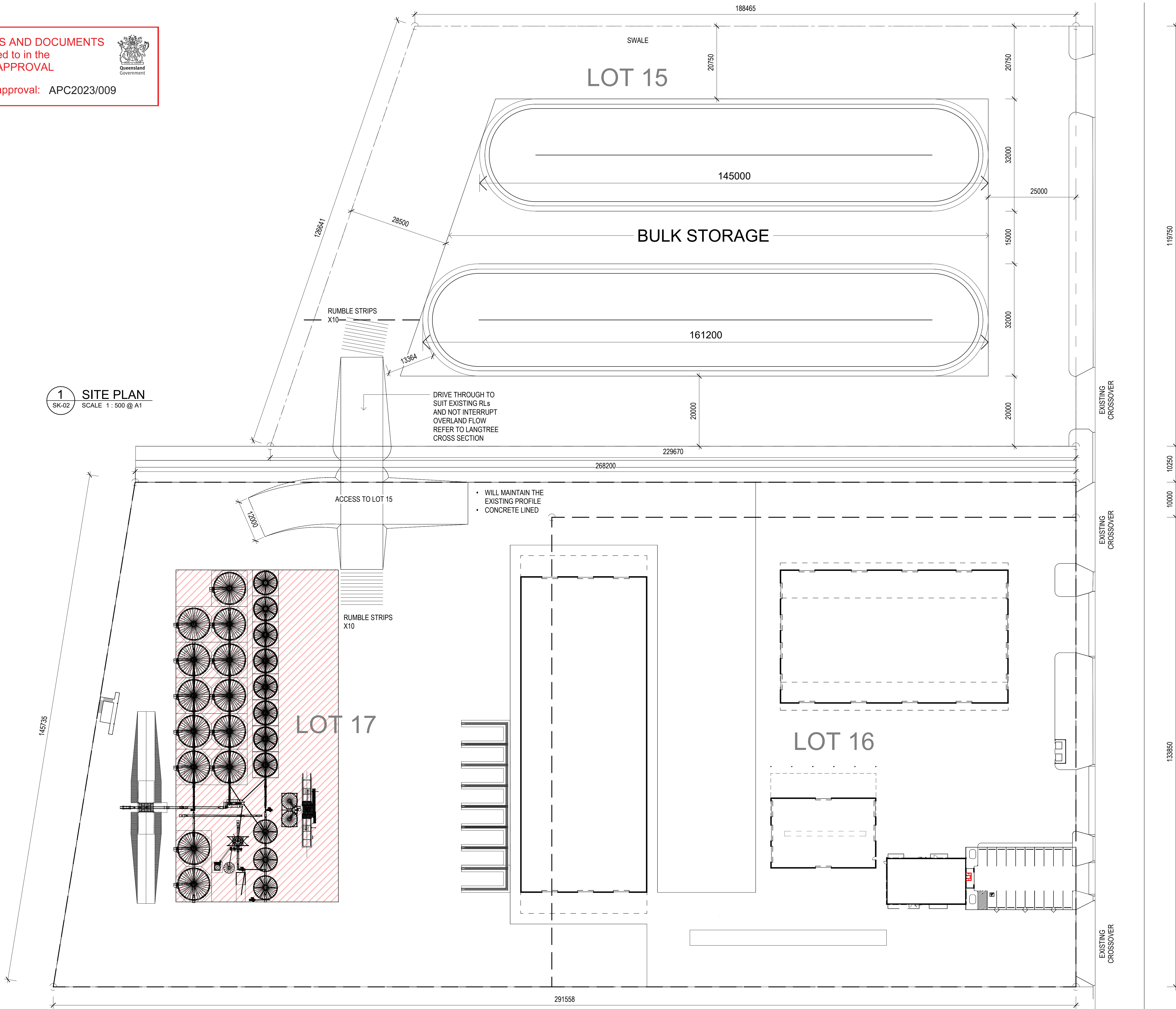


PLANS AND DOCUMENTS referred to in the SDA APPROVAL



SDA approval: APC2023/009

1 SITE PLAN  
SK-02 SCALE 1:500 @ A1



Do not scale off drawings  
Use only dimensions provided  
Verify all dimensions on site

AMENDMENTS	
ISSUE DESCRIPTION	DATE
1 OPTION 2	16/05/22
2 LOT 15 - BULK STORAGE	05/04/22
3 GENERAL UPDATES	14/06/22
4 SITE UPDATES	20/06/22
5 GENERAL UPDATES	28/07/22
6 SILOS ADDED	20/12/22
7 GENERAL UPDATES	13/01/23
8 CARPARK AND DRIVEWAY ADJUSTED	18/01/23
9 GENERAL UPDATES	03/04/23
10 SITE REVISED	20/04/23
11 LOT 15 UPDATE	17/05/23

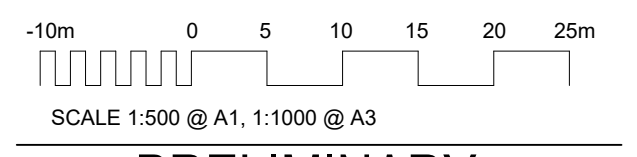


PROJECT  
Sizer & Cogill  
Bulk Storage

CLIENT  
Sizer & Cogill

LOCATION  
Cape Cleveland  
Industrial Park

DRAWN	Author	CHECKED	Checker
DATE	17/05/2023 2:22:27 PM		
SCALE	1:500 @ A1		



PRELIMINARY  
NOT FOR CONSTRUCTION

SHEET NAME  
SITE SURVEY

DRAWING NO.  
09-1777\_SK-00 P11





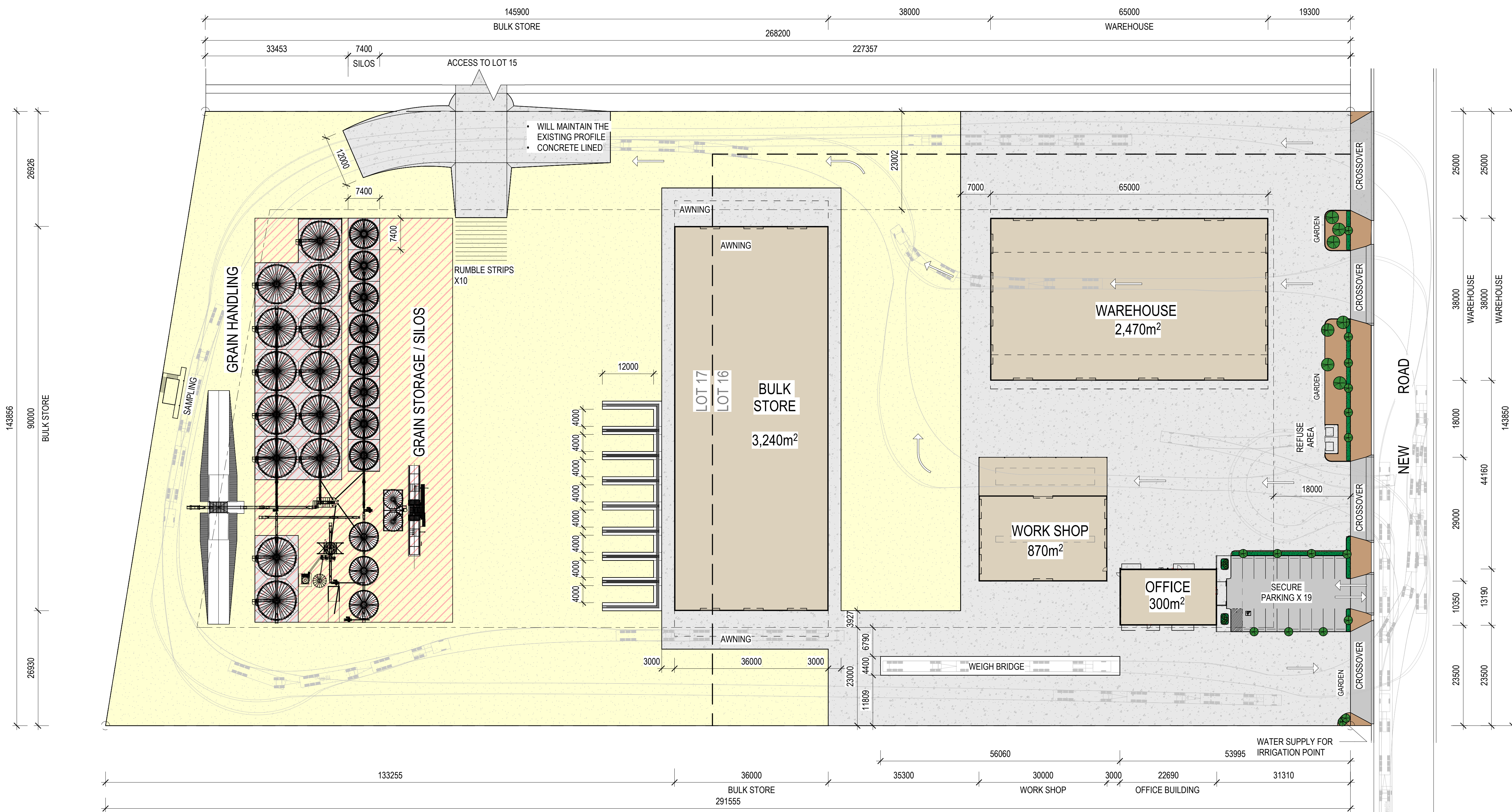
LEGEND

- BITUMEN
- GRAVEL
- GARDEN
- CONCRETE
- BUILDING
- GRAIN STORAGE / SILOS

SITE AREA	
NAME	AREA
BITUMEN	494 m <sup>2</sup>
BUILDING	6892 m <sup>2</sup>
CONCRETE	11706 m <sup>2</sup>
GRAIN STORAGE / SILOS	4368 m <sup>2</sup>
GRAVEL	16492 m <sup>2</sup>
LANDSCAPE	309 m <sup>2</sup>
	40260 m <sup>2</sup>

Do not scale off drawings  
Use only dimensions provided  
Verify all dimensions on site

AMENDMENTS		
ISSUE	DESCRIPTION	DATE
1	OPTION 2	14/01/22
2	OPTION 2	18/01/22
3	OPTION 2	21/01/22
4	OPTION 2	02/02/22
5	OPTION 2	04/02/22
6	OPTION 2	16/05/22
7	GENERAL UPDATES	09/05/22
8	GENERAL UPDATES	14/06/22
9	SITE UPDATES	20/06/22
10	SILOS ADDED	20/12/22
11	GENERAL UPDATES	13/01/23
12	CARPARK AND DRIVEWAY ADJUSTED	18/01/23
13	GENERAL UPDATES	03/04/23
14	SITE REVISED	20/04/23

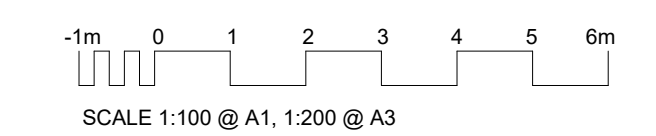


PROJECT  
**Sizer & Cogill Bulk Storage**

CLIENT  
**Sizer & Cogill**

LOCATION  
**Cape Cleveland Industrial Park**

DRAWN: \_\_\_\_\_ CHECKED: \_\_\_\_\_  
DATE: 20/04/2023 10:11:52 AM  
SCALE: 1 : 500 @ A1



**PRELIMINARY**  
NOT FOR CONSTRUCTION

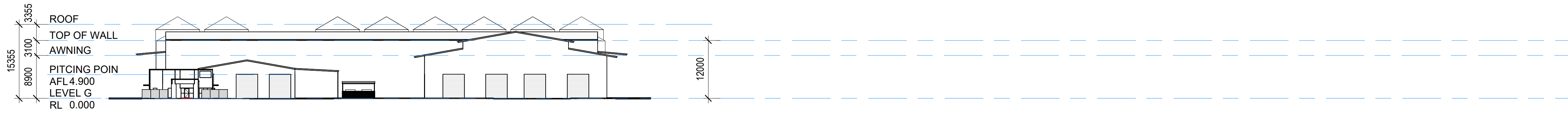
SHEET NAME  
**SITE PLAN**

DRAWING NO.  
**09-1777\_SK-01** P14

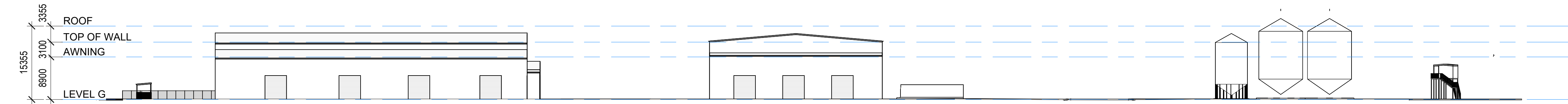




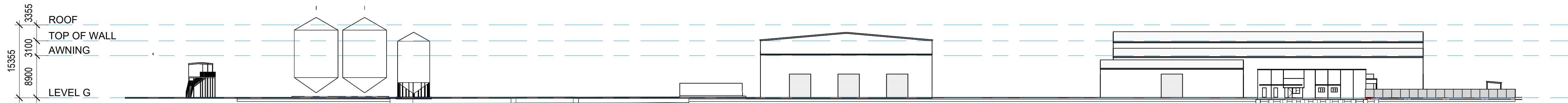
ISSUE	DESCRIPTION	DATE
1	OPTION 2	16/05/22
2	GENERAL UPDATES	14/06/22
3	SITE UPDATES	20/06/22
4	GENERAL UPDATES	28/07/22
5	SILOS ADDED	20/12/22
6	CARPARK AND DRIVEWAY ADJUSTED	18/01/23
7	GENERAL UPDATES	03/04/23
8	SITE REVISED	20/04/23



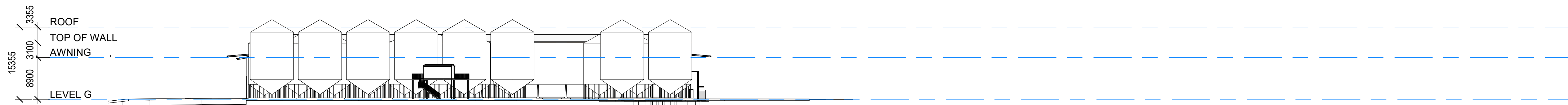
1 EAST ELEVATION  
SCALE 1 : 500 @ A1



2 NORTH ELEVATION  
SCALE 1 : 500 @ A1



3 SOUTH ELEVATION  
SCALE 1 : 500 @ A1



4 WEST ELEVATION  
SCALE 1 : 500 @ A1

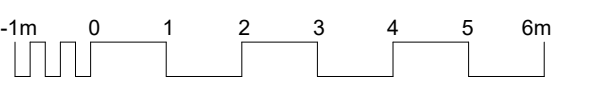


PROJECT  
Sizer & Cogill  
Bulk Storage

CLIENT  
Sizer & Cogill

LOCATION  
Cape Cleveland  
Industrial Park

DRAWN	Author	CHECKED	Checker
DATE	20/04/2023 10:11:56 AM		
SCALE	1 : 500 @ A1		



SCALE 1:100 @ A1, 1:200 @ A3

PRELIMINARY  
NOT FOR CONSTRUCTION

SHEET NAME  
ELEVATION





PLANS AND DOCUMENTS referred to in the SDA APPROVAL









SDA approval: APC2023/009

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AMENDMENTS		
ISSUE	DESCRIPTION	DATE
1	SITE STAGING	15/06/22
2	SITE UPDATES	20/06/22
3	GENERAL UPDATES	28/07/22
4	SILOS ADDED	20/12/22
5	GENERAL UPDATES	13/01/23
6	CARPARK AND DRIVEWAY ADJUSTED	18/01/23
7	GENERAL UPDATES	03/04/23
8	SITE REVISED	20/04/23
9	LOT 15 UPDATE	17/05/23

