



**Cowman Stoddart Pty Ltd**  
PO Box 738  
NOWRA NSW 2541

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6 April 2021

**Attention: Mr. S Richardson**

Dear Steve,

**Re: Preliminary Flood Hazard Analysis  
for Proposed Modification Application to MP10\_0144 and MP\_10\_0108,  
Shoalhaven Starches Gas Pipeline Project, Bolong Road, Bomaderry**

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**

On the 30<sup>th</sup> October 2012 the then Independent Planning Commission approved Concept Plan (MP10\_0144) and Project Application (MP\_10\_0108) for the Shoalhaven Starches Gas Pipeline Project. This project provided for the installation of a 5.5 km gas pipeline connecting the Shoalhaven Starches factory site located at Bolong Road, Bomaderry directly to the Eastern Gas Pipeline (EGP) at Pestells Lane, Meroo Meadow. The pipeline would tie directly into the EGP and provide gas directly to the Shoalhaven Starches factory.

Shoalhaven Starches have been reviewing the design requirements for this project and seek to undertake the following modifications to the project / concept approval:

- To relocate the approved location of the Gas Pressure Reduction Facility (GPRF) that is to be located on the approved Packing Plant site to the north of Bolong Road; and
- To alter the internal diameter of the pipeline which will result in an increase in the internal diameter of the pipeline from DN 150 to DN 200.

It is proposed to seek approval from the Department of Industry, Planning & Environment by way of a Modification to the Concept and Project Approval for the Shoalhaven Starches Gas Pipeline Project.

An aerial photograph of Shoalhaven Starches plant is provided on Image 1 and on Figure 1. Plans of the proposed relocation of the GPRF are provided in Appendix A. Image 2 provides a view of the existing GPRF located adjacent to the Co2 plant which is similar to the proposed facility.

### **WMAwater Pty Ltd**

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Image 1 – Google Map Aerial Photograph of Shoalhaven Starches Plant at Bomaderry



Image 2 – View of existing Gas Pressure Reduction Facility adjacent to the CO2 Plant

The proposed works (Appendix A) are inundated in the 1% Annual Exceedance Probability (AEP) flood event by floodwaters from the Shoalhaven River and this letter provides a Preliminary Flood Hazard Analysis that would support this Modification Application.

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 flood assessments for Shoalhaven Starches in the past and 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 Background

The pipeline route traverses flood prone land. Given the proposal involves the laying of a pipeline below ground level the Environmental Assessment (EA) for the original Project did not envisage flooding would raise significant issues. Section 7.4.1.2 of the EA for the original Project did give consideration of sea level rise and how this would be managed. The EA outlined that over half of the proposed gas pipeline route will be situated within a High Hazard flood storage area on the Shoalhaven River floodplain. The EA concluded however that there would be insignificant impacts to the gas pipeline, particularly with respect to erosion and sediment control. The Project Approval does not include any requirements in terms of flooding associated with this project.

The increase in the diameter of the pipe to be laid within the pipeline will not alter the position of the original Project Approval in terms of this issue.

The relocated location of the GPRF will be at a lower elevation compared to the approved location and sited within flood prone land. Given the nature of the structure being largely an open sided type structure, it is not expected that such a structure would create significant issues in terms of flooding. It is however considered prudent that a flood assessment be undertaken in relation to this facility and in particular having regard to the development on flood prone land requirement of the Shoalhaven Development Control Plan 2014.

## 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 1<sup>st</sup> July 2015). As the modifications will not involve fill, or subdivision of lands, compliance with these performance criteria has not been addressed.

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

PERFORMANCE CRITERIA	RESPONSE
<b>P1 Development or work on flood prone land will meet the following:</b>	
<b>The development will not increase the risk to life or safety of persons during a flood event on the development site and adjoining land.</b>	No additional workers will be on the site as a result of the proposed works.
<b>The development or work will not unduly restrict the flow behaviour of floodwaters.</b>	Refer Hydraulic Impact Assessment Section 3.2 below.
<b>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.</b>	The proposed GPRF is within existing built-up industrial land with minimal vegetation on 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 pipeline is located underground within rural lands. During the construction phase there is the potential for erosion, siltation and

