

## **AUTHOR**

**Wal Mullany**

BE, Grad Dip LGE, ME(Hons), MCP, MIE Aust, CPEng, NER

for Allen Price



## TABLE OF CONTENTS

<b>1.0 Introduction</b>	5
<b>2.0 Site &amp; Locality .</b>	6
2.1 General Description.	6
2.2 Proposed Development	7
<b>3.0 Stormwater Quality</b>	9
3.1 Distillery Heat Recovery Evaporators (DHRE)	9
3.2 Distillery Heat Recovery Building (DHRB)	9
3.3 DDG Heat Exchangers (DDGHE)	9
3.4 Qualitative Stormwater Quality Assessment DHRE, DHRB, DDGHE	10
3.5 Northern Carpark Extension	11
3.6 Overhead Gantry and Overhead Electrical Bridge	11
3.7 Stormwater Pollutant Estimation	11
3.8 Erosion and Sediment Control Concept	13
<b>4.0 Stormwater Quantity</b>	15
4.1 Site Retention Requirement	15
4.2 Runoff Mitigation	17
<b>5.0 DCP2014 Compliance Tables</b>	18
<b>6.0 Conclusion</b>	35
<b>APPENDIX A – Manildra Development Plans</b>	37
<b>APPENDIX B – Concept Engineering Plans</b>	38
<b>APPENDIX C – Concept DRAINS Model</b>	39
C-1: Existing Site Conditions – Model Structure	39
C-2: 1% AEP Results	41
C-3: 10 % AEP Results	43
C-4: 20% AEP Results	44

### Table of Revisions

Initial	Rev	Date	Details
WRM	0	24/7/2025	Client Review
WRM	1	5/8/2025	Include DDG Heat Exchange
WRM	2	26/8/2025	Issued for DA Submission



## 1.0 INTRODUCTION

Allen Price (AP) has been engaged by the Manildra Group to prepare an Integrated Water Cycle Management Strategy for Mod 31 BGD1 & BGD2 Distillery Heat Recovery Building, (including overhead gantry, Northern carpark extension and ancillary plant).

The proposed BGD1 & BGD2 Distillery Heat Recovery project is located within the existing processing plant at No 160 & No 171 Bolong Road, Bomaderry, being part lot 241/1130535, part lot 243/1309444 & part lot 1/1305953.

The provisions of Table 5 in section 6.1 of Chapter G2 of DCP2014 defines the proposal as a large scale development.

This report references the following Shoalhaven City Council (SCC) standards and technical advice:

D5 Engineering Standards document and DCP2014,

Chapter G2 of DCP2014,

Supporting document Sustainable Stormwater Technical Guidelines.

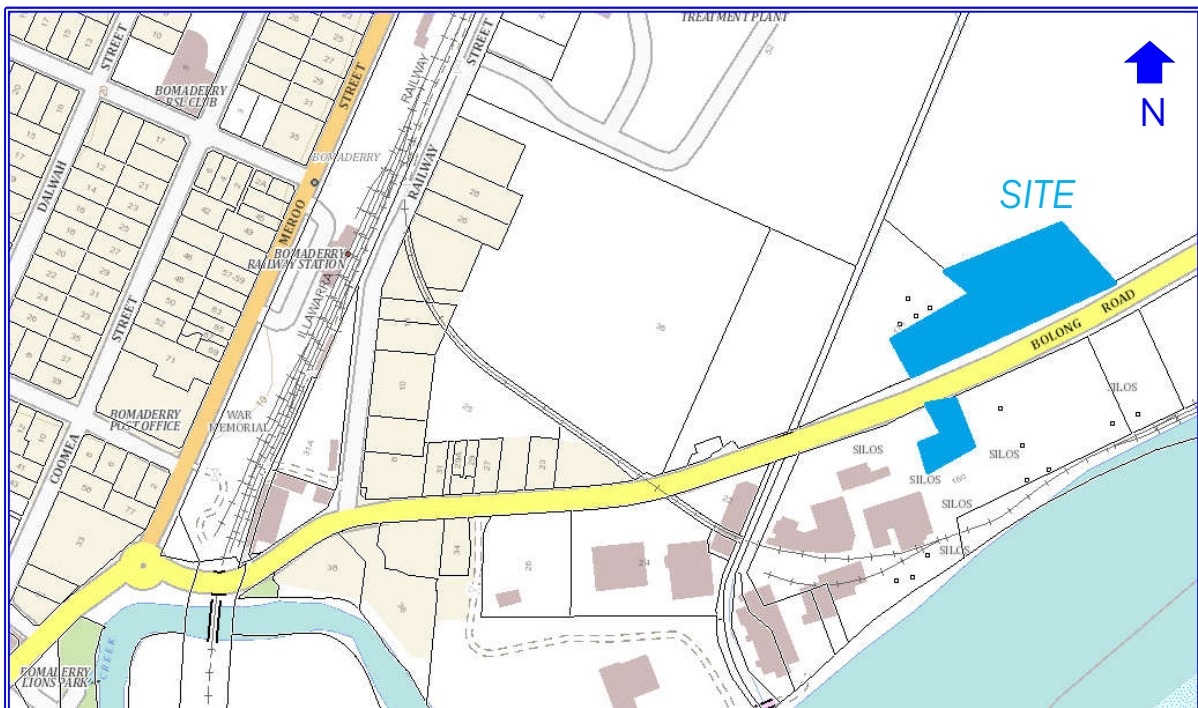
## 2.0 SITE AND LOCALITY

### 2.1 General Description

The site for the proposed MOD 31 BGD1 & BGD2 Heat Recovery buildings, overhead gantry, ancillary plant and the Northern Carpark extension is within the existing Manildra processing plant precinct in Bolong road, Bomaderry.

Access to the site is available via existing formalised entry points on Bolong Road.

The site location and overall layout is presented in Figure 2.1.



**Figure 2.1**  
**Site Locality Sketch**  
(source Six Maps)

Flooding impacts have been assessed by others and are not addressed by this report.

Flood levels in the vicinity of the site (Terara Gauge) for current climate conditions are presented in Table 10-1 of the Lower Shoalhaven (*Cardno 9 Nov 2022, p105*) as follows:

- PMF flood level RL7.46
- 1% AEP flood level at RL 5.19.
- 5% AEP flood level at RL 4.61.
- 10% AEP flood level at RL 3.99.
- 20% AEP flood level at RL 2.87.



Flood levels in the vicinity of the site (Terara Gauge) for the period 2050-2100 are presented in Table 10-2 and Table 10.3 of the Lower Shoalhaven Flood Study (Cardno 9 Nov 2022, p107) as follows:

- PMF flood level RL 7.47 – 7.47 (2050 – 2100)
- 1% AEP flood level at RL5.19 (2050 – 2100).
- 5% AEP flood level at RL4.61 (2050-2100).
- 10% AEP flood level at RL 4.0 (2050 – 2100).

The elevation of the site varies from RL 3.5 to RL3.75 on the southern side of Bolong Road. The elevation of the site varies from RL 3.3 to RL1.3 on the northern side Bolong Road.

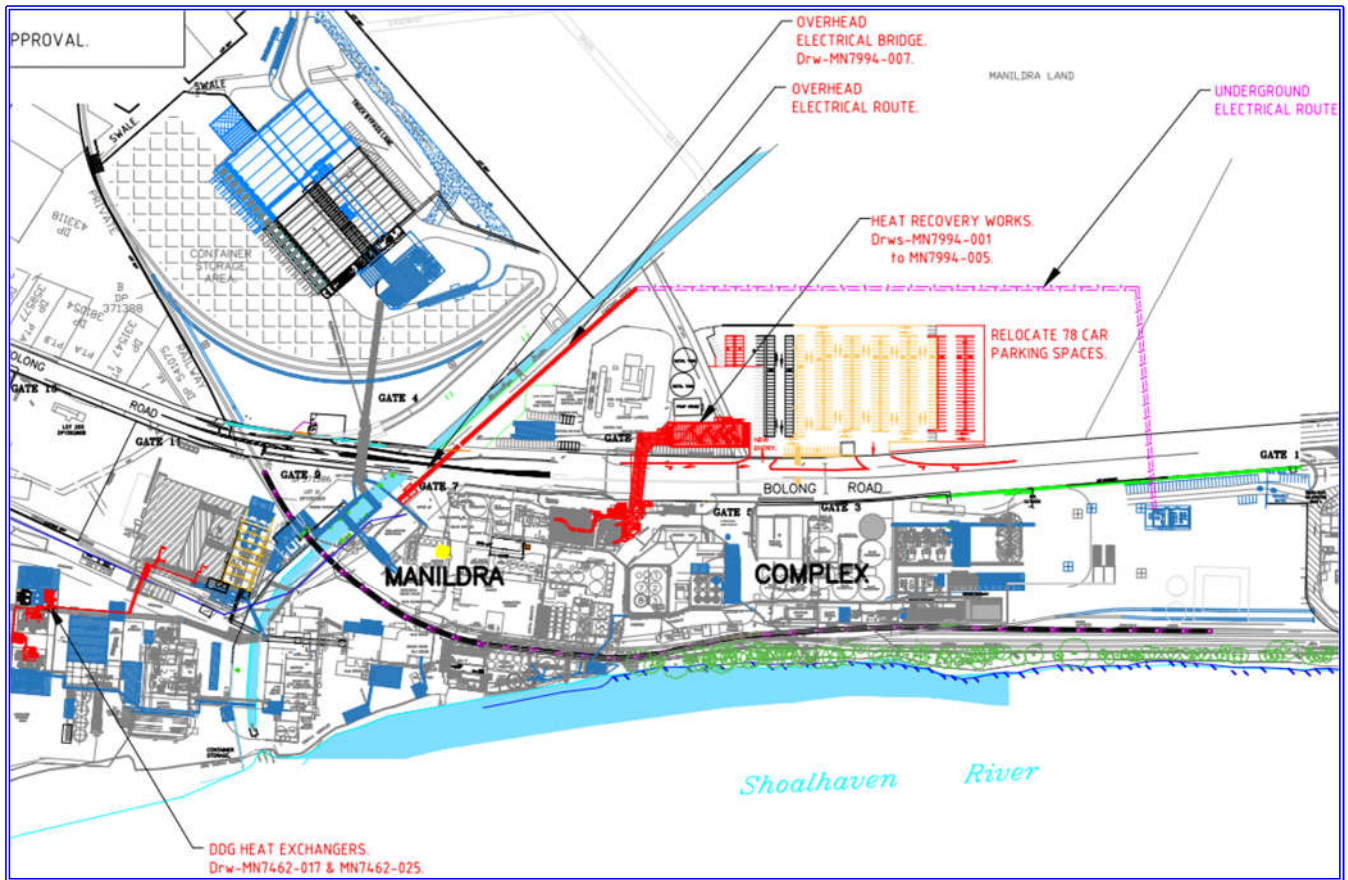
## **2.2 Proposed Development**

The proposal is for the BGD1 and BGD2 Heat Distillery Recovery buildings, overhead gantry, ancillary plant and Northern carpark extension will involve the following works:

- a. Distillery Heat Recovery Evaporators (southern side of Bolong Road).
- b. Overhead Gantry and Overhead Electrical Bridge across Bolong Road.  
The Overhead Gantry (OHG) and Overhead Electrical Bridge (OHEB) will be constructed over the existing Bolong Road carriageway and associated concrete footpaths.  
  
Clearance from the OGH to the Bolong Road carriageway will be 5.0 m.  
  
Clearance from the OHEB to the Bolong Road carriageway will be 6.0 m.
- c. Distillery Heat Recovery Building (northern side of Bolong Road)  
The ground floor will be set at RL 2.67. The Switch Room and other flood sensitive components can be set above the 1% AEP flood level.
- d. DDG Heat Exchangers  
The DDG Heat Exchangers will be constructed on the southern side of Bolong Road and be co-located with existing DDG Dryer #5 and existing DDG Dryer #6.
- e. Modification to the existing 'Northern Carpark'  
Additional parking spaces are to be provided in conjunction with construction of a new entry and exit driveways to Bolong Road.

The overall layout is presented in Figure 2.2 below.

Manildra Group drawings MN7994 -001 to 007 and MN7462-000, 001, 017 & 025 present the general site layout details and are attached as Appendix A.



**Figure 2.2**  
**Site Layout Plan**

(source Manildra MN7462-001-P08)



## 3.0 STORMWATER QUALITY

### **3.1 Distillery Heat Recovery Evaporators (DHRE)**

The Distillery Heat Recovery Evaporators (DHRE) will be constructed on an existing impervious surface and will therefore not increase the impervious area nor increase stormwater pollutant export from the site.

Stormwater runoff from the DHRE will be treated in accordance with the approved Shoalhaven Starches Environmental Procedure - *Stormwater Management Plan* (EN-P-0180 1.0I dated 31 Jan 2024) for Zone 6 Central and are therefore unlikely to generate any stormwater quality impacts during operation.

The Distillery Heat Recovery Building (BGD1 & BGD2) will be constructed on the existing impervious surface, which is currently the entry/exit driveway for the Northern Carpark, and will therefore not increase the impervious area nor increase stormwater pollutant export from the site.

Stormwater runoff will be treated in accordance with the approved Shoalhaven Starches Environmental Procedure - *Stormwater Management Plan* (EN-P-0180 1.0I dated 31 Jan 2024) for Zone 6 Central and are therefore unlikely to generate any stormwater quality impacts during operation.

### **3.2 Distillery Heat Recovery Building (DHRB)**

The Distillery Heat Recovery Building (DHRB) will be constructed on an existing impervious surface currently used for access and egress from the Northern Carpark

Construction of the DHRB will not increase the impervious area of the site nor increase stormwater pollutant export from the site.

Stormwater runoff will be treated in accordance with the approved Shoalhaven Starches Environmental Procedure - *Stormwater Management Plan* (EN-P-0180 1.0I dated 31 Jan 2024) for Zone 11 and are therefore unlikely to generate any stormwater quality impacts during operation.

### **3.3 DDG Heat Exchangers (DDGHE)**

The DDG Heat Exchangers (DDGHE) will be constructed on an existing impervious surface and therefore will not increase the impervious area of the site nor increase stormwater pollutant export from the site.



Stormwater runoff will be treated in accordance with the approved Shoalhaven Starches Environmental Procedure – *Stormwater Management Plan* (EN-P-0180 1.01 dated 31 Jan 2024) for Zone 08 and are therefore unlikely to generate any stormwater quality impacts during operation.

### **3.4 Qualitative Stormwater Quality Assessment for DHRE, DHRB & DDGHE**

A qualitative assessment of the relative impact of converting trafficable roads to roof can be made using *Australian Runoff Quality – A guide to WSUD* (Engineers Australia 2006) and *Using MUSIC in the Sydney Drinking Water Catchment* (Water NSW 2019).

#### ➤ Total Suspended Solids

A qualitative assessment using Figure 3.2 of *Australian Runoff Quality – A guide to WSUD* (Engineers Australia 2006) indicates the mean concentration of TSS for ‘All Roofs’ is lower than the mean concentration for ‘All Roads’ (35 mg/L vs 200 mg/L).

A qualitative assessment using Table 4.7 of *Using Music in the Sydney Drinking Water Catchment* indicates the mean concentration of TSS for ‘Roofs’ is lower than the mean concentration of TSS for ‘Sealed Roads’ (19.95 mg/L vs 269.2 mg/L).

#### ➤ Total Phosphorous

A qualitative assessment using Figure 3.3 of *Australian Runoff Quality – A guide to WSUD* (Engineers Australia 2006) indicates the mean concentration of TP for ‘All Roofs’ is lower than the mean concentration of TP for ‘All Roads’ (0.13 mg/L vs 0.25 mg/L).

A qualitative assessment using Table 4.7 of *Using Music in the Sydney Drinking Water Catchment* indicates the mean concentration of TP for ‘Roofs’ is lower than the mean concentration of TP for ‘Sealed Roads’ (0.13 mg/L vs 0.50 mg/L).

#### ➤ Total Nitrogen

A qualitative comparison using Table 6.1 and Table 6.2 of *Australian Runoff Quality – A guide to WSUD* (Engineers Australia 2006) indicates the mean concentration of TN for ‘Roof’ is lower than the mean concentration of TN for general stormwater (2.69 mg/L vs 6.55 mg/L).

A qualitative assessment using Table 4.7 of *Using Music in the Sydney Drinking Water Catchment* indicates the mean concentration of TN for ‘Roofs’ is lower than the mean concentration of TN for ‘Sealed Roads’ (1.99 mg/L vs 2.19 mg/L).

The qualitative assessment outlined above demonstrates that replacing trafficable impervious surfaces with roofs will not increase stormwater pollutant load from the site.



Specific MUSIC modelling for these components of the development is therefore not required.

### **3.5 Northern Carpark Extension**

The Mod 31 works for the Northern Carpark including new entry / exit lanes on Bolong Road extension will increase the impervious area by 11,749 m<sup>2</sup>.

The carpark extension has the potential to generate minor stormwater quality impacts during operation as a result of build up and subsequent wash off of particulate matter and vehicle related pollutants.

### **3.6 Overhead Gantry and Overhead Electrical Bridge**

The Overhead Gantry (OHG) will increase in impervious area will be 86 m<sup>2</sup>.

Runoff from the Overhead Gantry roof can be discharged directly to Bolong Road.

The overhead gantry effectively replaces the existing road surface and will therefore not increase stormwater pollution export from the site (refer to the Qualitative Assessment in Section 3.3 above).

The Overhead Electrical Bridge (OHEB) is an open structure and will have an imperceptible impact on the existing impervious area. The OHEB is not included in the Stormwater Quality model.

### **3.7 Stormwater Pollutant Estimation**

The potential operational stormwater quality impacts can be mitigated by way of a buffer strip and modifying the existing retention pond which will also capture sediment during construction and treat runoff during the operational phase.

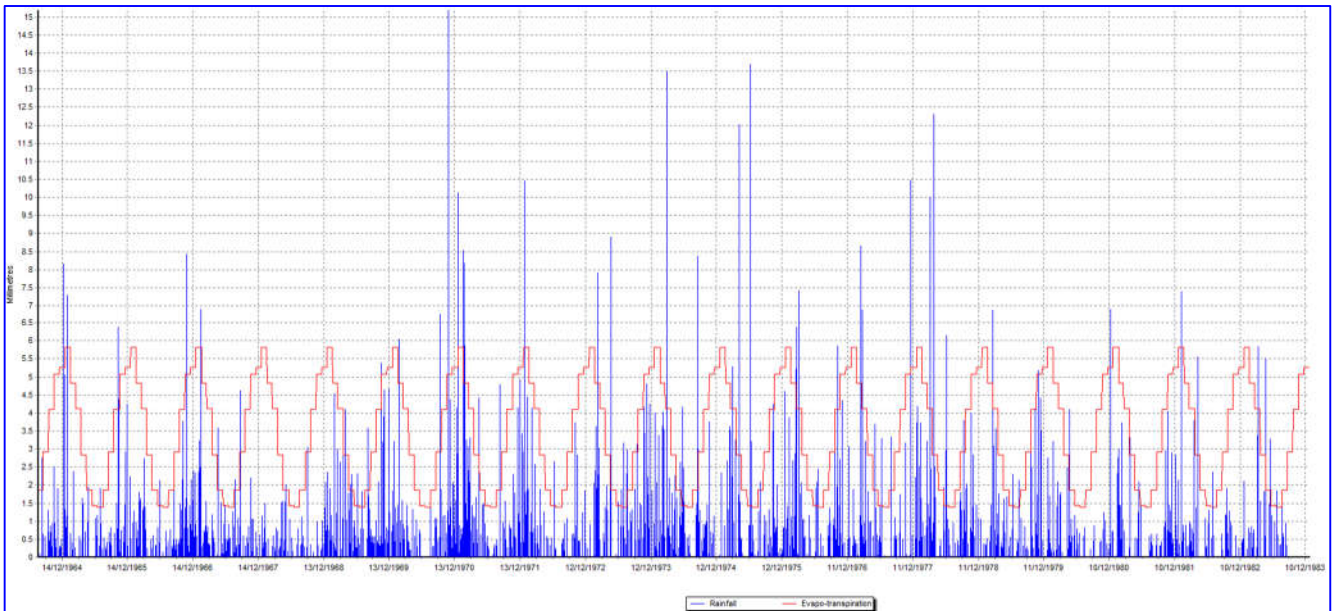
A stormwater quality model was developed using MUSIC v6.3 in order to assess the effectiveness of a buffer strip and existing retention pond to mitigate potential stormwater pollution generated by the carpark extension.

Rainfall data (six minute increment for the period 5 Aug 1964 – 10 Sep 1983) from HMAS Albatross was used. Evaporation data from Port Kembla for the same period was used.

Figure 3.1 presents the MUSIC model structure. Figure 3.2 presents the rainfall and evaporation data for the period modelled.



**Figure 3.1**  
**MUSIC Model Structure**



**Figure 3.2**  
**Rainfall & Evaporation Data**  
*HMAS Albatross 1964 - 1983*



Table 3.1 demonstrates that the buffer and modified retention pond will meet the stormwater pollution reduction targets outlined in Table 3 of SCC DCP Ch G2.

**Table 3.1  
Treatment Train Effectiveness**

	Sources	Residual Load	% Reduction
<b>Flow (ML/yr)</b>	9.82	5.4	45
<b>Total Suspended Solids (kg/yr)</b>	3420	136	96
<b>Total Phosphorus (kg/yr)</b>	5.78	0.771	86.7
<b>Total Nitrogen (kg/yr)</b>	23.1	8.41	63.6
<b>Gross Pollutants (kg/yr)</b>	246	0	100

### **3.8 Erosion and Sediment Control Concept**

Short term, temporary stormwater quality impacts are likely during the construction phase. Conventional sediment and erosion controls in close proximity to the individual components during construction will mitigate the potential for sediment export from the site.

Stormwater quality may be protected during construction through the minimisation of disturbed area and staged implementation of erosion and sediment control measures generally as follows:

#### **Step 1.**

- a. Establish internal access routes on sealed pavements within the existing operational area.
- b. Establish wheel shaker / wheel-wash on all entry / exit routes from which sediment may be mobilised from vehicle traffic.
- c. Establish perimeter fencing as required.



### **Step 2.**

Establish erosion and sediment control measures which will be in place for the duration of the construction period such as but not limited to:

- a. Install sediment traps and / or mesh and gravel filters to existing pits
- b. Install temporary all weather pavements.

### **Step 3.**

Limit the extent of bulk earthwork areas to ensure that the exposed area at any one time is not greater than 2,500 m<sup>2</sup>. In this regard, the general works sequence will be :

- a. Strip topsoil and place in temporary stockpile. Given that only limited respreading of topsoil on the site will occur, excess topsoil should be removed from the site progressively during the stripping operation. Excess topsoil may be stockpiled on the Manildra Environmental Farm.
- b. Undertake Bulk earthworks operations. Given that only limited filling is to be placed on the site, excess spoil should be imported or removed from the site progressively during the bulk earthworks operation. Excess spoil may be stockpiled on the Manildra Environmental Farm.
- c. Construct foundations for new plant components.
- d. Install new stormwater pits and pipes.
- e. Prepare subgrade for new pavements.
- f. Building works and roof water connections.
- g. Stabilise disturbed areas with grass seeding.
- h. Maintain erosion and sediment control measures.

A concept Erosion and Sediment Control Plan (ESCP) has been prepared to mitigate stormwater quality impacts. The concept ESCP is presented in Appendix B.



## 4.0 STORMWATER QUANTITY

### 4.1 Site Retention Requirement

Table 4.1 and Table 2 present the “existing” and post development site conditions.

**Table 4.1**

“EXISTING” SITE CONDITIONS					
Sub-catchment Description	Sub-Catchment Area		Impervious		Remarks
	m <sup>2</sup>	ha	%	ha	
Overhead Gantry	86	0.0086	0.0	0.000	Crosses Bolong Road
Bolong Road	816	0.0816	0.0	0.000	Road side verge
Northern Carpark	3,739	0.3739	100.0	0.374	Existing Paved Area - pre Mod 22
Carpark Extension (Mod 26)	7,404	0.7404	0.0	0.000	Carpark- pre Mod 22
Carpark Extension (Mod 31)	3,443	0.3443	0.0	0.000	Existing paddock
<b>Catchment Total =</b>	<b>15,489</b>	<b>1.5489</b>			
Imperv area (m <sup>2</sup> ) =	3,739.4		(ha)	0.374	
Imperv % =	24.1				

Table of chapter G2 of SCC DCP2014 outlines the site retention requirement. For an industrial development the retention requirement is 0.006m per m<sup>2</sup> of increased impervious area.

Table 4.3 presents the site retention requirement calculations. The site retention requirement for the site of 70.50 kL can be met by providing the existing retention basin associated with the Northern Carpark. Storage volume of 70.50 kL can be between achieved between RL 1.6 and RL 1.8 (refer to drawing 131353-403 in Appendix B)

The permanent water depth in the modified retention pond will not exceed 0.3m. Based on an infiltration rate of 4.32 mm/d ( $3 \times 10^{-6}$  m/s), the permanent water zone will drain over a period of 47days.

It is noted that the nature of the site is not conducive to onsite use of rain water.



**Table 4.2**

POST DEVELOPMENT SITE CONDITION					
Sub-catchment Description	Sub-Catchment Area		Impervious		Remarks
	m <sup>2</sup>	ha	%	ha	
Overhead Gantry	86	0.0086	100.0	0.009	Crosses Bolong Road
Bolong Road	816	0.0816	100.0	0.082	Increase in Impervious
Northern Carpark	3,739	0.3739	100.0	0.374	No increase in impervious area
Carpark Extension (Mod 26)	7,404	0.7404	100.0	0.740	New impervious area
Carpark Extension (Mod 31)	3,443	0.3443	100.0	0.344	New impervious area
Catchment Total =	15,489	1.5488			
Imperv area (m <sup>2</sup> ) =	14,488		(ha)	1.549	
Imperv % =	100.0		Δ =	1.1749	

**Table 4.3**

RETENTION REQUIREMENT DCP G2 Table 2 (Industrial Development)	
Mod 26 Carpark (m <sup>2</sup> )	7,404
Mod 31 Carpark (m <sup>2</sup> )	3,443
Mod 31 Gantry (m <sup>2</sup> )	86
Bolong Road (m <sup>2</sup> )	816
Total (m <sup>2</sup> )	11,749
Retention depth (m)	0.006
Retention volume (m <sup>3</sup> )	70.50

The permanent water depth in the modified retention pond will not exceed 0.3m. Based on an infiltration rate of 4.32 mm/d ( $3 \times 10^{-6}$  m/s), the stored water will drain over a period of 47days.



The modified retention pond is not less than 515m from the nearest residential dwelling. The modified retention pond will not provide additional mosquito breeding habitat above that which currently exists on the Shoalhaven River floodplain.

#### 4.2 Runoff Mitigation

A conceptual DRAINS model was established in order to estimate the increase in runoff resulting from the incremental increase in the impervious area.

The DRAINS hydrological parameters are as follows:

- Impervious depression storage: 1mm
- Pervious depression storage: 5mm
- Soil Type : 3

The DRAINS model estimates the site discharge from the Northern Carpark extension, Entry /Exit works on Bolong Rd and the Gantry for the following cases:

- a. Existing site conditions (refer Table 4.1),
- b. Post development site condition without OSD,
- c. Post development site condition with OSD.

The DRAINS model results are presented in Table 4.4 below. The increase in site discharge can be mitigated by way of a modification to the existing retention basin and installing a 0.45m x 0.30m box culvert outlet.

Table 4.4  
Site Discharge

SITE CONDITION	SITE DISCHARGE (m <sup>3</sup> /s)				
	4EY	20% AEP	10% AEP	5% AEP	1% AEP
Pre - Development	0	0.33	0.44	0.53	0.94
Post Development (No OSD)	0.17	0.57	0.68	0.82	1.21
Post-Development (With OSD)	0.02	0.08	0.10	0.12	0.17

The concept DRAINS model structure is presented in Appendix C.

The DRAINS model results are presented in Appendix D.



## 5.0 DCP2014 COMPLIANCE TABLES

The following table is prepared to demonstrate compliance with DCP2014 Chapter G2 – Sustainable Stormwater Management.