1 SITE PLAN  
SK-02 SCALE 1:500 @ A1

LEGEND

-  STAGE 1A
-  STAGE 1B
-  STAGE 2
-  STAGE 3
-  SITE WORKS TO BE COMPLETED IN STAGE 1A
-  SITE WORKS TO BE COMPLETED IN STAGE 1B

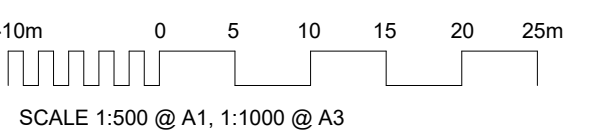


PROJECT  
Sizer & Cogill  
Bulk Storage

CLIENT  
Sizer & Cogill

LOCATION  
Cape Cleveland  
Industrial Park

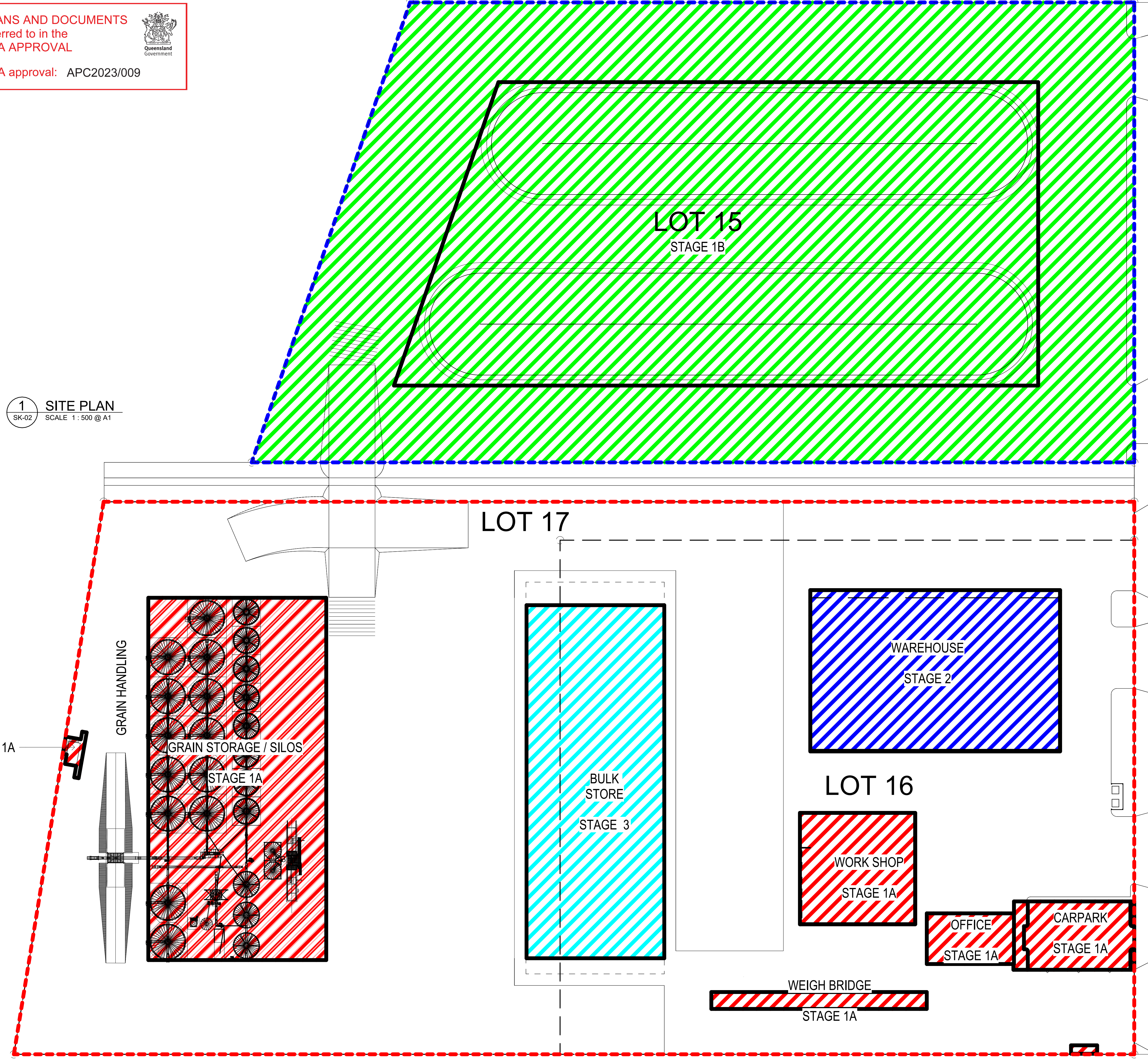
DRAWN	Author	CHECKED	Checker
DATE	17/05/2023 2:22:29 PM		
SCALE	1:500 @ A1		



PRELIMINARY  
NOT FOR CONSTRUCTION

SHEET NAME  
SITE STAGING

DRAWING NO.  
09-1777\_SK-04 P9





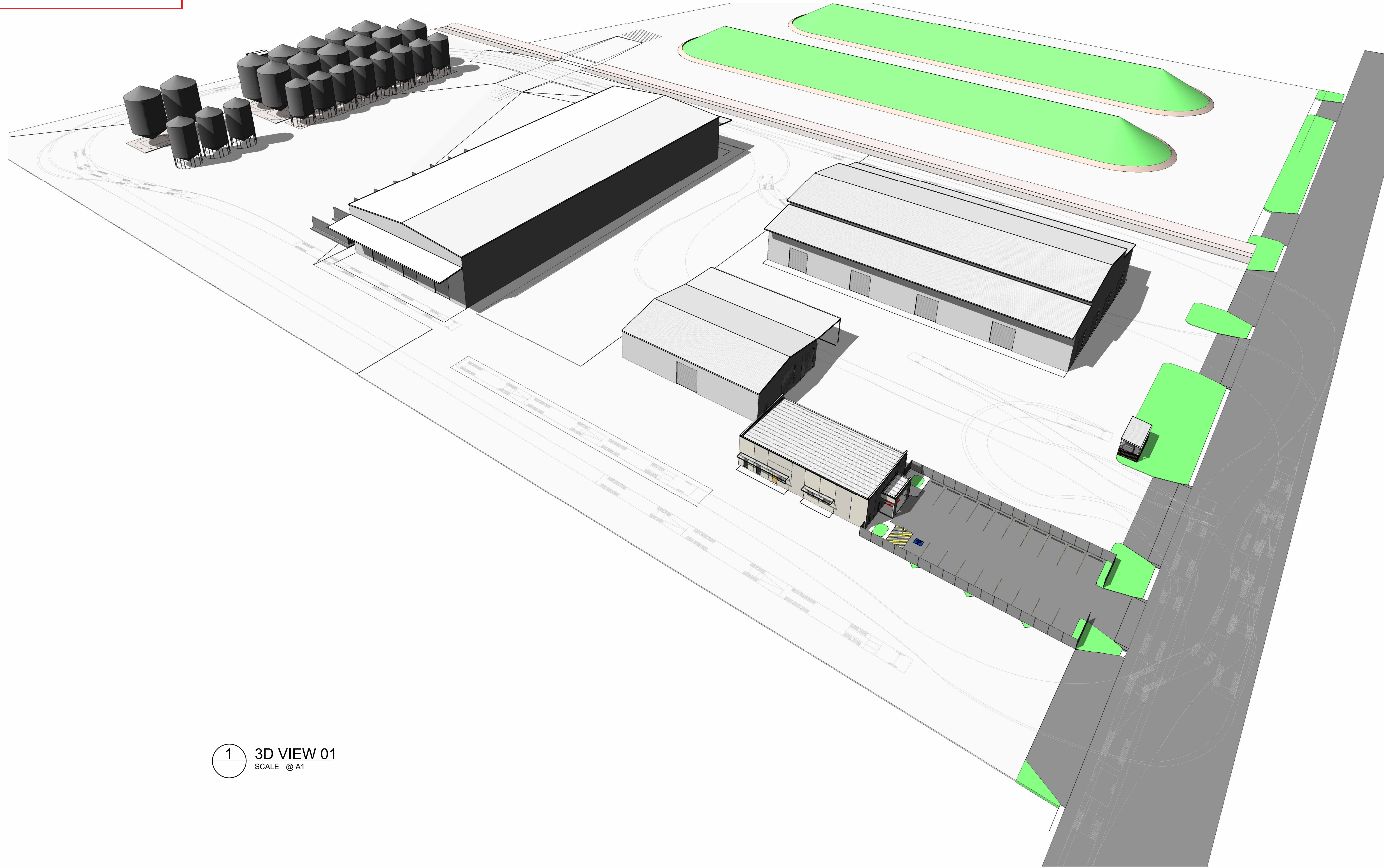
PLANS AND DOCUMENTS  
referred to in the  
SDA APPROVAL



SDA approval: APC2023/009

Do not scale off drawings  
Use only dimensions provided  
Verify all dimensions on site

AMENDMENTS		
ISSUE	DESCRIPTION	DATE
1	OPTION 2	14/01/22
2	OPTION 2	18/01/22
3	OPTION 2	21/01/22
4	OPTION 2	02/02/22
5	OPTION 2	04/02/22
6	GENERAL UPDATES	14/06/22
7	SITE UPDATES	20/06/22
8	GENERAL UPDATES	28/07/22
9	SILOS ADDED	20/12/22
10	GENERAL UPDATES	03/04/23
11	SITE REVISED	20/04/23
12	LOT 15 UPDATE	17/05/23



