



MPN
CONSULTING

Stormwater Management Plan

Tangaratta Feed Mill

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1 > Executive Summary

This report has been commissioned by Tangaratta Stockfeeds Pty Limited for the Environmental Impact Statement, to be lodged as part of the Development Application, for the proposed Tangaratta Feed Mill at 771 Wallamore Road, Wallamore.

Revision B of this report has been updated to reflect the revised site layout and to address the Tamworth Regional Council and State Departments Request for Further Information (RFI) dated November 2024.

additional information has been provided on the following to address the RFI items:

- Additional information provided in the report regarding catchment delineation, imperviousness, and changes in catchments' areas, also all the modelling results including hydrologic calculation and results provided as an appendix.
- An ultimate scenario has been added to the model and report to reflect the climate change condition.
- Additional data provided on the detention basin outlet and the discharge has been modelled for up to 1 in 500 yr flow to provide assurance on detention size and volume.
- Sub-Catchments delineation and modelling have been revised to reflect the new layout of the industrial site.
- Revision C of this report addresses some minor changes to the layout from the previous revision B.

This report addresses the following Engineering aspects of the proposed development:

- Topography
- Flooding
- Stormwater quality management
- Stormwater quantity management
- Erosion and sediment control.



2 > Purpose

This Stormwater Management Plan has been prepared to support the Environmental Impact Statement, to be lodged as part of the Development Application for the proposed Tangaratta Feed Mill.

3 > Introduction

3.1 Project Description

The current proposal includes the construction of a new poultry feed mill to the south of the existing feed mill, along with new car parking, loading docks, access roads, drainage swales, and a detention basin.

The proposed development is depicted on the architectural plans prepared by LGPM, attached in Appendix A, with excerpt below.

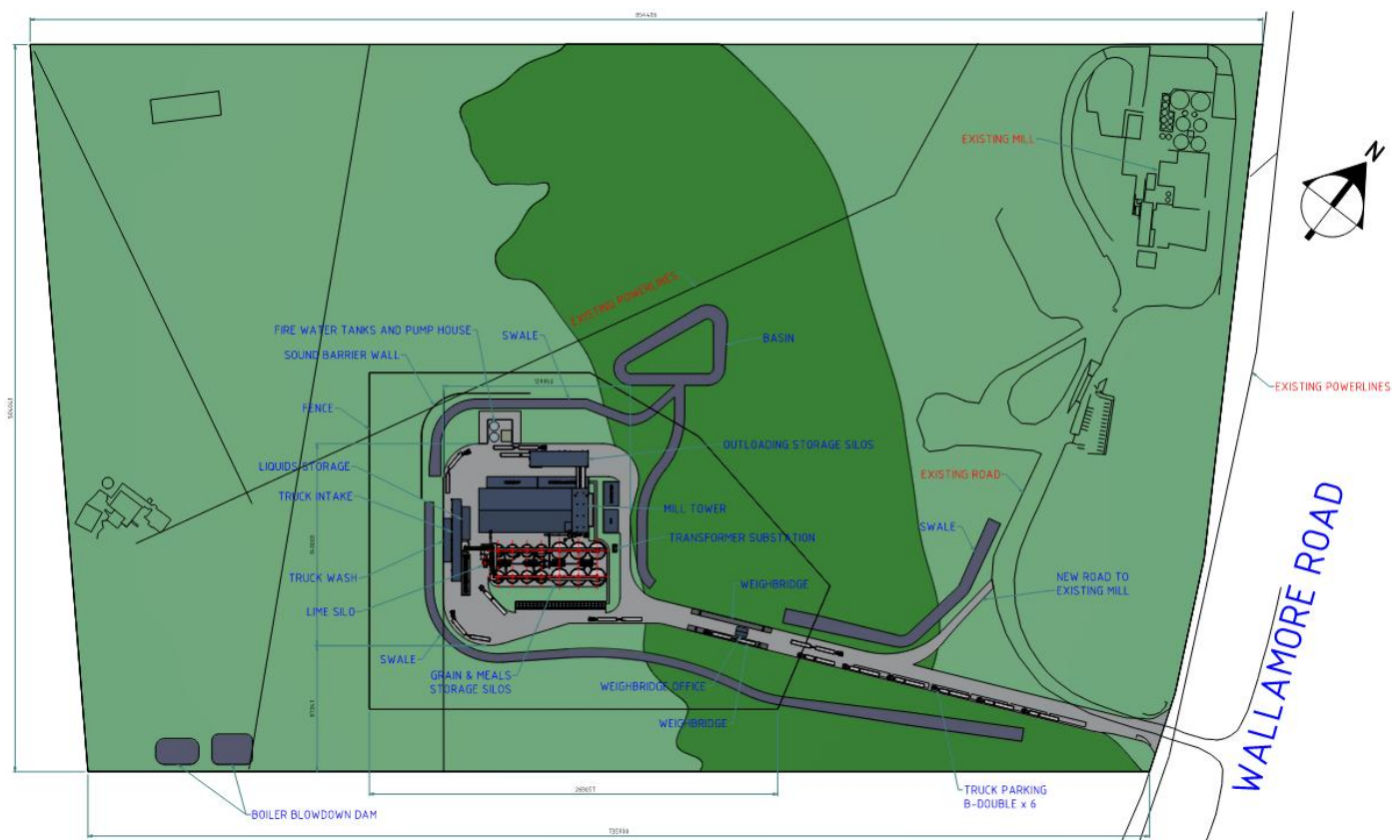


Figure 1 - Proposed Development



4 > Site Characteristics

4.1 Site Location

The site is located at 771 Wallamore Road, Wallamore on 40.62ha of rural land, formally described as Lot 4 on DP 578865.

The site is bounded by Wallamore Road to the East, Tangaratta Creek to the West and rural farmland to the North and South.



Figure 2 – Site Location



4.3 Topography and Existing Site Drainage

The site currently contains the current Tangaratta Stockfeeds mill, which will be expanded with the addition of the proposed new feed mill. The site is largely cleared and has been recently revegetated with native plants. There is an existing detention basin which was constructed to treat and detain the stormwater runoff from the existing development.

The site generally falls from the southern boundary to the north towards Wallamore Road, where there are a series of cut off drains directing stormwater flow to the western dam and the road table drains.

No external catchments appear to flow through the site, as the southern neighbour cuts off their overland flow with bunds and swales and directs it along the boundary toward Wallamore Road.

5 > Site Data

Site data has been obtained from the following sources of information:

- As constructed plans
- New South Wales Environmental Protection Authority (EPA)
- Tamworth Regional Council
- Satellite imagery
- Relevant reports
- Discussions with relevant authorities
- DBYD
- Survey plans.



6 > Stormwater

6.1 Flooding

Current flood mapping in the area indicates the site is not subject to flooding from any sources.

6.2 Site Based Stormwater Management Plan

The aim of the Stormwater Management Plan outlined below is to:

- Prevent or minimise adverse social or environmental impacts from stormwater runoff originating from the proposed development.
- Achieve acceptable levels of stormwater runoff quality and quantity.

The Stormwater Management Plan aims to identify Stormwater Quantity and Quality Best Management Practice for the site and demonstrate that water quantity and quality impacts will be minimised in receiving water.

The Stormwater Management Plan outlines the site in two sections, the operational phase and the construction phase. The operational phase addresses treatment of contaminated runoff from the developed site by natural methods before discharging into receiving waters, whilst the construction phase of the Stormwater Management Plan addresses erosion and sediment control to prevent contamination of water sources by stormwater runoff during construction of the site.

6.3 Operational Phase

6.3.1 Existing Site Drainage and Lawful Point of Discharge

Under existing conditions, stormwater runoff within the existing development site drains as overland flow through a series of grass swale bunds, generally falling north towards Wallamore Road. A portion of the site is conveyed west towards an existing dam on site, which will be retained. Refer to section 6.3.2 for a breakdown of catchments and their respective discharge points.

The lawful point of discharge will remain as per existing conditions, mimicking each catchment's overland flow path. Apart from the portion of site draining towards the western dam (Catchment 1), the rest of the site's developed catchments will be conveyed and eventuate onto Wallamore Road, of which contains a railway corridor. Given the site's proximity to the railway corridor, any increase of stormwater runoff has the potential to adversely impact the safety, structural integrity, and operation of a railway.



6.3.2 Catchment Breakdown

The site has been split into three main catchments which are described below and depicted in Figure 3.

1. Contains sub-catchment C – an existing upstream catchment that has been cut and redirected West toward the existing dam,
2. Contains sub-catchment A, B & D – a catchment running North-West through the main site, sheet flowing toward the Northwest boundary. This catchment sheet flows to the northern boundary, where it is conveyed into a cut off drain, eventually discharging from site onto Wallamore Road stormwater infrastructure.
3. Contains sub-catchment E & F – a catchment discharging toward Wallamore Road, East of the site.

The overall catchments and their respective sub-catchments have been depicted in Table 1.

Catchment	Sub-Catchments	Discharge Location	Downstream Impact Location
1	C	Swale	Existing dam on property Western boundary
2	A, B & D	Sheet Flow	Sheet flows to Northern boundary, cut off drain to culvert in northern corner (Wallamore Road) of property
3	E & F	Culvert	Swale to Wallamore Road boundary

Table 1 – Catchments Discharge Points

The Country Regional Network (CRN) railway line runs along the western side of Wallamore Road. Catchment discharge points 2 & 3 all eventually contribute to the overland flow impacting the railway corridor.

Catchments	1		2*		3			
Sub-Catchment	C		E		F			
	Existing	Developed	Existing	Developed	Existing	Developed	Existing	Developed
Area (Ha)	1.907	1.386	5.845	6.538	1.645	0.0821	1.593	2.42
Fraction Impervious (%)	0%	0%	5%	*	5%	5%	5%	20%
Time of Concentration (mins)	Pervious	30	30	27	*	25	25	25
	Impervious	-	-	30	*	25	7	25

Table 2 – Existing and developed catchment hydrological parameters.

*Refer to Table 3 for breakdown.

The catchment locations and extents are shown on MPN Plans 9883-SKC.01, attached in Appendix B, with excerpt in Figure 3. Refer to Appendix D for DRAINS model comprehensive results of each catchment.



Existing catchment 2 has been broken into three sub-catchments for development. These include:

1. Sub-catchment A – Feeding mill area, roof, hardstand, and landscape
2. Sub-catchment B – The basin area itself, along with surrounding downstream sheet flow area
3. Sub-catchment D – Upstream area from site that is being conveyed under the road through a proposed culvert, into a swale which bypasses the basin to its east.

Catchments	2		
Developed Sub-Catchment	02-A (SITE)	02-B (BASIN)	02-D (BYPASS)
Area (Ha)	2.622	0.381	3.527
Fraction Impervious (%)	70	0	15
Time of Concentration (mins)	Pervious	20	10
	Impervious	7	30

Table 3 - Existing and developed catchment hydrological parameters of Catchment 2

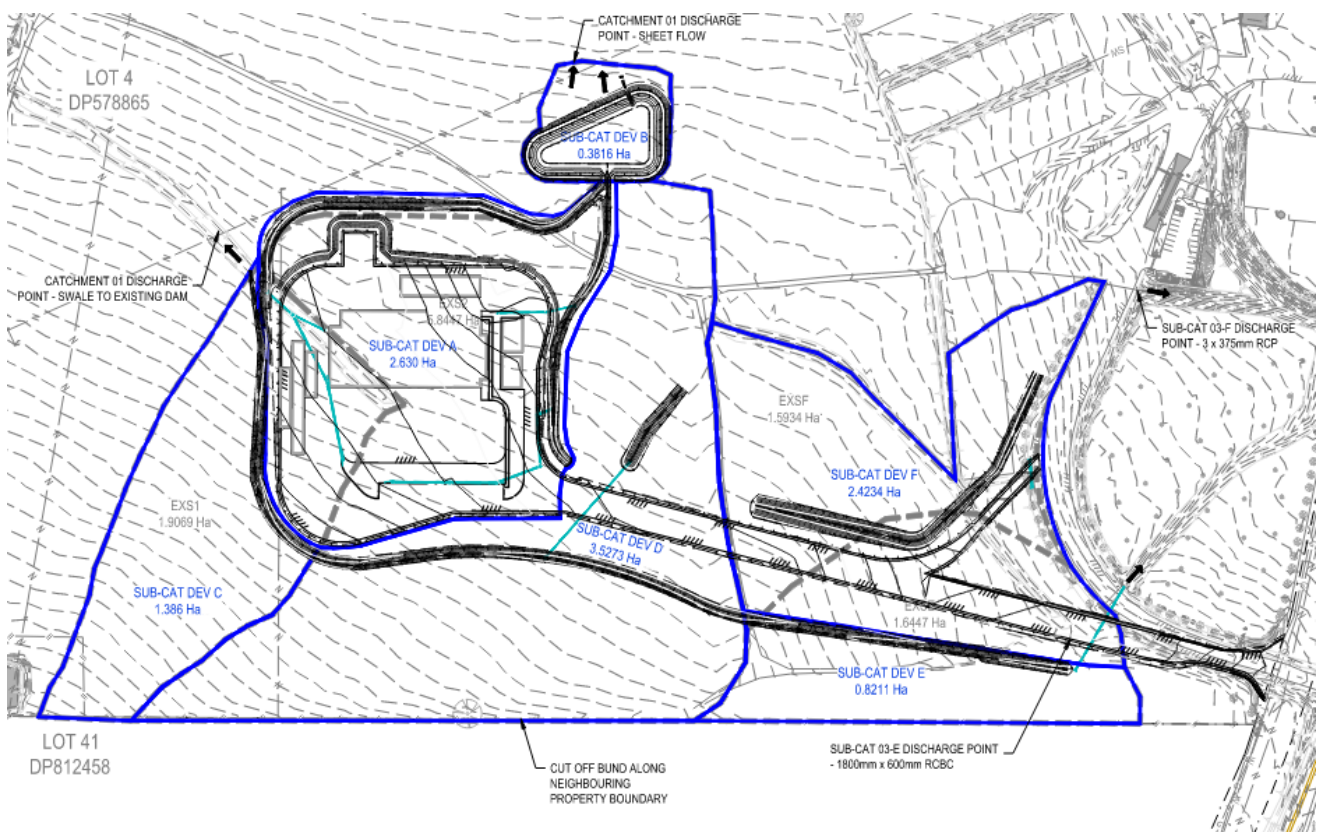


Figure 3 – Proposed Site Catchments Breakdown



6.3.3 Proposed Site Drainage

Stormwater runoff from each of the sub-catchments will be collected and conveyed in a new internal stormwater pit, pipe and/or open channel network. Stormwater runoff from sub-catchments C, D, E and F will be collected in grassed swales prior to discharge toward the site boundaries via overland flow, or to stormwater infrastructure on site.

The sub-catchment running through the proposed site (sub-catchment A) will be discharged to a detention basin (known as sub-catchment B). Stormwater will discharge from the basin as overland sheet flow via a level spreader toward the northern site boundary, mimicking the existing Catchment 02. Litter baskets will also be fitted to the new field inlet pits to capture gross pollutants.

The existing dam constructed as part of the existing development will be retained to service Catchment C (Existing Catchment 1) bypass catchment.

Stormwater from sub-catchments E and F (Catchment 3) will be conveyed through swales to existing culverts under roads. These culverts discharge back into swale before reaching the same point on the Wallamore Road property boundary, forming the discharge point for Catchment 03. Refer to section 6.3.5 Existing Stormwater Infrastructure for a breakdown of the existing stormwater infrastructure being used to convey development flows.

The proposed site stormwater infrastructure is shown on MPN Plans 9883-SKC.02, attached in Appendix B.

6.3.4 Stormwater Quantity Management Strategy

For the management of stormwater quantity for the proposed development, a DRAINS computer model was used to calculate the stormwater runoff quantity for the following case scenarios:

1. Existing case (representing the site and its surrounding catchments in their current state without changes)
2. Developed case (representing a development site area and the impact on the surrounding catchments in their current state)

The model adopted estimated parameters to reflect contributing sub-catchments, open channels and drainage features based available digital information including, LIDAR, survey, reports and drawings. An ILSAX hydrological model is built into the 2023 version of the DRAINS software for processing design rainfall information and generating flows influenced through temporal patterns. Design rainfall information for the site area was downloaded from the Bureau of Meteorology (BOM) data hub and rainfall intensities, depths and temporal patterns were input into the model. No climate change factors were assessed as part of this model.

In order to limit the site stormwater discharge at each of the catchment's respective discharge points, stormwater runoff from sub-catchment A will be detained within a detention basin. The basin will be over-sized to cater for the areas which will bypass detention (sub-catchments D, E, F). The location and configuration of the basin is shown on MPN Plans 9883-SKC.02-03, attached in Appendix B. The properties of the basins are listed in Table 4, 5 and 6.



Property	Detention Basin
Max Detention Volume (Incl. Freeboard)	1,476.17 m ³
Max Water Depth (1% AEP)	790mm
Max Water Depth (10% AEP)	630mm
Base of Basin	374 mAHD
Top of Bund (min)	375 mAHD
Freeboard (1% AEP)	210mm
Outlet V-Notch Arrangement	2.4m Width @ RL 375 IL @ 374m

Table 4 – Detention Basin Properties

The basin downstream from catchment 2-A is shaped to mimic downstream flow arrangements. The weir arrangement in this basin is 2.4m wide (at the top) V-notch outlet, which will allow for a progressively larger discharge of water as the basin becomes deeper. At an AEP 39% storm, the V-notch will discharge. At 1m deep, the bund height will contain stormwater to outlet at the V-notch and level spreader area at all times. Refer to Table 5 for depth to volume relationship, and Table 6 for basin inundation frequency.

Depth from Invert (m)	Basin Elevation (m AHD)	Staged Area (m ²)	Cumulative Volume (m ³)
0	374	1019.1	0
0.13	374.13	1119.62	139.02
0.25	374.25	1232.3	280.13
0.38	374.38	1348.6	447.89
0.5	374.5	1468.3	616.9
0.63	374.63	1591.6	815.8
0.75	374.75	1718.5	1014.4
0.88	374.88	1848.8	1246.28
1	375	1982.7	1476.17

Table 5 – Basin depth-area-volume



AEP (%)	Basin Water Elevation (m AHD)	Basin Water Depth (m)	Freeboard (mm)
39.3	374.51	0.51	490
20	374.58	0.58	420
10	374.65	0.65	350
5	374.71	0.71	290
2	374.77	0.77	230
1	374.82	0.82	180
0.5 (1 in 200 years)	374.87	0.87	130
0.2 (1 in 500 years)	374.94	0.94	60

Table 6 – Detention Basin Inundation levels

Runoff flows for AEPs from 39% to 1% and durations of 5 to 180 mins were calculated to ensure that peak runoff flows from the proposed development would not exceed peak runoff flows from the existing site.

Critical events for the site's catchments are compared in Table 7 and Table 8, and summarised in Table 9 and Table 10. As per Table 2, catchment 1 has reduced in size, whilst maintaining impervious values. The catchment is also bypassing treatment and not impacting site (or Wallamore Road). Peak flows have been reduced and are therefore not summarised in following tables. For a summary of hydrology calculation of catchment 1 and all other catchments on site, refer to Appendix D.

AEP (%)	Pre-Development Peak Flow (m ³ /sec)	Post-Development Peak Flow (m ³ /sec)	Post-Development Mitigated Peak Flow (m ³ /sec)
39	0.280	0.585	0.217
20	0.493	0.796	0.363
10	0.738	1.008	0.524
5	0.945	1.228	0.708
2	1.270	1.567	0.972
1	1.524	1.809	1.18

Table 7 – Existing and Proposed Peak Flows from Catchment 2 (Sub-Catchments A, B, D) (DRAINS ILSAX)



AEP (%)	Pre-Development Peak Flow (m ³ /sec)	Post-Development Peak Flow (m ³ /sec)
39	0.130	0.136
20	0.229	0.209
10	0.326	0.278
5	0.433	0.353
2	0.584	0.483
1	0.700	0.572

Table 8 – Existing and Proposed Peak Flows of bypass Catchment 3 (Sub-Catchments E & F) (DRAINS ILSAX)

AEP Event (%)	Pre-Development Discharge (m ³ /sec)	Post-Development Mitigated Discharge (m ³ /sec)	Net Discharge Change (m ³ /sec)
39	0.410	0.367	-0.043
20	0.722	0.594	-0.128
10	1.064	0.831	-0.233
5	1.378	1.085	-0.293
2	1.854	1.479	-0.375
1	2.224	1.775	-0.449

Table 9 – Existing and Proposed Peak Flows combined catchments 2 & 3 (DRAINS ILSAX)

Table 9 above compares all catchments that are impacted by the change in site imperviousness, where sub-catchment A has been over-detained to offset the increase from the bypassing sub-catchment D.

As all catchments in Table 7 and Table 8 contribute to flows discharging towards Wallamore Road and the railway corridor, these have been combined in Table 9 to depict **no worsening of total flows into Wallamore Road**. A summarised breakdown of the 1% AEP catchment discharge points is shown in Table 10.



Catchments	Pre-Development Discharge (m3/sec)	Post-Development Discharge (m3/sec)	Net Discharge Change (m3/sec)
02	1.177	0.951	-0.226
03	0.7	0.572	-0.128
Sub E	0.356	0.018	-0.338
Sub F	0.344	0.554	0.21
Total			-0.482

Table 10 – 1% AEP discharge Points contributing to Wallamore Road Railway Corridor

As depicted in Figure 3e 3, in the developed condition, the road layout and swales alter the existing catchments E and F boundaries. As a result, in the developed condition catchment plan, the area of Catchment E decreases, while the area of Catchment F increases. Effectively, the portion deducted from Catchment E has been added to Catchment F. This explains the changes in flow values between the pre- and post-development table. The detention basin has been able to reduce flows from the larger catchment 2, and therefore, the net discharge from the development onto the railway network and Wallamore Road has **reduced by 505L/s in a 1% AEP storm event.**

6.3.5 Existing Stormwater Infrastructure

The table below summarises each catchment's point of discharge, and its capacity. Refer to the survey by Bath Stewart Associates in Appendix C for a detailed breakdown of existing infrastructure.

Catchment	Sub-Catchments	Discharge Point	Capacity
1	C	Swale Dam	Reduced flows = adequate capacity
2	A, B & D	Inlet Pit 450 RCP	Reduced flows = adequate capacity
3	E	1800 x 600 RCBC	Reduced flows = adequate capacity RCP to be extended
	F	3 x 375 RCP	Capacity @ 2.7% Fall = 0.86m ³ /s 1% Post Dev Discharge = 0.418m ³ /s Adequate capacity

Table 11 – Existing Stormwater Infrastructure Capacity Summary



6.3.6 Ultimate Case Scenario Sensitivity Analysis

To further define the impacts of increases in stormwater discharge to the railway corridor, a sensitivity analysis was undertaken on the developed DRAINS model. This scenario was setup to represent a 'Future' or likely ultimate development case scenario.

The Australian Rainfall & Runoff guidebook has recently been updated to include a more in-depth breakdown of applying climate change factors. Some of these changes include a move from uniform to variable rainfall adjustments. This reflects evidence that the duration of a storm matters for estimating how temperature affects rainfall, with shorter duration storms being significantly more affected.

For this scenario, the rainfall dataset from the ARR Data Hub has been downloaded, with climate change factors included. Watercom has provided a tool in response to the ARR updates. This tool allows for the modification of DRAINS dataset to factor in a range of climate change factors. The factors range from 'low emission, near term horizon' modifications, all the way up to 'very high fossil fuel emission, long term horizon'.

This ARR and BOM data used for the DRAINS model has been modified to include the following;

1. Shared Socioeconomic Pathway (SSP) Scenario
SSP1-2.6 (low emissions/warming) has been chosen as a 'sustainable' scenario
2. Target Horizon Year
2040 has been chosen as a 'near to midpoint' term horizon scenario

A summary of changed data has been summarised below.

Burst Duration	Duration in Mins	Depth Factor	α %/°C	Burst Duration
≤1 hour	60	1.21	15.8%	21%
1.5 Hours	90	1.19	14.3%	19%
2 Hours	120	1.17	12.8%	17%
3 Hours	180	1.16	12.1%	16%

Table 12 – Climate change modified rainfall data with a 1.3°C warming

The below table represents the combined catchment 2 and 3, discharging to Wallamore Road and the railway corridor under an ultimate scenario.



AEP (%)	Pre-Development Discharge (m3/sec)	Post-Development Discharge (m3/sec)	Ultimate 2040 Discharge (m3/sec)	Increase in Flow (%)
39	0.347	0.721	0.969	34%
20	0.611	1.005	1.291	28%
10	0.896	1.286	1.678	30%
5	1.160	1.581	2.043	29%
2	1.567	2.050	2.606	27%
1	1.877	2.381	3.002	26%

Table 13 – Existing, Proposed and Ultimate (2040) Peak Flows combined catchments 2 & 3 (DRAINS ILSAX)

6.3.7 Stormwater Quality Management Strategy

In order to reduce overall post-development pollutant loads and concentrations being discharged from the site, treatment solutions have been provided to remove hydrocarbons, suspended solids and nutrients prior to being discharged from site.

6.3.7.1 Potential Pollutants Generated

The pollutants that could be potentially generated as a result of the development use are as follows:

- Litter
- Sediment
- Nutrients (Nitrogen and Phosphorous)
- Hydrocarbons (oils and grease)
- Surfactants
- Pathogens/Faecal Coliforms (bacteria and viruses).

The MUSIC computer modelling program developed by the Co-operative Research Centre for Catchment Hydrology was used to predict the performance of the proposed stormwater treatment train.

At this stage the pollutants modelled in MUSIC are Total Suspended Solids (TSS), Total Phosphorous (TP) and Total Nitrogen (TN).

6.3.7.2 Rainfall

The rainfall data used in the model was based on the Bureau of Meteorology data from rainfall station 55054 Tamworth Airport. The model was run from 16 August 1993 to 31 December 2003. The modelling time step was 6 minutes.



6.3.7.3 Rainfall Runoff Properties

The rainfall runoff properties listed in Table 5 below were adopted for the MUSIC modelling undertaken for the development.

