ANNEXURE 12

Stormwater Assessment

prepared by

Allen Price and Scarratts

22, 24, 171 and 220
Bolong Road, Bomaderry

STORMWATER MANAGEMENT REPORT

Allen Price & Scarratts Pty Ltd
Land & Development Consultants
75 Plunkett Street
NOWRA NSW 2541

Client: **Shoalhaven Starches P/L**
Project: **Stormwater Management Plan**
Project No: **N27563**
SCC Ref: **FOR MOD 16**
Date: **07 June 2018**

DEVELOPMENT DRAINAGE DESIGN REPORT at MANILDRA VARIOUS SITES BOLONG ROAD, BOMADERRY

This report has been prepared to support a modification to development approval (MOD 16) in accordance with Shoalhaven City Council's (SCC) D5 Engineering Standards document and DCP2014 for storm events from the 1:10 ARI to 1:100 ARI.

Calculations have been prepared by a qualified practicing engineer using DRAINS version 2018.05.

There are multiple areas proposed for development under this modification. Appendix A ref N27563-401 numbers each site to be addressed and are summarised as follows:

1. Product Dryer

This is currently hardstand area, therefore no pre/post flow considerations are required. Stormwater is proposed to sheet from roof to existing capture from ground (no downpipes) to match existing discharge pattern as outlined in Drawing ref MN6531-016 (Appendix B).

2. Sifter Room

The proposed sifter room raises the existing roof area (MN6531-014), therefore no pre/post flow considerations are required. Stormwater will continue to discharge unchanged from existing condition per pattern in drawing ref MN6531-016 (Appendix B).

3. Main Sub-Station Extension

The proposed Main Sub-Station extension raises the existing roof area with minor extensions (MN6531-013), therefore no pre/post flow considerations are required. Stormwater will continue to discharge unchanged from existing condition per pattern in drawing ref MN6531-016 (Appendix B).

4. Proposed Indoor Electrical Sub-Station

The indoor electrical substation (MN6531-010 & -011) is proposed over existing hardstand area, therefore no pre/post flow considerations are required. Stormwater is to be captured and discharged to existing nearby drainage infrastructure. See drawing N27563-402 (Appendix A) and Appendix C for calculations and layout.

5. Relocation of Parking Spaces

Proposed relocation of 26 parking spaces displaced by indoor electrical sub-station (4) is to sheet overland to existing swale to be dispersed over Adjoining bunded paddocks. Discharge is controlled by earth bund wall per prior plan N27259-101 to 103 as such no pre/post flow calculations are required.

6. & 7. Regularisation

Areas for MOD 3 & 12 Regularisation are proposed to have minor adjustment in location with no change in stormwater discharge location or patterns. Stormwater discharge pattern will remain as per MN6531-016 (Appendix B).

8. Rail Unloading Modification

The proposed rail unloading modification has no roof structure and is constructed over existing hardstand area (MN6531-012). Therefore no pre/post flow considerations are required. Stormwater discharge unchanged from existing pattern as per MN6531-016 (Appendix B)

9. Flour Mill C & Flour Mill A, B, C Ventilation

Proposed Flour Mill C structure (MN244-002 to -007, -010, -011) will be contained within the existing flour mill buildings and therefore stormwater analysis is not applicable.
The ventilation structures also provide no increase in hardstand area or other increase in capture areas and therefore no pre/post flow considerations are required. Stormwater discharge patterns will remain as per MN6531-016 (Appendix B).

10. Lime Silos

Proposed Lime Silos are to be constructed over existing hardstand area (MN6531-005 to -009) and therefore no pre/post flow considerations are required. Stormwater is to sheet from roof structures to existing ground capture points and discharge per existing condition per MN6531-016 (Appendix B).