1 3D VIEW 01  
SCALE @ A1

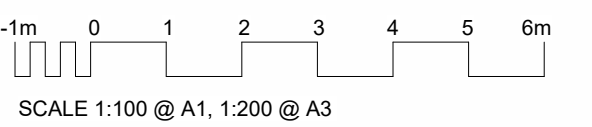


PROJECT  
Sizer & Cogill  
Bulk Storage

CLIENT  
Sizer & Cogill

LOCATION  
Cape Cleveland  
Industrial Park

DRAWN	Author	CHECKED	Checker
DATE	17/05/2023 2:22:34 PM		
STAMP			
SCALE	@ A1		



SCALE 1:100 @ A1, 1:200 @ A3

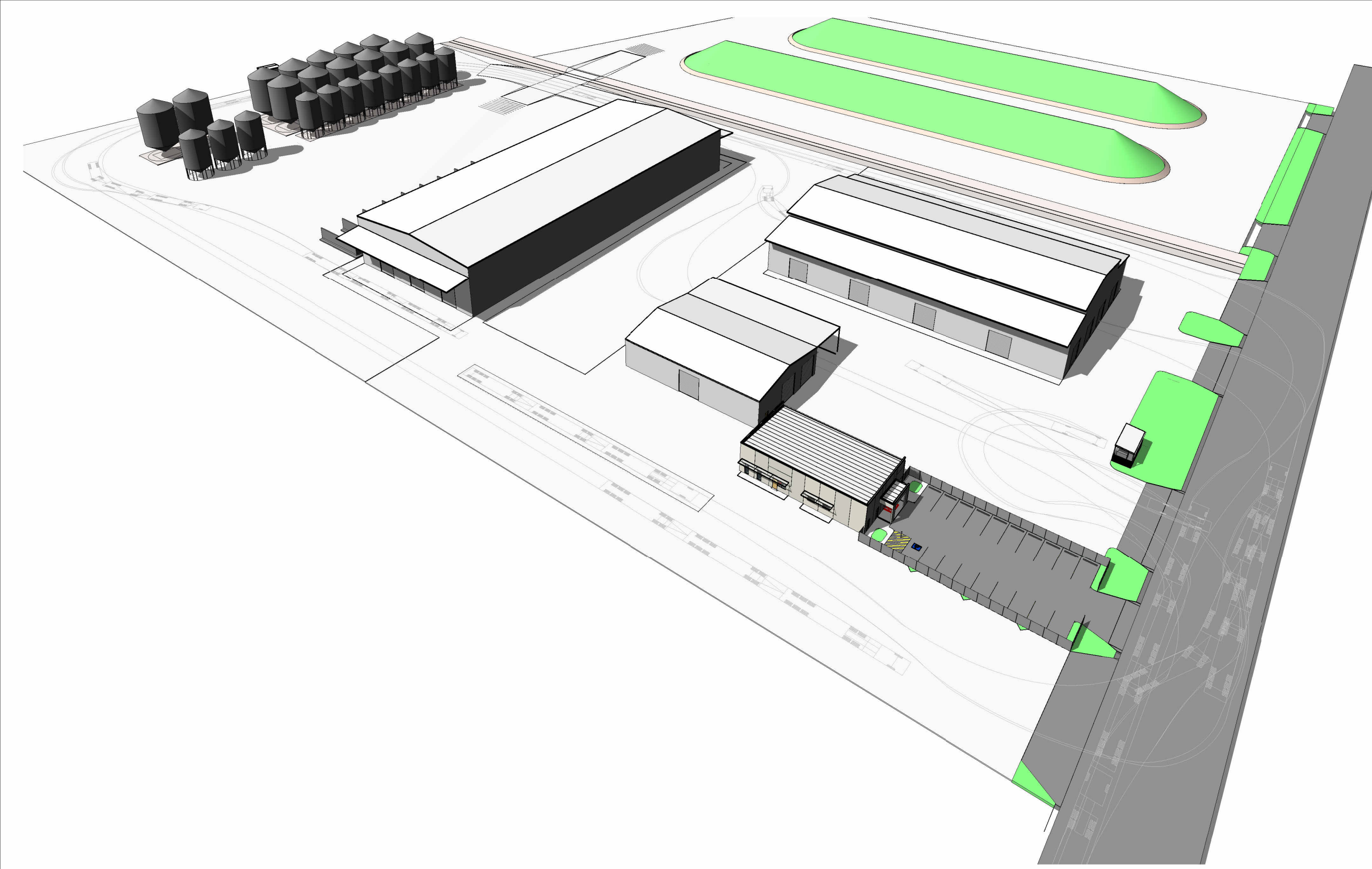
PRELIMINARY  
NOT FOR CONSTRUCTION

DRAWING NO.  
09-1777\_SK-10 P12

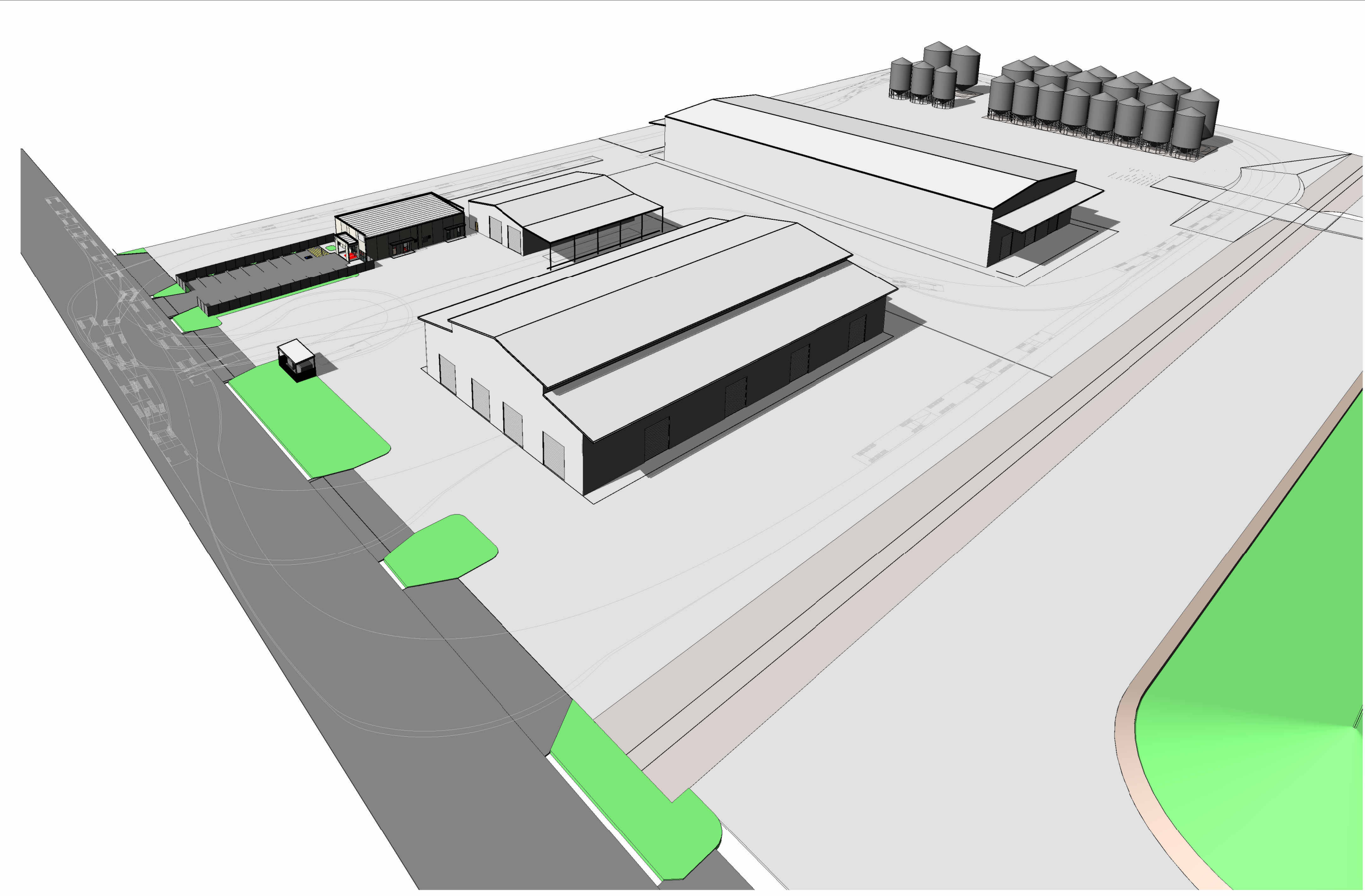


Do not scale off drawings  
Use only dimensions provided  
Verify all dimensions on site

AMENDMENTS		
ISSUE	DESCRIPTION	DATE
1	OPTION 2	14/01/22
2	OPTION 2	18/01/22
3	OPTION 2	21/01/22
4	OPTION 2	02/02/22
5	OPTION 2	04/02/22
6	GENERAL UPDATES	14/06/22
7	SITE UPDATES	20/06/22
8	GENERAL UPDATES	28/07/22
9	SILOS ADDED	20/12/22
10	GENERAL UPDATES	03/04/23
11	SITE REVISED	20/04/23
12	LOT 15 UPDATE	17/05/23




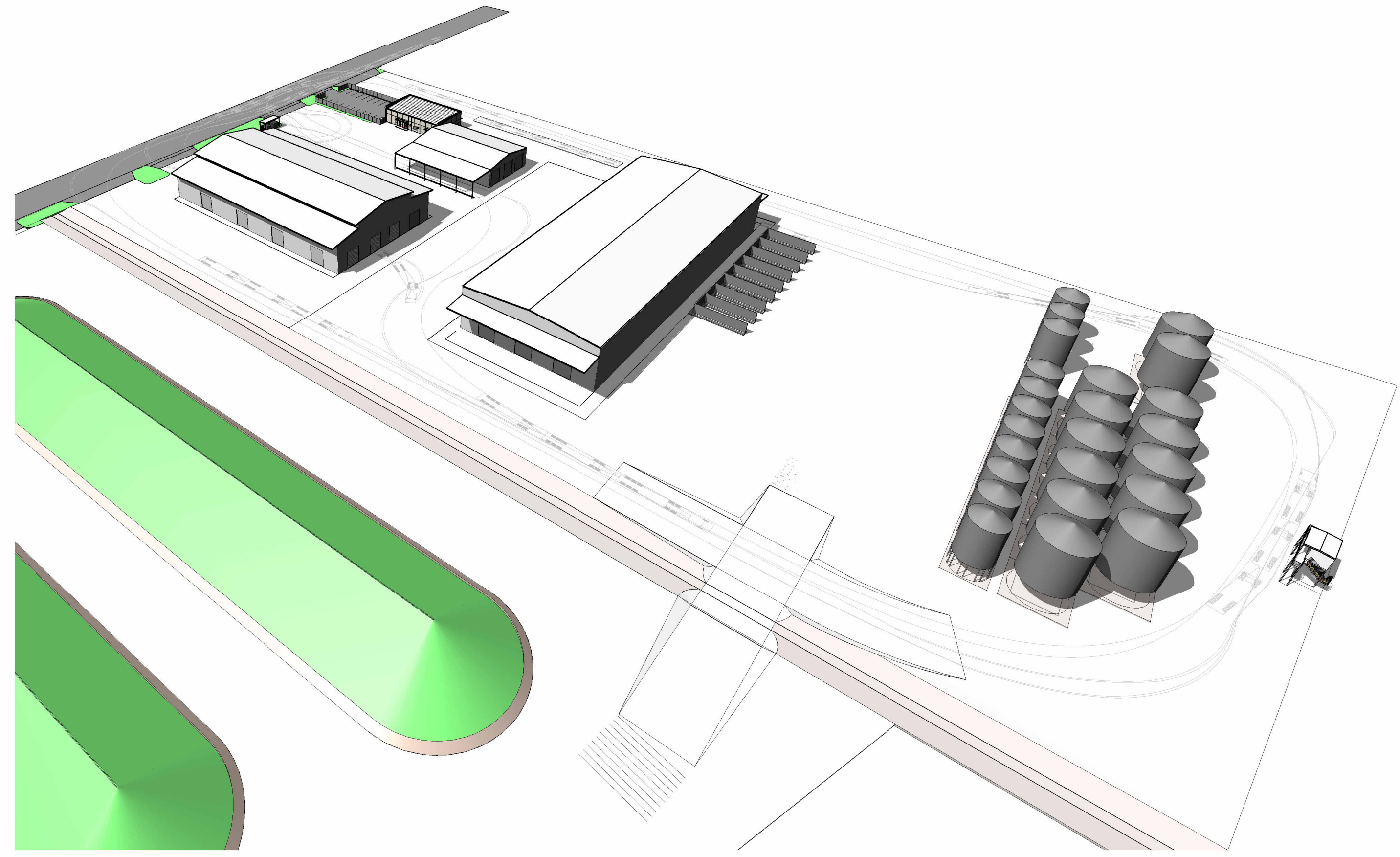
1 3D VIEW 01  
SCALE @ A1



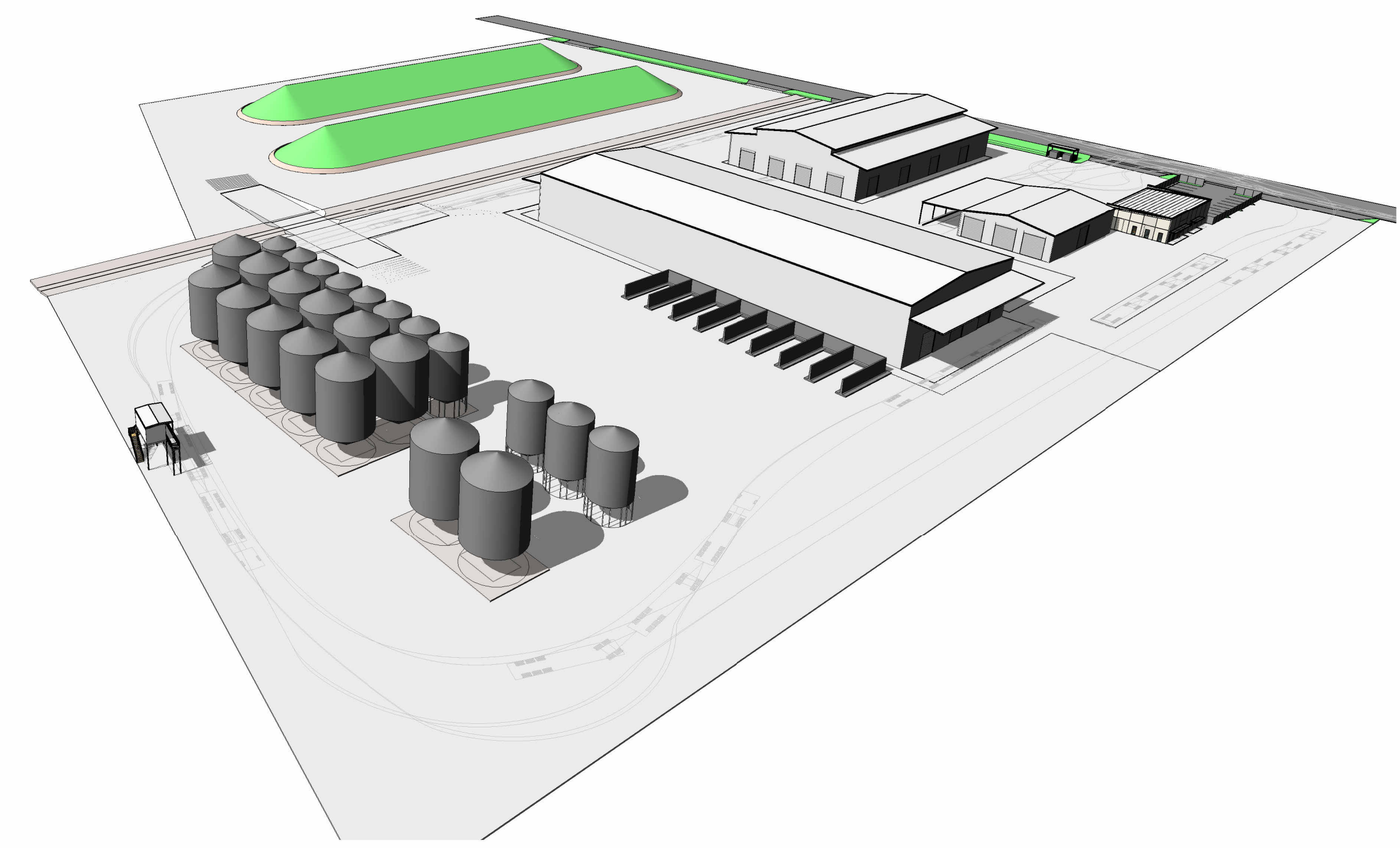
2 3D VIEW 02  
SCALE @ A1

PLANS AND DOCUMENTS referred to in the SDA APPROVAL

SDA approval: APC2023/009

3 3D VIEW 03  
SCALE @ A1



4 3D VIEW 04  
SCALE @ A1

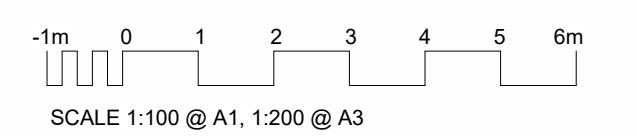


PROJECT  
Sizer & Cogill  
Bulk Storage

CLIENT  
Sizer & Cogill

LOCATION  
Cape Cleveland  
Industrial Park

DRAWN	Author	CHECKED	Checker
DATE	17/05/2023 2:22:41 PM		
STAMP			
SCALE	@ A1		



SCALE 1:100 @ A1, 1:200 @ A3

PRELIMINARY  
NOT FOR CONSTRUCTION

SHEET NAME  
3D VIEW

DRAWING NO.  
09-1777\_SK-11 P12



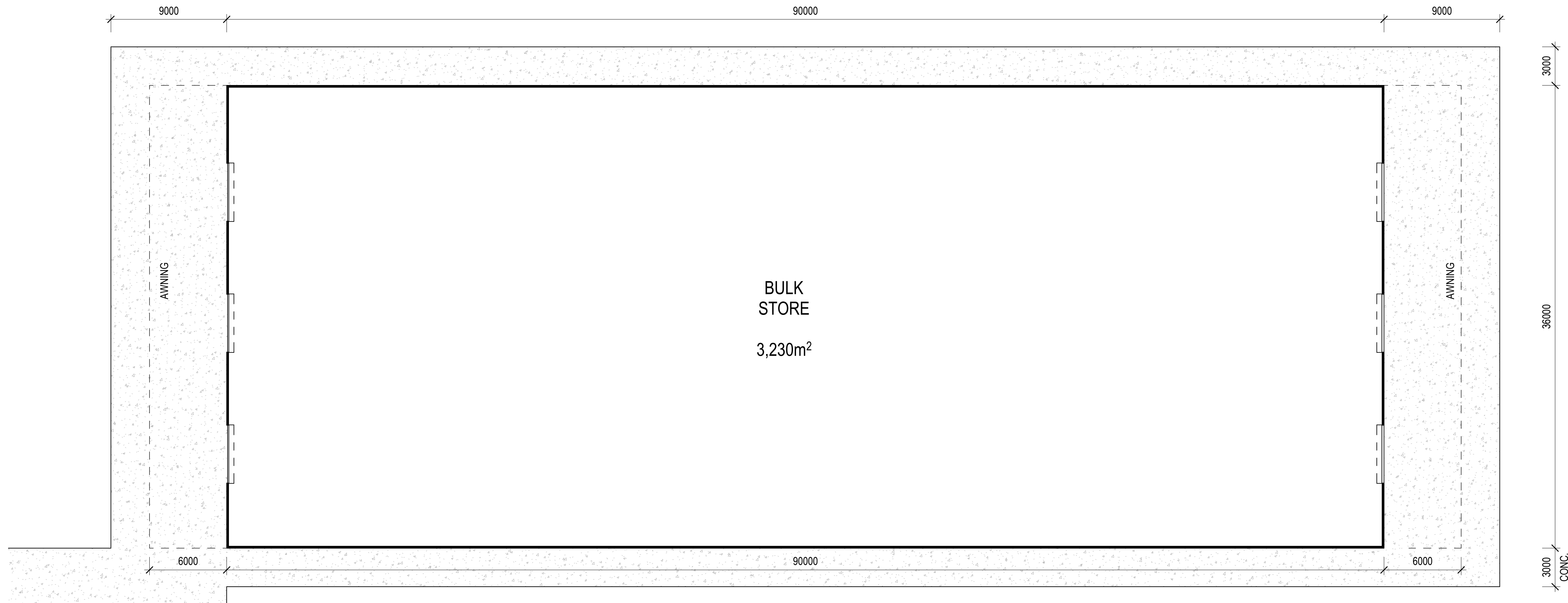
PLANS AND DOCUMENTS  
referred to in the  
SDA APPROVAL