Parameter	Roof	VALUE Road	Open Space
Rainfall Threshold (mm)	0.3	1.5	1.0
Soil Storage Capacity (mm)	100	100	100
Initial Storage (% of capacity)	25	25	25
Field Capacity (mm)	87	87	87
Infiltration Capacity Co-efficient a	250	250	250
Infiltration Capacity Co-efficient b	1.3	1.3	1.3
Initial Depth (mm)	10	10	10
Daily Recharge Rate (%)	60	60	60
Daily Base Flow Rate (%)	45	45	45
Deep Seepage (%)	0	0	0

Table 14 – MUSIC Rainfall Runoff Parameters

6.3.7.4 Pollutant Export Parameters

The adopted Pollutant Export Parameters for each source node type are presented in Table 6 below.

Runoff pollutant concentrations are generated stochastically from the defined mean and standard deviation.

		Log 10 TSS (mg/L)		Log 10 TN (mg/l)		Log 10 TP (mg/L)	
		Base Flow	Storm Flow	Base Flow	Storm Flow	Base Flow	Storm Flow
Roof	Mean	0	1.30	0	-0.89	0	0.30
	Std. Dev.	0	0.32	0	0.25	0	0.19
Roads	Mean	0	2.43	0	-0.30	0	0.34
	Std. Dev.	0	0.32	0	0.25	0	0.19
Landscape	Mean	1.20	3.00	-0.85	-0.30	0.11	0.34
	Std. Dev.	0.17	0.32	0.19	0.25	0.12	0.19
Bypass Areas	Mean	1.15	1.95	-1.22	-0.66	-0.05	0.3
	Std. Dev.	0.17	0.32	0.19	0.25	0.12	0.19

Table 15 – Pollutant Export Parameters (Reference : Tables 5-6 & 5-7 NSW MUSIC Modelling Guideline)



6.3.7.5 Water Quality Objectives

In the absence of specific Water Quality Objectives from Tamworth Regional Council, the industry standard pollutant reduction targets listed in Table 7 below have been adopted.

WATER QUALITY OBJECTIVES

Total Suspended Solids (TSS) % Reduction	Total Nitrogen (TN) % Reduction	Total Phosphorous (TP) % Reduction	Litter/ Gross Pollutants % Reduction	Oils/ Grease
85	45	65	90	No visible films or odours

Table 16 – Water Quality Objectives

6.3.7.6 Treatment Plan

In order to achieve the pollutant load reduction targets for the development, it is proposed to use mechanical and natural treatment methods to treat the runoff prior to discharge from the site.

Stormwater runoff from Catchment A will be treated by GPTs and/or buffer strips prior to discharging via swales to the detention basin.

Stormwater runoff from Catchments B, D & E will be treated by buffer strips and swales.

The treatment plan for the site is depicted on MPN Plans 9883-SKC.01, attached in Appendix B, with MUSIC excerpt shown below.

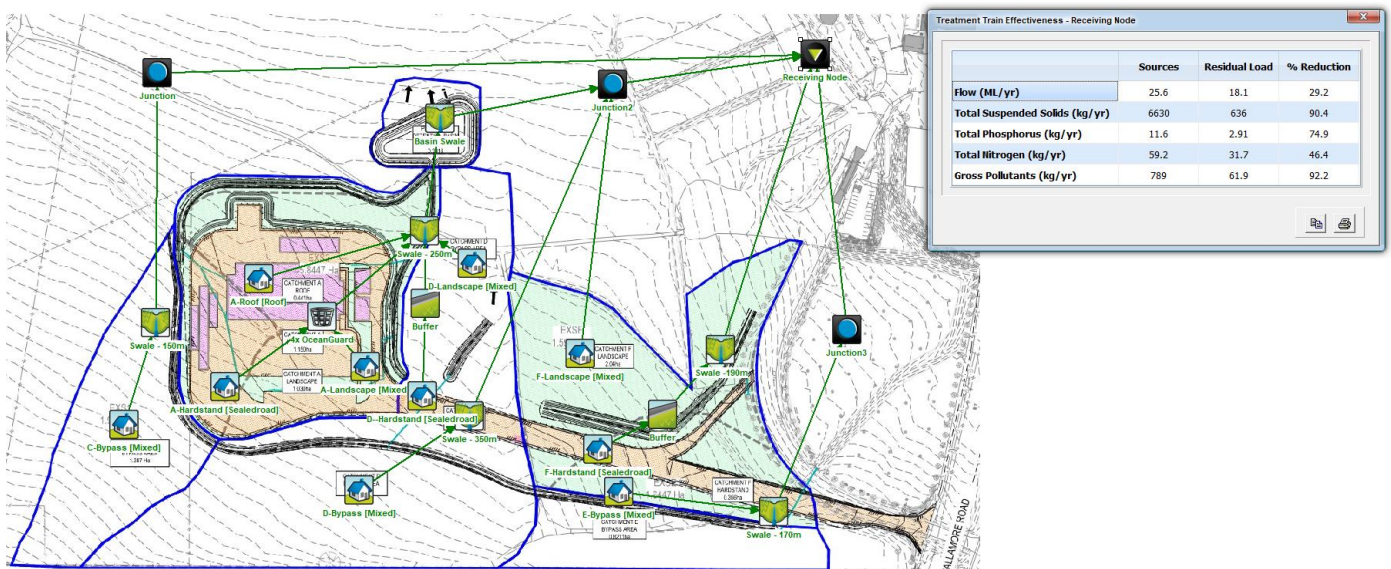


Figure 4 - Treatment Plan

6.3.7.7 MUSIC Results

The resulting percentage-based load reductions at the site outlet is shown in Table 8 below, together with the Water Quality Objectives for the receiving waters.

	Sources	Residual Load	%Reduction	Target %
Total Suspended Solids (kg/yr)	6630	636	90.4	85
Total Phosphorous (kg/yr)	11.6	2.91	74.9	65
Total Nitrogen (kg/yr)	59.2	31.7	46.4	45
Gross Pollutants (kg/yr)	789	61.9	92.2	90

Table 17 - Percentage Based Load Reduction Results

6.3.7.8 POD Pollutant Reduction

6.3.7.8.1 Litter

Rubbish bins will be located within the development buildings and car parks for use by staff and visitors. As a result of this and with the installation of the GPTs and swales, levels of litter exiting the site via stormwater are expected to be negligible.

6.3.7.8.2 Sediment

The TSS outflow is identified in Table 8 above. As can be seen the pollutant load reduction achieves the Water Quality Objectives. The TSS level is therefore considered acceptable.



6.3.7.8.3 Nitrogen and Phosphorous

The TN and TP loads are identified in the above Table 8. As can be seen the TN and TP loads leaving the site achieve the Water Quality Objectives. Significant reductions in Nitrogen and Phosphorous have been achieved. The Nitrogen and Phosphorous residual loads are therefore considered acceptable.

6.3.7.8.4 Hydrocarbons

Hydrocarbons will be digested and processed by soil microorganisms within the swales and attachment to vegetation where biological breakdown of the hydrocarbons can occur. Hydrocarbons will also be captured within the GPTs.

6.3.7.8.5 Surfactants

If car or truck washing occurs on site it will be within a bunded area where surfactants will be captured and treated prior to discharging into the stormwater network.

6.3.7.8.6 Heavy Metals

Heavy metals in stormwater runoff generally become attached to fine sediment. The swales will remove the majority of this fine sediment. The removal of the fine sediment should effectively remove most of the heavy metals in the runoff.

6.3.7.8.7 Pathogen/Faecal Coliforms

Domestic animals within the development will be under the control of their owners at all times and the owners will be expected to clean up after them.

6.3.7.9 Proposed Stormwater Quality Treatment Devices

6.3.7.9.1 Locations

The location of the proposed stormwater quality treatment devices is shown on MPN Plans 9883-SKC.01, attached in Appendix 2.

6.3.7.9.2 Device and Size

The device type and sizes are shown on MPN Plan 9883-SKC.01, attached in Appendix B.

6.3.8 Construction Phase (Sediment and Erosion Control)

6.3.8.1 Intent of Erosion and Sediment Control Management Plan

To prevent stormwater contamination (of watercourses) and the release of contaminated stormwater and wastewater by ensuring compliance with the Protection of the Environment Operations Act 1997.



6.3.8.2 Implementation Strategy

Establish control measures and best practice approaches to prevent stormwater contamination and minimise the risk and adverse effects of erosion and sedimentation. All Erosion and Sediment Control measures must be designed, constructed and maintained in a manner that is commensurate with the site's erosion risk.

6.3.8.3 Erosion and Sediment Control Measures

- Obtain a license or approval to operate activities that are classed as environmentally relevant activities (i.e. they have the potential to cause environmental harm).
- Implement and maintain appropriate control measures to prevent sediment laden wastewater and other potential pollutants such as oil, paint and wet concrete from entering the stormwater system via stormwater drains and gullies. The control measures which must be considered to be adopted are:
 - Limitation of site access during construction to minimise disruption to traffic. Install a temporary construction entry/exit sediment trap at all site accesses to minimise mud and sediment from the site being tracked onto public road, particularly during wet weather or when the site is muddy.
 - Install and maintain appropriate sediment fences around construction areas.
 - Divert clean stormwater runoff, using catch drains, around construction areas to existing or new stormwater drainage system.
 - Install sandbags and other pollution containment devices around stormwater drains and any other locations where required to prevent sediment entering the trunk stormwater system.
 - Cover open earth/soil areas progressively (with concrete slabs and pavements or mulch) to minimise areas of bare earth/soil.
 - Any stockpiles of excavated soil and demolition/construction waste must be located where risk of erosion and sedimentation is minimal and must be protected from wind and water erosion.
 - Implement and maintain appropriate control measures such as catch drains and sediment fences to prevent ponding of stormwater or discharge of stormwater from the site to adjacent properties.
 - Provision of spill/pollution control equipment that is readily accessible to clean up spills and leaks.
 - Ensure spill/pollution control measures are available and maintained in working condition.
 - Sediment contained by the sediment control devices such as sandbags, sediment fences and containment bunds must be frequently removed and placed in a controlled area.
 - Implement an inspection schedule for any spill or leaks of any potential polluting areas or activities.



6.3.8.4 Erosion and Sediment Control Management Goals

- Licenses, approvals, permits, and inspection reports are in order.
- Sediment or pollution control devices such as sandbags, sediment fences and containment bunds are in place, maintained and effective.
- Spill/pollution control equipment is readily accessible at designated locations.
- No accumulated sediment is contained by the sediment control devices such as hay bales, sediment fences and containment bunds.
- No sediment exceeding a depth of 300mm in the pollution control devices (e.g. silt trap).

6.3.8.5 Erosion and Sediment Control Implementation Program

- Licenses, permits or approvals for each environmentally relevant activity must be obtained prior to the commencement of the particular activity.
- Appropriate control measures such as sediment fences, temporary construction entry/exit sediment traps, pollution containment devices (e.g. sandbags), stormwater diversion, and administrative controls must be installed and established prior to commencement of the earthworks and construction activities.
- Pollution control devices such as spill control equipment must be inspected on a regular basis (at least weekly).
- Other sediment and pollution control equipment such as containment bunds, hay bales and sediment fences must be inspected on a regular basis (at least daily).
- Inspection for any leaks, spills or potential contaminating activity must be performed on a regular basis (at least daily).
- Remove accumulated sediment or other contaminants from sediment/pollution control devices on a regular basis.
- All erosion and sediment control measures must be inspected within 24 hours of expected rain and within 18 hours of a rainfall event.

6.3.8.6 Responsible Person or Organisation

The contractor shall be responsible for the implementation and maintenance of the Erosion and Sediment Control Measures.

6.3.8.7 Reporting/Review

Records such as licenses, approvals, permits and inspection reports must be reviewed on a regular basis (e.g. at least monthly) to ensure that legal compliance is met, complaints are reviewed and systems are working to prevent contamination.



6.3.8.8 Corrective Actions

- Perform clean-up of any spills immediately.
- Any mud or sediment which is tracked onto public roads is to be immediately removed using dry clean-up methods (i.e. shovel and broom).
- Remove or relocate any stockpiles of waste where there is a reasonable risk of erosion and sedimentation.
- Replace or repair sediment or pollution control devices if they are not maintained in good working condition.



7 > Conclusion

This Stormwater Management Plan demonstrates that under the proposed concept plan, stormwater quality and quantity treatment is achievable to the levels required by Tamworth Regional Council and Industry Best Management Practice.

Stormwater detention for the development will be provided in a detention basin located downstream of the site to suit the site's existing catchments. The detention basin will be over-sized to compensate for the areas of the site which bypass detention, and runoff from the basin will be evenly distributed via a level spreading bund.

Stormwater treatment for the development will be provided by a series of GPT's and swales located throughout the site, along with buffer strips along the internal roads.

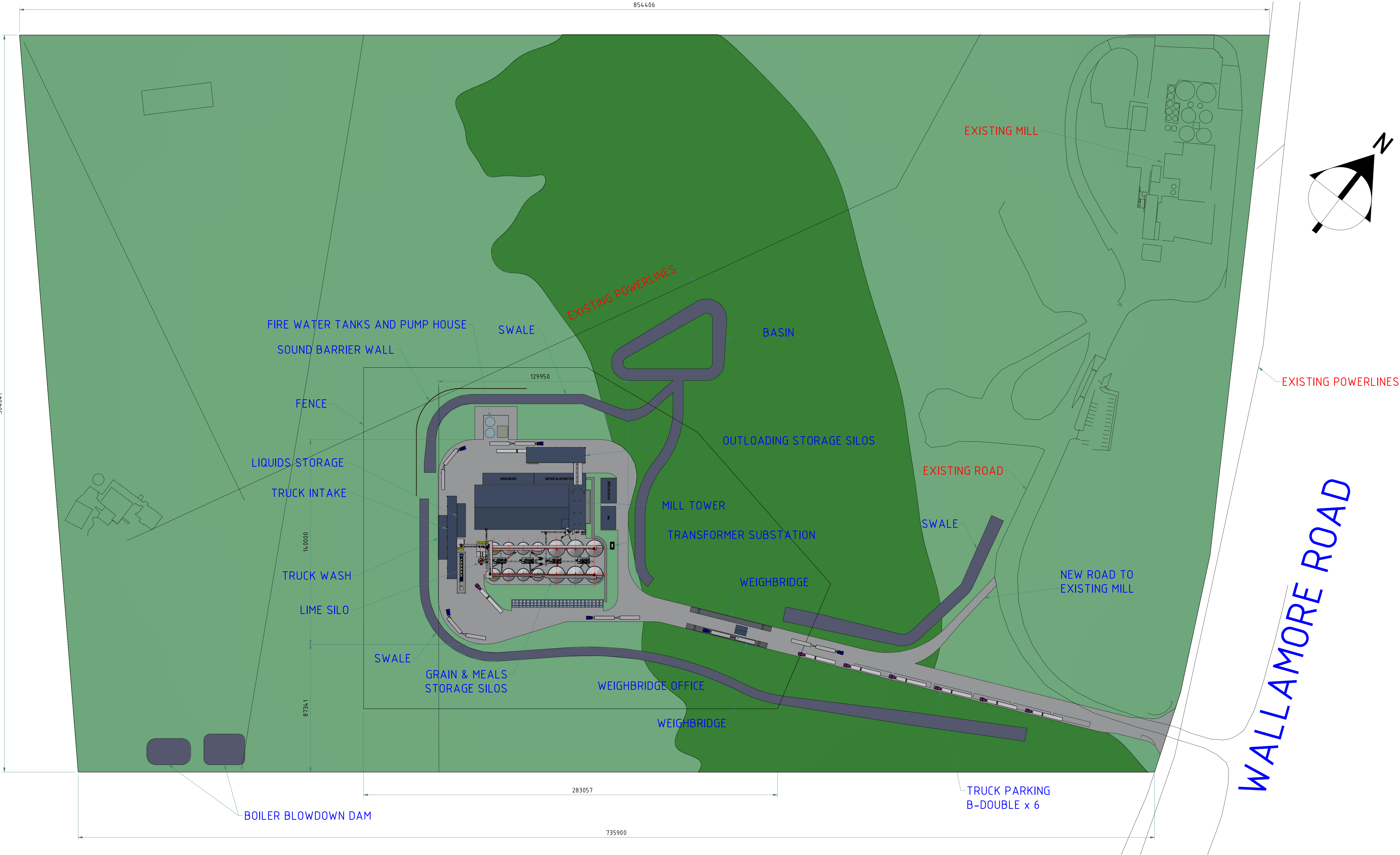
Quality assessment has been undertaken in accordance with WSUD principles and the NSW MUSIC Modelling Guideline (August 2015), which provide the accepted framework for stormwater quality modelling and the application of pollutant reduction targets. The ANZG (2018) water quality guidelines, which suggested for quality objectives, relate to environmental values such as marine and freshwater ecosystems, recreational use, and livestock drinking water. These are ambient water quality criteria for receiving environments, not performance targets for stormwater treatment systems. As such, the ANZG guidelines are not applicable to stormwater quality modelling. The adoption of the MUSIC pollutant reduction targets, consistent with industry practice and the MUSIC Guideline, is therefore considered the appropriate basis for assessing stormwater quality outcomes for this development.

8 > Limitations of Report

MPN have prepared this report for the proposed Tangaratta Feed Mill in accordance with MPN's proposal to Tangaratta Stockfeeds Pty Limited. This report is provided for the exclusive use of Tangaratta Stockfeeds Pty Limited for this specific project and its requirements. It should not be used or relied upon by a third party and MPN accept no responsibility for the use of this report by any party other than Tangaratta Stockfeeds Pty Limited.



Appendix A. Architectural Plans



J	MOVED PUMP HOUSE AND WATER TANKS	16/10/2025
H	WEIGHBRIDGE OFFICE MOVED, FENCE EXPANDED, DRIVEWAY TO OLD SITE ADJUSTED, ADDED FACADE TO PROCESS BUILDING ELEVATORS	3/10/2025
G	SOUND BARRIER SHORTENED	23/09/2025
F	DRAWING UPDATE	15/09/2025
REV	DESCRIPTION	DATE
	REVISION HISTORY	

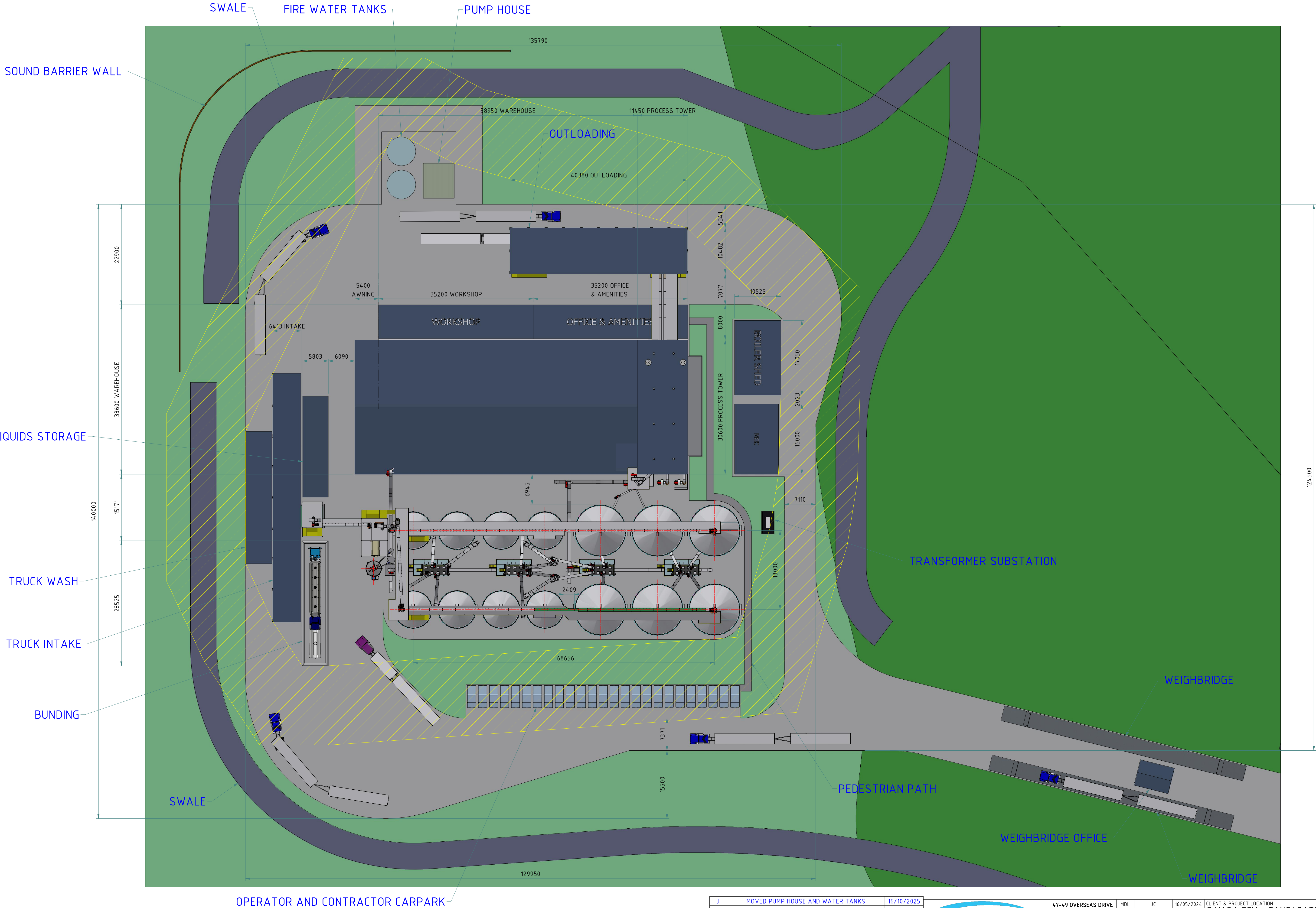


LGPM
PROCESS INNOVATION
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47-49 OVERSEAS DRIVE
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MDL	JC	16/05/2024	CLIENT & PROJECT LOCATION	
DRN	SJG	1/04/2025	BAIADA TFM - TANGARATTA, NSW	
CHK			100TPH FEED MILL PRE ENGINEERING	
UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN mm			GENERAL SITE LAYOUT	
THIRD ANGLE PROJECTION			OVERALL SITE	
A1			DRG No.	2752-0001-002
			REV.	J
			SHT	1 OF 3



J	MOVED PUMP HOUSE AND WATER TANKS	16/10/2025
H	WEIGHBRIDGE OFFICE MOVED, FENCE EXPANDED, DRIVEWAY TO OLD SITE ADJUSTED, ADDED FACADE TO PROCESS BUILDING ELEVATORS	3/10/2025
G	SOUND BARRIER SHORTENED	23/09/2025
F	DRAWING UPDATE	15/09/2025
REV	DESCRIPTION	DATE
	REVISION HISTORY	



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MDL JC 16/05/2024

DRN SJG 1/04/2025

CHK

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN mm

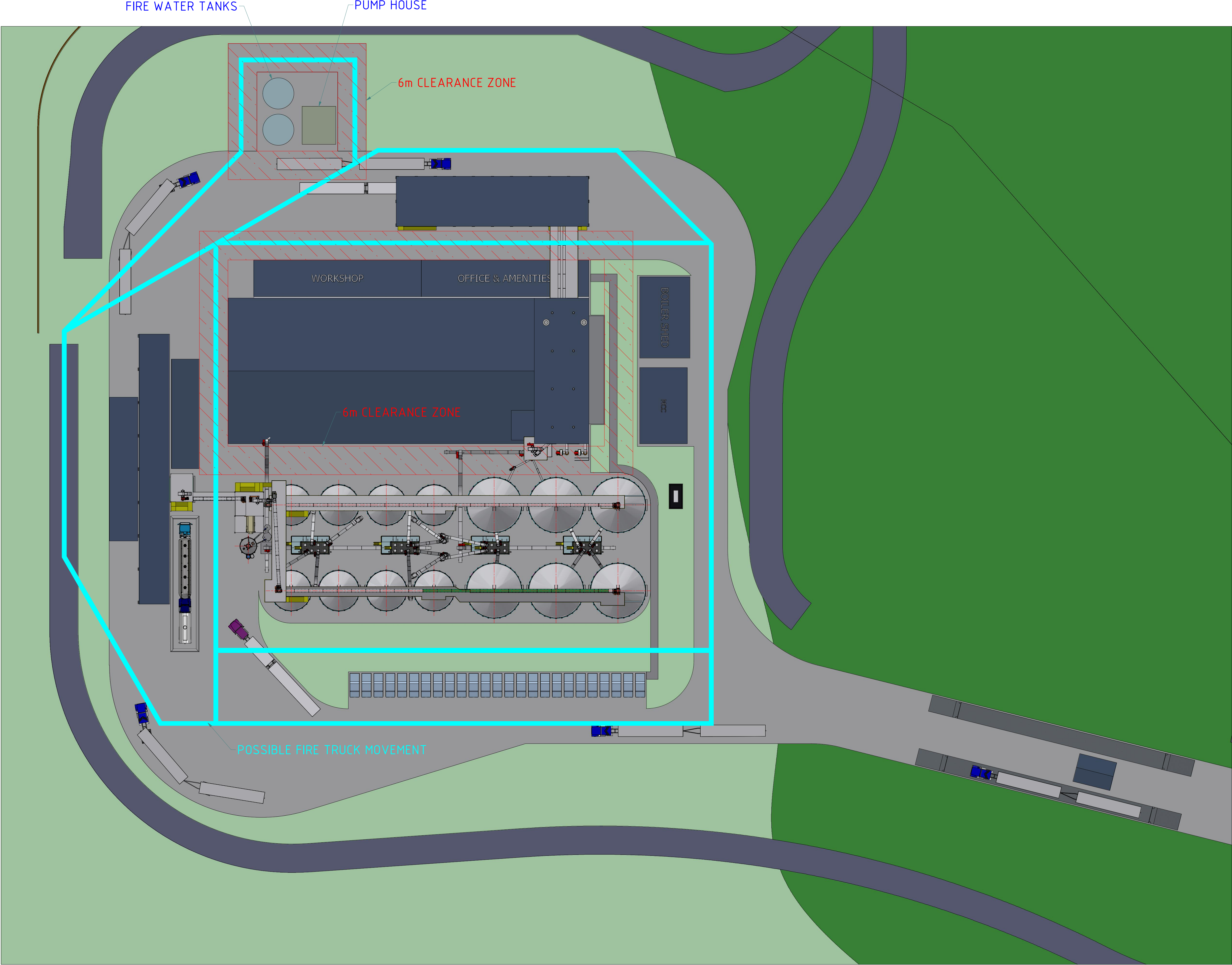
THIRD ANGLE PROJECTION

SCALE 1:400

A1

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CLIENT & PROJECT LOCATION		BAIADA TFM - TANGARATTA, NSW	
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NEW MILL OVERVIEW		DRG No. 2752-0001-002	
REV.	J	SHT	2 OF 3



