SMK
CONSULTANTS
surveying - irrigation - environmental - engineering - planning
ABN 63 061 919 003

39 Frome Street
PO Box 774
Moree NSW 2400
(02) 6752 1021
admin@smk.com.au
www.smk.com.au

The General Manager
Moree Plains Shire Council
PO Box 420
Moree 2400

8 August 2024

Our Reference: 24-71

Dear Sir/Madam,

Report on the effect of construction of mounds for dwellings on flood level and pondage at Proposed Subdivision of 9 Sunnyside Road Moree.

THE PROPOSAL AND PURPOSE OF REPORT

It is proposed by our client Mr Tony Beattie to subdivide the lot known as 9 Sunnyside Road Moree (Lot 24 DP1272753) into four residential lots per the amended DA2015-42. There is an existing dwelling on the proposed lot 30, and it is intended for Lots 31-33 to be able to have dwellings constructed in the future. This report is to assess the effect of constructing mounds on each of these lots and the change in flood flows & storage in the vicinity.

The assessment is based on a mound of 26 x 26 metres, with 4:1 batters on each lot. The assessed mound size is deliberately large in order for this report to be suitable for many potential house sizes. Each mound has been set at the flood planning level, which is 0.5 metres above the 1% AEP Flood (based on Dryside/WMS 2021).

The purpose of this report is to address whether the partial filling of each lot by more than 20% in area will adversely affect the flow of water or storage of water in the vicinity of the development.

Moree Plains Shire Development Control Plan 2013 Section 4, “Moree and Environs Floodplain Development and Management” states:

> *“Mounding or levees are not to exceed 20% of the land area within the allotment as measured by the surface area of the mound or the top of the levee unless certification has been provided by an appropriately qualified and experienced practicing engineer that the structure would not adversely affect the flow of water or storage of water so as to impact on the locality. In this regard, the cumulative effects of other mounds or levees in the vicinity are to be assessed.”*

Based on the above, the mounds need to be certified to have no adverse effect on the following:

1. Flow of water
2. Storage of water

1 FLOW OF WATER

The Office of Environment and Heritage in respect to flow of water consider the following factors when assessing the size and location of a farm levee bank.

1. Is the flow of water being re-directed into other floodways?
2. Is the flow being increased in velocity?
3. Is the flood level of the peak increasing in height?

These same principles are applicable to the potential mounds and will be addressed in the following sections.

1.1 GENERAL FLOW DIRECTION AND NATURE THROUGH MOREE

There are 4 main flow paths through Moree, being:

- Mehi River. The Moree Golf Course carries part of this flow. The major flow is in a westerly direction with a minor flow northward along Boundary Street, Coolabah Street and a floodway on the western side of Hassell Street. These flow paths do supply water indirectly to Gwydir Street.
- Gwydir Street. This flow travels directly west from the Mehi River and exits town through Greenbah Oval. This flow supplies minor flows into each north south street which can provide minor flows down Heber Lane, David Street and Donald Lane. Some of this water continues along Gwydir Street to Sunnyside Road. This flow affects the subject land.
- Iris Street. This flow is from the overflow of the Broadwater Creek westerly along Iris Street and exiting town through Greenbah Oval. This flow does affect the subject land.
- Drummond Street. This flow is from the overflow of the Broadwater Creek westerly along Drummond Street and exiting town through the Common Area. This flow affects the floodway on the northern side of the Moree Sewerage Treatment Facility.
- There is a high ridge between the Gwydir Street flow path and the flow on the northern side of the Sewerage Treatment Works on the western side of the treatment works.
- The floodway on the northern side of the subject lots is generally referred to the Boonery Road Floodway.
- The Boonery Street Floodway is only connected to the floodway on the northern side of the Sewerage treatment Works in extreme flood events. During the 2011, 2012 and 2022 floods being the highest recent floods within Moree, the northern and Boonery Road floodways did not join.

