ANNEXURE 4

ANNEXURE 4

Flood Assessment

prepared by

Webb McKeown & Associates

Cowman Stoddart Pty Ltd
PO Box 738
NOWRA
NSW 2541

J:\Jobs\114044\Admin\EthanolDistilleryAssessmentNov2016.docx

8 November 2016

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, Ethanol Distillery Plant

This letter has been prepared by R W Dewar BSc, MEngSci, MIEAust CPEng Member No 477618 who has over 30 years of experience in NSW in floodplain management.

1 Introduction

Shoalhaven Starches intend to undertake modifications to the existing Ethanol Distillery plant at their Bomaderry plant to:

- increase the proportion of 'beverage" grade ethanol that is able to be produced on the site, and
- to modify the type and location of the Water Balance Syrup Recovery Evaporator that has been previously approved under MOD 2 adjacent to the Ethanol Plant.

The proposal involves works at the existing plant as well as at the former Dairy Farmers plant. Appendix A provides plans of the proposal referred to above as well as a site plan. Details of the works are summarised below:

- relocation and provision of additional car parking on land adjacent to the BOC gas facility on the north side of Bolong Road. It is assumed that no importation of fill and minimal earthworks (except regrading) will be undertaken as part of these works and thus they will result in no loss of temporary floodplain storage or impediment to the conveyance of flood flows;
- construction of a substation, cooling towers and evaporators (relocated from approved location) to the immediate east of the existing plant;
- formation of an ISO tank container storage area to the immediate east of the above substation, cooling towers and evaporators;
- construction of twin 400,000 litre tanks with the existing tank removed at the ethanol recovery area;
- construction of a 1,000,000 litre tank at the ethanol storage area;
- construction of a pipe gantry and security gate;
- construction of a beverage grade ethanol plant;
- extend the railway siding yard;

WMAwater PTY LTD **ABN 14 600 315 053**

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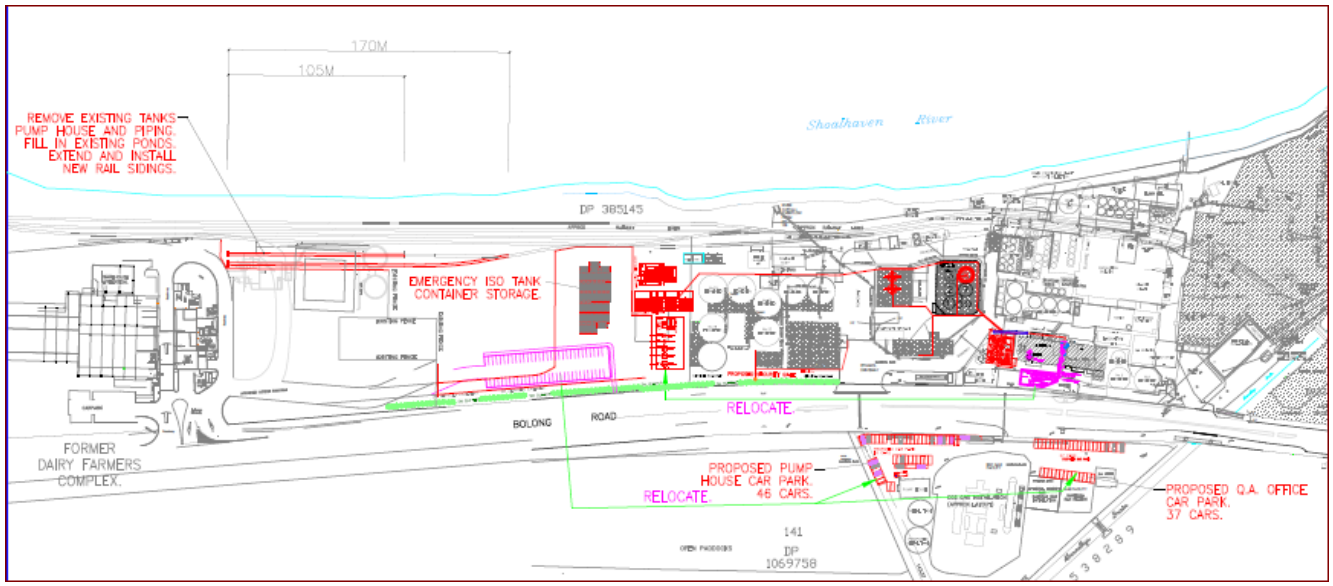
Plan views of the proposed works are provided in Appendix A and below.



The sites under consideration are 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.

WMAwater (formerly known as Webb McKeown & Associates) undertook the Council / State Government funded 1990 *Shoalhaven River Flood Study* and subsequent 2008 *Floodplain Risk Management Study and Plan*. WMAwater has also undertaken many similar type flood assessments for Shoalhaven Starches in the past and is therefore very familiar with flooding in the Shoalhaven River floodplain and the implications for flooding of further development within the confines of the Shoalhaven Starches and ex Dairy Farmers and ex Paper Mill plants on Bolong Road.

2 Description of Proposal and Council's Flood Certificate

The proposal is to construct plant and undertake works as described in Appendix A on the following lands:

- 160 Bolong Road site (existing Shoalhaven Starches plant) has land at approximately 4.0 mAHD and the 1% AEP flood level is approximately 5.6 mAHD according to the Flood Certificate obtained on 16th August 2016 (attached as Appendix B).
- 220 Bolong Road site (Dairy Farmers site)) has land at approximately 4.0 mAHD and the 1% AEP flood level is approximately 5.3 mAHD according to the Flood Certificate obtained on 16th August 2016 (attached as Appendix B).

Council's flood certificates (Appendix B) advise that the 160 Bolong Road and 220 Bolong Road sites are inundated in the 1% AEP event and described as High Hazard and Floodway. The projected 2050 sea level rise estimates due to climate change will not increase the 1% AEP flood level at the sites are too far upstream from the ocean. However with the projected 2100 sea level rise estimates the 1% AEP flood level will rise by 0.1m.

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 1st July 2015). As the works will not involve fill, excavation or subdivision of lands 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 not increase the number of workers on the site and there will be no other additional threat to the safety of any worker during a flood. Evacuation routes and protocols will be addressed in an updated Shoalhaven Starches Flood Plan.
The development or work will not unduly restrict the flow behaviour 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. 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 at 160 and 220 Bolong Road are within existing built up industrial land clear of vegetation. There will be some increase in impermeable area with these works but all runoff under existing and future conditions will reach the ground in nearly identical locations, thus these 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 associated with the production of ethanol are largely sealed structures and/or above the PMF flood level which means there will be minimal damage due to inundation, even in a PMF, unless the structure itself fails. There will potentially be some damage to electrical and other components feeding the equipment and these are considered in Shoalhaven Starches Flood Plan.
The development will not obstruct escape	The works will not occupy escape routes or cause

PERFORMANCE CRITERIA	RESPONSE
routes for both people and stock in the event of a flood.	workers to become trapped.
The development will not unduly increase dependency on emergency services.	The works are such that their construction will not increase the number of workers on the site and there will be no additional threat to the safety of any worker during a flood and no increase in dependency on emergency services. Evacuation will be addressed in the updated Shoalhaven Starches Flood Plan.
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 (apart from grasses) and is beyond the influence of normal fluvial geomorphic processes. The works will have no impact on water quality.

