



Cowman Stoddart Pty Ltd

PO Box 738

NOWRA

NSW 2541

114044/ethanolmodificationsjuly2020

7 September 2020

Attention: Mr. S Richardson

Dear Steve,

**Re: DCP2014 Chapter G9: Flood Compliance Report for Proposed Modification
Application to MP06-0228, Shoalhaven Starches Expansion Project, Bolong Road,
Mod 19 Modifications to Existing Ethanol Distillery**

This letter has been prepared by R W Dewar BSc, MEngSci, MIEAust CPEng Member No 477618 who has over 35 years of experience in NSW in floodplain management.

1 Introduction

Shoalhaven Starches intend to undertake modifications to the existing Ethanol Distillery Plant located at their Bomaderry factory site to increase the proportion of 'beverage' grade ethanol that is produced. A Google Map aerial photograph is provided below of the site as well as Drawing 001 which describes the proposed works. The complete set of design plans are provided in Appendix A. The modifications will enable increased flexibility in terms of the range of types of ethanol produced at the site (i.e. between fuel, industrial, pharmaceutical and beverage grade ethanol) to meet market demands.

The modification proposal will also enable an increase in production of up to 100 ML of beverage grade ethanol per annum and Shoalhaven Starches propose to undertake the following modifications to the plant:

- a) Ethanol plant modifications, Drw 002 to 006;
- b) Ethanol storage & load out additions, Drw 007 to 008;
- c) Relocated bunded product tanks, Drw 009 to 010;
- d) South western car park extension, Drw 011;
- e) Pipe bridge and re-route of pipe gantry approval, Drw 012;
- f) Product silos, chemical storage tanks, Drw 09 & 013;
- g) Relocated main substation extension, Drw 014;
- h) Relocated western substation, Drw 015;
- i) Additional cooling towers, Drw 016;
- j) Relocation of approved ISO container storage, Drw 016;
- k) Relocation of approved ethanol distillery control room, Drw 002.

WMAwater Pty Ltd

DIRECTORS

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R W Dewar
E J Askew
F L N Ling, RPEQ

SENIOR ASSOCIATES

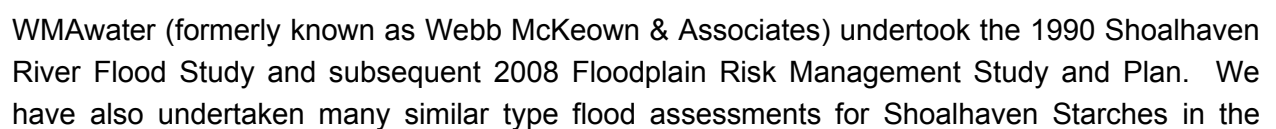
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past. Thus, we are very familiar with flooding in the Shoalhaven River floodplain and the implications for flooding of further development within the confines of the existing Shoalhaven Starches plant on Bolong Road.

The site is inundated in the 1% Annual Exceedance Probability (AEP) flood event by floodwaters from the Shoalhaven River and this letter provides an assessment of the implications of this proposal on flood levels, flows and velocities.

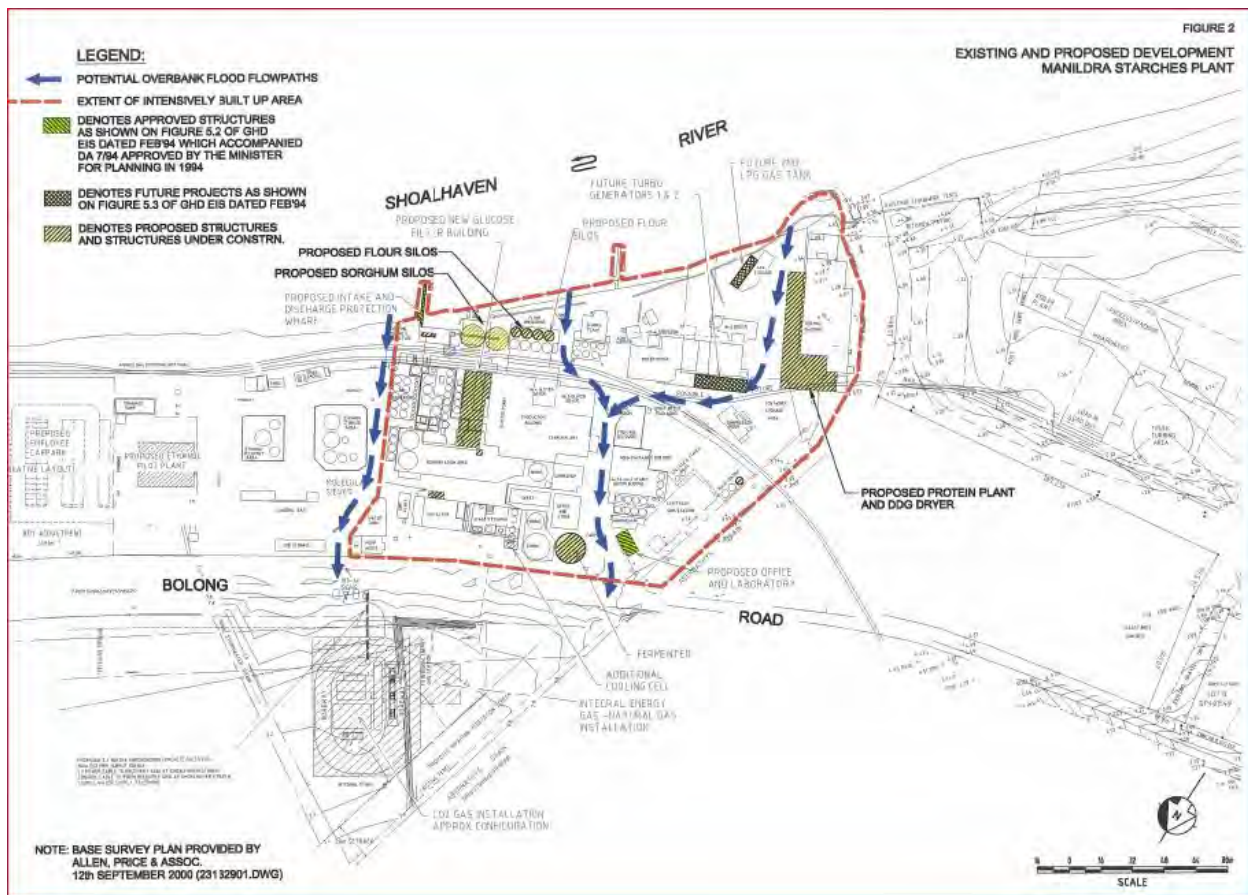
2 Description of Proposal

The proposal is to construct plant as described in Appendix A. An indicative ground level at the site is 4.5 mAHD (Figure 1). The 1% AEP flood level is 5.7 mAHD according to the Flood Certificate obtained from Council on 5th April 2018 (attached as Appendix B). Figure 2 provides the 1% AEP peak flood depths based on the TUFLOW modelling as the Flood Certificate is based on prior flood study results (refer Section 3.2.1 and below for an explanation of the difference).

The Flood Certificate also advises that in the 1% AEP event parts of the sites are described as High Hazard and Floodway and that the projected sea level rise estimates due to climate change will not increase the 1% AEP flood level at this site. It should be noted that the high hazard and floodway classifications (and all other flood related data) were taken from the hydraulic model established in the 1990 Shoalhaven River Flood Study. These are the maximum classifications for the site and the hazard will decrease towards Bolong Road as floodwaters dissipate into the northern floodplain.

The construction of any works on the floodplain will cause a loss of temporary floodplain storage and a loss of hydraulic conveyance. The resulting increase in flood levels will depend upon the magnitude of these losses. Given that parts of the proposed plant are on piers and / or raised above the 1% AEP flood level and the floodplain storage area of the Shoalhaven River floodplain is of the order of 100km², the loss of temporary floodplain storage due to the works is generally too small to be accurately evaluated (it is accounted for in the TUFLOW modelling for major structures). The main issue from a flooding perspective is therefore the construction of plant as it will impede flow from the Shoalhaven River crossing the site to enter the northern floodplain (i.e reduce the hydraulic conveyance through the site and potentially raise flood levels elsewhere).

Prior to construction of the Shoalhaven Starches plant at Bomaderry there would have been significant flow through the site during a flood, as there is across any riverbank. However, since approximately 1960 the ongoing construction of the plant has effectively blocked the flow path through a large part of the site. This issue has been investigated in our October 2000 report titled *"Further Development within the Manildra starches Plant off Bolong Road, Bomaderry - Hydraulic Assessment"*. The conclusions from that report are provided in Appendix C. In summary an agreement was reached that any future development within the intensively built-up area, as indicated on the Figure 2 below (taken from that report) would not require hydraulic modelling to quantify the hydraulic impacts and cumulative effects.



Flood impact assessment of the proposed plant (i.e will the works impact on flood levels) has therefore been separated into the following two categories (Sections 2.1 and 2.2) according to their site locations.

2.1 Proposed Plant within the Intensively Built Up Area as Described in the Plan above and in Appendix C (lettering as provide above)

- a) Ethanol plant modifications, Drw 002 to 006;
- e) Part of Pipe bridge and re-route of pipe gantry approval, Drw 012;
- g) Relocated main substation extension, Drw 014;
- k) Relocation of approved ethanal distillery control room, Drw 002.

2.2 Proposed Plant outside the Intensively Built Up Area as Described in the Plan above and in Appendix C (lettering as provide above)

- b) Ethanol storage & load out additions, Drw 007 to 008;
- c) Relocated bundled product tanks, Drw 009 to 010;
- d) South western car park extension, Drw 011;
- e) Part of Pipe bridge and re-route of pipe gantry approval, Drw 012;
- f) Product silos, chemical storage tanks, Drw 09 & 013;
- h) Relocated western substation, Drw 015;
- i) Additional cooling towers, Drw 016;
- j) Relocation of approved ISO container storage, Drw 016.

3 Compliance with Chapter G9: Development on Flood Prone Land (DCP2014)

The following sections describe compliance with Chapter G9: Development on Flood Prone Land (DCP2014 Amended 14th December 2018). As the works will not involve fill, or subdivision of lands and only a small amount of excavation piling, compliance with these performance criteria have not been addressed.

3.1 Performance Criteria - General (Section 5.1 of DCP only)

PERFORMANCE CRITERIA	RESPONSE
P1 Development or work on flood prone land will meet the following:	
The development will not increase the risk to life or safety of persons during a flood event on the development site and adjoining land.	The works are such that their construction will require 65 additional contractors but only an additional 2 full time workers. Thus, there will not be a significant increase in the permanent workforce on the site or provide an additional threat to the safety of any worker during a flood.
The development or work will not unduly restrict the flow behavior of floodwaters.	Refer Hydraulic Impact Assessment below.
The development or work will not unduly increase the level or flow of floodwaters or stormwater runoff on land in the vicinity.	Refer Hydraulic Impact Assessment below.
The development or work will not exacerbate the adverse consequences of floodwaters flowing on the land with regard to erosion, siltation and destruction of vegetation.	The works are within existing built up industrial land clear of vegetation. Due to there being no significant increase in footprint and all runoff under existing and future conditions reaching the ground in nearly identical locations, the works will have no impact on erosion or siltation.
The structural characteristics of any building or work that are the subject of the application are capable of withstanding flooding in accordance with the requirements of the Council.	A separate structural report will be provided.
The development will not become unsafe during floods or result in moving debris that potentially threatens the safety of people or the integrity of structures.	A separate structural report will be provided.
Potential damage due to inundation of proposed buildings and structures is minimised.	The works are largely sealed structures with many parts of the works above the PMF flood level which means there will be minimal damage due to inundation, unless the structure itself fails. There will potentially be some damage to electrical and other components feeding the equipment and

PERFORMANCE CRITERIA	RESPONSE
	these are considered in Shoalhaven Starches Flood Plan.
The development will not obstruct escape routes for both people and stock in the event of a flood.	The works will not occupy escape routes or cause workers to become trapped.
The development will not unduly increase dependency on emergency services.	The works are such that their construction will not significantly increase the number of workers on the site or provide an additional threat to the safety of any worker during a flood.
Interaction of flooding from all possible sources has been taken into account in assessing the proposed development against risks to life and property resulting from any adverse hydraulic impacts.	Refer Hydraulic Impact Assessment below.
The development will not adversely affect the integrity of floodplains and floodways, including riparian vegetation, fluvial geomorphologic environmental processes and water quality.	The works will be constructed on land designated as high hazard floodway in the 1% AEP event. The site is industrial land with nil existing vegetation and is beyond the influence of normal fluvial geomorphic processes. The works will have no impact on water quality.

3.2 Hydraulic Impact Assessment

As noted above in Section 2.1 four parts of the proposed works are within the agreed upon *intensively built up area*. As such the loss of flow conveyance due to construction of the works in this area will be minimal as the existing access corridors (which become flow paths during a flood) through the site will always remain. For this reason no hydraulic impact assessment has been undertaken for the works described in Section 2.1.

Of the remaining items located outside the agreed upon *intensively built up area* (Section 2.2) Item d) The South western car park extension, Drw 011 will involve no buildings, minimal earth works and all cars will be removed prior overtopping of the river bank. Item e) Part of Pipe bridge and re-route of pipe gantry approval, Drw 012 will involve no buildings, minimal earth works and the hydraulic impedance of the gantry supports is too small to be accurately modelled. Thus the hydraulic impact of these two items is considered to be nil and has not been considered further.

Hydraulic modelling of the remaining items in Section 2.2 has been undertaken as described below.

3.2.1 Hydraulic Modelling

Hydraulic or flood modelling typically involves the setting up and calibration of two computer models. A hydrologic model that converts the rainfall to runoff and a hydraulic model that includes inflow from the hydrologic model, as well as ocean boundaries, which determines peak

flood levels and velocities based on hydraulic formulae. Both models are calibrated to historical data, including historical flood levels and river flow gaugings, to ensure that they can replicate the historical events and are then used to determine design flood events. These are events that have a known probability of occurrence, such as the 1% Annual Exceedance Probability (AEP) event.

The CELLS model of the Shoalhaven River (established as part of the 1990 *Lower Shoalhaven River Flood Study*) represented the channel and floodplain as a series of interconnected cells, termed either river or floodplain cells. The river cells were connected by cross sections and the floodplain cells connected by weirs. Approximately 100 cells were used in the Shoalhaven River model with some cells over 4km² in area. The CELLS model is termed a one dimensional (1D) branched model in that it cannot account for flow in other than the one direction but has “branches” which allow flow to extend across the floodplain. The model used both field survey for weirs as well as bathymetric survey for the river cross sections at approximately 1 to 2 kilometre spacing.

The CELLS model is an unsteady flow model in that it modelled the full flood event (rising and falling water levels) and not just the peak and included ocean tidal hydrographs at both entrances, namely the Shoalhaven Heads and Crookhaven River, and some six flow hydrographs from the WBNM hydrologic model. Council's Flood Certificates are based on results from the CELLS model.

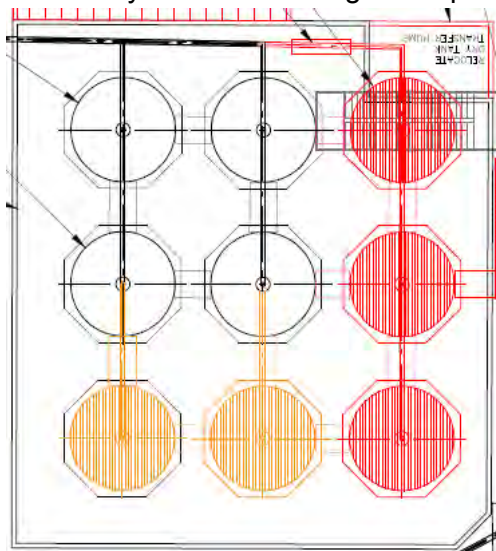
Since 1990 there have been significant advancements in the field of hydraulic modelling, though in hydrologic modelling there has been significantly less advancements and the WBNM model used previously is still used today.

The main advancements in hydraulic modelling are the use of more complex computer software (TUFLOW) that allows the river and floodplain to be discretised into a grid. This is typically 15m by 15m on large rivers and up to 2m by 2m on small urban catchments. These models are termed 2 Dimensional (2D) in that they determine the flow direction between grid cells producing vector velocities. These models are thus able to more accurately define the topography and in turn can more accurately represent the hydraulic effects of even a small development on a large floodplain. The use of TUFLOW allows more accurate definition of all hydraulic parameters (hazard, hydraulic classification, peak velocities and depths etc.) on the site. Thus, rather than a single value provided from the CELLS model (1990 *Lower Shoalhaven River Flood Study*) TUFLOW is able to demonstrate that hazard, velocity and other parameters will change as flow crosses over the northern bank and enters the northern floodplain.