DCP2014 Chapter G2 – Sustainable Stormwater Management – 5 Controls	
<b>5.1 Stormwater</b>	
<u>5.1.1 Minor and Major Systems Design</u>	
Acceptable Solutions	Compliance
A1.1 Runoff from impervious areas must not be concentrated or directed onto neighbouring properties	<p><u>Northern Carpark Extension</u> The carpark extension will drain through a buffer strip and modified existing retention pond within the site and thence to Abernethy's Drain. Runoff will not be directed onto adjoining properties.</p> <p>Complies</p> <p><u>OHG, OHEB, DHRB, DHRE, DDGHE</u> Runoff from these components will discharge to the existing managed area of the site in accordance with the approved Shoalhaven Starches Environmental Procedure - <i>Stormwater Management Plan</i> (EN-P-0180 1.01 dated 31 Jan 2024) for Zone 6 Central, Zone 8 Central and Zone 11.</p> <p>Runoff is not directed onto adjoining properties.</p> <p>Complies</p>
A1.2 For residential and rural residential areas, the drainage must be designed to cater for a 5 year ARI event.	Not applicable for industrial development.
A1.3 For mixed residential/commercial and industrial development, the drainage must be designed to cater for a 10 year ARI event.	<p><u>Northern Carpark Extension</u> The extended carpark will require detention storage to be provided to mitigate the additional runoff generated by the increased impervious area. The DRAINS model demonstrates that stormwater detention storage can be provided to comply with A1.3.</p> <p><u>OHG, OHEB, DHRB, DHRE, DDGHE</u></p>



	<p>Runoff from these components will discharge to the existing managed area of the site in accordance with the approved Shoalhaven Starches Environmental Procedure - <i>Stormwater Management Plan</i> (EN-P-0180 1.01 dated 31 Jan 2024) for Zone 6 Central, Zone 8 Central and Zone 11.</p> <p>Complies / Can comply</p>
<p>A1.4 Kerb and gutters are required if soil permeability is not sufficient to allow natural infiltration of stormwater runoff without causing adverse impacts onsite or to neighbouring properties.</p>	<p><u>Northern Carpark Extension, OHG &amp; Bolong Rd</u> The extended carpark will discharge via overland flow into the modified retention basin to the immediate north of the carpark.</p> <p>Discharge from the basin will be via a 0.45m x 0.3m box culvert into an existing discharge system to Abernethy's Drain as indicated on Drawing 131353-402.</p> <p>Runoff from the carpark will pass through the buffer strip as overland flow and thence into the modified retention basin.</p> <p>Kerbs and gutters will not be required to manage runoff from the carpark.</p> <p>N/A</p> <p><u>DHRB, DHRE, DDGHE</u> Runoff from these components will discharge to the existing managed area of the site in accordance with the approved Shoalhaven Starches Environmental Procedure - <i>Stormwater Management Plan</i> (EN-P-0180 1.01 dated 31 Jan 2024) for Zone 6 Central, Zone 8 Central and Zone 11.</p> <p>Complies / Can comply</p>
<p>A1.5 Runoff from roof gutters and downpipes can be directed to an existing or proposed stormwater system, when it can be proved that the systems design capacity is not exceeded.</p>	<p><u>Northern Carpark Extension, OHG &amp; Bolong Rd</u> The outlet from the modified retention pond can be designed to cater for the 1% AEP local catchment discharge.</p> <p>The modified retention pond discharges via an existing drainage system to Abernethy's Drain.</p>



	<p>N/A</p> <p><u>DHRB, DHRE, DDGHE</u> Runoff from these components will discharge to the existing managed area of the site in accordance with the approved Shoalhaven Starches Environmental Procedure - <i>Stormwater Management Plan</i> (EN-P-0180 1.01 dated 31 Jan 2024) for Zone 6 Central, Zone 8 Central and Zone 11.</p> <p>Complies / Can comply</p>
<p>A1.6 Where onsite infiltration/absorption is proposed for stormwater disposal, supporting geotechnical reports are submitted with a development application to assess the suitability of the proposal</p>	<p><u>Northern Carpark Extension, OHG &amp; Bolong Rd</u> Infiltration is not proposed for stormwater disposal. Stormwater discharge from the modified retention basin will be via an existing stormwater system to Abernethy's Drain.</p> <p>N/A</p> <p><u>DHRB, DHRE, DDGHE</u> Runoff from these components will discharge to the existing managed area of the site in accordance with the approved Shoalhaven Starches Environmental Procedure - <i>Stormwater Management Plan</i> (EN-P-0180 1.01 dated 31 Jan 2024) for Zone 6 Central, Zone 8 Central and Zone 11.</p> <p>N/A</p>
<p>A1.7 Stormwater inlet structures must be designed with a blockage factor provision in accordance with the latest version of Australian Rainfall and Runoff (ARR) guidelines</p>	<p><u>Northern Carpark Extension, OHG &amp; Bolong Rd</u> The outlet culvert can be designed to cater for a 1% AEP local catchment discharge. The overflow weir can be designed to have sufficient capacity to cater for any blockage of the outlet culvert. This can be done during the detail design for construction certificate.</p> <p>Can Comply</p> <p><u>DHRB, DHRE, DDGHE</u> Runoff from these components will discharge to the existing managed area of the site in accordance with the approved Shoalhaven Starches Environmental Procedure - <i>Stormwater Management Plan</i> (EN-P-0180 1.01 dated 31 Jan 2024) for Zone 6 Central, Zone 8 Central and Zone 11.</p>



	Complies
<p>A1.8 Major system drainage must be designed for a 1:100 year ARI event</p>	<p><u>Northern Carpark Extension, OHG &amp; Bolong Rd</u> The modified retention pond outlet system (low flow pipe and weir) can be designed to cater for a local catchment 1% AEP flood event. This will be done during the detail design for the construction certificate.</p> <p>Can Comply</p> <p><i>It is noted that the site will be inundated during a riverine flood of magnitude 1% AEP.</i></p> <p><u>DHRB, DHRE, DDGHE</u> Runoff from these components will discharge to the existing managed area of the site in accordance with the approved Shoalhaven Starches Environmental Procedure - <i>Stormwater Management Plan</i> (EN-P-0180 1.01 dated 31 Jan 2024) for Zone 6 Central, Zobe 8 Central and Zone 11.</p> <p>Complies.</p>
<p>A1.9 Trunk stormwater systems, which include open channels, large conduits and overland flow paths are designed for storms up to 100 year ARI event.</p>	<p>Trunk drainage not required</p> <p>N/A</p>
<p>A1.10 The following overland flow paths shall be utilised as Major system flow routes;</p> <ul style="list-style-type: none"> <li>• Roadways including footpath;</li> <li>• Pathways; and</li> <li>• Parkland or open space.</li> </ul>	<p>No new public roads, pathways nor public open space will be created.</p> <p>N/A</p>
<p>A1.11 Flow paths must be designed to ensure a velocity depth product of less than 0.3m<sup>2</sup> /s for a 100 year ARI storm event.</p>	<p><u>Northern Carpark Extension, OHG &amp; Bolong Rd</u> No new 100 yr ARI flow path required.</p> <p>N/A</p>

	<p><u>DHRB, DHRE, DDGHE</u> Runoff from these components will discharge to the existing managed area of the site in accordance with the approved Shoalhaven Starches Environmental Procedure - <i>Stormwater Management Plan</i> (EN-P-0180 1.01 dated 31 Jan 2024) for Zone 6 Central, Zone 8 Central and Zone 11.</p> <p>Complies</p> <p><i>It is noted that the site will be inundated during a riverine flood of magnitude 1% AEP.</i></p>
<p>A1.12 The continuity of the overland flow paths must not be obstructed by fences, walls, footpaths and the like.</p>	<p><u>Northern Carpark Extension, OHG &amp; Bolong Rd</u> The site is within the floodplain and will not obstruct flow paths. Continuity of other overland flow paths are not restricted,</p> <p>Complies</p> <p><u>DHRB, DHRE, DDGHE</u> Runoff from these components will discharge to the existing managed area of the site in accordance with the approved Shoalhaven Starches Environmental Procedure - <i>Stormwater Management Plan</i> (EN-P-0180 1.01 dated 31 Jan 2024) for Zone 6 Central, Zone 8 Central and Zone 11.</p> <p><i>It is noted that the site will be inundated during a riverine flood of magnitude 1% AEP.</i></p>
<p>5.1.2 <u>Disposal of Stormwater from Development sites</u></p>	
<p>A2.1 Roof water collection and disposal.</p>	<p><u>Northern Carpark Extension OHG &amp; Bolong Rd</u> Gantry roof will discharge to Bolong Rd</p> <p>Complies</p> <p><u>DHRB, DHRE, DDGHE</u> Runoff from these components will discharge to the existing managed area of the site in accordance with the approved Shoalhaven Starches Environmental Procedure - <i>Stormwater Management Plan</i> (EN-P-0180 1.01 dated 31 Jan 2024) for Zone 6 Central, Zone 8 Central and Zone 11.</p>



	Complies
A2.2 Surface water from paved areas.	<p><u>Northern Carpark Extension, OHG &amp; Bolong Rd</u> Runoff from the carpark will drain to the proposed buffer strip and modified retention pond shown on drawing 131353-402. Complies</p> <p><u>DHRB, DHRE, DDGHE</u> Runoff from these components will discharge to the existing managed area of the site in accordance with the approved Shoalhaven Starches Environmental Procedure - <i>Stormwater Management Plan</i> (EN-P-0180 1.01 dated 31 Jan 2024) for Zone 6 Central, Zone 8 Central and Zone 11.  Complies</p>
A2.3 Rainwater harvesting.	<p>This development does not offer practical opportunity for on-site use of rainwater. The modified retention basin will exceed the retention storage requirement.  N/A</p>
<u>5.1.3 Climate Change Controls</u>	
A3.1 Climate change impacts, such as changes to rainfall intensity, shall be considered in system design as per relevant policies and/or Australian Rainfall & Runoff (ARR) Guidelines.	<p><u>Northern Carpark Extension, OHG &amp; Bolong Rd</u> Detailed design of the modified retention pond can cater for change in rainfall intensity.  In this regard, detail design will be undertaken for the construction certificate.  Can comply.</p> <p><u>DHRB, DHRE, DDGHE</u> Runoff from these components will discharge to the existing managed area of the site in accordance with the approved Shoalhaven Starches Environmental Procedure - <i>Stormwater Management Plan</i> (EN-P-0180 1.01 dated 31 Jan 2024) for Zone 6 Central, Zone 8 Central and Zone 11.</p>



	<p>Can comply</p> <p><i>It is noted that :</i></p> <p><i>a. the site will be inundated during a riverine flood of magnitude 1% AEP.</i></p> <p><i>b. the predicted year 2100 climate change impact on riverine flooding is a flood level rise of 0.1m for a 1%AEP flood.</i></p>
<p>A4.1 Where relevant major and minor system design must consider the impact of sea level rise.</p>	<p>Tables 10-1, 10-2 and 10-3 of The Lower Shoalhaven River Flood Study (Cardno 9 Nov 2022 pp 105, 107) indicate:</p> <ul style="list-style-type: none"> <li>• the current 10% AEP flood level at the site is RL 3.99.</li> <li>• the 2100 10% AEP flood level at the site is RL4.00</li> <li>• the current 1% AEP flood level at the site is RL5.19.</li> <li>• the 2100 1% AEP flood level at the site is RL5.19</li> </ul> <p>Sea level rise and climate change will not significantly increase flood impact on the site.</p> <p>Flood sensitive components may be set at or above RL 5.69.</p> <p>Complies</p>
<p>5.1.4 Onsite Stormwater Detention (OSD)</p>	
<p>A5.1 OSD is to be sized to match pre-development peak flow rates for the 5, 20 and 100 year ARI rain events for the site</p>	<p><u>Northern Carpark Extension, OHG &amp; Bolong Rd</u> A dedicated retention / detention pond will ensure that pre-development discharge is not exceeded.</p> <p>Complies</p> <p><u>DHRB, DHRE, DDGHE</u> Runoff from these components will discharge to the existing managed area of the site in accordance with the approved Shoalhaven Starches Environmental Procedure - Stormwater Management Plan (EN-P-0180 1.01 dated 31 Jan 2024) for Zone 6 Central, Zone 8 Central and Zone 11.</p> <p>Complies</p>



<p>A5.2 For development other than subdivision, pre and post-development peak flow calculations must be based on the impervious percentages (as outlined below) or the actual impervious surface area (whichever is greater) as detailed on development plans.</p>	<p>Actual increase in impervious area used in runoff calculations.</p> <p>Can comply</p>
<p>A5.3 For subdivisions, pre and post-development peak flow calculations must be based on the impervious percentages as outlined below. Area impervious:</p> <ul style="list-style-type: none"> <li>• Open Space – 25%</li> <li>• Low and Med density residential – 80%</li> <li>• Industrial areas – 80%</li> <li>• Commercial areas – 90%</li> <li>• Half width road reserve – 95%</li> </ul>	<p>Not a subdivision development.</p> <p>Not applicable</p>
<p>A5.4 OSD design must consider downstream boundary conditions for the 100 year ARI level of the receiving water.</p>	<p>Tables 10-1, 10-2 &amp; 10-3 of The Lower Shoalhaven River Flood Study (Cardno 9 Nov 2022 pp 105, 107) indicates:</p> <ul style="list-style-type: none"> <li>• the current 10% AEP flood level at the site is RL 3.99.</li> <li>• the 2100 10% AEP flood level at the site is RL4.00</li> <li>• the current 1% AEP flood level at the site is RL 5.19.</li> <li>• the 2100 1% AEP flood level at the site is RL5.19</li> </ul> <p>Noting that the elevation of the site varies from RL 1.3 to RL 3.5, in the event of a 1% AEP riverine flood, the entire site will be inundated.</p> <p>OSD caters for discharge from the site in a 1% AEP local catchment flood.</p> <p>A5.4 is not applicable for this development.</p>
<p>A5.5 Detention storage must be located at a level above the 5 year ARI flood level</p>	<p><u>Northern Carpark Extension, OHG &amp; Bolong Rd</u> Complies for 20% AEP local catchment flood.</p> <p>Table 10-1 of The Lower Shoalhaven Flood Study (Cardno 9 Nov 2022, p105) indicates that the current</p>



	<p>20% AEP Shoalhaven River flood level in the vicinity the site is RL 2.87.</p> <p>Noting that the elevation of the carpark varies from RL 2.5 to RL 3.15, in the event of a 10% AEP riverine flood, much of carpark will be inundated to RL3.99.</p>
<p>A5.6 If OSD is provided in landscaped areas, the desirable maximum depth of ponding under design conditions is 300mm.</p>	<p>No OSD proposed for landscaped areas.</p> <p>N/A</p>
<p>A5.7 Despite A5.6 the desirable maximum depth of ponding can be increased to 1200mm provided that site slopes of the basin are <math>\geq 1:6</math>, or the provided storage is fenced off.</p>	<p>No OSD proposed for landscaped areas.</p> <p>Complies</p>
<p>A5.8 For subdivisions OSD shall be:</p> <ul style="list-style-type: none"> <li>• Designed at the subdivision stage</li> <li>• Constructed at the individual dwelling stage where OSD is proposed on each lot</li> <li>• Constructed at the subdivision stage where OSD is proposed to be provided through dedicated detention storage</li> </ul>	<p>Not a subdivision development.</p> <p>Not applicable</p>
<p>A5.9 50% of any retention volume can contribute towards the OSD volume required for the development, provided the systems are interconnected.</p>	<p>Not required and not applied for OSD calculations.</p> <p>N/A</p>
<p><b>5.2 Stormwater Quality and Waterway Protection</b></p>	
<p><u>5.2.1 Erosion and Sediment Control</u></p>	



<p>A6.1 Where vegetation exists on the site, buffer zones of vegetation shall be retained along the boundaries of the site where practicable, particularly those adjacent to creeks and street gutters</p>	<p>The works are on land Zoned E4 (General Industrial) which has generally been cleared.</p> <p>The works are within the existing Manildra precinct and is separated from the Shoalhaven River by the existing rail corridor.</p> <p>The development site is at least 80m from the top of the Shoalhaven River bank and is to the north of the existing rail corridor.</p> <p>No trees are to be removed</p> <p>Complies</p>
<p>A6.2 Sediment and erosion control measures shall not adversely impact on stormwater management measures of the site or any existing public drainage structures of systems</p>	<p><u>Northern Carpark Extension, OHG &amp; Bolong Rd</u> The concept erosion and sediment control plan demonstrates that all erosion and sediment control measures can be contained wholly within the site. A detailed erosion and sediment control plan can be developed in conjunction with the detailed construction certificate design for the works.</p> <p>Complies.</p> <p><u>DHRB, DHRE, DDGHE</u> Runoff from these components will discharge to the existing managed area of the site in accordance with the approved Shoalhaven Starches Environmental Procedure - <i>Stormwater Management Plan</i> (EN-P-0180 1.01 dated 31 Jan 2024) for Zone 6 Central, Zone 8 Central and Zone 11.</p> <p>Complies</p>



5.2.2 Stormwater Retention and re-use

A7.1

The volume of retention storage provided is to be equal to or greater than:

[storage depth\*] X [increase in impervious surfaces compared to pre-development] \*as outlined below (refer to Sustainable Stormwater Technical Guidelines for further details).

- Alterations, additions, auxiliary structures & second storey additions (10mm)
- Single dwelling & dual occupancy (10mm)
- Medium Density (9mm)
- High Density (8mm)
- Industrial (6mm)

Impervious area increase is 11,749 m<sup>2</sup>.

Retention storage depth is 0.006m.

Retention storage requirement is 70.5 kL.

Retention volume available exceeds 70.5 kL.

Can comply

A8.1

Residential development shall install rainwater tanks to meet a portion of supply such as outdoor use, toilets, laundry

Not applicable for Industrial development.

A8.2

Any overflow from rainwater tanks shall be directed into an existing stormwater system where possible, alternatively the overflow will be managed so that it does not cause nuisance to neighbouring properties

No rainwater tanks proposed

N/A

5.2.3 Small/medium scale development – Not Applicable  
(Assessed as Large scale development)



<u>5.2.4 Large Scale Development</u>	
<p>A10.1 For development within Sydney's drinking water supply catchments, a neutral or beneficial effect must be demonstrated in accordance with the State Environmental Planning Policy (Sydney Drinking Water Catchment) 2011.</p>	<p>Development is not within a Sydney Water drinking water supply catchment.</p> <p>Not applicable.</p>
<p>A10.2 For development outside Sydney's drinking water supply catchments, pollutant load reduction must be a minimum reduction of the load of the post development average annual load of pollutants in accordance with Table 3 and the following as relevant:</p> <ul style="list-style-type: none"> <li>• For greenfield sites or sites draining to a natural stream of 3rd order or lower, the 1.5 year ARI predevelopment peak discharge must be maintained.</li>   <li>• For development discharging to a natural stream, the post development duration of stream forming flows must be no greater than a stream erosion index of 2</li>   <li>• For development discharging to a tidal area or natural</li> </ul>	<p>Runoff from the development site will drain to the existing stormwater outfalls to Abenerthy's Drain and/or the Shoalhaven River.</p> <p>Complies.</p> <p>Runoff from the development site will drain to the existing stormwater outfalls to Abenerthy's Drain and/or the Shoalhaven River.</p> <p>Complies.</p>



<p>watercourse, outlets must be designed to limit erosion and sedimentation at the discharge point</p> <ul style="list-style-type: none"> <li>• For development discharging to St Georges Basin, Swan Lake, Lake Conjola, Burrill Lake, Lake Tabourie, Willinga Lake and Wollumboola Lake a higher Total Phosphorus reduction target of 65% must be achieved</li> <li>• For a development discharging into an area of significant biodiversity value, the post development residual pollutant concentrations must not exceed the ecological trigger values listed in the A &amp; NZ guidelines for fresh and Marine Water Quality</li> <li>• Un coated metal roofs, facades and/or downpipes are not supported</li> </ul>	<p>Runoff from the development site will drain to the existing stormwater outfall to the Shoalhaven River and/or Abernethy's Drain .</p> <p>Complies.</p> <p>The site does not drain to these catchments.</p> <p>N/A</p> <p>The site does not drain to an area of significant biodiversity.</p> <p>N/A</p> <p>Uncoated metal roofs, facades or downpipes are not proposed.</p> <p>Complies.</p>
<p><u>5.2.5 Design and Maintenance of Stormwater Treatment Measures</u></p>	
<p>A11.1 Where practicable, trunk drainage is to be provided as a natural vegetated stable channel; and</p>	<p>Trunk drainage not required.</p> <p>Not applicable</p>
<p>A11.2 Where practical due to adequate catchment area, constructed wetlands are preferred over the use of bio-retention basins and water quality ponds. The preference between a water</p>	<p>Short term construction impacts can be mitigated by conventional erosion and sediment control measures.</p> <p><u>Northern Carpark Extension, OHG &amp; Bolong Rd</u></p>



<p>quality pond and bioretention device will depend on site specific constraints</p>	<p><u>DHRB, DHRE, DDGHE</u> Runoff will drain through the existing SQID (Shoalhaven Starches Environmental Procedure - <i>Stormwater Management Plan</i> (EN-P-0180 1.01 dated 31 Jan 2024) for Zone 6 Central, Zone 8 Central and Zone 11 via existing stormwater outfalls to the Shoalhaven River / Abernethy's Drain</p> <p>Complies</p>
<p>A11.3 An Operation and Maintenance Plan is submitted to Council for all stormwater treatment measures proposed, whether remain in private ownership or to be handed over to Council; and</p>	<p><u>Northern Carpark Extension, OHG &amp; Bolong Rd</u> An operation and maintenance procedure can be developed for the modified retention / detention basin as part of the detailed design for the construction certificate. The operation and maintenance procedure can be appended to the Shoalhaven Starches Environmental Procedure - <i>Stormwater Management Plan</i> (EN-P-0180 1.01 dated 31 Jan 2024).</p> <p>Can comply</p> <p><u>DHRB, DHRE, DDGHE</u> The existing Shoalhaven Starches Environmental Procedure - <i>Stormwater Management Plan</i> (EN-P-0180 1.01 dated 31 Jan 2024) for Zone 6 Central, Zone 8 Central and Zone 11 apply.</p> <p>Complies</p>
<p>A11.4 System design allows for maintenance (i.e. access and room to operate safely) at all times; and</p>	<p>Complies.</p>
<p>A11.5 Stormwater treatment measures must not be connected until the majority of catchment infrastructure is completed and landforms stabilised with impervious or fully established grassed surfaces. Bioretention devices and constructed wetlands must be established offline from inflows until they are fully established</p>	<p>The modified retention / detention basin can be used as a temporary erosion and sediment control measure during the construction of the carpark extension.</p> <p>Complies</p> <p>No new bioretention devices nor constructed wetlands are proposed. N/A</p>



<p>A11.6 Where the development is staged, sacrificial zones must be included in the design of the stormwater treatment measures. Sacrificial zones are to be rectified upon completion of development at the developer's cost; and</p>	<p>Not applicable  No sacrificial zones are proposed.</p>
<p>A11.7 Structural stormwater treatment measures must be able to bypass flows in excess of the design discharge with negligible afflux resulting from over topping or blockage of the device; and</p>	<p>Not applicable.</p>
<p>A11.8 Trash racks are generally preferred over proprietary GPT's by Council</p>	<p>Trash racks not proposed.  Not applicable.</p>
<p>A11.9 In the event of a stormwater discharge, structure stormwater treatment measures must not allow the release of any previously trapped material.</p>	<p>Complies.</p>
<p>A11.10 Stormwater treatment measures must consider mosquito control in their design. Designs should consider: • Permanent water ponding; • Water depth; • Exposure to sunlight and wind; and • Proximity to residential development</p>	<p>Complies.</p>
<p>A11.11 All filter media used in bioretention stormwater treatment measures must meet the current specifications of the Guidelines for filter media in adoption guidelines for biofiltration systems or a demonstrated equivalent, verified by a soil laboratory registered by</p>	<p>Not applicable.</p>



the National Association of Testing Authorities; and	
A11.12 Design of stormwater treatment measures is in accordance with Sustainable Stormwater Technical Guidelines.	<p><u>Northern Carpark Extension, OHG &amp; Bolong Rd</u></p> <p>Complies</p> <p><u>DHRB, DHRE, DDGHE</u> An existing SQID (Shoalhaven Starches Environmental Procedure - <i>Stormwater Management Plan</i> (EN-P-0180 1.01 dated 31 Jan 2024) for Zone 6 Central, Zone 8 Central and Zone 11.</p> <p>Complies</p>
A11.13 Development adjacent to a watercourse or stormwater drain addresses environmental impact upon the water body.	<p>Erosion and sediment control measures implemented during construction will address the short term impacts.</p> <p>Can Comply.</p>
A11.14 Constructed wetlands and bioretention basins must be located in a treatment train approach immediately downstream of a sediment basin/forebay.	Not applicable.
A11.15 Bioretention devices must be designed in accordance with the latest version of the Adoption Guidelines for stormwater systems (CRC for water sensitive cities) and Facility for advancing water biofiltration (FAWB) Guidelines	Not applicable.
<b>5.3 Waterfront Land</b>	
<u>5.3.1 Development on Waterfront land</u>	
A12.1 The minimum width of the core riparian zone is in accordance with Table 4 or as specified by the Water Management Act 2000	<p>The site that is at least 80 m from the northern bank of the Shoalhaven River. The proposed works will not prevent additional re-vegetation of the riparian zone.</p> <p>N/A</p>



<p>A12.2 The core riparian zone must be maintained or restored or rehabilitated using appropriate local species with a range of canopy, understorey and ground cover species to enable a healthy and diverse ecosystem</p>	<p>The site that is at least 80 m from the northern bank of the Shoalhaven River. The proposed works will not prevent additional re-vegetation of the riparian zone.</p> <p>N/A</p>
<p>A12.3 Topsoil shall be reused from the development site where it contains known or potential seedbank on the development site</p>	<p>Not applicable.</p> <p>Topsoil does not have the potential for seedbank of native or useful exotic species.</p>
<p>A12.4 Transport infrastructure and services (ie sewer, electricity, gas and communications) shall be located outside the core riparian zone</p>	<p>The site that is at least 80 m from the northern bank of the Shoalhaven River.</p> <p>N/A</p>
<p>A12.5 Despite A12.4, where services must traverse the core riparian zone, the development application must demonstrate that there will be minimal impact on the function and integrity of the core riparian zone</p>	<p>The site that is at least 80 m from the northern bank of the Shoalhaven River.</p> <p>N/A</p>
<p>A12.6 Pathways, cycleways and pervious recreational area shall be located outside core riparian zone unless all of the following is satisfied:</p> <ul style="list-style-type: none"> <li>• An opportunity exists for the community to connect with and explore the watercourse in a strategic location</li> <li>• There will be minimal impact on the riparian function</li> <li>• The integrity of the riparian land is maintained</li> </ul>	<p>No footpaths or cycleways encroach into the riparian zone.</p> <p>Not applicable</p>
<p>A12.7 Bushfire asset protection zones shall be located outside the core riparian zone or vegetated buffer and should be incorporated into the development footprint</p>	<p>No APZ proposed.</p> <p>Not applicable.</p>



<p>A12.8 Crossings of waterways or other activities must have regard to the minimum structure requirements for fish passage in accordance with relevant NSW state government guidelines</p>	<p>No waterway crossings proposed.  Not applicable.</p>
<p>A12.9 Works carried out on waterfront land comply with the Water Management Act 2000</p>	<p>No works to be carried out on waterfront land  N/A</p>
<p>A12.10 Stormwater disposal over/across/through public waterfront reserves should be avoided to prevent erosion and need for remedial actions</p>	<p>No new stormwater outlets across waterfront land are proposed.  N/A .</p>
<p><u>5.3.2 Coastal areas –development discharging to coastal cliffs or coastal dunes.</u></p> <p>This Section Is Not Applicable</p>	

## 6.0 CONCLUSION

This report has assessed the stormwater quality and quantity impacts of proposed Mod 31 Chapter G2 of the SCC DCP.

Operational activity of the heat recovery facilities and overhead gantry are unlikely to generate stormwater pollutant export from the site. Stormwater pollutants generated from operational activity of the Northern Carpark can be mitigated by a conventional buffer and retention / detention pond.

Potential short term stormwater quality impacts from the construction works can be mitigated by the implementation of erosion and sediment control plan and staged earthworks such that the performance objectives and criteria in Ch G2 can be satisfied.