11. #8 Boiler and Generator Set

Proposed #8 Boiler and Generator set are to be constructed over existing hardstand area (MN6531-005 to -009) and therefore no pre/post flow considerations are required. Stormwater is to sheet from roof structures to existing ground capture points and discharge per existing condition per MN6531-016 (Appendix B).

As per the above summary, further consideration and calculations are required only for the Indoor Electrical Sub-Station (4).

It is found that 150mm diameter PVC pipes laid at minimum 0.4% grade will be sufficient to convey roofwater to the nearby drainage infrastructure. As there is no requirement for pre/post flow considerations there is no additional requirement for detention structures.

Appendix A to C show the calculations verifying that stormwater will be managed from the site such that there is no increase in discharge for up to the 1:100 ARI storm event.

APPENDIX A - Stormwater Management Plans ref N27563-401 to 402

SHOALHAVEN RIVER

BOMADERRY CREEK

BOLONG ROAD

ABERNETHYS DRAIN

OPEN SWALE

(10) PROPOSED LIME SILOS IS CONSTRUCTED OVER EXISTING HARDSTAND AREA (MN6531-005 TO -009), THEREFORE NO PRE/POST FLOW CONSIDERATIONS REQUIRED. STORMWATER TO SHEET FROM ROOVES TO EXISTING CAPTURE FROM GROUND - DISCHARGE UNCHANGED FROM EXISTING PER PATTERN IN DRAWING REF MN6531-016

(9) PROPOSED FLOUR MILL C WITHIN EXISTING FLOUR MILL BUILDING. THEREFORE STORMWATER ASSESSMENT NOT APPLICABLE. PROPOSED FLOUR MILL A, B & C VENTILATION (MN244-002 TO -007, -010, -011) PROVIDES NO INCREASE IN HARDSTAND FOOTPRINT OR INCREASE IN CAPTURE AREAS, THEREFORE NO PRE/POST FLOW CONSIDERATIONS REQUIRED. STORMWATER TO DISCHARGE UNCHANGED FROM EXISTING PER PATTERN IN DRAWING REF MN6531-016

(8) PROPOSED RAIL UNLOADING MODIFICATION HAS NO PROPOSED ROOF STRUCTURE AND IS CONSTRUCTED OVER EXISTING HARDSTAND AREA (MN6531-012), THEREFORE NO PRE/POST FLOW CONSIDERATIONS REQUIRED. STORMWATER TO DISCHARGE UNCHANGED FROM EXISTING PER PATTERN IN DRAWING REF MN6531-016

(11) PROPOSED #8 BOILER AND GENERATOR SET IS CONSTRUCTED OVER EXISTING HARDSTAND AREA (MN6531-005 TO -009), THEREFORE NO PRE/POST FLOW CONSIDERATIONS REQUIRED. STORMWATER TO SHEET FROM ROOVES TO EXISTING CAPTURE FROM GROUND - DISCHARGE UNCHANGED FROM EXISTING PER PATTERN IN DRAWING REF MN6531-016

(7) AREA FOR MOD 12 REGULARISATION TO HAVE MINOR RELOCATION/ADJUSTMENT. NO PROPOSED CHANGE IN DISCHARGE LOCATION OR PATTERNS

(1) PROPOSED PRODUCT DRYER. CURRENTLY HARDSTAND AREA, THEREFORE NO PRE/POST FLOW CONSIDERATIONS REQUIRED. STORMWATER TO SHEET FROM ROOF TO EXISTING CAPTURE FROM GROUND (NO DOWNPIPES) TO MATCH EXISTING DISCHARGE PATTERN AS OUTLINED IN DRAWING REF MN6531-016