SDA approval: APC2023/009

Do not scale off drawings  
Use only dimensions provided  
Verify all dimensions on site

AMENDMENTS		
ISSUE	DESCRIPTION	DATE
1	BUILDING BLOW UP'S	14/03/22
2	GENERAL UPDATES	14/06/22
3	SITE REVISED	20/04/23

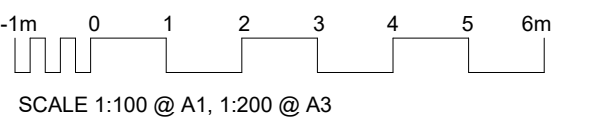


PROJECT  
Sizer & Cogill  
Bulk Storage

CLIENT  
Sizer & Cogill

LOCATION  
Cape Cleveland  
Industrial Park

DRAWN	Author	CHECKED	Checker
DATE	20/04/2023 10:12:48 AM		
SCALE	1 : 200 @ A1		



**PRELIMINARY**  
NOT FOR CONSTRUCTION

SHEET NAME  
**PLAN**  
**BULK STORAGE**

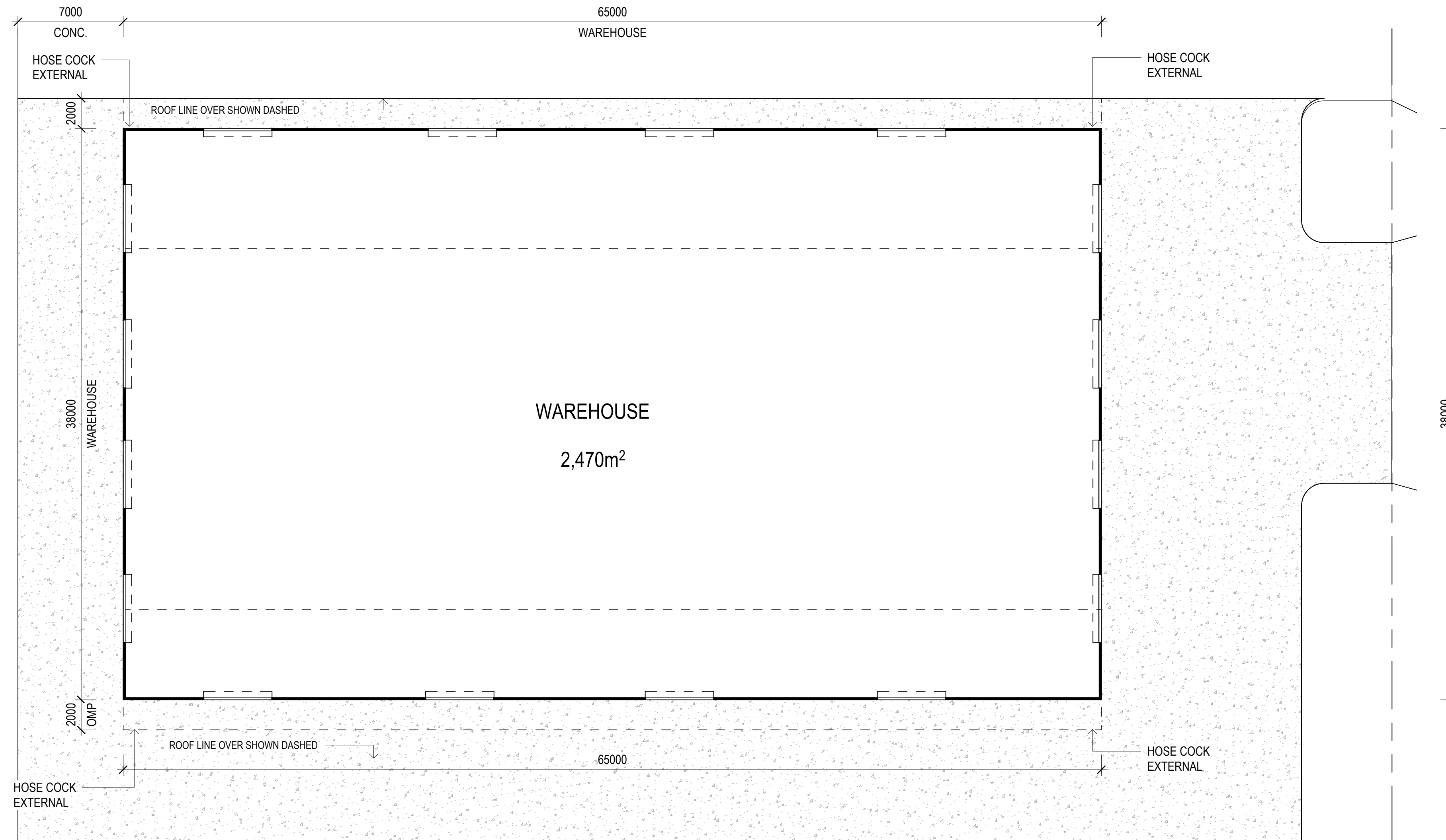
DRAWING NO.  
**09-1777\_SK-20** **P3**

**1** PLAN - BULK STORAGE  
SK-02 SCALE 1 : 200 @ A1





AMENDMENTS		
ISSUE	DESCRIPTION	DATE
1	BUILDING BLOW UP'S	14/03/22
2	GENERAL UPDATES	14/06/22
3	SITE REVISED	20/04/23



**1** PLAN - WAREHOUSE  
SK-02 SCALE 1 : 200 @ A1

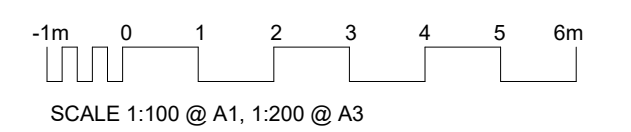


PROJECT  
Sizer & Cogill  
Bulk Storage

CLIENT  
Sizer & Cogill

LOCATION  
Cape Cleveland  
Industrial Park

DRAWN	Author	CHECKED	Checker
DATE	20/04/2023 10:12:47 AM		
STAMP			
SCALE	1 : 200 @ A1		



SCALE 1:100 @ A1, 1:200 @ A3  
**PRELIMINARY**  
NOT FOR CONSTRUCTION

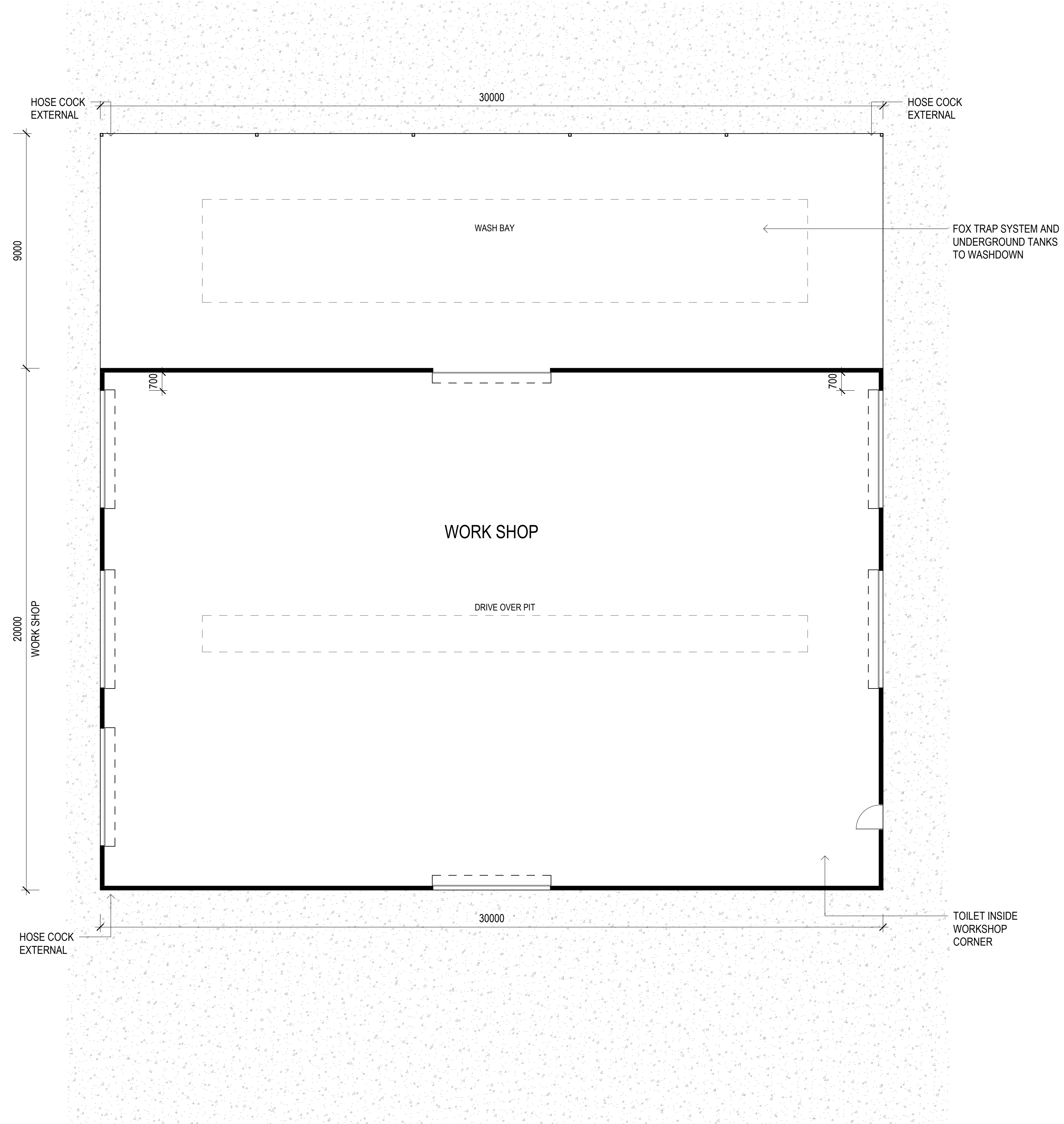
SHEET NAME  
**PLAN**  
**WAREHOUSE**

DRAWING NO.  
**09-1777\_SK-21** **P3**





AMENDMENTS		
ISSUE	DESCRIPTION	DATE
1	BUILDING BLOW UP'S	14/03/22
2	GENERAL UPDATES	14/06/22
3	GENERAL UPDATES	28/07/22
4	SITE REVISED	20/04/23

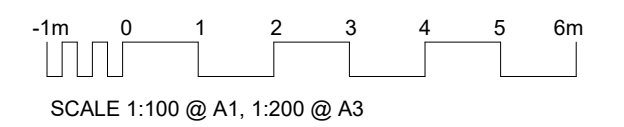


PROJECT  
Sizer & Cogill  
Bulk Storage

CLIENT  
Sizer & Cogill

LOCATION  
Cape Cleveland  
Industrial Park

DRAWN	Author	CHECKED	Checker
DATE	20/04/2023 10:12:48 AM		
SCALE	1 : 100 @ A1		



**PRELIMINARY**  
NOT FOR CONSTRUCTION

SHEET NAME  
**PLAN**  
**WORK SHOP**

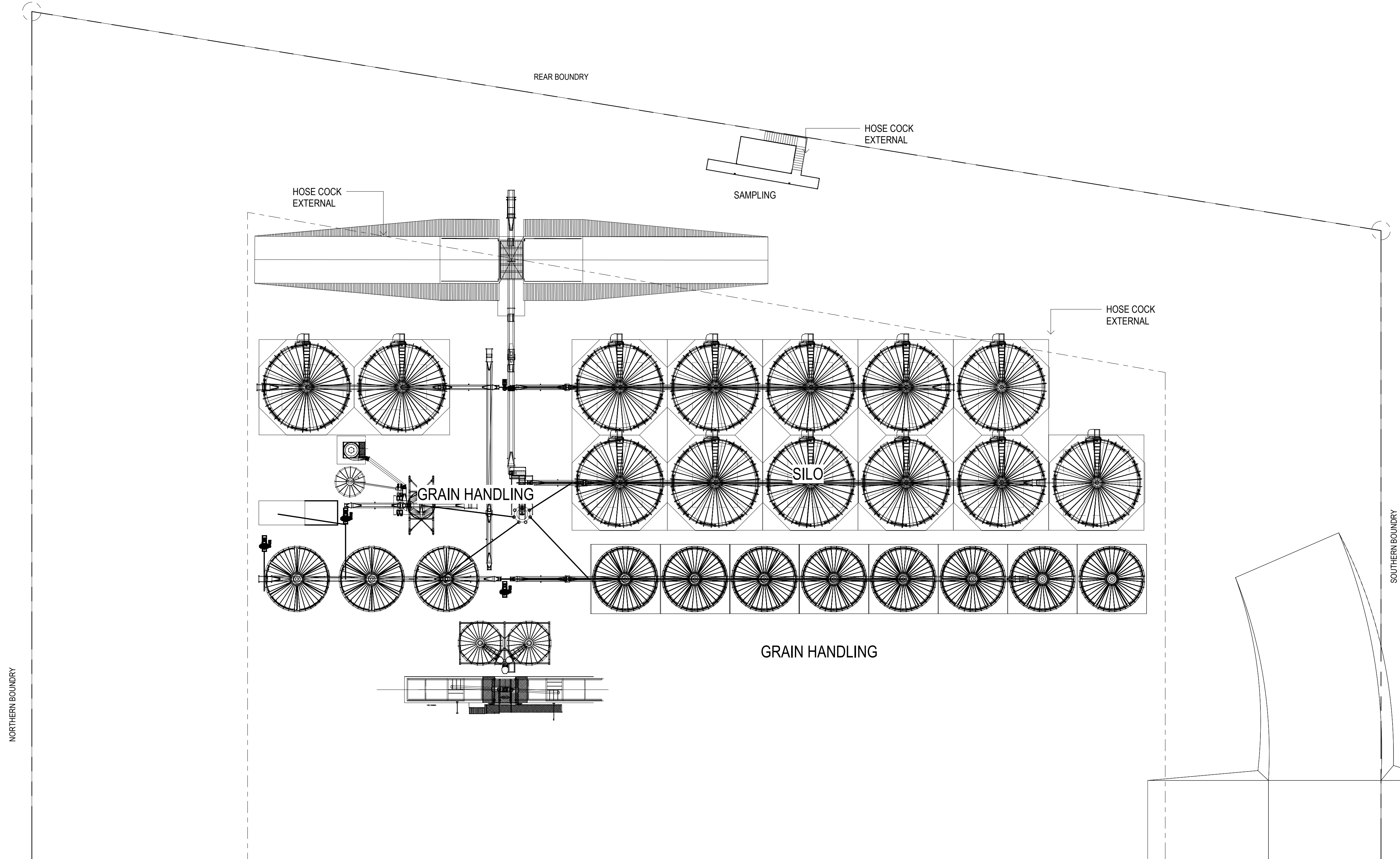
DRAWING NO.  
**09-1777\_SK-22** **P4**

**1** PLAN - WORK SHOP  
SK-02 SCALE 1 : 100 @ A1





AMENDMENTS		
ISSUE	DESCRIPTION	DATE
1	BUILDING BLOW UP'S	14/03/22
2	GENERAL UPDATES	14/06/22
3	SILOS ADDED	20/12/22
4	GENERAL UPDATES	03/04/23
5	SITE REVISED	20/04/23