The proposal is considered adequate from a stormwater management perspective and is recommended to be supported by the NSW Department of Planning, Housing and Infrastructure.

A handwritten signature in black ink, appearing to read 'Wai Mullany', written in a cursive style.

**Wai Mullany**

BE, Grad Dip LGE, ME(Hons), MCP, MIE Aust, CPEng, NER

**For Allen Price Pty Ltd**

**26 Aug 2025**



## **APPENDIX A – DEVELOPMENT PLANS**

### **Manildra Group Development Plans**

MN7462 -000\_P06

MN7462 -001\_P08

MN7462 -017\_P04

MN7462 -025\_P02

MN7994-001\_P09

MN7994-002\_P06

MN7994-003\_P05

MN7994-004\_P05

MN7994-005\_P06

MN7994-006\_P16

MN7994-007\_P03

### **multiCAD Plans**

1208-SK01\_P2

1208-SK02\_P2

1208-SK03\_P2

1208-SK04\_P2

1208-SK05\_P2

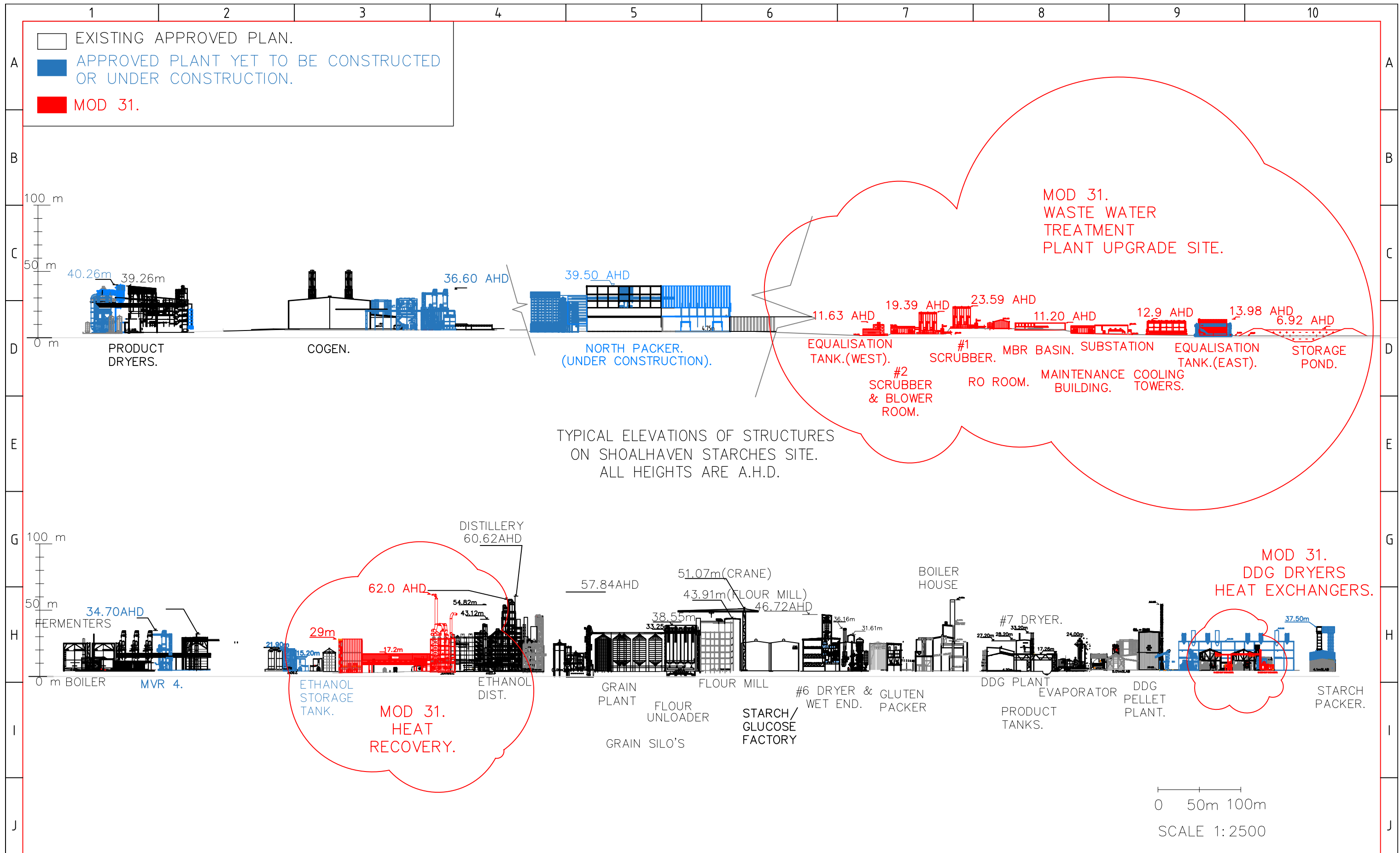
1208-SK06\_P2

1208-SK07\_P2

1208-SK08\_P2

1208-SK09\_P2

1208-SK10\_P2




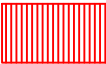



REV	ZONE	DETAILS	DRN	DATE	CHKD	APPD
P06	All	Changed to match engineers design.	B.M.	28-05-25	All	JS
P05	All	Was Mod 30.	P.C.	07-05-25	All	JS
P04	All	Changed to match engineers design.	P.C.	25-11-24	All	JS
P03	All	Starch dryers ect removed.	P.C.	15-11-24	All	JS
P01	All	Latest revision.	P.C.	05-09-24	All	B.H.

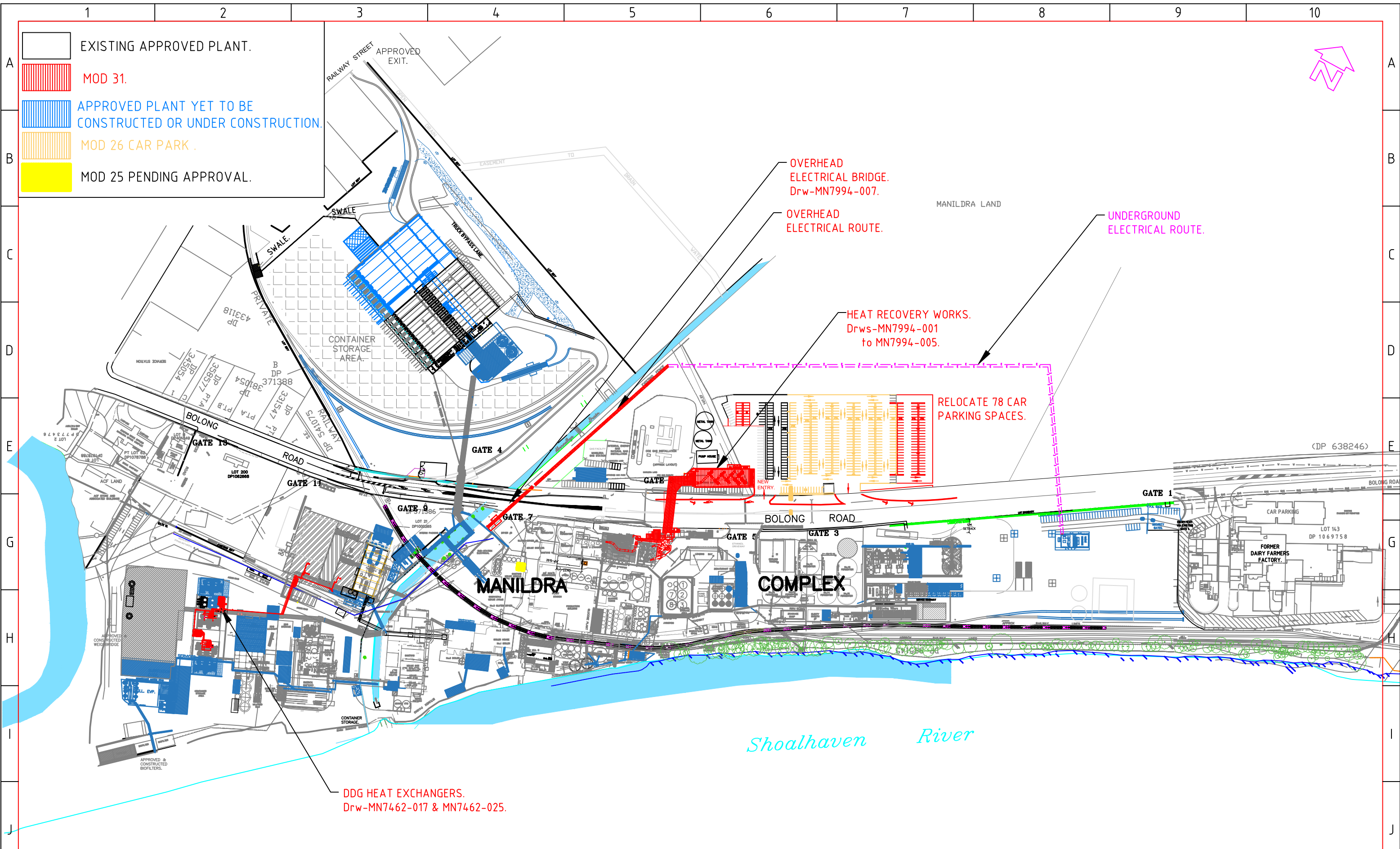


**MANILDRA GROUP**  
100% AUSTRALIAN



DRAWN P.C.	DATE 05/09/24	JOB TITLE SHOALHAVEN STARCHES.BOMADERRY. NSW	SHT SIZE A3
CHKD JS	DATE	DWG TITLE MOD 31.	REV.
APPD	DATE	SITE ELEVATIONS GA.	P06
SCALE 1:2500	PROJECT No. 7462-000	DWG No. MN7462-000	

	EXISTING APPROVED PLANT.
	MOD 31.
	APPROVED PLANT YET TO BE CONSTRUCTED OR UNDER CONSTRUCTION.
	MOD 26 CAR PARK.
	MOD 25 PENDING APPROVAL.



DDG HEAT EXCHANGERS.  
Drw-MN7462-017 & MN7462-025.

OVERHEAD ELECTRICAL BRIDGE.  
Drw-MN7994-007.

OVERHEAD ELECTRICAL ROUTE.

UNDERGROUND ELECTRICAL ROUTE.

HEAT RECOVERY WORKS.  
Drws-MN7994-001 to MN7994-005.

RELOCATE 78 CAR PARKING SPACES.

REV	ZONE	DETAILS	DRN	DATE	CHKD	APPD
P08	E4	Electrical Bridge Amended	P.C.	23-05-25	MP	
P07	ES	Electrical route adjacent to creek above ground.	P.C.	21-05-25	DJ	
P06	All	Was mod 30, car park mods, electrical route added.	P.C.	08-05-25	MP	
P04	All	To match engineers.	P.C.	25-11-24	MP	
P03	All	Starch dryers ect. & packer extension removed. DDG heat exch. relocated.	P.C.	11-11-24	CJ	
P01	All	First issue.	P.C.	12-07-24	J.S.	



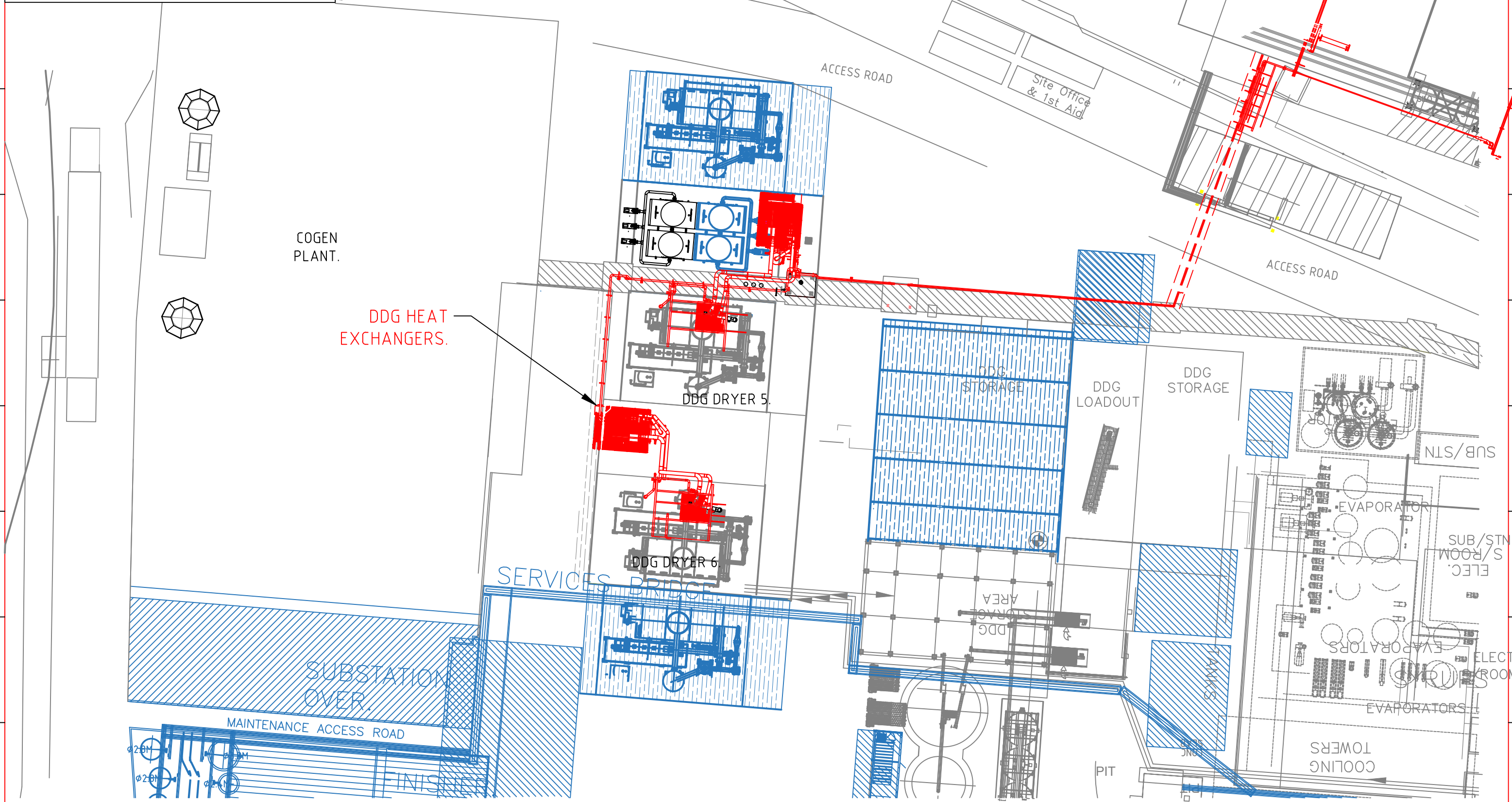
**MANILDRA GROUP**  
100% AUSTRALIAN



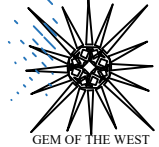
THIS DRAWING IS A CONFIDENTIAL COMMUNICATION OF MANILDRA GROUP. TO TAKE A COPY OR DISCLOSE TO A THIRD PARTY WITHOUT WRITTEN CONSENT CONSTITUTES AS AN INFRINGEMENT OF THE COPYRIGHT.


DRAWN PC	DATE 25-06-24	SITE MANILDRA-SHOALHAVEN STARCHES PTY LTD.	SHT SIZE A3
DESIGNED. AT	DATE	JOB TITLE NOWRA PLANT.	SHEET
CHKD SR	DATE	DWG TITLE MOD 31.	OF
APPD BH	DATE	PROJECT No. 7462-001	REV. P08
SCALE 1:3000	DWG No. MN7462-001		

EXISTING APPROVED PLANT.  
 MOD 31.  
 APPROVED PLANT YET TO BE CONSTRUCTED OR UNDER CONSTRUCTION.

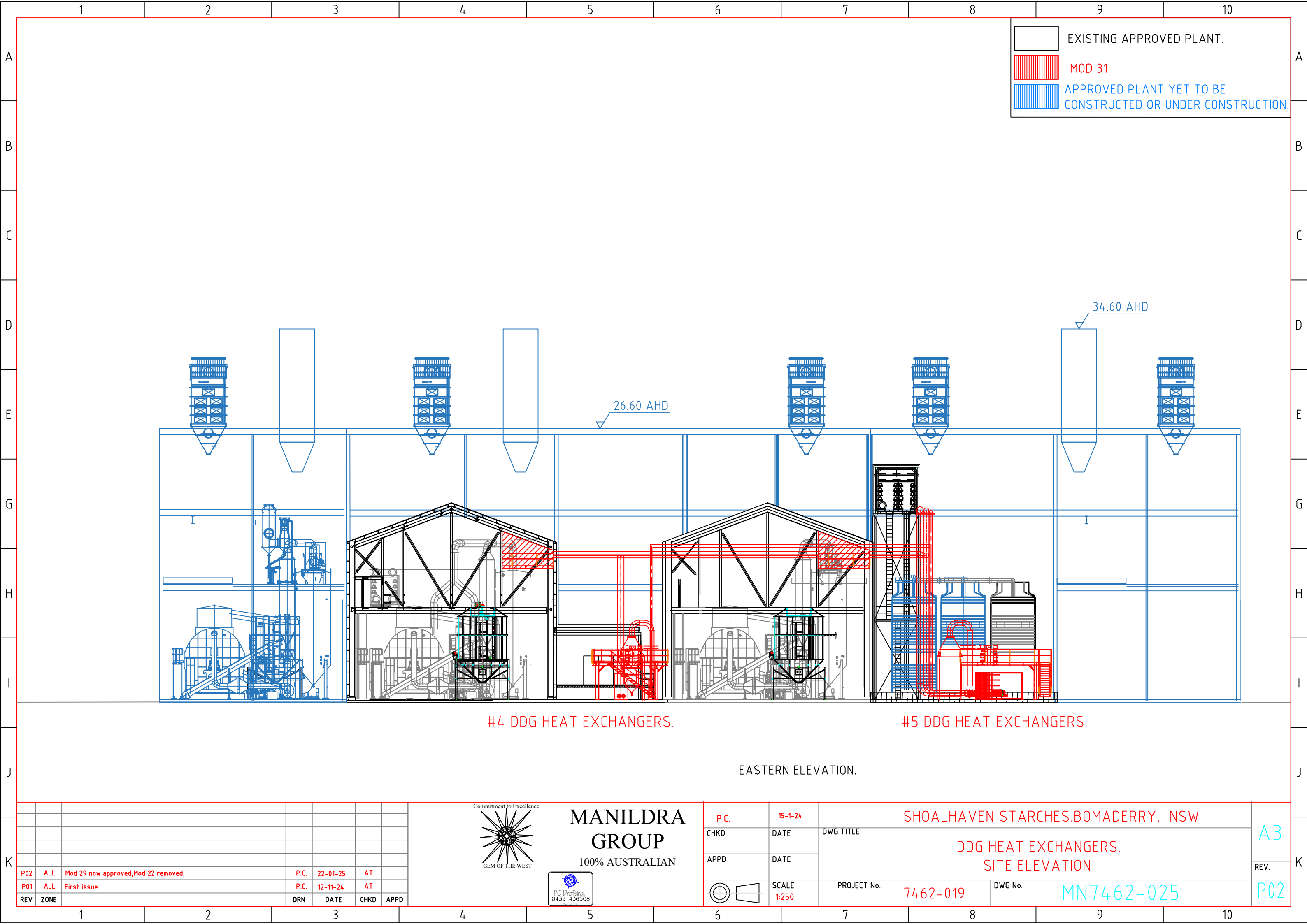


REV	ZONE	DRN	DATE	CHKD	APPD
P04	ALL		Mod 29 now approved, Mod 22 removed.	P.C.	22-01-25 AT
P03	ALL		Cooling towers/stack ect removed.Ht/ex relocated.	P.C.	12-11-24 AT
P01	ALL		Conceptual plan.	P.C.	16-8-24 AT

Commitment to Excellence  
  
**MANILDRA GROUP**  
 100% AUSTRALIAN

P.C.	15-1-24	SHOALHAVEN STARCHES.BOMADERRY. NSW	
CHKD	DATE	DWG TITLE	
APPD	DATE	DDG HEAT EXCHANGERS. SITE PLAN.	
	SCALE 1:500	PROJECT No. 7462-019	DWG No. MN7462-017

A3  
 REV.  
 P04



	EXISTING APPROVED PLANT.
	MOD 31.
	APPROVED PLANT YET TO BE CONSTRUCTED OR UNDER CONSTRUCTION.


#4 DDG HEAT EXCHANGERS.

#5 DDG HEAT EXCHANGERS.

EASTERN ELEVATION.


REV	ZONE	DRN	DATE	CHKD	APPD
P02	ALL		22-01-25	AT	
P01	ALL		12-11-24	AT	

Commitment to Excellence



**MANILDRA GROUP**  
100% AUSTRALIAN

GEM OF THE WEST

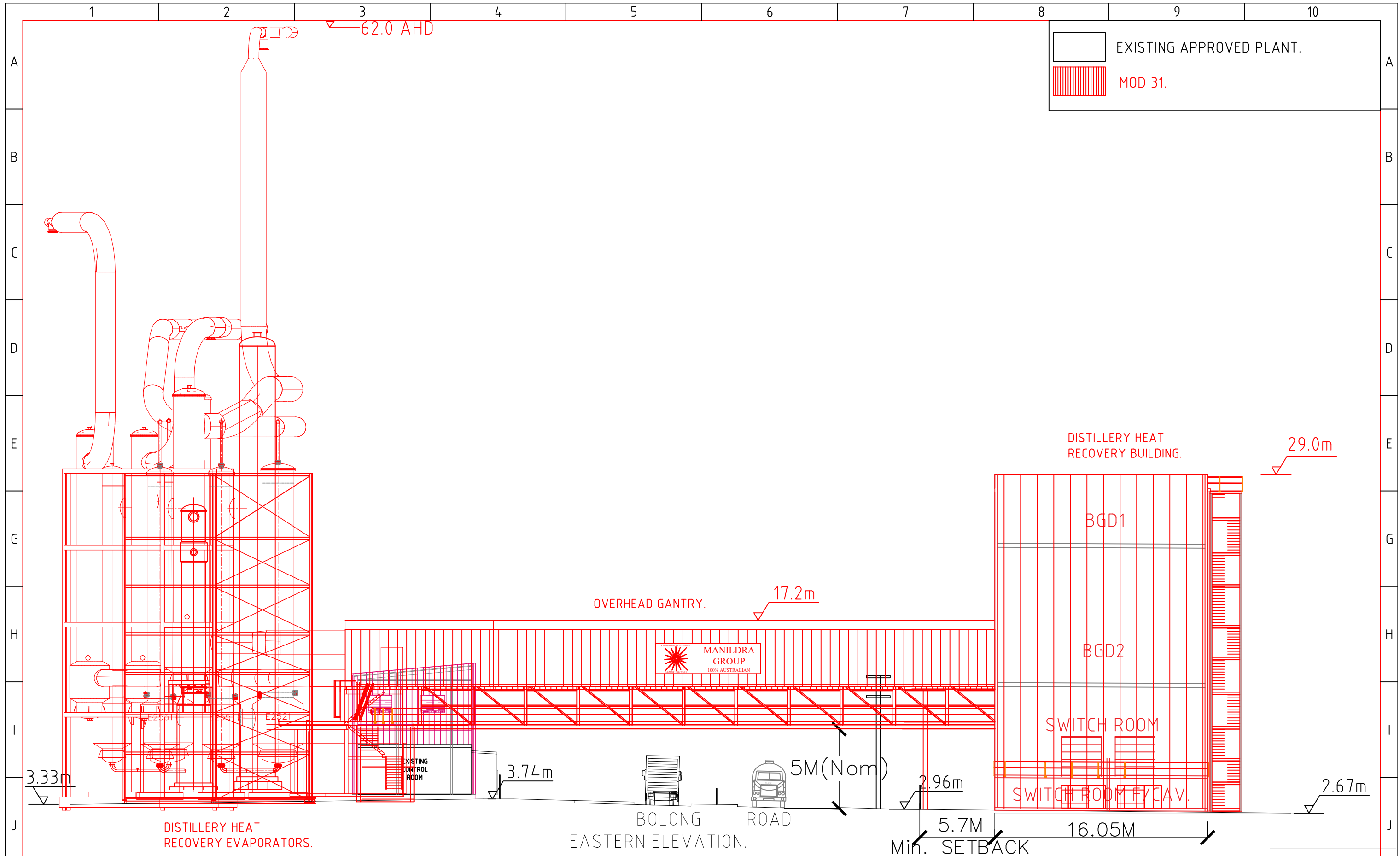


P.C.	15-1-24	DWG TITLE	SHOALHAVEN STARCHES.BOMADERRY. NSW
CHKD	DATE		
APPD	DATE	PROJECT No.	DWG No.
	SCALE 1:250		
		7462-019	MN7462-025

A3

REV. P02





REV	ZONE	DETAILS	DRN	DATE	CHKD	APPD
P06	ALL	Changes to match engineers design.	B.M.	28.05.25	MPoole	
P05	ALL	Changes to match engineers design.Fan build/bridge width & height increased.	P.C.	05-05-25	MPoole	
P04	ALL	Changes to match engineers design.	P.C.	22-11-24	MPoole	
P01	ALL	Construction layout.	P.C.	16-05-24	D.J.	



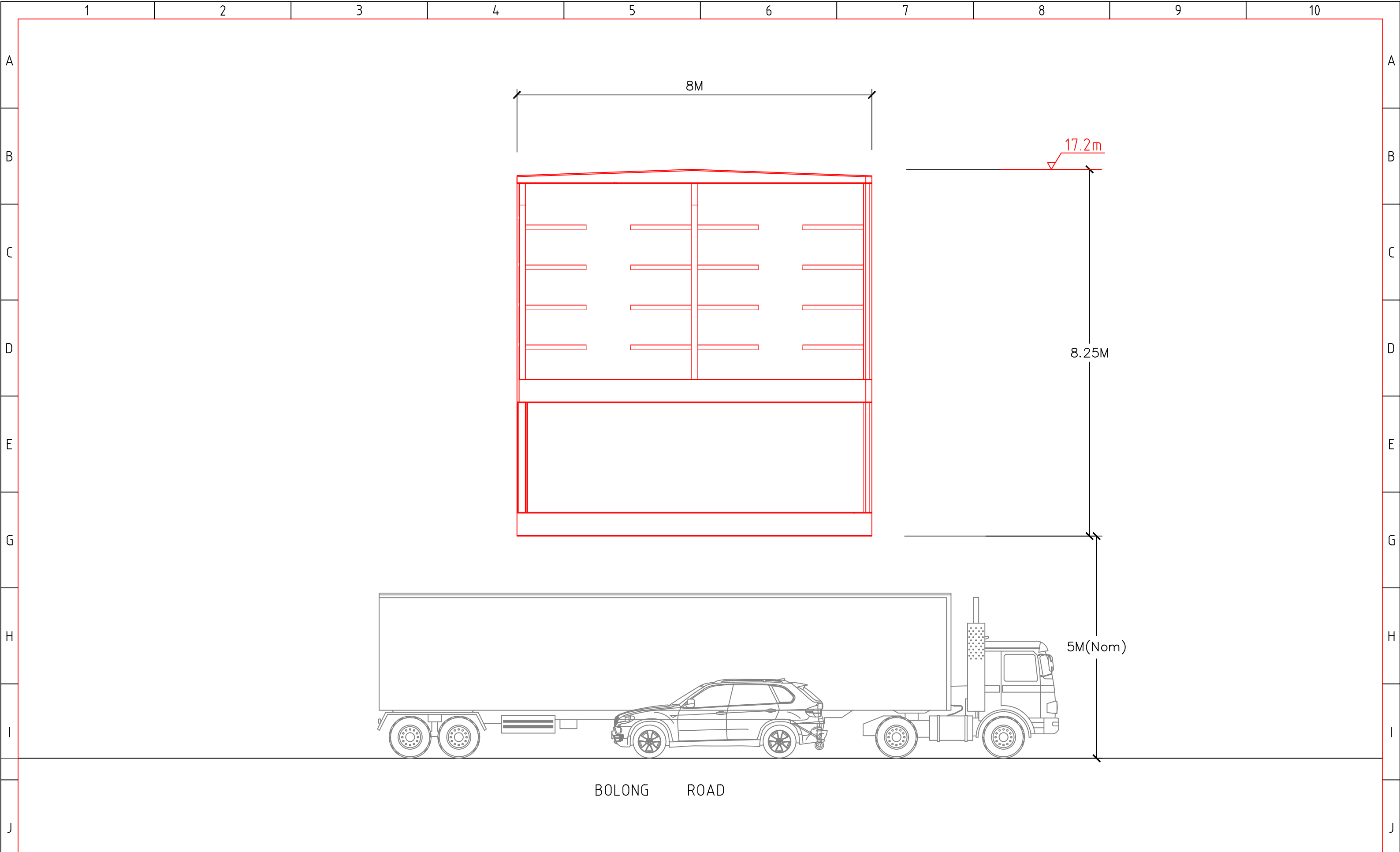
**MANILDRA GROUP**  
100% AUSTRALIAN



P.C.	DATE	DWG TITLE
CHKD	DATE	
APPD	DATE	
SCALE	PROJECT No.	DWG No.
1:250	7994 WAE	MN7994-002

SHOALHAVEN STARCHES.BOMADERRY. NSW  
MOD 31.BG1 & BG2 HEAT RECOVERY.  
SITE ELEVATION.

