

Transport for NSW
PO BOX 973
PARRAMATTA CBD NSW 2124

Job No. AM495

Attn: Mr Matty Mathivanar

21 May 2020

Re: Richmond Road Upgrade, Marsden Park

Dear Sir

As requested, we have assessed whether there is sufficient compensatory storage available at the Marsden Park Precinct development site to offset the flood storage which will be displaced by the Elara Boulevard to Heritage Drive section of the Richard Road upgrade project (**the project**) below the peak Hawkesbury-Nepean River 1% Annual Exceedance Probability (**AEP**) flood level of RL 17.3 m AHD.

1. Background

In consultation with the developers of the Marsden Park Precinct, Transport for NSW (**TfNSW**) has identified a site on the South Creek floodplain where there is the potential to recapture the estimated 82,500 m³ of flood storage which will be displaced by the project. **Figure 1** attached shows the location where it is proposed to lower natural surface levels as part of the project, noting that it overlaps with one of two existing compensatory flood storage areas which form part of the Marsden Park Precinct development.

2. Assessment of Available Compensatory Flood Storage

The developers of the Marsden Park Precinct provided a ground survey model which represented natural surface levels prior to the commencement of bulk earthworks on the South Creek floodplain, as well as a 3D surface model of finished surface levels over the extent of the compensatory flood storage area which lies to the west of the existing transmission easement. The left hand side of **Figure 2** attached shows the extent and indicative depth of excavation in the compensatory storage area which lies to the west of the transmission easement. Also shown on the left hand side of **Figure 2** are the finished surface level contours following completion of the bulk earthworks. It is noted that there is a depression which runs around the southern and eastern sides of the excavated area along which local catchment runoff will concentrate and flow in a northerly direction to its point of discharge to the adjacent watercourse.

A 3D model of the combined natural/finished surface was created using the 12d software. An iterative process was then undertaken to determine the extent of earthworks which would be required in order to recapture the estimated 82,500 m³ of flood storage which will be displaced by the project. The right hand side of **Figure 2** shows the extent and indicative depth of excavation associated with the combined compensatory storage area, noting the following criteria were applied in its development:

- the volume of compensatory excavation is to be no less than 82,500 m³;

- the maximum and minimum grades within the excavated area are to be 3% and 1%, respectively, noting the former is representative of the existing grade of the adjacent high ground and the latter represents the minimum grade which is required to effect positive drainage of the area; and
- the runoff from the excavated area is to drain to the depression which has been formed along the southern and eastern boundaries of the Marsden Park Precinct compensatory storage area.

Figure 3 shows the stage versus volume relationship for both displaced and compensatory flood storage. It is noted that the volume of compensatory flood storage lies below the elevation of the displaced flood storage. As a result, it can be concluded that the project will not result in a loss of flood storage for Hawkesbury-Nepean River dominant floods up to 1% AEP in magnitude.

Noted that if the excavated material from the compensatory flood storage area is not used as part of the general fill associated with the project, then it would need to be placed on land which lies outside the area which is subject to backwater flooding from the Hawkesbury-Nepean River during a 1% AEP flood event.