PERFORMANCE CRITERIA	RESPONSE
	destruction of vegetation. These issues will need to be addressed in the EA for the construction phase.
<b>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.</b>	<b>A separate structural report will be provided. Refer Section 3.2.4 below.</b>
<b>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.</b>	<b>A separate structural report on the potential failure of existing buildings and stored equipment and product will be provided. Refer Section 3.2.4 below.</b>
<b>Potential damage due to inundation of proposed buildings and structures is minimised.</b>	Inundation of the site and the 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 Starches Flood Plan taking into account the proposed works. Refer Section 3.2.4 below.
<b>The development will not obstruct escape routes for both people and stock in the event of a flood.</b>	The proposed works will not occupy escape routes or cause workers to become trapped.
<b>The development will not unduly increase dependency on emergency services.</b>	The works will not increase the number of workers from Shoalhaven Starches who may be subject to flood risk as a result of the proposed works.
<b>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.</b>	Refer Hydraulic Impact Assessment Section 3.2 below and particularly Section 3.2.4 below.
<b>The development will not adversely affect the integrity of floodplains and floodways, including riparian vegetation, fluvial geomorphologic environmental processes and water quality.</b>	The works will be constructed on land that is largely designated as high hazard flood storage in the 1% AEP event. Following construction of the pipeline there will be nil adverse affectation on the land above. The site of the GPRF 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**

### **3.2.1 Overview of Flooding on the Northern Floodplain of the Shoalhaven River**

Ponding of water in low lying areas on the northern floodplain of the Shoalhaven River occurs following periods of heavy and continuous rain. Some parts of the land are only 1 m above high tide and consequently are frequently inundated. This results from direct rainfall over the area and also from overflow from the creeks which flow through the area. In larger floods, both Abernethy's Drain and Bomaderry Creek will overtop their banks and inundate the area. This would have occurred in March 1978 and the other floods which occurred in the 1970's (August 1974, June 1975 and October 1976) as well as the April 1988 event. According to residents' reports none of these floods overtopped the northern river bank, in the vicinity of the Shoalhaven Starches plant or the Paper Mill, to any significant extent.

The existing and proposed works, since approximately 1990, on the northern floodplain do not increase flood levels in these "small" floods as there is no significant velocity and the area is a very large storage basin. The largest of these events occurred in March 1978 which approximated a 5% AEP flood. For the above reasons, construction of the existing works since 1990 plus the proposed works on the northern floodplain will not cause any significant increases in flood levels for these events. These are the most frequent events that affect the area, and the above five historical events are typical examples.

However, floods larger than March 1978 will occur and they will overtop the bank, causing a significant inflow of floodwaters to the area. In these larger overtopping floods the proposed and existing works since 1990 on the northern floodplain will have an impact upon flood levels by restricting flow and reducing temporary floodplain storage. These are much rarer events and generally the majority of the northern floodplain is inundated by up to 3 m depth of water. Some parts of Shoalhaven Starches plant are already inundated by up to 1.5 m depth of water and consequently the small increase in level caused by the existing and proposed works since 1990 is unlikely to be significant. Hydraulic modelling is undertaken to assess the impacts on the northern floodplain of further development within the Shoalhaven Starches plant.

### **3.2.2 Overview of Hydraulic Modelling**

The 1990 Lower Shoalhaven River Flood Study was commissioned by the NSW Government Public Works and determined design flood levels along the river and adjoining floodplain. From approximately the year 2000 to 2010 the hydraulic computer model, termed the CELLS model, established in that study was used by WMAwater, on behalf of Shoalhaven Starches, to evaluate the potential increases in flood level due to further works on the northern floodplain, including expansion of the plant itself and construction of the storage ponds.

The CELLS model of the Shoalhaven River represented the channel and floodplain as a series of interconnected cells, termed either river or floodplain cells. Since 1990 there have been significant advancements in the field of hydraulic modelling through the use of more complex computer software that allows the river and floodplain to be discretised into a grid. 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. In 2013, Shoalhaven Starches commissioned WMAwater to

update the Shoalhaven River Flood Study to current best practice using the TUFLOW 2D hydraulic modelling software.

### **3.2.3 Preliminary Hydraulic Assessment**

Detailed hydraulic assessment and modelling was not undertaken as part of the original EA. Hydraulic modelling is only required if the proposed works will potentially influence the volume of temporary floodplain storage or the conveyance of floodwaters across the floodplain.

