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Pacific Brook Christian School Ltd. (ABN: 77 622 818 400)
30 Sowerby Street, Muswellbrook, NSW, 2333
c/o: Stephanie Ferguson
Attn: NBRS Architecture

Date: 15 June 2020

Subject: **Flood Information and Levels Memo (Rev 2)**

Dear Stephanie,

Royal HaskoningDHV (RHDHV) has been commissioned to provide flood advice to support a SEARs application for a new school site 'Pacific Brooke Christian School'. The study site is located at an address referred to as **Lot 100 DP1261496, Maitland Street, Muswellbrook NSW** and is adjacent to the middle reach of Muscle Creek and is understood to be impacted by flooding from Muscle Creek.

The document is intended to provide preliminary information (prior to the completion of a more detailed flood impact assessment (FIA)) regarding existing flood information at the subject site.

1 RELEVANT FLOOD STUDIES

Muscle Creek Flood Study (RHDHV, January 2017)

RHDHV prepared the Muscle Creek Flood Study in 2017 as part of the Hunter River (Muswellbrook to Denman) Flood Risk Management Study (FRMS). The key objective of the study was to assess flooding within the township of Muswellbrook that occurs from runoff from the Muscle Creek Catchment. The results and key recommendations from this study were assessed in conjunction with Hunter River flood model results as part of the FRMS.

The Muscle Creek Flood Study includes:

- A description of the assessment methodologies and the data used to inform the assessment.
- Detailed flood maps that depict the extent and nature of flooding on the Lower Muscle Creek Floodplain for the 50, 20, 10, 5, 2, 1, 0.5 and 0.2 % AEP and Probable Maximum Flood (PMF) events.
- A preliminary assessment of flood risks.
- Information on potential flood mitigation measures that could be assessed further as part of the FRMS.

Design flood extents for the study as documented in the Muscle Creek Flood Study are presented in **Figure 1**.

Muswellbrook Floodplain Risk Management Study and Plan (RHDHV, 2019)

The Muswellbrook Floodplain Risk Management Study and Plan (FRMS&P) was provided to Muswellbrook Shire Council in 2019 and was prepared to reduce risk to life and property by identifying, assessing and comparing various risk management options whilst considering opportunities for environmental enhancement as part of the mitigation works.

The FRMS&P documents flooding behaviour (as per the Muscle Creek Flood Study), property inundation assessment, consideration of floodplain management options and response modification measures. One of these measures is a flood warning system for Muscle Creek, which would encompass the proposed school site.

Design flood extents for the study site are presented in **Figure 1**. The results show that all but the lower (north western) portion of the site flood free in the 100yr ARI (1% AEP) design event and while the site is fully inundated during the PMF, higher ground to the west of the site is less than 200m away.