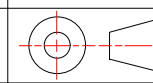
J	MOVED PUMP HOUSE AND WATER TANKS	16/10/2025
H	WEIGHBRIDGE OFFICE MOVED, FENCE EXPANDED, DRIVEWAY TO OLD SITE ADJUSTED, ADDED FACADE TO PROCESS BUILDING ELEVATORS	3/10/2025
G	SOUND BARRIER SHORTENED	23/09/2025
F	DRAWING UPDATE	15/09/2025
REV	DESCRIPTION	DATE
REVISION HISTORY		



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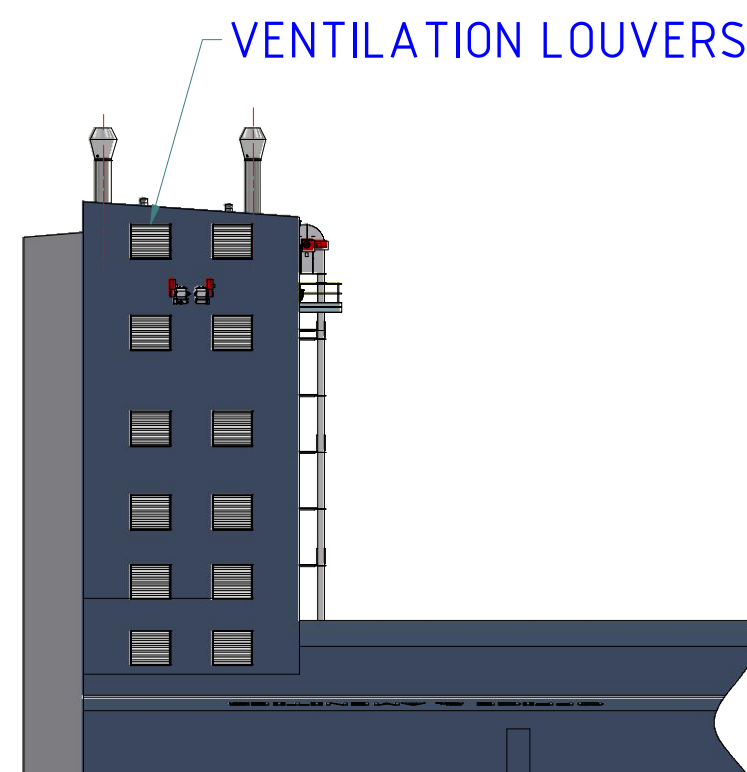
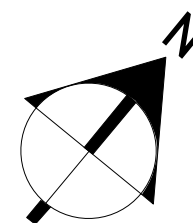
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DRN	SJG	1/04/2025
CHK		
UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN mm		SCALE 1: 400
		THIRD ANGLE PROJECTION

CLIENT & PROJECT LOCATION			BAIADA TFM - TANGARATTA, NSW		
			100TPH FEED MILL PRE ENGINEERING		
			GENERAL SITE LAYOUT		
			CLEARANCE ZONES		
DRG No.	2752-0001-002		REV.	J	SHT 3 OF 3



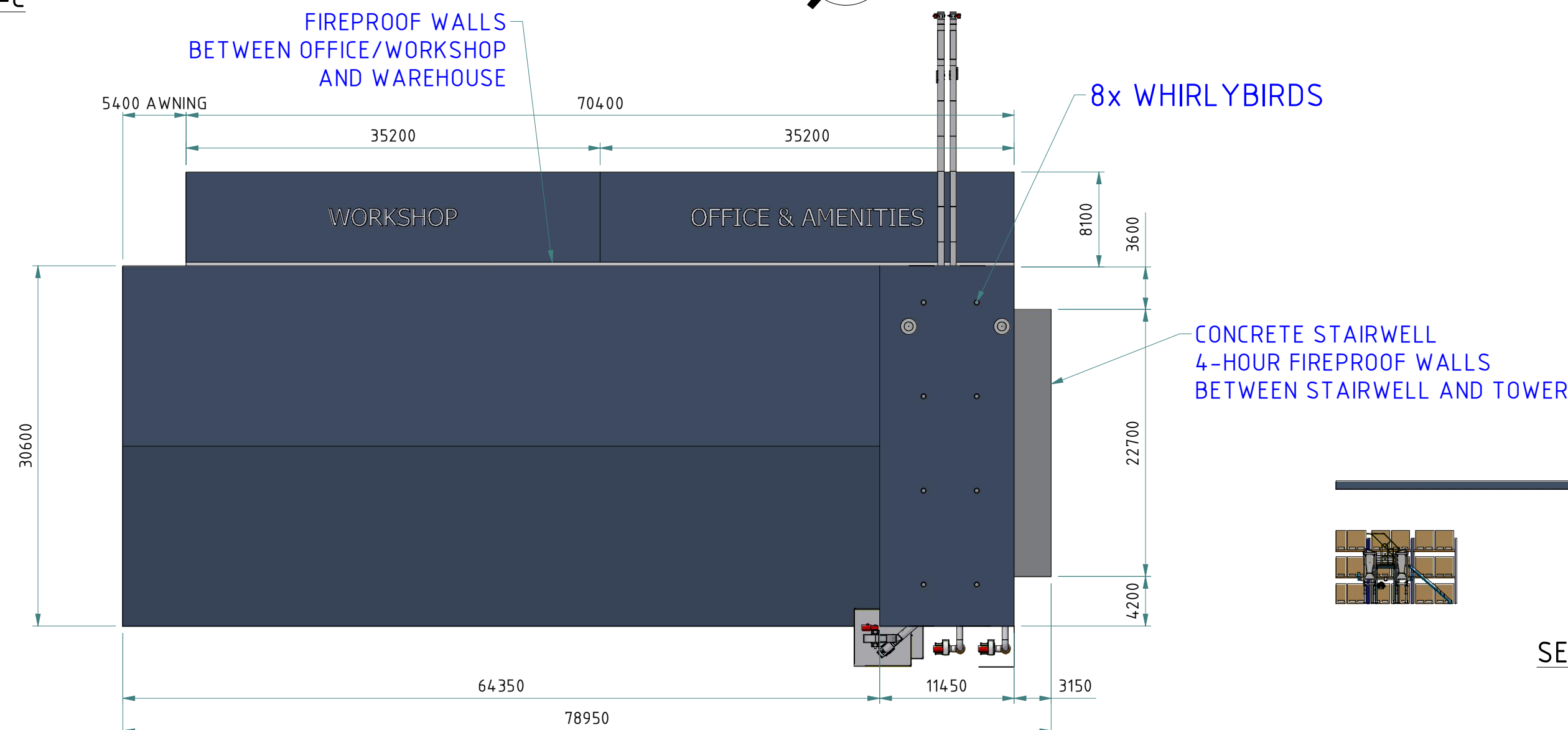
SECTION C-C
1 : 175

INTERNAL CLADDING AND ROLLER DOORS
TO SEPARATE PROCESS TOWER FROM WAREHOUSE



SECTION A-A
NORTH-WEST ELEVATION
1 : 400

VENTILATION LOUVERS



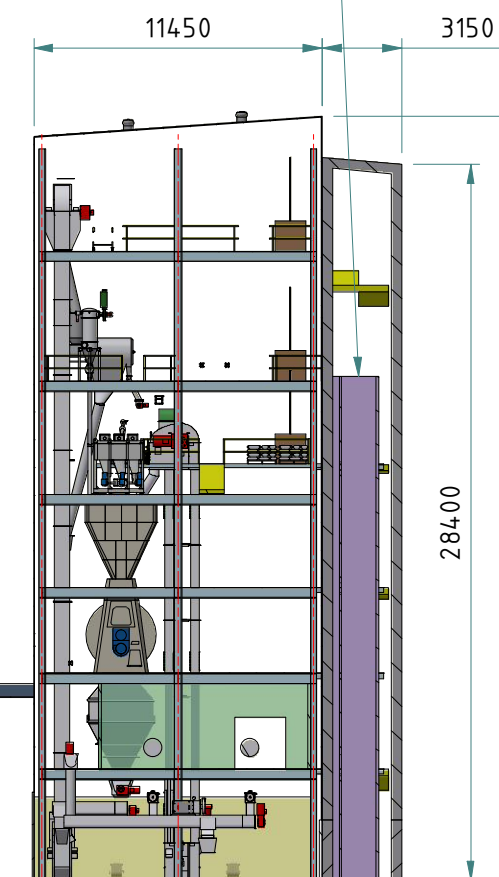
PROCESS BUILDING PLAN VIEW
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FIREPROOF WALLS
BETWEEN OFFICE/WORKSHOP
AND WAREHOUSE

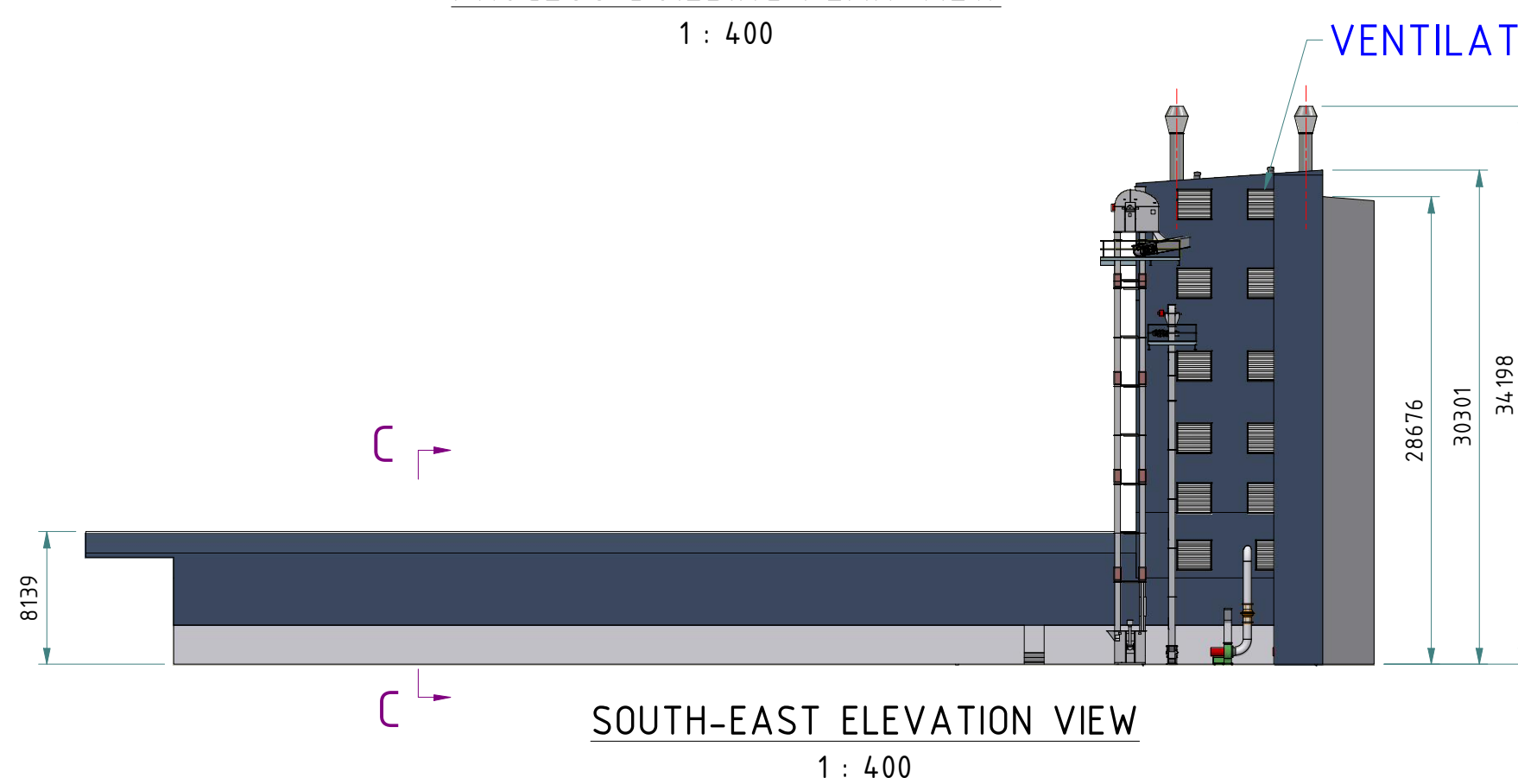
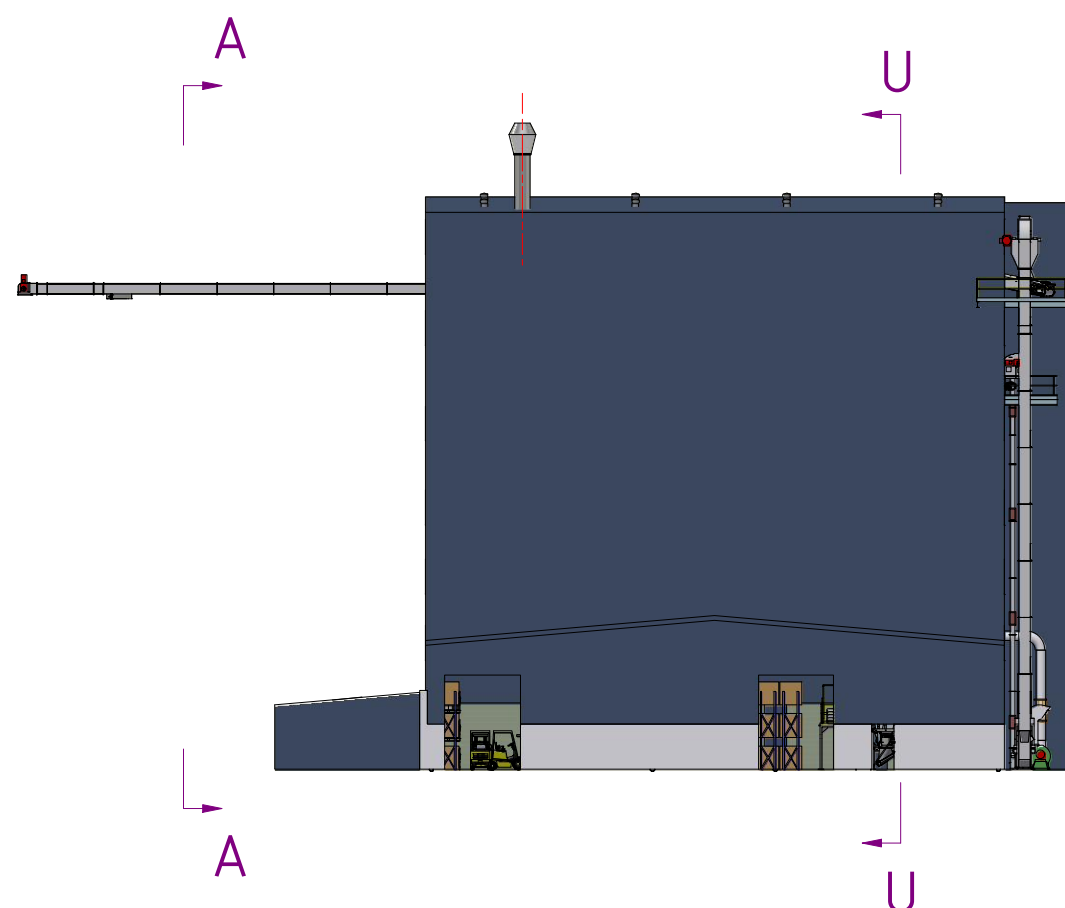
8x WHIRLYBIRDS

CONCRETE STAIRWELL
4-HOUR FIREPROOF WALLS
BETWEEN STAIRWELL AND TOWER

GOODS LIFT

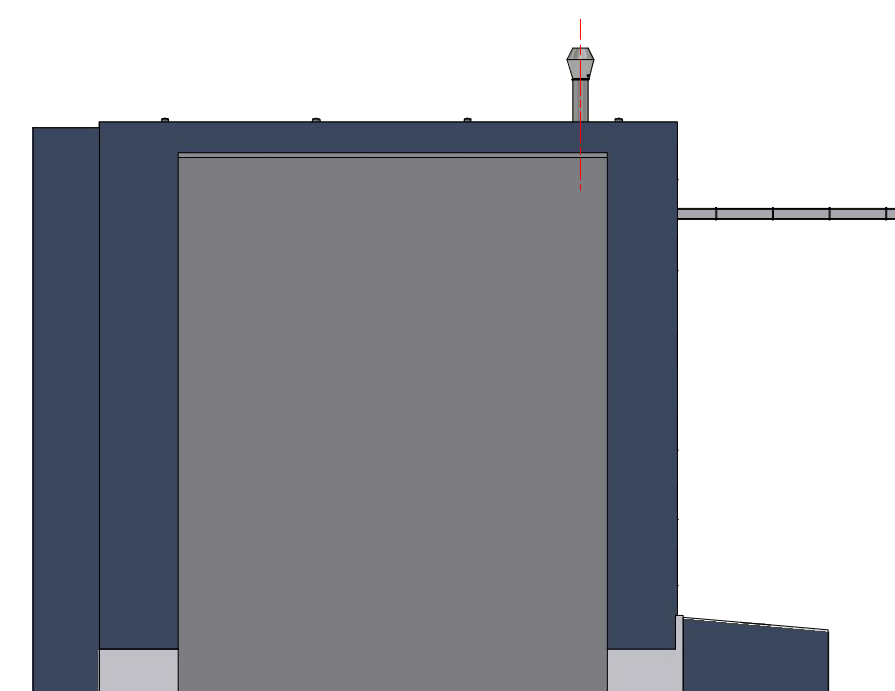


SECTION U-U
1 : 300



SOUTH-EAST ELEVATION VIEW
1 : 400

VENTILATION LOUVERS



REFERENCE DRAWINGS

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INLOADING LAYOUT 2752-0001-007

OUTLOADING LAYOUT 2752-0001-008

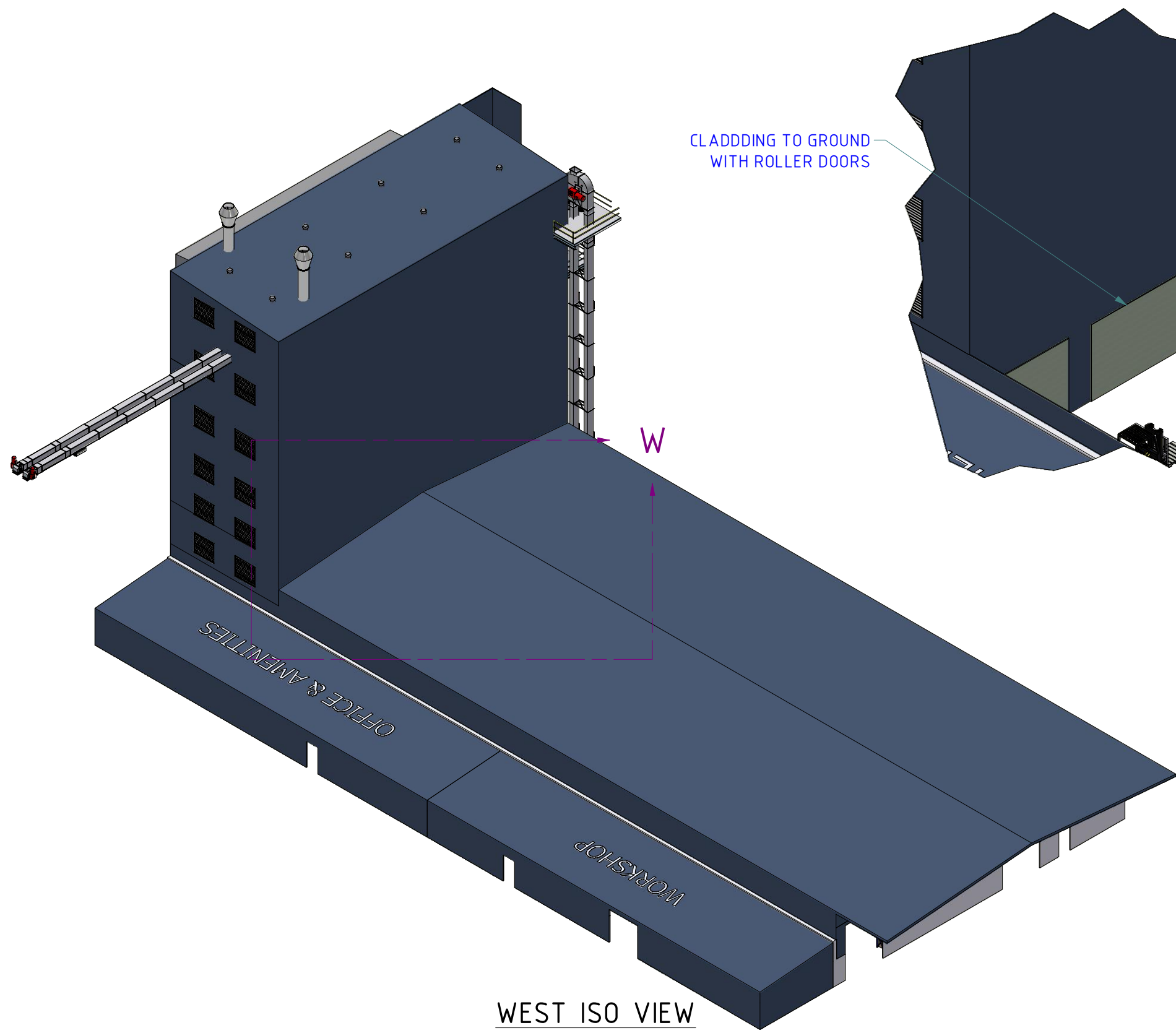
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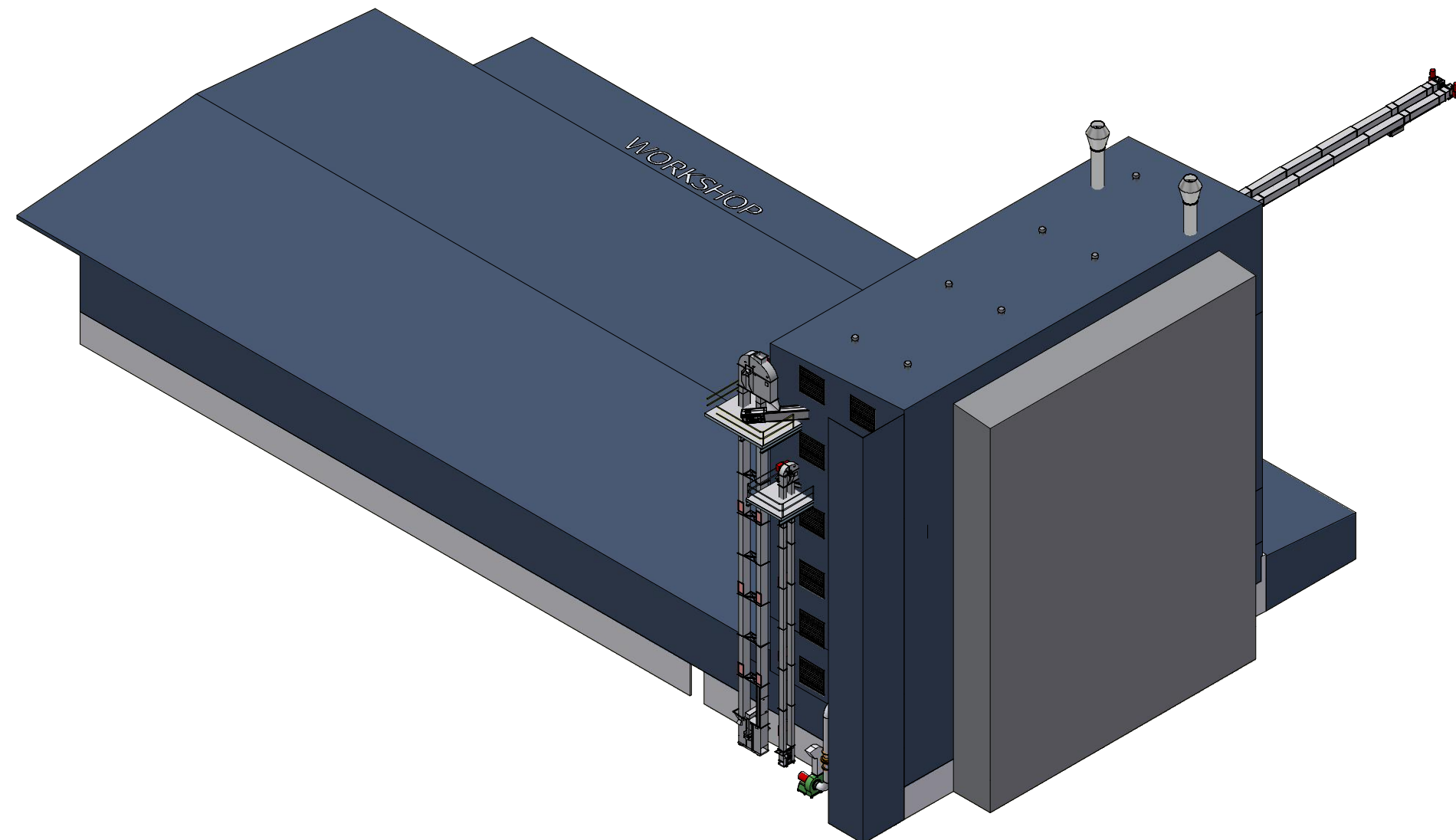
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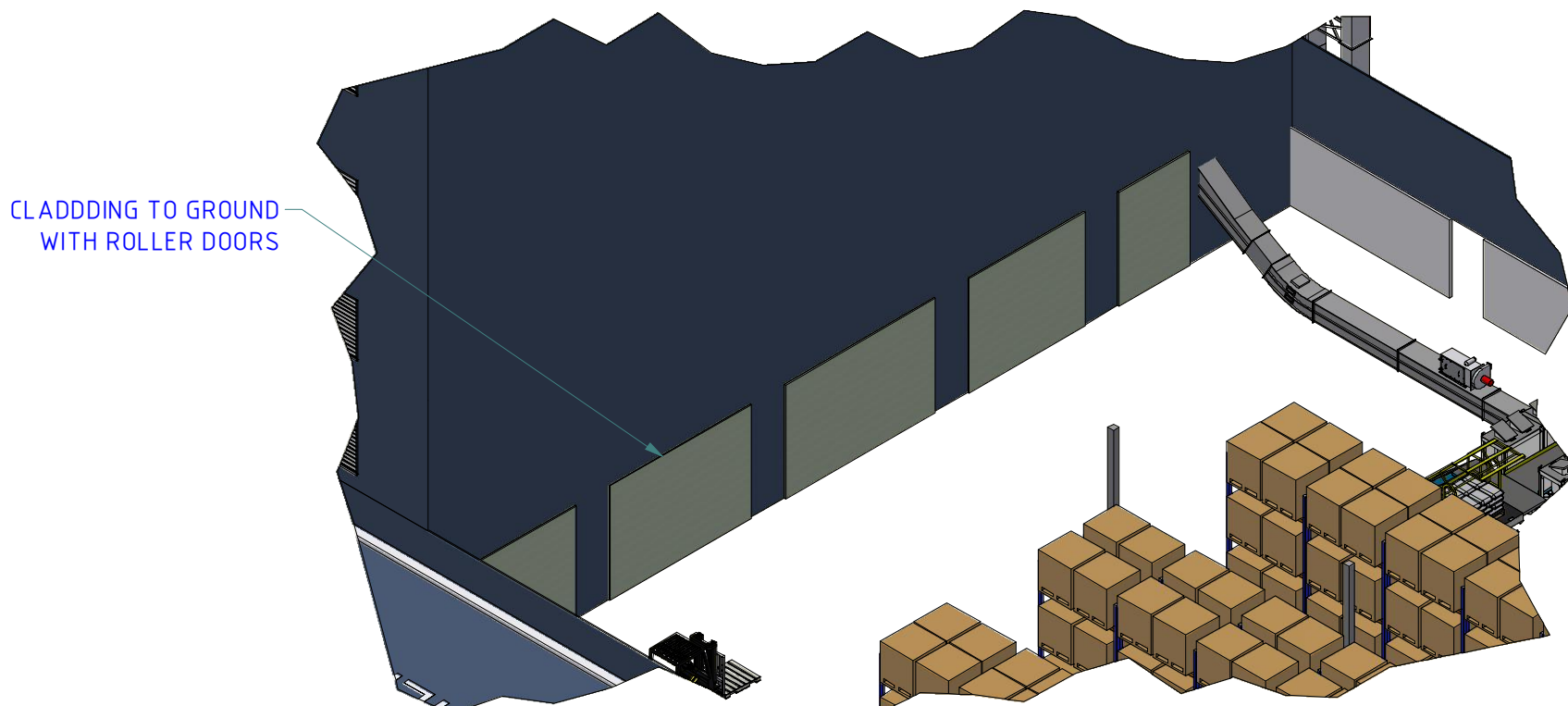
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UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN mm			PROCESS BUILDING LAYOUT			
THIRD ANGLE PROJECTION			MAIN VIEWS			
A2			P&ID ITEM No.	DRG No.	REV.	SHT
				2752-0001-006	D	1 OF 8