3.2.2 Hydraulic Modelling Process

The hydraulic effects (change in flood levels, flows or velocities) of the remaining proposed works in Section 2.2 at the Shoalhaven Starches plant site at Bomaderry were analysed using the TUFLOW hydraulic model established for the Shoalhaven Starches 2013 *Shoalhaven River Flood Study*. This model was calibrated to match the historical flood level data for the 1974, 1975, 1978 and 1988 floods and used to provide updated design flood levels for the Shoalhaven River downstream of Nowra.

Item b) Ethanol storage & load out additions, Drw 007 to 008 involves the construction of three 236kL storage tanks as indicated in the plan below, as well as an extension of the bund wall. The bund wall is designed to “capture” the contents of the tanks if a leak occurs. Whilst it may also prevent inundation of the bunded area in a flood, it has not been structural designed for this purpose. For this reason the TUFLOW hydraulic modelling has not included the inclusion of the bund walls. It should also be noted that the bund wall has been in existence for at least 20 years and has not been simulated in hydraulic modelling in the past.



Plan of Additional Ethanol Tanks and Bund Wall Extension

The modelling process was to compare the peak flood levels in each grid cell for the *Existing* and *Proposed* scenarios. The *Existing* scenario represents the existing floodplain including all proposed but un-built approved Shoalhaven Starches structures as at August 2020. The *Proposed* scenario reflects the existing floodplain but including the remaining items in Section 2.2 as described above. The comparison between the *Existing* and *Proposed* scenarios is termed a flood impact map.

More frequent events, smaller than the 1% AEP, have not been modelled as the northern riverbank of the Shoalhaven River is not overtopped to any significant extent until an event larger than the 5% AEP. Thus, in these small more frequent events there would be nil impact on peak flood levels of the proposed works. Larger events than the 1% AEP will occur but these events are obviously extremely rare and are not used for flood related planning determinations by Councils, except when their failure has potential catastrophic consequences (such as dam failure).

3.2.3 Hydraulic Modelling Results

The flood impact maps for the 1% AEP, 0.5% AEP and PMF / Extreme events are provided as Figure 3 to Figure 5. The different colours reflect the change in peak water levels as a result of the proposed works. In summary the purple tones reflect a decrease in flood level whilst the blue/green/brown tones reflect an increase in peak level.

In summary the proposed works show a very small decrease in flood level north of the plant and a similar slight increase in flood level to the immediate south of the works. This occurs as the

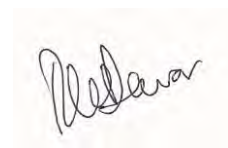
proposed works restricts the flow of floodwaters through the plant reaching the northern floodplain. The increase in flood level is largely within the confines of land owned by Shoalhaven Starches.

In conclusion WMAwater consider that there would be no significant incremental increase in the 1% AEP flood level as a result of the proposed works within the existing Shoalhaven Starches plant area.

Should you have any questions or require further clarification regarding the above do not hesitate to contact the undersigned.

Yours Sincerely,

WMAwater

A handwritten signature in black ink, appearing to read "R W Dewar", on a light-colored rectangular background.

R W Dewar
Director

LIST OF APPENDICES

Appendix A: Design Plans

Appendix B: Flood Certificate obtained from Council on 5th April 2018

Appendix C: Copy of Conclusions from October 2000 report titled "*Further Development within the Manildra starches Plant off Bolong Road, Bomaderry - Hydraulic Assessment*".

LIST OF FIGURES

Figure 1: ALS Topography Existing Condition

Figure 2: Peak Flood Depth, 1% AEP Event, Existing Condition

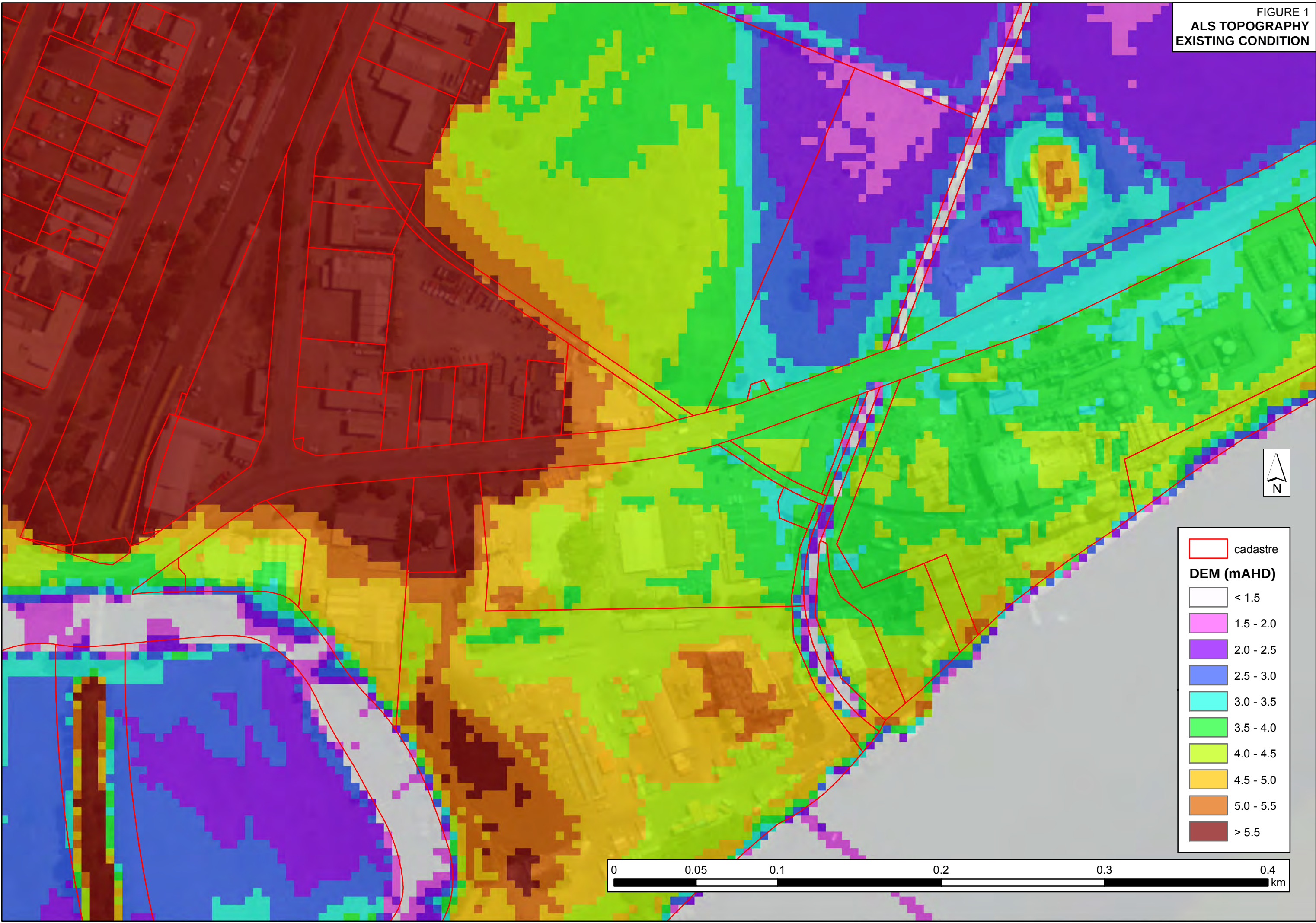
Figure 3: Peak Flood Level Impact, 1% AEP Event, Proposed Development v Previous Proposed Development

Figure 4: Peak Flood Level Impact, 0.5% AEP Event, Proposed Development v Previous Proposed Development

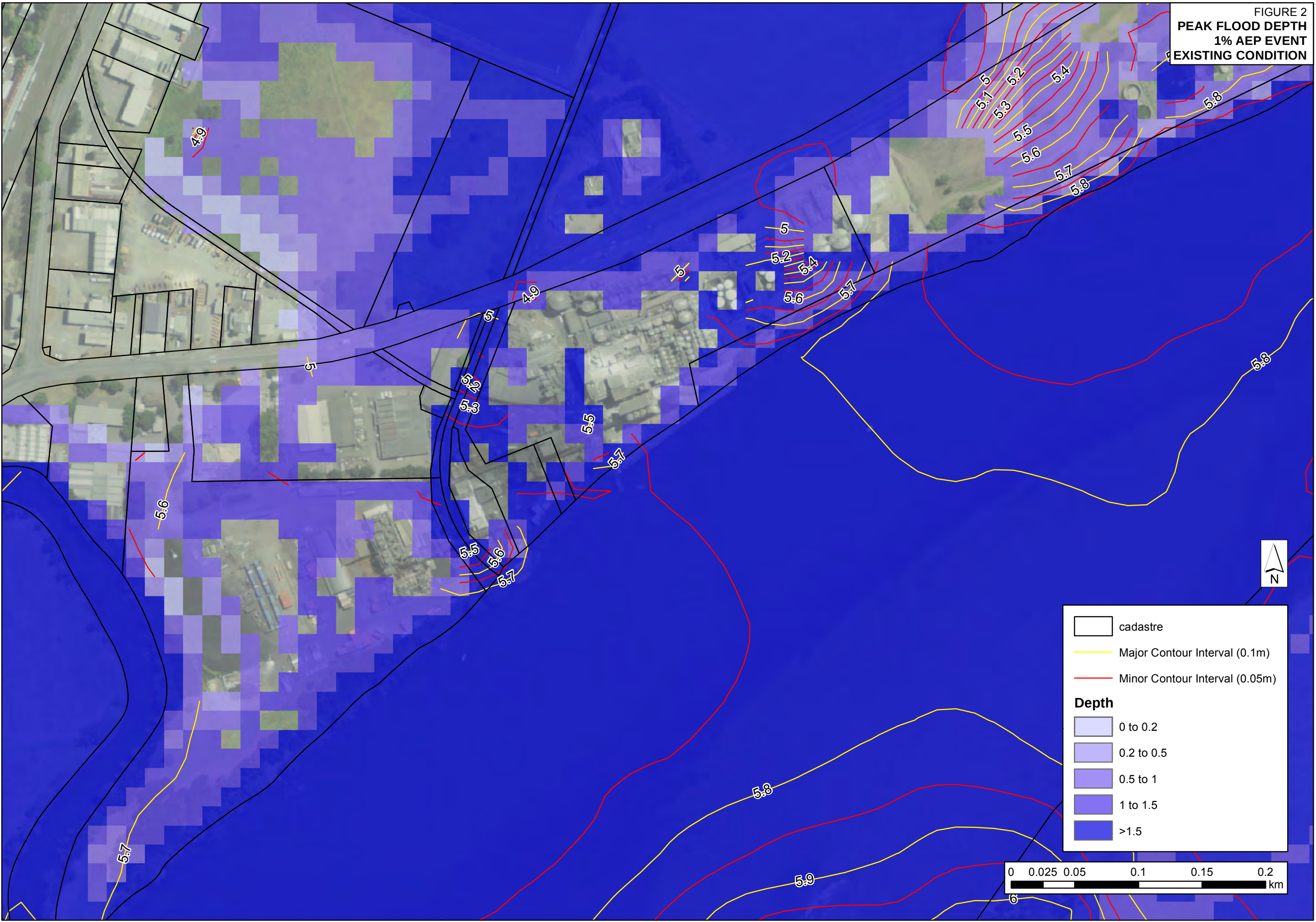
Figure 5: Peak Flood Level Impact, Extreme Event, Proposed Development v Previous Proposed Development



FIGURE 1
ALS TOPOGRAPHY
EXISTING CONDITION



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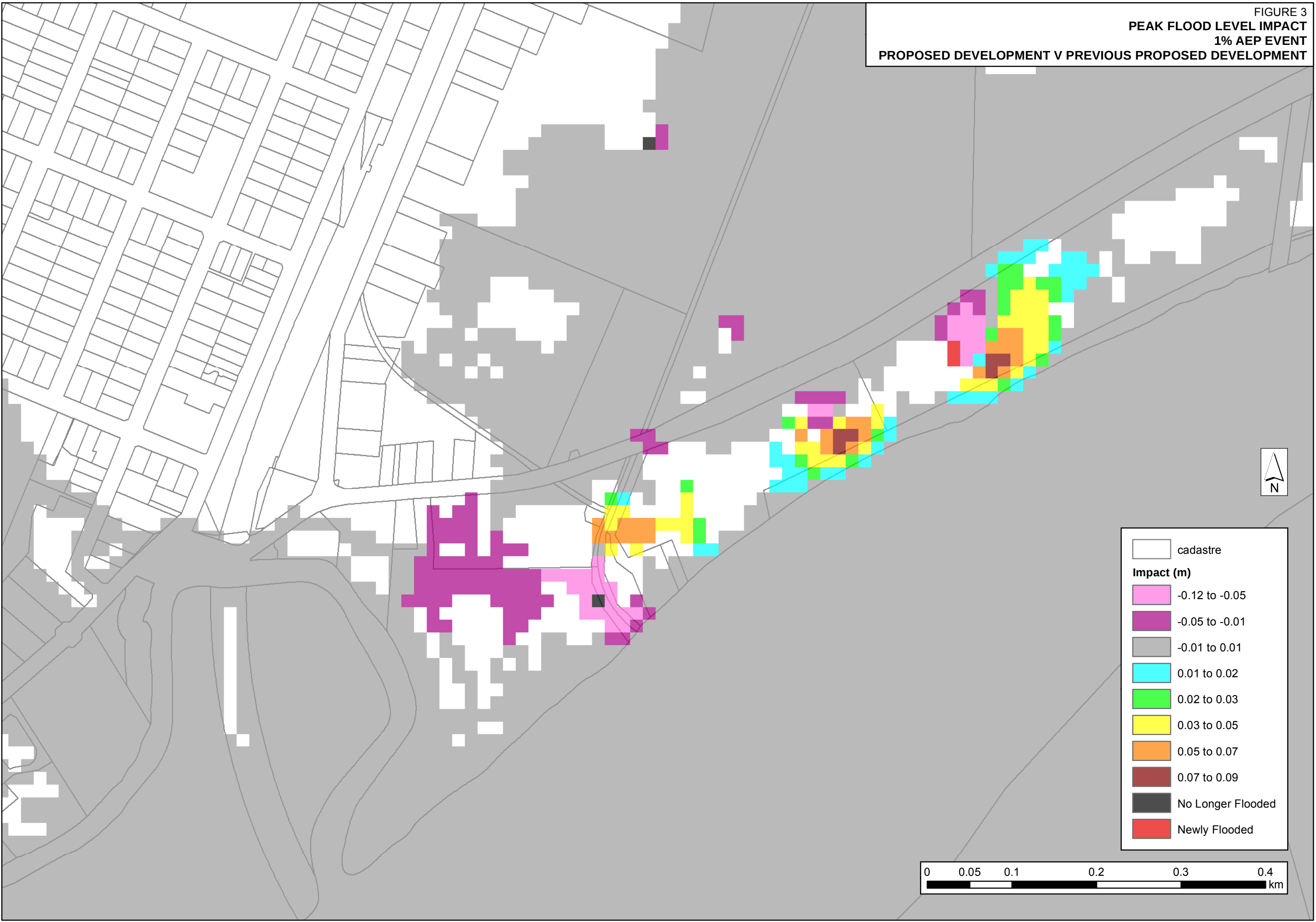