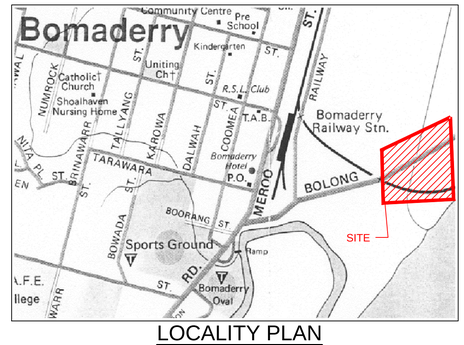
(6) AREA FOR MOD 3 REGULARISATION TO HAVE MINOR RELOCATION/ADJUSTMENT. NO PROPOSED CHANGE IN DISCHARGE LOCATION OR PATTERNS

(2) PROPOSED SIFTER ROOM RAISES EXISTING ROOF AREA (MN6531-014), THEREFORE NO PRE/POST FLOW CONSIDERATIONS REQUIRED. STORMWATER TO DISCHARGE UNCHANGED FROM EXISTING PER PATTERN IN DRAWING REF MN6531-016

(5) PROPOSED RELOCATION OF 26 PARKING SPACES DISPLACED BY INDOOR ELECTRICAL SUB-STATION (4). AREA TO SHEET OVERLAND TO EXISTING SWALE TO BE DISPERSED OVER ADJOINING BUNDED PADDOCKS. DISCHARGE IS CONTROLLED BY EARTH BUND WALL PER PRIOR PLAN N27259-101 TO 103 AS SUCH NO PRE/POST FLOW CALCULATIONS ARE REQUIRED.

(3) PROPOSED MAIN SUB-STATION EXTENSION RAISES EXISTING ROOF AREA WITH MINOR EXTENSIONS THAT ARE EXISTING HARDSTAND AREAS (MN6531-013), THEREFORE NO PRE/POST FLOW CONSIDERATIONS REQUIRED. STORMWATER TO DISCHARGE UNCHANGED FROM EXISTING PER PATTERN IN DRAWING REF MN6531-016

(4) PROPOSED INDOOR ELECTRICAL SUB-STATION (MN6531-010 &-011) ON EXISTING HARDSTAND AREA, THEREFORE NO PRE/POST FLOW CONSIDERATIONS REQUIRED. STORMWATER TO BE CAPTURED AND DISCHARGED TOWARD EASTERN SWALE. FOR PRELIMINARY CALCULATIONS AND LAYOUT SEE N27563-402.



LOCALITY PLAN

MAP DRAWN & PUBLISHED BY CARTODRAFT AUST P/L

0 10 20 30 40 50

SCALE:- 1:1500

Liability limited by a scheme approved under Professional Standards Legislation.

COVER OF EXCELLENCE

BEWARE!

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

DIAL BEFORE YOU DIG www.1100.com.au

REV	DESCRIPTION	BY	DATE				
P0	ISSUED FOR APPROVAL	RMH	07/06/18				

RATIO: 1:1500 (AT A1 ORIGINAL)

DATUM: N/A

ORIGIN:

DATE OF PLAN: JUNE 2018

SURVEY	OTHERS
DESIGN	RMH
DRAWN	RMH
CHECK'D	MAK

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STORMWATER MANAGEMENT PLAN
PROPOSED DEVELOPMENT MOD 16
OVER LOT 201 DP1062668, LOT 1 DP838753, LOT 141 & 143 DP1069758 & OTHERS AT BOLONG ROAD, BOMADERRY
FOR SHOALHAVEN STARCHES PTY LTD

DRAWING STATUS: FOR CONCEPT APPROVAL
NOT TO BE USED FOR CONSTRUCTION PURPOSES

DRAWING NUMBER: N27563-401

SHEET 1 OF 2

REVISION: P0

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ABERNETHYS DRAIN

OPEN SWALE

BOLONG ROAD

CARPARK EXTENSION TO SHEET OVERLAND TO OPEN SWALE. SWALE / BUNDED PADDOCKS TO MATCH EXISTING.