1.2 HISTORICAL FLOODING AND MEHI GAUGE READINGS

The Moree Gauge is at the main bridge in Balo Street. It has recorded floods since 1890 to the present day. The following table details the major floods that have affected the main part of town and the subject site. The Moree Plains Floodplain Management Study 2021 has predicted the 1%AEP flood level at the Moree gauge as RL209.02. This is based on computer modelled flows using predicted catchment runoff. The other gauged events are based on observed flood levels at the Moree gauge. The highest most recent flood is the 2012 flood event. This event is 0.18 below the 1955 flood event and the image above shows the flood water did not affect the proposed house mounds. Or conversely the mounds would not affect the flood at all.

418002 Mehi Gauge 1890-2022					
Rank	Year	AEP %	ARI Years	Gauge Reading	
		1.0%	100	209.02	MPSC Dryside
1	1955	0.8%	132	208.813	
2	2012	1.5%	66	208.633	- 0.18
3	1976	2.3%	44	208.533	- 0.28
4	2022	3.0%	33	208.44	- 0.37
5	1950	3.8%	26	208.393	- 0.42
6	2021	4.5%	22	208.37	- 0.44
7	1956	5.3%	19	208.353	- 0.46
8	1974	6.1%	17	208.273	- 0.54

Also, the image below shows the 2022 flood would not be affected by the proposed house mounds.

Also, the ridgeline between the Boonery Road floodway path and the floodway on the northern side of the sewerage works is higher than the flood level.

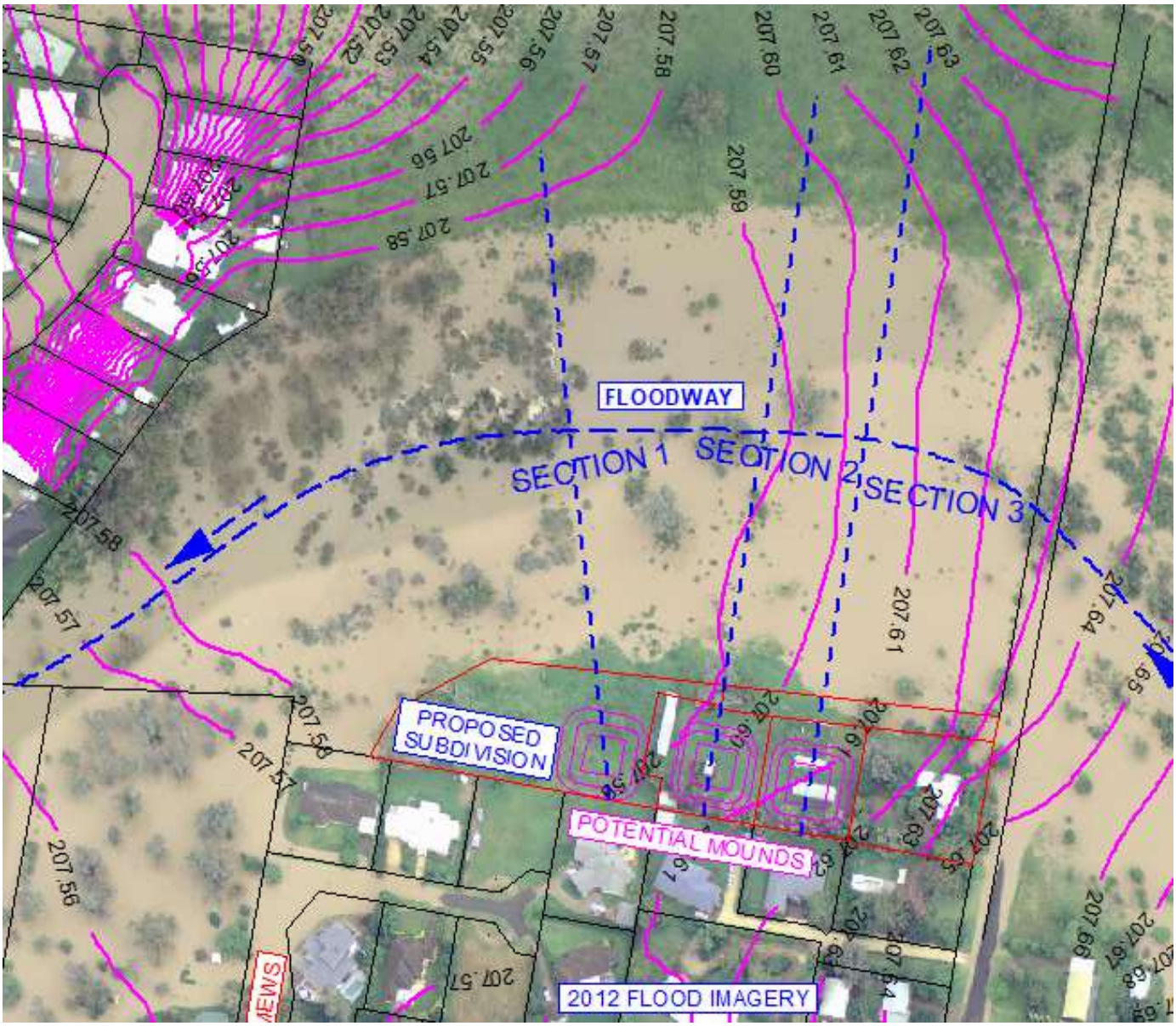
Numerous flood studies have been done for Moree the Current study is the 2021 Dryside Review of the Floodplain Management Plan. This review study has produced the flood contours used in the plan below. Also, the natural surface contours (not shown) were obtained from Geoscience Australia and were used to extract the cross section of the floodway through each house mound as shown on the cross section plan.