3.2 Hydraulic Impact Assessment

3.2.1 Background

The proposed works at 160 and 220 Bolong Road are surrounded by an extensive array of existing plant and buildings. Thus the flow path of floodwaters from the Shoalhaven River over the river bank and northwards towards Bolong Road, through the lands to be occupied by the proposed works, is already significantly impeded.

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 not all the proposed works are on the ground (i.e above the 1% AEP flood level or even the PMF) and the floodplain storage area of the Shoalhaven River floodplain is of the order of 100km^2, the loss of temporary floodplain storage due to the proposed works is minimal.

The loss of hydraulic conveyance depends on the extent of the restriction to a flowpath caused by the works. Prior to construction of the Shoalhaven Starches, Dairy Farmers and Paper Mill plants at Bomaderry there would have been significant flow towards Bolong Road during a flood, as there is across any river bank. However, since approximately 1960 the ongoing construction of the three plants has restricted the flow paths.

Whilst the individual impacts (construction of a single silo) may be small the cumulative increases from several developments may be significant. Therefore, the proposed works as

part of this assessment need to be assessed in the context of the incremental impact as well as the total cumulative impacts of all development within the immediate area. It is not possible to itemise all of the developments on the floodplain and their effects since white settlement. For the purposes of reporting the nominal starting date for the assessment of cumulative effects is 1990. This date was agreed previously (refer Webb McKeown & Associates October 2000 report titled *Further Development within the Manildra Starches Plant off Bolong Road, Bomaderry - Hydraulic Assessment*) and approximately corresponds to the floodplain development status at the time when the current Council design flood level information was established (1990 *Lower Shoalhaven River Flood Study*).

3.2.2 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 4km^2 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.

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 through 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.

3.2.3 Hydraulic Modelling Process

The hydraulic effects (change in flood levels, flows or velocities) of the proposed works at the Shoalhaven Starches and Dairy Farmers plants 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.

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 floodplain as at October 2016 and includes the recent applications by Shoalhaven Starches for modifications to their plant. The *Proposed* scenario reflects the floodplain as at October 2016 but including the construction of the proposed works as described in Appendix A. 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 river bank 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. 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).

3.2.4 Hydraulic Modelling Results

The flood impact map for the 1% AEP event is provided as Figure 1. The different colours reflect the change in peak water levels as a result of the proposed works. In summary the blue/red tones reflect a decrease in flood level whilst the green/brown tones reflect an increase in peak level.

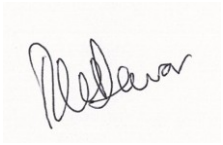
The proposed works do slightly decrease the amount of floodwaters from entering the northern floodplain across the river bank. Thus immediately upstream of the proposed works there is a slight increase in peak level. Though this increase in level is within the confines of land owned by Shoalhaven Starches. The potential impact of the proposed works is much reduced as they are sheltered behind existing buildings and structures that already inhibit the flow path.

Downstream of the proposed works on the northern side of Bolong Road near the Bomaderry sewage treatment plant there is a reduction in peak level of up to 30mm. This occurs because the proposed works reduce slightly the amount of flood waters crossing Bolong Road and thus flood levels are slightly lowered.

In conclusion the proposed works do not increase the 1% AEP flood level on lands outside those owned by Shoalhaven Starches. Consequently it was not considered necessary to consider the cumulative effects of the proposed works as there is no significant incremental increase (greater than 0.015m) as a result of these works.

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

Yours Sincerely,
WMAwater



R W Dewar
Director

FIGURE 1
PEAK FLOOD LEVEL IMPACT
1% AEP EVENT
ETHANOL EXTRACTION

Proposed Buildings
Existing Buildings
No Longer Flooded
Newly Flooded

Change in Flood Level (m)

< -0.1
-0.1 - -0.05
-0.05 - -0.04
-0.04 - -0.03
-0.03 - -0.02
-0.02 - -0.01
-0.01 - 0.01
0.01 - 0.015
0.015 - 0.02
0.02 - 0.025
0.025 - 0.05
0.05 - 0.1
> 0.1

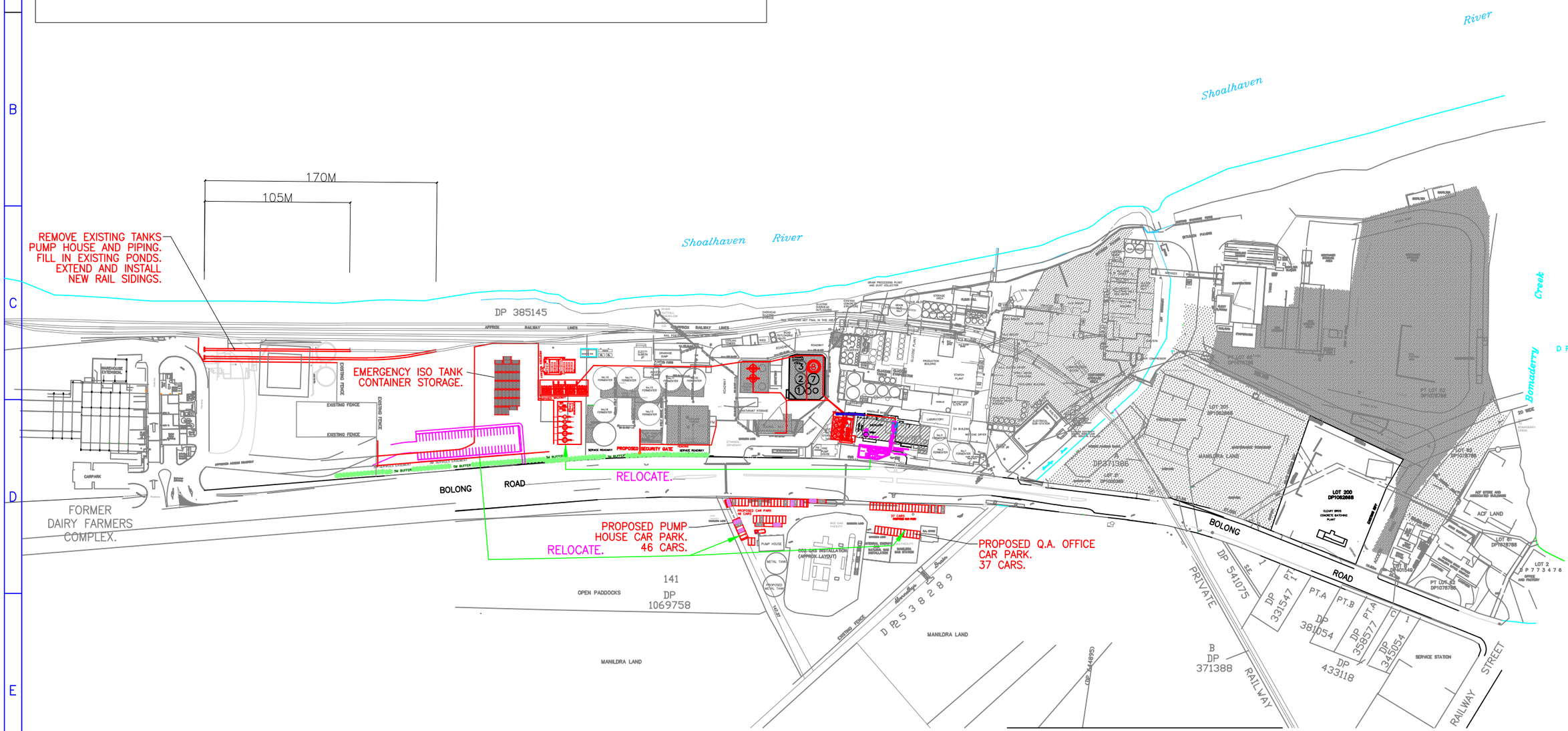
N

0 0.25 0.5 1 km

J:\Jobs\114044\ARC\Impacts\Oct16_EthanolExtraction\Figure01_ProposaL_EthA_1%AEP_Impact.mxd

