

SUPAGAS

23 Commercial Drive,
Dandenong South, VIC 3175

C:\Users\dewar\Desktop\Work\Manildra\Supagas\Co2Plant\June2021.docx

23 June 2021

Attention: Mr. B Vocale

Dear Ben,

**Re: Flood Compliance Report for Proposed Modification Application to MP06-0228,
Shoalhaven Starches Expansion Project, Bolong Road,
Proposed CO₂ Plant at Former Dairy Farmers Plant at 220 Bolong Road, Bomaderry
June 2021 Upgrade**

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

1 Introduction

In 2019 Supagas constructed a CO₂ plant to the immediate east of the former Dairy Farmers factory building at 220 Bolong Road Bomaderry. The plant takes CO₂ from existing Shoalhaven Starches operations and then processes this gas to food grade quality for supply to the food and beverage industry. Supagas now wish to install additional storage vessels and associated plant on the site to increase storage capability to enable:

- Improved storage volume capacity of liquid CO₂ product during planned and unplanned outages.
- Better batching/quarantining of product and quality control.
- Better availability of product during high demand periods.

The existing CO₂ plant is outlined in red on a GoogleMaps aerial photograph – Image 2 below. In addition, an underground pipeline was constructed from the plant to the existing Shoalhaven Starches operation at 160 Bolong Road as well as a cold-water scrubber and blower.



Image 1: January 2019



Image 2: April 2021

WMAwater Pty Ltd

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The site at 220 Bolong Road 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.

WMAwater (formerly known as Webb McKeown & Associates) undertook the 1990 Shoalhaven River Flood Study and subsequent 2008 Floodplain Risk Management Study and Plan for Shoalhaven City Council. We have also undertaken many similar type of flood assessments for Shoalhaven Starches in the past. We are therefore very familiar with flooding in the Shoalhaven River floodplain and the implications for flooding of further development in the northern floodplain and along Bolong Road.

2 Description of Proposal

The proposal is to undertake works to upgrade the plant as described in Appendix A. Indicative ground levels at the 220 Bolong Road site are around 4 to 5 mAHD (Figure 1) and the 1% AEP flood level is approximately 5.3 mAHD according to the Flood Certificate obtained on 13th September 2017 (attached as Appendix B).

This flood impact assessment was undertaken to assess the impacts due to works constructed in 2017 (i.e all works within the red outline in Image 2) plus the proposed works outlined in Appendix A. Thus, this assessment supersedes our flood impact assessment undertaken in November 2017.

The works at the existing Shoalhaven Starches operation at 160 Bolong Road (underground pipe connection) are too small to be accurately modelled within the existing hydraulic model and are therefore considered to provide minimal impact on flood levels outside the immediate 10m radius of the works. The loss of temporary floodplain storage due to these works is negligible within the context of the Shoalhaven River floodplain. This assessment has therefore focussed on assessing the impacts of the existing and proposed works at the 220 Bolong Road site and has ignored any flood affectation due to the existing works at the Shoalhaven Starches operation at 160 Bolong Road.

Council's flood certificate (Appendix B) advises that the 220 Bolong Road site is inundated in the 1% AEP event and is described as High Hazard and Floodway. The projected sea level rise estimates due to climate change will increase the 1% AEP flood level at this site by up to 0.1m. It should be noted that the high hazard and floodway classification was 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. This issue is discussed further in Section 3.2.1.

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 existing / proposed works do not involve the placement of fill, excavation or subdivision of lands the provisions of Section 5.2 of Chapter G9 are not relevant to this proposal and therefore not discussed further.

This letter has taken account of the flood related issues raised in an email of 3rd November 2017 from Shoalhaven City Council which states:

Flooding Comments/Requirements:

3. This site is categorised as high hazard floodway and the proposal is located partially at high hazard floodway and partially at high hazard flood storage. A detailed flood assessment report is required on how the proposal will achieve all relevant objectives, performance criteria and/or acceptable solutions of Shoalhaven Development Control Plan 2014, as prescribed in Section 5.1 and 5.2 of Chapter G9.

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.	There are currently two staff employed on the site. The modification proposal will not require any additional staff on site. The modification proposal will therefore not increase the number of persons on the site and therefore will not increase the risk to life or safety of persons during a flood event.
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 existing and proposed development is within existing built-up industrial land with trees on the periphery of the site. All runoff under existing and future conditions will reach the ground in nearly identical locations and thus 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 on the potential failure of existing buildings and stored equipment and product will be provided.
Potential damage due to inundation of existing and proposed buildings and structures is minimised.	Inundation of the site and the existing / proposed plant and / or debris impact may cause damage to electrical and other components feeding the equipment as well as damage to the plant itself. These issues will be considered in an updated Shoalhaven

PERFORMANCE CRITERIA	RESPONSE
	Starches Flood Plan. Of importance is the potential risk from equipment being moved by floodwaters from the site.
The development will not obstruct escape routes for both people and stock in the event of a flood.	The existing / proposed works will not occupy escape routes or cause workers to become trapped.
The development will not unduly increase dependency on emergency services.	The works will not increase the number of workers from Supagas who may be subject to flood risk.
Interaction of flooding from all possible sources has been taken into account in assessing the existing / 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 (from flood certificate in Appendix B). The site is industrial land with limited 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

No additional buildings will be constructed on site and the only change in land use activities is the existing and proposed construction of storage vessels plant and associated equipment. The additional proposed plant is shown on the plans in Appendix A.