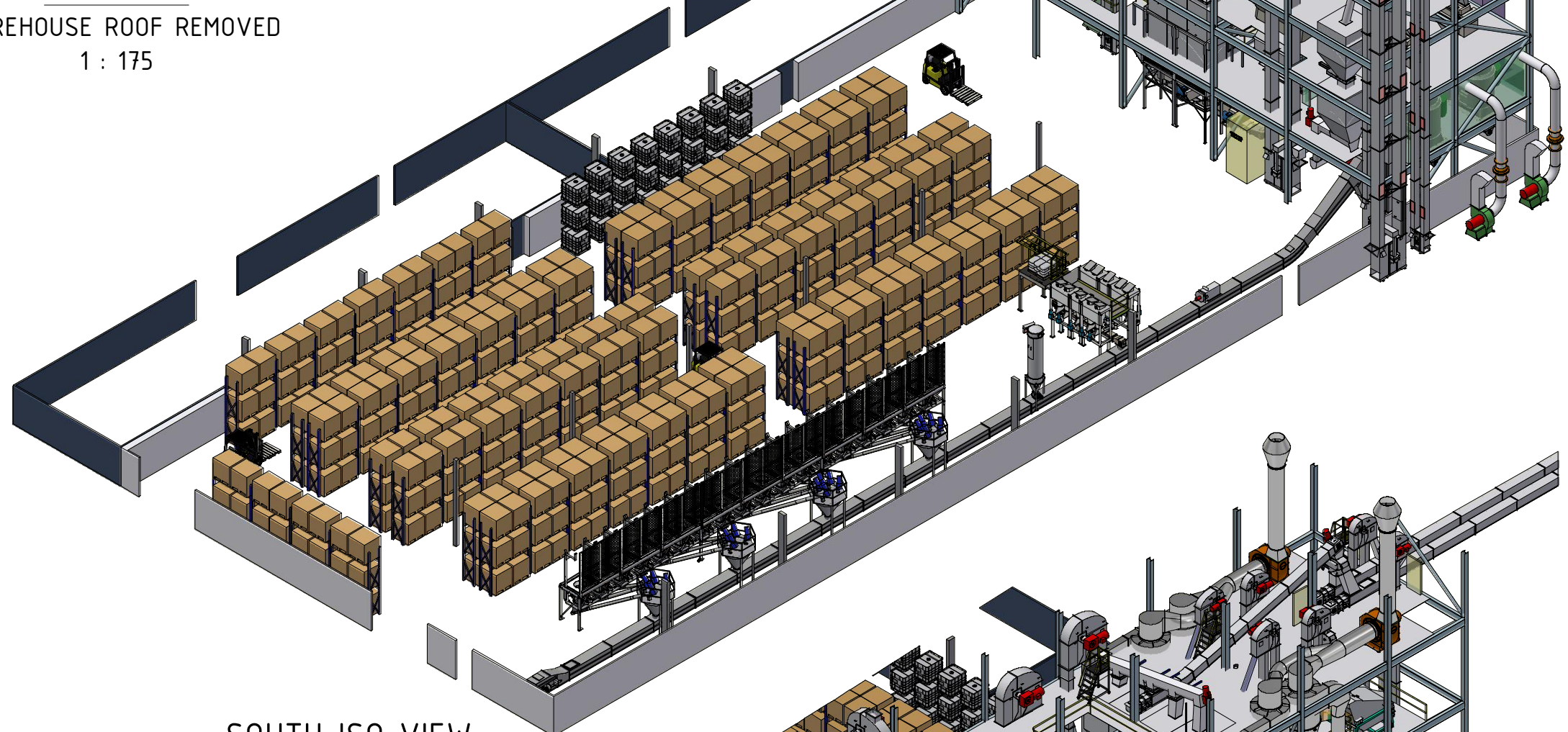
WEST ISO VIEW
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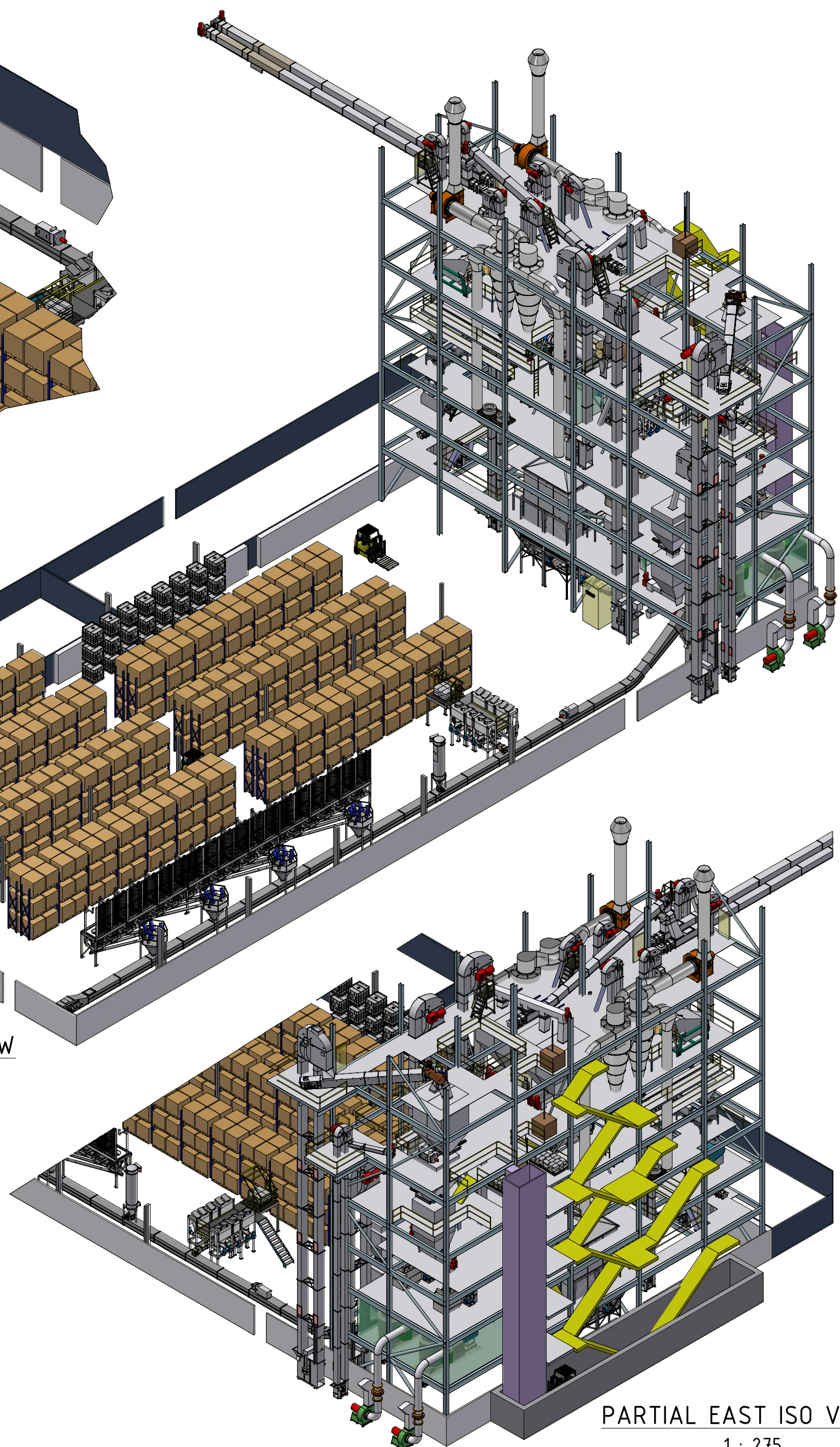
EAST ISO VIEW
1 : 350



DETAIL W
WAREHOUSE ROOF REMOVED
1 : 175



SOUTH ISO VIEW
1 : 275



PARTIAL EAST ISO VIEW 2
1 : 275

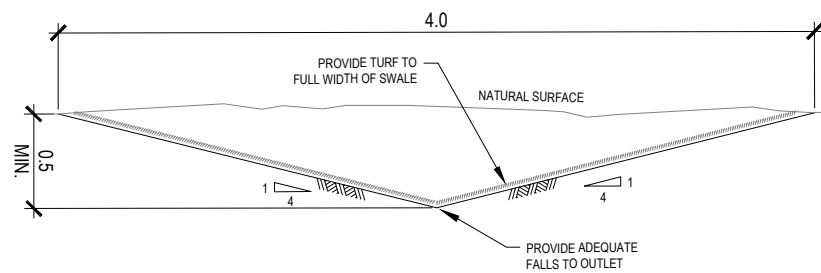


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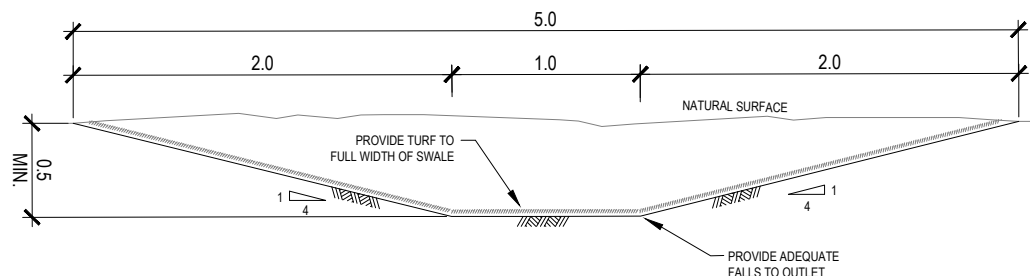
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P&ID ITEM No.	DRG No.	2752-0001-006	REV.	SHT
			D	3 OF 8



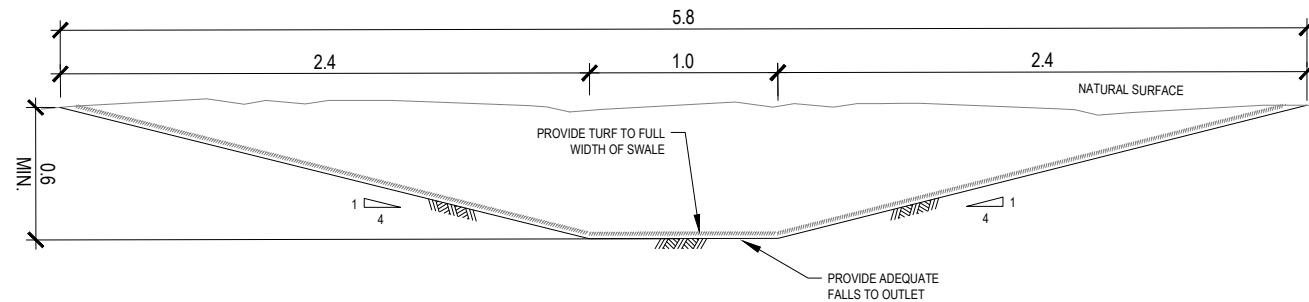
Appendix B. MPN Plans



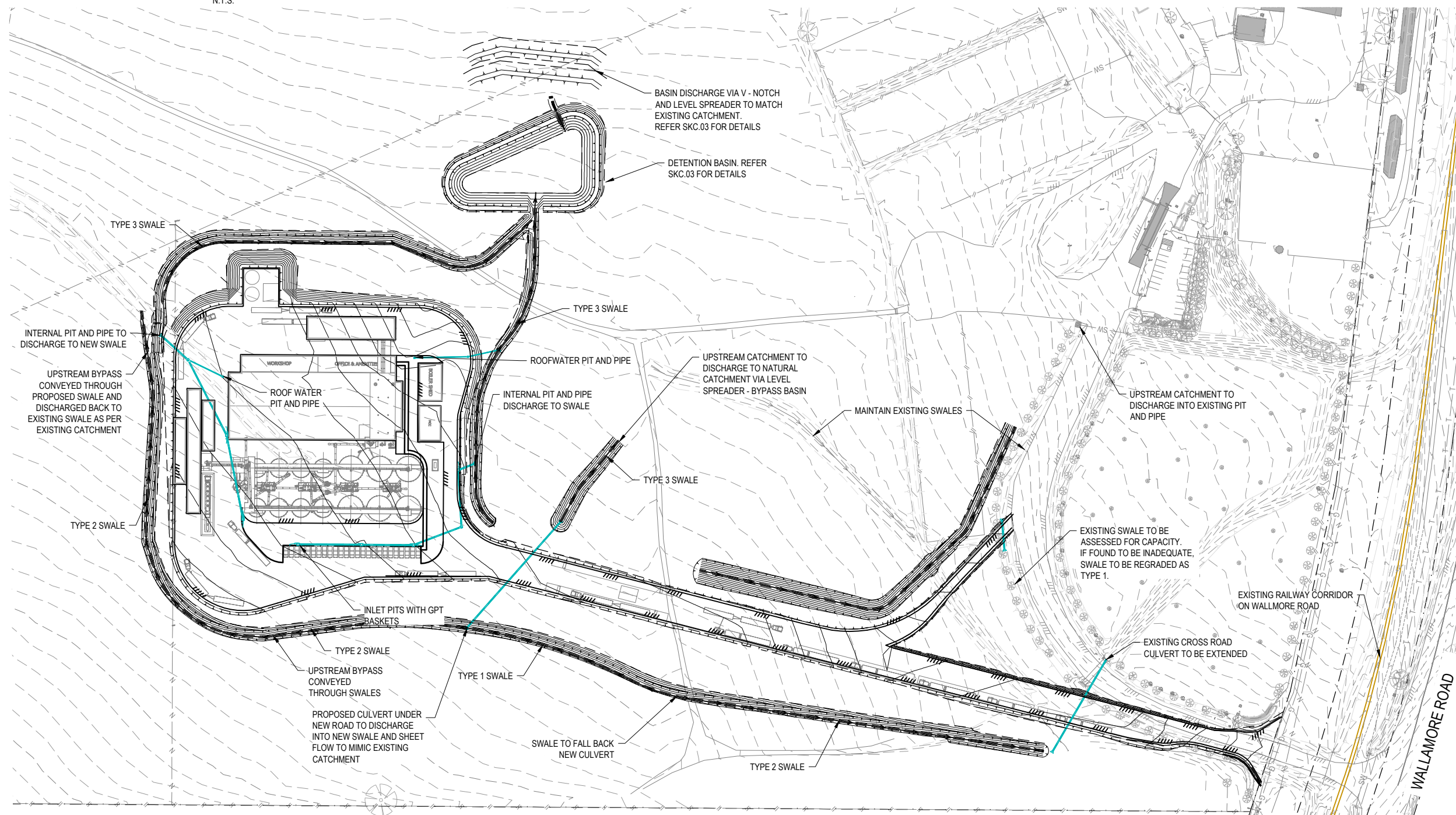
TYPICAL SWALE DRAIN DETAIL - TYPE 1 (0.5m DEEP)
N.T.S.



TYPICAL SWALE DRAIN DETAIL - TYPE 2 (0.5m DEEP WITH 1.0m BASE)
N.T.S.



TYPICAL SWALE DRAIN DETAIL - TYPE 3 (0.6m DEEP WITH 1.0m BASE)
N.T.S.



LEGEND

PROPOSED BUILDING	
PROPOSED EDGE OF PAVEMENT	
PROPOSED BARRIER KERB	
PROPOSED STORM WATER MAIN	
PROPOSED TOP OF BATTER	
PROPOSED TOE OF BATTER	
PROPOSED SWALE DRAIN	
EXISTING CATCHMENT	
CONTOURS EXISTING	
CONTOURS PROPOSED	

0 10 20 30 40 50
SCALE 1:1000 A1 1:2000 (A3)

ISSUE	DATE	AMENDMENT	BY	APP
E	20.11.25	DA ISSUE	JR	LS
D	01.09.25	DA ISSUE	JR	LS
C	28.02.25	DA ISSUE	BT	LS
B	05.04.24	DA ISSUE	BT	LS
A	09.02.24	DRAFT ISSUE	JB	LS

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CLIENT:
BAIADA TFM

PROPOSED FEEDMILL
GENERAL SITE LAYOUT
TANGARATTA, NSW

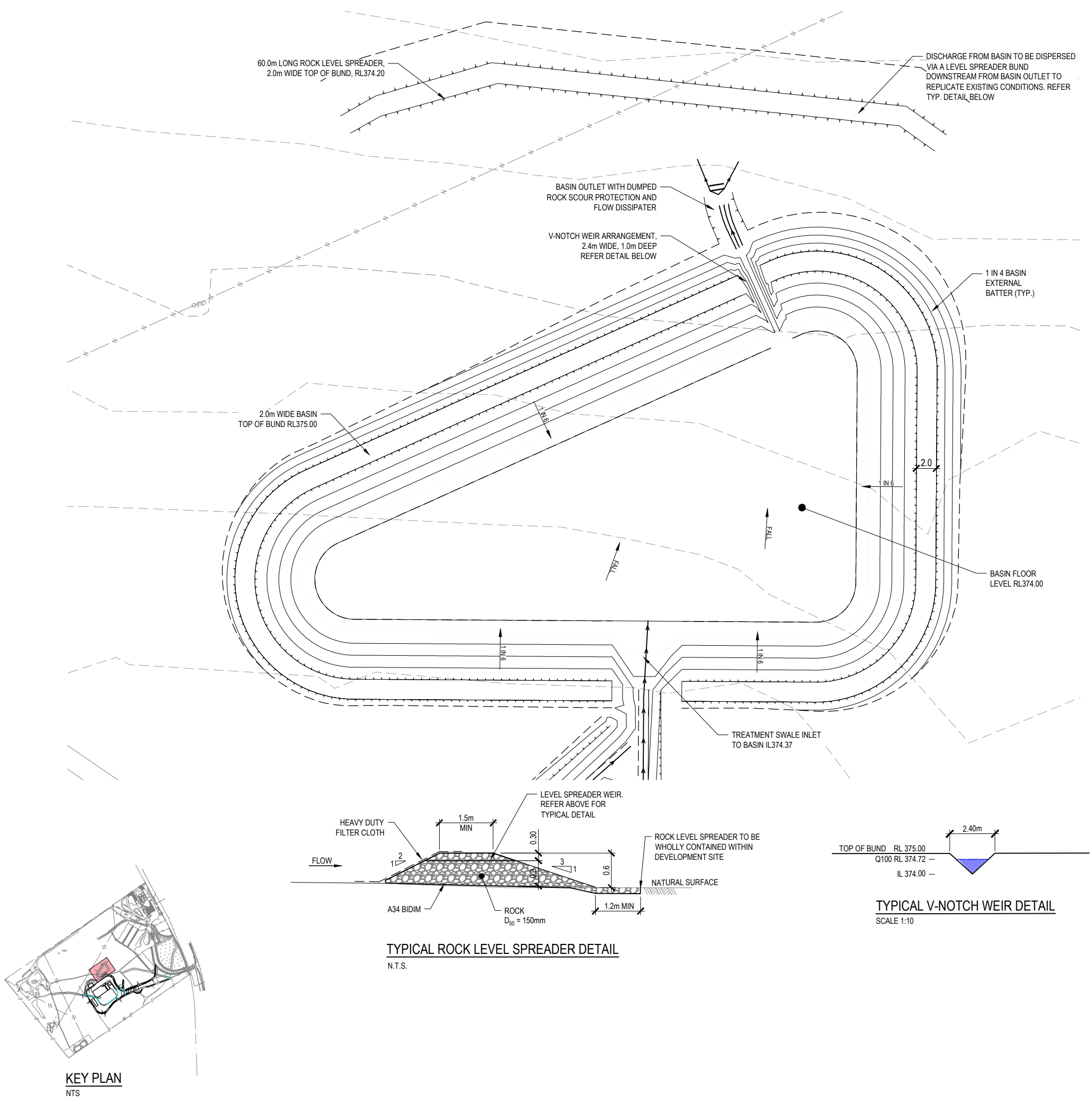
POST DEVELOPMENT PLAN

DESIGN: JB	DRAWN: LM	SCALES: AS SHOWN
CHKD: LS	APPROD: LS	DATE:

mpn JOB	DRAWING No.	REV
9883	SKC.02	E

PRELIMINARY

NOT FOR CONSTRUCTION



LEGEND

PROPOSED TOP OF BATTER

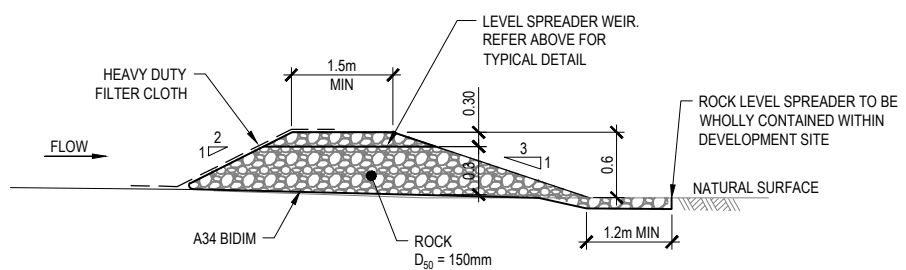
PROPOSED TOE OF BATTER

PROPOSED SWALE DRAIN

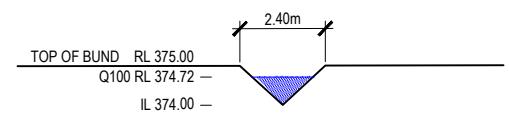
CONTOURS EXISTING

CONTOURS PROPOSED

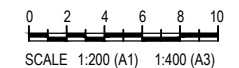
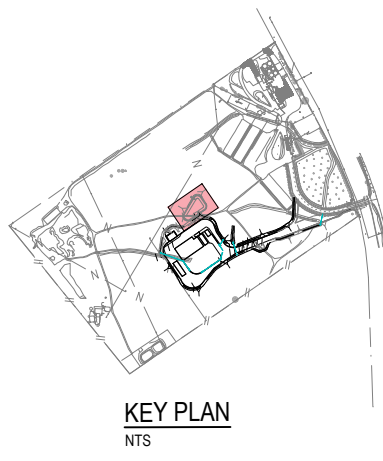
BASIN DEPTH-AREA-VOLUME				
DEPTH (m)	ELEVATION (m)	AREA (m²)	Δ VOLUME (m³)	VOLUME TO HEIGHT (m³)
0.000	374.00	1019.1	0.0	0.0
0.125	374.13	1119.6	133.1	133.1
0.250	374.25	1232.3	147.0	280.1
0.375	374.38	1348.6	161.3	441.3
0.500	374.50	1468.3	176.0	617.3
0.625	374.63	1591.6	191.2	808.6
0.750	374.75	1718.5	206.8	1015.4
0.875	374.88	1848.8	222.9	1238.3
1.000	375.00	1982.7	239.4	1477.8



TYPICAL ROCK LEVEL SPREADER DETAIL
N.T.S.