The Cross-section plan shows the ground surface, new house mound and the 1%AEP flood level at each cross section. The flood level represents the predicted undeveloped level with no house mound. The cross-sectional area of the proposed mound will displace floodwater and reduce the width of the floodway.

The displaced water will cause an increase in the depth of water at each cross-section. The depth of the change in height can be simply calculated by the dividing the area of displaced water by the reduced floodway width. There will be a minor increase in velocity of about 5% which would reduce the flood height change by a similar amount. This change is very minor and has been ignored in the calculation.

1.3 RESULTS OF FLOODWATER CHANGES DUE TO MOUND DISPLACEMENT OF FLOODWATER.

The following image shows the proposed mounds and the location of the natural surface cross sections through the mounds and across the full width of the floodway. The mounds are shown with the house area in the centre, a 5m mound perimeter for parking cars and then a 4 to 1 batter to ground level.



The cross-section lines are shown as dashed blue lines. Section 1 has in its centre an old gravel pit of much greater depth. The water in the gravel pit during a flood has been considered as a no flow area as part of the calculations. The downstream natural surface heights were adopted for the floor of the section used in the calculations associated with section 1.

The 1%AEP flood contours are shown in purple. Section 1 is in the middle of a ponded area of the floodway between contour RL207.58 and RL207.59. The pondage area is caused by the width of the floodway upstream of Sunnyside Road with a width of 316m being constrained to a naturally narrower floodway downstream of Section 1. The main floodway is split into 2 directions The northern floodway is over the ridgeline on the western side of the Moree Sewerage Ponds (320m wide) with the water discharging into the northern floodway and flowing to the west on the northern side of the developed extent of Moree at the northern end of Boonery Road. The southern section of floodway is the Boonery Road floodway which is 125m wide at its narrowest extent.

The historical floods at Sections 1, 2 and 3 have shown the ground surface at the proposed mound sites are above the full range of observed floods at the Moree Gauge. Therefore, during all historical floods for the past 134 years, the proposed mounds would have no influence on the predicted flood levels at the site.