The aerial image above from GoogleMaps indicates that the position of the existing / proposed storage vessels and plant is surrounded on the upstream (west) and downstream (east) side by existing buildings. Thus, the flow path of floodwaters from the Shoalhaven River over the riverbank and towards Bolong Road through the site, is already impeded but this will be increased with the existing / proposed construction of the plant.

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 the existing / proposed plant occupies a small footprint with much of it raised (as pipe work) 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 existing / proposed works is negligible.

The loss of hydraulic conveyance depends on the extent of the restriction to a flowpath caused by the existing / proposed plant. Prior to construction of the former Dairy Farmers plant (it

closed in 2006) there would have been significant flow through the site during a flood, as there is across any riverbank. However, since then the construction of the former Dairy Farmers plant has significantly restricted the flow path through the site.

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 model used both field survey for weirs as well as bathymetric survey for the river cross sections at approximately 1 to 2 kilometre spacing.

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

The main advancements in hydraulic modelling are using more complex computer software (TUFLOW) that allows the river and floodplain to be discretized 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 define the topography more accurately 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 can demonstrate that hazard, velocity and other parameters will change as flow crosses over the northern bank and enters the northern floodplain.

Figure 1 shows the model discretisation of the existing plant / buildings and proposed plant at the site.

3.2.2 Hydraulic Modelling Process

The hydraulic effects (change in flood levels, flows or velocities) of the existing / proposed works at the Dairy Farmers 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.

For the analysis it was assumed that the existing / proposed plant at the site would block 100% of the flow where there is a solid structure but only 50% blockage where there is only pipework as there are gaps between sections of the plant (refer Appendix A). These modelling assumptions are slightly different to those adopted in our November 2017 report which assumed 100% blockage throughout the entire extent of the 2019 works.

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 in 2017 (Image 1) at the site prior to construction of the existing CO2 plant. The *Proposed* scenario reflects the floodplain but including the existing (as shown on Image 2) and the proposed plant 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 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 existing / 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 and PMF events are provided as Figures 2 and 3. The different colours reflect the change in peak water levels because of the existing and proposed works. In summary the blue/red tones reflect a decrease in flood level whilst the blue/green/brown tones reflect an increase in peak level.

The existing / proposed works do slightly decrease the amount of floodwaters from entering the northern floodplain across the river bank. Thus, immediately upstream of the riverbank works there is a slight increase in peak level in the 1% AEP event with a more extensive impact in the PMF / Extreme event. Though this increase in level is largely within the confines of land owned by Shoalhaven Starches. The potential impact of the existing / proposed works is much reduced as they are sheltered behind existing buildings and structures that already inhibit the flow path. Also large parts of the proposed works are pipe work and thus not 100% barriers to flow.

North west of the existing / proposed works on Bolong Road there is a reduction in peak level of less than 0.1m. This occurs because the existing / proposed works reduce slightly the amount of flood waters crossing through the site and thus flood levels are slightly lowered.

In conclusion the existing / proposed works do not significantly increase the 1% AEP, or PMF / Extreme event flood levels on lands outside those owned by Shoalhaven Starches. Consequently, it was not considered necessary to consider the cumulative effects of the existing / proposed works as there is no significant incremental increase because of these works.