TYPICAL V-NOTCH WEIR DETAIL
SCALE 1:10



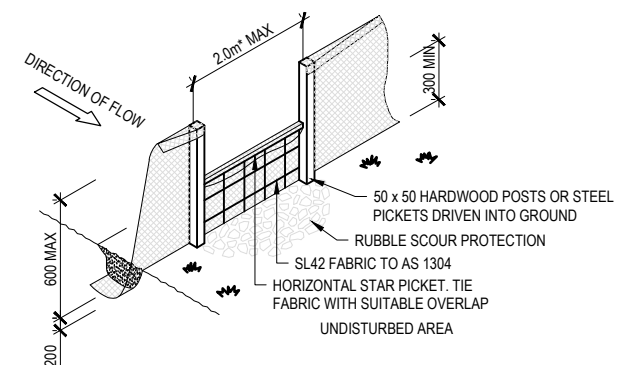
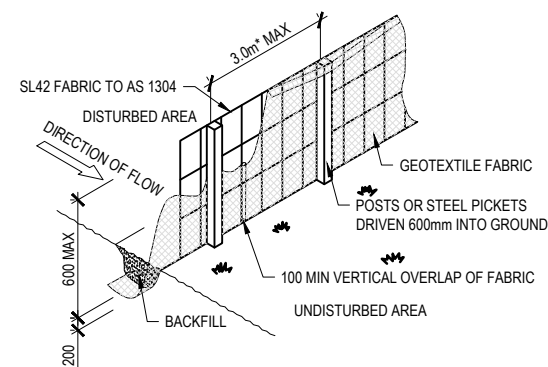
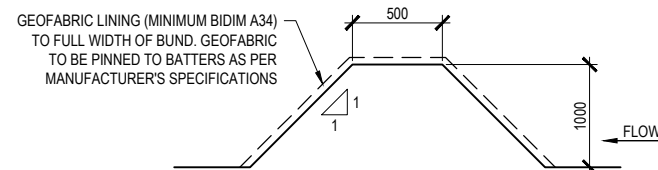
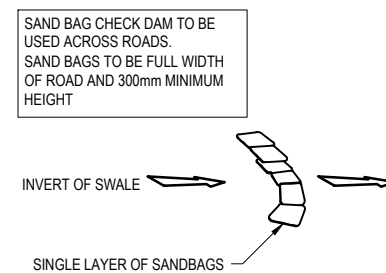
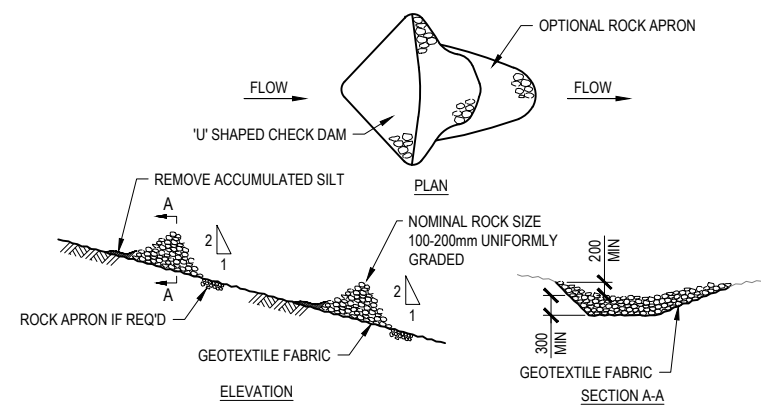
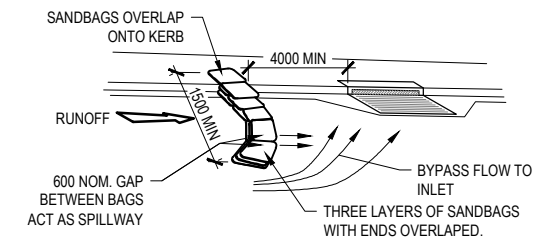
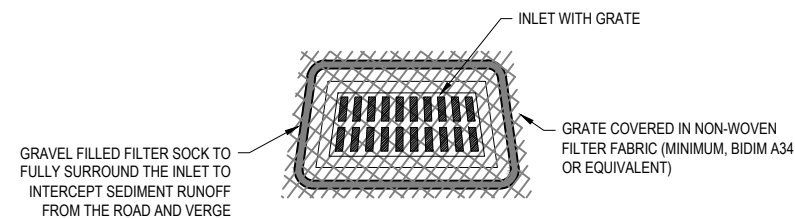
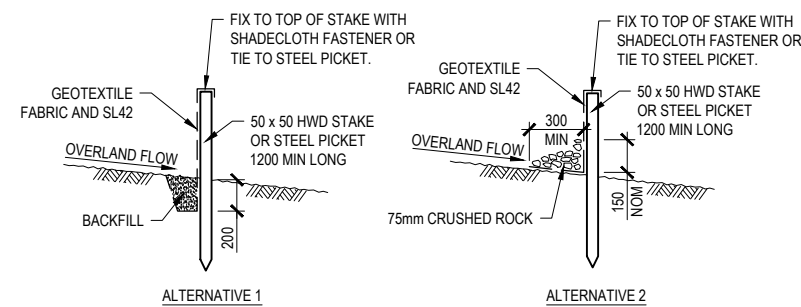
NOT FOR CONSTRUCTION

D	20.11.25	DA ISSUE	JR	LS
C	01.09.25	DA ISSUE	JR	LS
B	03.04.24	DA ISSUE	BT	LS
A	09.02.24	DRAFT ISSUE	JB	LS

ISSUE DATE AMENDMENT BY APP

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 ABN: 39 062 191 799 P: 61 7 3335 4555 E: solutions@mpnc.au Level 4, Building 3, Kings Row Office Park, 42 McDougall Street, Milton, QLD, 4064 CLIENT: **BAIADA TFM** **PROPOSED FEEDMILL GENERAL SITE LAYOUT** TANGARATTA, NSW **BASIN DETAILS AND LAYOUT** | | | | |------------|-----------|------------------| | DESIGN: JB | DRAWN: LM | SCALES: AS SHOWN | | CHKD: LS | APPRD: LS | DATE: | | | | | |-------------|---------------|----------| | mpn JOB | DRAWING No. | REV | | 9883 | SKC.03 | D | **PRELIMINARY** |



B	20.11.25	DA ISSUE		JR	LS
A	05.04.24	DA ISSUE		BT	LS
ISSUE	DATE	AMENDMENT		BY	APP

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CLIENT:
BALADA TFM

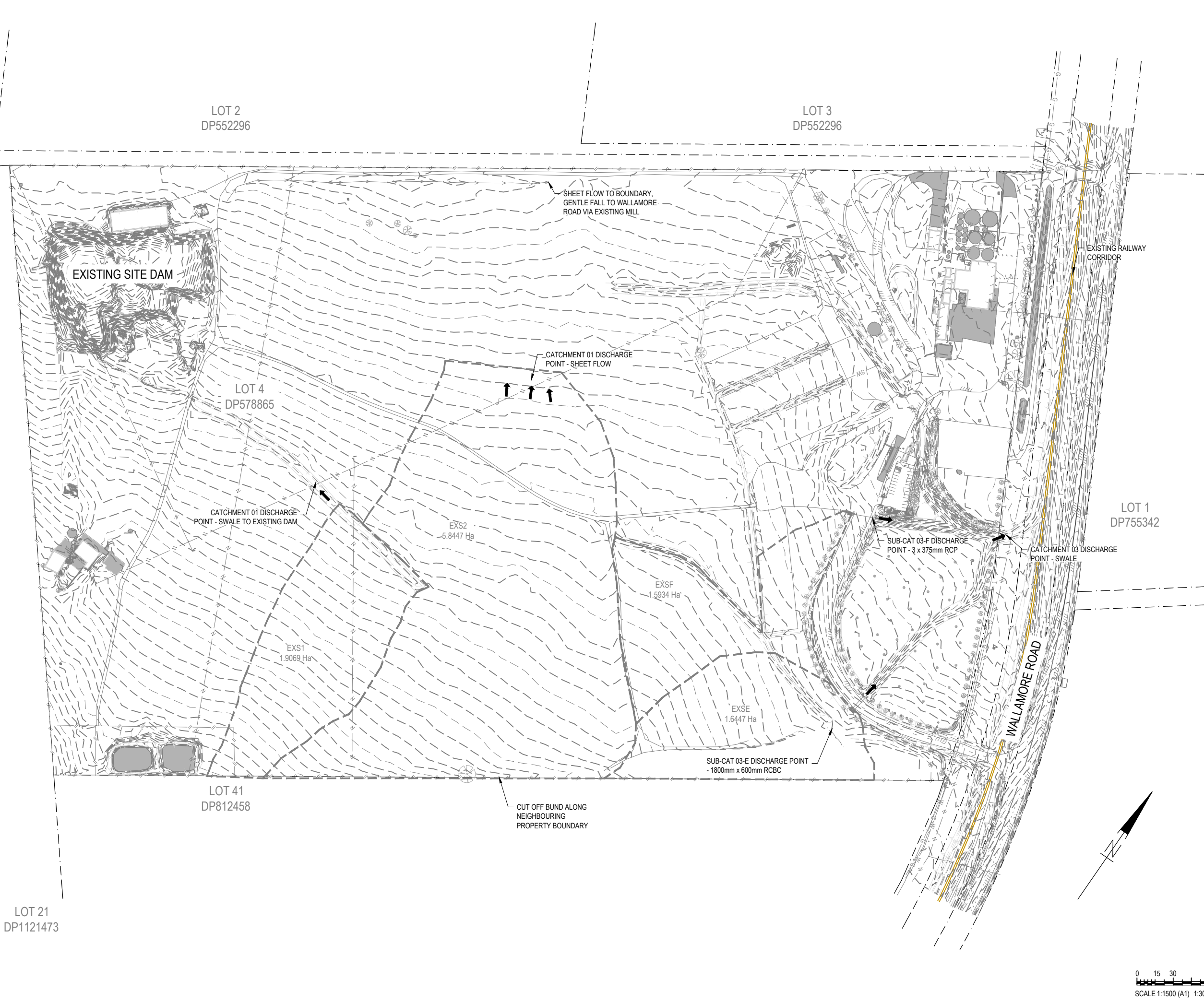
**PROPOSED FEEDMILL
GENERAL SITE LAYOUT**
TANGARATTA, NSW

EROSION AND SEDIMENT DETAILS

DESIGN: JB	DRAWN: BT	SCALES: AS SHOWN
CHKD: LS	APPRD: LS	DATE:

mpn JOB	DRAWING No.	REV
9883	SKC.05	B

PRELIMINARY



EXISTING

PROPOSED

PROPERTY BOUNDARY

CONTOUR

STORM WATER MAIN

EXISTING CATCHMENT BOUNDARY

CATCHMENT LABEL AND AREA

EX2/2
0.123ha

CATCHMENT SUMMARY		
CATCHMENT	TOTAL AREA (Ha)	POINT OF DISCHARGE
EXS1	1.9069	EXISTING SWALE EXISTING DAM
EXS2	5.8447	SHEET FLOW TO BDY
EXS3	3.2381	1800x600 RCBC (03-E) 3X375 RCP (03-F) EXISTING SWALE TO WALLAMORE ROAD
TOTAL	10.990	

C	20.11.25	DA ISSUE	JR	LS
B	01.09.25	DA ISSUE	JR	LS
A	28.02.25	DA ISSUE	BT	LS
ISSUE DATE		AMENDMENT		BY APP

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ABN: 39 062 191 799
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Level 4, Building 3,
Kings Row Office Park,
42 McDougall Street, Milton, QLD, 4064

CLIENT:
BAIADA TFM

PROPOSED FEEDMILL
GENERAL SITE LAYOUT
TANGARATTA, NSW

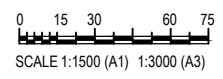
STORMWATER CATCHMENT
PLAN - EXISTING

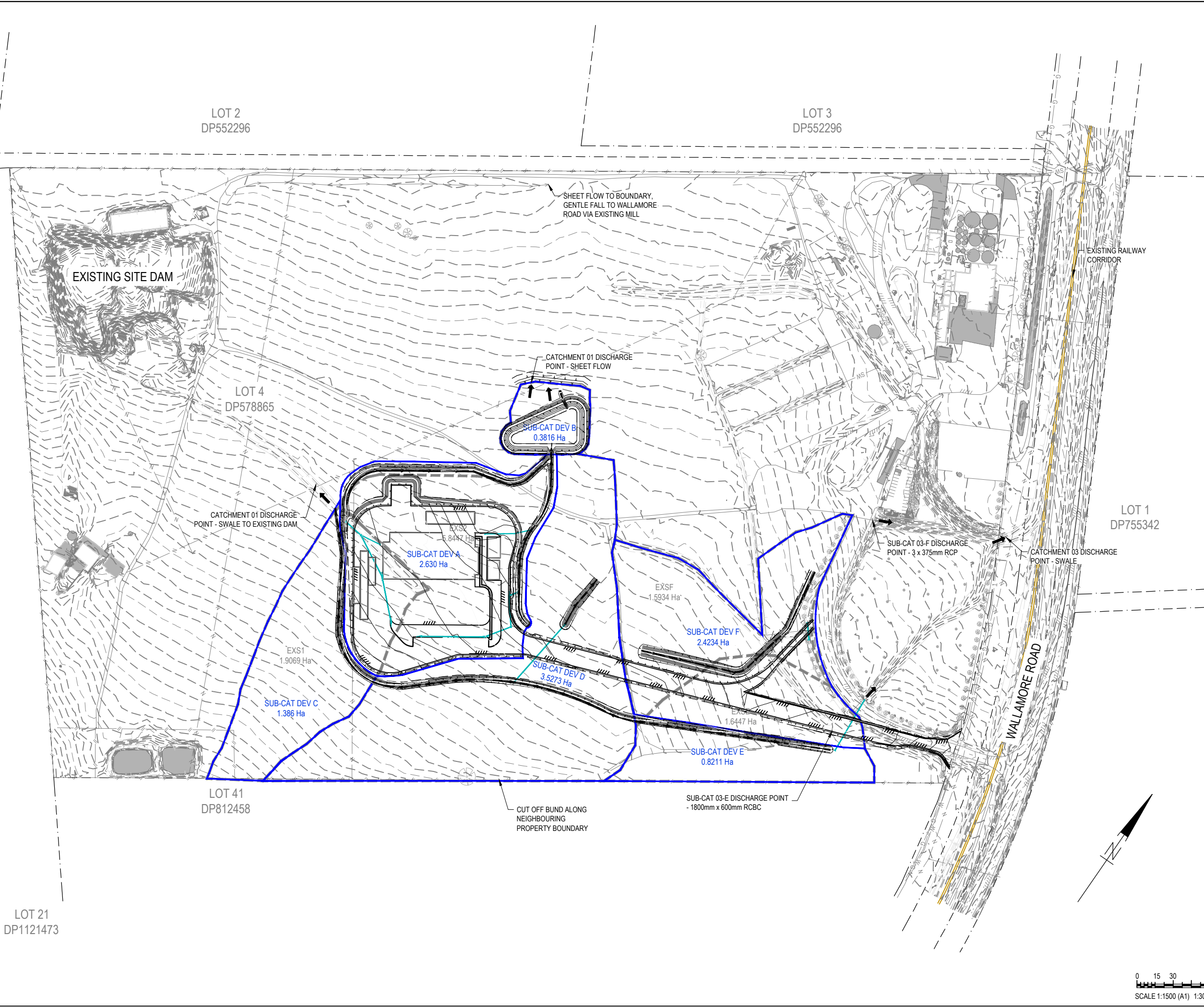
DESIGN: JB	DRAWN: LM	SCALES: AS SHOWN
CHKD: LS	APPRD: LS	DATE:

mpn JOB	DRAWING No.	REV
9883	SKC.06	C

PRELIMINARY

NOT FOR CONSTRUCTION





EXISTING

PROPOSED

PROPERTY BOUNDARY

CONTOUR

STORM WATER MAIN

INTERNAL EXISTING CATCHMENT BOUNDARY

INTERNAL SUB-CATCHMENT BOUNDARY

SUB-CATCHMENT LABEL AND AREA

5.00

SW

5.00

G2/2

0.234ha

CATCHMENT SUMMARY		
CATCHMENT	TOTAL AREA (Ha)	POINT OF DISCHARGE
EXS1	1.386	EXISTING SWALE EXISTING DAM
EXS2	6.545	SHEET FLOW TO BDY
EXS3	2.725	WALLAMORE ROAD EXISTING SWALE
A	2.630	SWALE TO DETENTION BASIN
B	0.381	LEVEL SPREADER
D	3.527	LEVEL SPREADER
E	0.821	1800x600 RCBC EXISTING SWALE TO WALLAMORE ROAD
F	0.356	3x375 RCP EXISTING SWALE TO WALLAMORE ROAD
F LANDSCAPE	2.040	EXISTING SWALE TO WALLAMORE ROAD
TOTAL	10.656	

C	20.11.25	DA ISSUE	JR	LS
B	01.09.25	DA ISSUE	JR	LS
A	28.02.25	DA ISSUE	BT	LS
ISSUE DATE		AMENDMENT	BY APP	

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Kings Row Office Park,
42 McDougall Street, Milton, QLD, 4064

CLIENT:
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PROPOSED FEEDMILL
GENERAL SITE LAYOUT
TANGARATTA, NSW

STORMWATER CATCHMENT
PLAN - DEVELOPED

DESIGN: JB	DRAWN: LM	SCALES: AS SHOWN
CHKD: LS	APPRD: LS	DATE:

mpn JOB	DRAWING No.	REV
9883	SKC.07	C

PRELIMINARY

NOT FOR CONSTRUCTION



Appendix C. Site Survey

IMPORTANT NOTES & CAUTIONS:-

1. These plans have been prepared at a reduction ratio at A3 as shown. The accuracy of any enlargement or other reproduction may be less than that of the original
2. All levels shown on this plan are reduced to the level based on PM 106337 with an RL 361.363
3. Survey orientation is to Grid North and based on GDA 2020 co-ordinate system
4. The cadastre shown on this plan has been located to a standard of accuracy in accordance with Regulation 10 of the Surveying & Spatial Information Regulation 2017. The boundaries have not been marked by this survey. It is our recommendation that marks to define the boundaries should be placed if any construction work is to be undertaken on or near the boundaries
5. Title search obtained from NSW Land Registry Services on 11.09.2020 for Folio Identifier 4/578865 indicates that the subject land is not burdened by any easements
6. All utility services shown on this drawing are approximate only and have been located from survey data & site investigation. It is the responsibility of the contractor to confirm services prior to any and all work on site - phone dial before you dig. Before commencing any excavation or construction on this site, you should contact the relevant authorities for verification of the location & depth of their services
7. This site survey was carried out using Differential Global Navigational Satellite System technology (GNSS) on 16.10.2020 & 17.01.2025
8. Tree canopies shown are approximate only
9. This plan is copyright and is not to be copied or reproduced in whole or in part without the prior written approval of Bath Stewart Associates Pty Ltd. Upon payment of all fees invoiced to complete this survey, the client, shall have a licence to use this drawing, (for which it was originally prepared), without the requirement to obtain the afore
10. These notes are an integral part of this plan
11. The DTM is in the Autocad file but turned off

SURVEY LEGEND

- K.I.P.

Kerb Inlet Pit
- Fence
- 50.29m

Boundary & Dimension
- 384.0

Contour & Height (0.2m Interval)
- 472.555

Spot Level
- T

Underground Telstra Cables
- W100

Watermains & Size
- WS

Waterservices
- E

Underground Electrical Cables
- S

Sewer Pipes and Manholes
- SW

Stormwater Pipe & Size
- G

Gasmain

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LEGEND (EXISTING - LIGHT PROPOSED - DARKER)		Rev.	DESCRIPTION	APPROVED	DATE	Model: 20305V16	Original A3 Drawing Scale Bar: Contours at 0.2m Intervals A3 Scale 1:4,000 40.0 0.0 40.0 80.0	 BATH STEWART ASSOCIATES Pty Ltd DEVELOPMENT CONSULTANTS SURVEYORS - ENGINEERS - PLANNERS - PROJECT MANAGERS 239 Marius Street TAMWORTH NSW 2340 Telephone (02) 6766 5966 A.C.N. 659 162 062 This document / plan / drawing / sketch is the copyright property of Bath Stewart Associates Pty Ltd and shall not be copied or reproduced in part or whole, in any media without written approval, nor shall it be used except for the Development and Site Specified.	TANGARATTA STOCK FEEDS PTY LTD 771 WALLAMORE ROAD, TANGARATTA	Ref. No: 20305D
CENTRE LINE KERB AND GUTTER TOP OF BATTER SURFACE DRAINAGE EDGE OF BITUMEN SEAL ENCLOSURE SEWERMAIN WATERMAIN (& SIZE) STORMWATER DRAINAGE OVERHEAD POWER UNDERGROUND ELECTRICAL	        					DIz: Various Survey: G.H. & A.H. Drawn: M.Beath Designed: Not Applicable Checked: M.Beath	Datum Description: PM106337 RL 361.363 GDA2020 Located within the western verge at the intersection of Meldorn and Browns Lane			
ENTRE LINE ERB AND GUTTER OP OF BATTER URFACE DRAINAGE EDGE OF BITUMEN SEAL ENCLOSURE SEWERMAIN ATERMAIN (& SIZE) TORMWATER DRAINAGE VERHEAD POWER NDERGROUND ELECTRICAL	        									
		A	Issued for Client's information	M.Beath	292.01.25					

Lot 1
DP 552296

Lot 2
DP 552296

Left

Lot 21
DP 1121473

Sheet 03

Joins

Top

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LEGEND (EXISTING — LIGHT PROPOSED — DARKER)	
CENTRE LINE	—
KERB AND GUTTER	—
TOP OF BATTER	—
SURFACE DRAINAGE	—
EDGE OF BITUMEN SEAL	—
FENCELINE	—
SEWERMAIN	—
WATERMAIN (& SIZE)	—
STORMWATER DRAINAGE	—
OVERHEAD POWER	—
UNDERGROUND ELECTRICAL	—
TREE	—
SHRUB	—
SIGN	—
SEWER MANHOLE, INSPECTION PIT	—
DOWNPIPE & ROOFWATER OUTLET	—
POWER POLE	—
STREETLIGHT	—
GUIDE POST	—
WATER (HYDRANT, VALVE, METER)	—
TELSTRA PIT AND CABLES	—

Rev.	DESCRIPTION
A	Issued for Client's information

APPROVED	DATE
M.Beath	292.01.25

Model: 20305V16
DL: Various
Survey: G.H. & A.H.
Drawn: M.Beath
Designed: Not Applicable
Checked: M.Beath

Original A3 Drawing Scale Bar: Contours at 0.2m Intervals AS Scale 1:1,000
Drawing: 20305D Rev A
Datum Description: PM106337 RL 361.363 GDA2020 Located within the western verge at the intersection of Meldorn and Browns Lane

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office@bathstewart.com.au

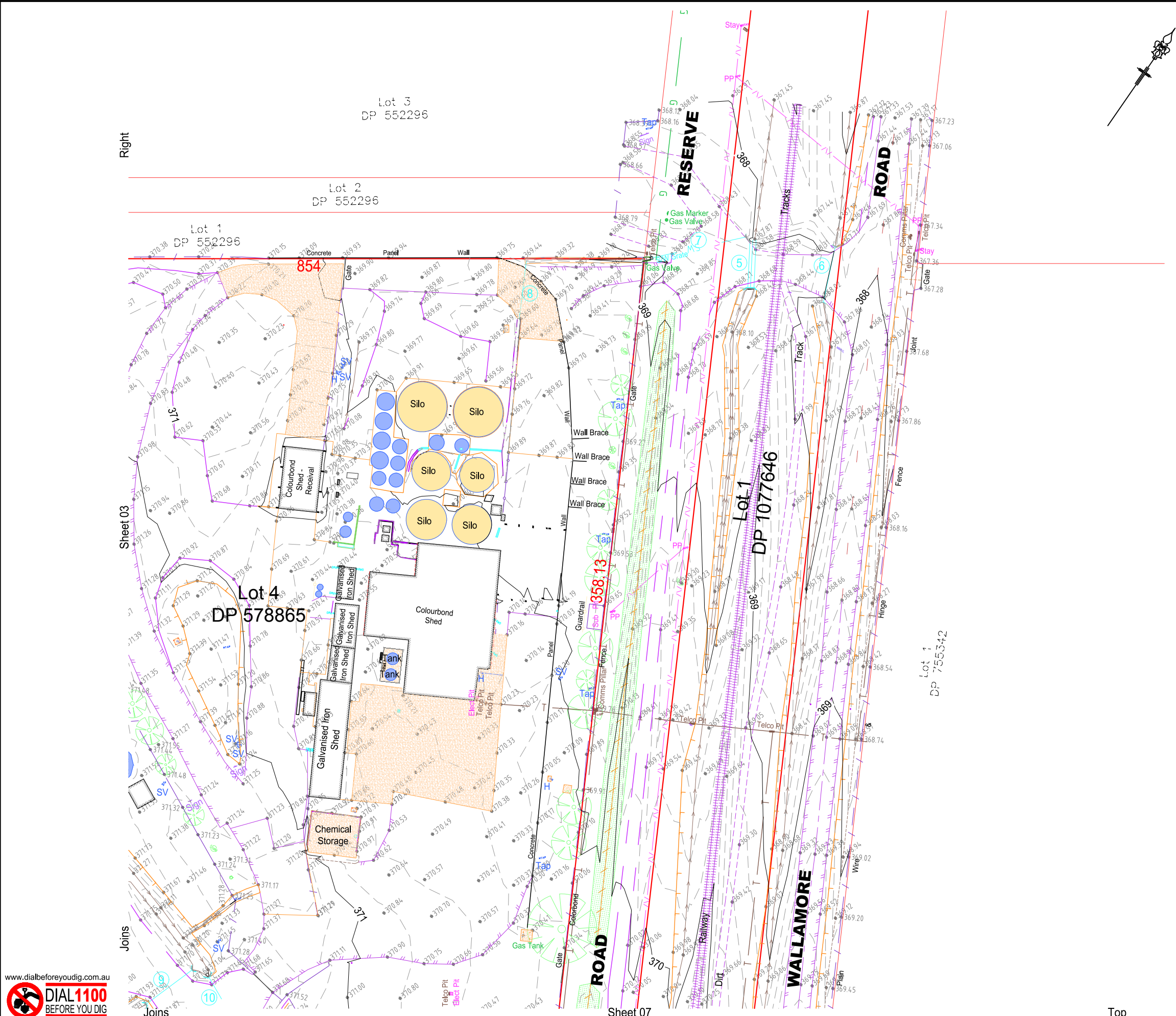
TANGARATTA STOCK FEEDS PTY LTD
771 WALLAMORE ROAD, TANGARATTA
LOT 4 DP 578865
TOPOGRAPHICAL & DETAIL SURVEY (SH 01 of 09)

Ref. No:	20305D
Sheet No:	02 of 10
Revision:	A
©Bath Stewart & Associates Pty Ltd	