FIGURE 3

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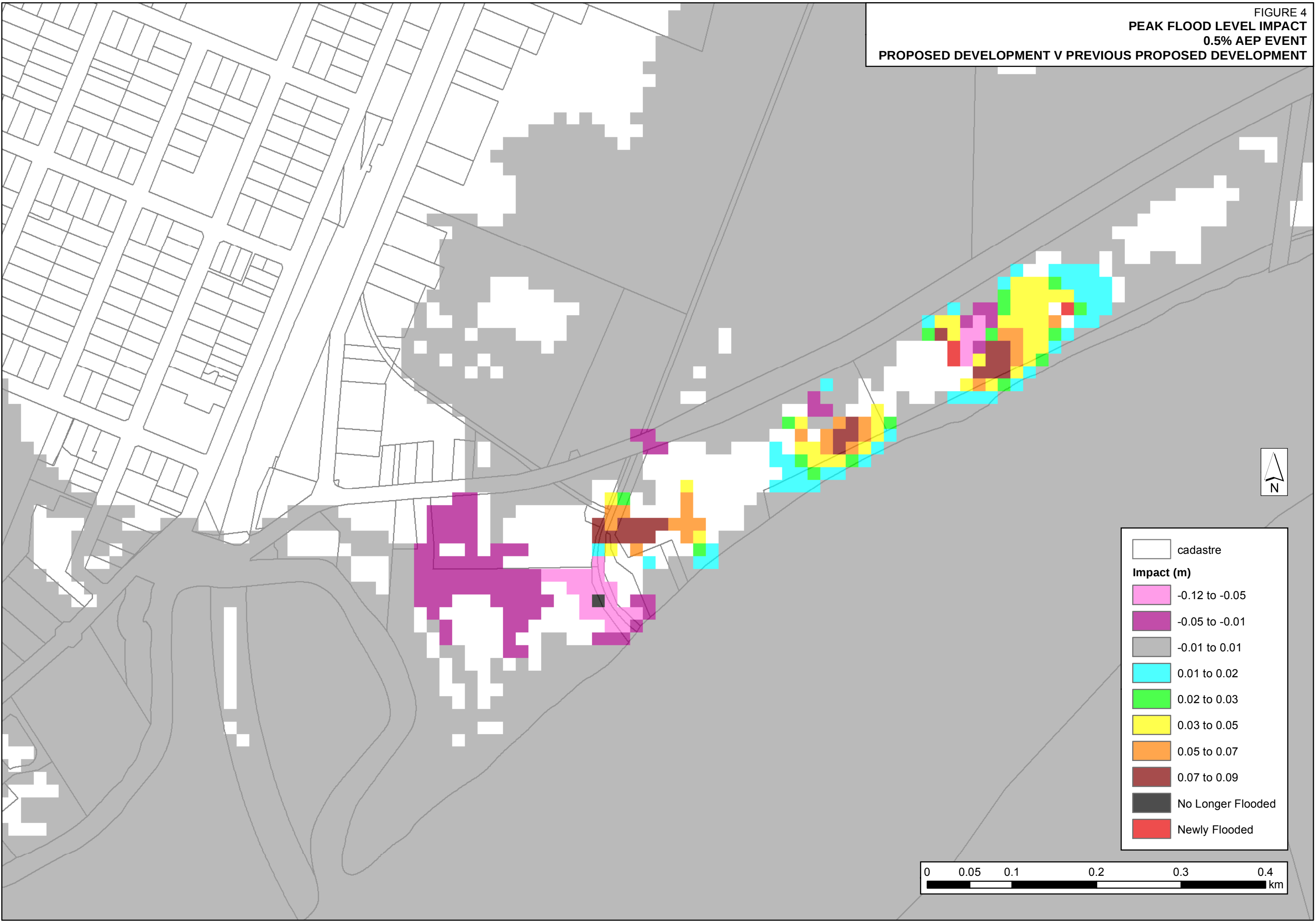
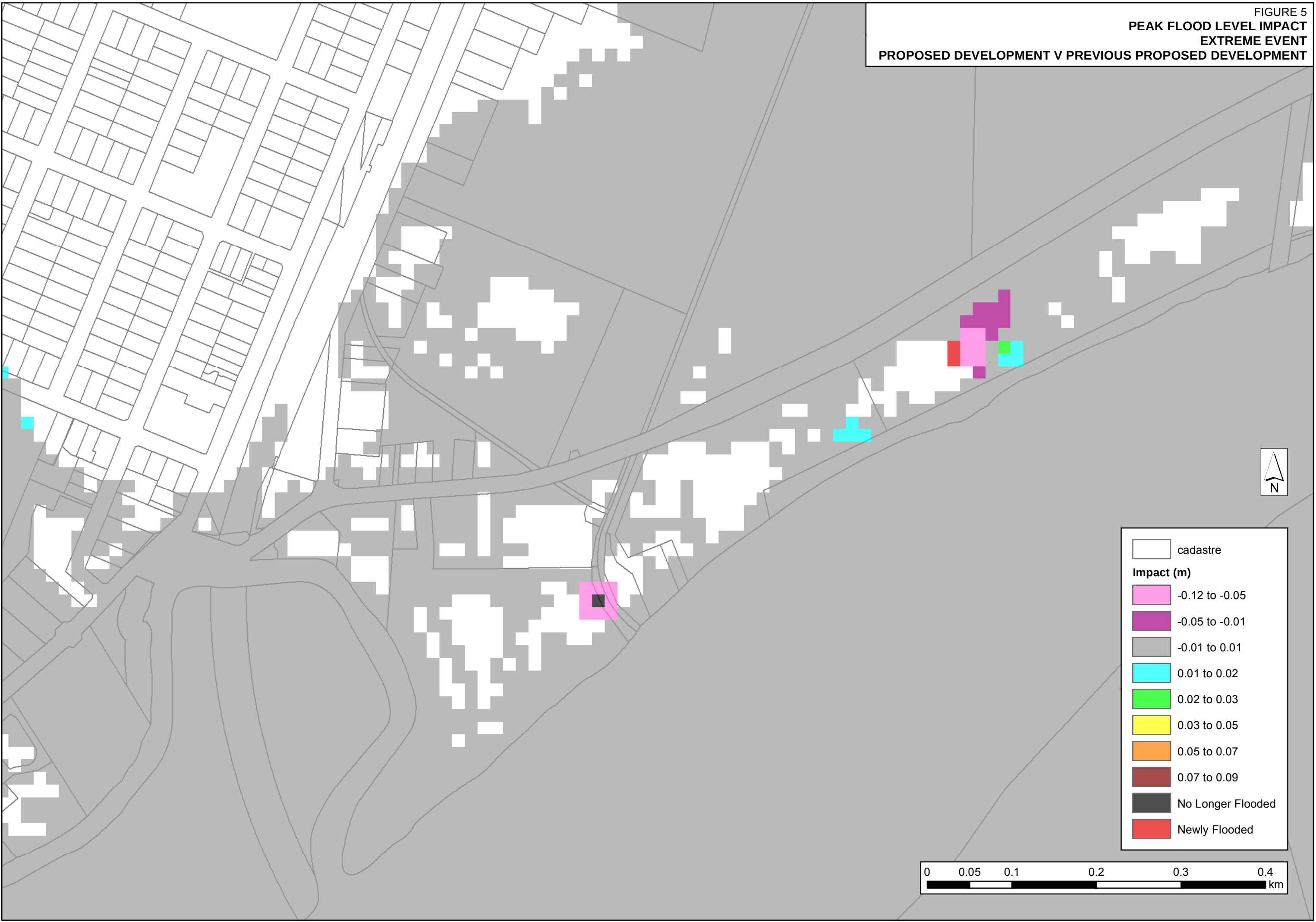
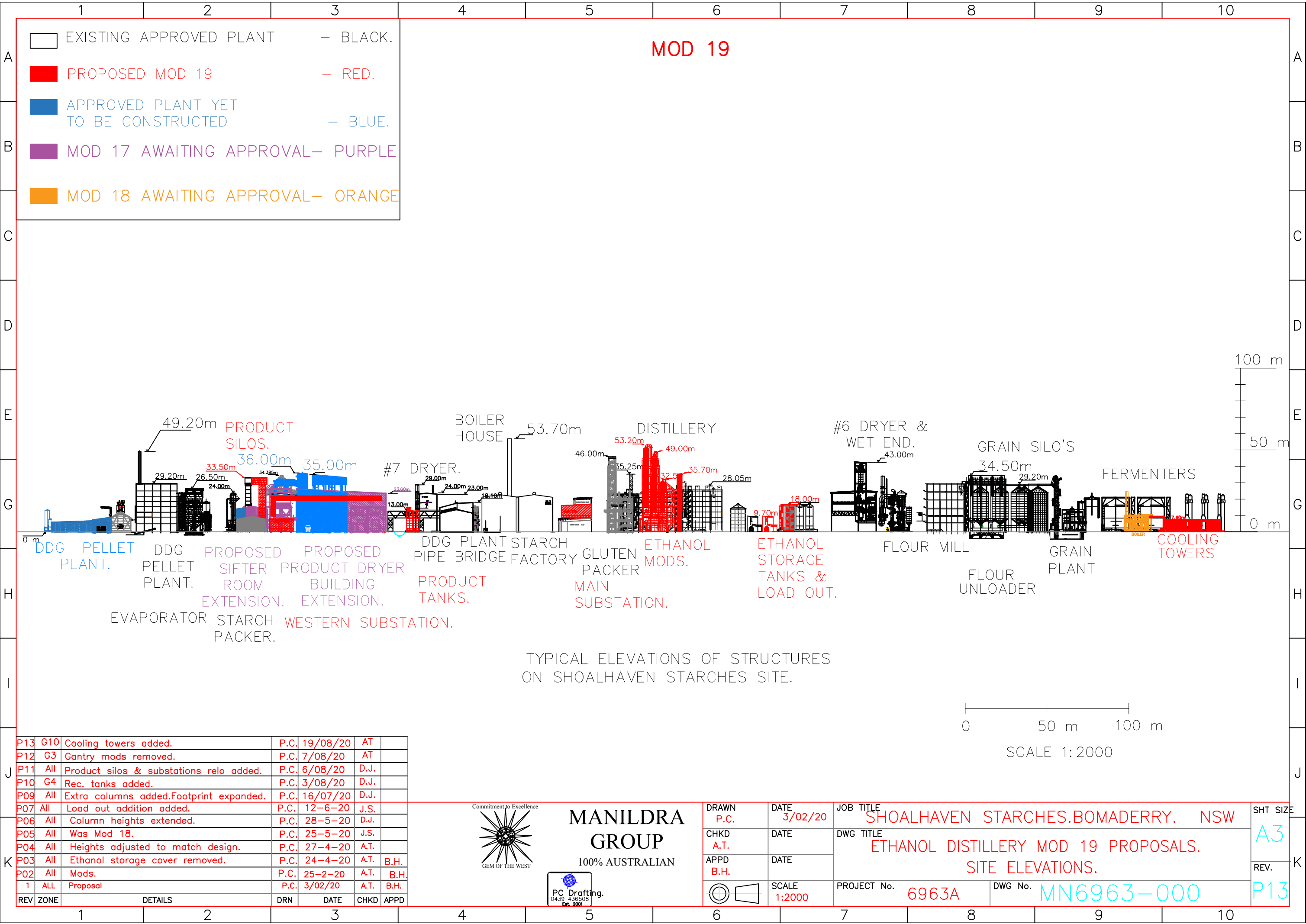


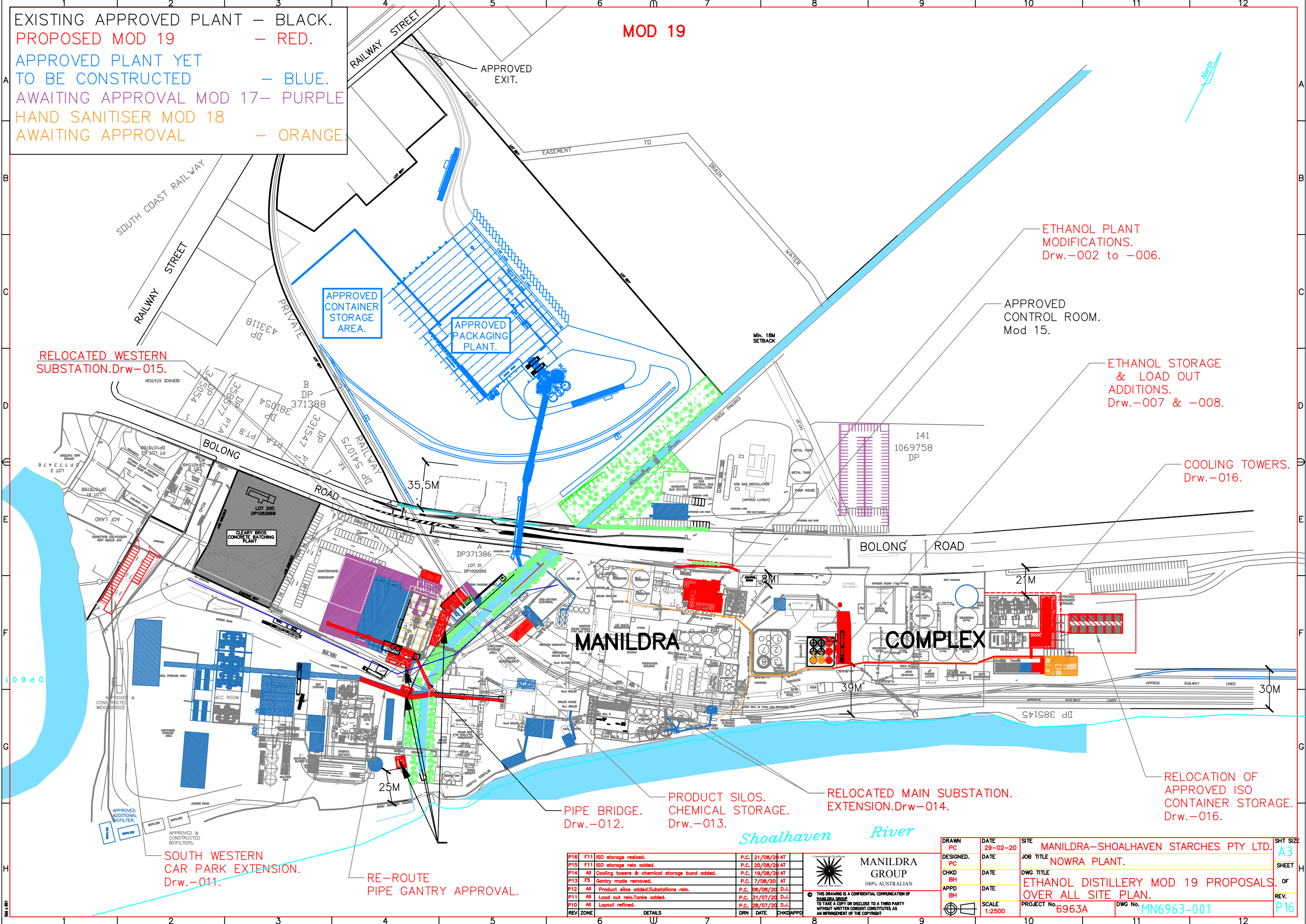
FIGURE 4
PEAK FLOOD LEVEL IMPACT
0.5% AEP EVENT
PROPOSED DEVELOPMENT V PREVIOUS PROPOSED DEVELOPMENT

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EXISTING APPROVED PLANT — BLACK.
PROPOSED MOD 19 — RED.
APPROVED PLANT YET TO BE CONSTRUCTED — BLUE.
AWAITING APPROVAL MOD 17— PURPLE
HAND SANITISER MOD 18
AWAITING APPROVAL — ORANGE.

MOD 19

ETHANOL PLANT MODIFICATIONS.
Drw.—002 to —006.

APPROVED CONTROL ROOM.
Mod 15.

ETHANOL STORAGE & LOAD OUT ADDITIONS.
Drw.—007 & —008.

COOLING TOWERS.
Drw.—016.

RELOCATED MAIN SUBSTATION.
EXTENSION.Drw—014.

RELOCATION OF APPROVED ISO CONTAINER STORAGE.
Drw.—016.

PRODUCT SILOS.
CHEMICAL STORAGE.
Drw.—013.

PIPE BRIDGE.
Drw.—012.

RE-ROUTE PIPE GANTRY APPROVAL.