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

Yours Sincerely,

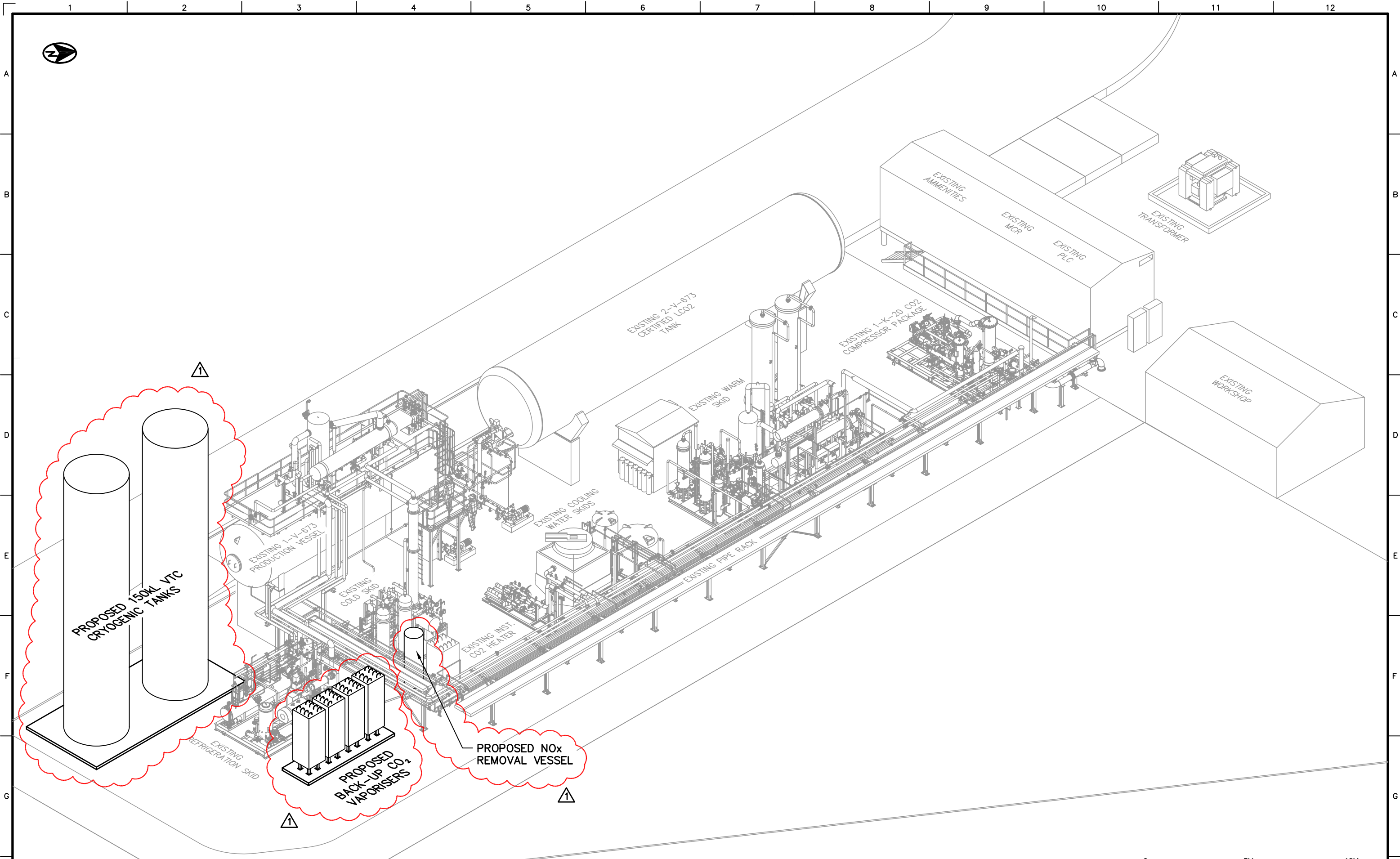
WMAwater

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

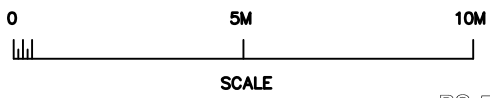
R W Dewar

Director





ISOMETRIC VIEW (LOOKING WEST)



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1	06 NOV 2020	ISSUED FOR PLANNING APPROVAL	CKL				
0	11 FEB 2020	AS BUILT	LV				
A	06 FEB 2019	ISSUED FOR INFORMATION	C.B		L.M	G.R	