SHT SIZE	A3
REV.	P06



BOLONG ROAD

REV	ZONE	DETAILS	DRN	DATE	CHKD	APPD
P04	ALL	Changes to match engineers design.Width & height increased.	P.C.	05-05-25	MPoole	
P04	ALL	Changes to match engineers design.	P.C.	22-11-24	MPoole	
P01	ALL	Construction layout.	P.C.	16-05-24	D.J.	

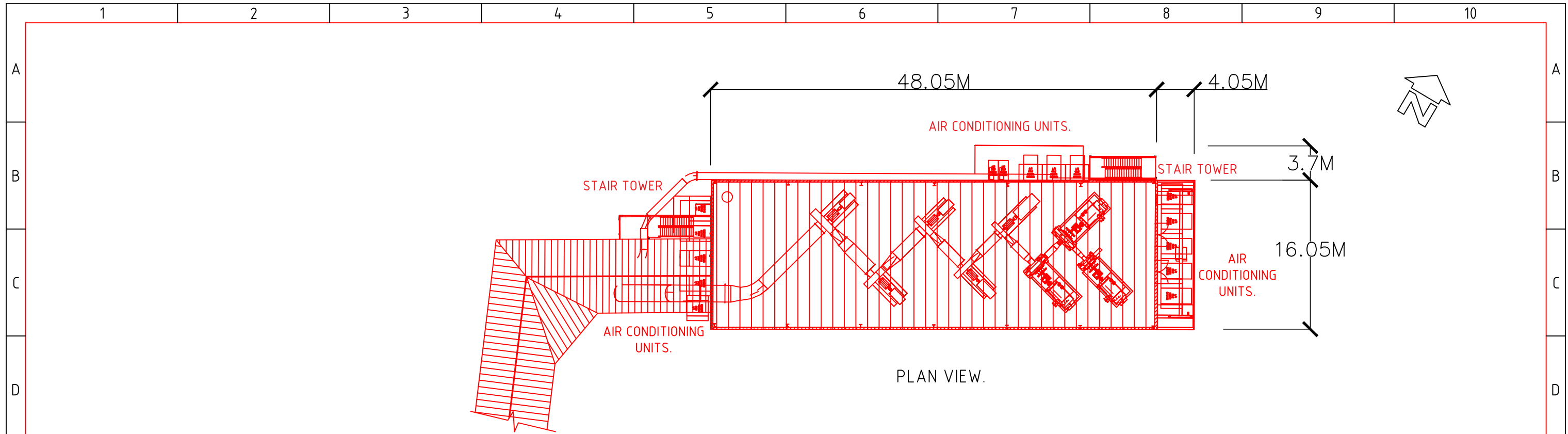


Commitment to Excellence  
**MANILDRA GROUP**  
 100% AUSTRALIAN

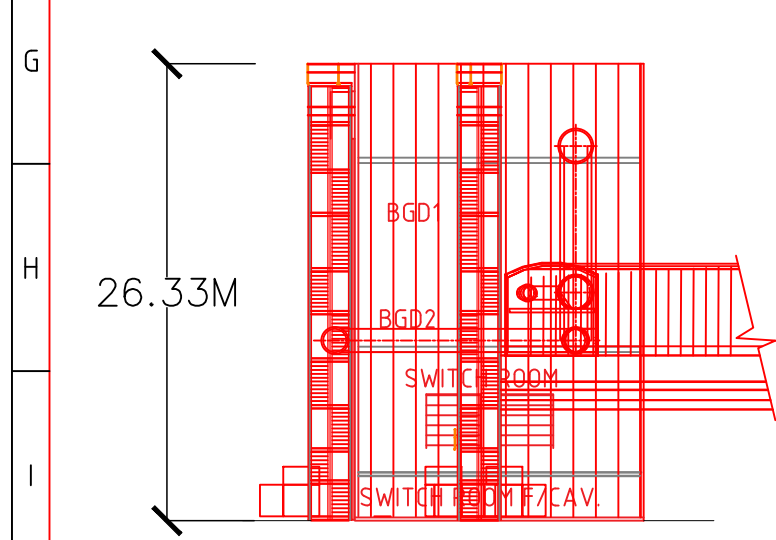


P.C.	DATE	DWG TITLE
CHKD	DATE	SHOALHAVEN STARCHES.BOMADERRY. NSW MOD 31.BG1 & BG2 HEAT RECOVERY. GANTRY SECTIONAL ELEVATION.
APPD	DATE	
	SCALE 1:75	PROJECT No. 7994 WAE
		DWG No. MN7994-003

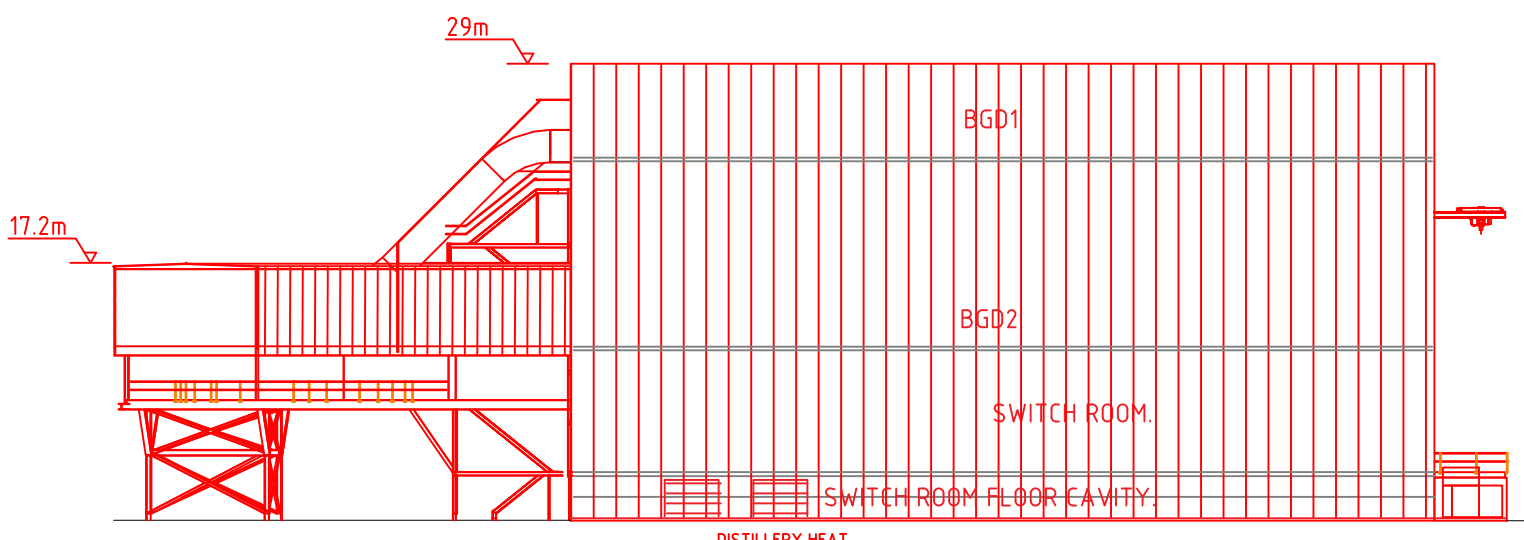
SHOALHAVEN STARCHES.BOMADERRY. NSW		SHT SIZE
MOD 31.BG1 & BG2 HEAT RECOVERY.		A3
GANTRY SECTIONAL ELEVATION.		REV.
		P05



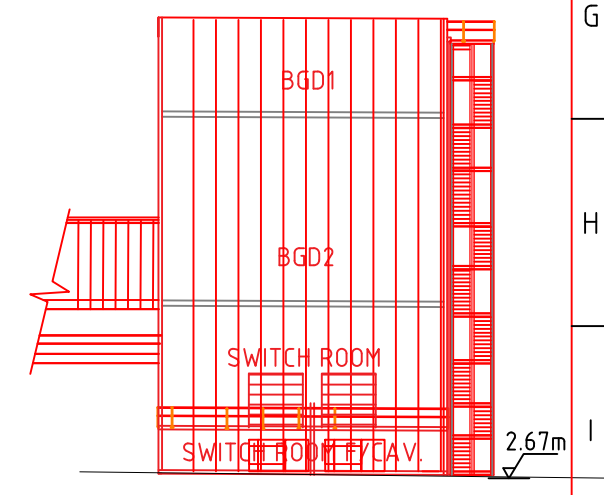
PLAN VIEW.



BACK ELEVATION.



SIDE ELEVATION.



FRONT ELEVATION.

REV	ZONE	DETAILS	DRN	DATE	CHKD	APPD
P05	ALL	Changes to match engineers design.Width & height increased.	P.C.	05-05-25	MPoole	
P04	ALL	Changes to match engineers design.	P.C.	22-11-24	MPoole	
P01	ALL	Construction layout.	P.C.	16-05-24	D.J.	



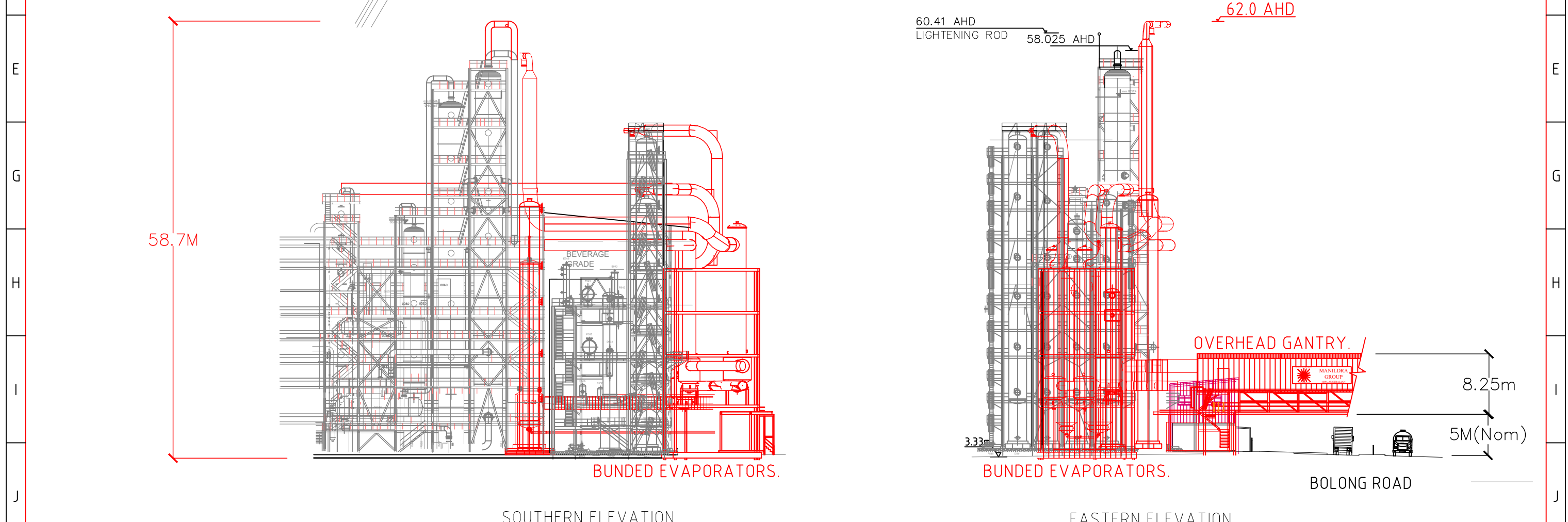
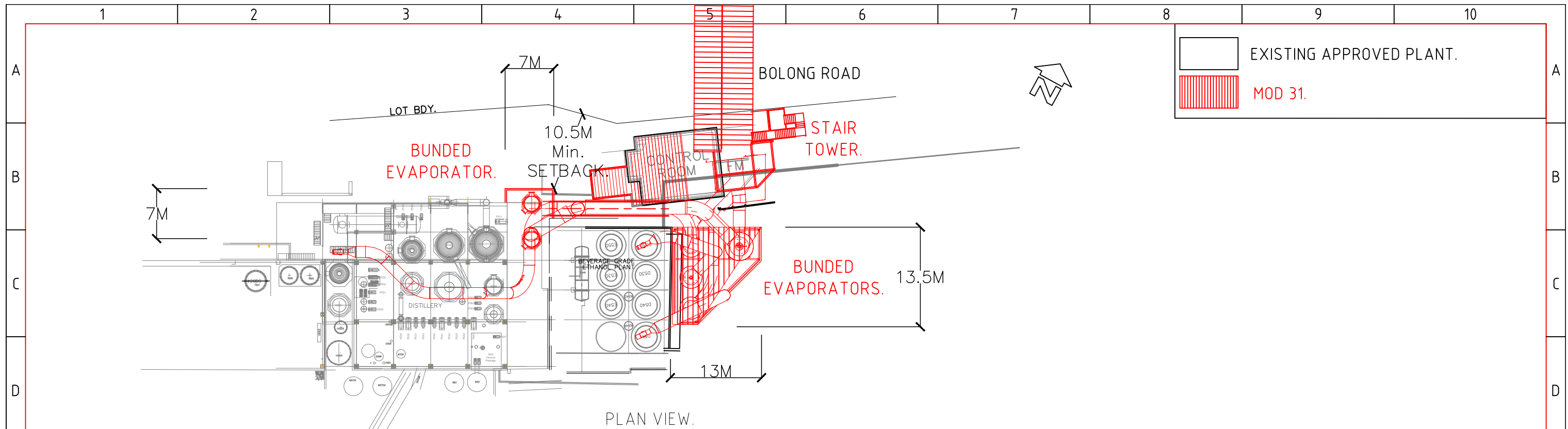
**MANILDRA GROUP**  
100% AUSTRALIAN



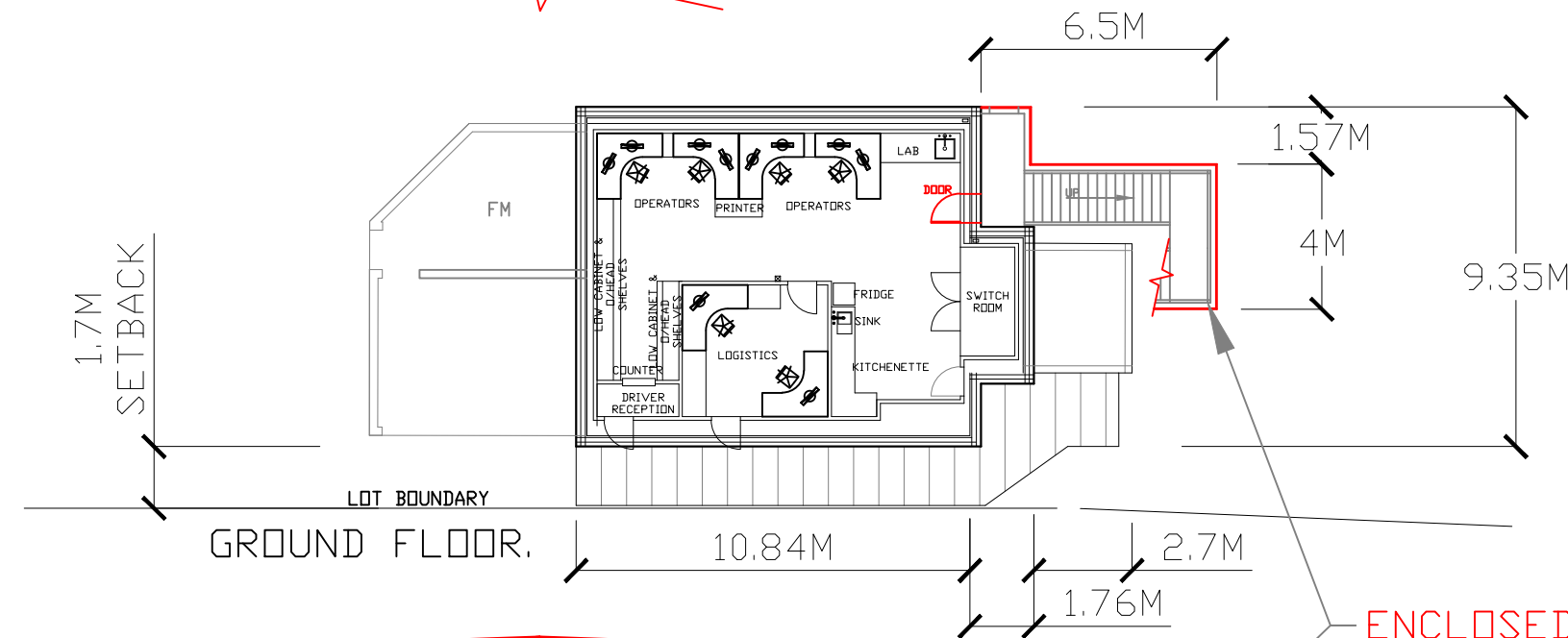
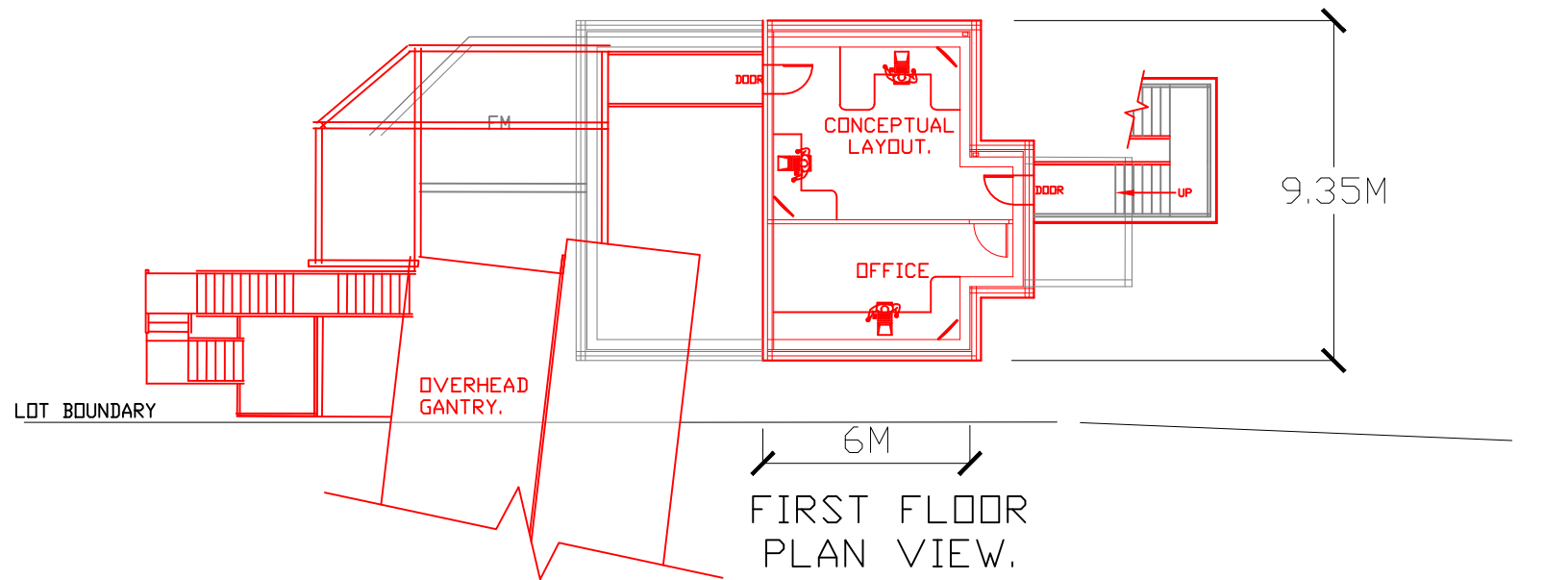
P.C.	DATE	DWG TITLE
CHKD	DATE	
APPD	DATE	
SCALE	PROJECT No.	DWG No.
1:400	7994 WAE	MN7994-004

SHOALHAVEN STARCHES.BOMADERRY. NSW  
MOD 31.BG1 & BG2 HEAT RECOVERY.  
DISTILLERY HEAT RECOVERY BUILDING.

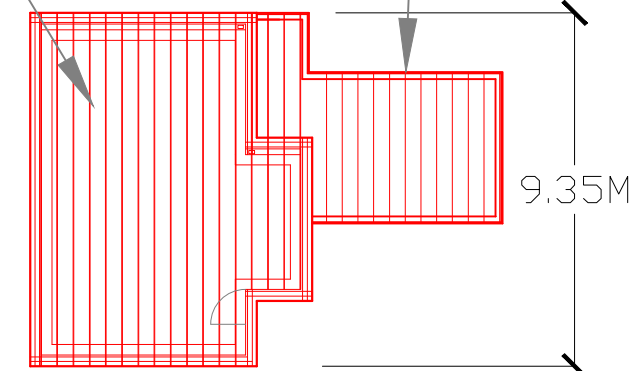
SHT SIZE	A3
REV.	P05



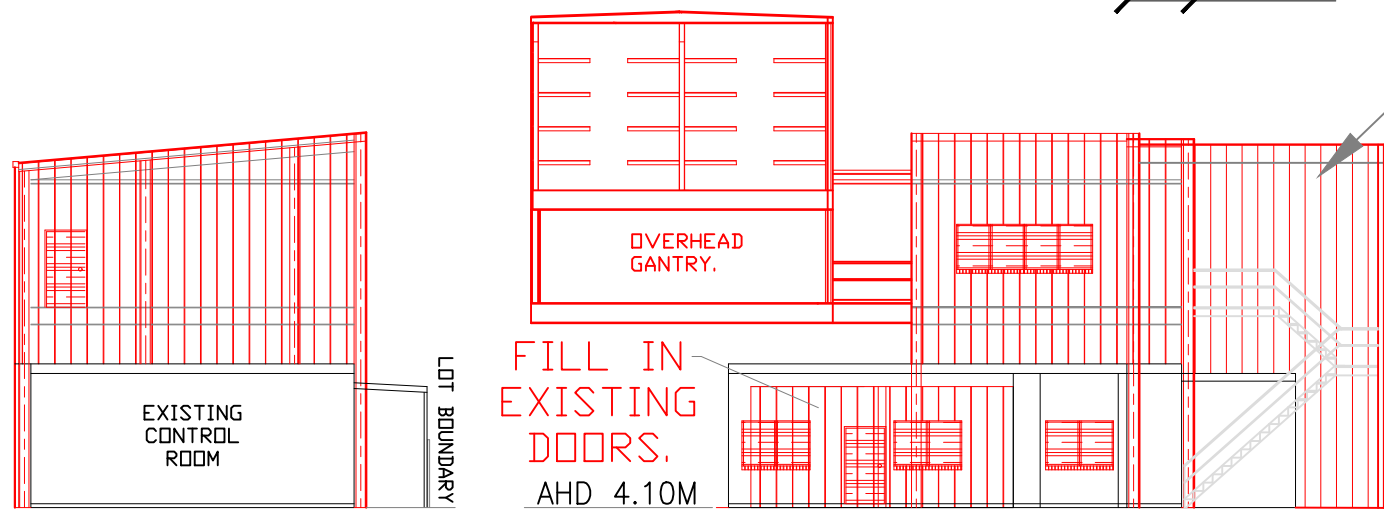
		Commitment to Excellence		MANILDRA GROUP		P.C.		SHOALHAVEN STARCHES.BOMADERRY. NSW		SHT SIZE	
		GEM OF THE WEST		100% AUSTRALIAN		CHKD		MOD 31.BG1 & BG2 HEAT RECOVERY.		A3	
		PC Drafting 0439 436508				APPD		DISTILLERY HEAT RECOVERY EVAPORATORS.		REV.	
						SCALE		PROJECT No. 7994 WAE		P06	
						1:500		DWG No. MN7994-005			
REV	ZONE	DRN	DATE	CHKD	APPD						
P06	ALL	B.M.	28-05-25	MPoole							
P05	ALL	P.C.	06-05-25	MPoole							
P04	ALL	P.C.	22-11-24	MPoole							
P01	ALL	P.C.	16-05-24	D.J.							



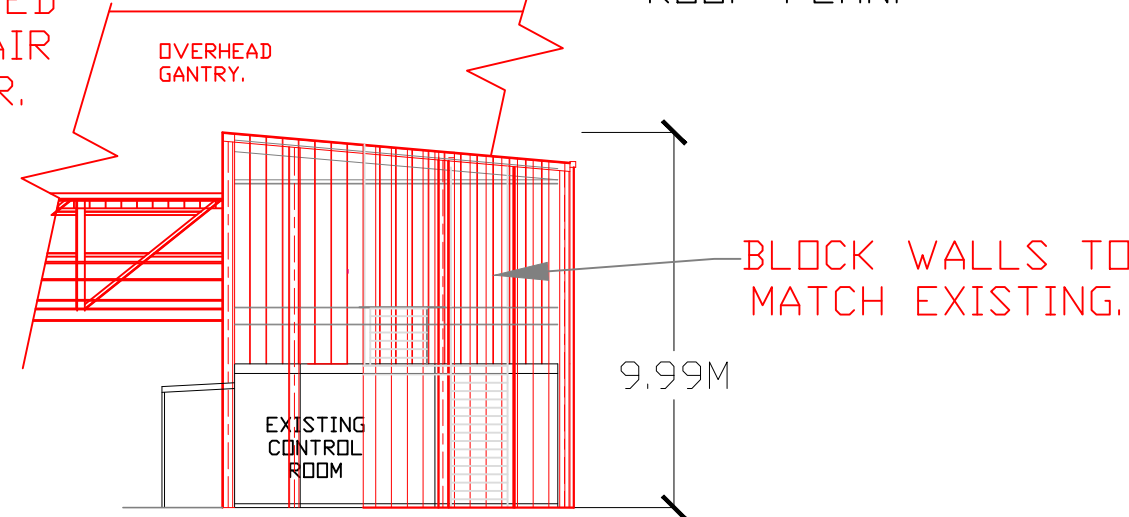
CONCRETE ROOF,  
4 HOUR FIRE RATED.



AHD 14.00M



ENCLOSED STAIR TOWER.



EXISTING APPROVED PLANT.

MOD 31.