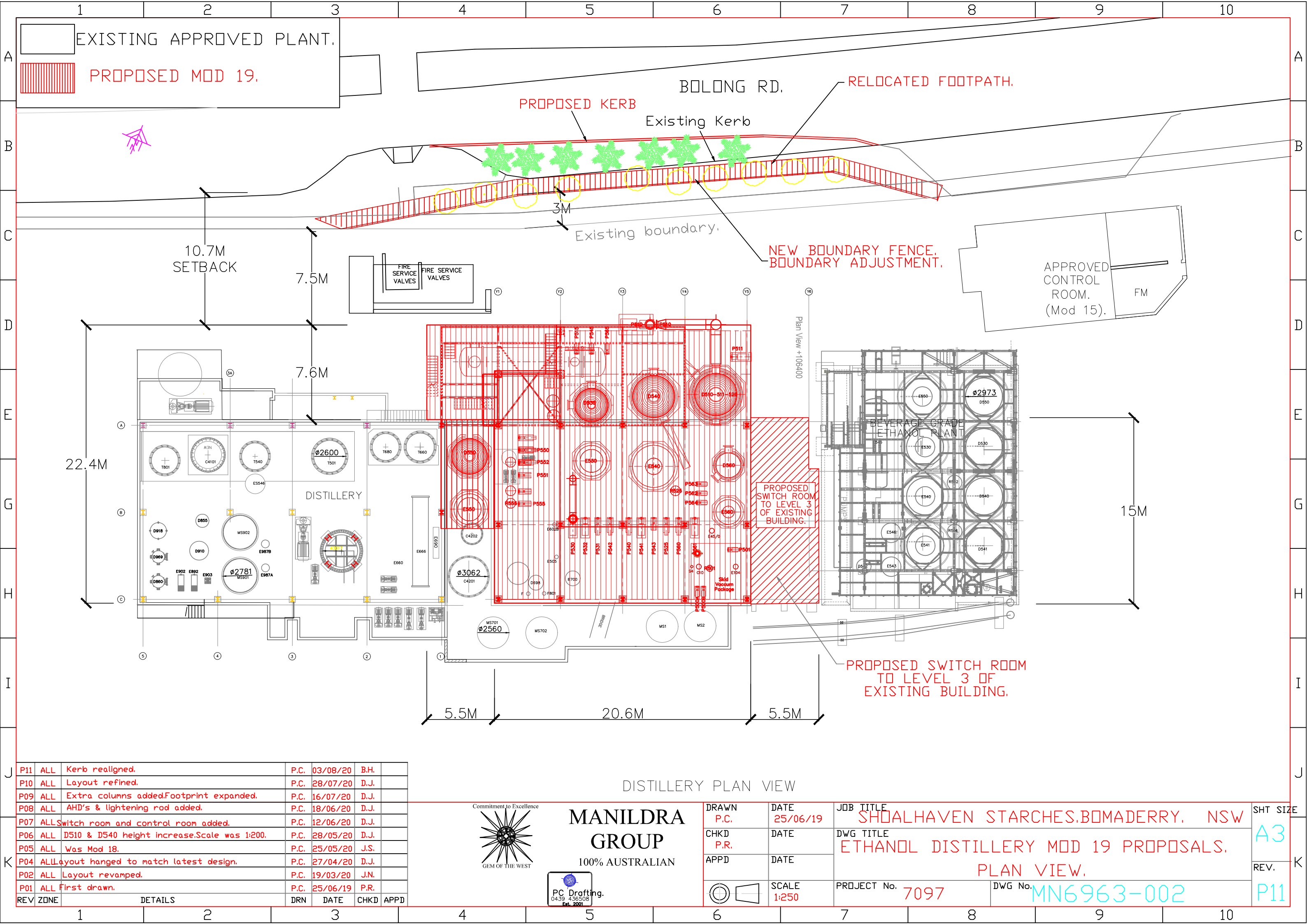
SOUTH WESTERN CAR PARK EXTENSION.
Drw.—011.

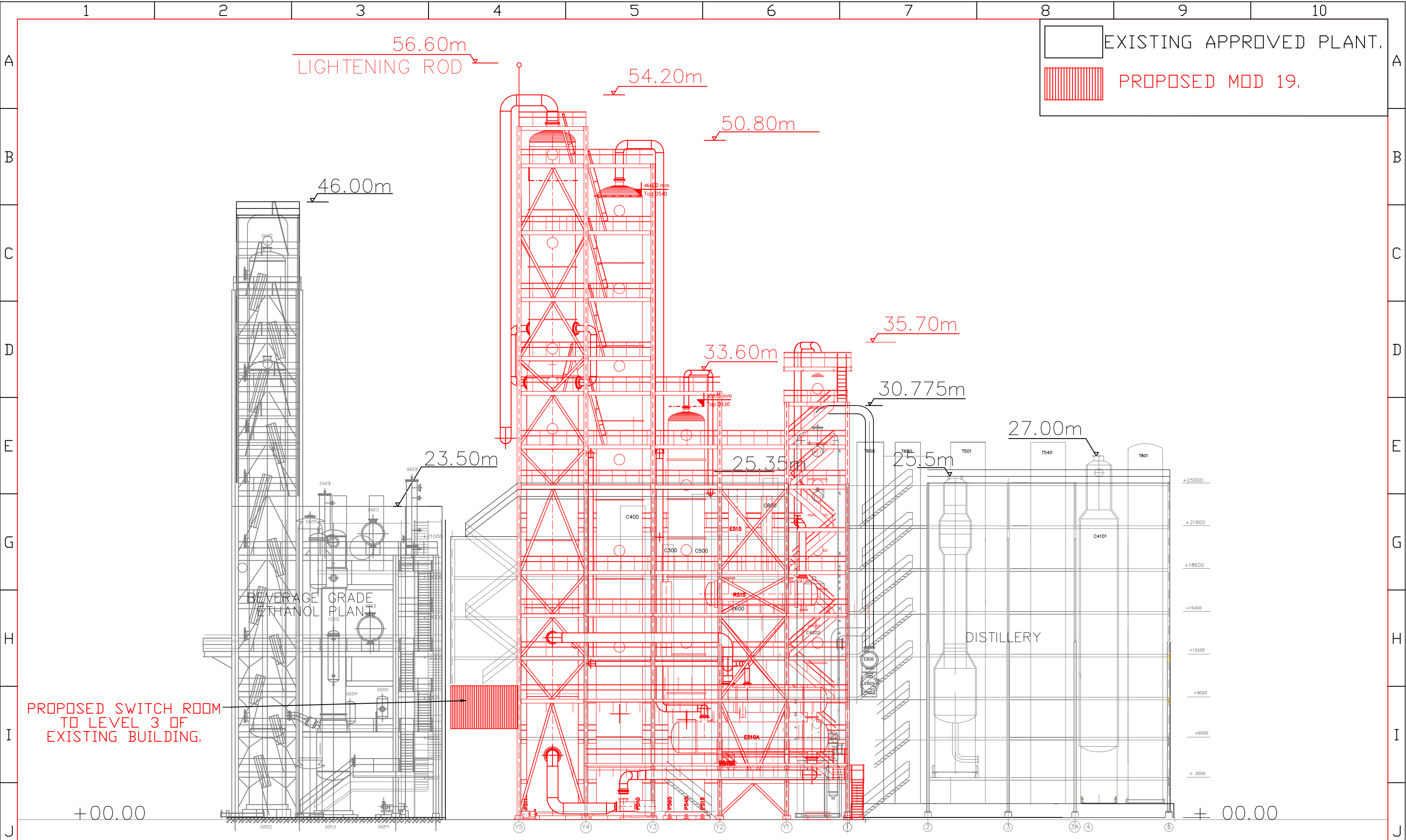
P16	F11	ISO storage reloaded.	P.C.	21/08/20	AT
P15	F11	ISO storage reloaded.	P.C.	20/08/20	AT
P14	All	Cooling towers & chemical storage bund added.	P.C.	19/08/20	AT
P13	F5	Gantry mods removed.	P.C.	7/08/20	AT
P12	All	Product silos added.Substations reloaded.	P.C.	06/08/20	D.J.
P11	All	Load out reloaded.Tanks added.	P.C.	31/07/20	D.J.
P10	All	Layout refined.	P.C.	28/07/20	D.J.
REV	ZONE	DETAILS	DRN	DATE	CHKD/APPD

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DRAWN PC	DATE 29-02-20	SITE MANILDRA-SHOALHAVEN STARCHES PTY LTD.	SHT SIZE A3
DESIGNED PC	DATE	JOB TITLE NOWRA PLANT.	SHEET H
CHKD BH	DATE	DWG TITLE ETHANOL DISTILLERY MOD 19 PROPOSALS.	OF
APPD BH	DATE	PROJECT No. 6963A	REV. P16
SCALE 1:2500		DWG No. MN6963-001	





ELEVATION LOOKING SOUTH FROM BOLONG ROAD.

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P09	ALL	Extra columns added.Footprint expanded.	P.C.	20/07/20	D.J.	
P07	ALL	AHD's & lightening rod added.	P.C.	18/06/20	D.J.	
P07	ALL	AHD's & lightening rod added.	P.C.	18/06/20	D.J.	
P06	ALL	D510 & D540 height increase.Scale was 1:200.	P.C.	28/05/20	D.J.	
P05	ALL	Was Mod 18.	P.C.	25/05/20	J.S.	
REV	ZONE	DETAILS	DRN	DATE	CHKD	APPD



PC Drafting.
0439 436508
Est. 2001



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DRAWN
P.C.

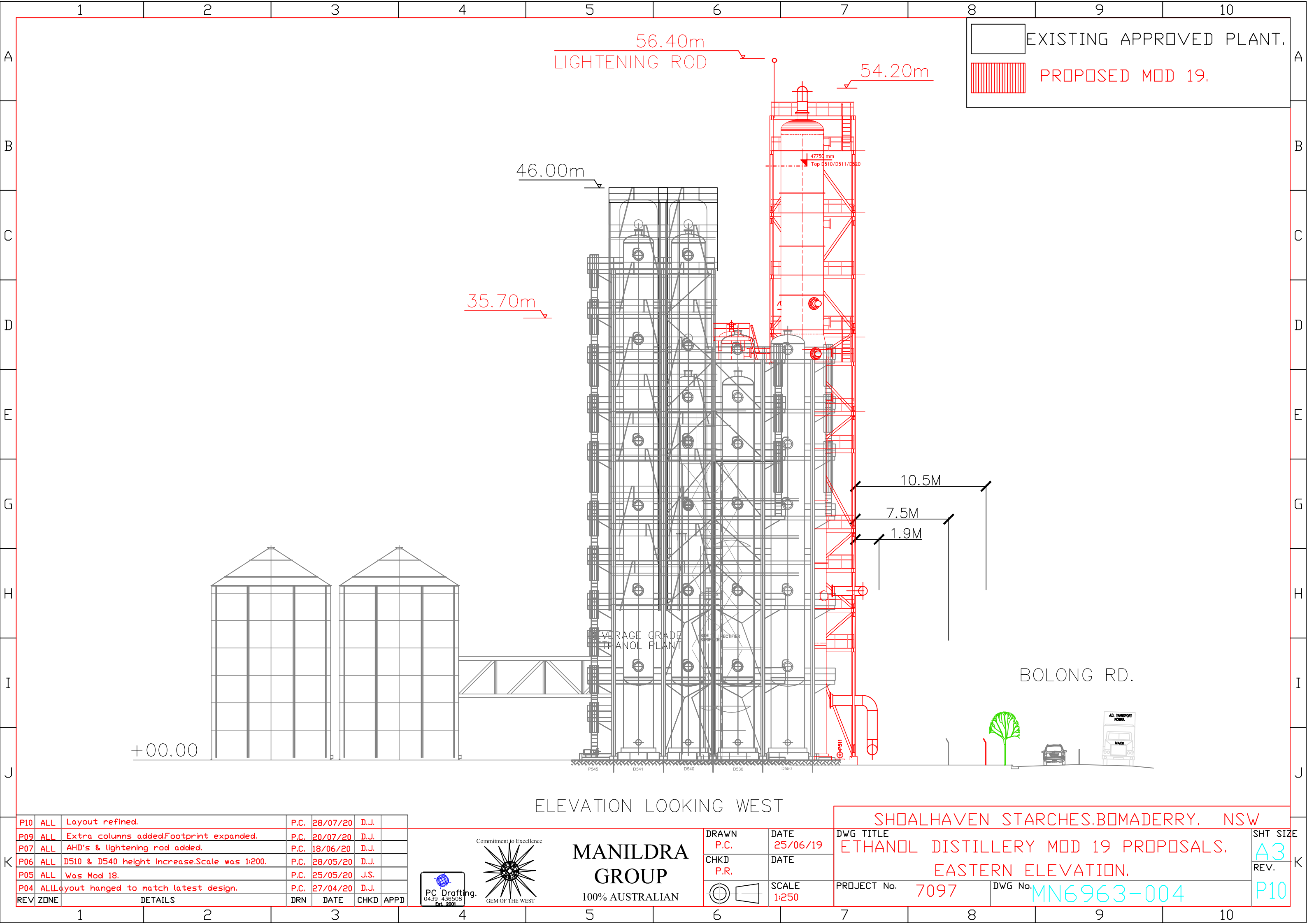
CHKD
P.R.

SCALE
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DATE
25/06/19

DATE

SHOALHAVEN STARCHES.BOMADERRY. NSW		SHT SIZE
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PROJECT No. 7097	DWG No. MN6963-003	P10



EXISTING APPROVED PLANT.

PROPOSED MOD 19.

56.40m
LIGHTENING ROD

54.20m

46.00m

35.70m

10.5M

7.5M

1.9M

AVERAGE GRADE
ETHANOL PLANT

BOLONG RD.

+00.00

ELEVATION LOOKING WEST

P10	ALL	Layout refined.	P.C.	28/07/20	D.J.	
P09	ALL	Extra columns added.Footprint expanded.	P.C.	20/07/20	D.J.	
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P06	ALL	D510 & D540 height increase.Scale was 1:200.	P.C.	28/05/20	D.J.	
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PC Drafting.

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GEM OF THE WEST

MANILDRA GROUP

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DATE
25/06/19

CHKD
P.R.

DATE

SCALE
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SHOALHAVEN STARCHES.BOMADERRY. NSW

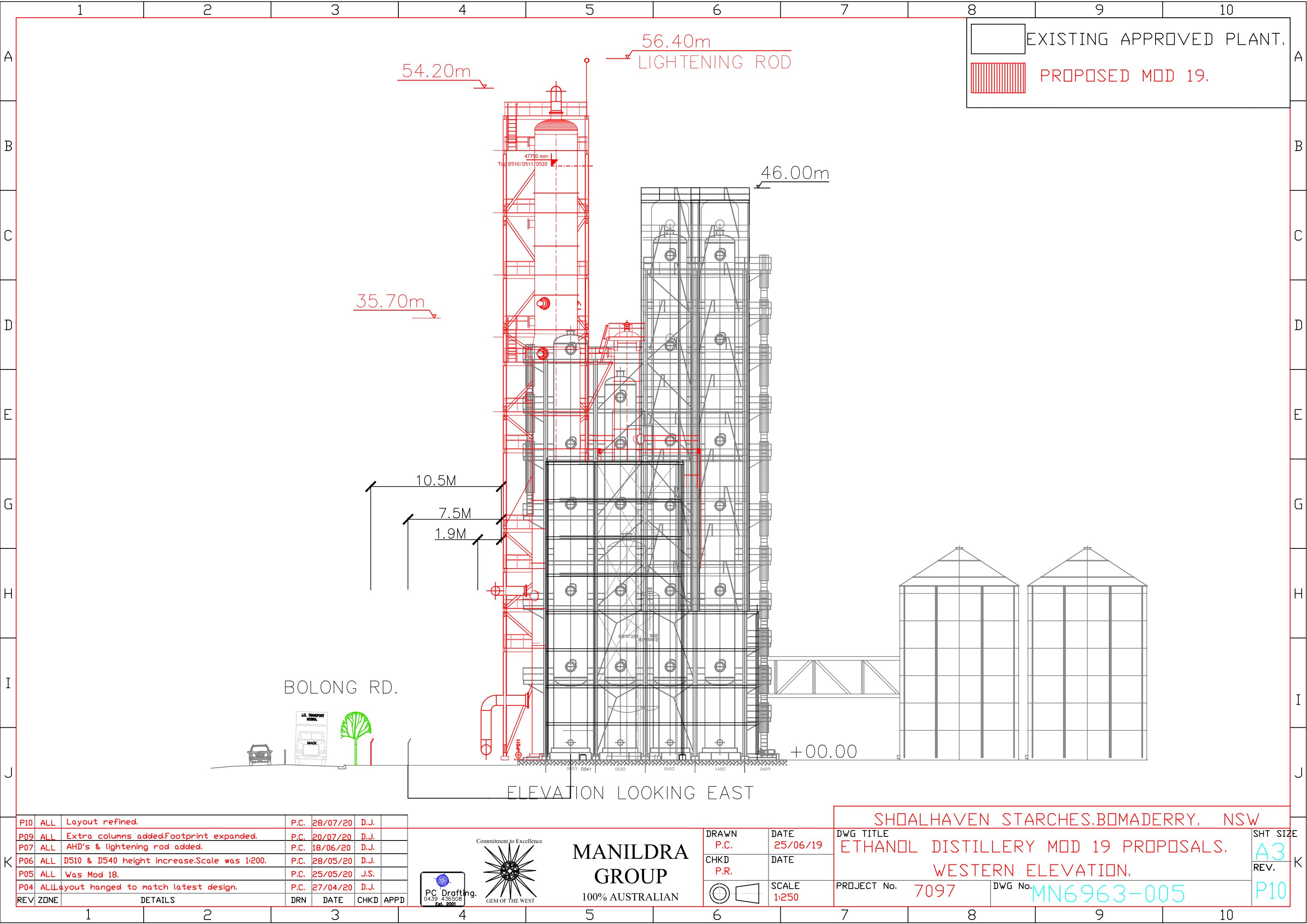
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ETHANOL DISTILLERY MOD 19 PROPOSALS.
EASTERN ELEVATION.

PROJECT No. 7097

DWG No. MN6963-004

SHT SIZE
A3

REV.
P10



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P07	ALL	AHD's & lightening rod added.	P.C.	18/06/20	D.J.	
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P04	ALL	Layout hanged to match latest design.	P.C.	27/04/20	D.J.	
REV	ZONE	DETAILS	DRN	DATE	CHKD	APPD



PC Drafting.
0439 436508
Est. 2001

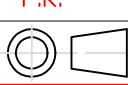


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DRAWN
P.C.