The increase in diameter of the pipe will have no impact on flooding as the pipe is underground and it is only during the construction phase that consideration is required for the potential impacts on the environment and during flood events.

Construction of the GPRF should have negligible impact on flooding as the plant is constructed on piers as shown in Image 2, thus resulting in minimal loss of temporary floodplain storage or conveyance. However, this assessment should be reviewed once final design plans of the GPRF become available.

### **3.2.4 Preliminary Hazard Assessment**

The proposed GPRF and pipeline are critical facilities in that failure of the works during a flood and subsequent reconstruction may have a significant financial impact on the ability of Shoalhaven Starches to recover. The works are also identified as a hazardous establishment in the 2005 NSW Floodplain Development Manual. There is also the potential that anthropomorphic sea level rise may increase design flood levels and thus the risk from flooding.

The above means that management of the potential public health and environmental risks associated with the escape of materials due to inundation or damage by floodwaters must be considered and formal flood management and procedures adopted in this regard. Consideration should be given to ensuring that the GPRF can withstand inundation of floodwaters and structural damage due to flood debris in events up to the Probable Maximum Flood. These issues would need to be resolved at the detail design stage.

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

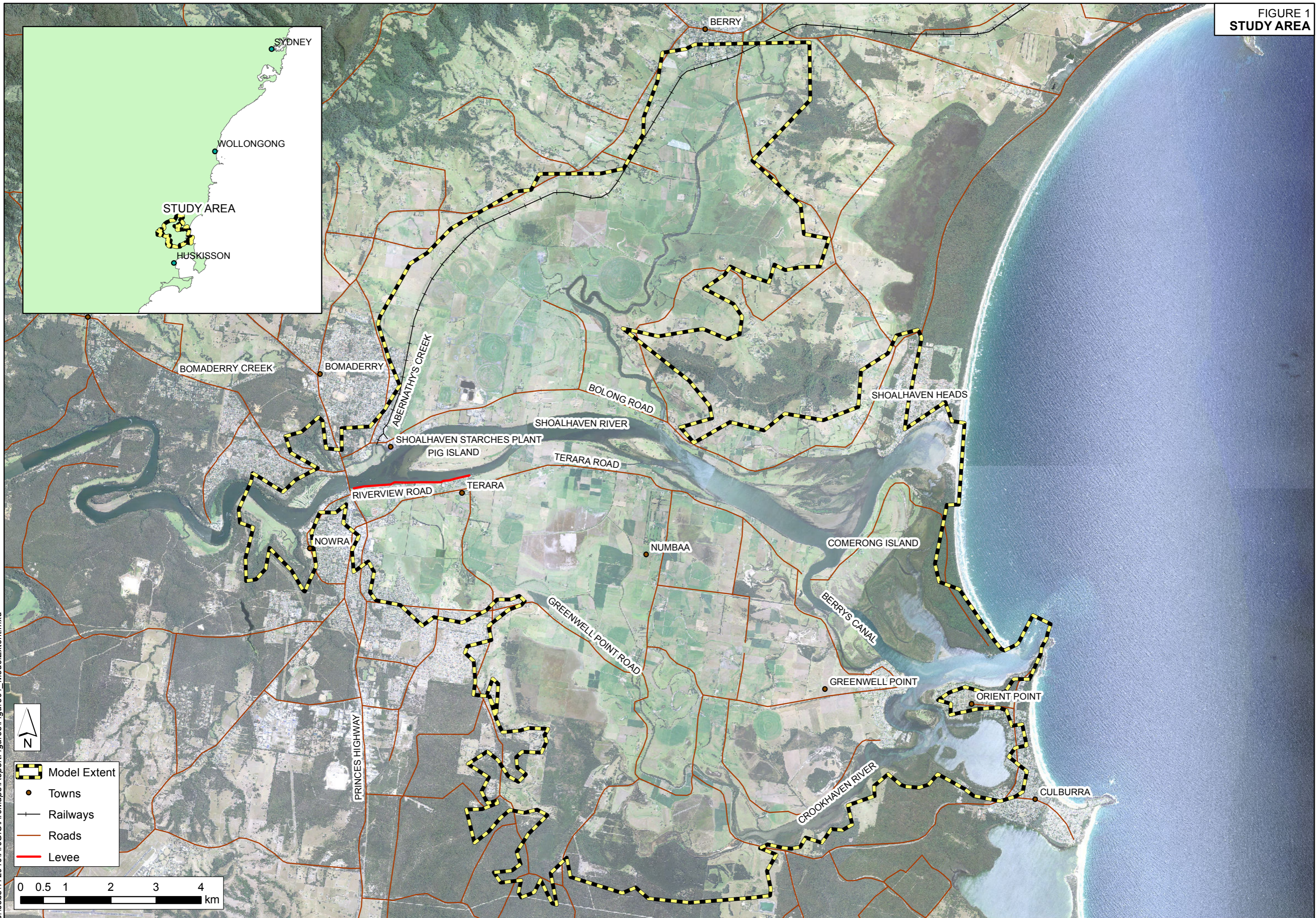
Yours Sincerely,  
**WMAwater**

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

R W Dewar  
**Director**



FIGURE 1  
STUDY AREA

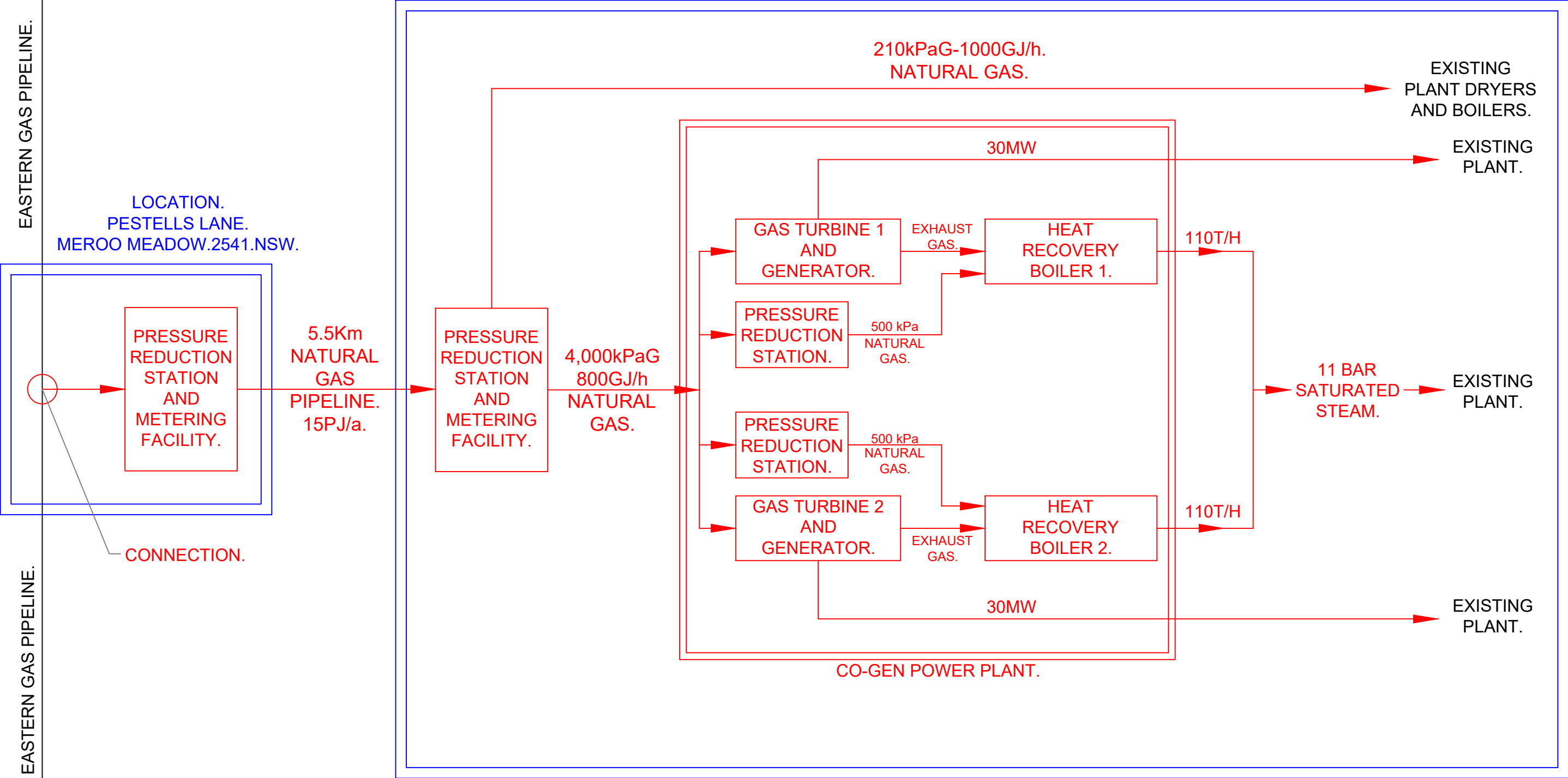




**Appendix A: Plans of Proposed Works**

PLANT LOCATION.  
36 BOLONG ROAD.  
BOMADERRY.2541.NSW.

LOCATION.  
PESTELLS LANE.  
MEROO MEADOW.2541.NSW.



REV	ZONE	DETAILS	DRN	DATE	CHKD	APPD
P06	E4	Figure was 1,200GJ/h.	P.C.	16-06-21	B.H.	
P05	E4	Figure was 785GJ/h.	P.C.	20-04-21	B.H.	
P04	E5	Figures modified.	P.C.	23-03-21	B.H.	
P03	ALL	Split system shown.	P.C.	16-03-21	B.H.	
P02	ALL	Modified for co-gen.	P.C.	16-02-21	B.H.	
P01	ALL	First issue.	P.C.	10-12-20	B.H.	