EXISTING	—	BLACK.
PROPOSED MODIFICATION WORKS	—	RED
ORIGINAL APPROVAL SHOWN RELOCATED	—	BLUE
ORIGINAL MOD 2 APPROVAL	—	MAGENTA

N



ISS	DATE	ZONE	CHANGE AMENDMENTS	BY	CKD
H	31/10/16	D3	Entrance road relocated.Wording.	P.C	B.H.
G	26/10/16	ALL	Syrups tank removed.	P.C	B.H.
F	20/9/16	ALL	Rail sidings added.	P.C	B.H.
E	15/9/16	ALL	Car parks relocated.	P.C	B.H.
D	30/8/16	ALL	Syrups tank added,layout revised.	P.C	B.H.
0	26/7/16	ALL	Revised layout.MN285.	P.C	B.H.
A	2-7-15	ALL	Revised layout.	P.C	S.R.

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DRAWN	P.C.
TRACED	----
CHECKED	/
APPROVED	
DRG PRACTICE	AS1100

TITLE: MODIFICATION TO SHOALHAVEN STARCHES EXPANSION PROJECT.
PROPOSED BEVERAGE GRADE ETHANOL PLANT.
PLAN VIEW OF NEW WORKS.

SIZE A3	SCALE: 1:3000
MANILDRA-5927	
DRG. No:	MN285-001H

EXISTING – BLACK.
PROPOSED MODIFICATION WORKS–RED
RELOCATED APPROVAL – BLUE
ORIGINAL MOD 2 APPROVAL–MAGENTA

50M 28.17M

N

TANK 1,000,000 LT

TWO TANKS
400,000 LT EACH
EXISTING TANK
TO BE REMOVED.

EXISTING DME STRUCTURE
TO BE REMOVED.
S.C.C. DEMOLITION
APPROVAL NUMBER
DA13/1713.(15/07/2016).

Shoalhaven River

COOLING TOWERS

SUBSTATION

NEW PIPE GANTRY

APPROX RAILWAY LINES

EMERGENCY ISO TANK CONTAINER STORAGE.

PROPOSED WALKWAY

PROPOSED COMPRESSOR ROOM

RECEIVER

ELECT.SUBSTATION 7

EXISTING DRAINAGE SUMP
19M/3M/3.5M DEEP
VOLUME = 465.5 m³
CAPACITY = 465,500 Litres

EXISTING PUMP HOUSE

EXISTING AMENITIES

FM

SHED

ROAD OUTLOADING SILOS

ROADWAY

EXISTING CONCRETE STRUCTURE

GRAIN SILO No.1

FLOUR SILOS

STORAGE AREA

FLOUR UNLOADING

ION CONVERTER

GLUCOSE PLANT

AMMONIA TANK

GLUCOSE TANKS

PRODUCTION BUILDING

FERMENTATION AREA

1000m3

ETHANOL RECOVERY AREA

ETHANOL STORAGE AREA

5

PROCESS TANKS

COMPRESSOR

SERVICE ROADWAY

FUTURE 17

CIP TANK SLAB

FENCING

PROPOSED SECURITY GATE

LOADING BAY

REMOVE WATER TANKS

CONTROL ROOM

LABORATORY

DISTILLERY

No.3 FERMENTER

No.2 FERMENTER

PUMP HOUSE

LANDSCAPE

DRIVEWAY

BEVERAGE GRADE ETHANOL PLANT

5M SERVICES EASEMENT

5M BUFFER

BOLONG RD.

EVAPORATORS

WATER TANKS,PUMP HOUSE &
FIRE STATION TO BE REMOVED.
FIRE MONITOR TO REMAIN.

RELOCATE APPROVED MOD 2 EVAPORATOR.

PROPOSED CAR PARK
46 CARS
MANILDRA LAND

OPEN PADDOCK
MANILDRA LAND

37 CARS
PROPOSED CAR PARK

BOC GAS FACILITY

Q.A. OFFICE

PROPOSED PUMP HOUSE CAR PARK.
46 CARS.

APPROVED RECTIFIER &
STRIPPER SHOWN RELOCATED.

PUMP HOUSE

METAL TANK

RELOCATE APPROVED MOD 3 CAR PARK.

PROPOSED Q.A. OFFICE
CAR PARK.
37 CARS.

BRIDGE

0 10 METRE

PLAN VIEW

ISS	DATE	ZONE	CHANGE AMENDMENTS	BY	CKD
J	31/10/16	D3	Entrance road relocated.Wording	P.C.	B.H.
H	26/10/16	ALL	Tanks capacity adjusted.	P.C.	B.H.
G	26/10/16	ALL	Syrups tank removed.	P.C.	B.H.
E	15/9/16	ALL	Car parks relocated.	P.C.	B.H.
D	30/8/16	A L L	Pipe runs revised.Approved Manildra.	P.C.	K.L.

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MANILDRA GROUP
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DRAWN P.J.C.
TRACED----
CHECKED
APPROVED
DRG PRACTICE AS1100

TITLE MODIFICATION TO SHOALHAVEN STARCHES EXPANSION PROJECT.
PROPOSED BEVERAGE GRADE ETHANOL PLANT.
PLAN VIEW.

SIZE A3 | SCALES 1:1000 | SHT

MR–5927

DRG No MN285–002J

EXISTING DME STRUCTURE
TO BE REMOVED.
S.C.C. DEMOLITION APPROVAL
NUMBER DA13/1713.(15/07/2016).

N

54486
5176
24412
24898

RECTIFIER(MOD 2) C4201.(ø3.06m).
RELOCATED FROM
APPROVED MOD 2 LOCATION.

MOLECULAR SIEVES

CYCLOHEXANE TANK 1
CYCLOHEXANE TANK 2
ETHANOL TANK

CONTROL ROOM

19500
24679

RELOCATED

SIDE STRIPPER

OLD BEER COLUMN D10 TO BE REMOVED.

OLD BEER COLUMN D10 TO BE REMOVED AND NEW COLUMN TO BE INSTALLED IN SAME LOCATION.

1ST EFF

2ND EFF

PROPOSED STRIPPER C4202.(ø1.54m).

E691
E554
E690
E515
MS901
MS902
T660
T680
T501
T540
T801
E662
E814

14865
20469
2171
1122
2310

WATER TANKS TO BE REMOVED.

D541 E541 E543 D542 R546 E546
D540 E540 R542
D530 E530 E545
D550 E550

PUMPS

BEVERAGE GRADE ETHANOL PLANT

CLEAR

E10

3000
1200

PERIMETER BUND WALL Ø3682

PUMP TYP

4TH EFF
3RD EFF
2ND EFF

CONCRETE SLAB

9122

CONDENSER ON PLATFORM

1st & 2nd EFFECT EVAPORATORS,(ø2.7m).
PUMPS AND BUND WALL
RELOCATED FROM
APPROVED MOD 2 LOCATION.

APPROVED FIVE COLUMN EVAPORATOR AND ASSOCIATED EQUIPMENT(MOD 2). (TO BE RELOCATED).