CHKD
P.R.

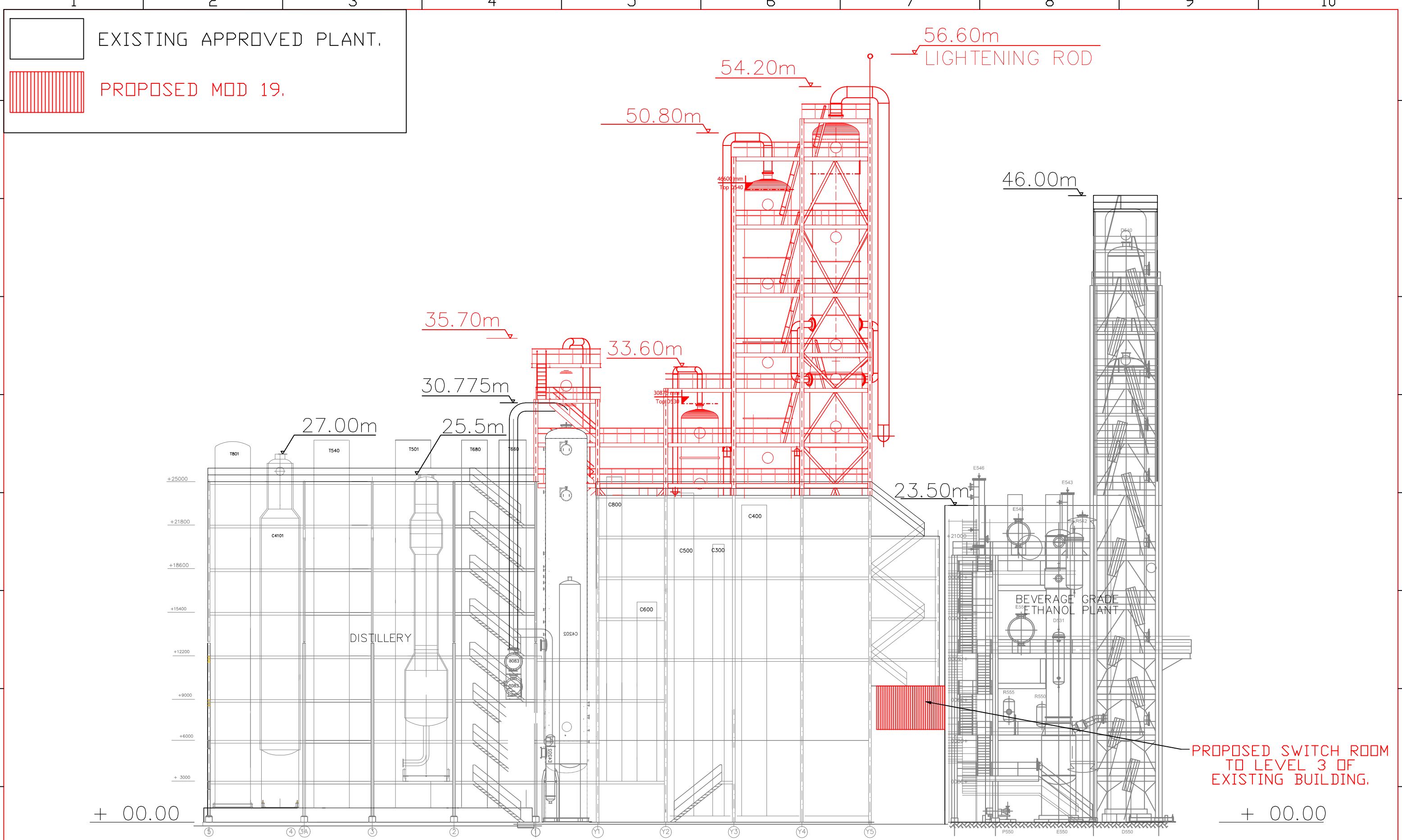


DATE
25/06/19

DATE

SCALE
1:250

SHOALHAVEN STARCHES.BOMADERRY. NSW		SHT SIZE
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ETHANOL DISTILLERY MOD 19 PROPOSALS.		REV.
WESTERN ELEVATION.		P10
PROJECT No.	7097	DWG No.
MN6963-005		



ELEVATION LOOKING NORTH TOWARDS BOLONG ROAD.

P10	ALL	Layout refined.	P.C.	28/07/20	D.J.	
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P07	ALL	AHD's & lightening rod added.	P.C.	18/06/20	D.J.	
P06	ALL	D510 & D540 height increase.Scale was 1:200.	P.C.	28/05/20	D.J.	
P05	ALL	Was Mod 18.	P.C.	25/05/20	J.S.	
P04	ALL	Layout hanged to match latest design.	P.C.	27/04/20	D.J.	
REV	ZONE	DETAILS	DRN	DATE	CHKD	APPD

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MANILDRA GROUP
100% AUSTRALIAN

PC Drafting.
0439 436508
Est. 2001



GEM OF THE WEST

DRAWN
P.C.

APPD

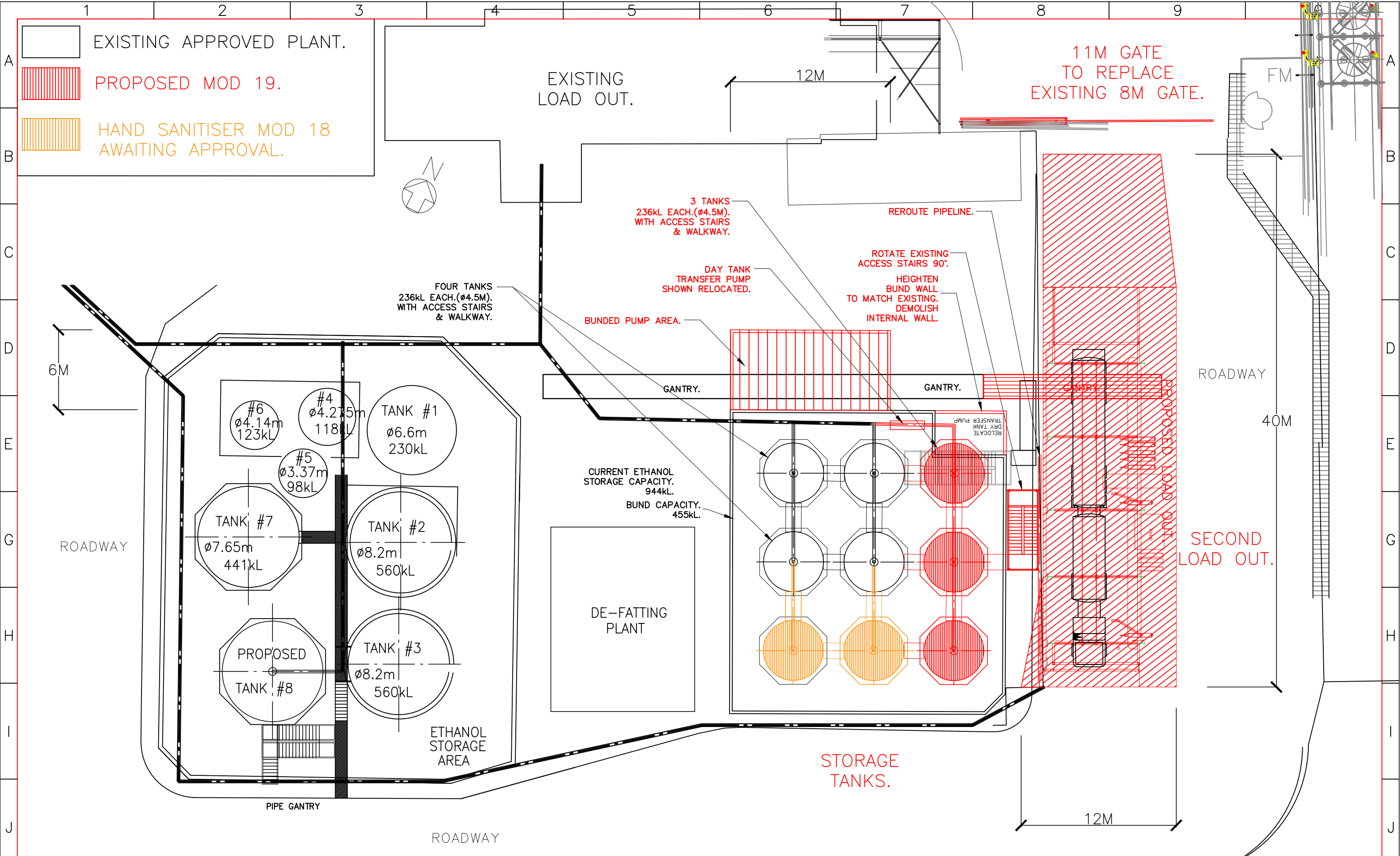


DATE
25/06/19

DATE

SCALE
1:250

SHOALHAVEN STARCHES.BOMADERRY. NSW		DWG TITLE	SHT SIZE
		ETHANOL DISTILLERY MOD 19 PROPOSALS. SOUTHERN ELEVATION.	A3 REV.
PROJECT No.	7097	DWG No.	MN6963-006
			P10



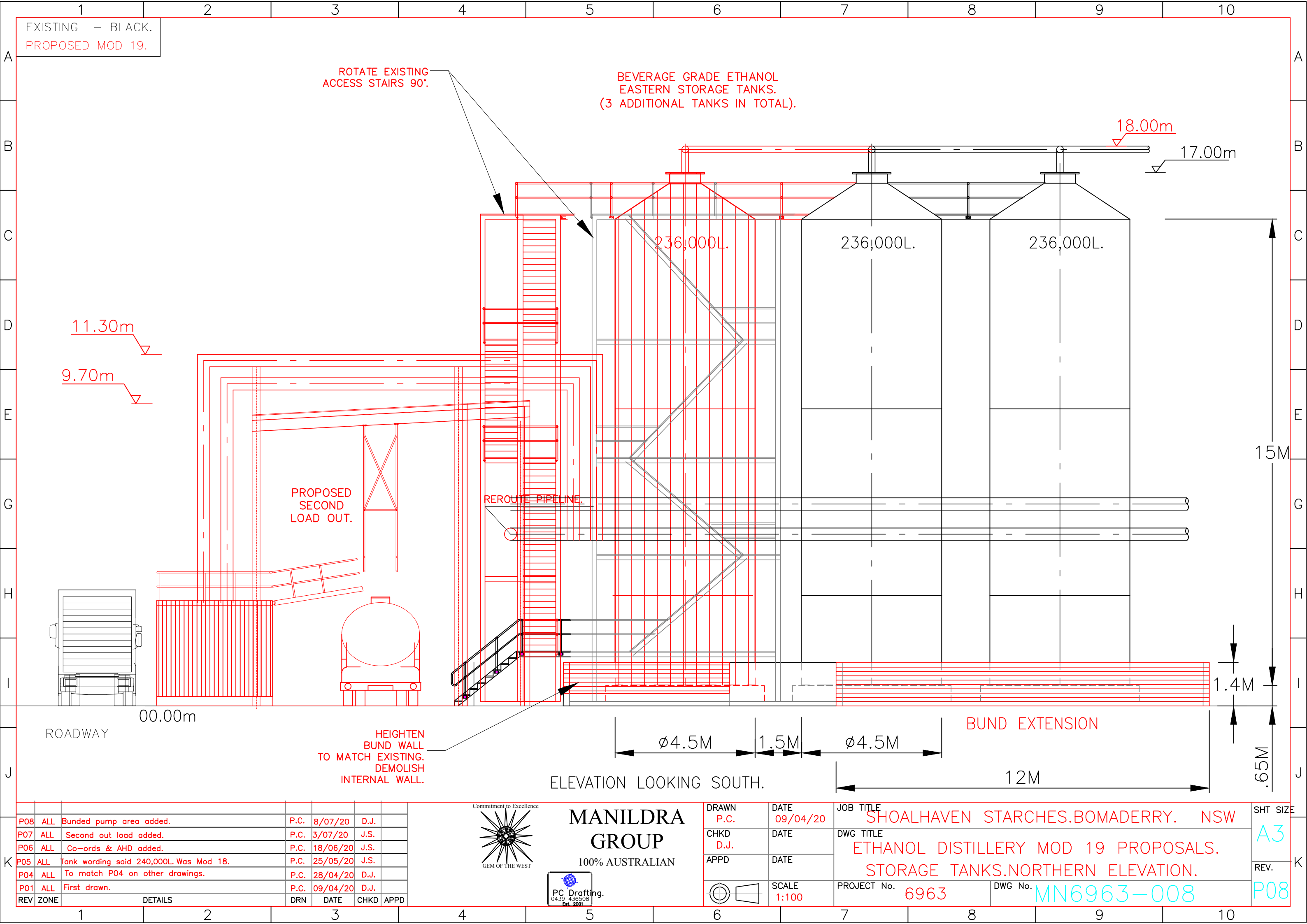
REV	ZONE	DETAILS	DRN	DATE	CHKD	APPD
P08	ALL	Bunded pump area added.	P.C.	8/07/20	D.J.	
P07	ALL	Second out load added.	P.C.	3/07/20	J.S.	
P06	ALL	Co-ords & AHD added.	P.C.	18/06/20	J.S.	
P05	ALL	Was Mod 18.	P.C.	25/05/20	J.S.	
P04	ALL	2 tanks moved to hand sanitiser application.	P.C.	24/04/20	D.J.	
P01	ALL	First drawn.	P.C.	09/04/20	D.J.	



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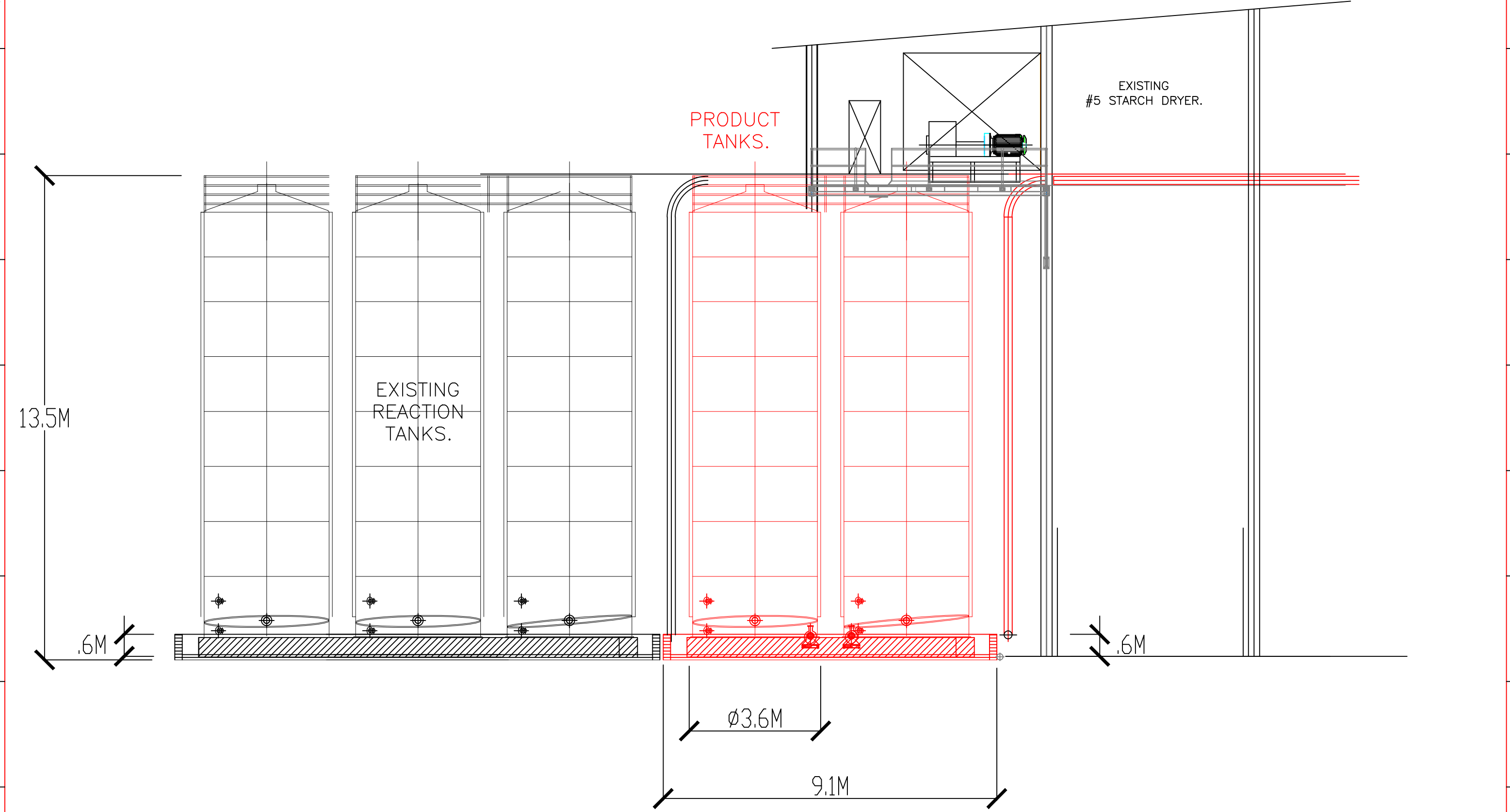
DRAWN P.C.	DATE 09/04/20	JOB TITLE SHOALHAVEN STARCHES.BOMADERRY. NSW	SHT SIZE A3
CHKD D.J.	DATE	DWG TITLE ETHANOL DISTILLERY MOD 19 PROPOSALS.	REV.
APPD	DATE	PROJECT No. 6963	REV.
SCALE 1:250		DWG No. MN6963-007	P08