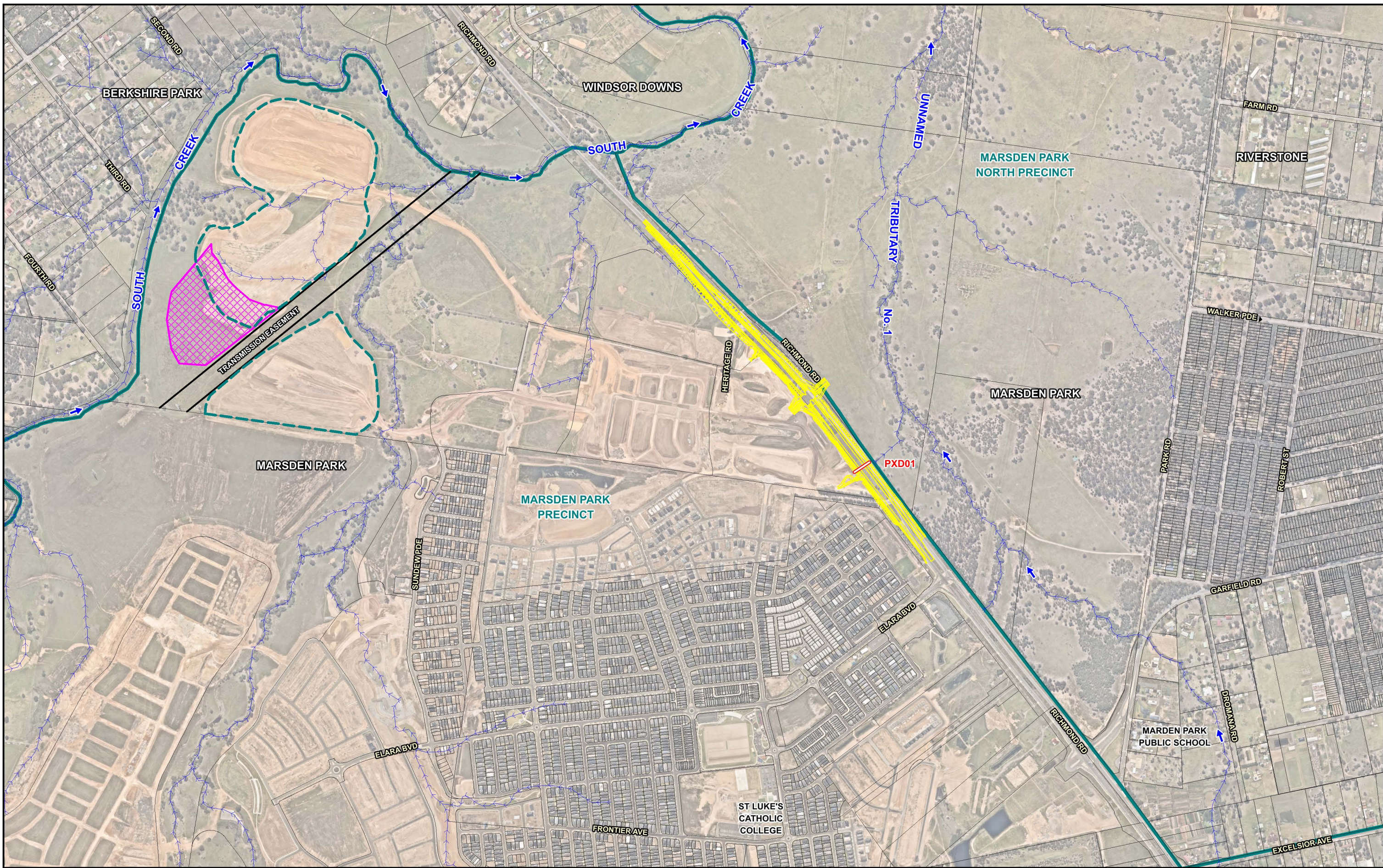
We trust that the assessment set out herein is in accordance with your requirements. However, please do not hesitate to contact me should you have any queries or wish to discuss any aspect of our submission.