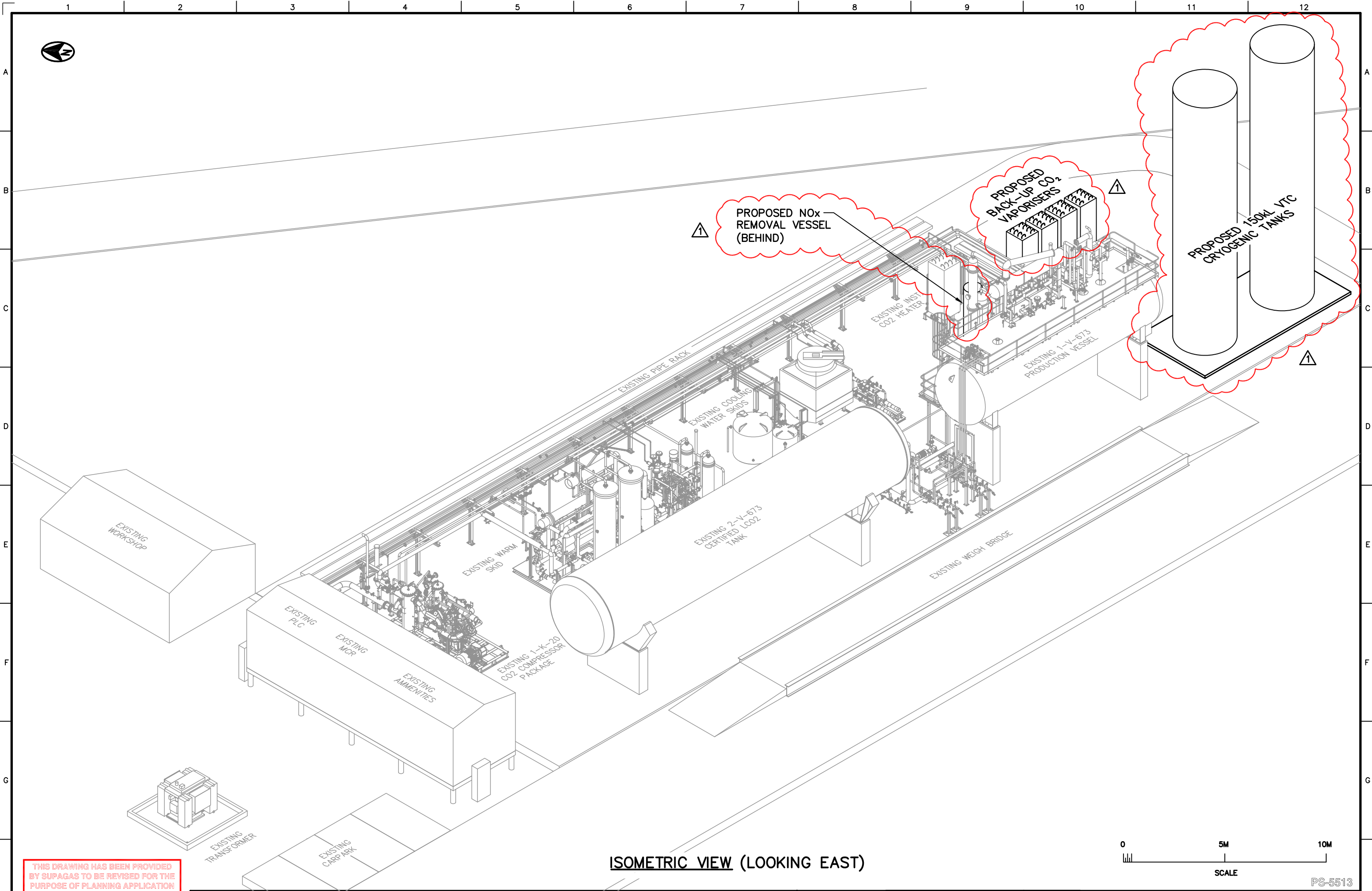
DRAWING No.	DESCRIPTION

GLP
Gas Liquid Processing
A.B.N 88 097 256 927

16 LILLEE CRESCENT, TULLAMARINE, VICTORIA
Tel : +61 3 9335 9000 Fax : +61 3 9334 5488 Web : www.glp.com.au

CLIENT : SUPAGAS PTY LTD 50MTPD CO2 PLANT MANILDRA STARCHES NOWRA NSW			TITLE : CO2 PLANT GENERAL LAYOUT ISOMETRIC VIEW #1		
JOB NUMBER	ISSUE DATE	SCALE	A3	DWG. No. P17316-L1-032	REV. 1
P17316	06 FEB 2019	DNS			

PS-5513



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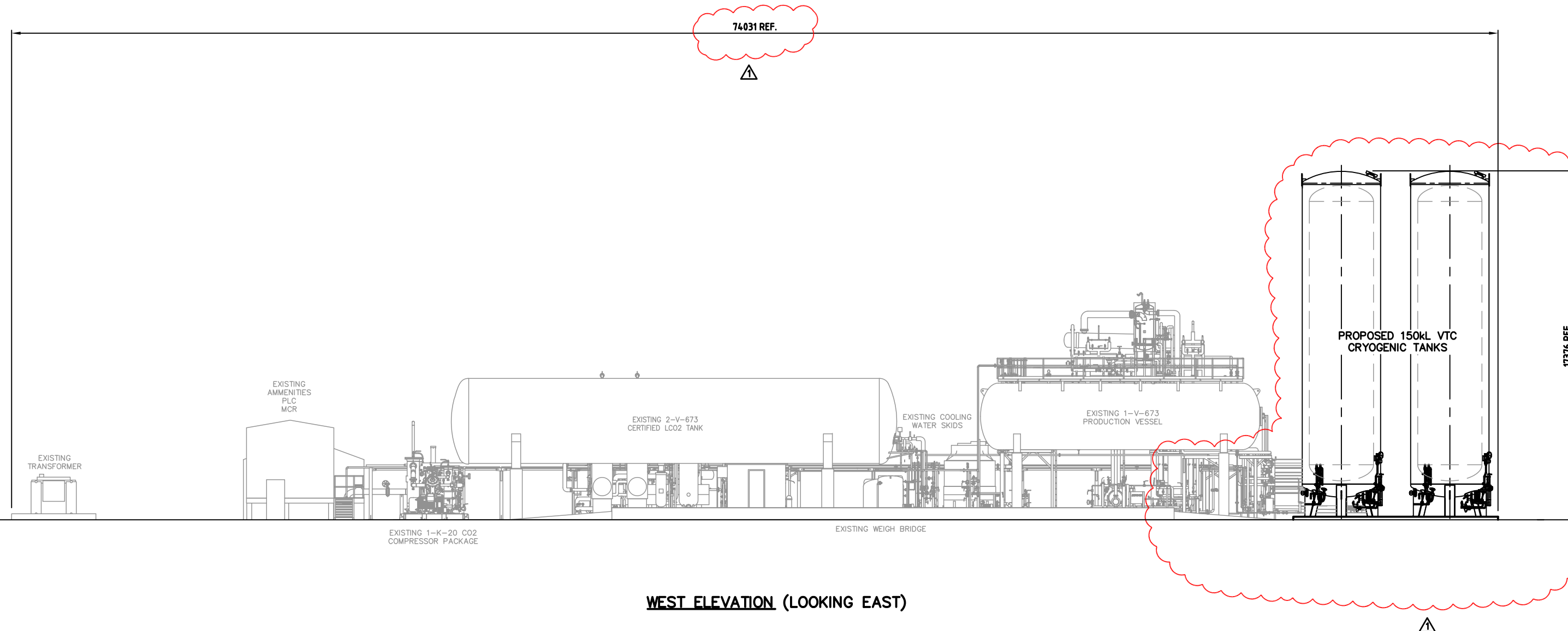
REV	No.	DATE	REVISION	DRAWN BY	DWG. CHKD.	PROJ. ENG.	PROJ. MGR.	CLIENT
1	06 NOV 2020		ISSUED FOR PLANNING APPROVAL	CKL				
0	18 FEB 2020		AS BUILT	LV				
A	07 FEB 2019		ISSUED FOR INFORMATION	C.B		L.M		