1 2 3 4 5 6 7 8 9 10

A
B
C
D
E
F
G
H
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K

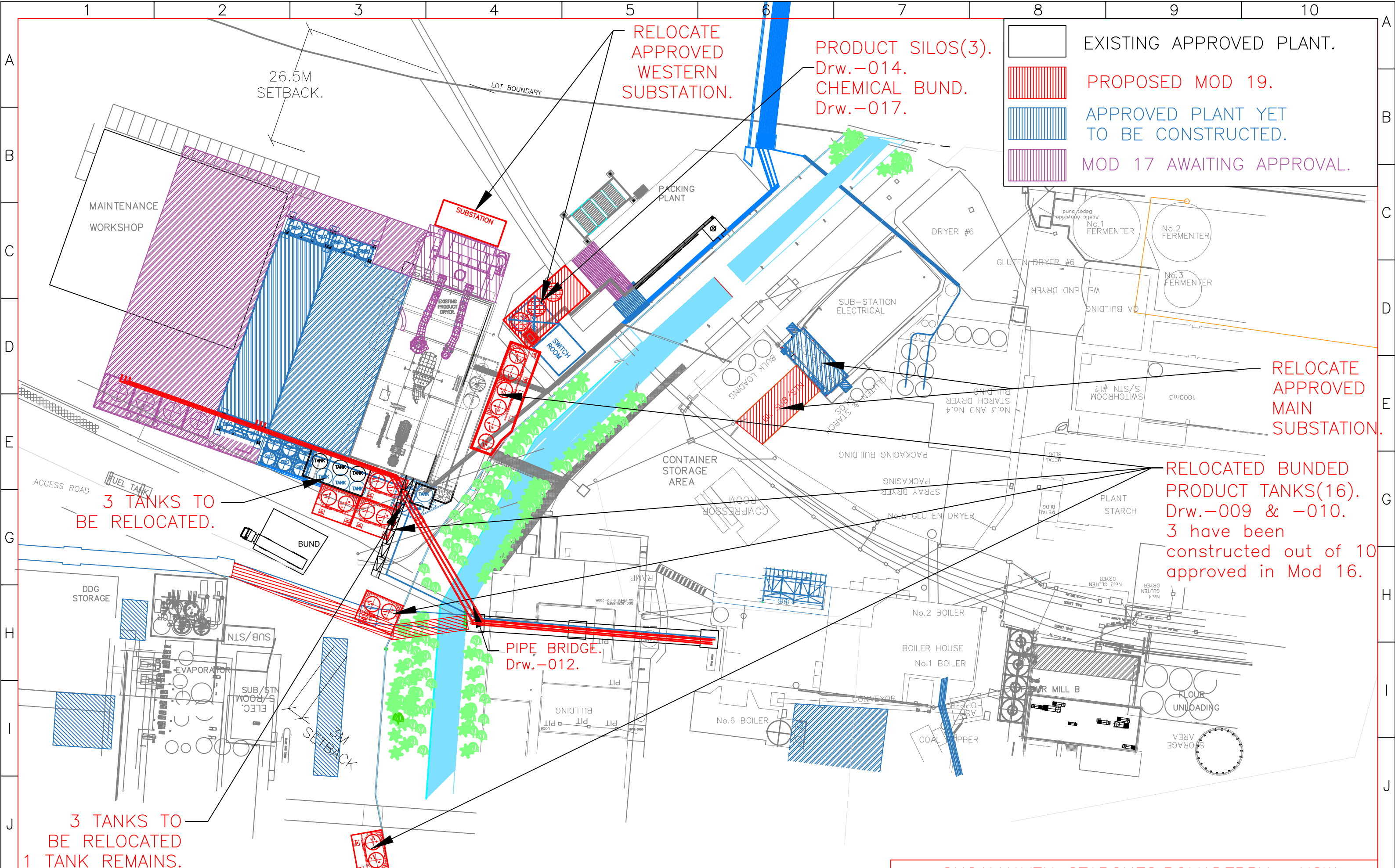
EXISTING — BLACK.
PROPOSED MOD 19.



TYPICAL ELEVATION SHOWING TWO TANKS.

Commitment to Excellence  GEM OF THE WEST MANILDRA GROUP 100% AUSTRALIAN PC Drafting. 0439 436508 Est. 2001				DRAWN P.C. CHKD A.T. APPD	DATE 01/07/20 DWG TITLE PRODUCT TANK ADDITIONS. TYPICAL TANK ELEVATION. SCALE 1:100	JOB TITLE SHOALHAVEN STARCHES.BOMADERRY. NSW PROJECT No. 6963 DWG No. MN6963-009	SHT SIZE A3 REV. P03
P03 ALL Replaces previous drawing. P.C. 03/08/20 A.T. REV ZONE DETAILS DRN DATE CHKD APPD							

1 2 3 4 5 6 7 8 9 10



EXISTING APPROVED PLANT.

PROPOSED MOD 19.

APPROVED PLANT YET TO BE CONSTRUCTED.

MOD 17 AWAITING APPROVAL.

P09	ALL	Chemical bund shown..	P.C.	21-8-20	J.S.	
P08	ALL	Tank wording added & modified.	P.C.	11-8-20	J.S.	
P07	ALL	Pipe bridge re-routed.	P.C.	10-8-20	A.T.	
P06	ALL	Layout revamped.	P.C.	7-8-20	A.T.	
P05	ALL	Product silos added.2 tanks added.	P.C.	5-8-20	A.T.	
REV	ZONE	DETAILS	DRN	DATE	CHKD	APPD

PC Drafting.
0439 436508
Est. 2001

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MANILDRA GROUP

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DRAWN
P.C.

CHKD
D.J.



DATE
25/06/19

DATE

SCALE
1:750

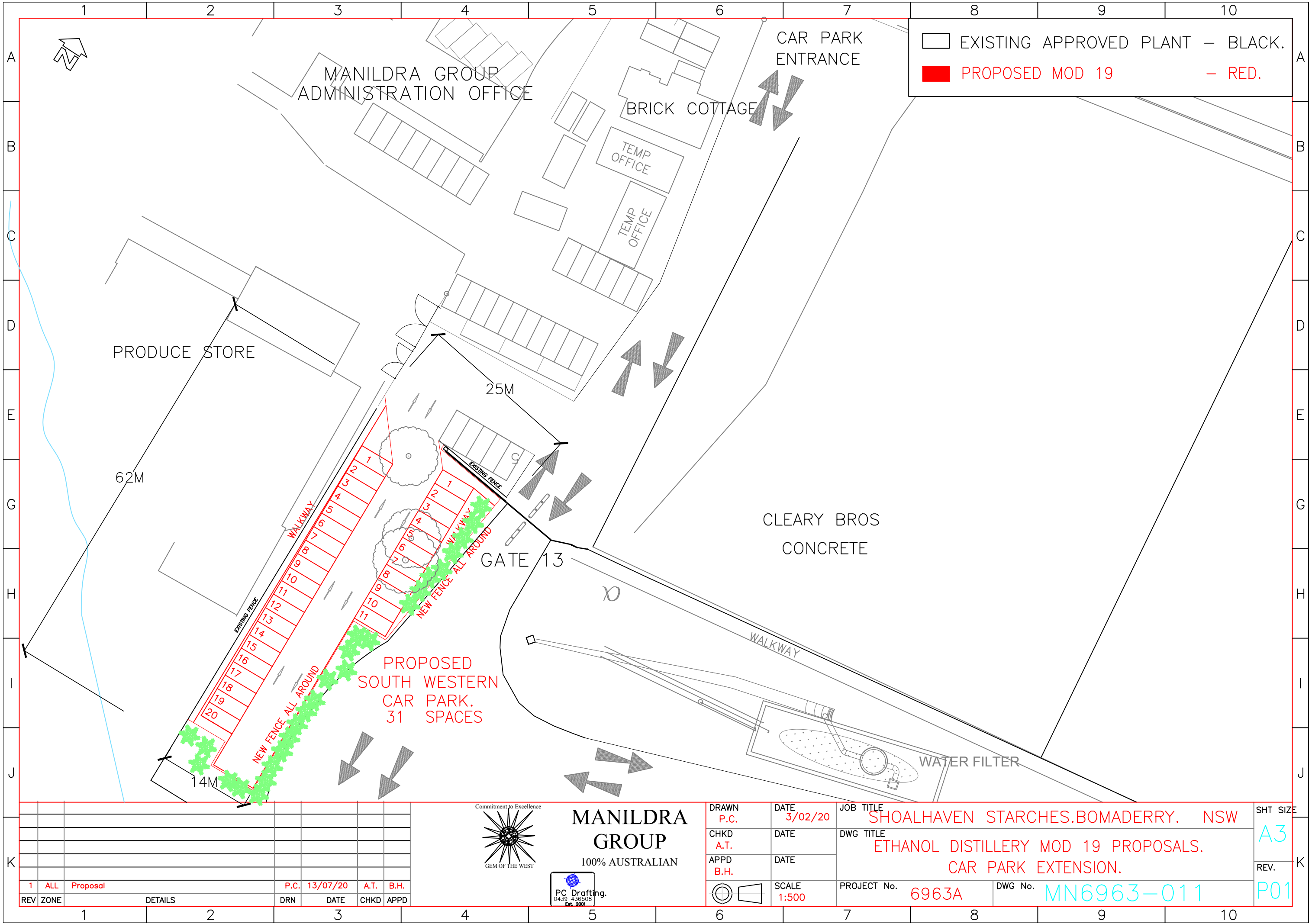
SHOALHAVEN STARCHES.BOMADERRY. NSW

DWG TITLE
ETHANOL DISTILLERY MOD 19 PROPOSALS.
SITE PLAN.

PROJECT No. 6963

DWG No. MN6963-010

SHT SIZE
A3
REV.
P09



REV	ZONE	DETAILS	DRN	DATE	CHKD	APPD
1	ALL	Proposal	P.C.	13/07/20	A.T.	B.H.



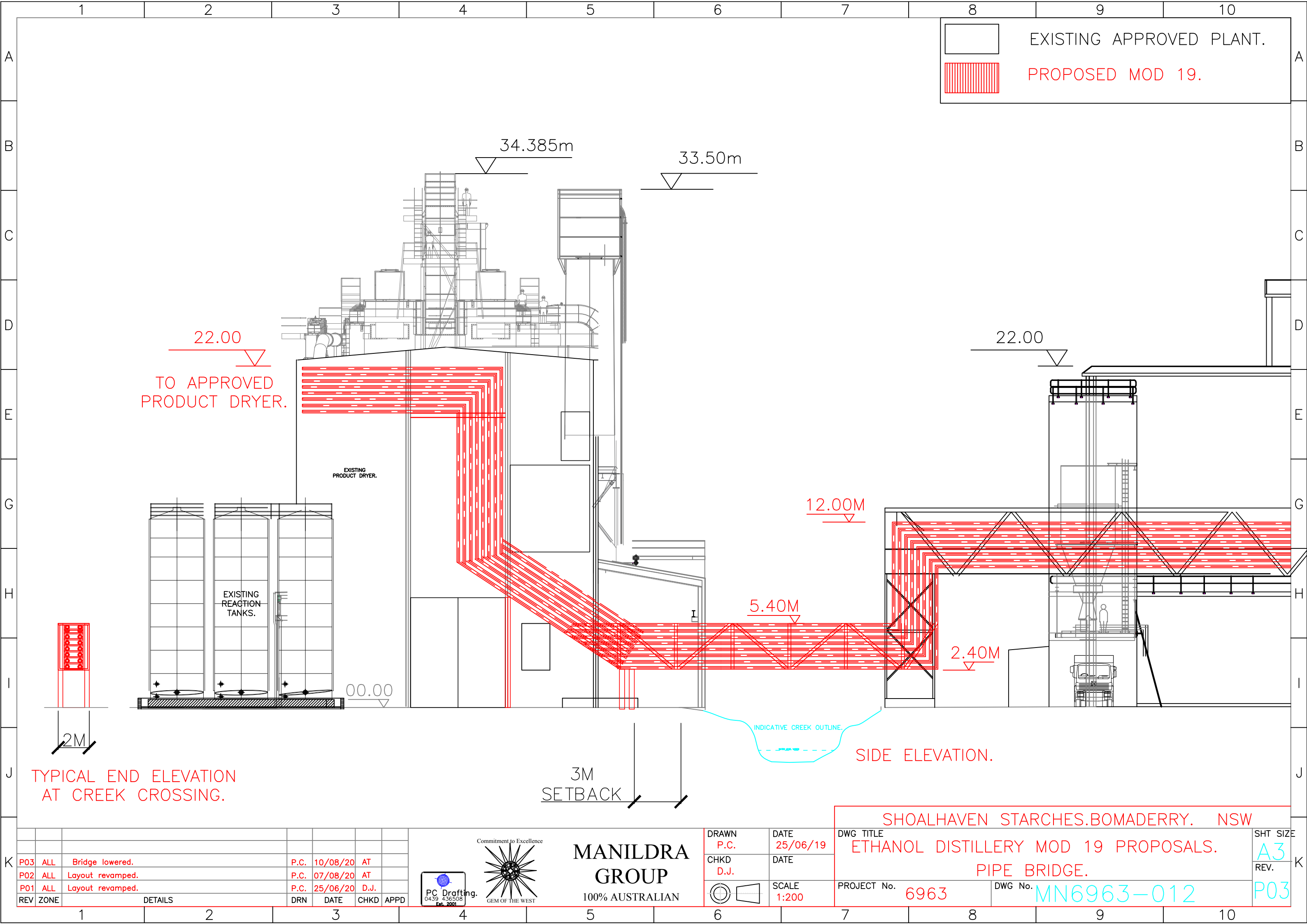
MANILDRA GROUP
100% AUSTRALIAN



DRAWN P.C.	DATE 3/02/20
CHKD A.T.	DATE
APPD B.H.	DATE
	SCALE 1:500

JOB TITLE	
SHOALHAVEN STARCHES.BOMADERRY. NSW	
DWG TITLE	
ETHANOL DISTILLERY MOD 19 PROPOSALS. CAR PARK EXTENSION.	
PROJECT No.	DWG No.
6963A	MN6963-011

SHT SIZE A3
REV. P01



EXISTING APPROVED PLANT.

PROPOSED MOD 19.

REV	ZONE	DETAILS	DRN	DATE	CHKD	APPD
P03	ALL	Bridge lowered.	P.C.	10/08/20	AT	
P02	ALL	Layout revamped.	P.C.	07/08/20	AT	
P01	ALL	Layout revamped.	P.C.	25/06/20	D.J.	

PC Drafting.

0439 436508

Est. 2001

Commitment to Excellence

GEM OF THE WEST

MANILDRA GROUP

100% AUSTRALIAN

DRAWN
P.C.

CHKD
D.J.