FIRE SERVICE VALVES
FIRE SERVICE VALVES

DISTILLERY

15000
3000
12349

PUMP HOUSE TO BE REMOVED.

BOUNDARY FENCE

BOLONG RD

22671

TO BE RELOCATED.

0 1 2 3 4 5 6 7 8 9 10 METRE

PLAN VIEW

DISTILLERY MODIFICATIONS
SHOALHAVEN STARCHES PTY. LTD

EXISTING –					BLACK.
ORIGINAL APPROVAL(MOD2) NOT CONSTRUCTED TO BE RELOCATED –					MAGENTA
ORIGINAL APPROVAL SHOWN RELOCATED –					BLUE
PROPOSED MODIFICATION WORKS –					RED

ISS	DATE	ZONE	CHANGE AMENDMENTS	BY	CKD
F	28/10/16	ALL	Columns tagged.	P.C	B.H.
E	26/10/16	ALL	Beverage grade modified.	P.C	K.L.
D	31/08/16	ALL	Manildra approved.	P.C	K.L.
0	25/07/16	ALL	Revised layout.	P.C	B.H.
A	2–7–15	ALL	Revised layout.	P.C	S.R.

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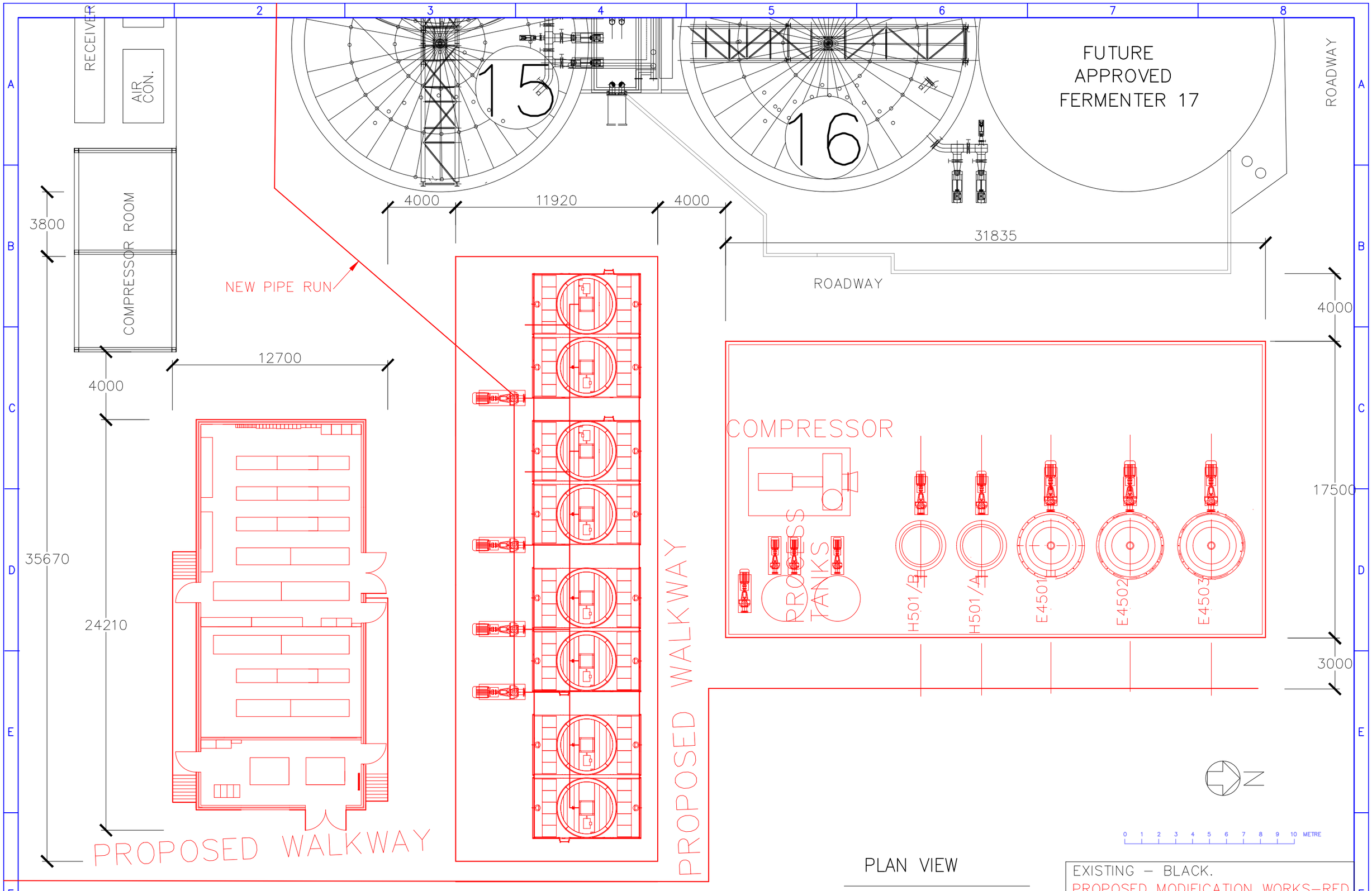
DRAWN P.J.C.
TRACED – – – –
CHECKED
APPROVED
DRG PRACTICE AS1100

TITLE MODIFICATION TO SHOALHAVEN STARCHES EXPANSION PROJECT.
PROPOSED BEVERAGE GRADE ETHANOL PLANT.
DISTILLERY PLAN VIEW.

SIZE A3 | SCALES 1:200 | SHT
MR–5927
DRG № MN285–003F



PLAN VIEW

EXISTING – BLACK.
PROPOSED MODIFICATION WORKS–RED

ISS	DATE	ZONE	CHANGE AMENDMENTS	BY	CKD
E	27/10/16	ALL	Dimension added.	P.C	B.H.
D	30/8/16	ALL	Revised & Manildra approved.	P.C	K.L.
0	25/07/16	ALL	Revised layout.	P.C	B.H.
A	2–7–15	ALL	Revised layout.	P.C	S.R.

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DRAWN P.J.C.
TRACED – – – –
CHECKED
APPROVED
DRG PRACTICE AS1100

TITLE MODIFICATION TO SHOALHAVEN STARCHES EXPANSION PROJECT.
PROPOSED BEVERAGE GRADE ETHANOL PLANT.
EVAPORATOR PLAN VIEW.

SIZE A3 | SCALES 1:200 | SHT
MR–5927
DRG № MN285–004E

EXISTING – BLACK.
PROPOSED MODIFICATION WORKS–RED

ROADWAY

ROADWAY

PIPE GANTRY

TWO PROPOSED TANKS
400,000 L EACH.
ø5.5M

PROPOSED
TANK

PROPOSED
TANK

ETHANOL
RECOVERY
AREA

DE–FATTING
PLANT

ETHANOL
STORAGE
AREA

7650
DIA

TANK #3

PROPOSED
TANK #8

PROPOSED
BEVERAGE GRADE ETHANOL
STORAGE TANK #8.
1,000,000L.
ø7.65m

TANK #2

TANK #7

#5

TANK #1

#4

#6

EXISTING TANK
TO BE REMOVED.

NEW PIPE RUNS
ON NEW &
EXISTING GANTRIES.

ROADWAY

ISS	DATE	ZONE	CHANGE AMENDMENTS	BY	CKD
E	26/10/16	ALL	Tanks capacity adjusted.	P.C.	B.H.
D	30/8/16	A L L	Pipe runs revisedManildra approved.	P.C.	K.L.
1	26/7/16	A L L	For approval.	P.C	B.H.