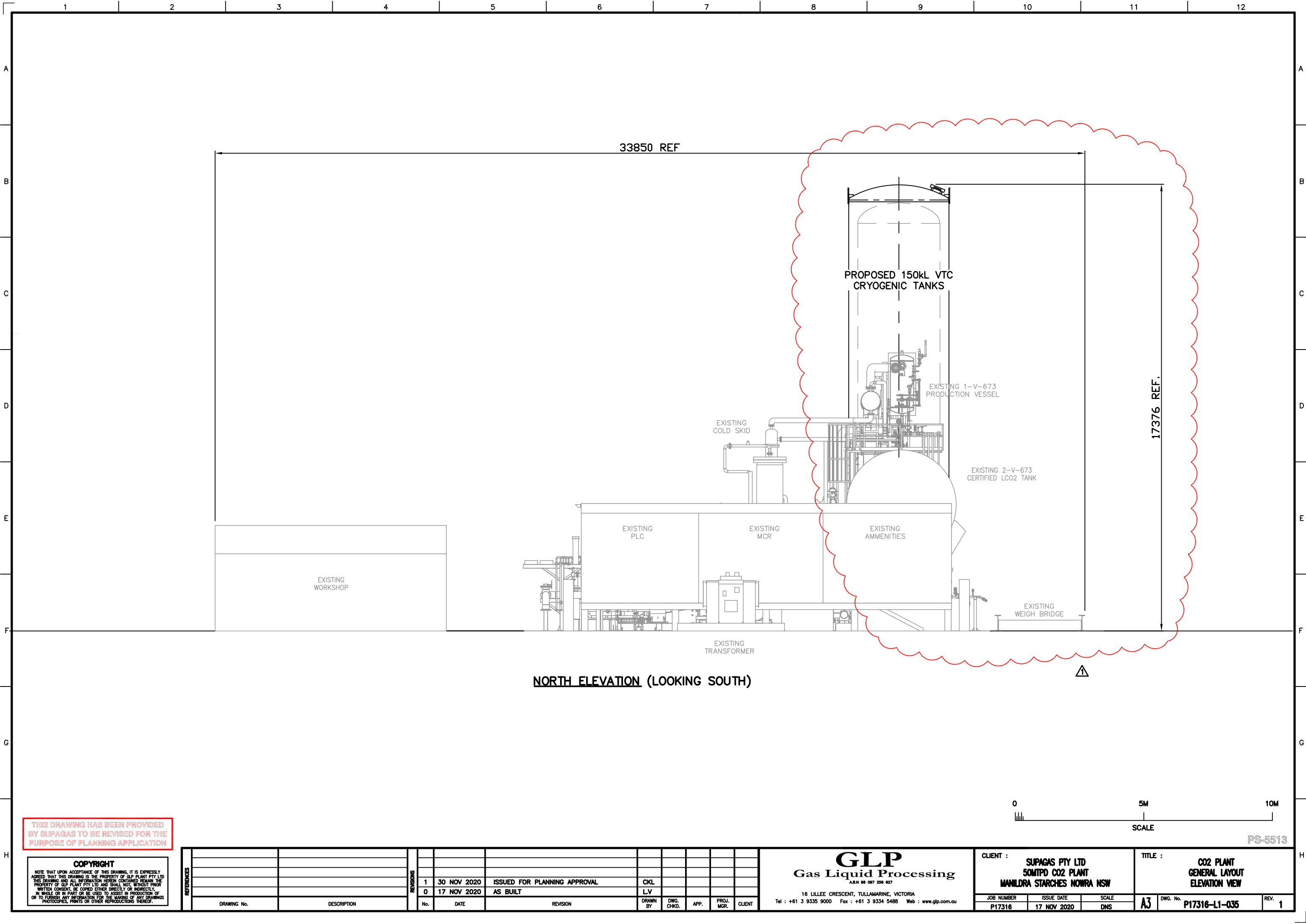
REF	DESCRIPTION
1	DRAWING No.
2	DESCRIPTION