EXISTING DRAINAGE STRUCTURE TO BE RELOCATED AS REQUIRED

EXISTING SERVICES TO BE RELOCATED AS REQUIRED (DESIGN BY OTHERS)

DOWNPIPES TO BE PROVIDED TO AS3500 REQUIREMENTS. CONNECT TO EXISTING STORMWATER PIT
RL 2.8
INV 2.2

Ø150 PVC

Ø150 PVC

PIPE SIZING CALCULATIONS PROVIDED IN AP&S STORMWATER MANAGEMENT REPORT

BEWARE!

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

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0 2.5 5 7.5 10 15

SCALE:- 1:250

Liability limited by a scheme approved under Professional Standards Legislation.

COVER OF EXCELLENCE

M:\Projects\2000\27000sN27563\Drawings\N27563-402.dwg

RATIO: 1:250 (AT A1 ORIGINAL)

DATUM: N/A

ORIGIN:

DATE OF PLAN: JUNE 2018

	SURVEY	OTHERS
DESIGN		RMH
DRAWN		RMH
CHECK'D		MAK

REV	DESCRIPTION	BY	DATE
P0	ISSUED FOR APPROVAL	RMH	07/06/18

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BOC SUBSTATION STORMWATER MANAGEMENT PLAN
PROPOSED DEVELOPMENT MOD 16
OVER LOT 201 DP1062668, LOT 1 DP838753, LOT 141 & 143 DP1069758 & OTHERS AT BOLONG ROAD, BOMADERRY
FOR SHOALHAVEN STARCHES PTY LTD