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GEM OF THE WEST

MANILDRA
GROUP
100% AUSTRALIAN

DRAWN P.J.C.
TRACED – – – –
CHECKED
APPROVED
DRG PRACTICE AS1100

TITLE
MODIFICATION TO SHOALHAVEN STARCHES EXPANSION PROJECT.
PROPOSED BEVERAGE GRADE ETHANOL PLANT.
STORAGE TANK PLAN.

SIZE A3 | SCALES 1:200 | SHT
MR–5927
DRG № MN285–005E

EXISTING	–	BLACK.
PROPOSED MODIFICATION WORKS	–	RED
ORIGINAL APPROVAL SHOWN RELOCATED	–	BLUE

46.00m

PROPOSED RECTIFIER.

EXISTING DME STRUCTURE
TO BE REMOVED.
S.C.C. DEMOLITION APPROVAL
NUMBER DA13/1713.(15/07/2016).

35.235m

PROPOSED BEVERAGE GRADE PLANT.

23.50m

+24000
+21000
+18000
+15000
+12000
+9000
+6000
+3000
+0

DISTILLERY

25.35m

C400
C800
C300
C500
C600

CONTROL ROOM

RELOCATED RECTIFIER.

30.775m

C4202
E4202

T660
T680
T501
T540
T801

25.5m

27.00m

C4101
E806
E805

+25000
+21800
+18600
+15400
+12200
+9000
+6000
+3000
+0

5000 | 5000 | 5000 | 5000 | 4550 | 6000 | 6000 | 5000 | 7000

Y5 | Y4 | Y3 | Y2 | Y1 | 3000 DIA | 1 | 2 | 3 | 3A | 4 | 5

ARRANGEMENT – ELEVATION LOOKING SOUTH FROM GRID A

ISS	DATE	ZONE	CHANGE AMENDMENTS	BY	CKD
E	28/10/16	ALL	Columns reconfigured.	P.C.	B.H.
D	30/8/16	ALL	Manildra approved.	P.C	K.L.
0	25/07/16	ALL	Revised layout.	P.C	B.H.
A	2–7–15	ALL	Revised layout.	P.C	S.R.

Commitment to Excellence
GEM OF THE WEST

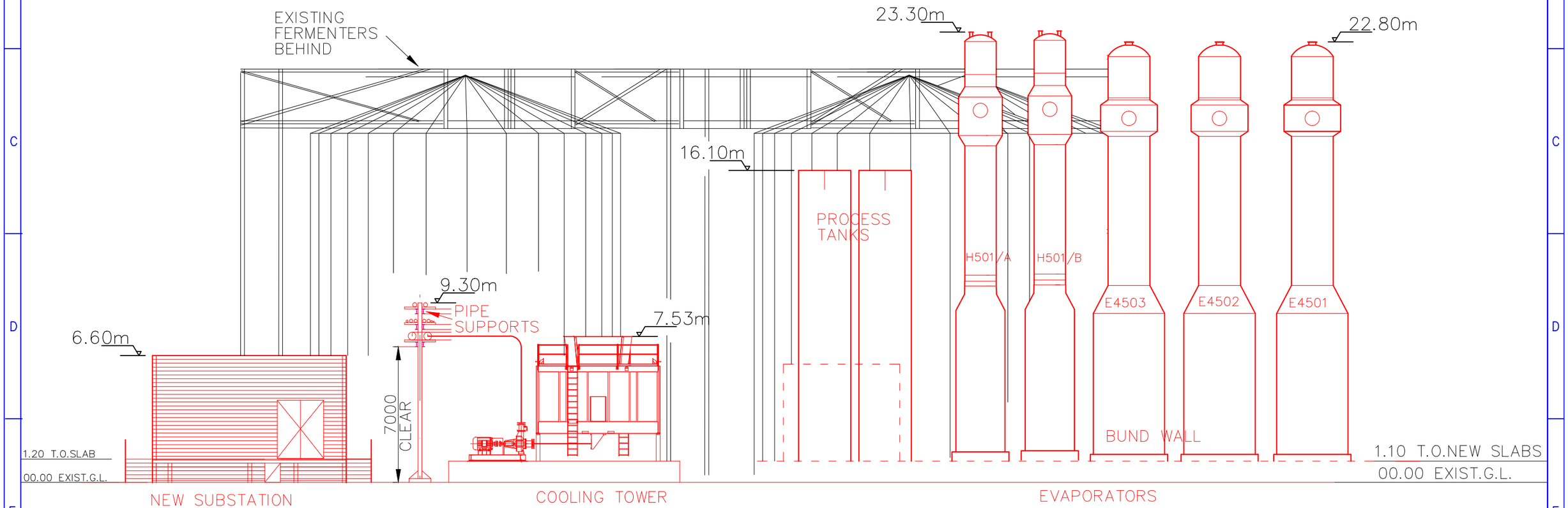
MANILDRA GROUP
100% AUSTRALIAN

DRAWN P.J.C.
TRACED – – – –
CHECKED
APPROVED
DRG PRACTICE AS1100

TITLE
MODIFICATION TO SHOALHAVEN STARCHES EXPANSION PROJECT.
PROPOSED BEVERAGE GRADE ETHANOL PLANT.
DISTILLERY ELEVATION LOOKING SOUTH.

SIZE A3 | SCALES 1:200 | SHT
MR–5927
DRG № MN285–006E

EXISTING – BLACK.
PROPOSED MODIFICATION WORKS–RED



ELEVATION LOOKING WEST

ISS	DATE	ZONE	CHANGE AMENDMENTS	BY	CKD
E	27/10/16	ALL	Was RLs.	P.C	K.L.
D	30/8/16	ALL	Manildra approved.	P.C	K.L.
0	25/07/16	ALL	Revised layout.	P.C	B.H.
A	2–7–15	ALL	Revised layout.	P.C	S.R.
1	29–06–15	A L L	For approval.	Paul C.	J.S.