GLP
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16 LILLEE CRESCENT, TULLAMARINE, VICTORIA
Tel : +61 3 9335 9000 Fax : +61 3 9334 5488 Web : www.glp.com.au

CLIENT : SUPAGAS PTY LTD 50MTPD CO2 PLANT MANILDRA STARCHES NOWRA NSW			TITLE : CO2 PLANT GENERAL LAYOUT ISOMETRIC VIEW #2		
JOB NUMBER P17316	ISSUE DATE 07 FEB 2019	SCALE DNS	A3	DWG. No. P17316-L1-033	REV. 1





NORTH ELEVATION (LOOKING SOUTH)

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REVISEMENTS										
	No.	DATE	REVISION		DRAWN BY	DWG. CHKD.	APP.	PROJ. MGR.	CLIENT	
	1	30 NOV 2020	ISSUED FOR PLANNING APPROVAL		CKL					
	0	17 NOV 2020	AS BUILT		LV					

GLP
Gas Liquid Processing
A.B.N 88 097 256 927

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CLIENT : SUPAGAS PTY LTD 50MTPD CO2 PLANT MANILDRA STARCHES NOWRA NSW			TITLE : CO2 PLANT GENERAL LAYOUT ELEVATION VIEW		
JOB NUMBER P17316	ISSUE DATE 17 NOV 2020	SCALE DNS	A3	DWG. No. P17316-L1-035	REV. 1



COUNCIL REFERENCE: 28112E (D17/319168)
CONTACT PERSON: Kate Britton
DATE: 26 September 2017

Peta Church
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	Peta Church	Date Requested: 13 Sep 2017
Reason for Enquiry	New Construction	
Contact Details	Phone: 02 4423 6198 Email: peta@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
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SITE SPECIFIC CONSIDERATIONS

- 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.
- 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 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. $FPL = 1\% \text{ AEP flood level} + \text{freeboard (0.5m)}$). 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.

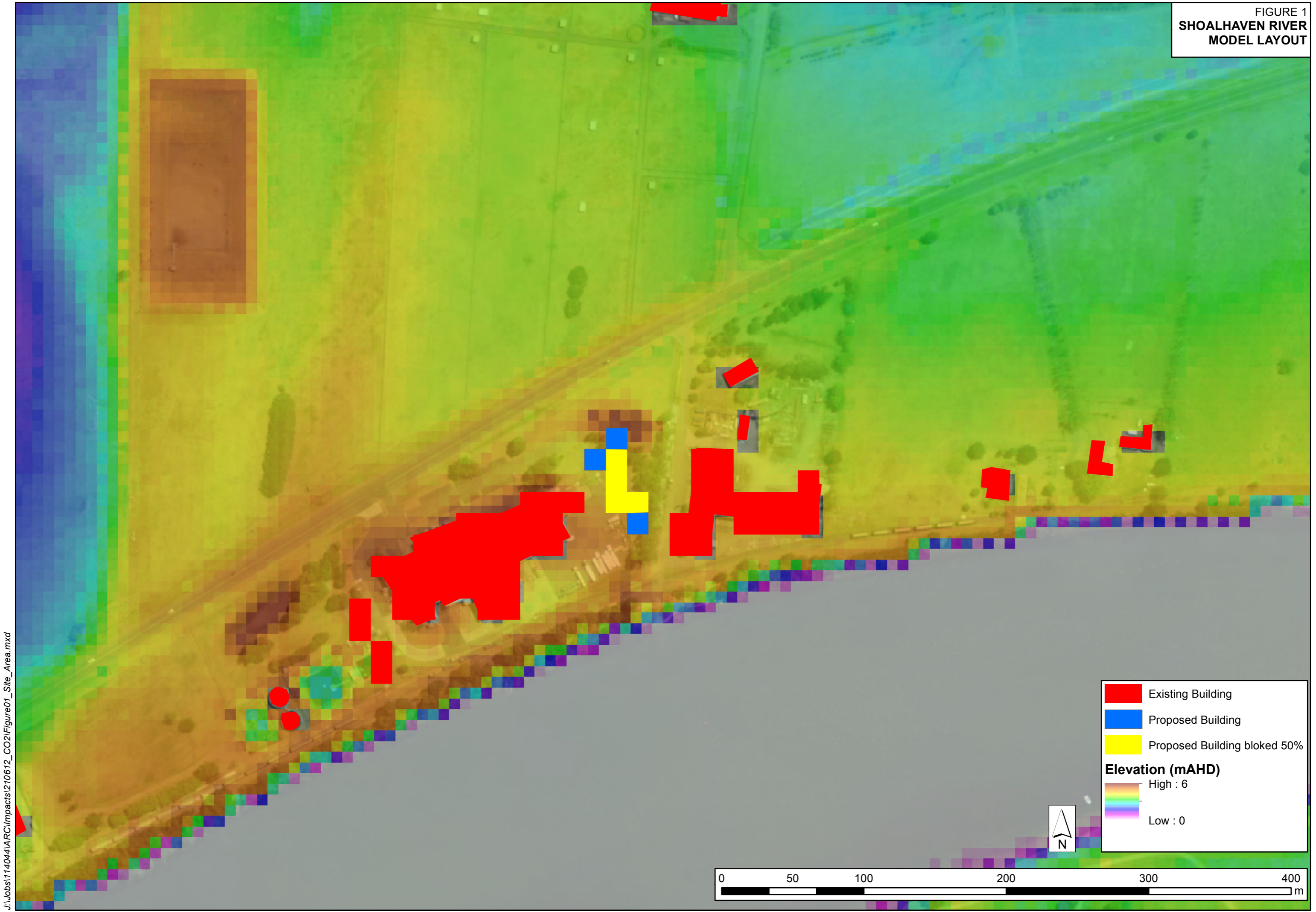
Hydraulic category describes the function of a specific part of the Flood Planning Area in conveying flood waters during a 1% AEP flood. There are three possible hydraulic categories – floodway, flood storage or flood fringe.