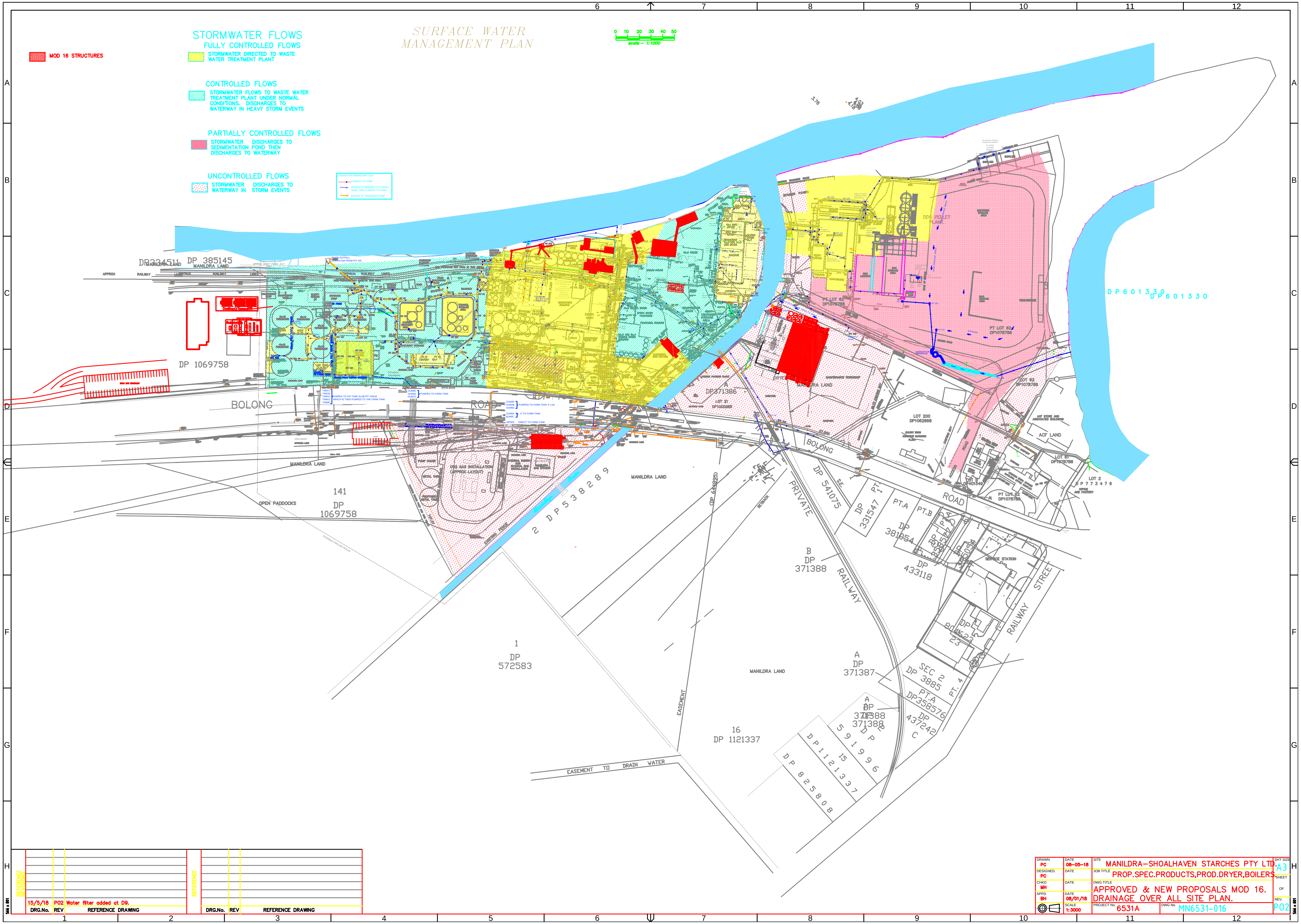
DRAWING STATUS: FOR CONCEPT APPROVAL
NOT TO BE USED FOR CONSTRUCTION PURPOSES

DRAWING NUMBER: N27563-402

SHEET 2 OF 2

REVISION: P0

APPENDIX B: MN6531-016 – MOD16 Drainage Over All Site plan



DRAWN PC	DATE 08-05-18	SITE	MANILDRA–SHOALHAVEN STARCHES PTY LTD.
DESIGNED. PC	DATE	JOB TITLE	PROP.SPEC.PRODUCTS,PROD.DRYER,BOILERS.
CHKD MH	DATE	DWG TITLE	APPROVED & NEW PROPOSALS MOD 16. DRAINAGE OVER ALL SITE PLAN.
APPD BH	DATE 08/01/18		
	SCALE 1:3000	PROJECT No. 6531A	DWG No. MN6531-016

SHT SIZE A3 · SHEET OF · REV. P02

Appendix C - Stormwater Calculations - Rational Method and Pipe Size Calculations

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75 Plunkett Street
NOWRA NSW 2541

Client:	**Shoalhaven Starches**
Project:	**MOD 16 Application - Stormwater Management**
Project No:	**N27563**
SCC Ref:	**N/A**
Date:	**07-Jun-18**

Note: Bold cells only are inputs

Discharge

Block Size =	**313**	m2	
% of area drained =	**100%**		
Area to drain =	**313**	m2	
ARI =	**10**	years	
tc =	**5**	mins	
C =	**0.9**	(from Table 5.1 DCP100 - 100% impervious)	
I =	**194**	mm/hr (from DCP100 IFD Table for Nowra)	
Q =	15.2	L/s	(Q = CIA/360)

Pipe size to cater for design flow using Colebrook-White Method

Nominal Diameter =	**150**	mm	
Actual ID =	0.151	m	from table below (Hardies Design Manual, 1987 - page 2-51 for sewer pipe which is smaller ID than stormwater pipe)
k =	0.003	mm	for uPVC with chemically cemented joints (Hardies Design manual, 1987 - page 4-78)
ν =	1.14E-06		Water at 15 degrees C
V =	0.84	m/s	
N_R =	1.12E+05		
f =	0.01757		
Sf =	0.0042	m/m	ie at a grade of: 0.4 % or 1 in: 236.6

Assume minimum grade (from site inspection) = 1 %

Therefore, DN 150 mm pipe at minimum grade of 0.4 % is adequate to cater for design flows of 15.2 L/s