P16	ALL	Southern door removed. Egress to gantry shown in plan view.	P.C.	07-05-25	J.S.	
P15	ALL	Was Mod 22, was full length.	P.C.	07-05-25	J.S.	
P14	17	Western window removed.	P.C.	20-09-23	A.T.	
P13	ALL	Some building details added for fire rating.	P.C.	06-09-23	A.T.	
P12	ALL	Existing veranda shown.	P.C.	01-8-22	BH	
P11	ALL	Was Mod 23.	P.C.	04-5-21	BH	
P10	ALL	Now Mod 23.	P.C.	25-03-21	BH	
REV	ZONE	DETAILS	DRN	DATE	CHKD	APPD

Commitment to Excellence

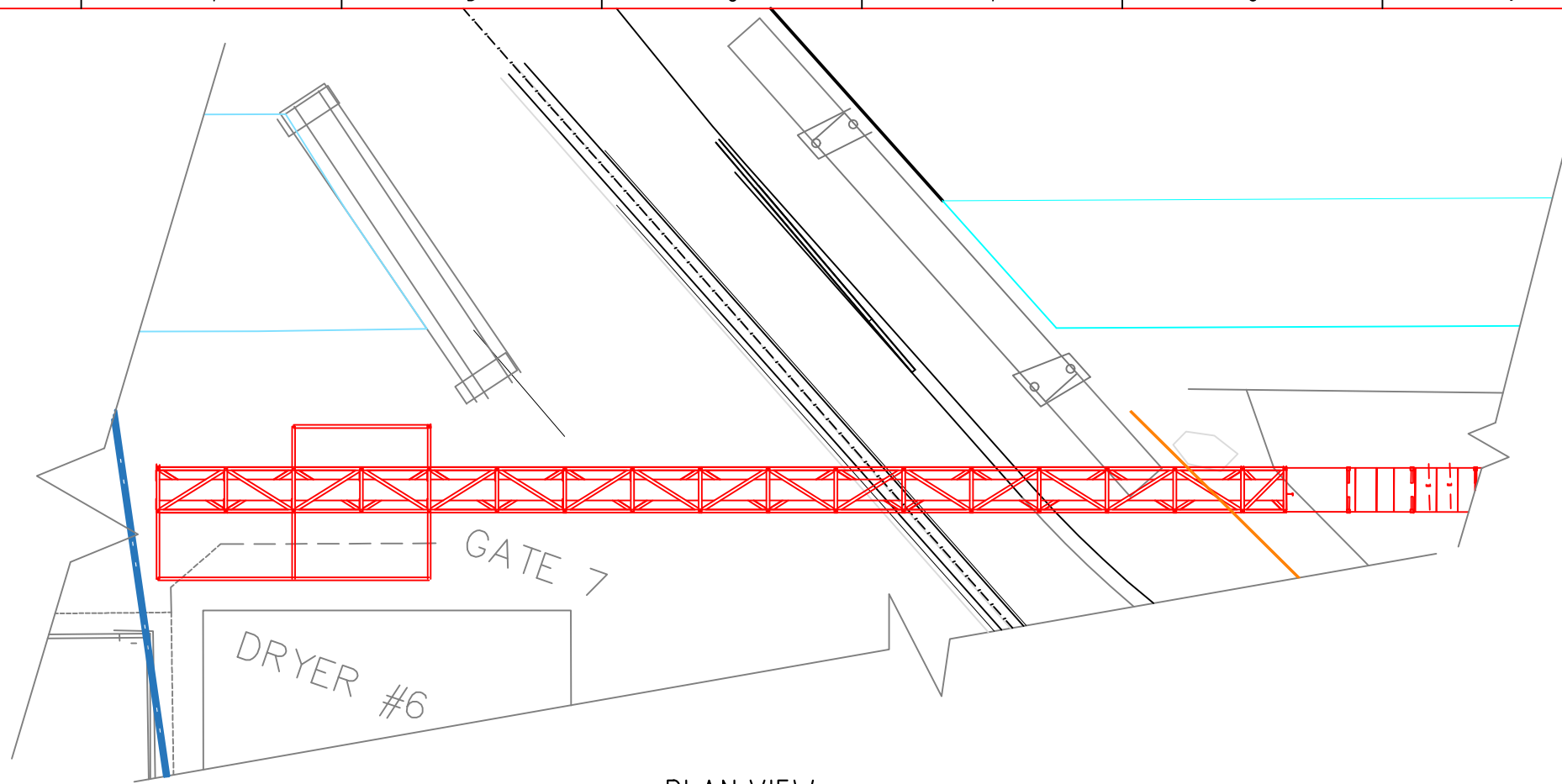
**MANILDRA GROUP**

100% AUSTRALIAN

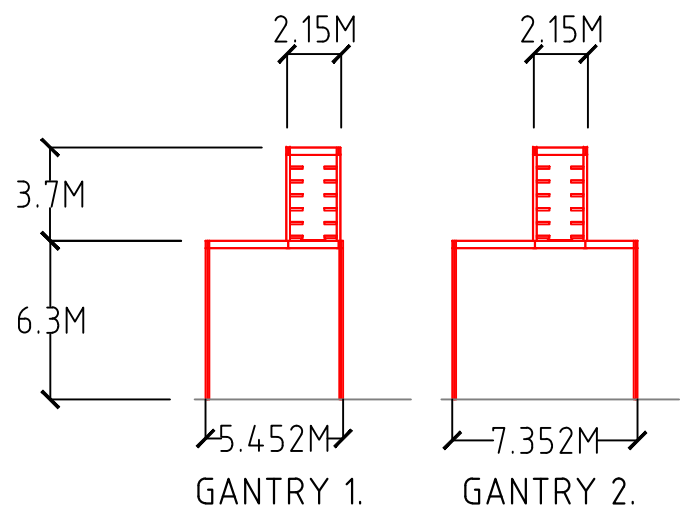
GEM OF THE WEST

PC Drafting  
0439 436508

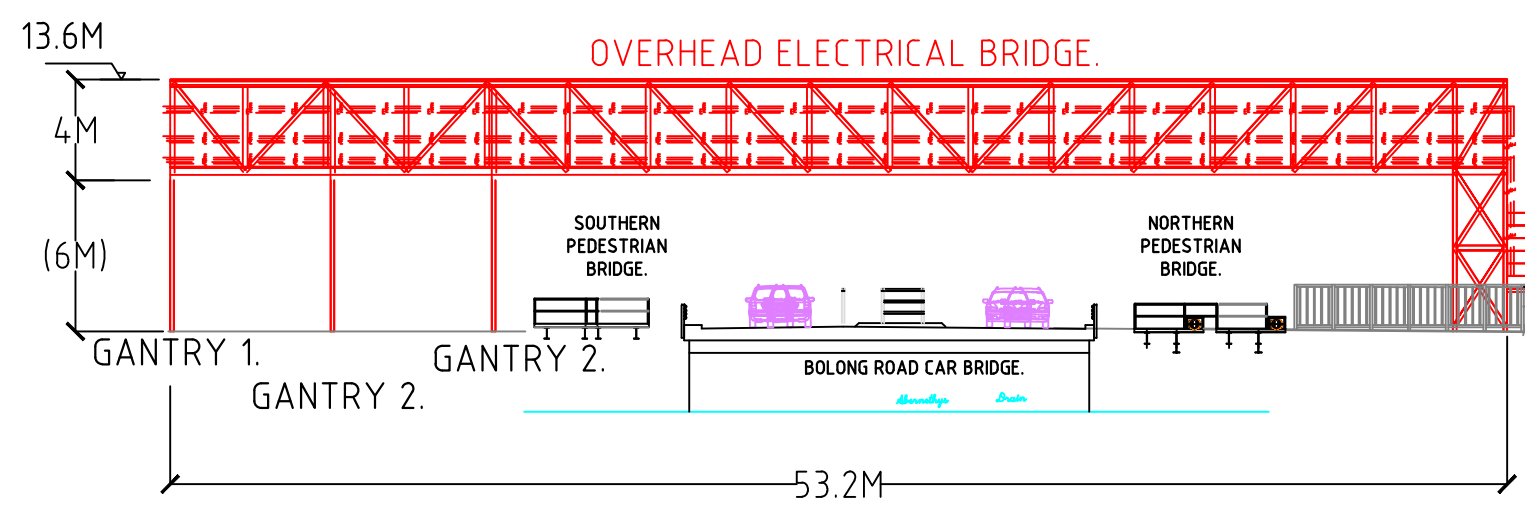
DRAWN P.C.	DATE 25/06/19	JOB TITLE SHOALHAVEN STARCHES, BOMADERRY, NSW	SHT SIZE A3
CHKD T.J.	DATE	DWG TITLE MOD 31. CONTROL ROOM ADDITIONS.	REV. K
APPD	DATE	PROJECT No. 7193WAE	DWG No. MN7994-006
SCALE 1:200			P16



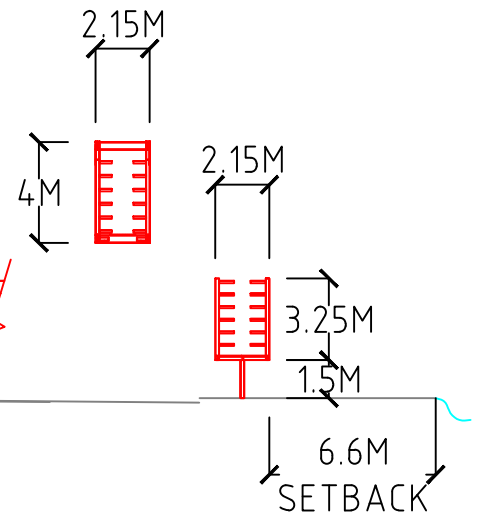
PLAN VIEW.



END ELEVATION.



EASTERN ELEVATION.



END ELEVATION.

REV	ZONE	DETAILS	DRN	DATE	CHKD	APPD
P03	ALL	Bridge design changed by MP.	P.C.	23/05/25	MP	DJ
P02	ALL	Electrical now above ground.End els added.	P.C.	21/05/25	DJ	
P01	ALL	First issue.	P.C.	09/05/25	MP	

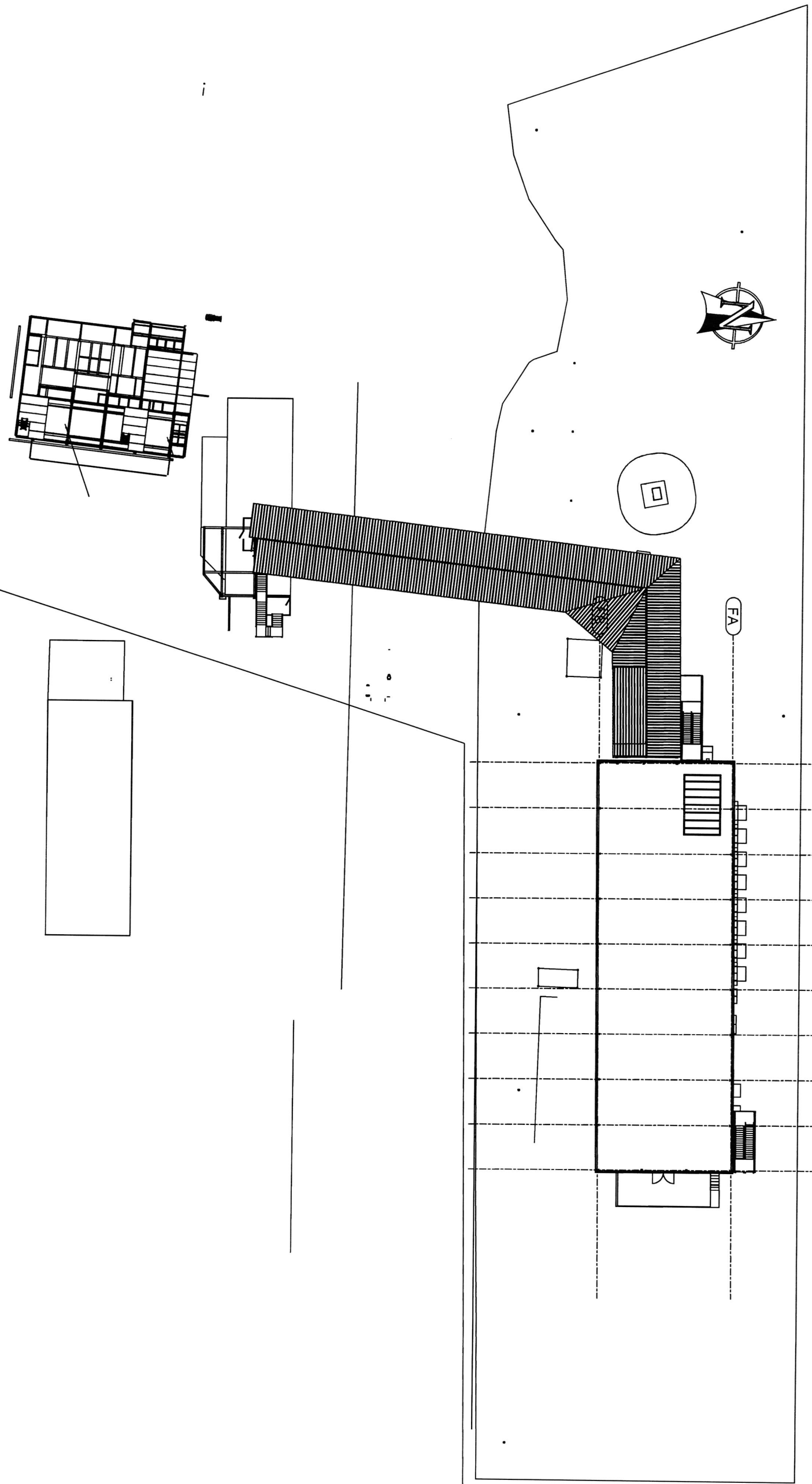


**MANILDRA GROUP**  
100% AUSTRALIAN OWNED AND MANUFACTURED

P.C.	DATE
CHKD	DATE
SCALES 1:300	

SHOALHAVEN STARCHES.BOMADERRY.NSW.	
MOD 31.ELECTRICAL ROUTE. OVERHEAD ELECTRICAL BRIDGE.	
PROJECT No. MN7994-007	DWG No. MN7994-007

SHT SIZE	A3
REV.	P03



F1 F2 F3 F4 F5 F6 F7 F8 F9 F10



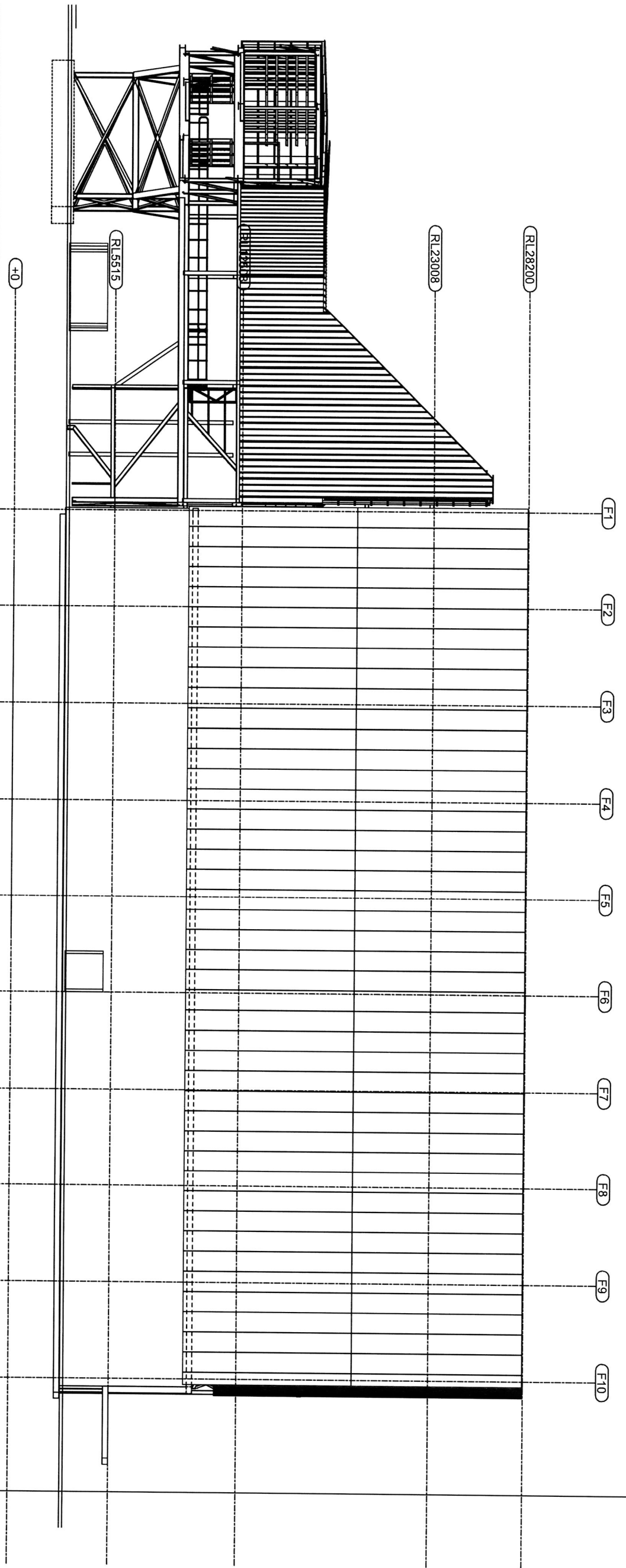
FA

- ERECTOR NOTES:
- 1) INDICATES MARKED END OF MEMBER TO BE ERECTED AT THIS LOCATION.
  - 2) COLUMNS HAVE ASSEMBLY MARK STAMPED ON NORTH OR WEST FACING FLANGE NEAR BASE OF SHAFT UNO.

P2	FOR INFORMATION ONLY	11/04/23	P.L.	D.P.		
P1	FOR INFORMATION ONLY	20/11/24	P.L.	D.P.		
REV	REVISION DETAILS	DATE	DRG BY	DRG CHK	DESIGN CHK	DESIGN APPROVAL

**multicAD**  
 www.multicad.com.au PH: (02) 44721611 FAX: (02) 44721633  
 PROJECT: DHR PROJECT  
 CLIENT: MANILDRA  
 A.C.N. 101 897 207

<small>THIS DRAWING IS THE SOLE PROPERTY OF MULTICAD PTY LTD AND IT IS RETURNABLE ON REQUEST. THE DRAWING AND THE DESIGN CONCEPTS ARE NOT TO BE COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT THE WRITTEN CONSENT OF MULTICAD PTY LTD AND MAY BE USED FOR MANUFACTURE ONLY. THESE CONDITIONS APPLY TO ALL DRAWINGS AGREED IN ACCORDANCE WITH AS1100 COMPANY.</small>			
TITLE	SCALE	JOB No.	DRAWING No.
PLAN VIEW	1:250	1208	SK01
	DRAWN		REV.
	P.L.		P2



SOUTH ELEVATION - 5

2	FOR INFORMATION ONLY	11/04/25	P.L.	D.P.		
1	FOR INFORMATION ONLY	20/1/24	P.L.	D.P.		
REV	REVISION DETAILS	DATE	DRG BR	DRG CHG	DESIGN CHK	DESIGN APPROVAL

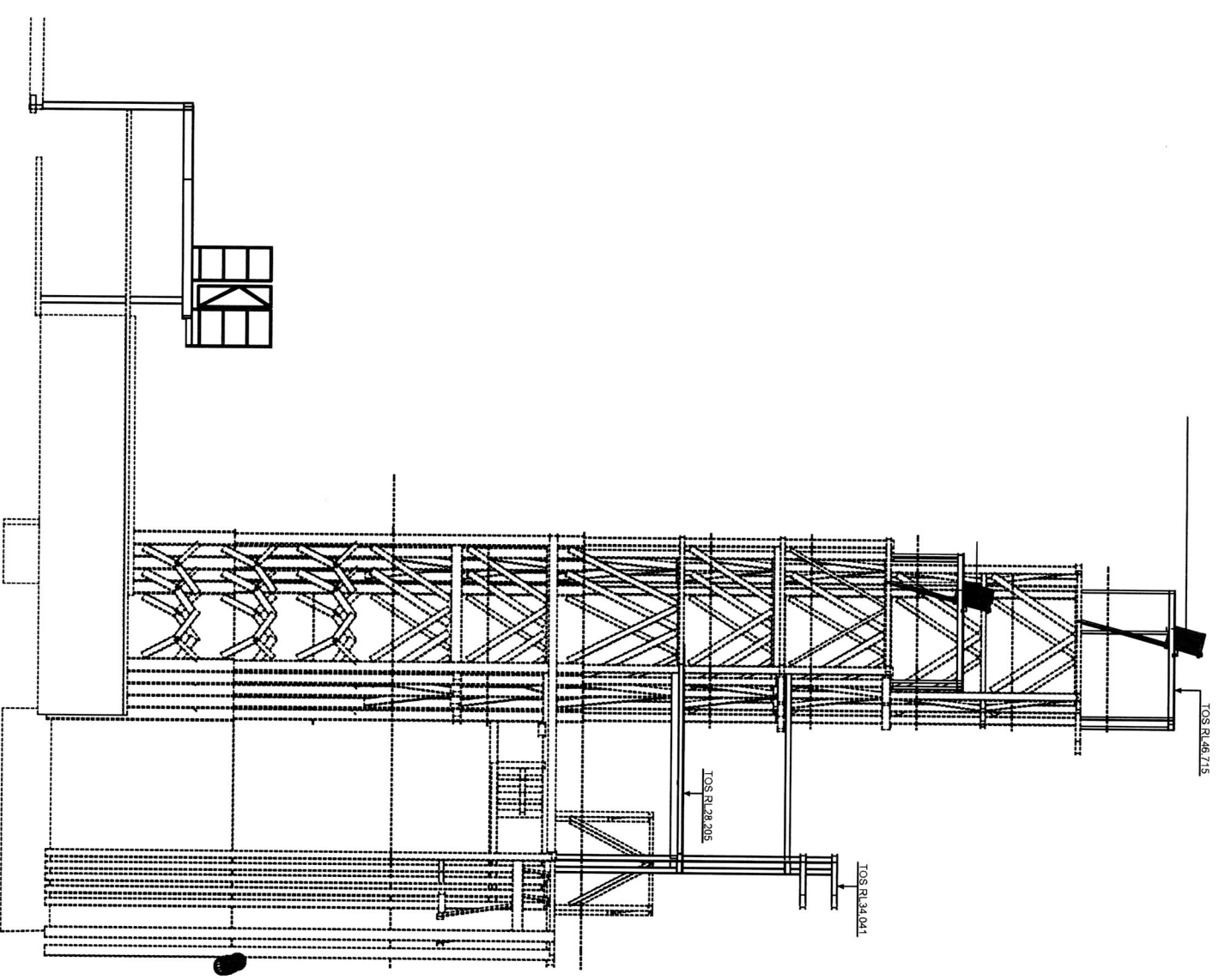
ERECTOR NOTES:  
 1) INDICATES MARKED END OF MEMBER TO BE ERECTED AT THIS LOCATION. RESEMBLY MARK STAMPED ON NORTH OR WEST FACING FLANGE NEAR BASE OF SHAFT U.N.O.

**multicad**  
 www.multicad.com.au Ph: (02) 4421811 Fax: (02) 4421833  
 PROJECT: DHR PROJECT  
 CLIENT: MANILDRA

THIS DRAWING IS THE SOLE PROPERTY OF MULTICAD PTY LTD AND IS RESTRICTED TO SOLE USE. ANY REUSE OR REPRODUCTION OF THIS DRAWING WITHOUT THE WRITTEN CONSENT OF MULTICAD PTY LTD AND ANY REUSE FOR ANY PURPOSE MAY BE SUBJECT TO PROSECUTION UNDER APPLICABLE LAWS.

DATE: 11/04/25  
 DRAWN BY: [Name]  
 CHECKED BY: [Name]

TITLE: SOUTH ELEVATION			
SCALE 1:100	JOB No.	DRAWING No.	REV
DRAWN P.L.	1208	SK02	P2



EAST ELEVATION AT EVAPORATORS

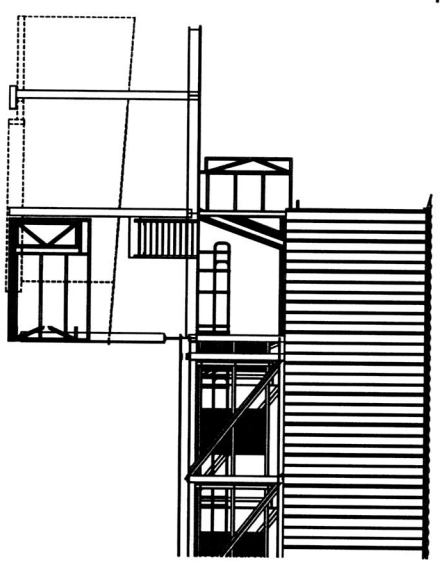
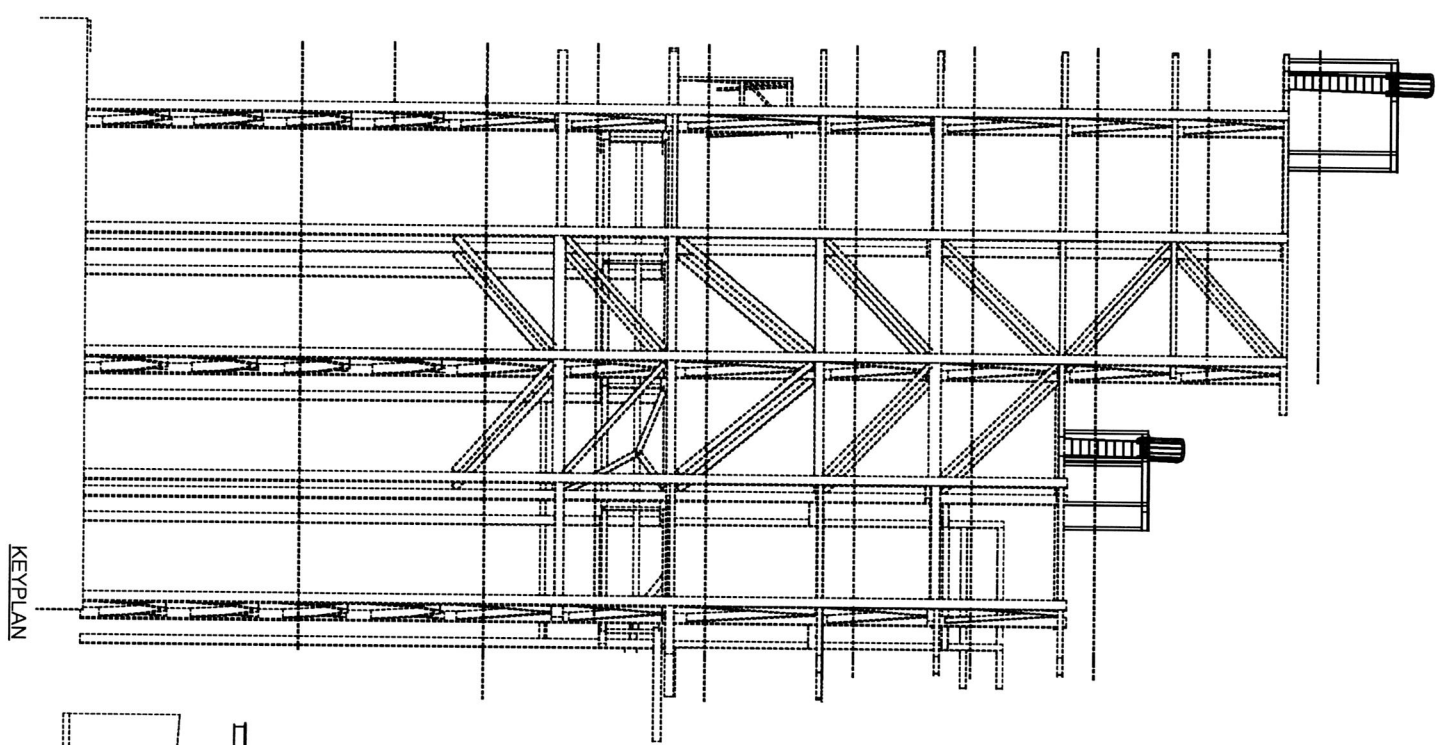
P2	FOR INFORMATION ONLY	11/04/25	P.L.	D.P.		
P1	FOR INFORMATION ONLY	20/11/24	DRG	D.P.		
REV	REVISION DETAILS	DATE	BY	CHK	DESIGN	DESIGN APPROVAL

- ERECTOR NOTES
- INDICATES MARKED END OF MEMBER TO BE ERRECTED AT THIS LOCATION. RESEMBLY MARK STAMPED ON NORTH OR WEST FACING FLANGE NEAR BASE OF SHAFT/U.N.O.

**multicad**  
 www.multicad.com.ph PH: (02) 4721011 FAX: (02) 4721033  
 PROJECT: DHR PROJECT  
 CLIENT: MANILDRA

THIS DRAWING IS THE PROPERTY OF MULTICAD P.V. LTD. AND IS NOT TO BE REPRODUCED OR COPIED IN ANY MANNER WITHOUT THE WRITTEN CONSENT OF MULTICAD P.V. LTD. AND ANY OTHER PERSON WITHOUT THE WRITTEN CONSENT OF MULTICAD P.V. LTD.