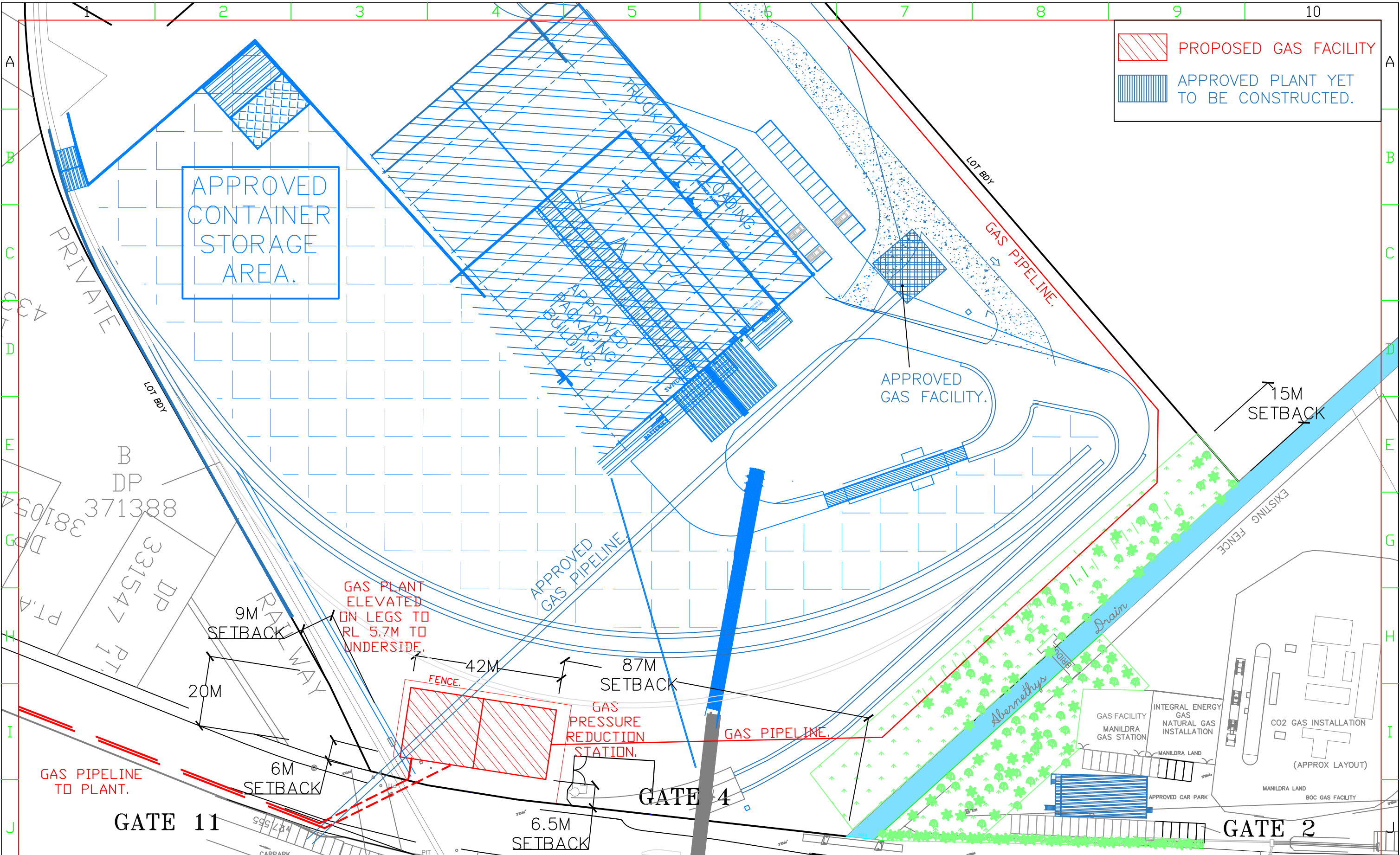
**MANILDRA GROUP**  
100% AUSTRALIAN



P.C.	12/11/20
CHKD	DATE
B.H.	
APPD	DATE
SCALE	NTS

<b>SHOALHAVEN STARCHES.BOMADERRY. NSW</b>	
DWG TITLE	
<b>GAS PIPELINE,PRESSURE REDUCTION STATIONS AND METERING FACILITY FOR CO-GEN PLANT.</b>	
PROJECT No.	DWG No.
<b>7208</b>	<b>MN7208-000</b>

**A3**  
REV.  
**P06**



 **PROPOSED GAS FACILITY**  
 **APPROVED PLANT YET TO BE CONSTRUCTED.**

PD7	ALL	Length was 40m.	P.C.	25/6/21	B.H.	
PD6	ALL	Gas line to plant rerouted.	P.C.	21/6/21	B.H.	
PD5	ALL	Gas line rerouted, rail shaded in.	P.C.	24/3/21	B.H.	
PD4	ALL	Setback dimension to creek to pipe added.	P.C.	16/3/21	B.H.	
PD3	ALL	Setback dimension to creek added.	P.C.	16/3/21	B.H.	
PD2	ALL	Proposal refined.	P.C.	22/2/21	B.H.	
PD1	ALL	Proposal.	P.C.	08/12/20	B.H.	T.J.
REV	ZONE	DETAILS	DRN	DATE	CHKD	APPD