Lot 3
DP 552296



LEGEND (EXISTING - LIGHT PROPOSED - DARKER) CENTRE LINE KERB AND GUTTER TOP OF BATTER SURFACE DRAINAGE EDGE OF BITUMEN SEAL FENCELINE SEWERMAIN WATERMAIN (& SIZE) STORMWATER DRAINAGE OVERHEAD POWER UNDERGROUND ELECTRICAL		TREE SHRUB SIGN SEWER MANHOLE, INSPECTION PIT DOWNPIPE & ROOFWATER OUTLET POWER POLE STREETLIGHT GUIDE POST WATER (HYDRANT, VALVE, METER) TELSTRA PIT AND CABLES	Rev. DESCRIPTION APPROVED DATE	Model: 20305V16 DL: Various Survey: G.H. & A.H. Drawn: M.Beath Designed: Not Applicable Checked: M.Beath	Original A3 Drawing Scale Bar: Contours at 0.2m Intervals A3 Scale 1:1,000 Drawing: 20305D Rev A Datum Description: PM106337 RL 361.363 GDA2020 Located within the western verge at the intersection of Meldorn and Browns Lane	BATH STEWART ASSOCIATES Pty Ltd DEVELOPMENT CONSULTANTS SURVEYORS - ENGINEERS - PLANNERS - PROJECT MANAGERS 239 Marius Street TAMWORTH NSW 2340 Telephone (02) 6766 5966 A.C.N. 659 162 062 This document / plan / drawing / sketch is the copyright property of Bath Stewart Associates Pty Ltd and shall not be copied or reproduced in part or whole, in any media without written approval, nor shall it be used except for the Development and Site Specific	TANGARATTA STOCK FEEDS PTY LTD 771 WALLAMORE ROAD, TANGARATTA LOT 4 DP 578865 TOPOGRAPHICAL & DETAIL SURVEY (SH 02 of 09)	Ref. No: 20305D Sheet No: 03 of 10 Revision: A ©Bath Stewart & Associates Pty Ltd
A		Issued for Client's information		M Beath	292.01.25			



LEGEND (EXISTING — LIGHT PROPOSED — DARKER)	
CENTRE LINE	---
KERB AND GUTTER	---
TOP OF BATTER	---
SURFACE DRAINAGE	---
EDGE OF BITUMEN SEAL	---
FENCELINE	---
SEWERMAIN	---
WATERMAIN (& SIZE)	---
STORMWATER DRAINAGE	---
OVERHEAD POWER	---
UNDERGROUND ELECTRICAL	---

Rev.	DESCRIPTION	APPROVED	DATE
A	Issued for Client's information	M.Beath	292.01.25

Model:	20305V16
DL:	Various
Survey:	G.H. & A.H.
Drawn:	M.Beath
Designed:	Not Applicable
Checked:	M.Beath

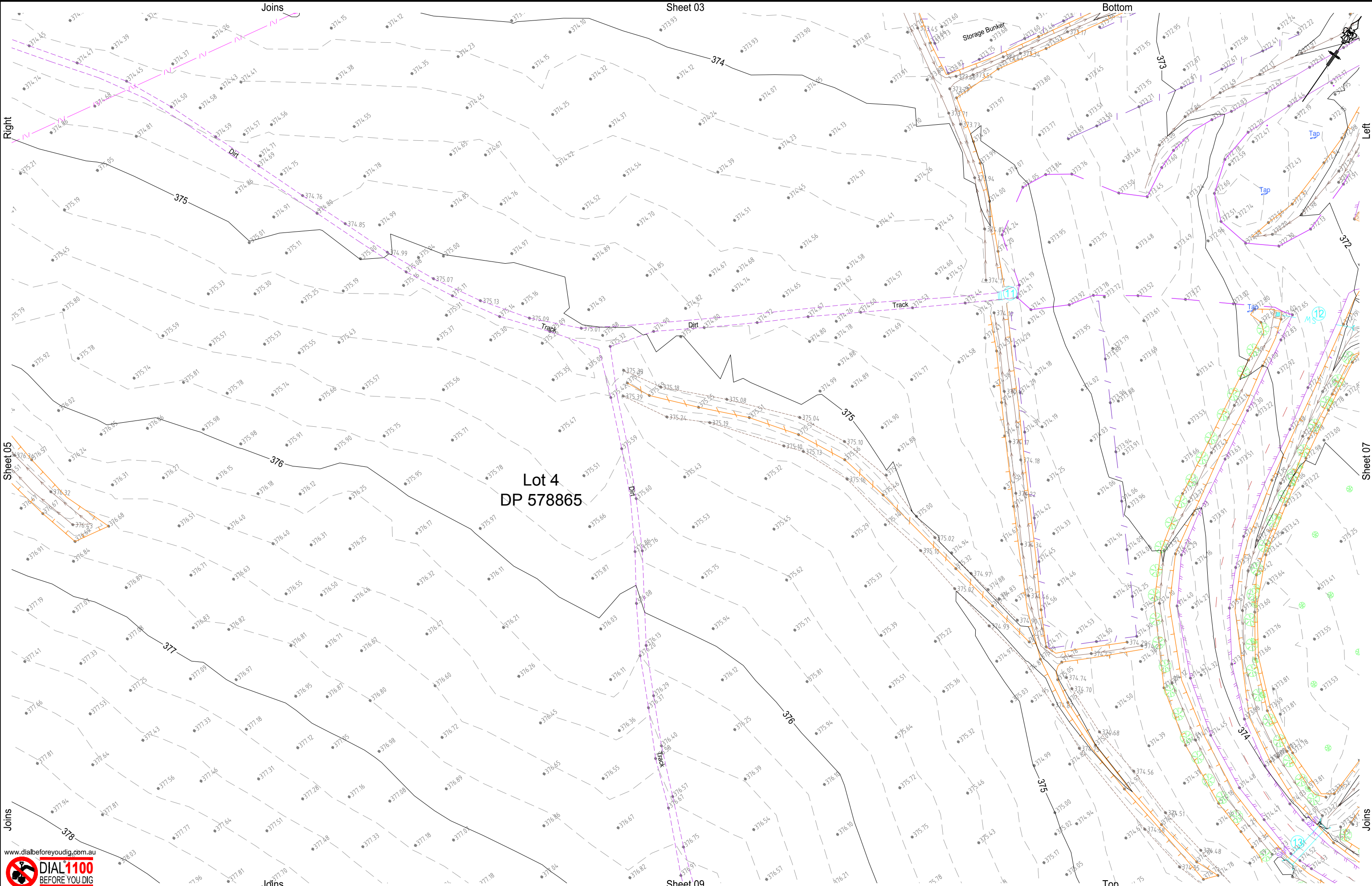
Original A3 Drawing Scale Bar:
Contours at 0.2m Intervals
AS Scale 1:1,000
Drawing: 20305D Rev A
Datum Description:
PM106337 RL 361.363 GDA2020
Located within the western verge at the intersection of Meldorn and Browns Lane

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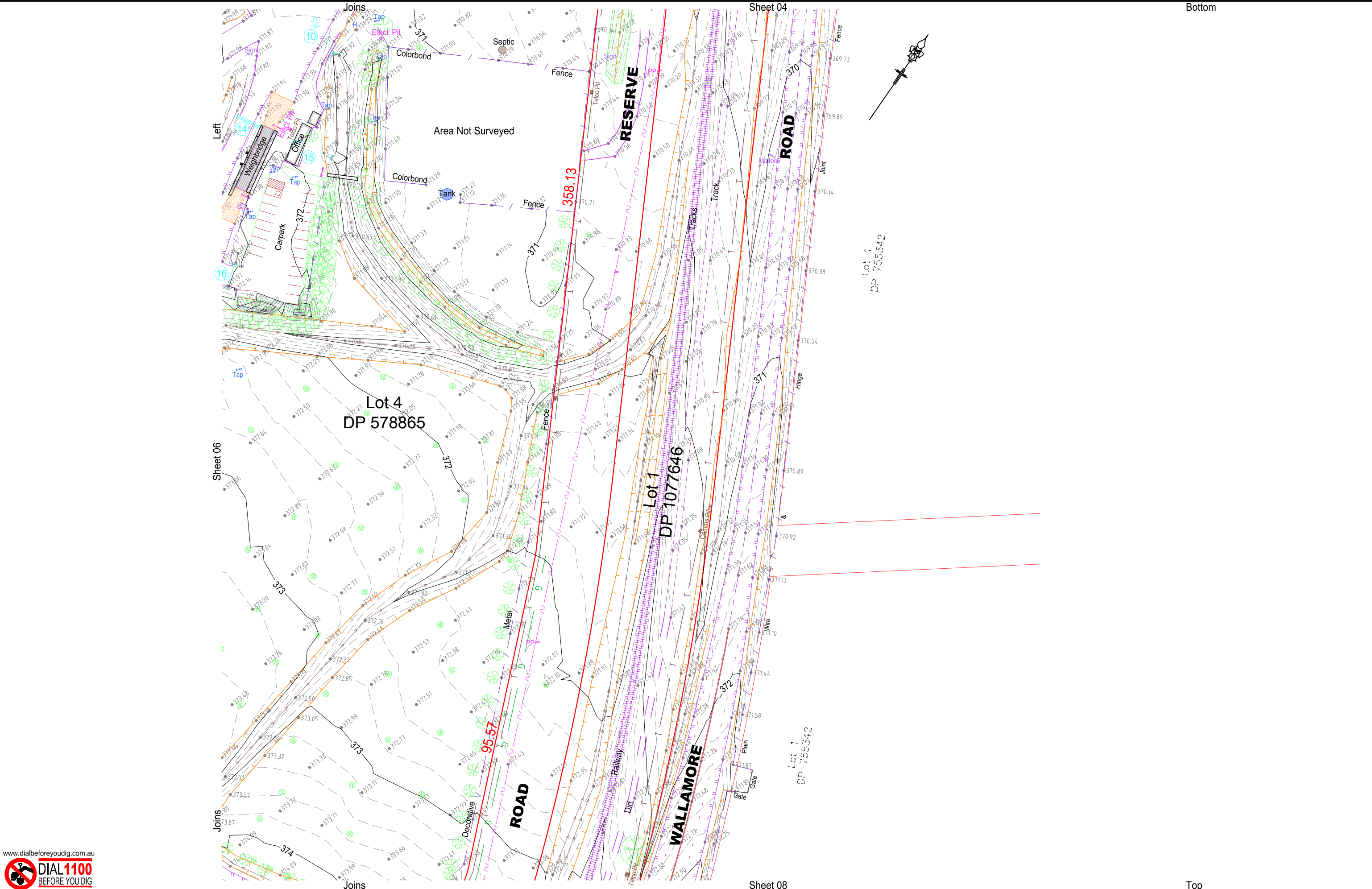
TANGARATTA STOCK FEEDS PTY LTD
771 WALLAMORE ROAD, TANGARATTA
LOT 4 DP 578865
TOPOGRAPHICAL & DETAIL SURVEY (SH 03 of 09)

Ref. No:	20305D
Sheet No:	04 of 10
Revision:	A
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LEGEND (EXISTING — LIGHT PROPOSED — DARKER)		Rev.	DESCRIPTION	APPROVED	DATE	Model: 20305V16	Original A3 Drawing Scale Bar: Contours at 0.2m Intervals A3 Scale 1:1,000 10 0 10 20	BATH STEWART ASSOCIATES Pty Ltd DEVELOPMENT CONSULTANTS SURVEYORS — ENGINEERS — PLANNERS — PROJECT MANAGERS 239 Marius Street TAMWORTH NSW 2340 Telephone (02) 6766 5966 A.C.N. 659 162 062 office@bathstewart.com.au		TANGARATTA STOCK FEEDS PTY LTD 771 WALLAMORE ROAD, TANGARATTA LOT 4 DP 578865 TOPOGRAPHICAL & DETAIL SURVEY (SH 05 of 09)		Ref. No: 20305D Sheet No : 06 of 10 Revision : A ©Bath Stewart & Associates Pty Ltd	
CENTRE LINE	---					DI: Various	Drawing: 20305D Rev A	 This document / plan / drawing / sketch is the copyright property of Bath Stewart Associates Pty Ltd and shall not be copied or reproduced in part or whole, in any media without written approval, nor shall it be used except for the Development and Site Specified.					
KERB AND GUTTER	---					Survey: G.H. & A.H.	Datum Description: PM106337 RL 361.363 GDA2020						
TOP OF BATTER	---					Drawn: M.Beath	Located within the western verge at the intersection of Meldorn and Browns Lane						
SURFACE DRAINAGE	---					Designed: Not Applicable							
EDGE OF BITUMEN SEAL	---					Checked: M.Beath							
FENCELINE	---												
SEWERMAIN	---												
WATERMAIN (& SIZE)	---												
STORMWATER DRAINAGE	---												
OVERHEAD POWER	---												
UNDERGROUND ELECTRICAL	---												
TREE	---												
SHRUB	---												
SIGN	---												
SEWER MANHOLE, INSPECTION PIT	---												
DOWNPIPE & ROOFWATER OUTLET	---												
POWER POLE	---												
STREETLIGHT	---												
GUIDE POST	---												
WATER (HYDRANT, VALVE, METER)	---												
TELSTRA PIT AND CABLES	---												
A Issued for Client's information													
M.Beath													
292.01.25													



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LEGEND (EXISTING — LIGHT PROPOSED — DARKER)	
CENTRE LINE	—
KERB AND GUTTER	—
TOP OF BATTER	—
SURFACE DRAINAGE	—
EDGE OF BITUMEN SEAL	—
FENCELINE	—
SEWERMAIN	—
WATERMAIN (& SIZE)	—
STORMWATER DRAINAGE	—
OVERHEAD POWER	—
UNDERGROUND ELECTRICAL	—
TREE	—
SHRUB	—
SIGN	—
SEWER MANHOLE, INSPECTION PIT	—
DOWNPIPE & ROOFWATER OUTLET	—
POWER POLE	—
STREETLIGHT	—
GUIDE POST	—
WATER (HYDRANT, VALVE, METER)	—
TELSTRA PIT AND CABLES	—

Rev.	DESCRIPTION
A	Issued for Client's information

APPROVED	DATE
M.Beath	292.01.25

Model: 20305V16
Di: Various
Survey: G.H. & A.H.
Drawn: M.Beath
Designed: Not Applicable
Checked: M.Beath

Original A3 Drawing Scale Bar: Contours at 0.2m Intervals A3 Scale 1:1,000 Drawing: 20305D Rev A Datum Description: PM106337 RL 361.363 GDA2020 Located within the western verge at the intersection of Meldorn and Browns Lane
--

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TANGARATTA STOCK FEEDS PTY LTD 771 WALLAMORE ROAD, TANGARATTA		Ref. No: 20305D
LOT 4 DP 578865		Sheet No: 07 of 10
TOPOGRAPHICAL & DETAIL SURVEY (SH 06 of 09)		Revision: A
		©Bath Stewart & Associates Pty Ltd



 **DIAL 1100**
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LEGEND (EXISTING - - LIGHT PROPOSED - - DARKER)		Rev.	DESCRIPTION	APPROVED	DATE	Model: 20305V16 Dtz: Various Survey: G.H. & A.H. Drawn: M.Beath Checked: Not Applicable Designed: M.Beath	Original A3 Drawing Scale Bar: Contours at 0.2m Intervals A3 Scale 1:1,000 Drawing: 20305D Rev A Datum Description: PM106337 RL 361.363 GDA2020 Located within the western verge at the intersection of Meldorn and Browns Lane	BATH STEWART ASSOCIATES Pty Ltd DEVELOPMENT CONSULTANTS SURVEYORS - ENGINEERS - PLANNERS - PROJECT MANAGERS 239 Marius Street TARMOROTH NSW 2340 Telephone (02) 6766 5966 A.C.N. 659 162 062 office@bathstewart.com.au	TANGARATTA STOCK FEEDS PTY LTD 771 WALLAMORE ROAD, TANGARATTA LOT 4 DP 578865 TOPOGRAPHICAL & DETAIL SURVEY (SH 07 of 09)	Ref. No: 20305D Sheet No: 08 of 10 Revision: A © Bath Stewart & Associates Pty Ltd
CENTRE LINE KERB & GUTTER TOP OF BATTER SURFACE DRAINAGE SEWAGE OF BITUMEN SEAL FENCELINE SEWERMAIN WATERMAIN (ø & SIZE) WATER (HYDRANT, VALVE, METER) TELSTRA PIT AND CABLES UNDERGROUND ELECTRICAL			TREE SHRUB SIGN SEWER MANHOLE, INSPECTION PIT DOWNPIPE & ROOFWATER OUTLET POWER POLE STREETLIGHT GUIDE POST							
A			Issued for Client's information	M.Beath	292.01.25					



Appendix D. Hydrology Modelling Results

PIT / NODE DETAILS

Name	Max HGL	Max Pond HGL	Version 8			Overflow (cu.m/s)	Constraint
			Max Surface Flow Arrivin (cu.m/s)	Max Pond Volume (cu.m)	Min Freeboard (m)		
DD	374.65		1.079				
DB	374.34		0.586				

SUB-CATCHMENT DETAILS

Name	Max	Paved	Grassed	Paved	Grassed	Supp.	Due to Storm
	Flow Q (cu.m/s)	Max Q (cu.m/s)	Max Q (cu.m/s)	Tc (min)	Tc (min)	Tc (min)	
Existing 2	1.687	0.118	1.581	15	27	27	1 in 500 AEP, 30 min burst, Storm 7
Existing E	0.501	0.03	0.472	22	25	25	1 in 500 AEP, 30 min burst, Storm 9
Existing F	0.485	0.029	0.457	22	25	25	1 in 500 AEP, 30 min burst, Storm 9
Developed E	0.025	0.002	0.024	7	25	22	1 in 500 AEP, 30 min burst, Storm 4
Developed C	0.365	0	0.365	30	30	30	1 in 500 AEP, 45 min burst, Storm 2
Developed F	0.767	0.241	0.584	10	25	12	1 in 500 AEP, 30 min burst, Storm 4
Dev D	0.967	0.263	0.767	10	30	33	1 in 500 AEP, 30 min burst, Storm 4
Dev B	0.128	0	0.128	15	20	15	1 in 500 AEP, 25 min burst, Storm 3
Dev A	1.34	1.164	0.176	7	20	10	1 in 500 AEP, 10 min burst, Storm 7
Existing 1	0.503	0	0.503	30	30	30	1 in 500 AEP, 45 min burst, Storm 2

PIPE DETAILS

Name	Max Q (cu.m/s)	Max V (m/s)	Max U/S HGL (m)	Max D/S HGL (m)	Due to Storm
------	-------------------	----------------	--------------------	--------------------	--------------

CHANNEL DETAILS

Name	Max Q (cu.m/s)	Max V (m/s)	Due to Storm
------	-------------------	----------------	--------------

OVERFLOW ROUTE DETAILS

Name	Max Q U/S	Max Q D/S	Safe Q	Max D	Max DxV	Max Width	Max V	Due to Storm
Level Spreader	0.962	0.965	1.497	0.151	0.27	4	1.78	1 in 500 AEP, 30 min burst, Storm 4
Level Spreader	0.462	0.462	1.431	0.087	0.14	4	1.6	1 in 500 AEP, 45 min burst, Storm 5
v notch	0.383	0.462	0.139	0.571	0.77	1.37	1.56	1 in 500 AEP, 45 min burst, Storm 5

DETENTION BASIN DETAILS

Name	Max WL	MaxVol	Max Q	Max Q	Max Q
			Total	Low Level	High Level
Basin A	374.94	1362	0.383	0	0.383

PIT / NODE DETAILS

Name	Max HGL	Max Pond HGL	Version 8		Min Freeboard (m)	Overflow (cu.m/s)	Constraint
			Max Surface Flow Arrivin (cu.m/s)	Max Pond Volume (cu.m)			
DD	374.64		0.902				
DB	374.32		0.453				

SUB-CATCHMENT DETAILS

Name	Max	Paved	Grassed	Paved	Grassed	Supp.	Due to Storm
	Flow Q (cu.m/s)	Max Q (cu.m/s)	Max Q (cu.m/s)	Tc (min)	Tc (min)	Tc (min)	
Existing 2	1.393	0.102	1.3	15	27	27	1 in 200 AEP, 30 min burst, Storm 7
Existing E	0.421	0.026	0.395	22	25	25	1 in 200 AEP, 30 min burst, Storm 9
Existing F	0.408	0.025	0.383	22	25	25	1 in 200 AEP, 30 min burst, Storm 9
Developed E	0.021	0.002	0.02	7	25	22	1 in 200 AEP, 30 min burst, Storm 6
Developed C	0.3	0	0.3	30	30	30	1 in 200 AEP, 45 min burst, Storm 2
Developed F	0.649	0.21	0.49	10	25	12	1 in 200 AEP, 30 min burst, Storm 4
Dev D	0.804	0.229	0.631	10	30	33	1 in 200 AEP, 30 min burst, Storm 4
Dev B	0.108	0	0.108	15	20	15	1 in 200 AEP, 25 min burst, Storm 3
Dev A	1.161	1.016	0.145	7	20	10	1 in 200 AEP, 10 min burst, Storm 7
Existing 1	0.412	0	0.412	30	30	30	1 in 200 AEP, 45 min burst, Storm 2

PIPE DETAILS

Name	Max Q (cu.m/s)	Max V (m/s)	Max U/S HGL (m)	Max D/S HGL (m)	Due to Storm
------	-------------------	----------------	--------------------	--------------------	--------------

CHANNEL DETAILS

Name	Max Q (cu.m/s)	Max V (m/s)	Due to Storm
------	-------------------	----------------	--------------

OVERFLOW ROUTE DETAILS

Name	Max Q U/S	Max Q D/S	Safe Q	Max D	Max DxV	Max Width	Max V	Due to Storm
Level Spreader	0.8	0.803	0.642	0.137	0.23	4	1.66	1 in 200 AEP, 30 min burst, Storm 4
Level Spreader	0.347	0.348	1.431	0.075	0.11	4	1.44	1 in 200 AEP, 45 min burst, Storm 5
v notch	0.285	0.348	0.139	0.513	0.65	1.23	1.47	1 in 200 AEP, 45 min burst, Storm 5

DETENTION BASIN DETAILS

Name	Max WL	MaxVol	Max Q	Max Q	Max Q
			Total	Low Level	High Level
Basin A	374.87	1223.1	0.285	0	0.285

PIT / NODE DETAILS

Name	Max HGL	Max Pond HGL	Version 8		Min Freeboard (m)	Overflow (cu.m/s)	Constraint
			Max Surfac Flow Arrivin (cu.m/s)	Max Pond Volume (cu.m)			
DD	374.63		0.788				
DB	374.31		0.359				

SUB-CATCHMENT DETAILS

Name	Max	Paved	Grassed	Paved	Grassed	Supp.	Due to Storm
	Flow Q (cu.m/s)	Max Q (cu.m/s)	Max Q (cu.m/s)	Tc (min)	Tc (min)	Tc (min)	
Existing 2	1.177	0.091	1.094	15	27	27	1% AEP, 30 min burst, Storm 7
Existing E	0.356	0.023	0.333	22	25	25	1% AEP, 30 min burst, Storm 9
Existing F	0.344	0.022	0.322	22	25	25	1% AEP, 30 min burst, Storm 9
Developed E	0.018	0.002	0.017	7	25	22	1% AEP, 30 min burst, Storm 6
Developed C	0.252	0	0.252	30	30	30	1% AEP, 45 min burst, Storm 2
Developed F	0.554	0.187	0.412	10	25	12	1% AEP, 30 min burst, Storm 4
Dev D	0.685	0.204	0.531	10	30	33	1% AEP, 30 min burst, Storm 4
Dev B	0.093	0	0.093	15	20	15	1% AEP, 25 min burst, Storm 3
Dev A	1.031	0.908	0.123	7	20	10	1% AEP, 10 min burst, Storm 7
Existing 1	0.347	0	0.347	30	30	30	1% AEP, 45 min burst, Storm 2

PIPE DETAILS

Name	Max Q (cu.m/s)	Max V (m/s)	Max U/S HGL (m)	Max D/S HGL (m)	Due to Storm
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CHANNEL DETAILS

Name	Max Q (cu.m/s)	Max V (m/s)	Due to Storm
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OVERFLOW ROUTE DETAILS

Name	Max Q U/S	Max Q D/S	Safe Q	Max D	Max DxV	Max Width	Max V	Due to Storm
Level Spreader	0.682	0.683	1.497	0.125	0.19	4	1.56	1% AEP, 30 min burst, Storm 4
Level Spreader 1	0.269	0.269	1.431	0.067	0.09	4	1.34	1% AEP, 1.5 hour burst, Storm 4
v notch	0.229	0.269	0.139	0.466	0.56	1.12	1.4	1% AEP, 1.5 hour burst, Storm 4

DETENTION BASIN DETAILS

Name	Max WL	MaxVol	Max Q	Max Q	Max Q
			Total	Low Level	High Level
Basin A	374.82	1132	0.229	0	0.229

PIT / NODE DETAILS		Version 8					
Name	Max HGL	Max Pond HGL	Max Surface Flow (cu.m/s)	Max Pond Volume (cu.m)	Min Freeboard (m)	Overflow (cu.m/s)	Constraint
DD	374.61		0.691				
DB	374.31		0.298				

SUB-CATCHMENT DETAILS							
Name	Max Flow Q (cu.m/s)	Paved Max Q (cu.m/s)	Grassed Max Q (cu.m/s)	Paved Tc (min)	Grassed Tc (min)	Supp. Tc (min)	Due to Storm
Existing 2	0.983	0.081	0.909	15	27		27 2% AEP, 30 min burst, Storm 7
Existing E	0.297	0.02	0.276	22	25		25 2% AEP, 30 min burst, Storm 9
Existing F	0.287	0.02	0.268	22	25		25 2% AEP, 30 min burst, Storm 9
Developed	0.015	0.001	0.014	7	25		22 2% AEP, 30 min burst, Storm 6
Developed	0.209	0	0.209	30	30		30 2% AEP, 45 min burst, Storm 2
Developed	0.468	0.166	0.342	10	25		12 2% AEP, 30 min burst, Storm 4
Dev D	0.579	0.181	0.441	10	30		33 2% AEP, 30 min burst, Storm 4
Dev B	0.079	0	0.079	15	20		15 2% AEP, 25 min burst, Storm 10
Dev A	0.909	0.807	0.102	7	20		10 2% AEP, 10 min burst, Storm 7
Existing 1	0.287	0	0.287	30	30		30 2% AEP, 45 min burst, Storm 2

PIPE DETAILS					
Name	Max Q (cu.m/s)	Max V (m/s)	Max U/S HGL (m)	Max D/S HGL (m)	Due to Storm