TITLE:			
EAST ELEVATION AT EVAPORATORS			
SCALE	JOB No.	DRAWING No.	REV.
1:100			
DRAWN			
P.L.	1208	SK03	P2



- ERECTOR NOTES
- 1) INDICATES MARKED END OF MEMBER TO BE ERECTED AT THIS LOCATION.
  - 2) MARK STAMPED ON NORTH OR WEST FACING FLANGE NEAR BASE OF SHAFT U.N.O.

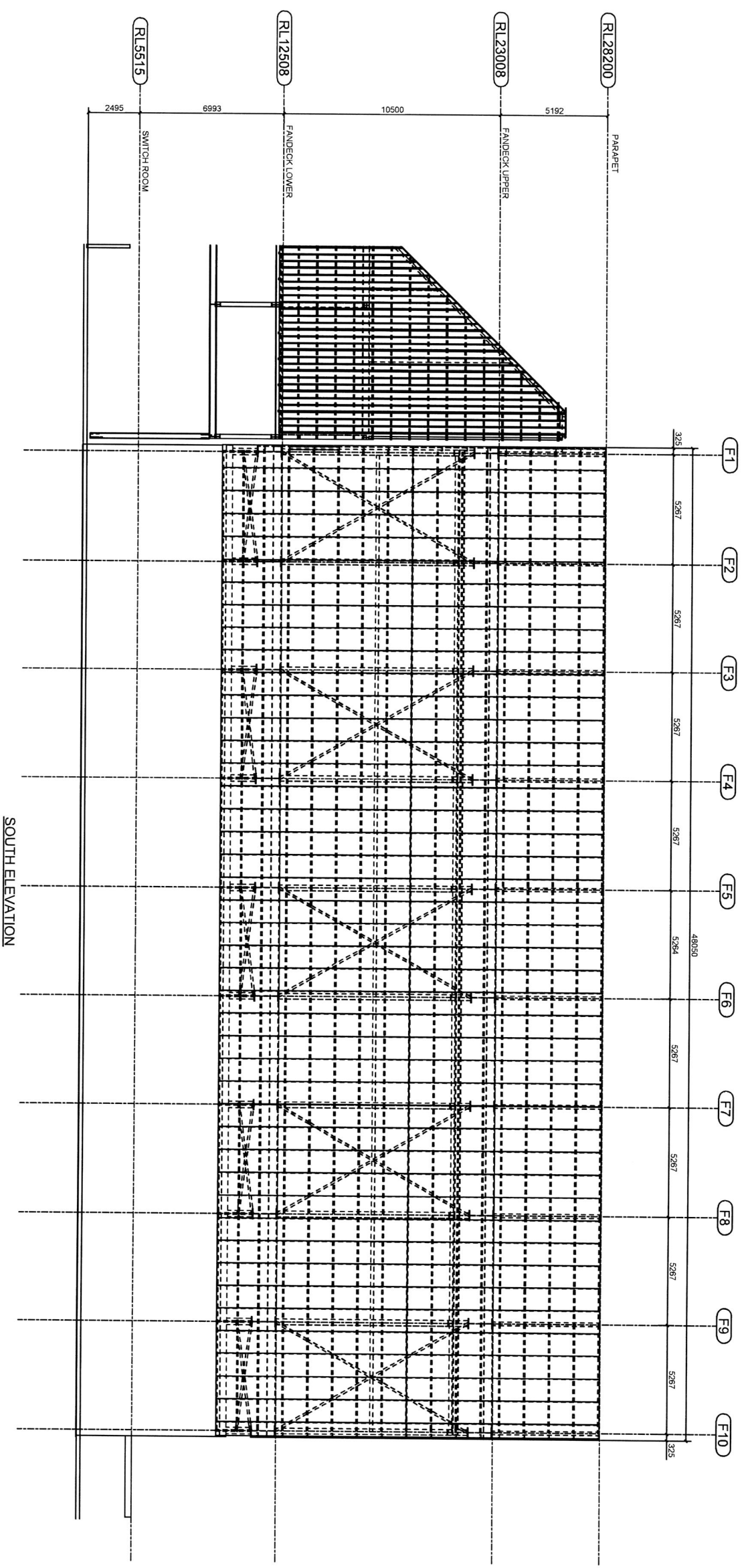
REV	FOR INFORMATION ONLY	11/04/23	P.L.	D.P.		
	FOR INFORMATION ONLY	20/11/24	DRG	D.P.	DESIGN	DESIGN
	REVISION DETAILS		DT	CHK	CHK	APPROVAL

**multicad**  
 www.multicad.com.ph PH: (02) 4472101 FAX: (02) 4472103  
 PROJECT: DHR PROJECT  
 CLIENT: MANILDRA

THIS DOCUMENT IS THE PROPERTY OF MULTICAD, LTD. AND IS NOT TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM. WITHOUT PERMISSION IN WRITING FROM THE COMPANY.

**ALL DRAWINGS ARE IN 1/100**

TITLE			
NORTH ELEVATION			
SCALE	JOB No.	DRAWING No.	REV.
1:100		1208	SK04
DRAWN			P2



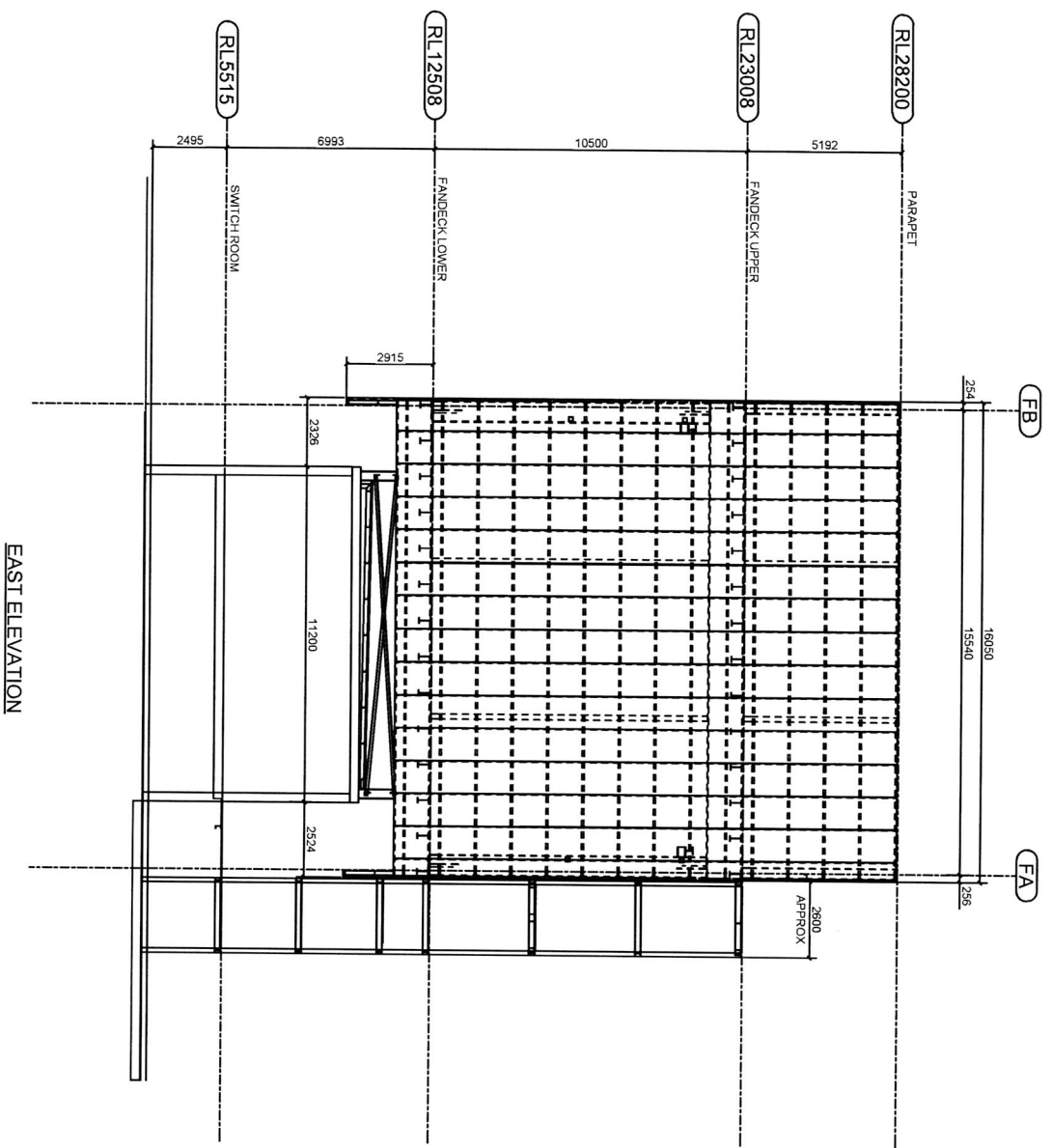
REV	FOR INFORMATION ONLY	REVISION DETAILS	DATE	BY	CHK	APP
P1	FOR INFORMATION ONLY		28/03/23	PL	DRG	DESIGN
P2	FOR INFORMATION ONLY		11/04/23	PL	DRG	DESIGN

ERECTOR NOTES:  
 1) INDICATES MARKED END OF MEMBER TO BE ERECTED  
 2) THIS COMPANY IS RESPONSIBLE FOR THE DESIGN AND CONSTRUCTION OF THE STRUCTURE. MARK STAMPED ON NORTH OR WEST FACING FLANGE NEAR BASE OF SHAFT/ U.N.O.

**multicad**  
 www.multicad.com.au PH: (02) 44721611 FAX: (02) 44721633  
 PROJECT: DHR PROJECT  
 CLIENT: MANILDRA

THIS DRAWING IS THE PROPERTY OF MULTICAD PTY LTD AND IS NOT TO BE REPRODUCED OR COPIED IN ANY MANNER WITHOUT THE WRITTEN PERMISSION OF MULTICAD PTY LTD. ANY OTHER REVISIONS WITHOUT THE WRITTEN PERMISSION OF MULTICAD PTY LTD ARE VOID.

TITLE:	FAN BUILDING
SCALE:	1:100
JOB No:	1208
DRAWING No:	SK05
REV:	P2



EAST ELEVATION

P2	FOR INFORMATION ONLY	11/04/25	P.L.	O.P.	
P1	FOR INFORMATION ONLY	28/02/25	P.L.	O.P.	
REV	REVISION DETAILS	DATE	DRG BY	DRG CHK	DESIGN APPROVAL

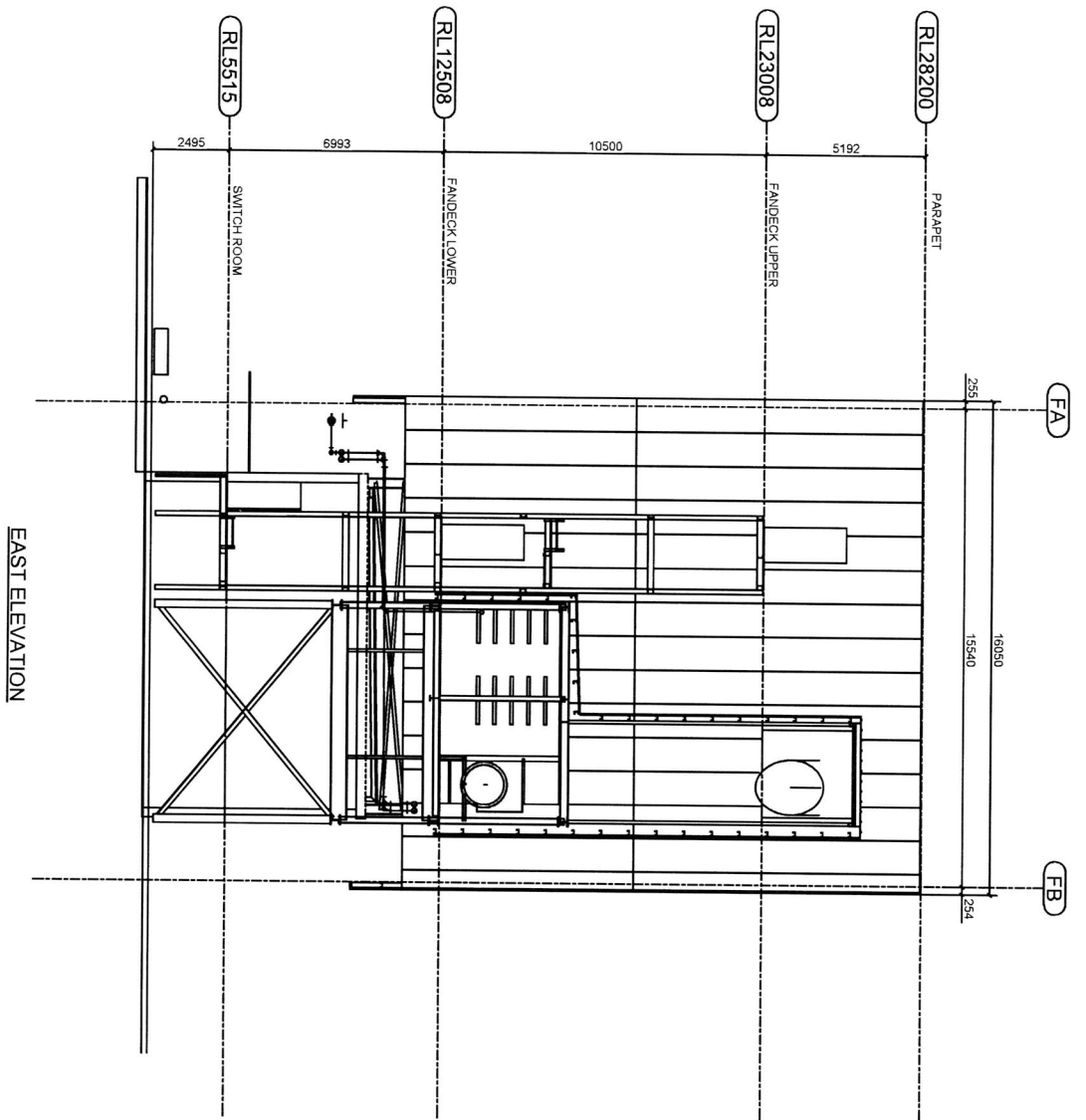
ERECTOR NOTES:  
 1) INDICATES MARKED END OF MEMBER TO BE ERECTED AT THIS LOCATION.  
 2) MARK STAMPED ON NORTH OR WEST FACING FLANGE NEAR BASE OF SHAFT U.N.O.

**multicad**  
 www.multicad.com.au Ph: (02) 44721811 Fax: (02) 44721833  
 PROJECT: DHR PROJECT  
 CLIENT: MANILDRA

THIS DRAWING IS THE SOLE PROPERTY OF MULTICAD PTY LTD AND IS NOT TO BE REPRODUCED, COPIED, DISTRIBUTED, LOANED, RENTED, REPRODUCED, OR IN ANY MANNER MADE AVAILABLE TO ANY OTHER PERSON WITHOUT THE WRITTEN CONSENT OF MULTICAD PTY LTD AND COMPANY.  
 ADO BRUNNEN & CO PTY LTD

TITLE: FAN BUILDING EAST ELEVATION			
SCALE 1:100	JOB No.	DRAWING No.	REV
DRAWN P.L.	1208	SK06	P2





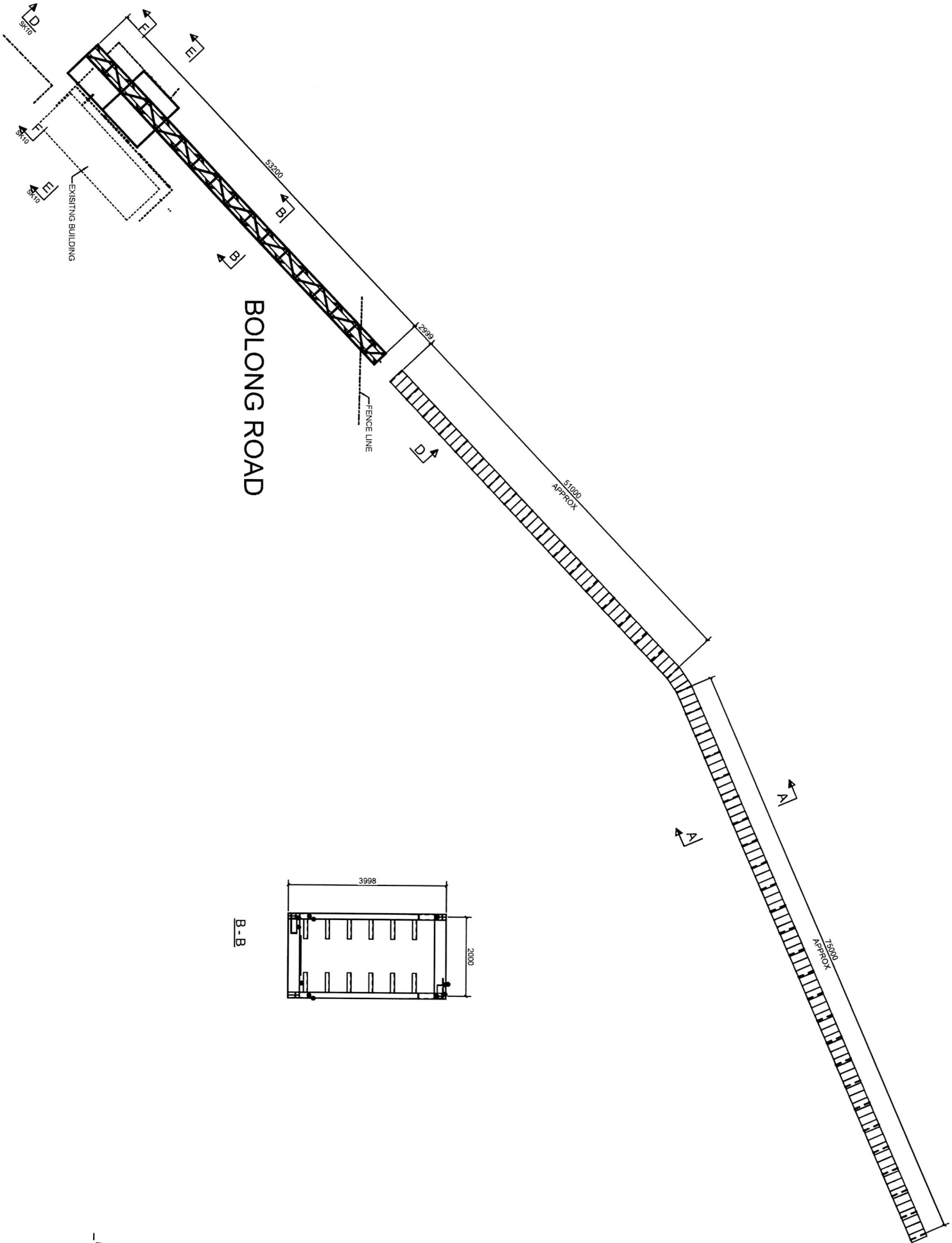
P2	FOR INFORMATION ONLY	11/04/25	P.L.	D.P.		
P1	FOR INFORMATION ONLY	28/03/25	P.L.	D.P.		
REV	REVISION DETAILS	DATE	DRG BR	DRG CDR	DESIGN CHK	DESIGN APPROVAL

ERECTOR NOTES:  
 1) INDICATES MARKED END OF MEMBER TO BE ERECTED AT THIS LOCATION. SECURITY MARKS STAMPED ON NORTH OR WEST FACING FLANGE NEAR BASE OF SHAFT U.N.O.

**multicad**  
 www.multicad.com.au Ph: (02) 4421811 Fax: (02) 4421833  
 PROJECT: DHR PROJECT  
 CLIENT: MANILDRA  
 A/C.N. 01 842 201

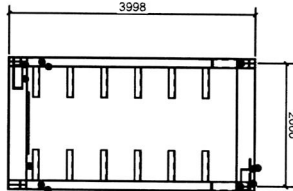
THIS DRAWING IS THE SOLE PROPERTY OF MULTICAD PTY LTD AND IS RESTRICTED TO THE PROJECT AND SITE SPECIFIC. IT IS NOT TO BE REPRODUCED, COPIED, DISTRIBUTED, OR USED FOR ANY OTHER PROJECT WITHOUT THE WRITTEN ORDER FROM THE COMPANY.  
 ALL DRAWINGS ARE IN 1:100

TITLE: FAN BUILDING EAST ELEVATION			
SCALE 1:100	JOB No.	DRAWING No.	REV
DRAWN P.L.	1208	SK08	P2

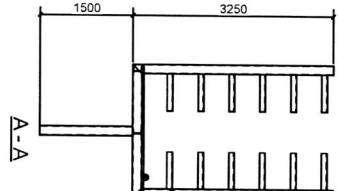


BOLONG ROAD

KEYPLAN



B - B



A - A

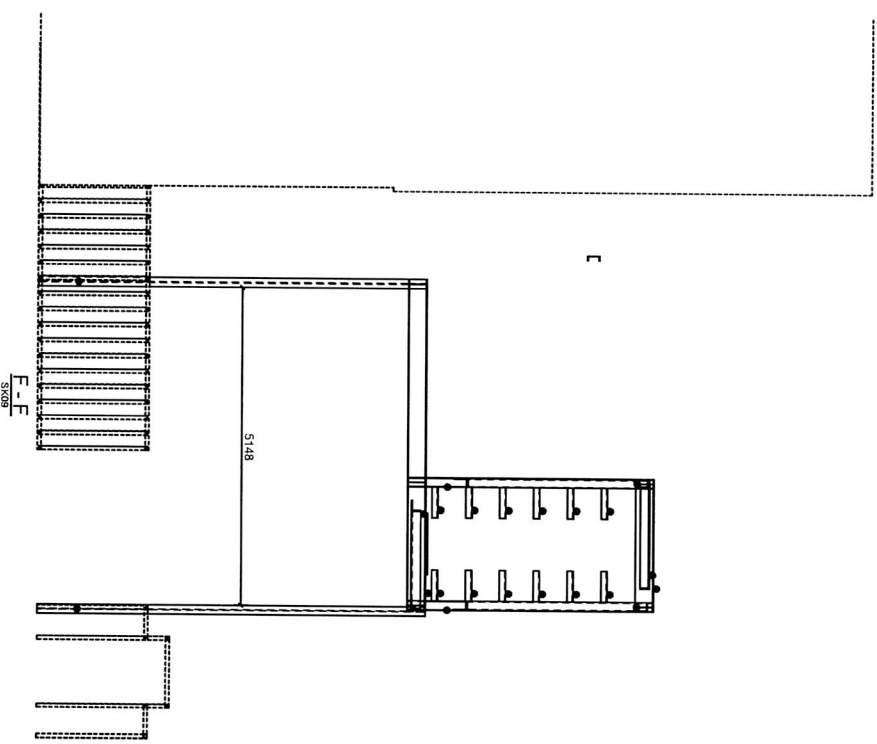
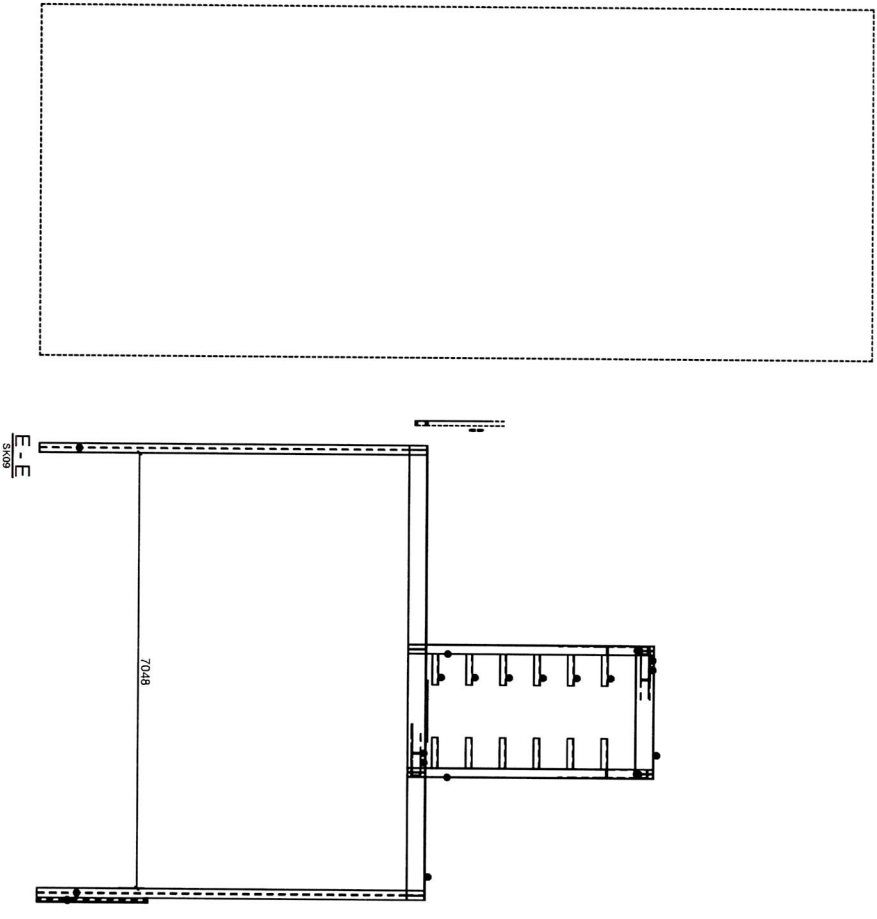
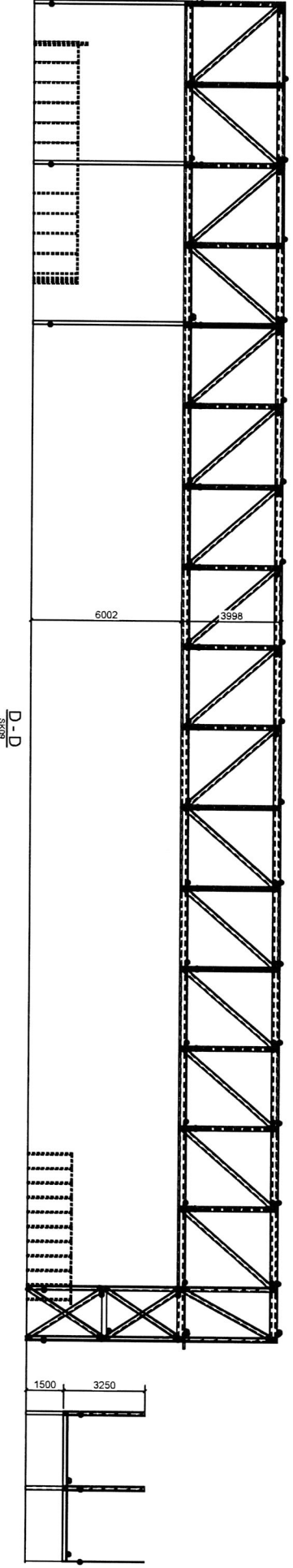
- ERECTION NOTES:
- 1) INDICATES MARKED END OF MEMBER TO BE ERECTED AT THIS LOCATION. MARK STAMPED ON NORTH OR WEST FACING FLANGE NEAR BASE OF SHAFT U.N.O.
  - 2) INDICATES MARKED END OF MEMBER TO BE ERECTED AT THIS LOCATION. MARK STAMPED ON NORTH OR WEST FACING FLANGE NEAR BASE OF SHAFT U.N.O.

REV	FOR INFORMATION ONLY	REVISION DETAILS	DATE	P.L.	D.R.	DESIGN	DESIGN
D2			11/04/28	DRG	DRG	CHK	DESIGN APPROVAL

**multicad**  
[www.multicad.com.au](http://www.multicad.com.au) PH: (02) 44721011 FAX: (02) 44721033  
 PROJECT: DHR PROJECT  
 CLIENT: MANILDRA

THIS DRAWING IS THE SOLE PROPERTY OF MULTICAD PTY LTD AND IS NOT TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, WITHOUT THE WRITTEN PERMISSION OF MULTICAD PTY LTD. AND ANY REPRODUCTION OR TRANSMISSION WITHOUT THE WRITTEN PERMISSION OF MULTICAD PTY LTD IS STRICTLY FORBIDDEN.