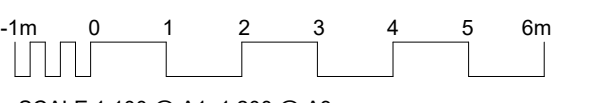


PROJECT  
Sizer & Cogill  
Bulk Storage

CLIENT  
Sizer & Cogill

LOCATION  
Cape Cleveland  
Industrial Park

DRAWN	Author	CHECKED	Checker
DATE	20/04/2023 10:12:32 AM		
SCALE	1 : 250 @ A1		



SCALE 1:100 @ A1, 1:200 @ A3  
**PRELIMINARY**  
NOT FOR CONSTRUCTION

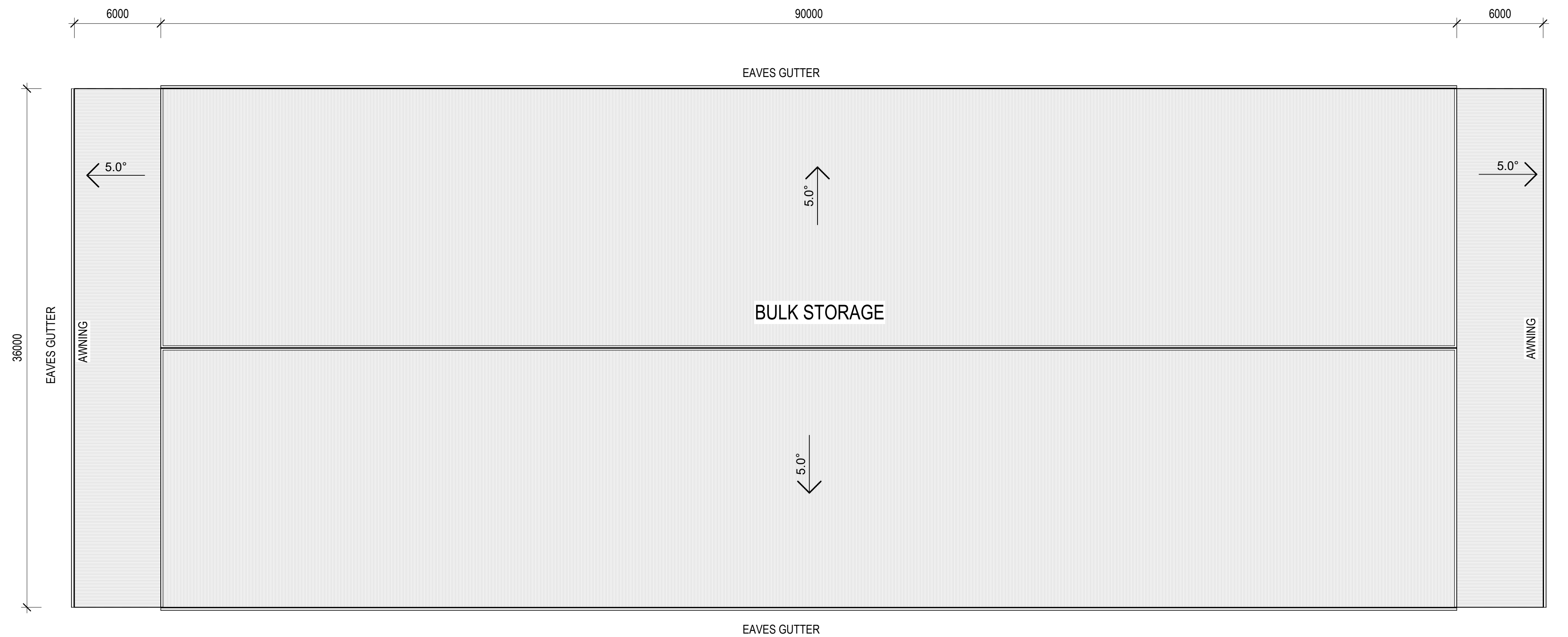
SHEET NAME  
**PLAN SILO**  
**GRAIN HANDELING**

DRAWING NO.  
**09-1777\_SK-23** **P5**





AMENDMENTS		
ISSUE	DESCRIPTION	DATE
1	ROOF PLANS	21/01/23
2	SITE REVISED	20/04/23



**1** BULK STORAGE - ROOF PLAN  
SK-02 SCALE 1:200 @ A1



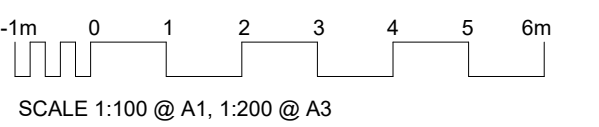
NORTH

PROJECT  
Sizer & Cogill  
Bulk Storage

CLIENT  
Sizer & Cogill

LOCATION  
Cape Cleveland  
Industrial Park

DRAWN	Author	CHECKED	Checker
DATE	20/04/2023 10:17:52 AM		
SCALE	1:200 @ A1		



**PRELIMINARY**  
NOT FOR CONSTRUCTION

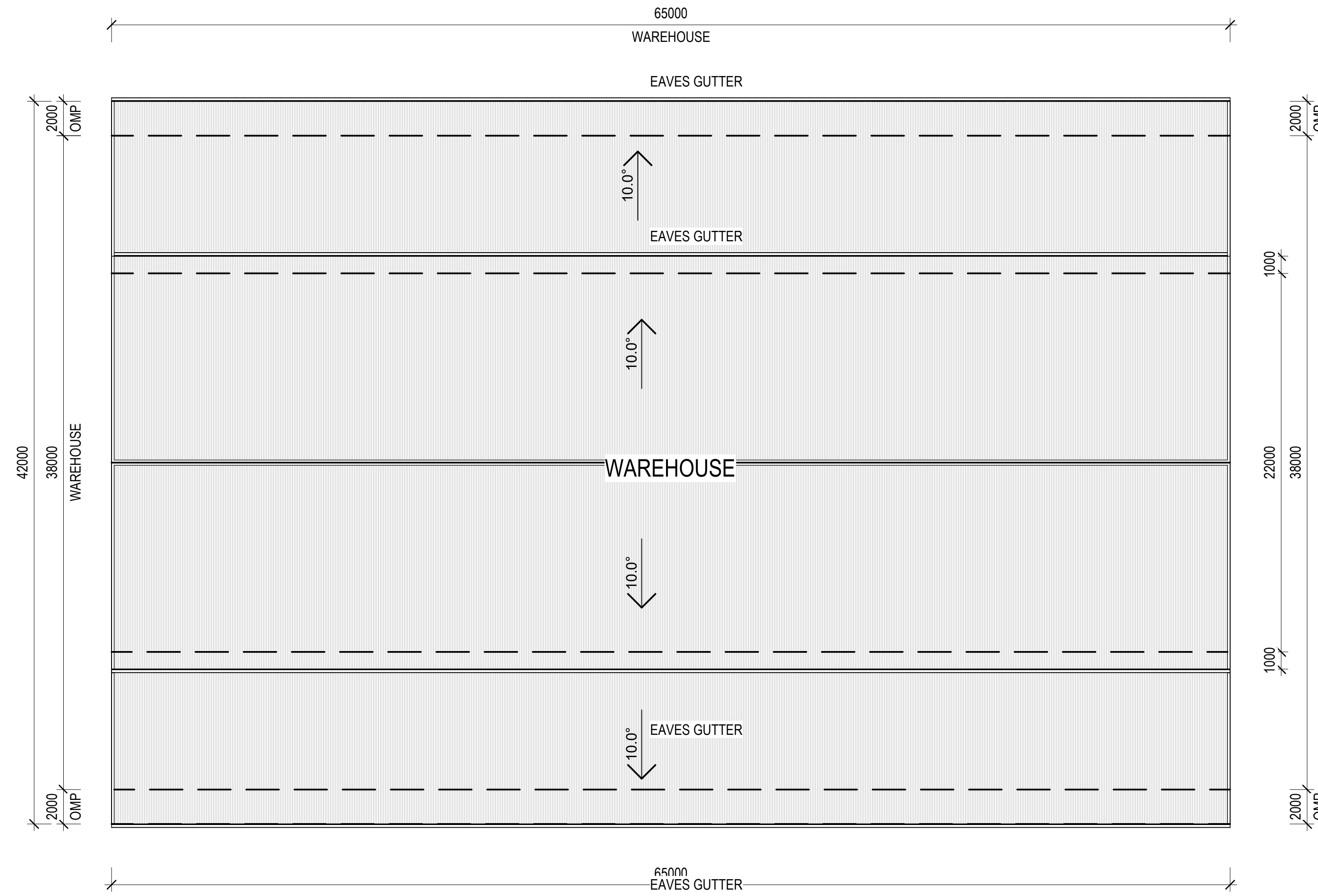
SHEET NAME  
ROOF PLAN  
BULK STORAGE

DRAWING NO.	09-1777_SK-24	P2
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AMENDMENTS	
ISSUE DESCRIPTION	DATE
1 ROOF PLANS	21/01/23
2 SITE REVISED	20/04/23



1 ROOF PLAN - WAREHOUSE  
SK-02 SCALE 1 : 200 @ A1

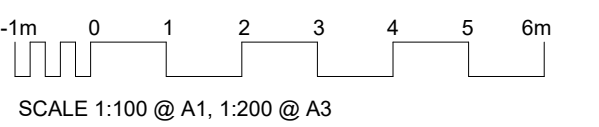


PROJECT  
Sizer & Cogill  
Bulk Storage

CLIENT  
Sizer & Cogill

LOCATION  
Cape Cleveland  
Industrial Park

DRAWN	Author	CHECKED	Checker
DATE	20/04/2023 10:11:49 AM		
STAMP			
SCALE	1 : 200 @ A1		



PRELIMINARY  
NOT FOR CONSTRUCTION

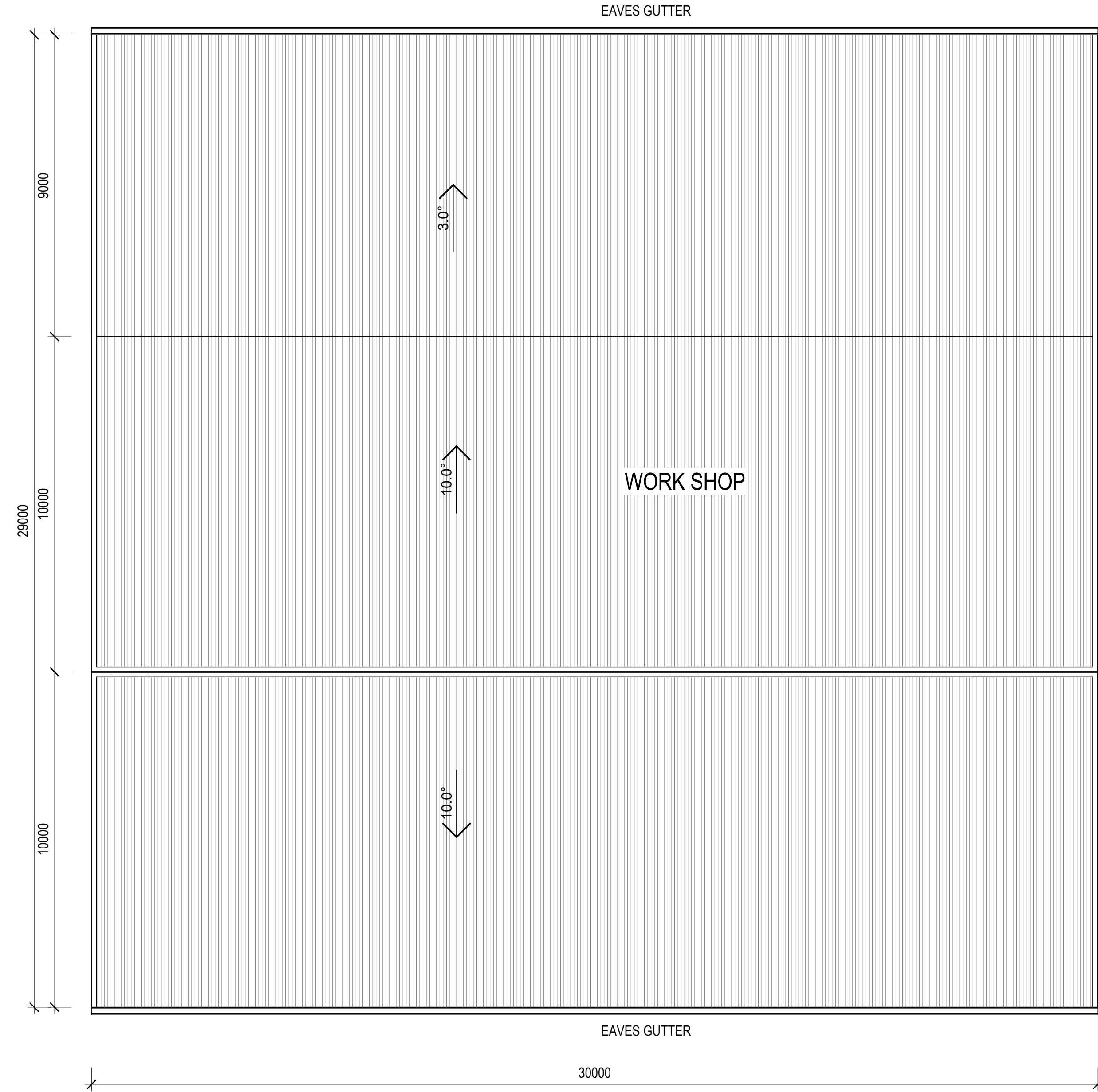
SHEET NAME  
ROOF PLAN  
WAREHOUSE

DRAWING NO.  
09-1777\_SK-25 P2





AMENDMENTS		
ISSUE	DESCRIPTION	DATE
1	ROOF PLANS	21/01/23
2	SITE REVISED	20/04/23



**1** ROOF PLAN - WORK SHOP  
SK-02 SCALE 1 : 100 @ A1

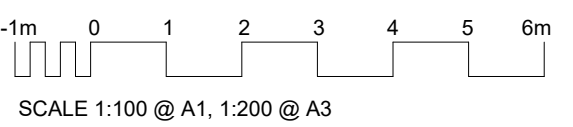


PROJECT  
Sizer & Cogill  
Bulk Storage

CLIENT  
Sizer & Cogill

LOCATION  
Cape Cleveland  
Industrial Park

DRAWN	Author	CHECKED	Checker
DATE	20/04/2023 10:11:49 AM		
STAMP			
SCALE	1 : 100 @ A1		