For the Modelled predicted 1%AEP flood level from the 2021Moree Floodplain Management Plan a minor amount of water would be present at each mound's location. This has the effect of redistributing the water over the floodway area.

It can be simply calculated as the displaced cross-sectional area being spread over the entire width of the reduced cross section width. In the case of each of the cross sections the relevant data is below.

Section	Original Section Width	Reduced Width	Storage Area	Storage Area Reduction	Increase in flood depth
	m	m	sqm	sqm	m
1	285	250	491	13	0.052
2	279	267	404	2.4	0.009
3	316	281	430	3.1	0.01

Note there will be a slight increase in velocity of the water caused by the water raising but the velocity change is about 0.014m/sec, a minute change. This would cause no effect on adjoining properties.

The above table states that at Section 1 a 52mm increase in water level could be experienced at this section due to the mound on Lot 33. This 52mm increase would be reduced by a slight increase in flow to the north, that could halve this amount.

At Section 2 the minute decrease in flow area of 2.4 sqm would result in a 9mm increase in flood water. This increase in flood level has as its outlet both the southern and northern floodways. Thus, the true change would be less than the stated amount.

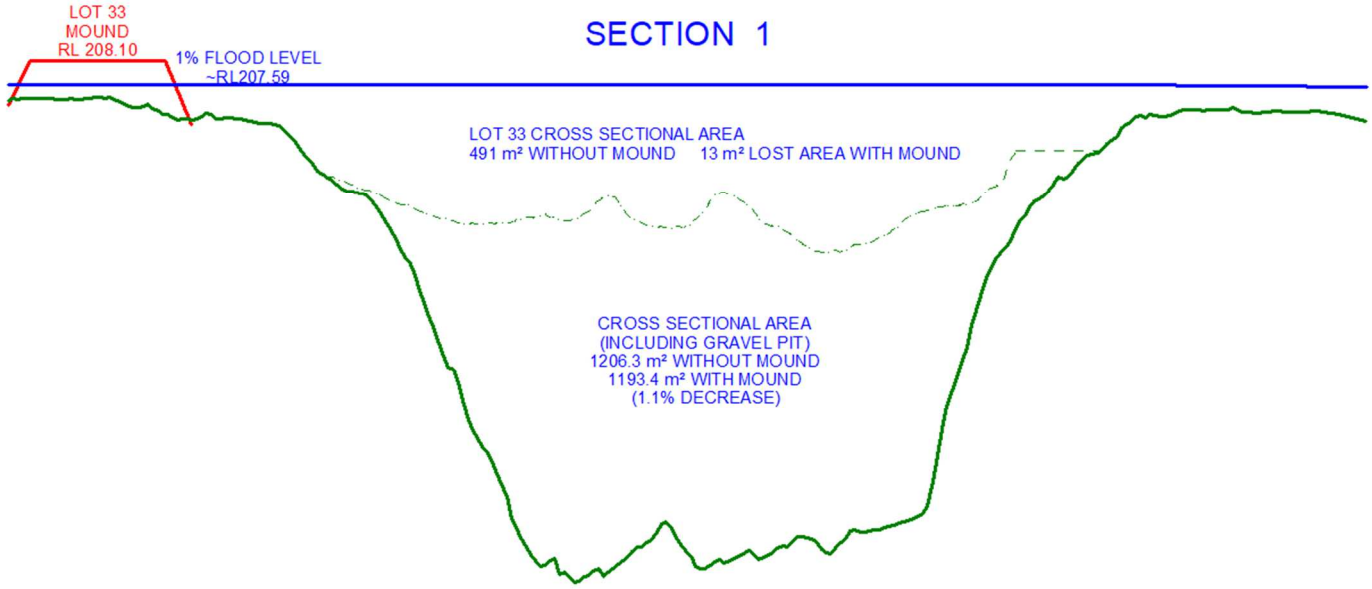
At Section 3 the minute decrease in flow area of 3.1 sqm would result in a 10mm increase in flood water. Again, this increase in flood level has as its outlet both the southern and northern floodways. Thus, the true change would be less than the stated amount.