TITLE:	ELEC BRIDGE
PLAN	
SCALE:	1:50
JOB No.	1208
DRAWING No.	SK09
REV	P2



- ERECTOR NOTES
- 1) INDICATES MARKED END OF MEMBER TO BE ERECTED AT THIS LOCATION. ENSURE MEMBER IS MARKED NEARLY OR WEST FACING FLANGE NEAR BASE OF SHAFT/U.I.O.

REV	FOR INFORMATION ONLY	REVISION DETAILS	DATE	D.L.	D.P.	DESIGN	DESIGN
				DRG	DRG	CHK	APPROVAL
P2			11/04/25				

**multicad**  
 www.multicad.com.ph PH: (02) 44721811 FAX: (02) 44721833  
 PROJECT: DHR PROJECT  
 CLIENT: MANILDRA

THIS DRAWING IS THE PROPERTY OF MULTICAD P.V. LTD. AND IS NOT TO BE REPRODUCED OR COPIED IN ANY MANNER WITHOUT THE WRITTEN PERMISSION OF MULTICAD P.V. LTD. AND MULTICAD P.V. LTD. IS NOT RESPONSIBLE FOR ANY DAMAGE OR LOSS OF PROFITS OR OTHER PERSONS WHOSE INTERESTS ARE AFFECTED BY THIS DRAWING.

TITLE		SCALE		JOB No.		DRAWING No.		REV.	
ELEC BRIDGE SECTIONS		1:50		1208		SK10		P2	
SCALE	JOB No.	DRAWING No.	REV.	DRAWN	P.L.				

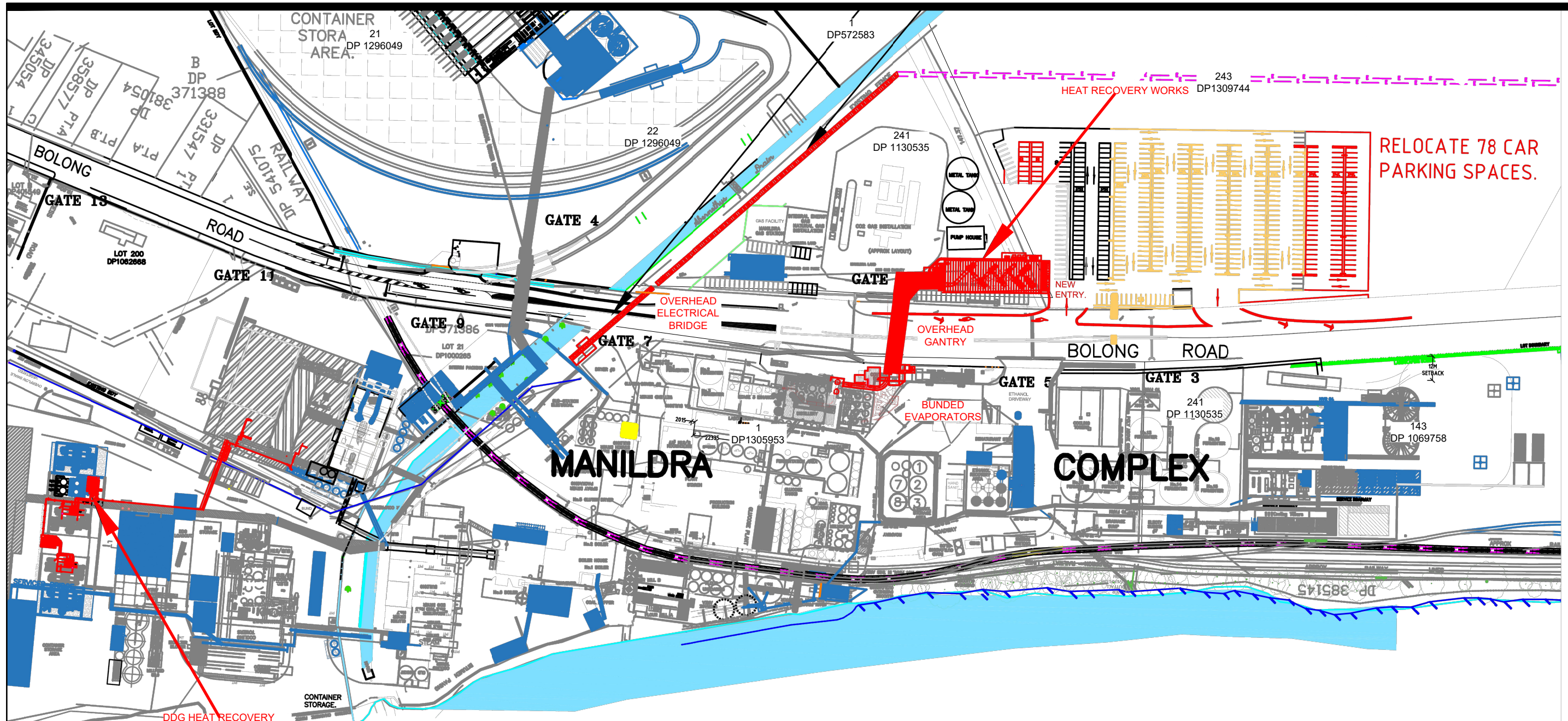


## **APPENDIX B – CONCEPT ENGINEERING**

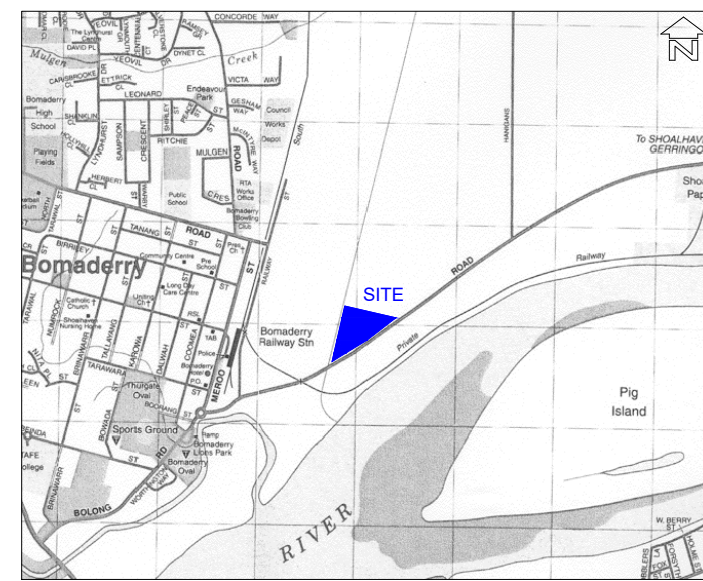
131353-401: LOCALITY SKETCH AND SITE PLAN

131353-402: CONCEPT LAYOUT & EROSION & SEDIMENT CONTROL PLAN

131353-403: CARPARK TYPICAL SECTION & EROSION & SEDIMENT CONTROL PLAN DETAILS



**OVERALL SITE PLAN**  
SCALE 1:1,000  
SOURCE: MANILRA GROUP PLAN 7462-001 P08

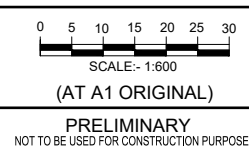


**LOCALITY SKETCH**  
N.T.S  
PUBLISHED BY CARTO MAPS

**BEWARE!**  
THE CONTRACTOR IS TO VERIFY THE LOCATION OF ALL EXISTING SERVICES PRIOR TO COMMENCEMENT OF CONSTRUCTION AND SHALL BE RESPONSIBLE, AT THE CONTRACTOR'S EXPENSE, FOR ANY REPAIRS TO DAMAGE CAUSED DURING CONSTRUCTION.

**SITE LOCALITY PLAN AND LAYOUT PLAN**  
**MOD 31 BGD1, BGD2 HEAT RECOVERY & CARPARK**  
Over Part Lot 241/1130535, Part Lot 243/1309444, Part Lot 1/1305953  
At No 160 & No 171 BOLONG ROAD, BOMADERY  
For MANILDRA - SHOALHAVEN STARCHES

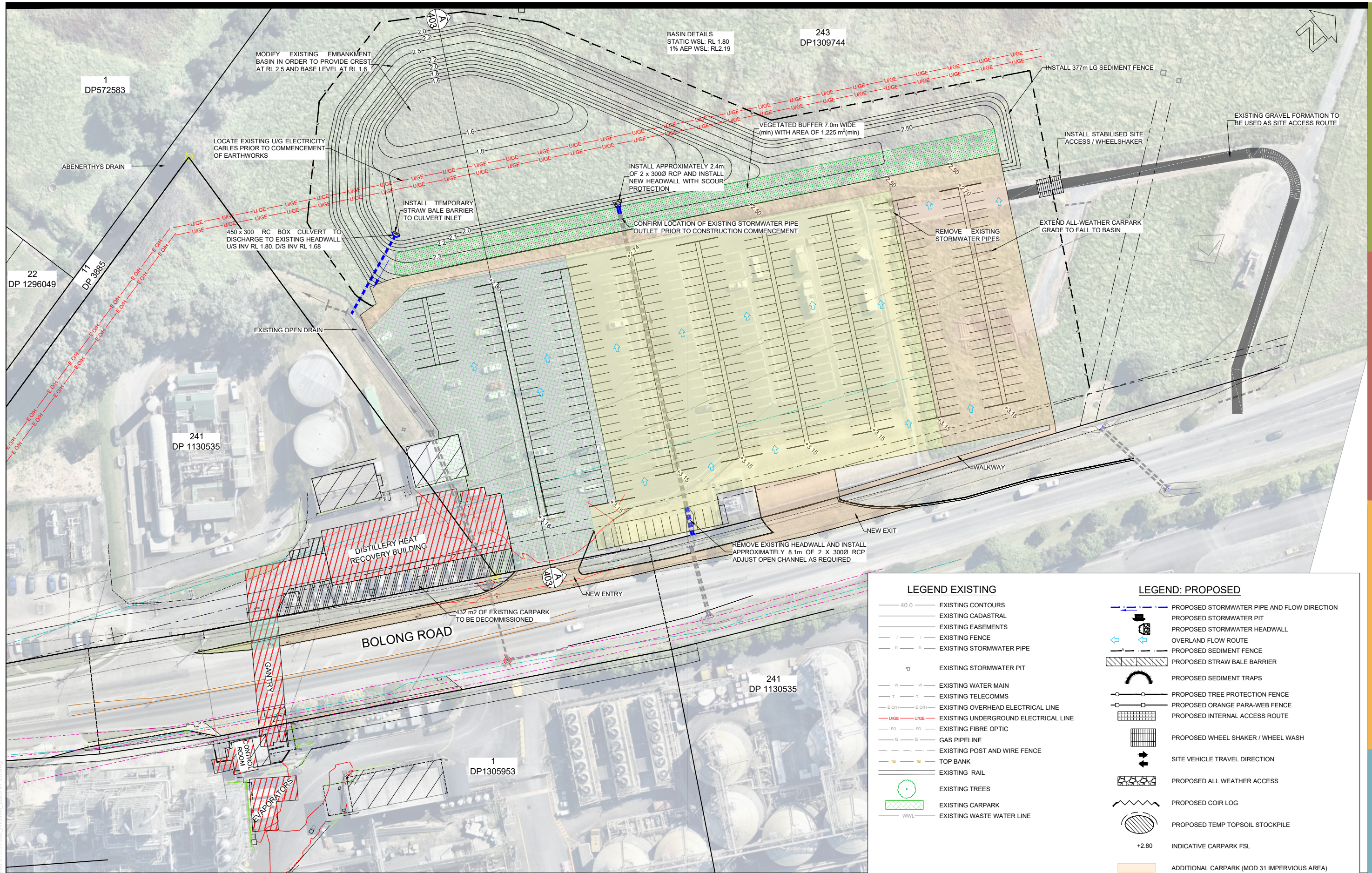
ISSUE	DESCRIPTION	BY	DATE
1	SITE PLAN UPDATED	WRM	5 AUG 25



SURVEY	DESIGN	DRAWN	CHECK'D	DATUM
AP (FK)	WRM	WRM	RMH	AUSTRALIAN HEIGHT DATUM
ALLEN PRICE PTY LTD Nowra Office • 75 Plunkett St, Nowra NSW 2541 Kiama Office • 1/28 Bong Bong St, Kiama NSW 2533 Wollongong Office • SE 1 L2 83-85 Market St, Wollongong NSW 2500 (02) 4421 6544 • consultants@allenprice.com.au • allenprice.com.au				DATE OF SURVEY 9/4/22 & 16/04/25
DRAWING NUMBER 131353 - 401				SHEET 1

ORIGIN	ISSUE
SSM 42898	1
RL 49.239 AHD	1

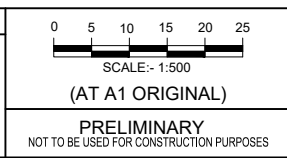
**PROFESSIONAL STANDARDS SCHEME**  
Liability limited by a scheme approved under Professional Standards Legislation



**BEWARE!**  
 THE CONTRACTOR IS TO VERIFY THE LOCATION OF ALL EXISTING SERVICES PRIOR TO COMMENCEMENT OF CONSTRUCTION AND SHALL BE RESPONSIBLE, AT THE CONTRACTOR'S EXPENSE, FOR ANY REPAIRS TO DAMAGE CAUSED DURING CONSTRUCTION.

**CONCEPT LAYOUT & EROSION AND SEDIMENT CONTROL PLAN**  
**MOD 31 BGD1, BGD2 HEAT RECOVERY & CARPARK**  
 Over Part Lot 241/1130535, Part Lot 243/1309444, Part Lot 1/1305953  
 At No 160 & No 171 BOLONG ROAD, BOMADERRY  
 For MANILDRA - SHOALHAVEN STARCHES

ISSUE	DESCRIPTION	BY	DATE



SURVEY	DESIGN	DRAWN	CHECK'D
AP (FK)	WRM	WRM	RMH

**ALLEN PRICE PTY LTD**  
 Nowra Office • 75 Plunkett St, Nowra NSW 2541  
 Kiama Office • 1/28 Bong Bong St, Kiama NSW 2533  
 Wollongong Office • SE 1 L2 83-85 Market St, Wollongong NSW 2500  
 (02) 4421 6544 • consultants@allenprice.com.au • allenprice.com.au

DATUM	ORIGIN
AUSTRALIAN HEIGHT DATUM	SSM 42898
DATE OF SURVEY	RL 49.239 AHD
9/4/22 & 16/04/25	
DRAWING NUMBER	SHEET
131353 - 402	2
	ISSUE
	0

**PROFESSIONAL STANDARDS SCHEME**  
 Liability limited by a scheme approved under Professional Standards Legislation

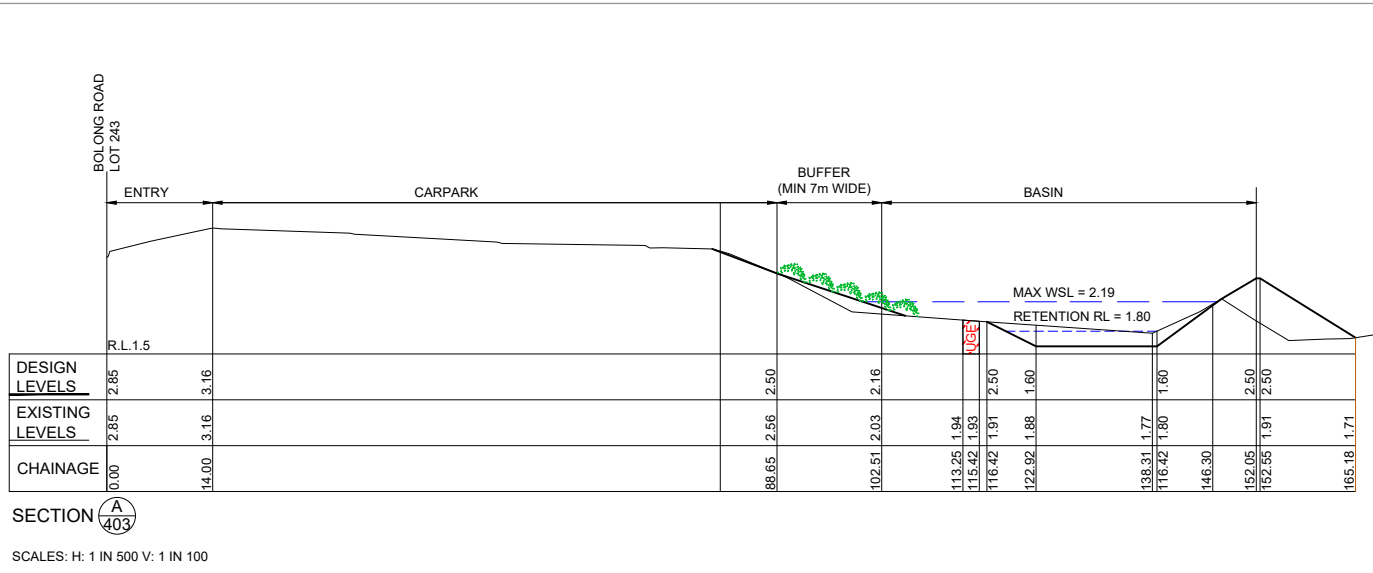
**LEGEND EXISTING**

- 40.0 — EXISTING CONTOURS
- — EXISTING CADASTRAL
- — EXISTING EASEMENTS
- / - / EXISTING FENCE
- — EXISTING STORMWATER PIPE
- — EXISTING STORMWATER PIT
- W — W — EXISTING WATER MAIN
- T — T — EXISTING TELECOMMS
- E OH — E OH — EXISTING OVERHEAD ELECTRICAL LINE
- UIGE — UIGE — EXISTING UNDERGROUND ELECTRICAL LINE
- FO — FO — EXISTING FIBRE OPTIC
- G — G — EXISTING GAS PIPELINE
- — EXISTING POST AND WIRE FENCE
- TB — TB — TOP BANK
- — EXISTING RAIL
- — EXISTING TREES
- — EXISTING CARPARK
- WW — WW — EXISTING WASTE WATER LINE

**LEGEND: PROPOSED**

- — PROPOSED STORMWATER PIPE AND FLOW DIRECTION
- — PROPOSED STORMWATER PIT
- — PROPOSED STORMWATER HEADWALL
- — OVERLAND FLOW ROUTE
- — PROPOSED SEDIMENT FENCE
- — PROPOSED STRAW BALE BARRIER
- — PROPOSED SEDIMENT TRAPS
- — PROPOSED TREE PROTECTION FENCE
- — PROPOSED ORANGE PARA-WEB FENCE
- — PROPOSED INTERNAL ACCESS ROUTE
- — PROPOSED WHEEL SHAKER / WHEEL WASH
- — SITE VEHICLE TRAVEL DIRECTION
- — PROPOSED ALL WEATHER ACCESS
- — PROPOSED COIR LOG
- — PROPOSED TEMP TOPSOIL STOCKPILE
- +2.80 INDICATIVE CARPARK FSL
- — ADDITIONAL CARPARK (MOD 31 IMPERVIOUS AREA)
- — ADDITIONAL CARPARK (MOD 26 IMPERVIOUS AREA)
- — ADDITIONAL BUILDINGS (MOD 31 IMPERVIOUS AREA)

C:\Users\AllenPrice\Desktop\131353 - Manildra - Mod 31 BGD1 - Erosion and Sediment Control Plan - 2025.07.29.dwg

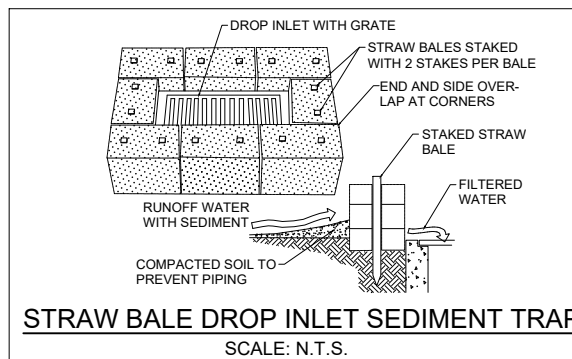
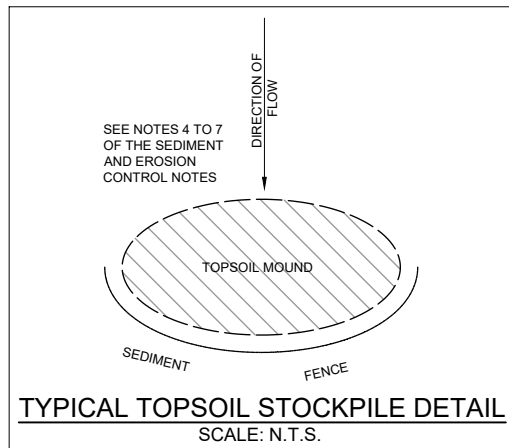
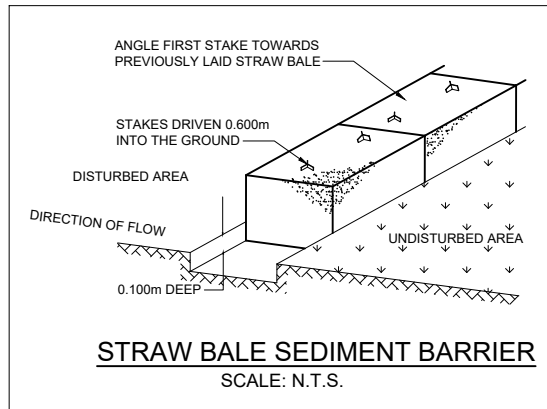
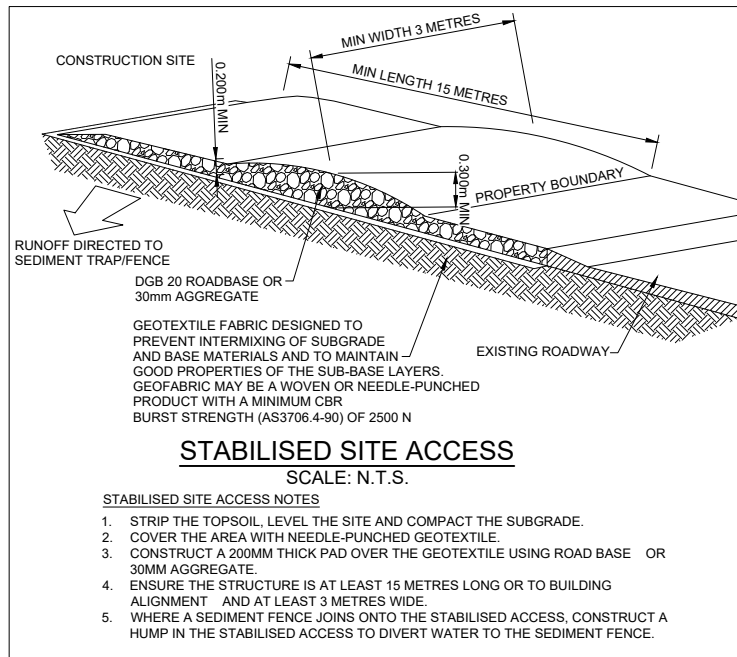
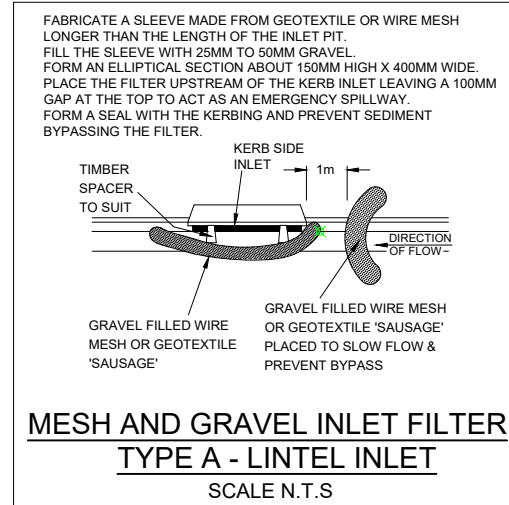
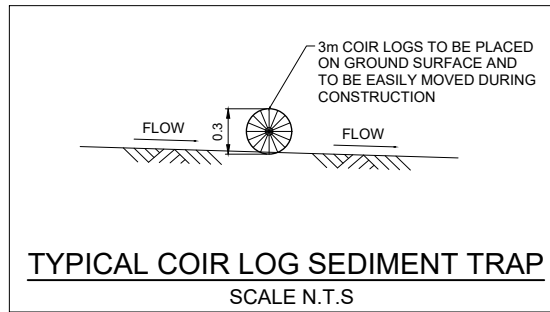


**BUFFER & BASIN NOTES:**

- BUFFER TO BE NOT LESS THAN 7.0m WIDE AND 175m LENGTH.
- OVERALL BUFFER AREA TO BE NOT LESS THAN 1,225 m<sup>2</sup>.
- 1% AEP HYDRAULIC LOADING IS 5.5 L/s/m WITH VELOCITY OF 0.5m/s.
- 20% AEP HYDRAULIC LOADING IS 2.6 L/s/m WITH VELOCITY OF 0.4m/s.
- 4 EY HYDRAULIC LOADING IS 0.9 L/s/m WITH VELOCITY OF 0.3m/s
- BUFFER AND BASIN PLANTINGS TO CONSIST OF THE FOLLOWING SPECIES:
  - Microlaena stipodes
  - Juncus spp @ 10 plants / m<sup>2</sup>
  - Lomandra longifolia @ 6 plants / m<sup>2</sup>

**BASIN DETAILS:**

- TOP OF EMBANKMENT TO BE NOT LESS THAN RL 2.50.
- FLOOR OF BASIN TO BE RL 1.60.
- NOMINAL RETENTION VOLUME BETWEEN RL.1.6 AND RL.1.8 TO BE NOT LESS THAN 290m<sup>3</sup>.
- BASIN OUTLET TO BE 450 x 300 RC BOX CULVERT WITH OUTLET INVERT RL.1.80.