DATE
25/06/19

DATE

SCALE
1:200

SHOALHAVEN STARCHES.BOMADERRY. NSW

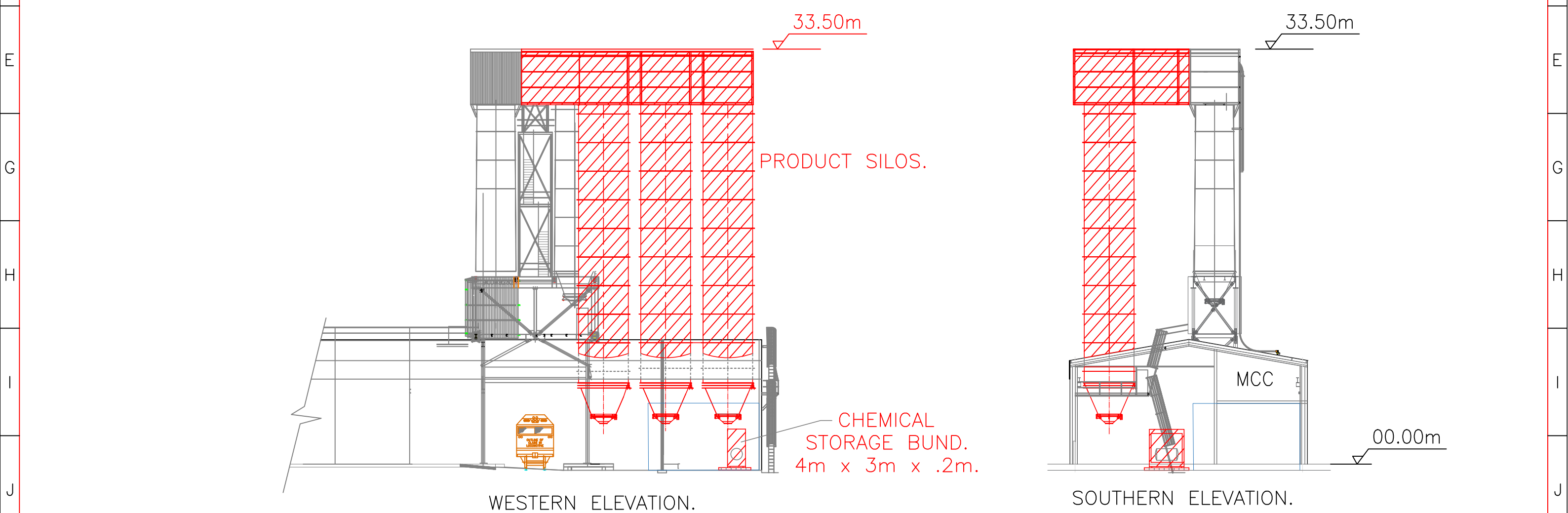
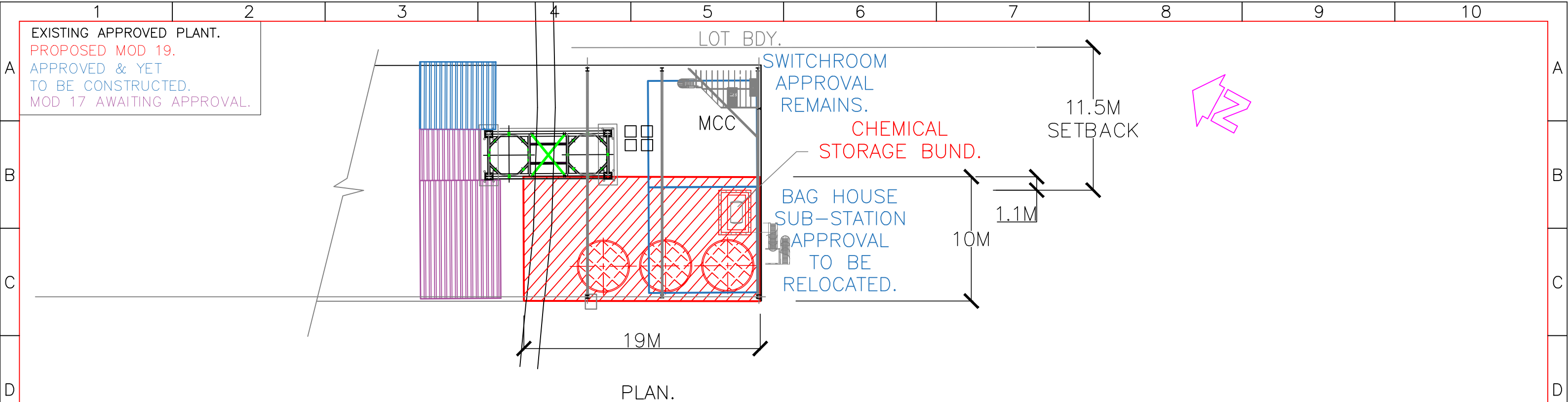
ETHANOL DISTILLERY MOD 19 PROPOSALS.

PIPE BRIDGE.

PROJECT No. 6963

DWG No. MN6963-012

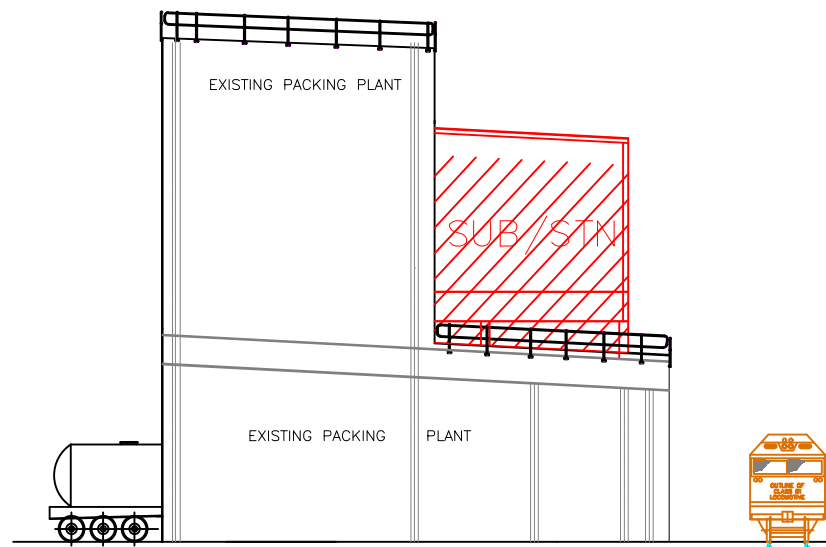
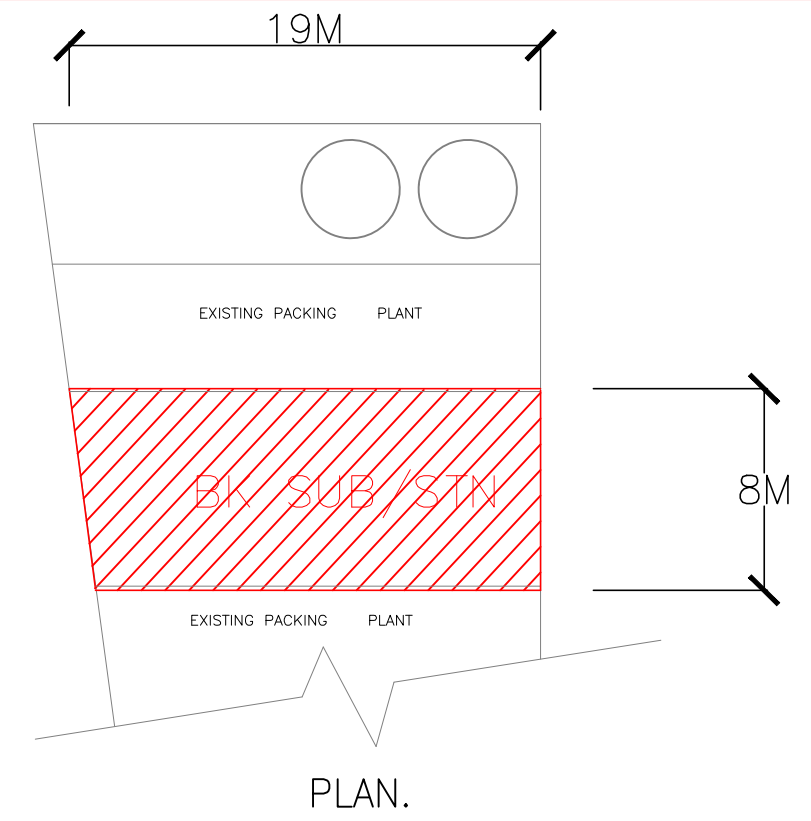
SHT SIZE
A3
REV.
P03



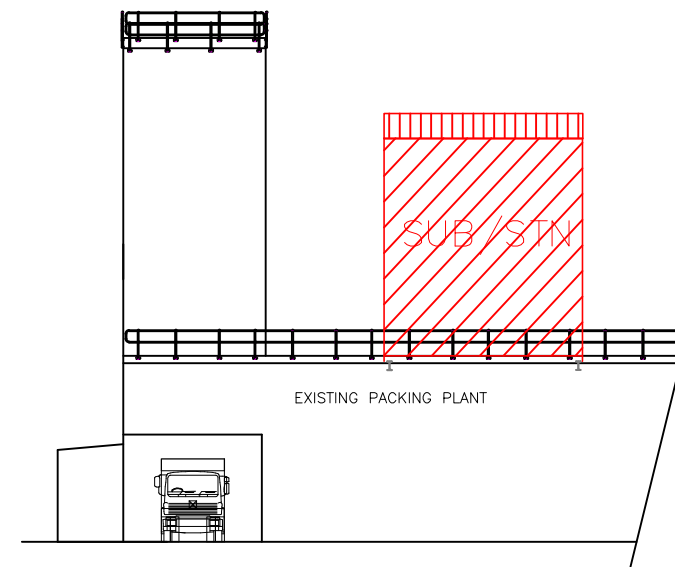
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EXISTING APPROVED PLANT.
PROPOSED MOD 19.

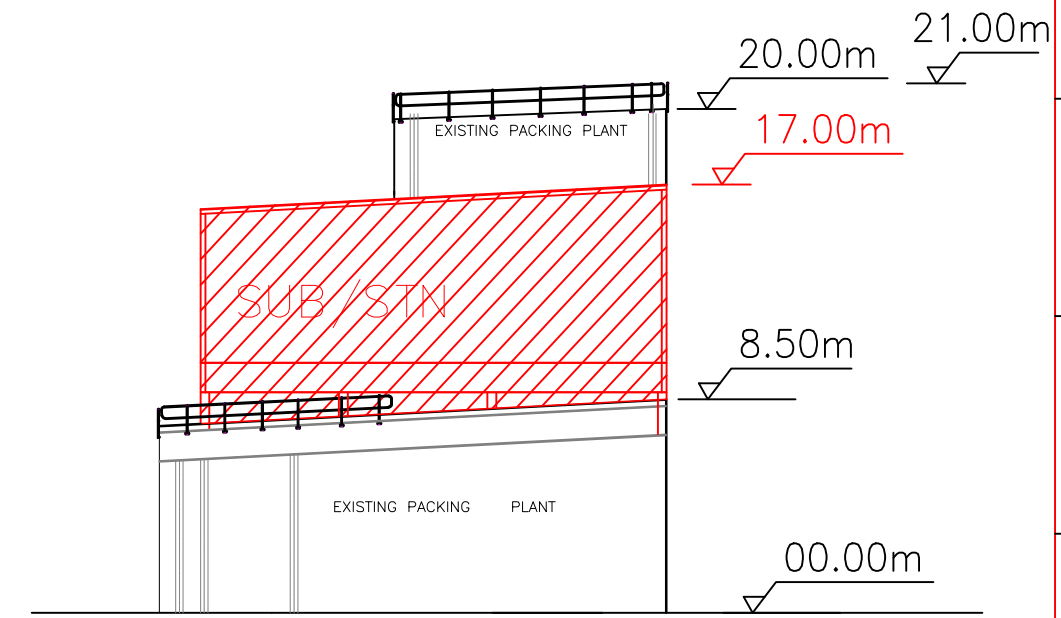
RELOCATION OF APPROVED
MAIN SUBSTATION EXTENSION.



WESTERN ELEVATION.



SOUTHERN ELEVATION.



EASTERN ELEVATION.

REV	ZONE	DETAILS	DRN	DATE	CHKD	APPD
P02	ALL	Replaces previous drawing no.	P.C.	5/08/20	AT	
P01	ALL	Silo proposal.	P.C.	5/08/20	D.J.	