The change in flood level due to the mounds at section 2 and 3 is minute and the mounds will have no affect on surrounding existing development.

The change in flood level due to the mound at section 1 is minor and the mound will have little or no effect on surrounding existing development. The location of the northern overflow floodway will substantially ameliorate the effect of this mound. The effect from this mound happens opposite an open floodway with no houses and by the time the effect is opposite housing downstream its full effect would be reduced to an insignificant effect.

The change in velocity is also minute and can be said to have no effect on surrounding lots.

The following cross section shows the natural surface levels of Cross Section 1 , 2 and 3. The proposed Mound location and height and the 1%AEP flood level.


SECTION 1
LOT 33
MOUND
RL 208.10
1% FLOOD LEVEL
~RL207.59
LOT 33 CROSS SECTIONAL AREA
491 m² WITHOUT MOUND 13 m² LOST AREA WITH MOUND
CROSS SECTIONAL AREA
(INCLUDING GRAVEL PIT)
1206.3 m² WITHOUT MOUND
1193.4 m² WITH MOUND
(1.1% DECREASE)


SECTION 2
LOT 32
MOUND
RL 208.11
1% FLOOD LEVEL
~RL207.59
LOT 32 CROSS SECTIONAL AREA
404 m² WITHOUT MOUND 2.4 m² LOST AREA WITH MOUND


SECTION 3
LOT 31
MOUND
RL 208.12
1% FLOOD LEVEL
~RL207.605
LOT 31 CROSS SECTIONAL AREA
430 m² WITHOUT MOUND 3.1 m² LOST AREA WITH MOUND

1.4 SUMMARY.

The previous images of each of the sections shows at Sections 2 and 3 the area of floodwater displaced is minute compared to the total flow area for each section. Visual inspection of the cross sections shows the mounds will have little to no effect on adjacent lands. The increased water level of 9 and 10 mm will not affect the houses to the south nor the houses on the northern side of the floodway. The northern floodway will assist in reducing these minute increases and further reduce the effect of the mounds. Regardless the increased water levels are considered negligible.

At Section 1 the mound will cause a 53mm increase in flood level which again will not affect the land to the south and will partly be distributed into the northern floodway and therefore reducing its effect on downstream residences.

If this increase in water level is considered significant by Council, then the mound area could be reduced for the proposed house, or the house could be placed on piers with a total height of between 0.75m to 1.1m to floor level. A small mound could be provided for storage of vehicles in flood time.

Note historically since 1890 no flood water observed flood at the Moree River Gauge has had a level equivalent to or higher than the Council predicted 1%AEP flood.

All observed floods at the Moree Gauge have been at a level that would produce a flood level on Lots 31 and 32 below the ground level at the proposed mound. Therefore, historically no flood water has ever affected the site of these mounds in 134 years.

Lot 33 has been affected by historical floods. The 1955 flood is 207mm lower than the 1%AEP flood level at the Moree Gauge. Ground surface at the Lot 33 mound site would have been between 51mm and 483mm below flood water. The effect of the mound in a 1955 flood would be minor with the area of water displacement being about 7 sqm. The redistributed volume of no flow area would have resulted in a 28mm increase in water level at Section 1. This is considered minor.

I believe the effect of the mounds in minor historical floods less than or equal to the 1955 event would be negligible.

Yours sincerely,

James Lillyman
BUrbDev(SpatialSc)
Surveyor

Paul Covell
BSurv MIS MIAA
Registered Surveyor

SMK CONSULTANTS
surveying – irrigation – environmental – engineering – planning
39 Frome Street | PO Box 774
Moree NSW 2400
T: (02) 6752 1021 | F: (02) 6752 5070
E: james@smk.com.au | W: www.smk.com.au