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.



FIGURE 1
SHOALHAVEN RIVER
MODEL LAYOUT



Existing Building

Proposed Building

Proposed Building bloked 50%

Elevation (mAHD)

High : 6

Low : 0



FIGURE 2
SHOALHAVEN RIVER
IMPACT PROPOSED DEVELOPMENT
1% AEP EVENT

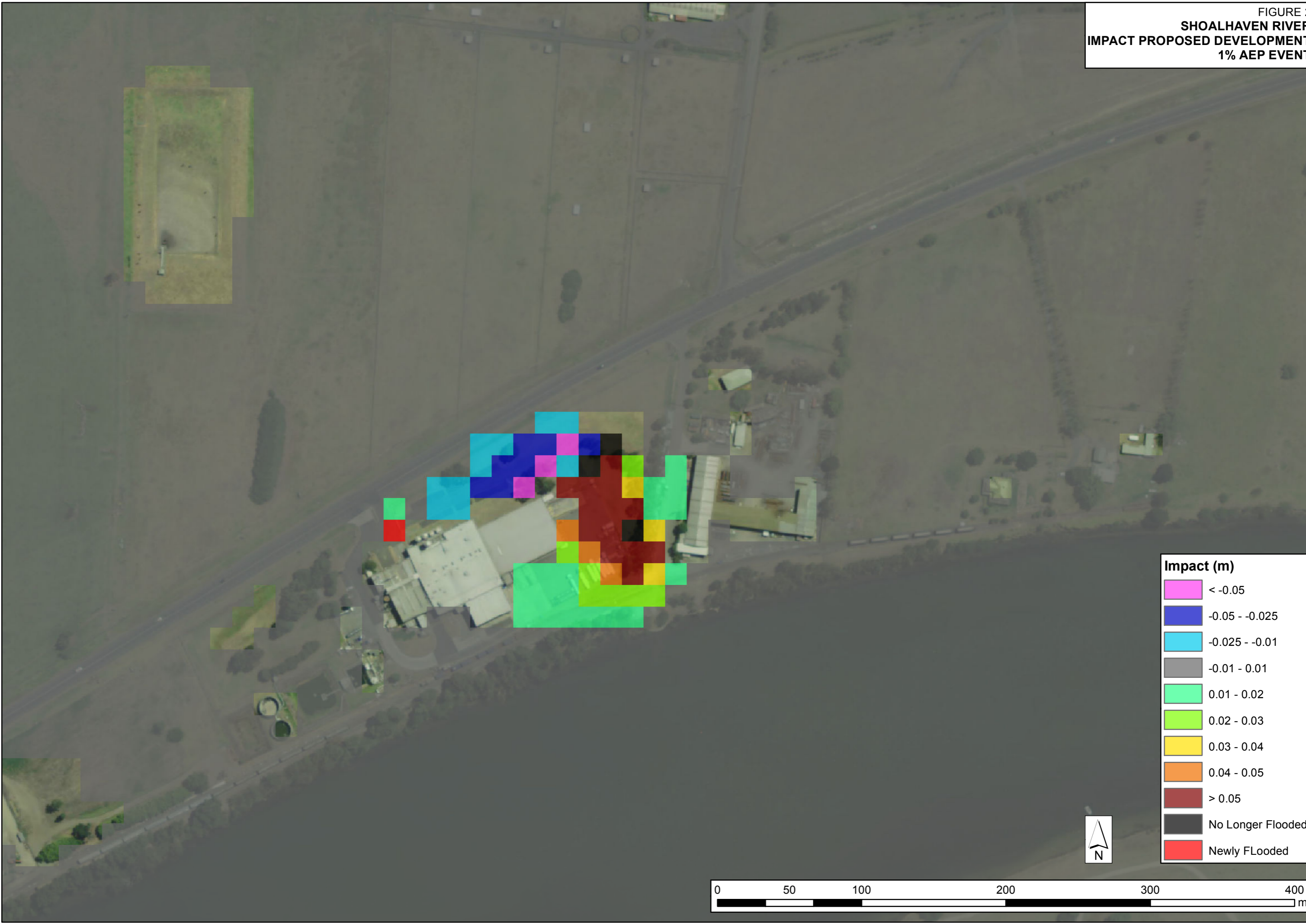