**PRELIMINARY**  
NOT FOR CONSTRUCTION

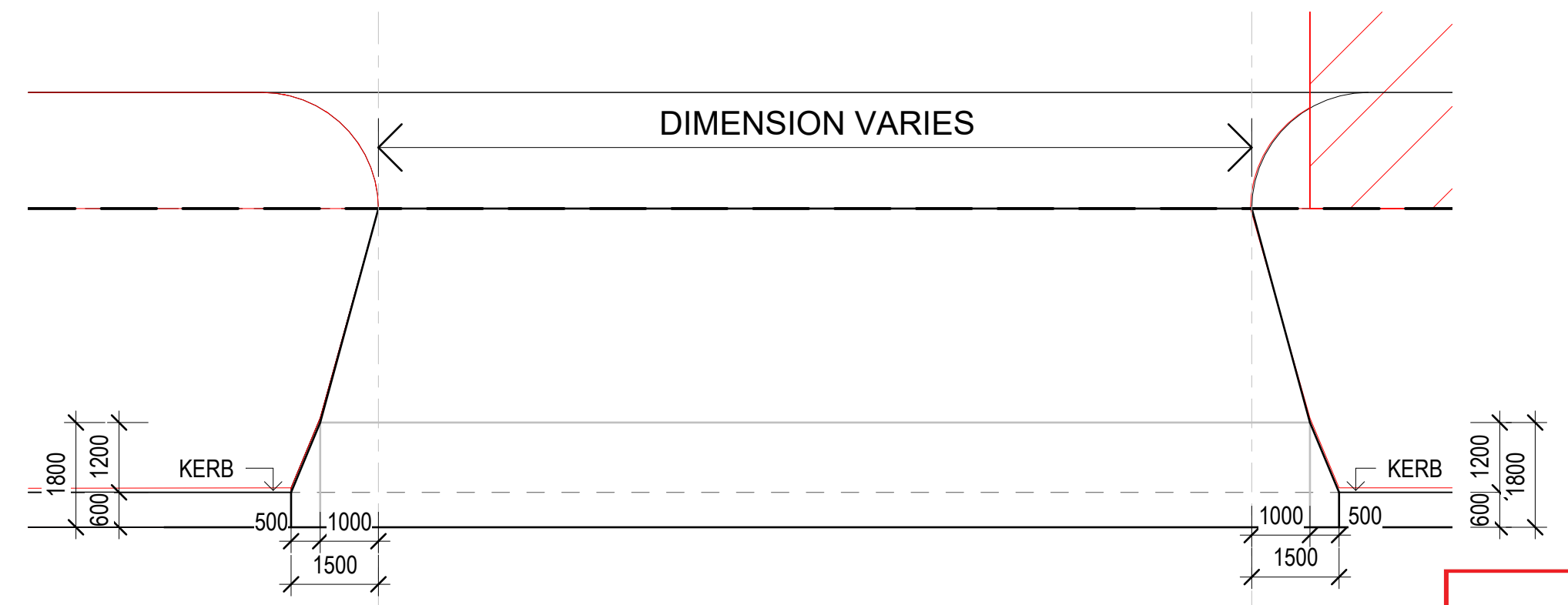
SHEET NAME  
ROOF PLAN  
WORK SHOP

DRAWING NO.	
09-1777_SK-26	P2



Do not scale off drawings  
Use only dimensions provided  
Verify all dimensions on site

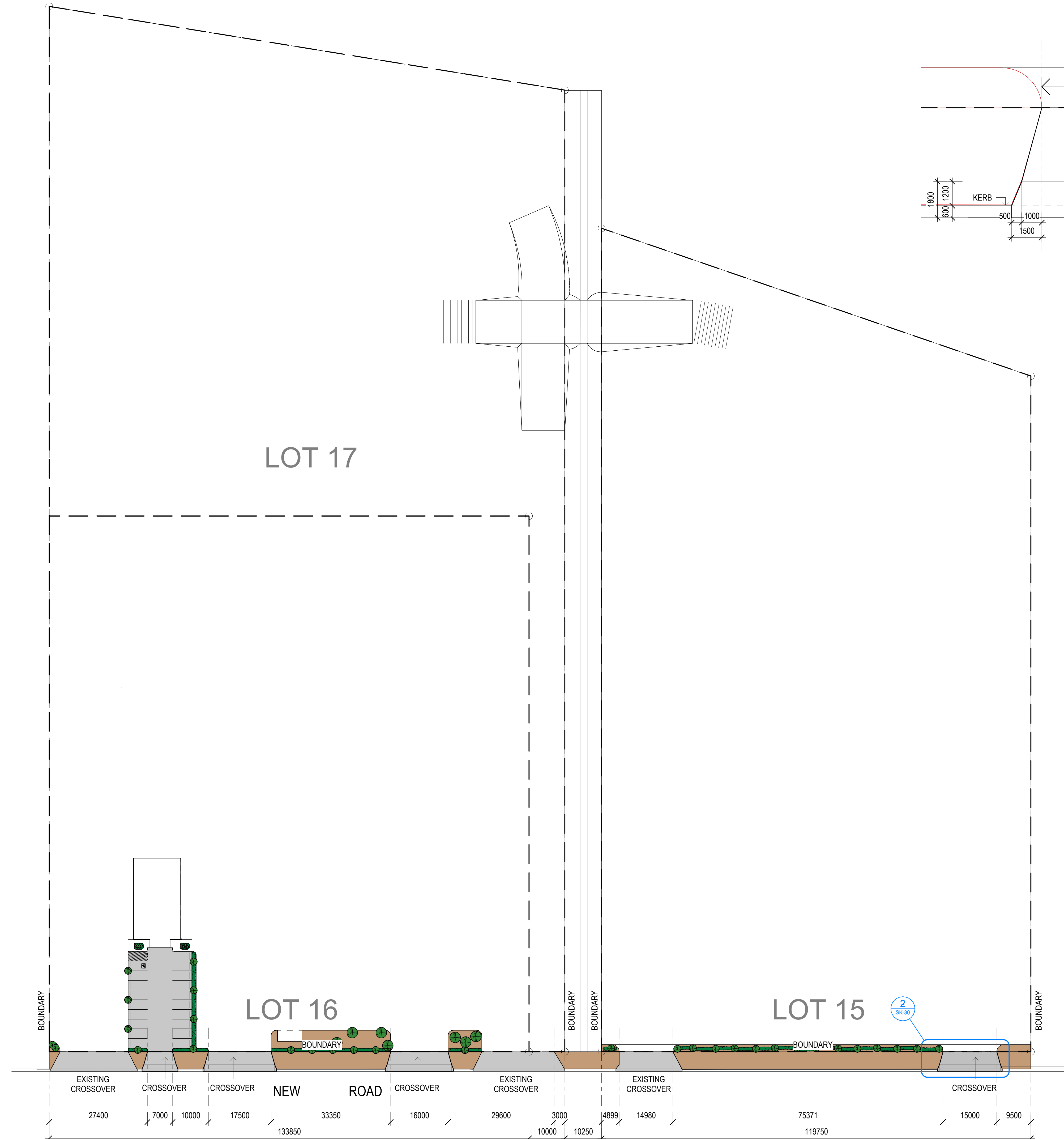
AMENDMENTS		
ISSUE	DESCRIPTION	DATE
1	DRIVEWAY SETOUT	11/10/22
2	DRIVEWAY SETOUT	20/12/22
3	CARPARK AND DRIVEWAY ADJUSTED	18/01/23
4	GENERAL UPDATES	03/04/23



**2** DRIVWAY SETOUT TYPICAL  
SK-30 SCALE 1:100 @ A1

**PLANS AND DOCUMENTS**  
referred to in the  
**SDA APPROVAL**

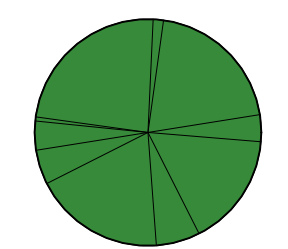
SDA approval: APC2023/009



**1** DRIVEWAY SETOUT  
SK-02



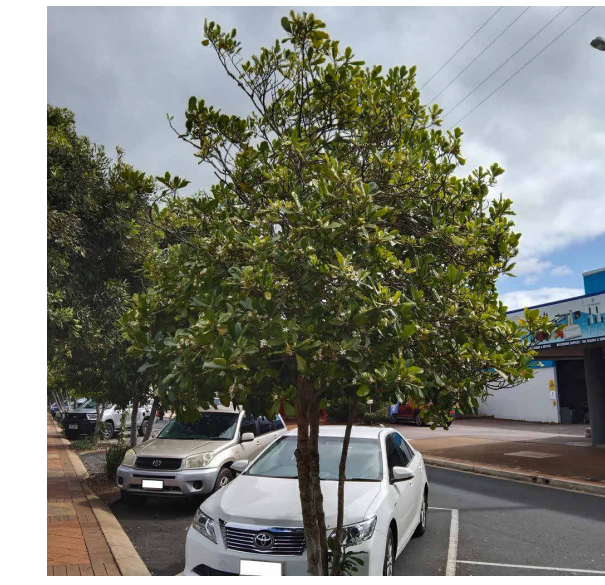
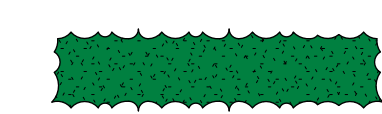
HARPULLIA HILLII  
TULIPWOOD  
WIDTH 3m  
HEIGHT 10m



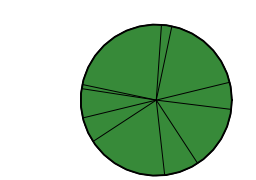
PURPLE GEM  
BARLERIA OBTUSA  
WIDTH .6m  
HEIGHT .9-1.2m



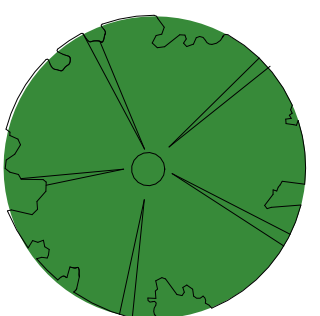
DURANTA  
DURANTA REPENS AND CULTIVARS  
WIDTH 2-1m  
HEIGHT 2-1.8m



BROWN GARDENIA  
ATRACTOCARPUS FITZALANII  
WIDTH 2-3m  
HEIGHT 5m



BROWN SILKY OAK  
GREVILLEA BAILEYANA  
WIDTH 3-4m  
HEIGHT 5-1m



**PLANTING LEGEND**



PROJECT  
**Sizer & Cogill  
Bulk Storage**

CLIENT  
**Sizer & Cogill**

LOCATION  
**Cape Cleveland  
Industrial Park**

DRAWN	Author	CHECKED	Checker
DATE	20/04/2023 10:12:34 AM		
SCALE	As indicated @ A1		

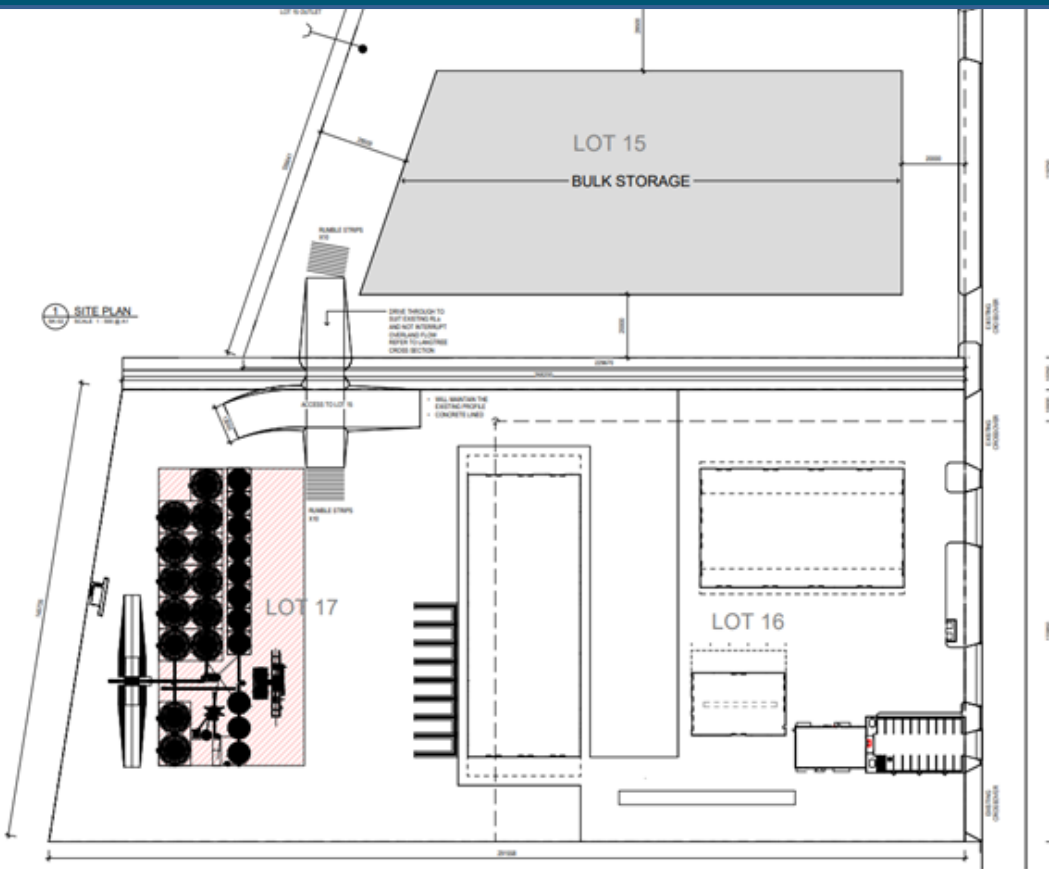
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SHEET NAME  
**DRIVEWAY SETOUT &  
LANDSCAPING**

DRAWING NO.  
**09-1777\_SK-30** **P4**



# SIZER & COGILL CBIP LOTS 15, 16 AND 17



## STORMWATER QUALITY MANAGEMENT PLAN

CLEVELAND INDUSTRIAL PARK



**Controlled Copy No.: 1**

**Revisions: A**

**Revision Record:**

<b>Rev</b>	<b>Review Date</b>	<b>Description</b>	<b>Prepared</b>	<b>Checked</b>	<b>Approved</b>
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## 1.0 INTRODUCTION

This Stormwater Quality Management Plan (SQMP) has been prepared by Langtree Consulting on behalf of Sizer & Cogill for their development located on Lots 15, 16 and 17, Cleveland Bay Industrial Park development at the Townsville State Development Area (TSDA). Notwithstanding this please note that the entire Cleveland Bay Industrial Park Development Western Precinct (CBIP) has been re-assessed as part of this report to reflect the as built form of the development.

The Western Precinct is approximately 113.5ha and is shown red in **Figure 1**. The total area that has been approved for development is approximately 59.5ha as shown in **Figure 2**. This report addresses the proposed development of Lots 15, 16 and 17 on SP331994.