Yours faithfully

Lyll & Associates Consulting Water Engineers



Scott Button
Principal



**RICHMOND ROAD UPGRADE ELARA BOULEVARD TO HERITAGE ROAD
FLOODING AND DRAINAGE INVESTIGATION**

Figure 1

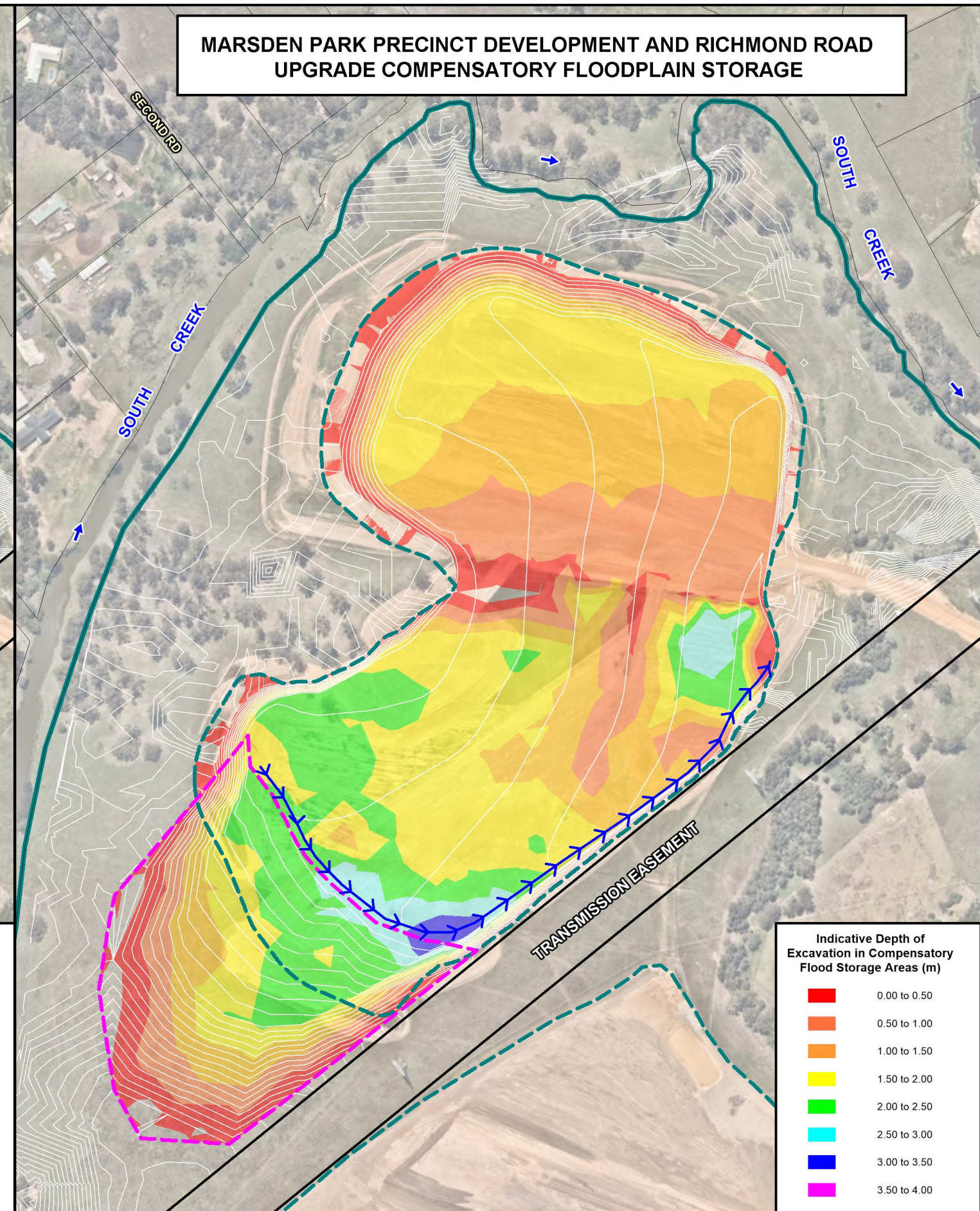
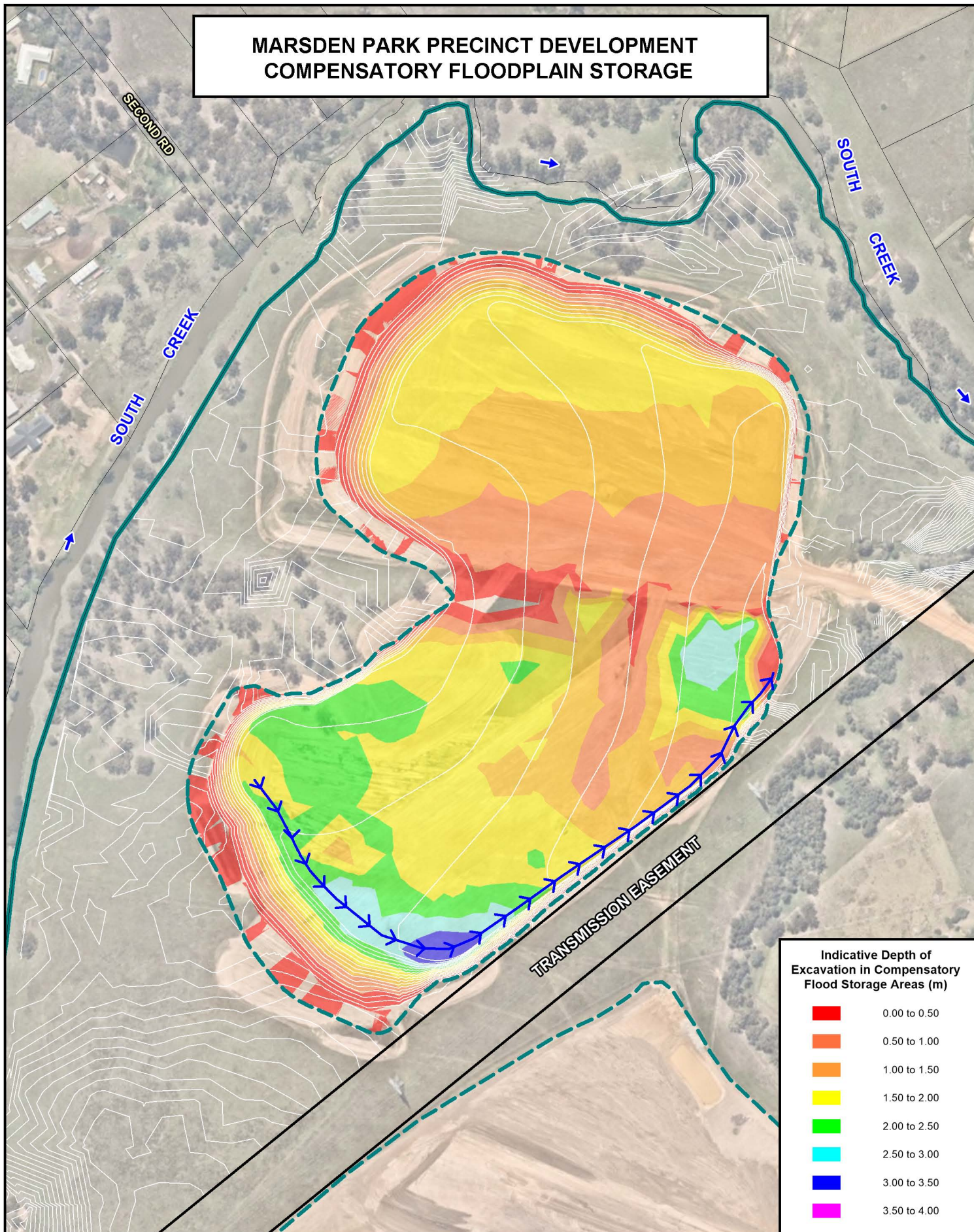
- LEGEND**
-  Extent of Richmond Road Upgrade Compensatory Flood Storage Area
 -  Richmond Road Upgrade Design Strings
 -  Development Precinct Boundary
 -  Proposed Transverse Drainage Structure and Identifier
 -  Extent of Marsden Park Precinct Development Compensatory Flood Storage Area