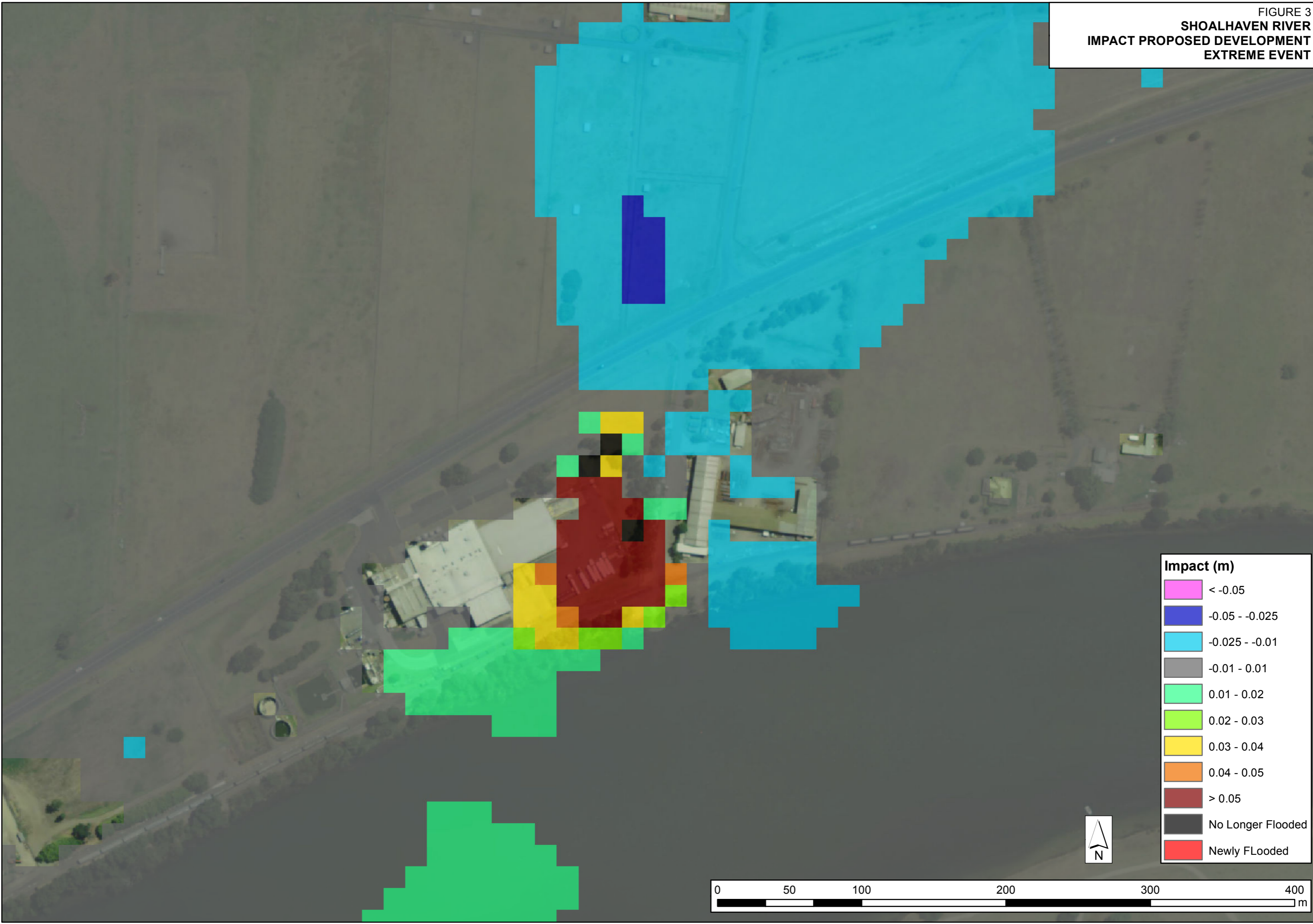


FIGURE 3
SHOALHAVEN RIVER
IMPACT PROPOSED DEVELOPMENT
EXTREME EVENT

J:\Jobs\114044\ARC\Impacts\210612_CO2\Figure03_Proposal_CO2V4_PMF_Impact.mxd



Impact (m)

	< -0.05
	-0.05 - -0.025
	-0.025 - -0.01
	-0.01 - 0.01
	0.01 - 0.02
	0.02 - 0.03
	0.03 - 0.04
	0.04 - 0.05
	> 0.05
	No Longer Flooded
	Newly FLooded