CHANNEL DETAILS			
Name	Max Q (cu.m/s)	Max V (m/s)	Due to Storm

OVERFLOW ROUTE DETAILS								
Name	Max Q U/S	Max Q D/S	Safe Q	Max D	Max DxV	Max Width	Max V	Due to Storm
Level Spread	0.575	0.576	0.642	0.114	0.17	4	1.46	2% AEP, 30 min burst, Storm 4
Level Spread	0.212	0.212	1.431	0.06	0.07	4	1.26	2% AEP, 2 hour burst, Storm 8
v notch	0.185	0.212	0.139	0.427	0.49	1.02	1.34	2% AEP, 2 hour burst, Storm 8

DETENTION BASIN DETAILS					
Name	Max WL	MaxVol	Max Q Total	Max Q Low Level	Max Q High Level
Basin A	374.77	1044.1	0.185	0	0.185

PIT / NODE DETAILS		Version 8					
Name	Max HGL	Max Pond HGL	Max Surface Flow (cu.m/s)	Max Pond Volume (cu.m)	Min Freeboard (m)	Overflow (cu.m/s)	Constraint
DD	374.6		0.504				
DB	374.3		0.213				

SUB-CATCHMENT DETAILS							
Name	Max Flow Q (cu.m/s)	Paved Max Q (cu.m/s)	Grassed Max Q (cu.m/s)	Paved Tc (min)	Grassed Tc (min)	Supp. Tc (min)	Due to Storm
Existing 2	0.727	0.072	0.669	15	27		27 5% AEP, 30 min burst, Storm 8
Existing E	0.22	0.016	0.204	22	25		25 5% AEP, 30 min burst, Storm 5
Existing F	0.213	0.016	0.197	22	25		25 5% AEP, 30 min burst, Storm 5
Developed	0.011	0.002	0.01	7	25		22 5% AEP, 30 min burst, Storm 1
Developed	0.159	0	0.159	30	30		30 5% AEP, 45 min burst, Storm 10
Developed	0.342	0.152	0.252	10	25		12 5% AEP, 30 min burst, Storm 1
Dev D	0.423	0.166	0.325	10	30		33 5% AEP, 30 min burst, Storm 1
Dev B	0.059	0	0.059	15	20		15 5% AEP, 25 min burst, Storm 9
Dev A	0.746	0.671	0.076	7	20		10 5% AEP, 10 min burst, Storm 7
Existing 1	0.218	0	0.218	30	30		30 5% AEP, 45 min burst, Storm 10

PIPE DETAILS					
Name	Max Q (cu.m/s)	Max V (m/s)	Max U/S HGL (m)	Max D/S HGL (m)	Due to Storm

CHANNEL DETAILS			
Name	Max Q (cu.m/s)	Max V (m/s)	Due to Storm

OVERFLOW ROUTE DETAILS								
Name	Max Q U/S	Max Q D/S	Safe Q	Max D	Max DxV	Max Width	Max V	Due to Storm
Level Spread	0.42	0.42	1.497	0.097	0.12	4	1.29	5% AEP, 30 min burst, Storm 1
Level Spread	0.153	0.153	1.431	0.052	0.06	4	1.17	5% AEP, 2 hour burst, Storm 1
v notch	0.135	0.153	0.139	0.378	0.4	0.91	1.25	5% AEP, 2 hour burst, Storm 1

DETENTION BASIN DETAILS					
Name	Max WL	MaxVol	Max Q Total	Max Q Low Level	Max Q High Level
Basin A	374.71	939.5	0.135	0	0.135

PIT / NODE DETAILS		Version 8					
Name	Max HGL	Max Pond HGL	Max Surface Flow (cu.m/s)	Max Pond Volume (cu.m)	Min Freeboard (m)	Overflow (cu.m/s)	Constraint
DD	374.59		0.415				
DB	374.29		0.152				

SUB-CATCHMENT DETAILS							
Name	Max Flow Q (cu.m/s)	Paved Max Q (cu.m/s)	Grassed Max Q (cu.m/s)	Paved Tc (min)	Grassed Tc (min)	Supp. Tc (min)	Due to Storm
Existing 2	0.57	0.054	0.53	15	27	27	10% AEP, 45 min burst, Storm 7
Existing E	0.166	0.014	0.151	22	25	25	10% AEP, 30 min burst, Storm 5
Existing F	0.16	0.014	0.147	22	25	25	10% AEP, 30 min burst, Storm 5
Developed	0.008	0.001	0.008	7	25	22	10% AEP, 30 min burst, Storm 1
Developed	0.122	0	0.122	30	30	30	10% AEP, 45 min burst, Storm 7
Developed	0.27	0.127	0.145	10	25	12	10% AEP, 15 min burst, Storm 6
Dev D	0.326	0.143	0.242	10	30	33	10% AEP, 30 min burst, Storm 1
Dev B	0.045	0	0.045	15	20	15	10% AEP, 30 min burst, Storm 6
Dev A	0.637	0.58	0.057	7	20	10	10% AEP, 10 min burst, Storm 7
Existing 1	0.168	0	0.168	30	30	30	10% AEP, 45 min burst, Storm 7

PIPE DETAILS					
Name	Max Q (cu.m/s)	Max V (m/s)	Max U/S HGL (m)	Max D/S HGL (m)	Due to Storm

CHANNEL DETAILS			
Name	Max Q (cu.m/s)	Max V (m/s)	Due to Storm

OVERFLOW ROUTE DETAILS								
Name	Max Q U/S	Max Q D/S	Safe Q	Max D	Max DxV	Max Width	Max V	Due to Storm
Level Spread	0.323	0.323	0.642	0.085	0.1	4	1.17	10% AEP, 30 min burst, Storm 1
Level Spread	0.108	0.108	1.431	0.045	0.04	4	1.12	10% AEP, 3 hour burst, Storm 4
v notch	0.093	0.108	0.139	0.332	0.32	0.8	1.17	10% AEP, 3 hour burst, Storm 4

DETENTION BASIN DETAILS					
Name	Max WL	MaxVol	Max Q Total	Max Q Low Level	Max Q High Level
Basin A	374.65	842.4	0.093	0	0.093

PIT / NODE DETAILS		Version 8					
Name	Max HGL	Max Pond HGL	Max Surface Flow (cu.m/s)	Max Pond Volume (cu.m)	Min Freeboard (m)	Overflow (cu.m/s)	Constraint
DD	374.57		0.311				
DB	374.28		0.1				

SUB-CATCHMENT DETAILS							
Name	Max Flow Q (cu.m/s)	Paved Max Q (cu.m/s)	Grassed Max Q (cu.m/s)	Paved Tc (min)	Grassed Tc (min)	Supp. Tc (min)	Due to Storm
Existing 2	0.382	0.046	0.358	15	27	27	20% AEP, 45 min burst, Storm 6
Existing E	0.116	0.012	0.107	22	25	25	20% AEP, 45 min burst, Storm 6
Existing F	0.113	0.012	0.104	22	25	25	20% AEP, 45 min burst, Storm 6
Developed	0.006	0.001	0.005	7	25	22	20% AEP, 45 min burst, Storm 6
Developed	0.081	0	0.081	30	30	30	20% AEP, 45 min burst, Storm 8
Developed	0.203	0.111	0.097	10	25	12	20% AEP, 15 min burst, Storm 7
Dev D	0.24	0.121	0.125	10	30	33	20% AEP, 15 min burst, Storm 7
Dev B	0.03	0	0.03	15	20	15	20% AEP, 30 min burst, Storm 5
Dev A	0.526	0.502	0.038	7	20	10	20% AEP, 10 min burst, Storm 5
Existing 1	0.111	0	0.111	30	30	30	20% AEP, 45 min burst, Storm 8

PIPE DETAILS					
Name	Max Q (cu.m/s)	Max V (m/s)	Max U/S HGL (m)	Max D/S HGL (m)	Due to Storm

CHANNEL DETAILS			
Name	Max Q (cu.m/s)	Max V (m/s)	Due to Storm

OVERFLOW ROUTE DETAILS								
Name	Max Q U/S	Max Q D/S	Safe Q	Max D	Max DxV	Max Width	Max V	Due to Storm
Level Spread	0.236	0.235	1.497	0.072	0.07	4	1.04	20% AEP, 15 min burst, Storm 7
Level Spread	0.068	0.068	1.431	0.038	0.03	4	1.14	20% AEP, 2 hour burst, Storm 8
v notch	0.059	0.068	0.139	0.28	0.25	0.67	1.06	20% AEP, 2 hour burst, Storm 8

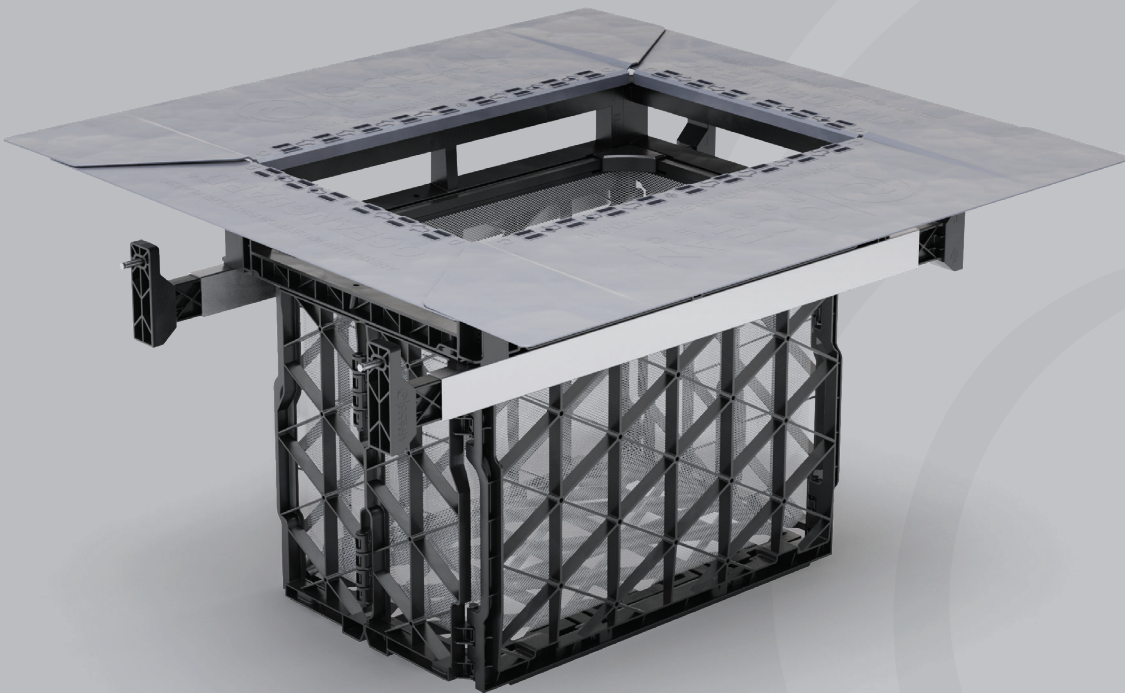
DETENTION BASIN DETAILS					
Name	Max WL	MaxVol	Max Q Total	Max Q Low Level	Max Q High Level
Basin A	374.58	735.8	0.059	0	0.059



Appendix E. OceanGuards Technical specifications

OceanGuard®

Installation Guide



Stopping Pollution Entering Waterways



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Introduction	3
Equipment	4
Components	4
Configurations	7
Installation Procedure	8



Introduction

The purpose of this manual is to advise the safest and most efficient method for installing the OceanGuard®.

This document does not include any details relating to OH&S procedures or requirements related to gully pit installation. It is recommended that all personnel performing installation activities evaluate their own requirements for the compliance with relevant industry regulations and guidelines.

Equipment

Typical tools required for installation include:

- **Tape measure**
 - **Marking tools (marker, spray paint etc.)**
 - **8mm masonry drill & drill bit**
 - **10mm socket and ratchet**
- **Hammer**
 - **Stanley knife**
 - **Straight edge**
 - **Hacksaw**

Components

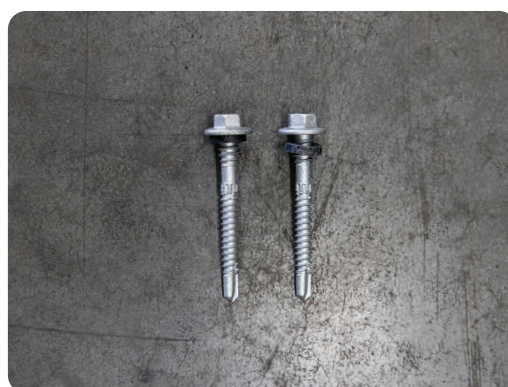
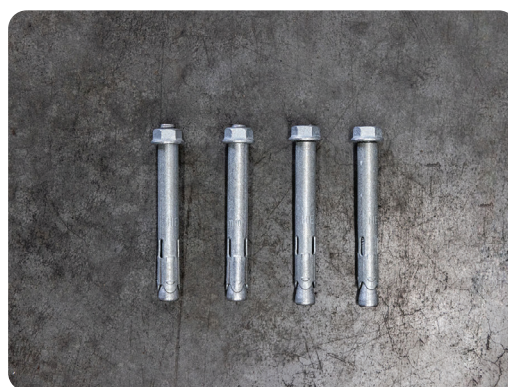
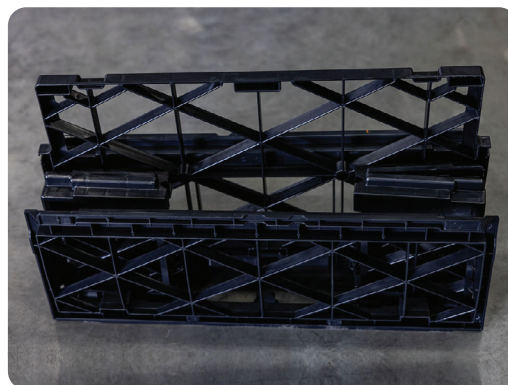
Part ID	Qty	Description
	1	Cardboard Box
A	2	Overflow Frame (long)
B	2	Overflow Frame (short)



Part ID	Qty	Description
C	2	Divertor Panel (long)
D	2	Divertor Panel (short)
	2	Support Strut
	4	Wall Bracket / Mount



Part ID	Qty	Description
	1	Filtration Cage
	1	Filtration Bag & Support Ring
	4	Dynabolts
	2	Self-tapping screws



Configurations

The OceanGuard® can fit a range of pits typically found in Australia including, kerb entry, rear entry with grated drain entry as well as field gully pits. There are multiple sizes to suit pits ranging in plan dimensions of 450 x 450mm to 900mm x 900mm. Additional custom sizes are available to suit large circular and non-standard pits.

The standard OceanGuard® installation collects surface flow only (see *Figure 1*). In some instances, it may be necessary to collect pipe flow, however in this scenario design checks by a suitably qualified engineer need to be undertaken. Please note that the OceanGuard® technology is not a replacement for an in-line gross pollutant trap. Please consult Ocean Protect or the suitably qualified engineer for clarification.

Example Configuration Details:

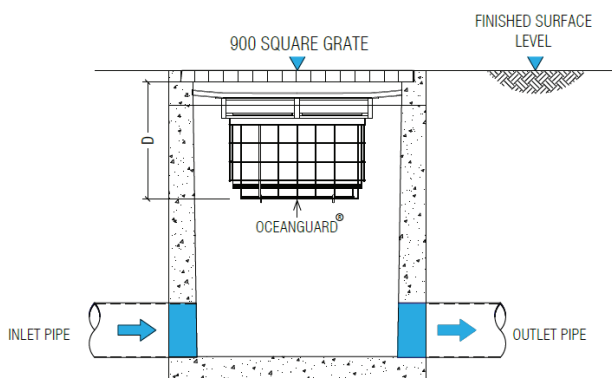


Figure 1: Standard configuration – surface flow

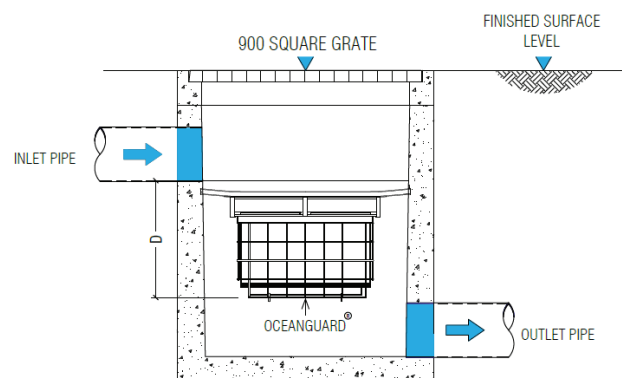


Figure 2: Example configuration – pipe flow

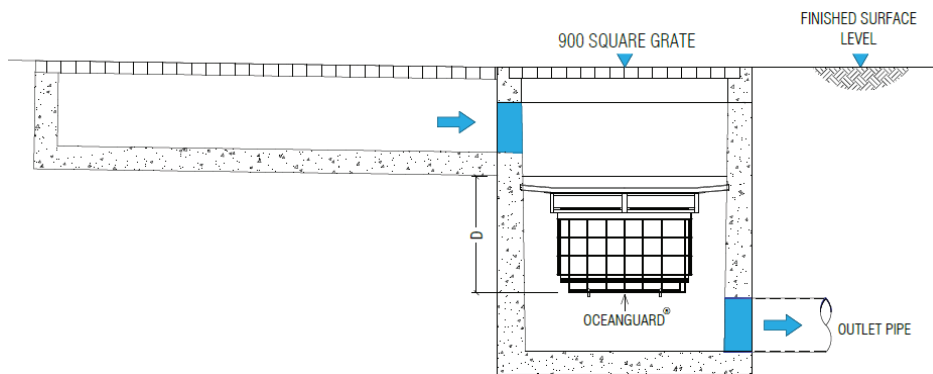


Figure 3: Example configuration – Grated strip/trench drain

Installation Procedure

Overflow Box Assembly

- 1 Identify
1 x Overflow Frame (long) **PART A**
1 x Overflow Frame (short) **PART B**



-
- 2 Interlock the corner connection, as shown below. Press down and click components together



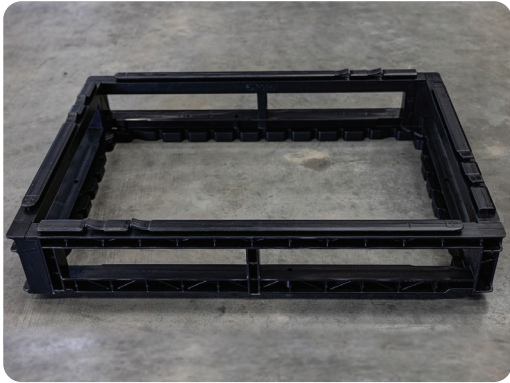
-
- 3 Repeat Step 1 and 2 for the second half



- 4 Interlock the ends of the two L-shaped sections of Overflow Frame simultaneously, as shown below



- 5 Press down on the corners to click together

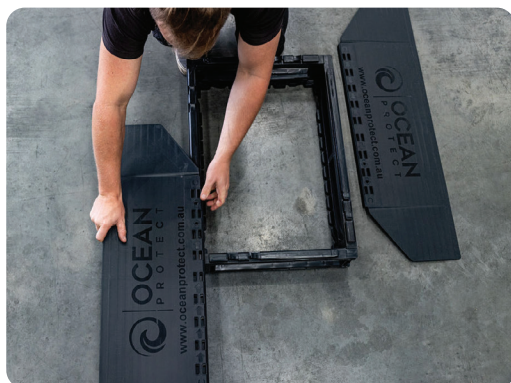


Divertor Panel Installation

- 1 Identify
1 x Divertor Panel (long) **PART C**



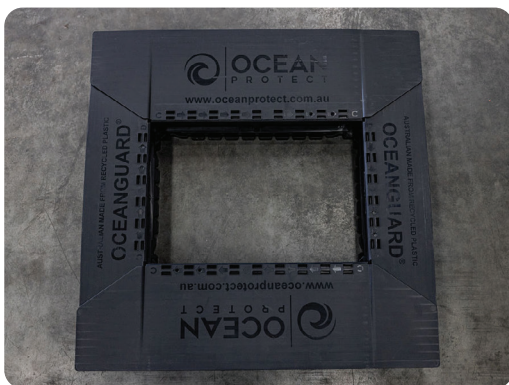
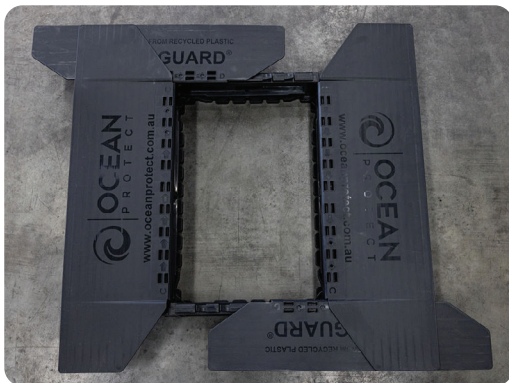
- 2 Align **Part C** on to the **Part A** overflow frame (long side), making sure to note the directional arrows
Slide all the way to the end of **Part A**, as shown below



- 3** Identify
1 x Divertor Panel (short) **PART D**



- 4** Align **Part D** onto **Part B** overflow frame (short side), making sure to note the directional arrows
Slide underneath the long panels installed in Step 2
Slide all the way to the end of **Part B**, as shown below



Strut Installation

- 1 Select pit wall for strut mounting, measure, and mark centre line



- 2 Align the centreline on Strut Location Template with centreline of the pit, ensuring the top edge of the template is level with the desired finished Divertor Panel level (i.e. incoming flow invert level)

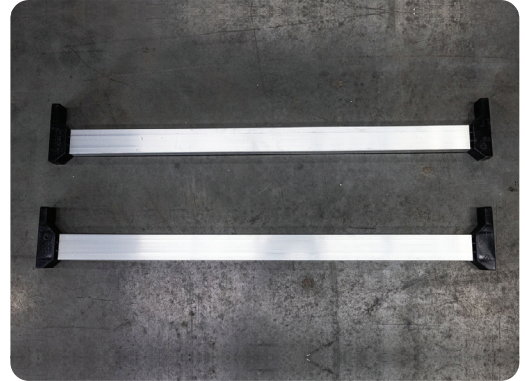


- 3 Hold Strut Location Template in place and drill through both marked points with 8mm masonry drill bit



- 4 Repeat Step 3 on opposite pit wall

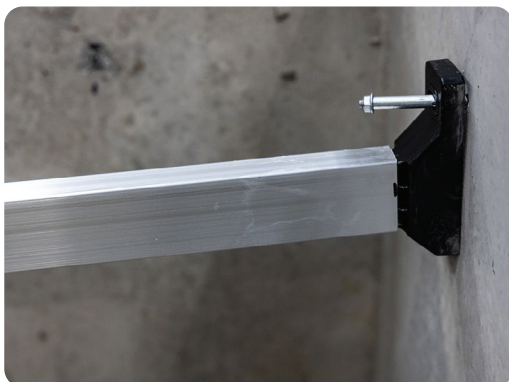
- 5** Identify
4 x Wall Bracket/Mount
4 x 8mm Dynabolts
2 x Support Struts



- 6** Insert 2 x Wall Bracket into each end of the support strut



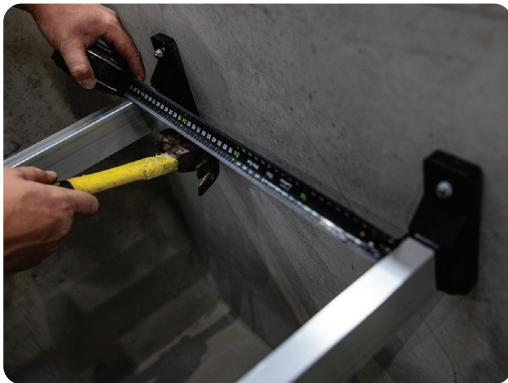
- 7** Align Wall Brackets with hole drilled in Step 3



- 8** Seat Dynabolt in place using hammer
Repeat Steps 7 & 8 to have 2 struts in place



- 9** Double check spacing between struts matches the Flow Divertor internal frame width and adjust spacing if required by gently tapping struts with hammer

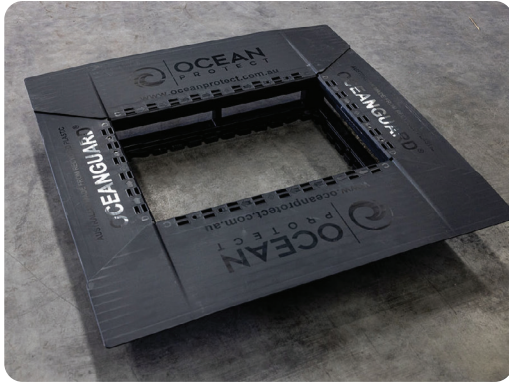


- 10** Secure struts in place by tightening the Dynabolts



Flow Divertor Install

- 1 Return to the completed Flow Divertor



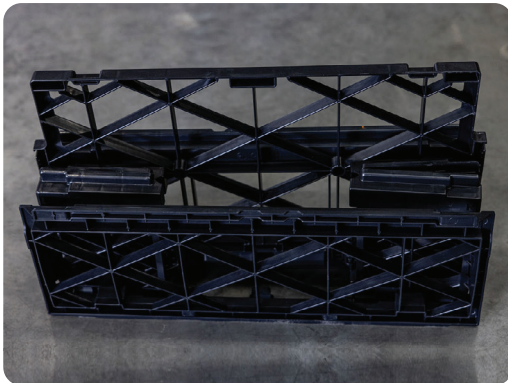
- 2 If Flow Divertor needs to be reduced in size to suit pit, invert the Flow Divertor and place on a flat surface. Then, using a Stanley knife, score the marked trim lines and fold back edge removing the excess.