Commitment to Excellence
GEM OF THE WEST

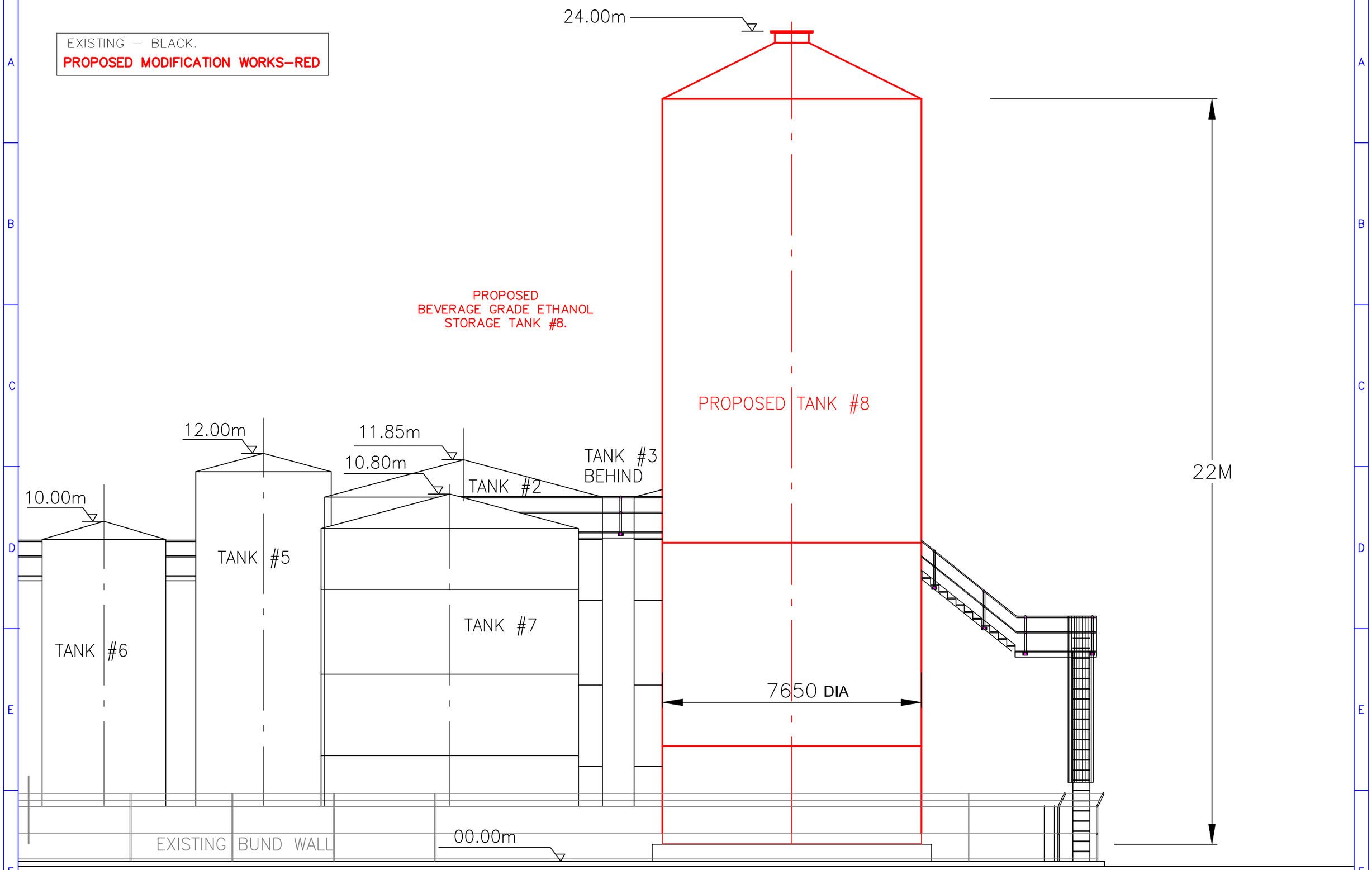
MANILDRA GROUP
100% AUSTRALIAN

DRAWN P.J.C.
TRACED – – – –
CHECKED
APPROVED
DRG PRACTICE AS1100

TITLE
MODIFICATION TO SHOALHAVEN STARCHES EXPANSION PROJECT.
PROPOSED BEVERAGE GRADE ETHANOL PLANT.
EVAPORATOR ELEVATION LOOKING WEST.

SIZE A3 | SCALES 1:200 | SHT
MR–5927
DRG № MN285–007E

EXISTING – BLACK.
PROPOSED MODIFICATION WORKS–RED



ISS	DATE	ZONE	CHANGE AMENDMENTS	BY	CKD
C	27/10/16	A L L	Tank now 1,000,000l.	P.C.	B.H.
1	26/7/16	A L L	For approval.	P.C.	B.H.

Commitment to Excellence
GEM OF THE WEST

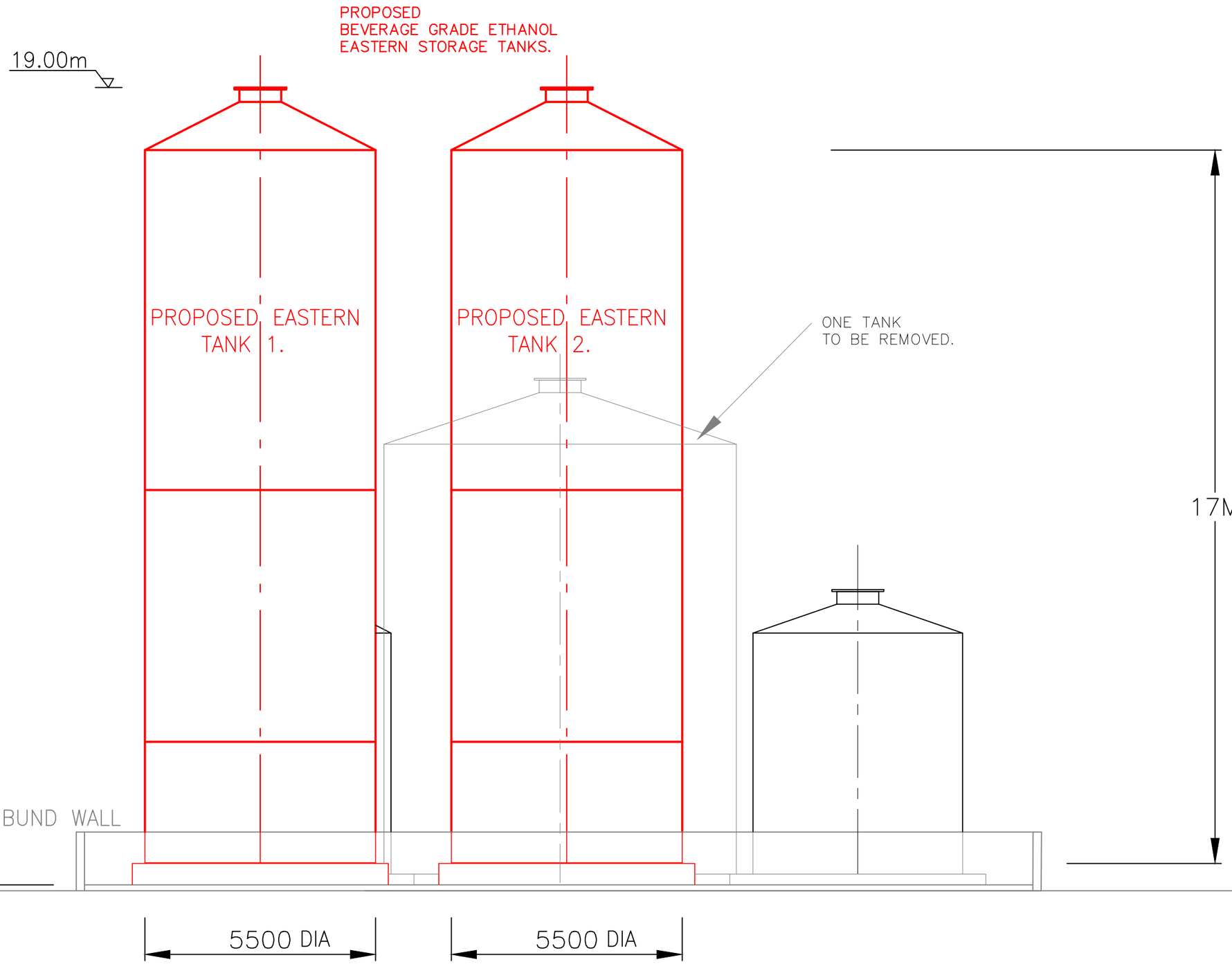
MANILDRA GROUP
100% AUSTRALIAN

DRAWN P.J.C.
TRACED
CHECKED
APPROVED
DRG PRACTICE AS1100

TITLE
MODIFICATION TO SHOALHAVEN STARCHES EXPANSION PROJECT.
PROPOSED BEVERAGE GRADE ETHANOL PLANT.
STORAGE TANK ELEVATION LOOKING EAST.