MANILDRA
GROUP
100% AUSTRALIAN

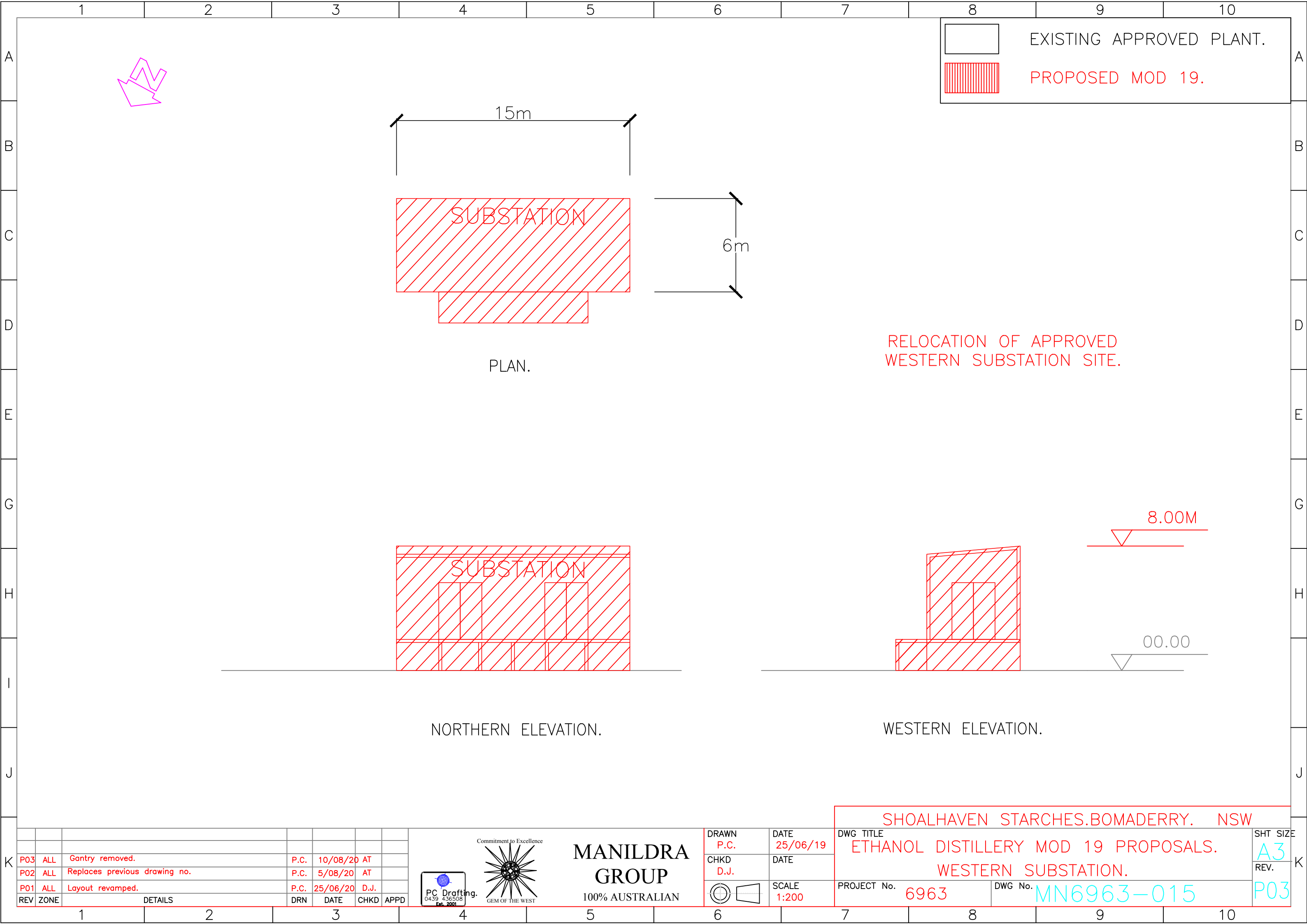


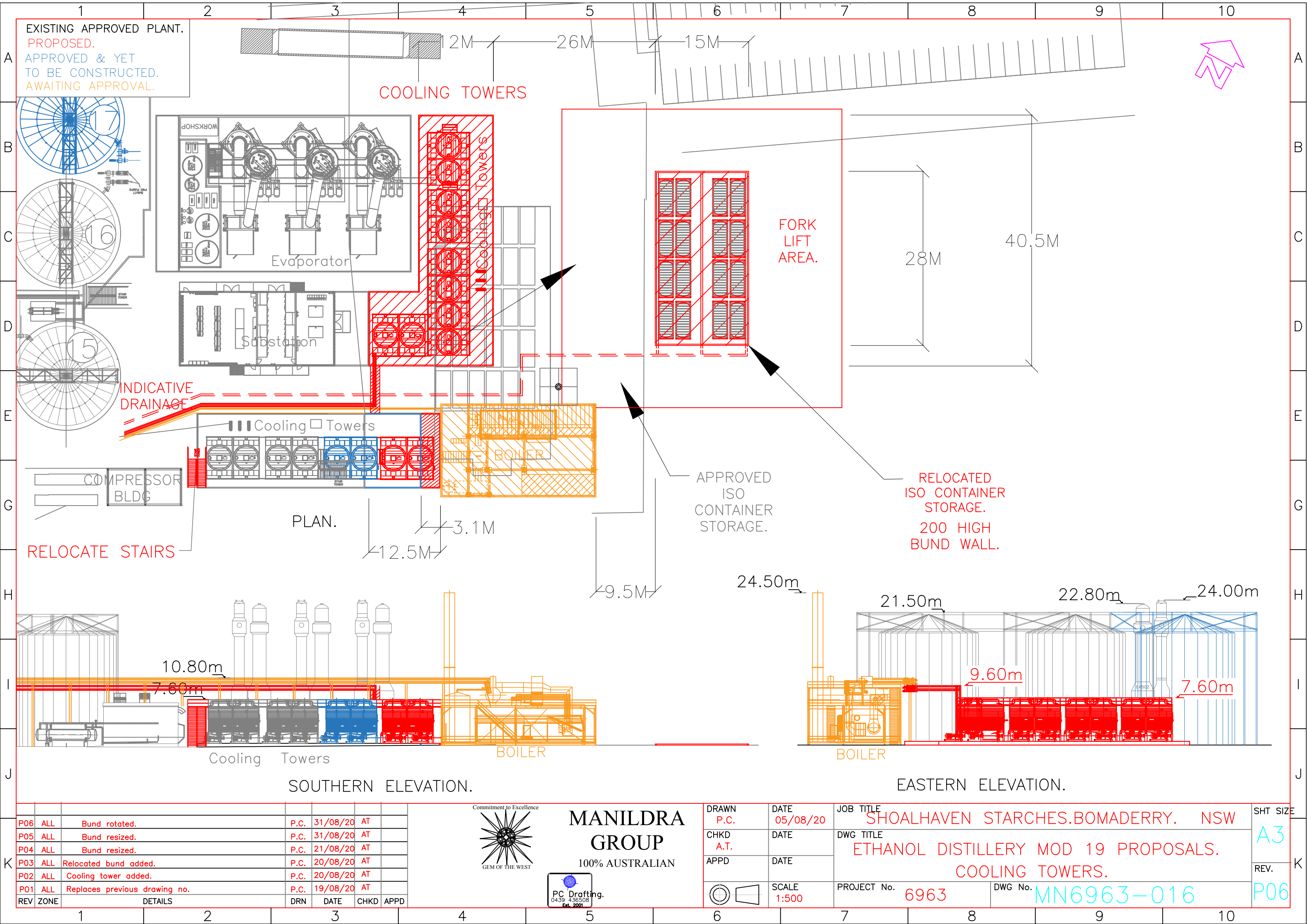
DRAWN
P.C.
CHKD
A.T.
APPD

DATE
05/08/20
DATE
DATE
SCALE
1:300

JOB TITLE
SHOALHAVEN STARCHES.BOMADERRY. NSW
DWG TITLE
ETHANOL DISTILLERY MOD 19 PROPOSALS.
RELOCATED MAIN SUBSTATION EXTENSION.
PROJECT No. 6963
DWG No. MN6963-014

SHT SIZE
A3
REV.
P02





EXISTING APPROVED PLANT.
PROPOSED.
APPROVED & YET
TO BE CONSTRUCTED.
AWAITING APPROVAL.

COOLING TOWERS

FORK
LIFT
AREA.

APPROVED
ISO
CONTAINER
STORAGE.

RELOCATED
ISO CONTAINER
STORAGE.
200 HIGH
BUND WALL.

PLAN.

SOUTHERN ELEVATION.

EASTERN ELEVATION.

REV	ZONE	DETAILS	DRN	DATE	CHKD	APPD
P06	ALL	Bund rotated.	P.C.	31/08/20	AT	
P05	ALL	Bund resized.	P.C.	31/08/20	AT	
P04	ALL	Bund resized.	P.C.	21/08/20	AT	
P03	ALL	Relocated bund added.	P.C.	20/08/20	AT	
P02	ALL	Cooling tower added.	P.C.	20/08/20	AT	
P01	ALL	Replaces previous drawing no.	P.C.	19/08/20	AT	



MANILDRA
GROUP
100% AUSTRALIAN



DRAWN
P.C.

CHKD
A.T.

APPD



DATE
05/08/20

DATE

DATE

SCALE
1:500

JOB TITLE
SHOALHAVEN STARCHES.BOMADERRY. NSW
DWG TITLE
ETHANOL DISTILLERY MOD 19 PROPOSALS.
COOLING TOWERS.

PROJECT No. 6963

DWG No. MN6963-016

SHT SIZE

A3

REV.

P06



Flood Certificate obtained from Council on 5th April 2018

Appendix B

COUNCIL REFERENCE: 28112E (D18/102788)
CONTACT PERSON: Kate Britton
DATE: 5 April 2018

Stephen Richardson

Thank you for your recent inquiry in relation to flood data held by Shoalhaven City Council.

Please find below the original details of your inquiry, some general information on flooding as well as the requested property specific Flood Certificate.

Details of Inquiry:

Name of Inquirer	Stephen Richardson	Date Requested: 14 Mar 2018
Reason for Enquiry	New Construction	
Contact Details	Phone: 44236198 Email: steve@cowmanstoddart.com.au Postal:	
Preferred Response	Email	
Notes		
Survey Detail	Not Provided	
Flood Safety Tip	Causeways can kill! Never drive through flood waters! Wait and be safe!	
General Flood Information	Shoalhaven City Council in conjunction with SES has produced site specific flood brochures for Shoalhaven Heads, Nowra / Bomaderry / Terara, Greenwell Point/Orient Point and Sussex Inlet. General Flood Information booklets, such as "What to do before, during & after a flood" prepared by Emergency Management Australia are also available. You can pick up free copies of all brochures at the City Administration Building in Nowra.	

FLOOD CERTIFICATE

According to the *Lower Shoalhaven River Floodplain Risk Management Plan – Climate Change Assessment (2011)* the following properties are affected by the 1% AEP flood event:

Bolong Rd, BOMADERRY - Lot 141 DP 1069758
160 Bolong Rd, BOMADERRY - Lot 1 DP 838753
171 Bolong Rd, BOMADERRY - Lot 241 DP 1130535
Bolong Rd, BOMADERRY - Lot B DP 334511
Bolong Rd, BOMADERRY - Lot A DP 42232
22 Bolong Rd, BOMADERRY - Lot 21 DP 1000265
Bolong Rd, BOMADERRY - Lot B DP 376494
Bolong Rd, BOMADERRY - Lot 1 DP 385146
24 Bolong Rd, BOMADERRY - Lot 201 DP 1062668

These properties have been treated as a whole and levels provided are the highest for each event across the entire area.

FLOOD INFORMATION

Year	Existing	Projected 2050	Projected 2100
Flood Planning Level	Not applicable	6.2m AHD	6.2m AHD

Hazard Category	High	High	High
Hydraulic Category	Floodway	Floodway	Floodway

Probable Maximum Flood Level	7.9m AHD	7.9m AHD	7.9m AHD
1% AEP Flood Level	5.7m AHD	5.7m AHD	5.7m AHD
2% AEP Flood Level	5.2m AHD	5.2m AHD	5.2m AHD
5% AEP Flood Level	5.0m AHD	5.0m AHD	5.0m AHD
10% AEP Flood Level	4.5m AHD	4.5m AHD	4.5m AHD

Velocity (1% AEP flood event)	1.0m/s*	0.9m/s*	0.9m/s*
-------------------------------	---------	---------	---------

* Minimal velocity information is available for this property therefore the provided velocity is approximate only

SITE SPECIFIC CONSIDERATIONS

1. Current NSW Government legislation requires climate change to be considered as part of this Floodplain Risk Management Study and Plan. Climate change related information evolves with time and it is expected that existing flood behaviour and levels may change in the future.
2. All applications for buildings, and the like, must take into account the projected 2050 flood information. All subdivision and other long-term planning must take into account the projected 2100 flood information.
3. Information provided in this flood certificate uses previous State Government sea level rise benchmarks (400mm and 900mm for the 2050 and 2100 horizon's respectively).

On Tuesday 10th February 2015 Council's Policy & Resources Committee resolved to no longer use State Government benchmarks and to "Establish a sea level rise benchmarks for planning purposes based on a 2030 horizon 100 mm, a 2050 horizon of 230 mm and 360 mm horizon for 2100". The new benchmarks will be incorporated into the flood information in future. Until studies incorporating the new benchmarks are undertaken Council will continue to use the best available information.

4. Not all of the property is categorised high hazard floodway. Part of the property is categorised high hazard flood storage. For more specific information regarding the different hazard and hydraulic categorisations on this property please contact Council's Natural Resource and Floodplain Unit on (02) 44293392.



1AEP 2050 1m contours



1AEP 2050 hazard and hydraulic categories

(Red-High hazard floodway; Yellow- High hazard storage; Green – Low hazard storage; Brown – Flood planning extent)

STANDARD CONSIDERATIONS

Properties below the Flood Planning Level:

Council considers the land in question to be below the flood planning level and therefore subject to flood related development controls. The conditions as set out below will reduce flood risk in flood events up to the Flood Planning Level, however the property may still be subject to flooding at higher levels during rare flood events.

Development controls apply to flood affected properties.

Development conditions will vary depending on flood hazard, hydraulic category as well as the type of development that is proposed. Please refer to the following documents for information on Council's flood related development controls and the NSW State Government's Floodprone Land Policy.

- Shoalhaven Development Control Plan – Chapter 9: Development on Flood Prone Land <http://dcp2014.shoalhaven.nsw.gov.au/main-category/whole-document>
- NSW Floodplain Development Manual 2005: <http://www.environment.nsw.gov.au/floodplains/manual.htm>

DISCLAIMER

Your enquiry relating to the likelihood of the land specified in the application being flooded has been referred to the Council's Floodplain Engineer.

In responding to your application the Council seeks to bring to your attention the fact that pursuant to s.733 of the Local Government Act a council does not incur liability in respect of the giving of any advice furnished in good faith by the Council relating to the likelihood of any land being flooded or the nature or extent of any such flooding.

The Council does not have a legal obligation to provide advice to you and to the extent that this reply is giving advice, the Council provides that advice in good faith with the intention of preserving, so far as is legally possible, the Council's immunity from liability pursuant to s.733 of the Local Government Act.

While all reasonable care has been taken to ensure the accuracy of the information given in this reply, its purpose is to provide a general indication of flood risk in the area. Flood lines shown on Council maps indicate the approximate extent of flooding only in relation to the abovementioned land.

The information provided may contain errors or omissions and the accuracy may not suit the purposes of all users. A site survey and further investigation are strongly recommended before commencement of any project based on this data.

The information given is the most current information at the time of the request. It is to be noted, however, that flood information is constantly reviewed and updated and as such, the information contained in this regard is current only on the day of issue.

Before acting upon the information provided in this reply, the Council urges you to obtain separate and independent advice as Council, in giving this information, does not intend it to be relied upon in such a fashion as to impose liability upon the Council.

Should you not be prepared to accept the information contained in this reply upon that basis then you should immediately notify Council.

GLOSSARY

AEP (Annual Exceedance Probability) means the chance of a flood of a given or larger size occurring in any one year, usually expressed as a percentage – for example a 1% AEP flood event has a 1% chance of occurring in any one calendar year.

AHD (Australian Height Datum) is a common national surface level datum corresponding approximately to mean sea level.

Flood fringe is the part of the floodplain remaining after the floodway and flood storage areas have been defined.

Flood planning area is any land identified as being flood affected in the 1% AEP flood event plus freeboard.

Flood planning level (FPL) is the 1% AEP flood level plus freeboard. The FPL is used for planning purposes, as determined in floodplain risk management studies and incorporated in floodplain risk management plans.

Flood prone land means any land susceptible to flooding up to the probable maximum flood event (that is, land within the floodplain) as identified in an adopted Council flood study or floodplain risk management study and plan.

Flood storage areas are those parts of the floodplain that are important for the temporary storage of floodwaters during the passage of a flood.

Flood study is a technical investigation of flood behaviour. It defines the nature of flood risk by establishing the extent, level and velocity of floodwaters. The study also provides information on the distribution of flood flows across various sections of the flood plain for the full range of flood events up to and including the PMF.

Floodplain risk management plan is a plan developed in accordance with the principles and guidelines contained in the NSW Government Floodplain Management Manual. Usually includes both written and diagrammatic information describing how particular areas of flood prone land are to be used and managed to achieve defined objectives.

Floodplain risk management study is a study that identifies and compares various risk management options. This includes an assessment of their social, economic, ecological and cultural impacts, together with opportunities to maintain and enhance river and floodplain environments.

Floodway means those parts of the floodplain where a significant discharge of water occurs during floods. They are often aligned with natural defined channels. Floodways are areas that, even if only partially blocked, would cause a significant redistribution of flood flow, or a significant increase in flood levels.

Freeboard is currently 0.5m for all catchments in the Shoalhaven. Freeboard is a factor of safety used to set the FPL (i.e. FPL = 1% AEP flood level plus freeboard (0.5m)). Freeboard takes into account uncertainties in flood modelling and climate change predictions, local factors that cannot be included in the flood model or wave action caused by wind, boats or vehicles driving through flood waters.

Hazard category represents the risk or danger to personal safety, evacuation movements and buildings and structures within the Flood Planning Area during the 1% AEP flood. There are only two possible hazard categories – high or low.

Hydraulic category describes the function of a specific part of the Flood Planning Area in conveying flood waters during a 1% AEP flood. There are three possible hydraulic categories – floodway, flood storage or flood fringe.

Probable maximum flood (PMF) is the largest flood that could conceivably occur at a particular location, usually estimated from probable maximum precipitation. Generally, it is not physically or economically possible to provide complete protection against this event. The PMF defines the extent of flood prone land, that is, the floodplain.

Provisional is used for hazard categories that have been determined in a flood study. Hazard categories are provisional until the floodplain risk management study and plan has been completed and adopted by Council, as this document considers additional risks, not considered during the flood study.



Copy of Conclusions from October 2000 report titled "*Further Development within the Manildra starches Plant off Bolong Road, Bomaderry - Hydraulic Assessment*"

Appendix C

3. CONCLUSIONS

3.1 Proposed Development

For the reasons detailed above, and as agreed in consultation with Council and DLWC, hydraulic modelling of the proposed development has not been undertaken. There is a need however, to consider (amongst other things) the flood hazard and structural assessment (with regard to velocity of floodwaters and impact by flood debris) of the proposed development. In quantifying the flood hazard, some important issues for consideration include:

- damage to the plant, including as a result of flood debris or structural failure,
- damage to the plant due to the possible buoyancy of equipment,
- malfunction of the plant (or any services on which the plant relies for operation) as a result of inundation and the associated risk of such malfunction to other users of the floodplain,
- access and evacuation.

3.2 Future Development

In consultation with Council and the DLWC, it is agreed that any future development of the Manildra Starches Plant within the intensively built-up area, as defined on Figures 2 and 4, will not require hydraulic modelling to quantify the hydraulic impacts and cumulative effects. The hydraulic impacts and cumulative effects of such developments are considered to be insignificant given the intensive development already present. As mentioned in previous sections, the only opportunity for floodwaters to pass through the intensively built-up area of the site is through the limited number of gaps or openings between the plant and associated buildings. Although these gaps or openings may be relocated to accommodate any future development, the movement of overland floodwaters will never be completely blocked, as gaps or openings similar to those which currently exist will always be maintained for trafficability requirements.

Any proposed future development is not exempt from flood hazard and structural assessment as outlined in Section 3.1

3.3 Future Development on the Northern Floodplain

This study has identified that there is no need for hydraulic modelling of the proposed, or any future proposed development within the existing intensively built-up area of the Manildra Starches Plant (shown on Figures 2 and 4). However during the course of this investigation, and in consultation with Council and the DLWC, it should be noted that any further development upon the northern floodplain (outside the built-up area shown on Figures 2 and 4), and in particular any development adjacent to the river bank, has the potential to increase the cumulative impact on flood levels and velocities.

The main areas of concern on the northern river bank are the unrestricted low lying areas between high ground and the existing developments, termed flowpaths or floodways. The bank is relatively

high (4 mAHD or higher) and is not significantly overtopped in (say) smaller than 10% AEP events, although flooding will still occur in these small events due to local catchment runoff and from Broughton Creek. Restricting these floodways has the greatest potential to increase flood levels, for events greater than the 10% within the Shoalhaven River and the southern floodplain.

Some suggestions for reducing the impact of further development include:

- developing on the localised high ground along the river bank whilst dedicating the lower areas as flow paths/floodways,
- constructing works in the “shadow” of existing plant,
- constructing compensatory works by clearing a flow path adjacent to the development (cut/fill approach).

In summary Council should be mindful of the above possible concerns in assessing further development in this area. In particular the existing flow paths or floodways across the northern river bank should be assessed as part of a detailed hydraulic modelling investigation to justify future works and demonstrate that there is no significant adverse impact.