**SEDIMENT AND EROSION CONTROL**

- ALL WORKS TO BE CARRIED OUT IN ACCORDANCE WITH LANDCOM'S SOILS AND CONSTRUCTION VOLUME 1, 4TH EDITION, MARCH 2004.
- SEDIMENT AND EROSION CONTROL MEASURES AS DETAILED ON THIS PLAN ARE TO BE IMPLEMENTED PRIOR TO CONSTRUCTION WORK COMMENCING.
- THE CONTRACTOR SHALL TAKE ALL REASONABLE MEASURES TO MINIMISE THE EFFECTS OF DUST EMISSIONS FROM THE SITE INCLUDING THE SPREADING OF MULCH IN AREAS WHERE CONSTRUCTION HAS BEEN COMPLETED.
- ALL TOPSOIL FROM THE CONSTRUCTION AREAS IS TO BE STRIPPED AND STOCKPILED.
- STOCKPILES OF TOPSOIL ARE TO BE GRASS SEEDED OR MULCHED.
- TOPSOIL STOCKPILES ARE TO BE LOCATED OUTSIDE AREAS OF CONCENTRATED STORMWATER RUNOFF. STOCKPILES ARE TO BE PLACED IN LOTS OUTSIDE THE BUILDING AREA WHERE POSSIBLE OR IN PROPOSED PUBLIC RESERVES. REFER TO TYPICAL TOPSOIL DETAIL.
- THE MOVEMENT OF MACHINERY OVER THE SITE IS TO BE LIMITED TO THE CONSTRUCTION AREAS, UNLESS AUTHORIZED BY THE SUPERINTENDENT. TO AVOID DISTURBANCE TO EXISTING VEGETATED AREAS, NO-GO AREAS, AS NOTED ON THE PLAN, ARE TO BE MARKED OFF PRIOR TO COMMENCEMENT OF WORKS.
- AREAS OF THE SITE THAT ARE DISTURBED BY CONSTRUCTION WORKS ARE TO BE TOPSOILED, SEEDED AND FERTILIZED IMMEDIATELY AFTER CONSTRUCTION WORKS IN THE PARTICULAR AREA HAVE FINISHED AND NOT LEFT TILL THE END OF THE OVERALL CONSTRUCTION.
- CONSTRUCTION AREAS SHALL NOT BE LEFT IN AN OPEN AND DISTURBED STATE FOR MORE THAN FOURTEEN (14) DAYS. AREAS EXPECTED TO BE LEFT OPEN FOR PERIODS LONGER THAN THIS ARE TO BE SEEDED.
- STORMWATER PITS ARE TO HAVE TEMPORARY SEDIMENT CONTROL DEVICES PLACED AROUND THE TOP DURING CONSTRUCTION. THIS WILL TAKE THE FORM OF STRAWBALES OR MESH AND GRAVEL FILTERS. PLACED TO PREVENT SEDIMENT FROM THE CONSTRUCTION AREAS LEAVING THE SITE. THESE ARE TO REMAIN UNTIL THE ABOVE COVERAGE IS ACHIEVED OR THE ROADS ARE OPENED TO THE PUBLIC, WHICHEVER OCCURS FIRST.
- ANY EXISTING BARE OR DISTURBED AREAS OF THE SITE NOT AFFECTED BY THE CONSTRUCTION WORKS ARE TO BE TOPSOILED, SEEDED AND FERTILIZED AND MAINTAINED TO PROMOTE GROWTH.
- TEMPORARY MESH AND GRAVEL SEDIMENT BARRIERS ARE TO BE PLACED AT KERB INLET PITS AFTER THE ROAD WORKS HAVE BEEN COMPLETED UNTIL GRASS COVER ON THE FOOTPATHS HAS BEEN ESTABLISHED.
- SEDIMENT & EROSION CONTROL STRUCTURES ARE TO BE MAINTAINED ON A DAILY BASIS DURING CONSTRUCTION AND ON A MINIMUM OF WEEKLY BASIS DURING THE SIX MONTH LIABILITY PERIOD (OR AS REQUIRED DEPENDING UPON WEATHER CONDITIONS AND STABILISATION LEVEL). ALL MATERIAL REMOVED FROM THE TRAPS IS TO BE SPREAD AND GRASS SEEDED OR DISPOSED OF OFF SITE IN AN APPROVED MANNER. UPON THE SALE OF EACH INDIVIDUAL LOT TO A THIRD PARTY PURCHASER, THE RESPONSIBILITY OF THE STABILISATION OF THE LOT BECOMES THE RESPONSIBILITY OF THE NEW PROPERTY OWNER.
- ALL IMPORTED FILL IS ASSUMED TO BE A MATERIAL OTHER THAN DISPERSIVE CLAY. ALL FILL MATERIAL IS TO BE TESTED FOR DISPERSABILITY PRIOR TO PLACEMENT ON THE SITE AND IF FOUND TO BE DISPERSIVE THE SUPERINTENDENT IS TO BE NOTIFIED PRIOR TO PLACEMENT OF ANY FILL FOR ADVICE ON TREATMENT OF DISPERSIVE SOILS.
- ALL ACCESS TO SITE MUST BE VIA "STABILIZED SITE ACCESS".
- TEMPORARY STRAWBALE SEDIMENT FENCES AND/OR COIR LOGS TO BE PLACED EVERY 30m DURING BOXING OUT OF PAVEMENT WHEN PAVEMENT WORKS ARE NOT TAKING PLACE OR SITE IS INACTIVE. SECURE STRAWBALES WITH STAKES. SECURE COIR LOGS WITH STAKES OR SANDBAGS.

**SITE FILLING NOTES**

- ALL WORK IS TO BE CARRIED OUT IN ACCORDANCE WITH COUNCIL'S DEVELOPMENT CONSTRUCTION SPECIFICATION AND ENGINEERING DESIGN SPECIFICATION (D6).
- ALL WORKS ARE TO BE CONDUCTED TO THE REQUIREMENTS OF THE DEVELOPMENT MANAGER OR DELEGATE.
- EXISTING TOPSOIL IN AREA OF PROPOSED FILLING WORKS IS TO BE STRIPPED AND STOCKPILED IN AN AREA APPROVED BY THE SUPERVISOR. TOPSOIL IS TO BE USED FOR RE-SPREADING OVER THE FILLED AREA AT THE COMPLETION OF WORKS.
- FILL MATERIAL IS TO BE APPROVED BY THE SUPERVISOR.
- ALL FILLING WORKS TO BE PLACED AND COMPACTED IN LAYERS NO GREATER THAN 150mm IN THICKNESS.
- ALL FILL IS TO BE PLACED UNDER LEVEL 1 SUPERVISION IN ACCORDANCE WITH AS3798.
- ALL LOTS FILLED ARE TO HAVE A GEOTECHNICAL ASSESSMENT FOR LOT CLASSIFICATION IN ACCORDANCE WITH AS2870.
- THE CONTRACTOR IS TO ENSURE COMPACTION IS CARRIED OUT TO A MINIMUM 95% STANDARD PROCTOR AND PROVIDE THE SUPERINTENDENT WITH SUITABLE GEOTECHNICAL EVIDENCE.
- THIS SITE IS TO BE RE-GRADED TO DESIGN CONTOURS AND/OR SPOT LEVELS AS SHOWN ON PLAN.
- IN THE AREA OF PROPOSED FILLING AND/OR RE-GRADING EXISTING VEGETATION IS TO BE CLEARED. ALL EXISTING VEGETATION AFFECTED BY CONSTRUCTION WORK AND LARGE TREES AS IDENTIFIED BY THE SUPERVISOR ARE TO BE REMOVED AND DISPOSED OF OFF SITE OR MULCHED ON SITE. NO GREEN WASTE TO BE BURNT ON SITE.
- CARE IS TO BE TAKEN TO PROTECT STOCKPILES AND DISTURBED AREAS THAT HAVE HAD TOPSOIL TYPE MATERIAL REMOVED ESPECIALLY DURING PERIODS OF HIGH WIND.
- ALL DISTURBED AREAS ARE TO BE GRASS SEEDED AND FERTILISED AT THE COMPLETION OF THE WORKS WITH NATIVE GRASS SEED MIX AND STERILE COVER CROP FOR INITIAL STABILISATION.

**SUGGESTED SEED MIX FOR COVER CROP STABILISATION OF DISTURBED AREAS**

SUMMER(SEPT-MAR):	WINTER(APR-AUG):
60% SORGHUM	80% OATS
30% MILLET	10% CEREAL RYE
10% BUCKWHEAT	10% WHEAT

SEED SOWING RATE: 3-5KG/HA  
PLUS MULTIGROW FERTILISER @ 200KG/HA

**SUGGESTED NATIVE SEED MIX FOR RE-VEGETATION OF DISTURBED AREAS**

- 20% GRIFFIN WEEPING GRASS (MICROLAENA STIPODES VAR)
- 20% OXLEY WALLABY GRASS (RYTIDOSPERMA GENICULATUM)
- 20% REDGRASS (BOTHRIOCHLOA MACARAI)
- 15% WINDMILL GRASS (CHLORIS TRUNCATA)
- 15% KANGAROO GRASS (THEMEDA AUSTRALIS)
- 10% QUEENSLAND BLUEGRASS (DICANTHIUM SERICEUM)

SEED SOWING RATE: 12KG/HA  
SOW ALL YEAR ROUND WITH IRRIGATION  
SOW AUTUMN - SPRING AFTER RAIN

**BEWARE!**  
THE CONTRACTOR IS TO VERIFY THE LOCATION OF ALL EXISTING SERVICES PRIOR TO COMMENCEMENT OF CONSTRUCTION AND SHALL BE RESPONSIBLE, AT THE CONTRACTOR'S EXPENSE, FOR ANY REPAIRS TO DAMAGE CAUSED DURING CONSTRUCTION.

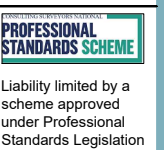


**CARPARK TYPICAL SECTION & ESCP DETAILS**  
MOD 31 BGD1, BGD2 HEAT RECOVERY & CARPARK  
Over PART Lot 241/1130535, Lot 243/1309444, PART Lot 1/1305953  
At No 160 & No 171 BOLONG ROAD, BOMADERRY  
For MANILDRA - SHOALHAVEN STARCHES

ISSUE	DESCRIPTION	BY	DATE
=			

AS SHOWN  
(AT A1 ORIGINAL)  
PRELIMINARY  
NOT TO BE USED FOR CONSTRUCTION PURPOSES

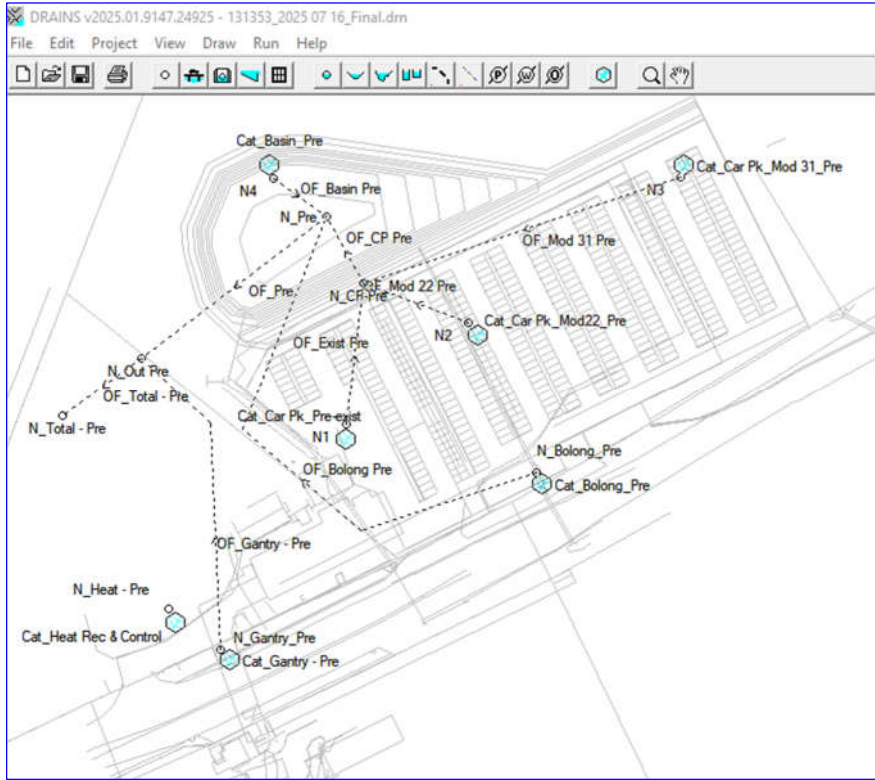
SURVEY	DESIGN	DRAWN	CHECK'D	DATUM	ORIGIN
AP (FK)	WRM	WRM	RMH	AUSTRALIAN HEIGHT DATUM	SSM 42898
ALLEN PRICE PTY LTD Nowra Office • 75 Plunkett St, Nowra NSW 2541 Kiama Office • 1/28 Bong Bong St, Kiama NSW 2533 Wollongong Office • SE 1 L2 83-85 Market St, Wollongong NSW 2500 (02) 4421 6544 • consultants@allenprice.com.au • allenprice.com.au				DATE OF SURVEY 9/4/22 & 16/04/25	RL 49.239 AHD
				DRAWING NUMBER 131353 - 403	SHEET 3
					ISSUE 0



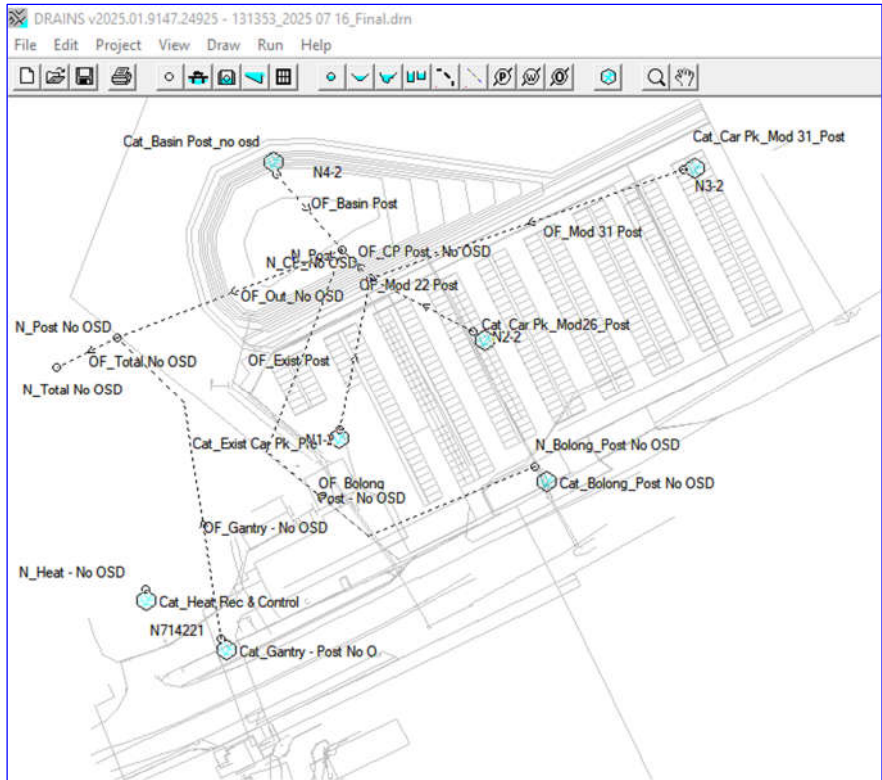
Liability limited by a scheme approved under Professional Standards Legislation



# APPENDIX C-1: CONCEPT DRAINS MODEL STRUCTURE “Existing” Site Conditions

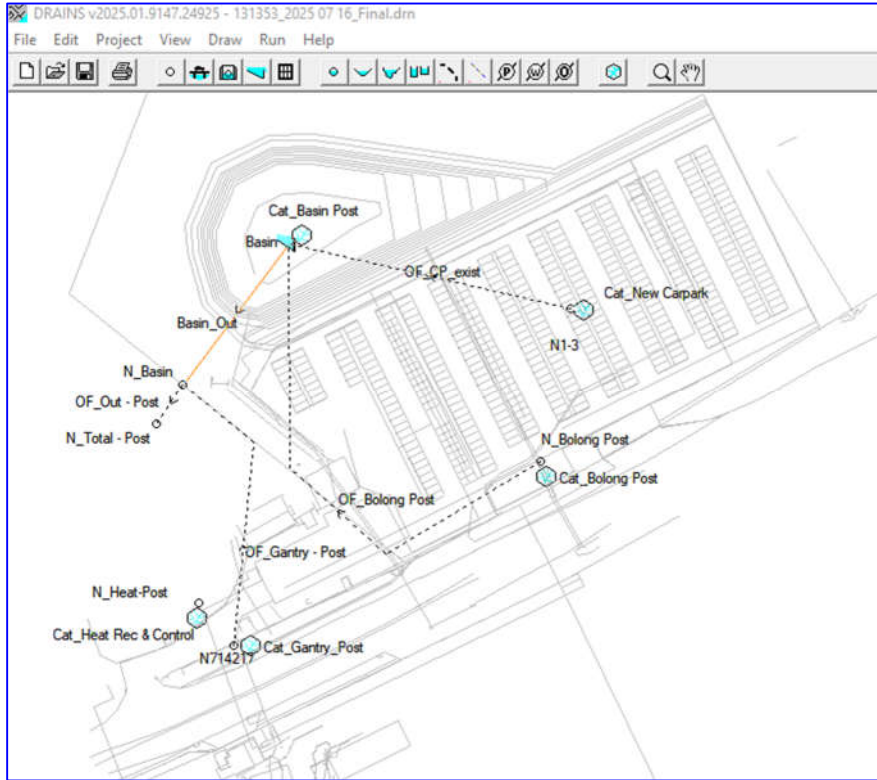


## Post Development No OSD





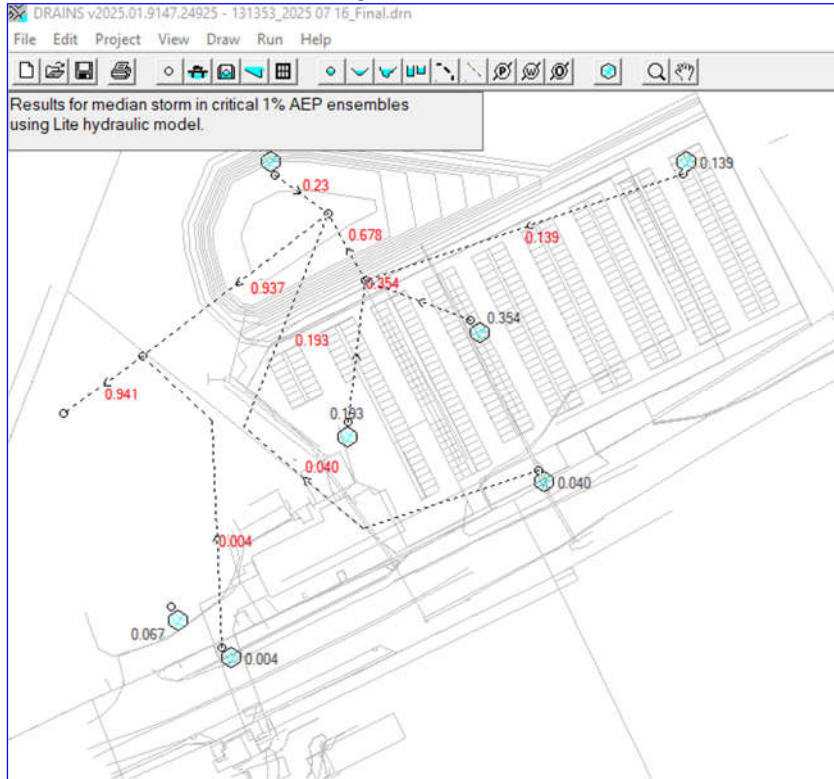
## Post Development With OSD



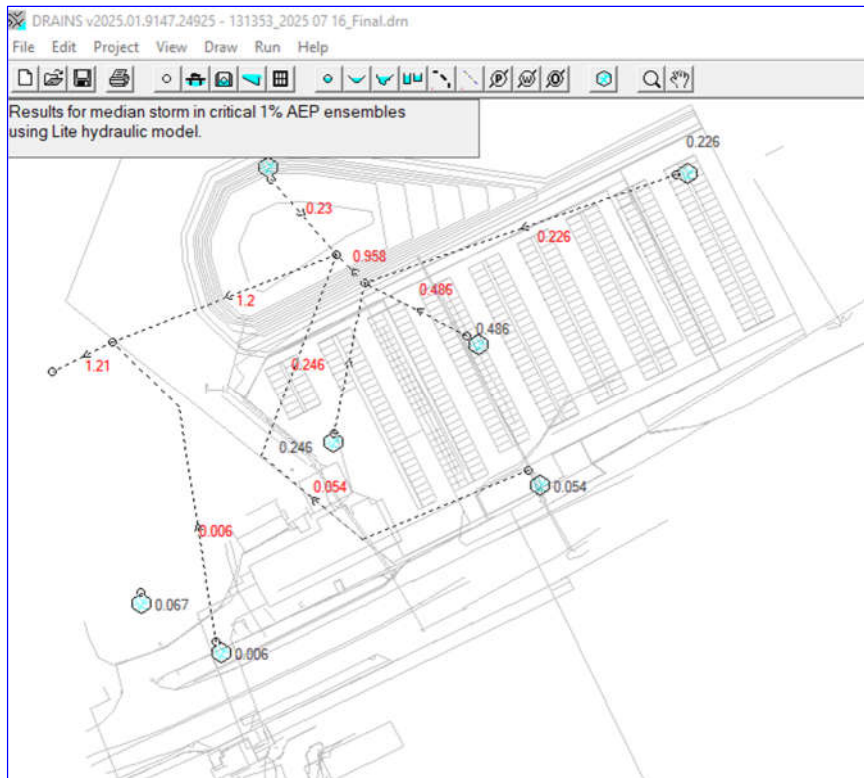


## APPENDIX C-2: CONCEPT DRAINS MODEL 1% AEP RESULTS

### “Existing” Site Conditions

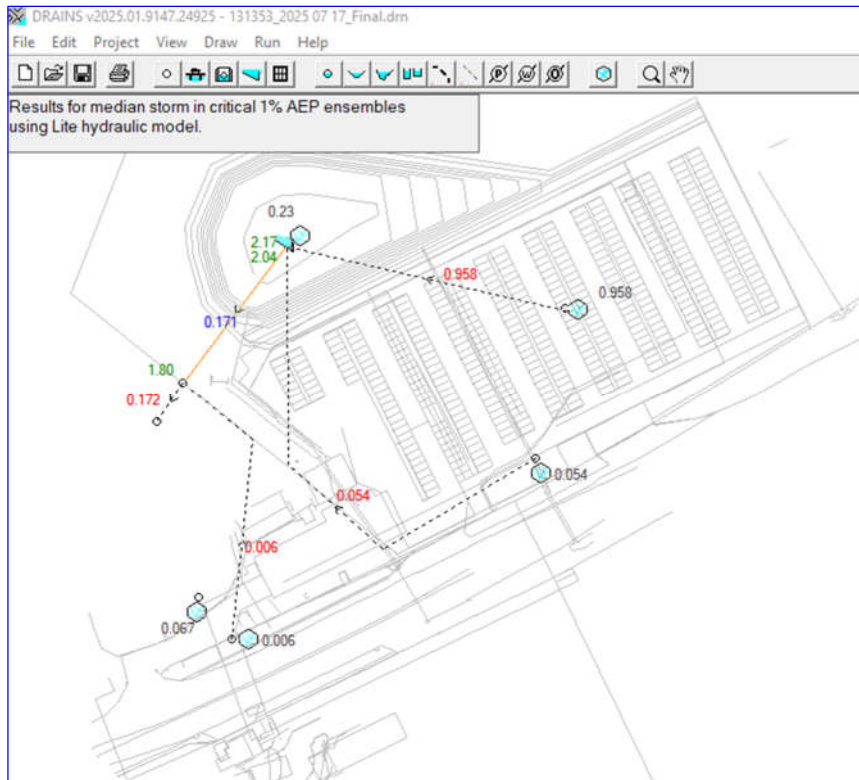


### Post Development No OSD





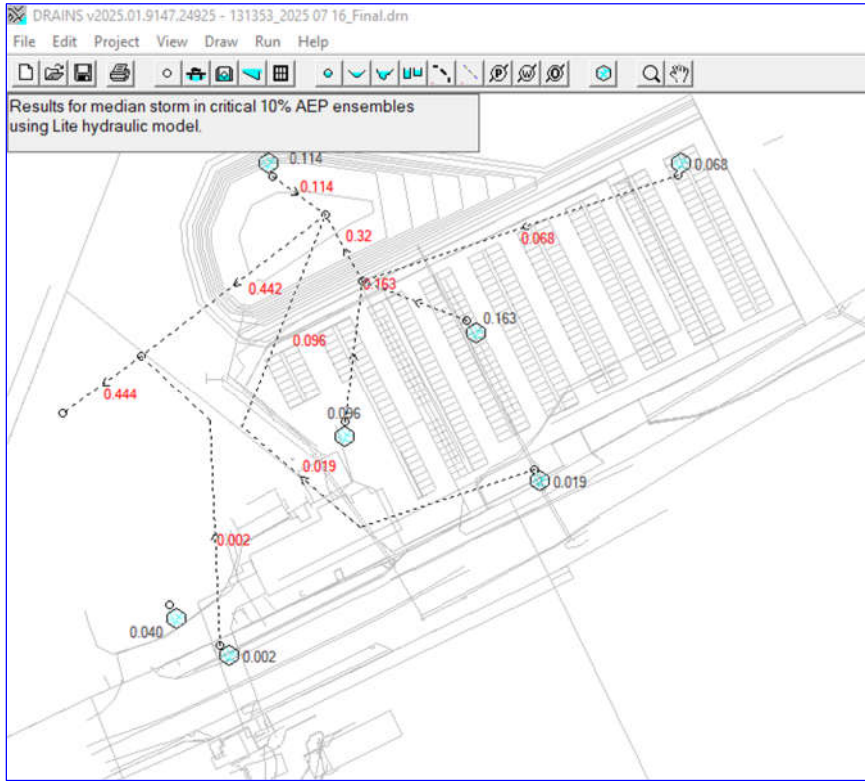
## Post Development With OSD



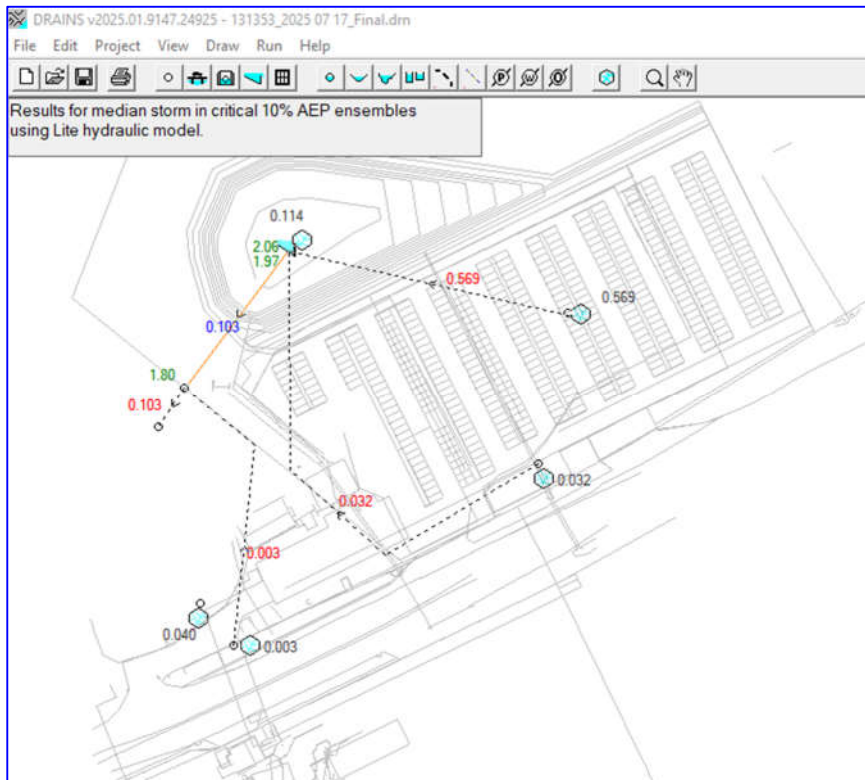


## APPENDIX C-3: CONCEPT DRAINS MODEL 10% AEP RESULTS

### “Existing” Site Conditions



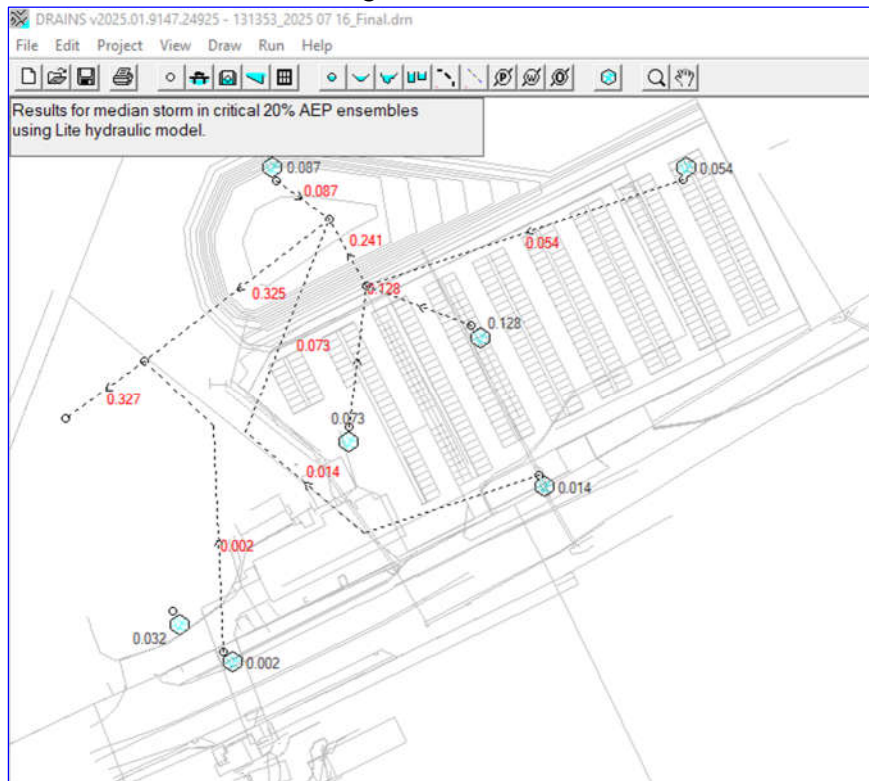
### Post Development With OSD





## APPENDIX C-4 – CONCEPT DRAINS MODEL 20% AEP RESULTS

### “Existing” Site Conditions



### Post Development With OSD