SIZE A 1 | SCALES 1:100 | SHT
MR–5927
DRG. № MN285–008C

EXISTING – BLACK.
PROPOSED MODIFICATION WORKS–RED



ISS	DATE	ZONE	CHANGE AMENDMENTS	BY	CKD
C	27/10/16	A L L	Tank now 400,000L.	P.C.	B.H.
1	26/7/16	A L L	For approval.	P.C.	B.H.

Commitment to Excellence
GEM OF THE WEST

MANILDRA GROUP
100% AUSTRALIAN

DRAWN P.J.C.
TRACED ----
CHECKED
APPROVED
DRG PRACTICE AS1100

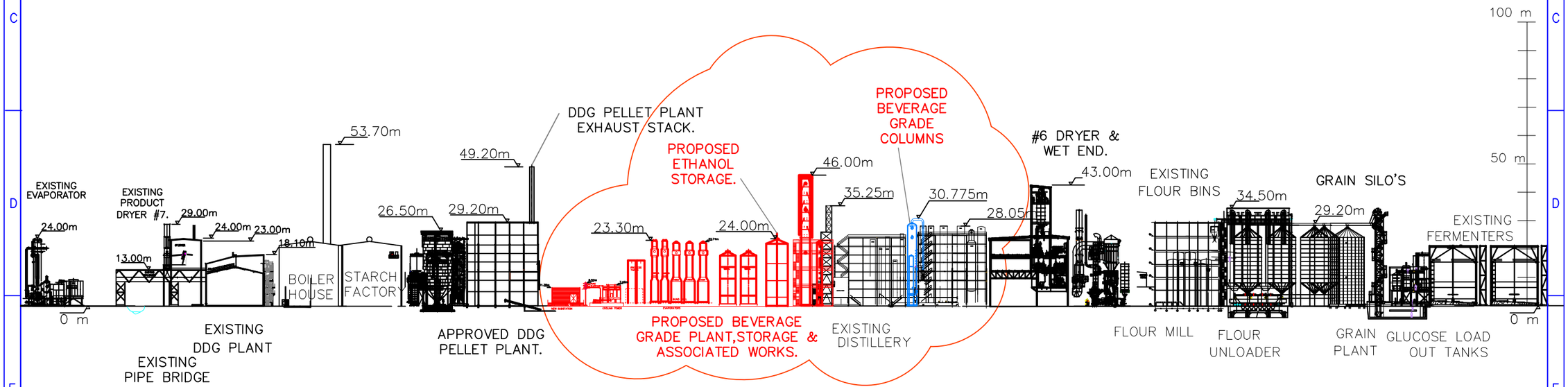
TITLE MODIFICATION TO SHOALHAVEN STARCHES EXPANSION PROJECT.
PROPOSED BEVERAGE GRADE ETHANOL PLANT.
EAST STORAGE TANKS ELEVATION LOOKING WEST.

SIZE A1 | SCALES 1:100 | SHT
MR–5927
DRG. № MN285–009C

EXISTING APPROVED PLANT.

PROPOSED BEVERAGE GRADE ETHANOL PLANT & ASSOCIATED PLANT.

RELOCATED APPROVAL.



TYPICAL ELEVATIONS OF STRUCTURES ON SHOALHAVEN STARCHES SITE.

0 — 50 m — 100 m

SCALE 1:700

ISS	DATE	ZONE	CHANGE AMENDMENTS	BY	CKD
F	26/10/16	ALL	Tank heights finalised.	P.C.	B.H.
E	26/10/16	ALL	Syrups tank removed.	P.C.	B.H.
D	31/08/16	All	Manildra approved.	P.C.	K.L.
0	26/7/16	All	New layout.New drawing number.	P.C.	B.H.
I	19-02-15	D2	Colour amended.	P.C.	P.C./J.S.
H	9-02-15	D1	Dryer #6 added.	P.C.	P.C./J.S.
G	30-01-15	A L L	Notes amended,council application added.	P.C.	P.C./J.S.

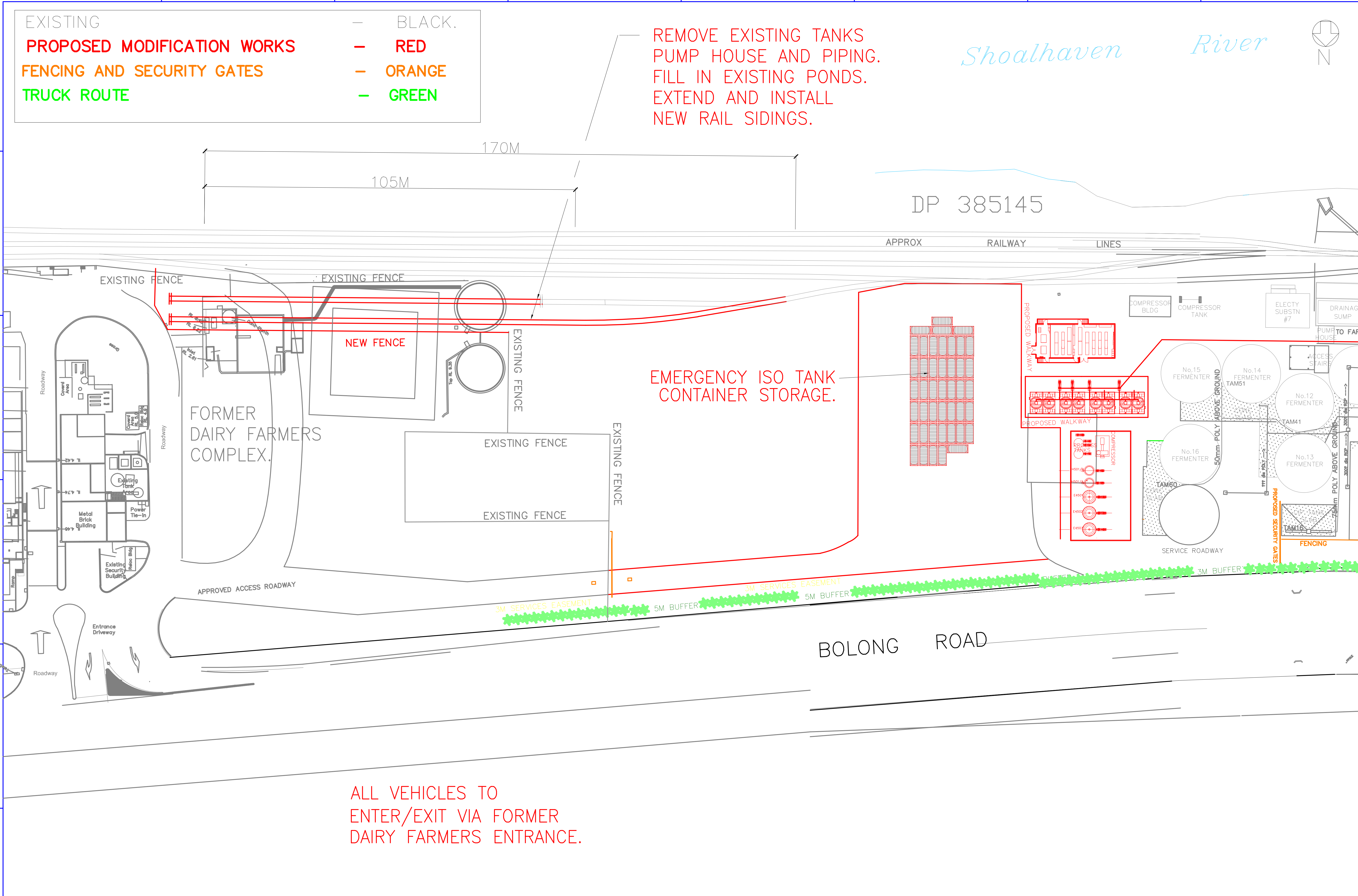
Commitment to Excellence
GEM OF THE WEST