**Figure 1.** Development Site Locality



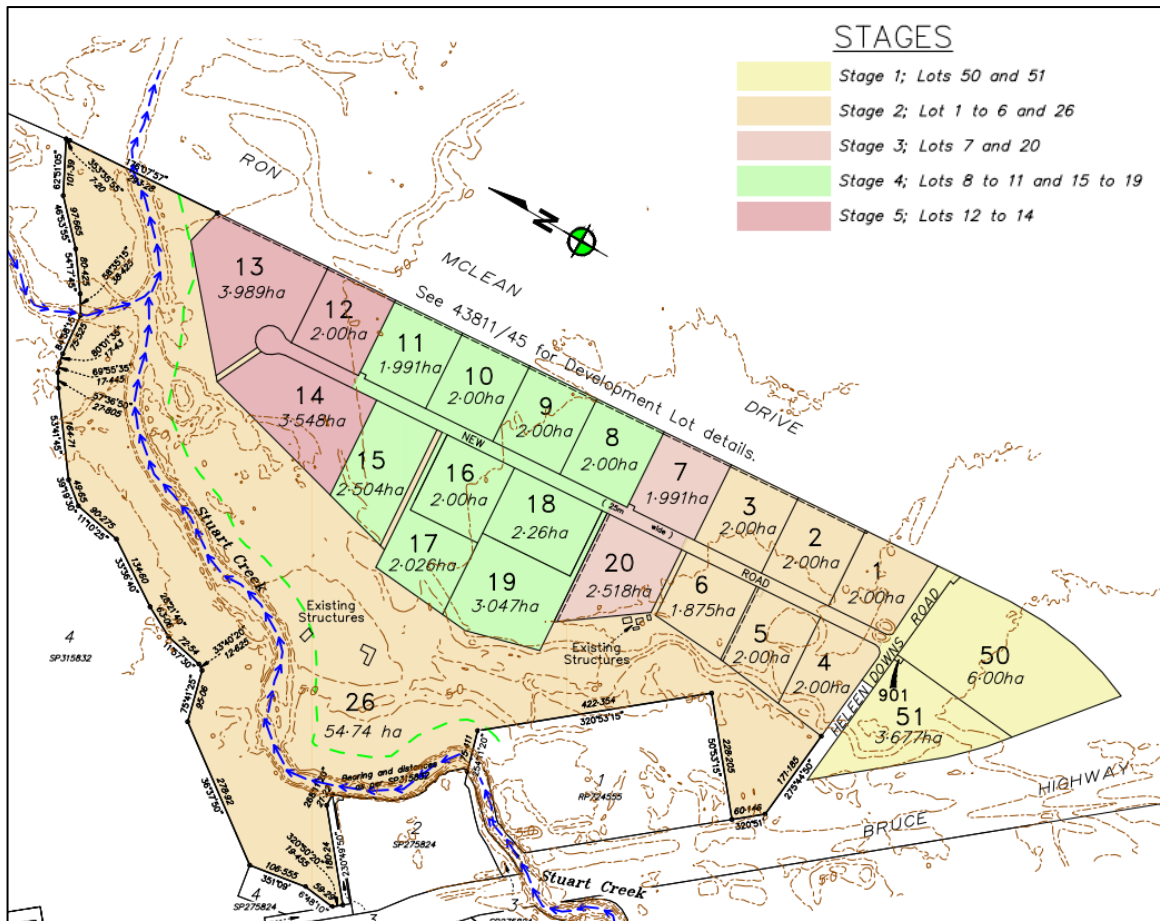


Figure 2. Proposed Development Layout (Western Precinct)

Please note that it is proposed that Lots 15, 16 and 17 at CBIP will be used for agricultural storage including grain storage, the storage for bulk bags, IBC'S (intermediate Bulk Containers) and other agricultural products, which are then distributed when required.

## 2.0 OBJECTIVE

The objective of this report is to assess the best practice stormwater quality management for CBIP Lots 15, 16 and 17 and ultimately across the entire development site to enable the Western Precinct to be developed with the permitted industrial uses and site coverage of 90%. In addition, it is intended to implement best practice stormwater quality management to ensure the health of the receiving waters of Stuart Creek, during the operational phase of the development (i.e. post-development).

The best practice stormwater quality management measure are to be designed to meet the requirements and principles outlined within:

- Healthy Water Code of Townsville City Council City Plan;
- Table B (Appendix 2) of the State Planning Policy July 2017 (SPP);
- WSUD Design Objectives for Urban Stormwater Management;
- Construction and Establishment Guidelines, Swales, Bioretention Systems and Wetlands;
- Concept Design Guidelines for Water Sensitive Urban Design;
- Standard Drawings for Water Sensitive Urban Design;
- Environmental Protection (Water) Policy 2009 (Townsville region); and
- Water Quality Guidelines for the Great Barrier Reef Marine Park (2010).



### 3.0 SITE SPECIFIC INFORMATION

#### 3.1 WESTERN PRECINCT DETAILS

The CBIP Western Precinct consists of twenty-two (22) industrial allotments. The industrial allotments range from 1.875ha to 6.0ha. Refer to **Figure 2** above.

A breakdown of individual lot details and allotment size is summarised in **Table 1**.

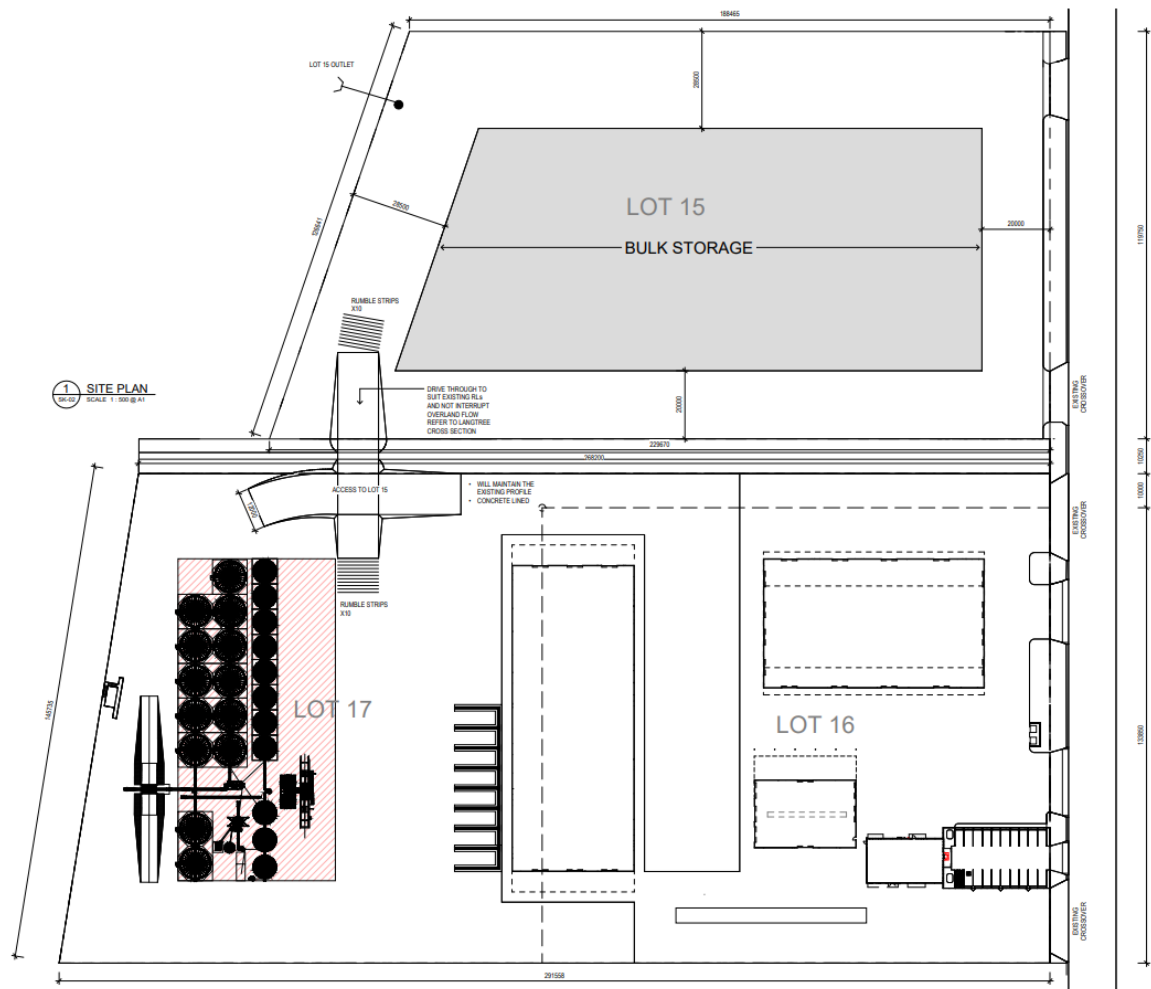
**Table 1: Western Precinct Development Lots & Area**

Land use	Lot No.	Lot Area
Industrial Lot	Lot 50 on SP331993	6.0 ha
Industrial Lot	Lot 51 on SP331993	3.69 ha
Sewerage Pump Station	Lot 901 on SP331993	0.014 ha
Industrial Lot	Lot 1 on SP331994	2.0 ha
Industrial Lot	Lot 2 on SP331994	2.0 ha
Industrial Lot	Lot 3 on SP331994	2.0 ha
Industrial Lot	Lot 4 on SP331994	2.0 ha
Industrial Lot	Lot 5 on SP331994	1.979 ha
Industrial Lot	Lot 6 on SP331994	1.875 ha
Industrial Lot	Lot 7 on SP331994	1.991 ha
Industrial Lot	Lot 8 on SP331994	2.0 ha
Industrial Lot	Lot 9 on SP331994	2.0 ha
Industrial Lot	Lot 10 on SP331994	2.0 ha
Industrial Lot	Lot 11 on SP331994	1.991 ha
Industrial Lot	Lot 12 on SP331994	2.0 ha
Industrial Lot	Lot 13 on SP331994	3.989 ha
Industrial Lot	Lot 14 on SP331994	3.548 ha
Industrial Lot	Lot 15 on SP331994	3.548 ha
Industrial Lot	Lot 16 on SP331994	2.504 ha
Industrial Lot	Lot 17 on SP331994	2.0 ha
Industrial Lot	Lot 18 on SP331994	2.026 ha
Industrial Lot	Lot 19 on SP331994	2.26 ha
Industrial Lot	Lot 20 on SP331994	3.047 ha
Balance	-	57.041 ha
	<b>Sub Total</b>	113.5 ha
Industrial Lot	Lot 1 on RP724555	9.452 ha
	<b>Total</b>	113.5 ha

Note: \* Easements burdening lots.

### 3.2 LOTS 15, 16 AND 17 ON SP338023

Lots 15, 16 and 17 on SP338023 are proposed to be amalgamated and developed as one lot and will be referred to as the subject site here on in. It is proposed that the subject site will be utilised as a bulk storage site. Refer to **Figure 3** for proposed site layout plan.



**Figure 3.** Proposed Development Layout

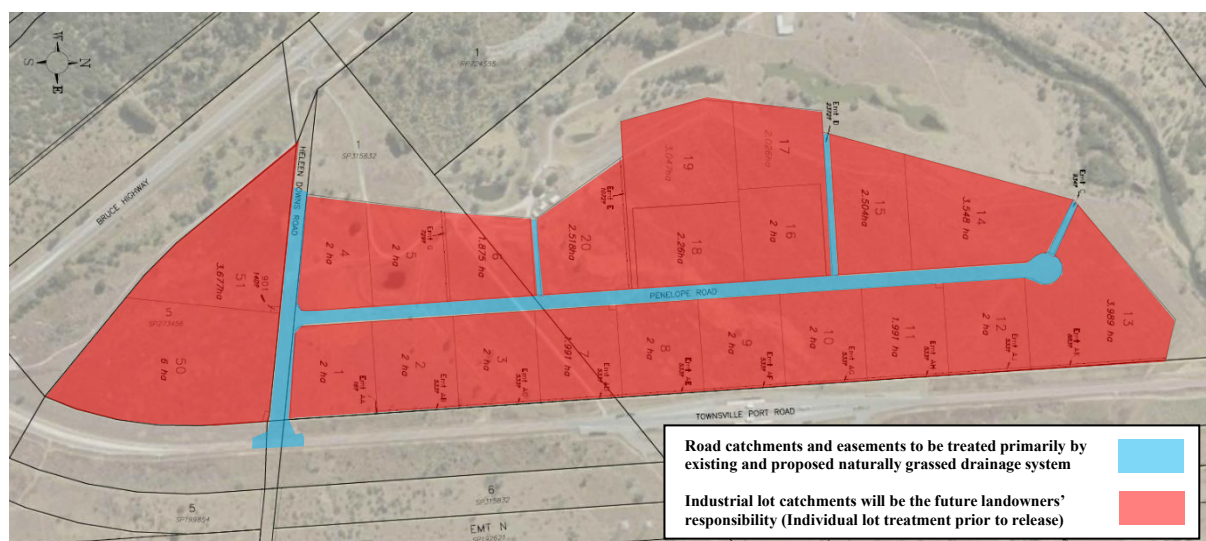


## 4.0 STORMWATER REGIME

### 4.1 PREVIOUS STORMWATER QUALITY REGIME

It has previously been anticipated that all the stormwater runoff from the CBIP industrial lots will be treated onsite and will be the responsibility of the future lot owner. Stormwater runoff from the roadways (i.e. Heleen Downs Road and Penelope Road), will be treated by existing and proposed naturally grassed open drains within the balance area. The entire drainage area is accessible for maintenance from Heleen Downs Road and Penelope Road.

The stormwater catchments which will be treated by individual lot treatment systems constructed by landowners prior to discharge to existing and constructed naturally grassed open drains within the balance area. This area is shown in **Figure 4** in **RED**. Roadway/easement areas that will be treated via the existing and constructed naturally grassed open drains is shown in **BLUE**. It is noted that stormwater from Lots 16 and 18 fall towards Penelope Road and have been assumed to be treated by individual lot system by the lot owners before entering individual field inlet pits which discharging into the positive stormwater network prior to release to the naturally grassed open drains in the balance area.



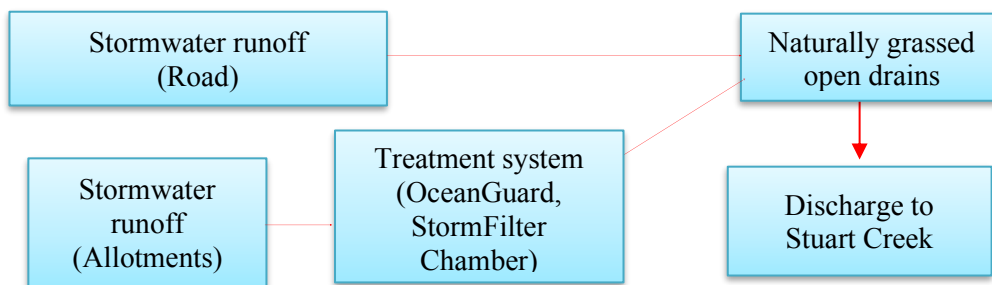
**Figure 4.** Existing Lot Stormwater Treatment Catchments

## 4.2 MUSIC MODELLING

Water quality modelling previously conducted for the now constructed (mitigated) scenario, using the Model for Urban Stormwater Improvement Conceptualisation (MUSIC) software to demonstrate the TCC target reduction criteria. Stormwater treatment trains were developed and modelled for the sites to determine the effectiveness of the water quality measures in achieving the relevant water quality objectives.

Treatment areas for Lots and Roadways are as per the **Table 1** above.