- 3 Lower and press flow diverter into position ensuring the underside of flow diverter is in good contact with both struts
The Divertor Panels should fit snug with the internal pit walls



- 4 Identify the Filtration Cage



- 5 Lower Filtration Cage into the centre of the Overflow Divertor frame and unfold the cage
The edges of the Filtration Cage will lock into the Overflow Divertor



- 6** Ensure all four edges of the Filtration cage are pushed flush against Flow Divertor and push base of Filtration Cage into position. It will click together



- 7** Identify the Filtration Bag and Support Ring



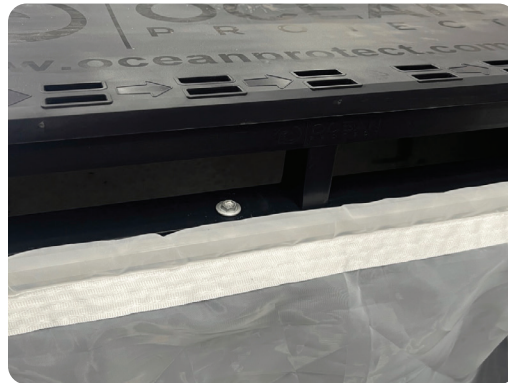
- 8** Lower the Filtration bag into the Flow Divertor ensuring a secure fit

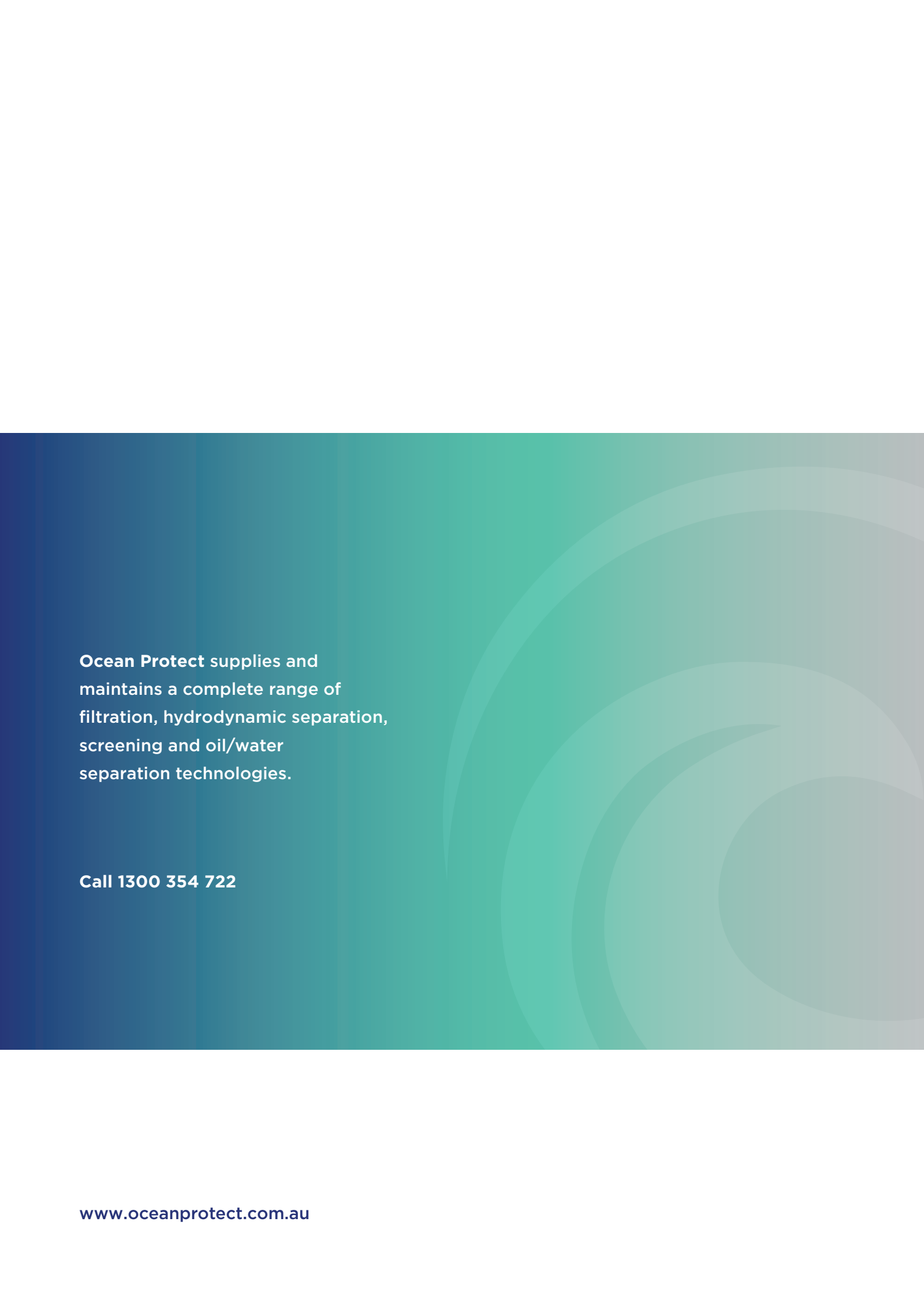


- 9 Identify the 2 x Self-tapping screws which will be used to fasten the Flow Diverter Frame to the struts



- 10 Insert the self-tapping screws into holes located on long edge of Overflow Box
Secure in place, driving the screw into the aluminium strut below
Repeat for the opposite side of the Overflow Box



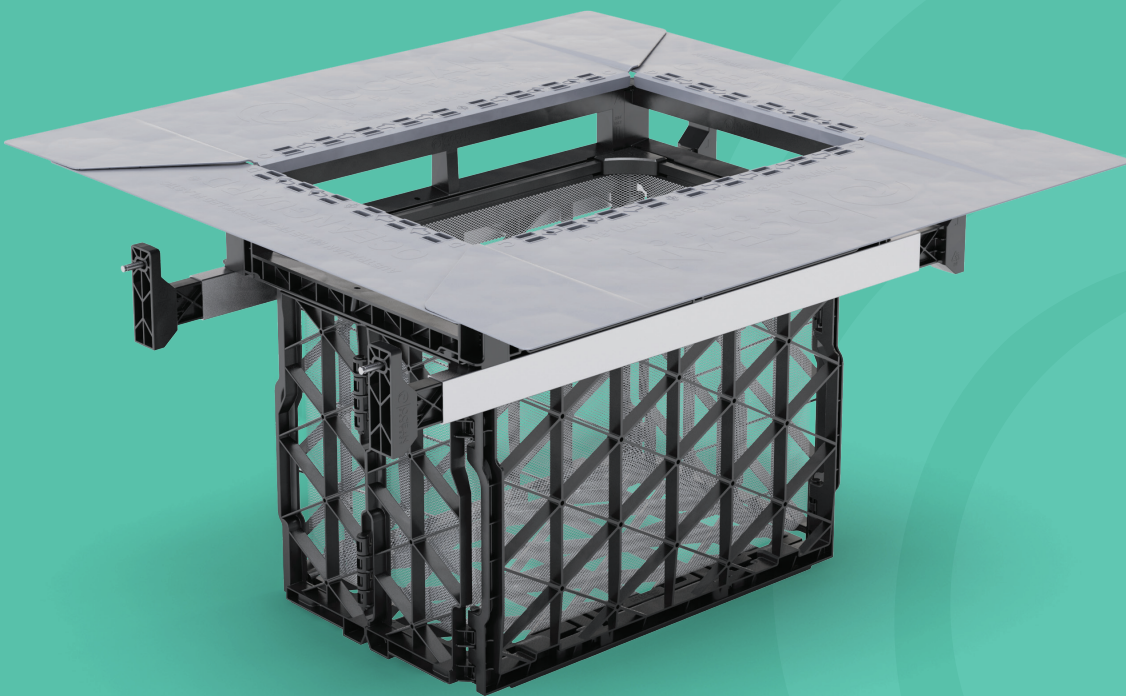
The background of the page features a series of concentric circles in shades of teal and green, centered on the right side. On the left side, there are vertical stripes in varying shades of blue and green. The text is positioned on the left, overlaid on these stripes.

Ocean Protect supplies and maintains a complete range of filtration, hydrodynamic separation, screening and oil/water separation technologies.

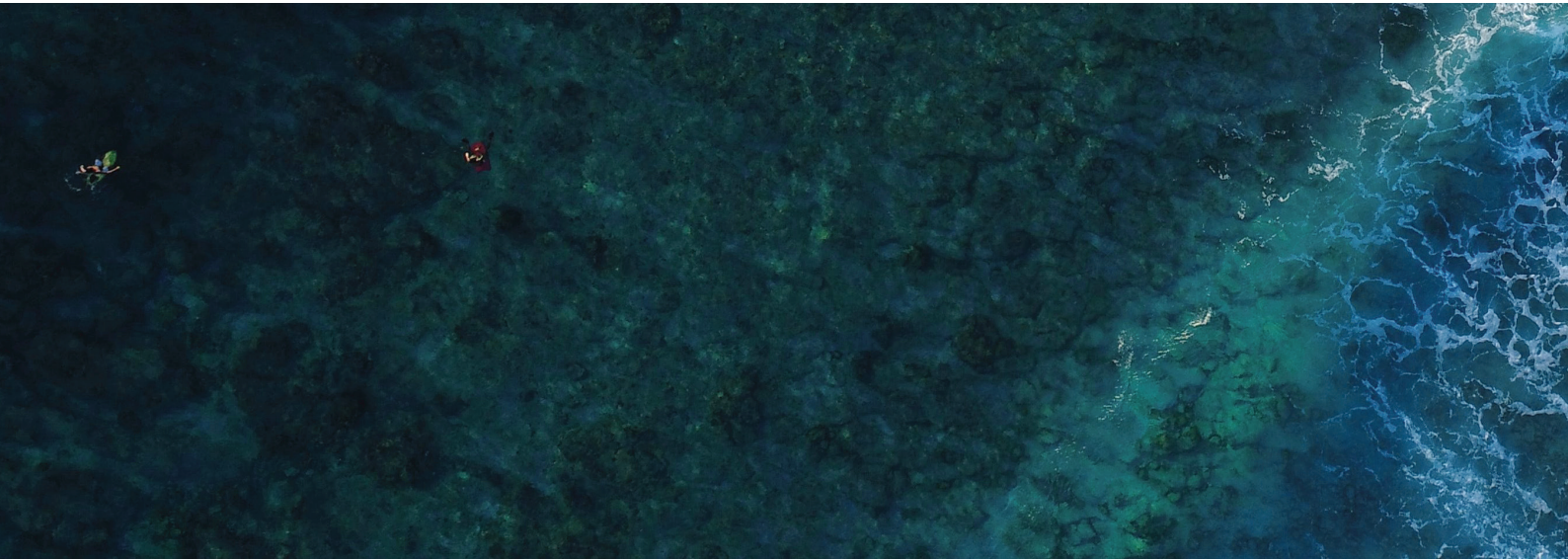
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OceanGuard®

Operations & Maintenance Manual



Stopping Pollution Entering Waterways



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Introduction	3
Health and Safety	4
How does it work?	5
Maintenance Procedures	6
Maintenance Services	7



Introduction

The primary purpose of stormwater treatment devices is to capture and prevent pollutants from entering waterways, maintenance is a critical component of ensuring the ongoing effectiveness of this process. The specific requirements and frequency for maintenance depends on the treatment device and pollutant load characteristics of each site. This manual has been designed to provide details on the cleaning and maintenance processes for the OceanGuard® as recommended by the manufacturer (Ocean Protect).

The OceanGuard® technology is a gully pit basket designed to fit within new and existing gully pits to remove pollution from stormwater runoff. The system has a choice of filtration liners, designed to remove gross pollutants, solids, and other attached pollutants as either a standalone technology or as part of a 'treatment train' (e.g. with StormFilter®, Jellyfish® or biofiltration). OceanGuards are highly effective, easy to install and simple to maintain.

Stormwater professionals should note that Ocean Protect is not permitted to supply OceanGuard® technologies to provide pre-treatment to proprietary stormwater treatment assets that are not provided by Ocean Protect.

Why do I need to perform maintenance?

Adhering to the inspection and maintenance schedule of any stormwater treatment device is essential to ensuring that it functions properly throughout its design life.

During each inspection and clean, details of the mass, volume and type of material that has been collected by the device should be recorded. This data will assist with the revision of future management plans and help determine maintenance interval frequency. It is also essential that qualified and experienced personnel carry out all maintenance (including inspections, recording and reporting) in a systematic manner.

Maintenance of your stormwater management system is essential to ensuring ongoing at-source control of stormwater pollution. Maintenance also helps prevent structural failures (e.g. prevents blocked outlets) and aesthetic failures (e.g. debris build up), but most importantly ensures the long term effective operation of the OceanGuard®.

Health and Safety

Access to pits containing an OceanGuard® typically requires removing (heavy) access covers/grates, but typically it is not necessary to enter into a confined space. Pollutants collected by the OceanGuard® will vary depending on the nature of your site. There is potential for these materials to be harmful. For example, sediments may contain heavy metals, carcinogenic substances or sharp objects such as broken glass and syringes. For these reasons, there should be no primary contact with the waste collect and all aspects of maintaining and cleaning your OceanGuard® require careful adherence to Occupational Health and Safety (OH&S) guidelines.

It is important to note that the same level of care needs to be taken to ensure the safety of non-work personnel, as a result it may be necessary to employ traffic/pedestrian control measures when the device is situated in, or near areas with high vehicular/pedestrian activity.

Personnel health and safety

Whilst performing maintenance on the OceanGuard®, precautions should be taken in order to minimise (or when possible prevent) contact with sediment and other captured pollutants by maintenance personnel. In order to achieve this the following personal protective equipment (PPE) is recommended:

- Puncture resistant gloves
- Steel capped safety boots
- Long sleeve clothing, overalls or similar skin protection
- Eye protection
- High visibility clothing or vest

During maintenance activities it may be necessary to implement traffic control measures. Ocean Protect recommend that a separate site specific traffic control plan is implemented as required to meet the relevant governing authority guidelines.

The OceanGuard® is designed to be maintained from surface level, without the need to enter the pit. However depending on the installation configuration, location and site specific maintenance requirements it may be necessary to enter a confined space occasionally. It is recommended that all maintenance personnel evaluate their own needs for confined space entry and compliance with relevant industry regulations and guidelines. Ocean Protect maintenance personnel are fully trained and carry certification for confined space entry.

How does it work?

OceanGuard® is designed to intercept stormwater as it enters the stormwater pits throughout a site. The OceanGuard® has diversion panels that sit flush with the pit walls, this ensures that as stormwater enters at the top of the pit it is directed to the middle of the insert where the Filtration bag is situated. The filtration bag allows for screening to occur removing 100% of pollutants greater than the opening of the filtration material (200micron, 1600micron bags available).

During larger rain events the large flows overflow slots in the flow diverter of the OceanGuard® ensure that the conveyance of stormwater is not impeded thus eliminating the potential for surface flooding. As the flow subsides, the captured pollutants are held in the OceanGuard® filtration bag. The waste then starts to dry which reduces the magnitude of organic material decomposition transitioning between maintenance intervals.

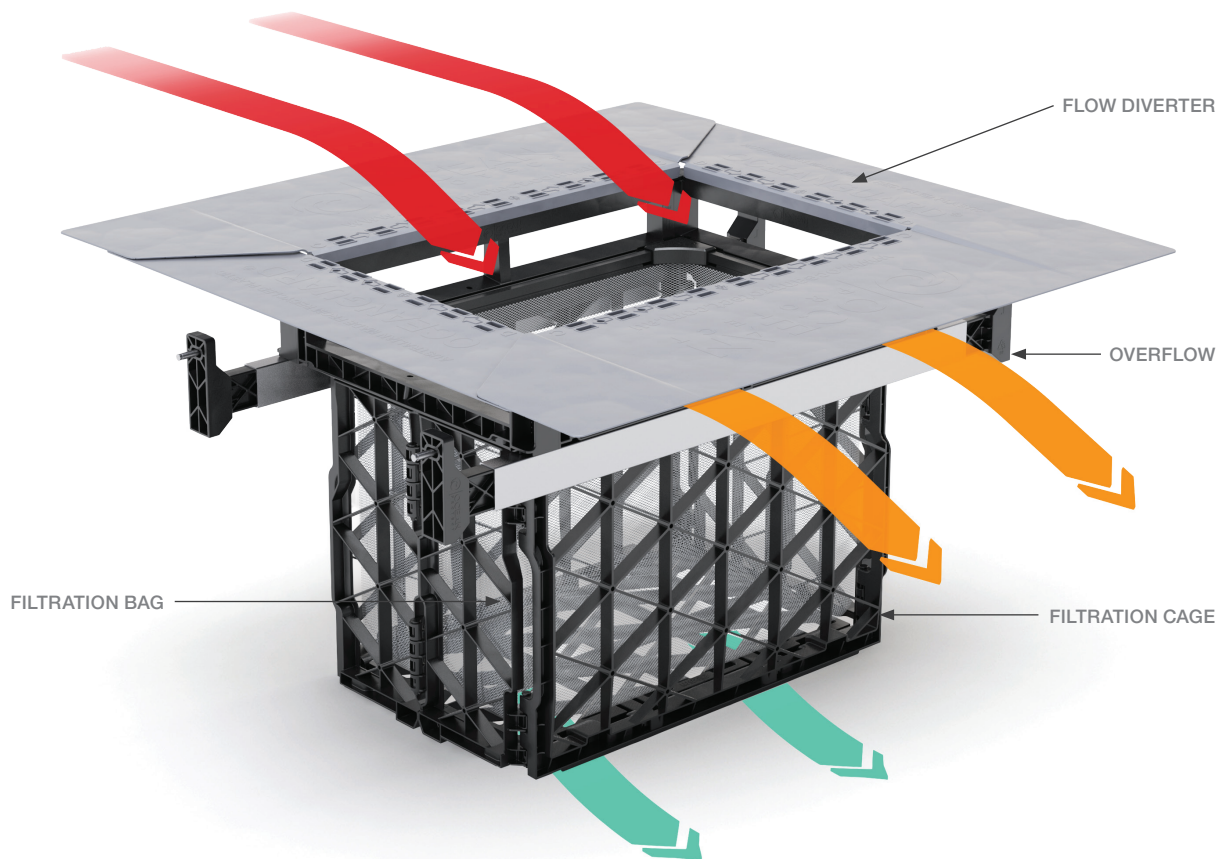


Figure 1: OceanGuard® components

Maintenance Procedures

To ensure that each OceanGuard® achieves optimal performance, it is advisable that regular maintenance is performed. The OceanGuard® requires 1-6 minor services annually (3 to 4 typical). Pending the outcome of these inspections, additional maintenance servicing may be required.

Primary types of maintenance

The table below outlines the primary types of maintenance activities that typically take place as part of an ongoing maintenance schedule for the OceanGuard®.

Service Type	Description of Typical Activities	Frequency
Minor Service	Filter bag inspection and evaluation Removal of capture pollutants Disposal of material	1-6 Times Annually
Major Service	Filter Bag Replacement Support frame rectification	As required

Maintenance requirements and frequencies are dependent on the pollutant load characteristics of each site. The frequencies provided in this document represent what the manufacturer considers to be best practice to ensure the continuing operation of the device is in line with the original design specification.

Minor Service

This service is designed to return the OceanGuard® back to optimal operating performance. This type of service can be undertaken either by hand or with the assistance of a Vacuum unit.

Hand Maintenance

- 1 Establish a safe working area around the OceanGuard®
- 2 Remove access cover/grate
- 3 Use two lifting hooks to remove the filtration bag
- 4 Empty the contents of the filtration bag into a disposal container
- 5 Inspect and evaluate the filtration bag
- 6 Inspect and evaluate remaining OceanGuard® components (i.e. flow diverter, filtration cage and supporting frame)
- 7 Rejuvenate filtration bag by removing pollutant build up with a stiff brush, additionally the filtration bag can be washed using high pressure water
- 8 Re-install filtration bag and replace access cover/grate

Vacuum Maintenance

- 1 Establish a safe working area around the OceanGuard®
- 2 Remove access cover/grate
- 3 Vacuum captured pollutants from the filtration bag
- 4 Remove filtration bag
- 5 Inspect and evaluate the filtration bag
- 6 Inspect and evaluate remaining OceanGuard® components (i.e. flow diverter, filtration cage and supporting frame)
- 7 Rejuvenate filtration bag by removing pollutant build up with a stiff brush, additionally the filtration bag can be washed using high pressure water
- 8 Re-install filtration bag and replace access cover/grate

Major Service (Filter Bag Replacement)

For the OceanGuard®, a major service is a reactionary process based on the outcomes from the minor service.

Trigger Event from Minor Service	Maintenance Action
Filtration bag inspection reveals damage	Replace the filtration bag ^[1]
Component inspection reveals damage	Perform rectification works and if necessary replace components ^[1]

^[1] Replacement filtration bags and components are available for purchase from Ocean Protect

Additional Types of Maintenance

Occasionally, events on site can make it necessary to perform additional maintenance to ensure the continuing performance of the device.

Hazardous Material Spill

If there is a spill event on site, all OceanGuard® pits that potentially received flow should be inspected and cleaned. Specifically, all captured pollutants from within the filtration bag should be removed and disposed in accordance with any additional requirements that may relate to the type of spill event. All filtration bags should be rejuvenated (replaced if required) and re-installed.

Blockages

The OceanGuard's internal high flow bypass functionality is designed to minimise the potential of blockages/flooding and this configuration has been field proven for over twenty years. Flooding caused by an OceanGuard® style of pit basket is extremely rare and in the unlikely event that flooding occurs around the stormwater pit the following steps should be undertaken to assist in diagnosing the issue and implementing the appropriate response.

- 1 Inspect the OceanGuard® flow diverter, ensuring that they are free of debris and pollutants
- 2 Perform a minor service on the OceanGuard®
- 3 Remove the OceanGuard® to access the pit and inspect both the inlet and outlet pipes, ensuring they are free of debris and pollutants

Major Storms and Flooding

In addition to the scheduled activities, it is important to inspect the condition of the OceanGuard® after a major storm event. The inspection should focus on checking for damage and higher than normal sediment accumulation that may result from localised erosion. Where necessary damaged components should be replaced and accumulated pollutants disposed.

Disposal of Waste Materials

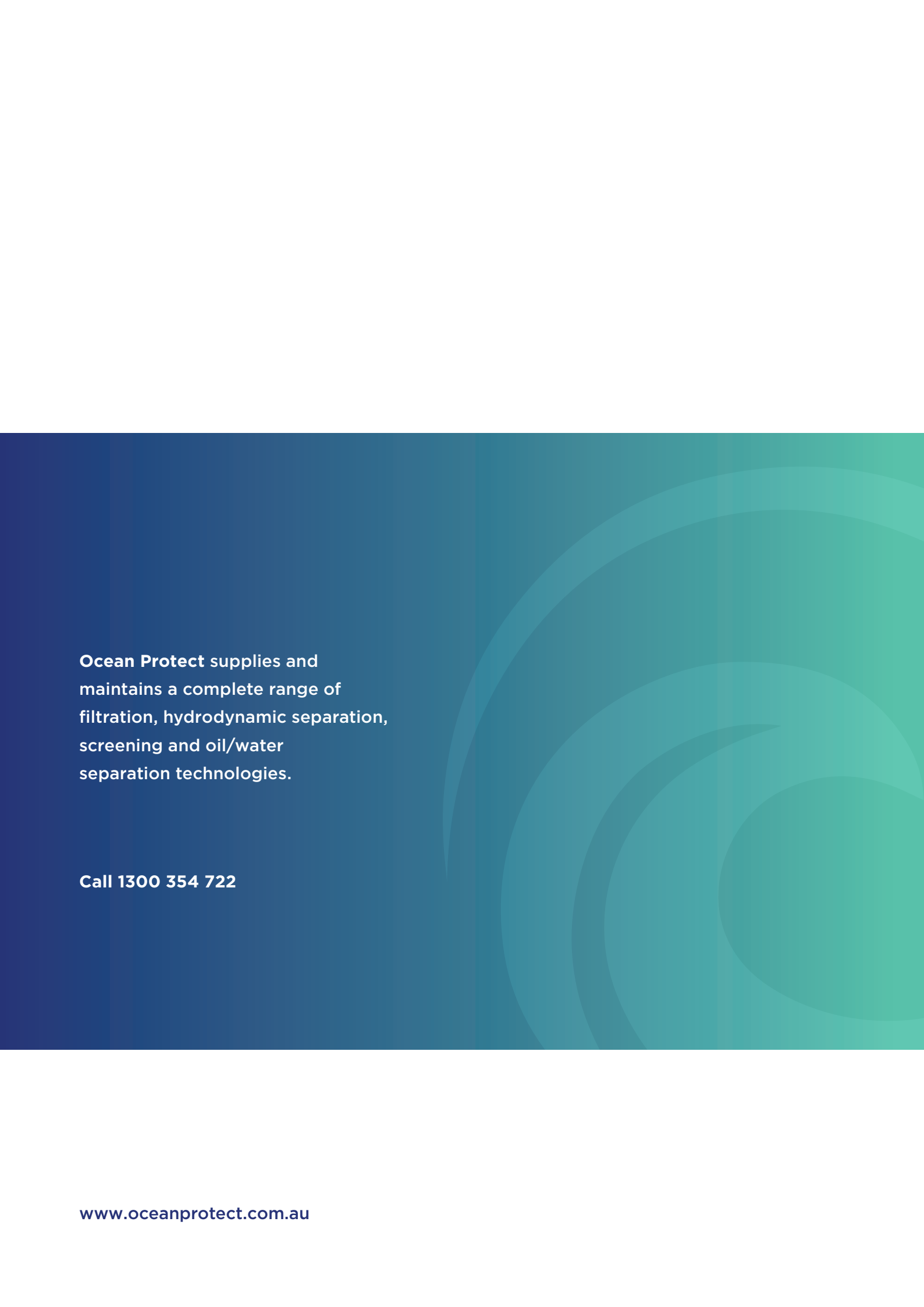
The accumulated pollutants found in the OceanGuard® must be handled and disposed of in a manner that is in accordance with all applicable waste disposal regulations. When scheduling maintenance, consideration must be made for the disposal of solid and liquid wastes. If the filtration bag has been contaminated with any unusual substance, there may be additional special handling and disposal methods required to comply with relevant government/authority/industry regulations.

Maintenance Services

With over a decade and a half of maintenance experience Ocean Protect has developed a systematic approach to inspecting, cleaning and maintaining a wide variety of stormwater treatment devices. Our fully trained and professional staff are familiar with the characteristics of each type of system, and the processes required to ensure its optimal performance.

Ocean Protect has several stormwater maintenance service options available to help ensure that your stormwater device functions properly throughout its design life. In the case of our OceanGuard®, we offer long term pay-as-you-go contracts, pre-paid once off servicing and replacement filter bags.

**For more information please visit
www.oceanprotect.com.au**



Ocean Protect supplies and maintains a complete range of filtration, hydrodynamic separation, screening and oil/water separation technologies.

Call 1300 354 722