MANILDRA GROUP
100% AUSTRALIAN

DRAWN P.J.C.
TRACED----
CHECKED
APPROVED
DRG PRACTICE AS1100

TITLE MODIFICATION TO SHOALHAVEN STARCHES EXPANSION PROJECT.
PROPOSED BEVERAGE GRADE ETHANOL PLANT.
OVERALL SITE ELEVATIONS.

SIZE A3 | SCALES 1:1500 | SHT
MR-5927
DRG Nº MN285-010F



EXISTING — BLACK.
PROPOSED MODIFICATION WORKS — RED
FENCING AND SECURITY GATES — ORANGE
TRUCK ROUTE — GREEN
REMOVE EXISTING TANKS PUMP HOUSE AND PIPING. FILL IN EXISTING PONDS. EXTEND AND INSTALL NEW RAIL SIDINGS.
Shoalhaven River
N
170M
105M
DP 385145
APPROX RAILWAY LINES
EXISTING FENCE
EXISTING FENCE
NEW FENCE
EXISTING FENCE
EXISTING FENCE
EXISTING FENCE
EXISTING FENCE
FORMER DAIRY FARMERS COMPLEX.
EMERGENCY ISO TANK CONTAINER STORAGE.
PROPOSED WALKWAY
PROPOSED WALKWAY
COMPRESSOR BLDG
COMPRESSOR TANK
ELECTY SUBSTN #7
DRAINAGE SUMP
PUMP HOUSE
TO FARM
No.15 FERMENTER
No.14 FERMENTER
No.12 FERMENTER
No.16 FERMENTER
No.13 FERMENTER
TAM51
TAM41
TAM60
TAM16
50mm POLY ABOVE GROUND
POLY ABOVE GROUND
PROPOSED SECURITY GATES
FENCING
SERVICE ROADWAY
3M BUFFER
5M BUFFER
5M BUFFER
3M SERVICES EASEMENT
APPROVED ACCESS ROADWAY
Roadway
Roadway
Entrance Driveway
Roadway
Metal Brick Building
Power Tie-In
Existing Tank Area
Existing Security Building
BOLONG ROAD
ALL VEHICLES TO ENTER/EXIT VIA FORMER DAIRY FARMERS ENTRANCE.

ISS	DATE	ZONE	CHANGE AMENDMENTS	BY	CKD
J	31/10/16	D3	Wording.	P.C	B.H.
H	27/10/16	ALL	Entrance relocated.	P.C	B.H.
F	20/9/16	ALL	Rail sidings added.	P.C	B.H.
E	15/9/16	ALL	Car parks relocated.	P.C	B.H.
1	16/8/16	ALL	Draft	P.C	B.H.

MANILDRA GROUP
Commitment to Excellence

DRAWN P.C.
TRACED ---
CHECKED /
APPROVED
DRG PRACTICE AS1100

TITLE:
MODIFICATION TO SHOALHAVEN STARCHES EXPANSION PROJECT.
PROPOSED BEVERAGE GRADE ETHANOL PLANT.
PLAN VIEW OF TRAFFIC MANAGEMENT & NEW RAIL SIDING.

SIZE A3
SCALE: 1:1000
MANILDRA-5927
DRG. No. MN285-011J

Appendix A

Appendix B

Shoalhaven City Council

Bridge Rd, Nowra NSW 2541 **02 4429 3111**
Deering St, Ulladulla NSW 2539 **02 4429 8999**
Address all correspondence to
The General Manager, PO Box 42, Nowra NSW 2541 Australia
DX5323 Nowra Fax 02 4422 1816

COUNCIL REFERENCE: 28112E (244348)
CONTACT PERSON: Kate Britton
DATE: 16 August 2016

Stephen Richardson
PO BOX 738
Nowra NSW 2541

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:** 01 Aug 2016
Reason for Enquiry	New Construction	
Contact Details	Phone: 02 4423 6198 Email: steve@cowmanstoddart.com.au Postal: PO BOX 738 Nowra	
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)* this property, 160 Bolong Rd, BOMADERRY - Lot 1 DP 838753, **is affected by the 1% AEP flood event.**

FLOOD INFORMATION

Year	Existing	Projected 2050	Projected 2100
Flood Planning Level	Not applicable	6.1m AHD	6.1m AHD
Hazard Category	High	High	High
Hydraulic Category	Floodway	Floodway	Floodway
Probable Maximum Flood Level	7.8m AHD	7.8m AHD	7.8m AHD
1% AEP Flood Level	5.6m AHD	5.6m AHD	5.6m AHD
2% AEP Flood Level	5.1m AHD	5.1m AHD	5.1m AHD
5% AEP Flood Level	4.6m AHD	4.6m AHD	4.6m AHD
10% AEP Flood Level	4.5m AHD	4.5m AHD	4.5m AHD
Velocity (1% AEP flood event)	3.0m/s*	3.0m/s*	3.0m/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.
   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.
   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.

2. 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.

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 be 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. Floodway's 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 additions risks, not considered during the flood study.

Shoalhaven City Council

Bridge Rd, Nowra NSW 2541 **02 4429 3111**
Deering St, Ulladulla NSW 2539 **02 4429 8999**
Address all correspondence to
The General Manager, PO Box 42, Nowra NSW 2541 Australia
DX5323 Nowra Fax 02 4422 1816

COUNCIL REFERENCE: 28112E (D16/244467)
CONTACT PERSON: Kate Britton
DATE: 16 August 2016

Stephen Richardson
PO BOX 738
Nowra NSW 2541

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:** 01 Aug 2016
Reason for Enquiry	New Construction	
Contact Details	Phone: 02 4423 6198 Email: steve@cowmanstoddart.com.au Postal: PO BOX 738 Nowra	
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)* this property, 220 Bolong Rd, BOMADERRY - Lot 143 DP 1069758, **is affected by the 1% AEP flood event.**

FLOOD INFORMATION

Year	Existing	Projected 2050	Projected 2100
Flood Planning Level	Not applicable	5.8m AHD	5.9m AHD
Hazard Category	High	High	High
Hydraulic Category	Floodway	Floodway	Floodway
Probable Maximum Flood Level	7.6m AHD	7.6m AHD	7.6m AHD
1% AEP Flood Level	5.3m AHD	5.3m AHD	5.4m AHD
2% AEP Flood Level	4.8m AHD	4.8m AHD	4.9m AHD
5% AEP Flood Level	4.3m AHD	4.3m AHD	4.3m AHD
10% AEP Flood Level	4.4m AHD	4.4m AHD	4.4m AHD
Velocity (1% AEP flood event)	1.4m/s	1.4m/s	1.3m/s

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.
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   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.

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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 be 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.

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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 additions risks, not considered during the flood study.