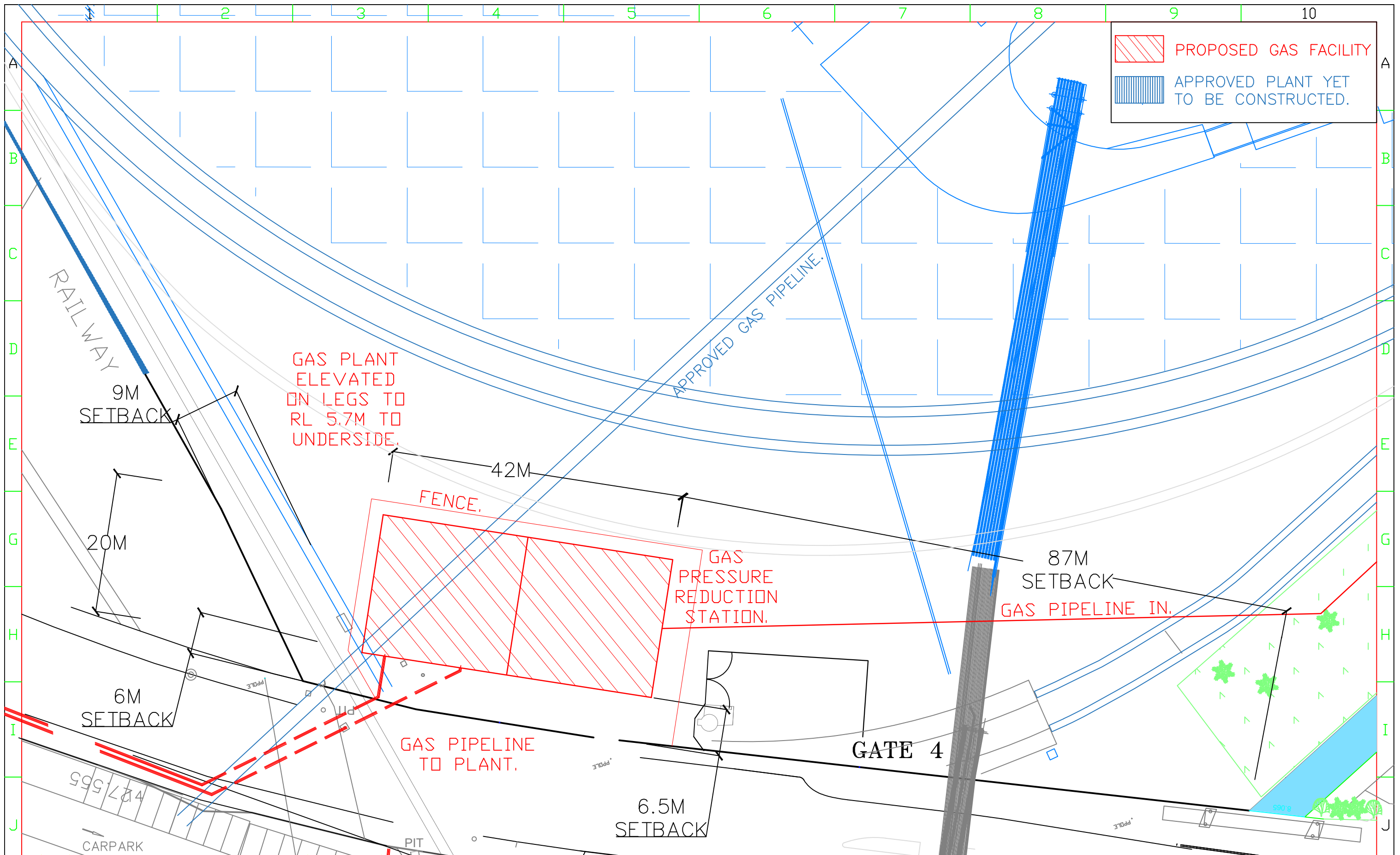
**MANILDRA GROUP**  
100% AUSTRALIAN



P.C.	DATE
CHKD	08/12/20
B.H.	DATE
APPD	

SCALE	1:1000
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**SHOALHAVEN STARCHES, BOMADERRY.**  
 DWG TITLE: **GAS FACILITY, OVERALL SITE PLAN.**  
 PROJECT No: **10\_0108** DWG No: **MN7297-001**  
 SHT SIZE: **A3**  
 REV: **P07**



	PROPOSED GAS FACILITY
	APPROVED PLANT YET TO BE CONSTRUCTED.

GAS PLANT ELEVATED ON LEGS TO RL 5.7M TO UNDERSIDE.

APPROVED GAS PIPELINE.

FENCE.  
GAS PRESSURE REDUCTION STATION.

87M SETBACK  
GAS PIPELINE IN.

GAS PIPELINE TO PLANT.

GATE 4

6.5M SETBACK

9M SETBACK

20M

6M SETBACK

RAILWAY

CARPARK

PIT

PD6	ALL	Length was 40m.	P.C.	25/6/21	B.H.	
PD5	ALL	Gas line to plant rerouted.	P.C.	21/6/21	B.H.	
PD4	ALL	Gas line rerouted, rail shaded in.	P.C.	24/3/21	B.H.	
PD3	ALL	Setback dimension to creek added.	P.C.	16/3/21	B.H.	
PD2	ALL	Proposal refined.	P.C.	22/2/21	B.H.	
PD1	ALL	Proposal.	P.C.	08/12/20	B.H.	T.J.
REV	ZONE	DETAILS	DRN	DATE	CHKD	APPD



**MANILDRA GROUP**  
100% AUSTRALIAN



P.C.	DATE
CHKD	08/12/20
B.H.	DATE
APPD	
	SCALE
	1:500

SHOALHAVEN STARCHES, BOMADERRY.	
DWG TITLE	GAS FACILITY, SITE PLAN.
PROJECT No.	10_0108 MN7297-002

A3  
REV.  
P06