N
120 0 120 240 360 m
Scale: 1:12,000



**MARSDEN PARK PRECINCT DEVELOPMENT
COMPENSATORY FLOODPLAIN STORAGE**

**MARSDEN PARK PRECINCT DEVELOPMENT AND RICHMOND ROAD
UPGRADE COMPENSATORY FLOODPLAIN STORAGE**

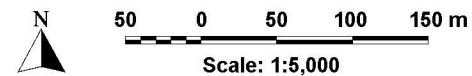


Indicative Depth of Excavation in Compensatory Flood Storage Areas (m)

Red	0.00 to 0.50
Orange	0.50 to 1.00
Yellow	1.00 to 1.50
Light Green	1.50 to 2.00
Green	2.00 to 2.50
Cyan	2.50 to 3.00
Blue	3.00 to 3.50
Purple	3.50 to 4.00

Indicative Depth of Excavation in Compensatory Flood Storage Areas (m)

Red	0.00 to 0.50
Orange	0.50 to 1.00
Yellow	1.00 to 1.50
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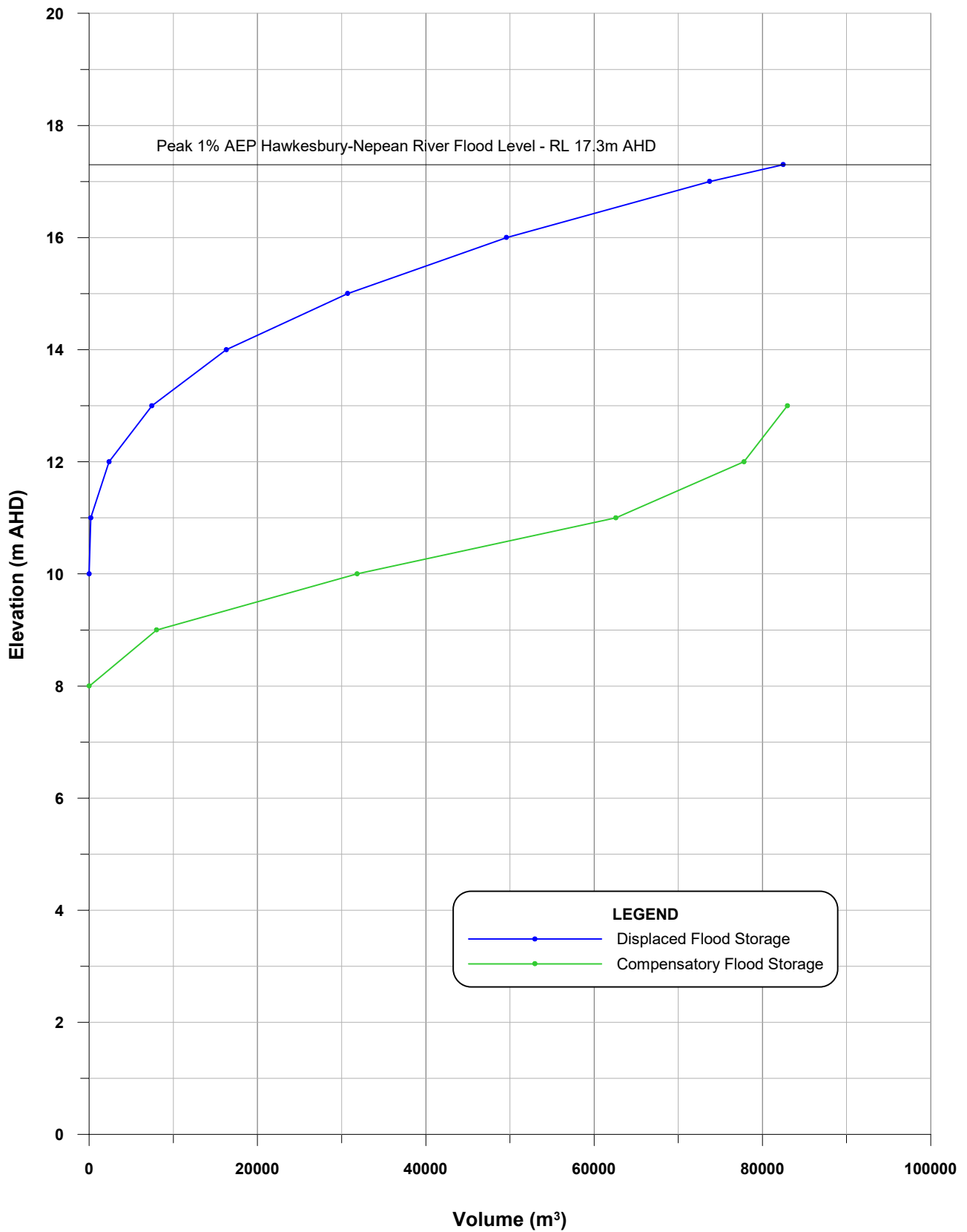


Note:
The extent and indicative depth of compensatory flood storage associated with the Marsden Park Precinct development is only shown west of the transmission easement.

LEGEND

	Extent of Marsden Park Precinct Development Compensatory Flood Storage Area
	Extent of Richmond Road Upgrade Compensatory Flood Storage Area
	Concentrated Flow Path
	Finished Surface Levels (m AHD) (0.2 m Intervals)

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FLOODING AND DRAINAGE INVESTIGATION**



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Figure 3

STORAGE VERSUS VOLUME RELATIONSHIP
DISPLACED AND COMPENSATORY FLOOD STORAGE