The existing modelled stormwater treatment trains for each catchment within the Western Precinct can be represented as shown in **Figure 5**.

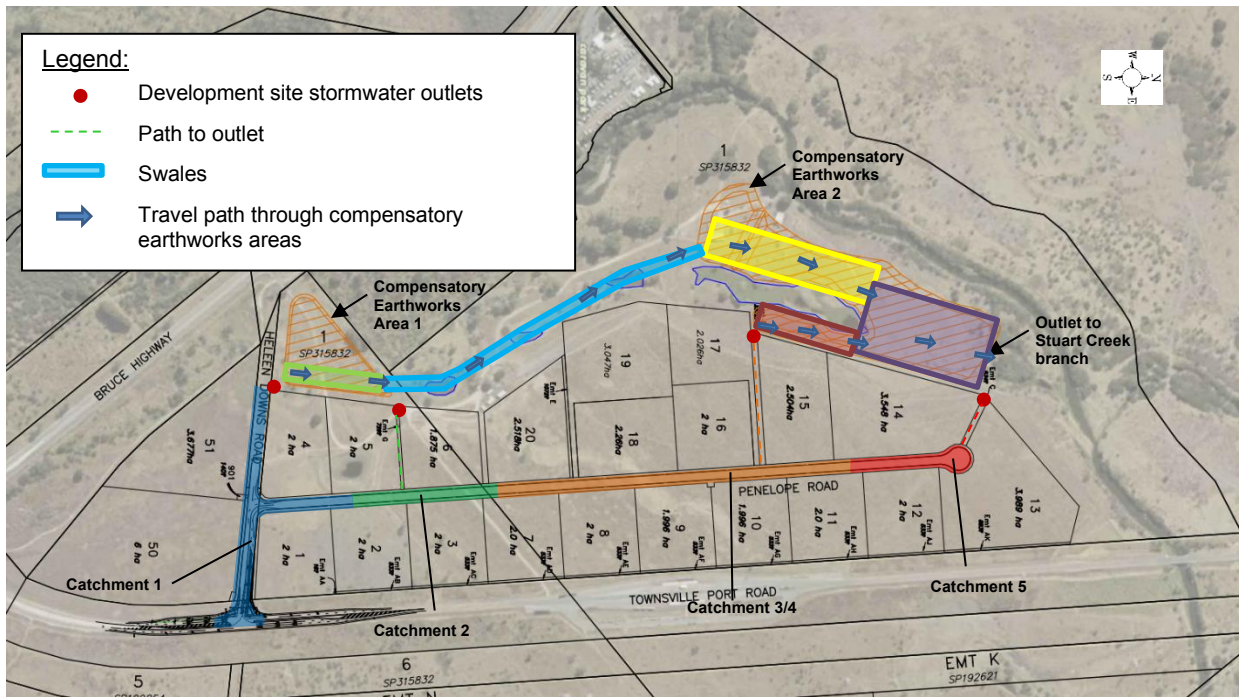


**Figure 5.** Typical stormwater treatment train

Please note the as built form of the CBIP development has been constructed with significantly wider swales and larger compensatory earthworks areas than was originally modelled. The constructed built form of the CBIP development is shown in Figure 6.

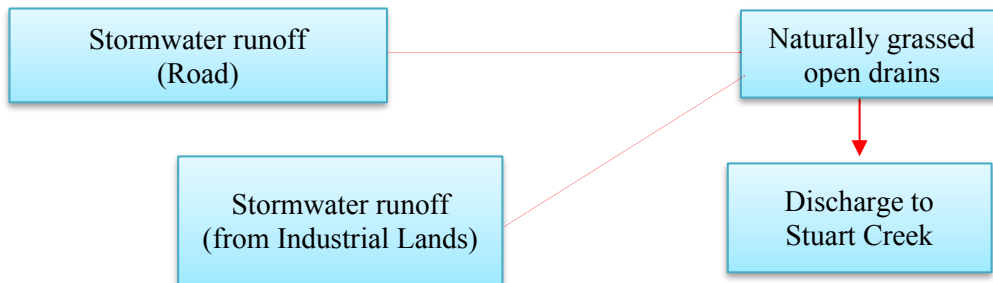
As a direct result, a review of the previous stormwater quality modelling with respect to the as built form of the CBIP has found that the existing model is very conservative and does not represent as built form of the CBIP development.





**Figure 6.** Revised modelled drainage plan

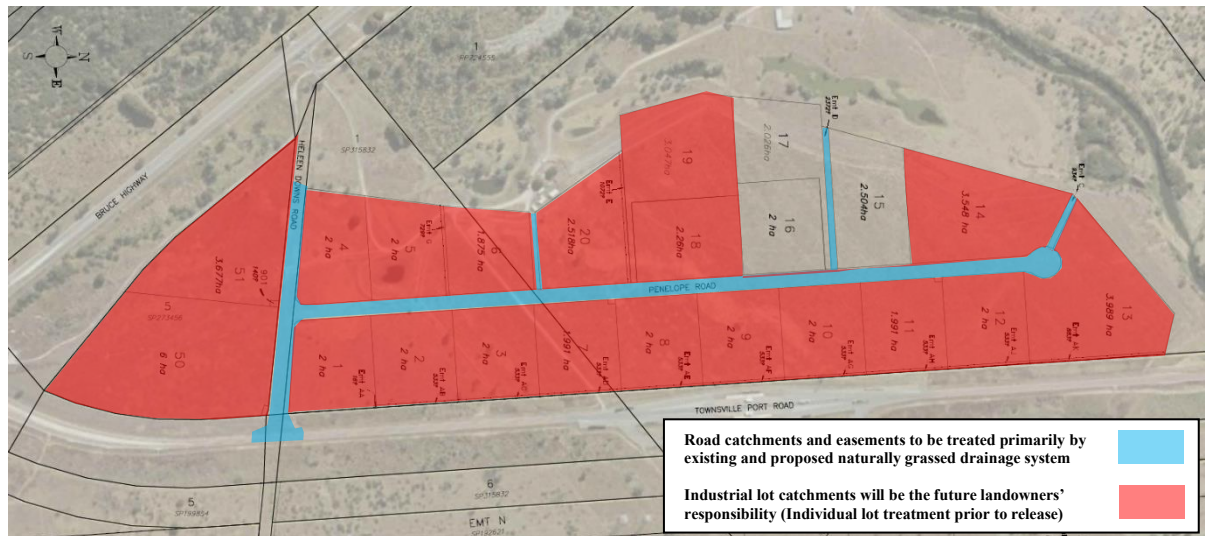
Hence, with regards to Lots 15, 16 and 17, these lands have now be modelled in accordance with below:



**Figure 7.** CBIP Lots 15, 16 and 17 stormwater treatment train

With respect to the subject site, it is noted that the fraction impervious for the proposed layout has been maintained at 90%, to accommodate any future development of the subject site.

Therefore the proposed stormwater treatment area of the CBIP Western Precinct is shown in **Figure 8**



**Figure 8.** Revised Stormwater Treatment Catchments

The updated MUSIC Modelling Diagram is Shown in **Figure 9**.



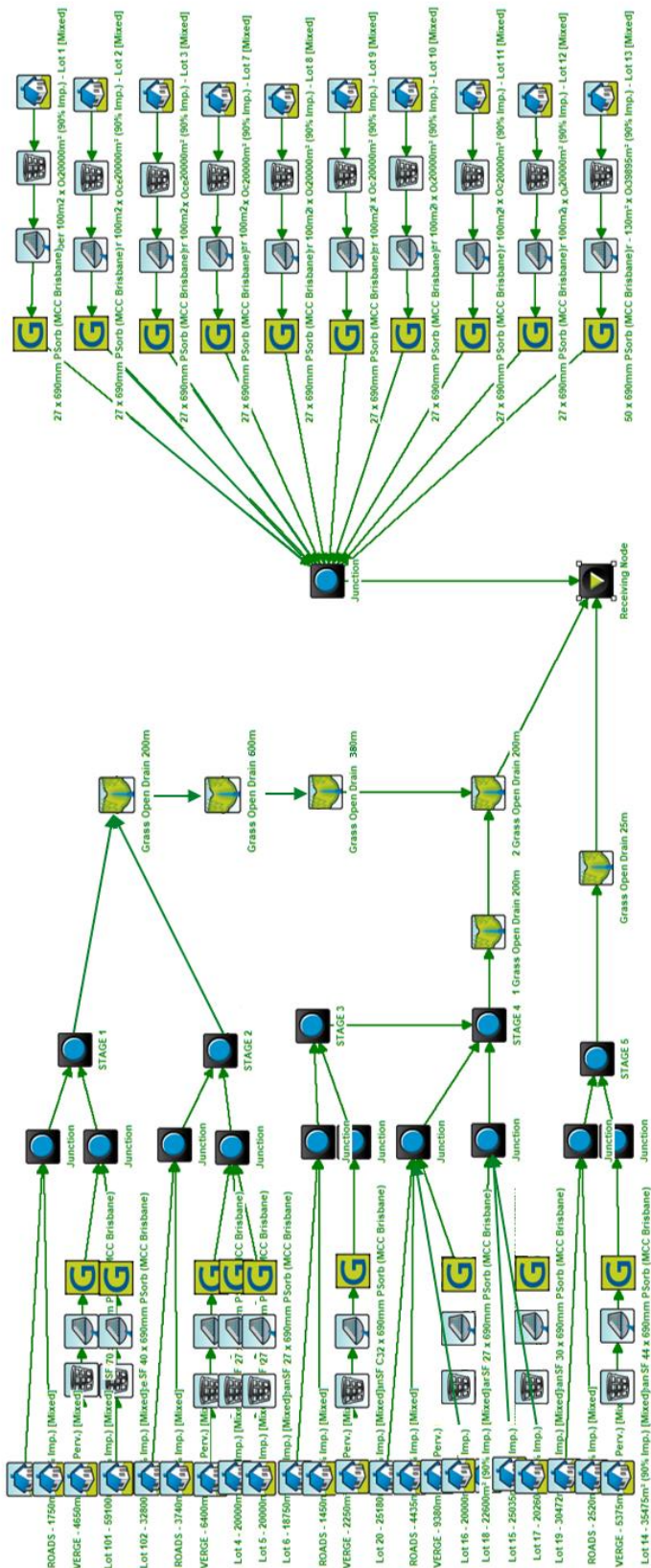


Figure 9. Modified MUSIC Modelling Diagram

## 5.0 STORMWATER QUALITY ASSESSMENT

### 5.1 POLLUTANTS OF CONCERN

The key pollutants generated by an urban industrial development during the operational (post-development) phase are listed in Urban Stormwater Quality Planning Guidelines 2010 by the Department of Environment and Resource Management (DERM) which generally included the following:

- Sediment
- Nutrients
- Oxygen-demanding substances
- pH (acidity)
- Micro-organisms
- Toxic organics
- Metals
- Gross pollutants (litter and debris)
- Oils and surfactants
- Increased water temperature

Considering that the proposed development involves transportation facilities, the general key pollutants of concern in runoff generated from this type of development include:

- Sediment
- Nutrients
- Gross pollutants
- Oils and surfactants

### 5.2 WATER QUALITY OBJECTIVES (WQO)

Townsville City Council (TCC) set the following design objectives for stormwater treatments set out by for Industrial Developments:

- ≥80% reduction in total suspended solids load
- ≥ 65% reduction in total phosphorus load
- ≥ 40% reduction on total nitrogen load
- ≥ 90% reduction in gross pollutant load.

The above design objectives are in accordance with *TCC City Plan – Schedule SC6.4.3.9.2, Section 2: Design Objectives for Stormwater Management*.



The rainfall, runoff and pollutant parameters adopted within the MUSIC Modell are detailed in **Tables 2, 3 and 4**.

**Table 2: Rainfall Parameters**

Input Parameter	Data Used in Modelling
Rainfall station	032040 TOWNSVILLE AERO
Time step	6 minutes
Modelling period	1970 – 1975
Mean annual rainfall (mm)	1152mm
Evapotranspiration	1734mm
Rainfall runoff parameters	Industrial (90% Impervious)
Pollutant export parameters	Industrial

**Table 3: Runoff Parameters**

Input Parameter	Data Used in Modelling
Land use	Industrial
Rainfall threshold (mm)	1.0
Soil storage capacity (mm)	18
Initial storage (% capacity)	10
Field capacity (mm)	80
Infiltration capacity coefficient (a)	243
Infiltration capacity coefficient (b)	0.6
Initial depth (mm)	50
Daily recharge rate (%)	0
Daily baseflow rate (%)	31
Daily deep seepage rate (%)	0

**Table 4: Pollutant Export Parameters for Industrial – Roads/Pavement**

Industrial	Total Suspended Solids (log mg/L)		Total Phosphorous (log mg/L)		Total Nitrogen (log mg/L)	
	Mean	Std Dev.	Mean	Std Dev.	Mean	Std Dev.
Baseflow parameters	0.78	0.45	-1.11	0.48	0.14	0.20
Stormwater parameters	2.43	0.44	-0.30	0.36	0.25	0.32

The MUSIC pollutant load results for the development sites are summarised in **Table 5**.

**Table 5: MUSIC Modelling Results**

Parameters	TCC Target Reduction Criteria	MUSIC Results	Objective Achieved?
TSS	80%	89.29	Yes
TP	65%	65.29	Yes
TN	40%	41.7	Yes
GP	90%	100	Yes

Based on the MUSIC Modelling Results summarised in **Table 5**, the anticipated load-based pollutant outcomes for the western precinct including modifications to Lots 15, 16 and 17 on SP724555 as a completed development are better those identified in **Section 5.2** of this report and thus, still meets the overall design objectives. As such, the stormwater leaving the completed development will not exceed allowable pollutant load levels prior discharging into Stuart Creek.



### 5.3 STORMWATER QUALITY OPERATIONS AND MAINTENANCE

The general water quality operations and maintenance of the site shall include but not limited to the following:

- No maintenance of any plant or equipment or refuelling equipment is to occur within 50m of an existing waterway;
- Waste materials are not to be dumped into any receiving waters or waterways;
- Observed litter or other materials surrounding waterways shall be removed from the water as soon as practicable;
- Plant refuelling or vehicle washing, or maintenance shall only take place where spillages will not discharge to waters or stormwater drains;
- All spillages shall be cleaned up as soon as practicable. Hosing down or releasing waste to stormwater drains or receiving waters will not be permitted;
- All turf strips and concrete drains shall be maintained at regular intervals or after significant rain events to ensure their function (i.e. removal of silt and debris);
- Any fuels, herbicides, oils, paints or chemicals shall not be stored in a manner that spillages may enter waters or be subject to stormwater runoff. All fuels, herbicides, oils, paints and other chemicals must be stored within a bunded area which will contain the volume of materials stored; and

## 6.0 CONCLUSION

The objective of this report is to assess the best practice stormwater quality management measures across the development site and the entire Western Precinct. Please note the subject site has been modelled as 90% impervious, to accommodate any future development of the subject site.

This report has reviewed the pollutant parameters of the subject site and investigated the impact of the proposed Western Precinct development on downstream properties and receiving waters. Based on the assessment, the WQO's specified for TSS, TN, TP, GP can be achieved with the existing and proposed naturally grassed open drains.