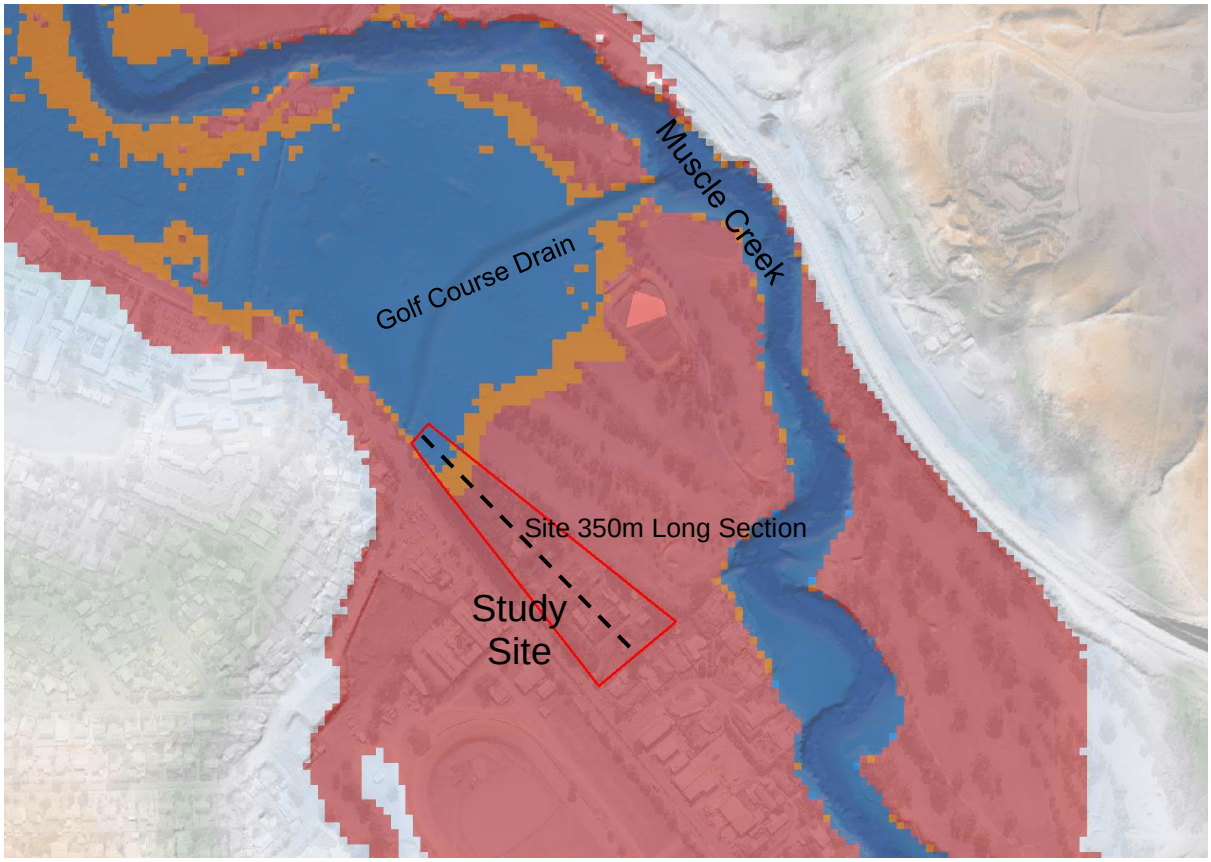

***Figure 1**:* 20yr (blue), 100yr (orange) & PMF (pink) flood extents for Muscle Creek

2 SUMMARY OF FLOOD INFORMATION AND DESIGN LEVELS

A summary of existing flood levels (RHDHV, 2019) are provided in **Table 1** for the downstream (north western) part of the site. A long section presenting the site ground levels and design flood levels is presented in **Figure 2**. The results show that the site ground levels range between 147.1 and 149.5 m AHD and that the 1% AEP (100yr ARI) level is 147.61 m AHD. The results show that the lower part of the site is flooded by tailwater flooding (from a breakout from the Golf Course drain) and that the depth of flooding in the 1% AEP is approximately 0.5m at the lower part of the site. In the PMF, the site would be flooded by more than 2m depth, however, evacuation to higher ground is available some 200m to the west.

Table 1: Design Flood Levels (m AHD) *(RHDHV, 2019)*

Design Event (ARI)	Peak Flood Level (m AHD)
Ground Level	147.22
10yr / 10% AEP	147.15
20yr / 5% AEP	147.33
50yr / 2% AEP	147.41
100yr / 1% AEP	147.61
200yr / 0.5% AEP	147.80
500yr / 0.2% AEP	148.03
PMF	150.26

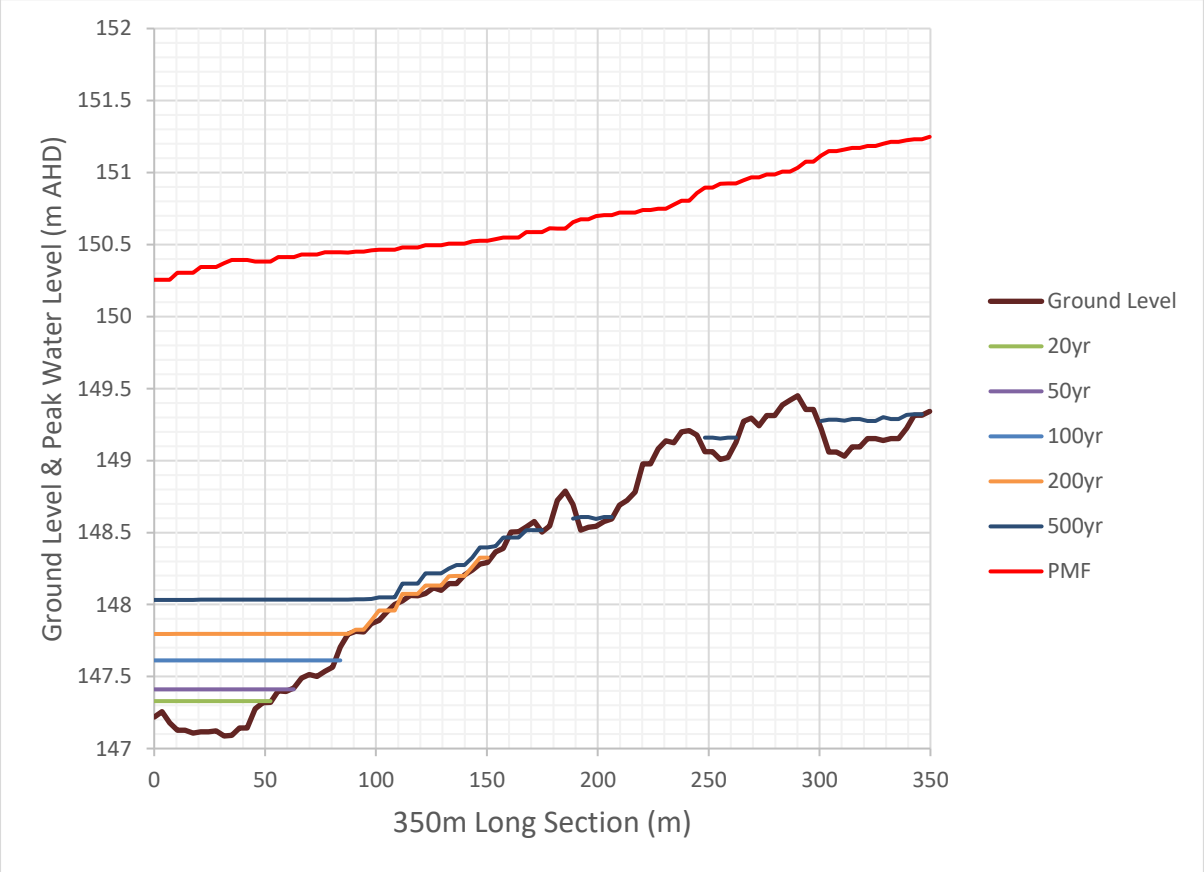

Figure 2*: Design Flood Level – Long Section*

Note: Long section location provided in Figure 1.

Given the 1% AEP flood level is 147.61 m AHD the flood planning level (i.e. minimum flood level) for the site is 148.11 m AHD (i.e. 1% AEP design level with 0.5m freeboard).

It is important to note that a small portion of the site currently is considered to provide flood storage (see **Figure 3**). Any land filling in this location may result in increased flood levels to downstream properties which may be considered unacceptable.

Figure 4 presents the hazard categorisation using from the Muswellbrook FRMS&P (RHDHV, 2019). The figure shows that there are no restrictions to the development based on hazard.

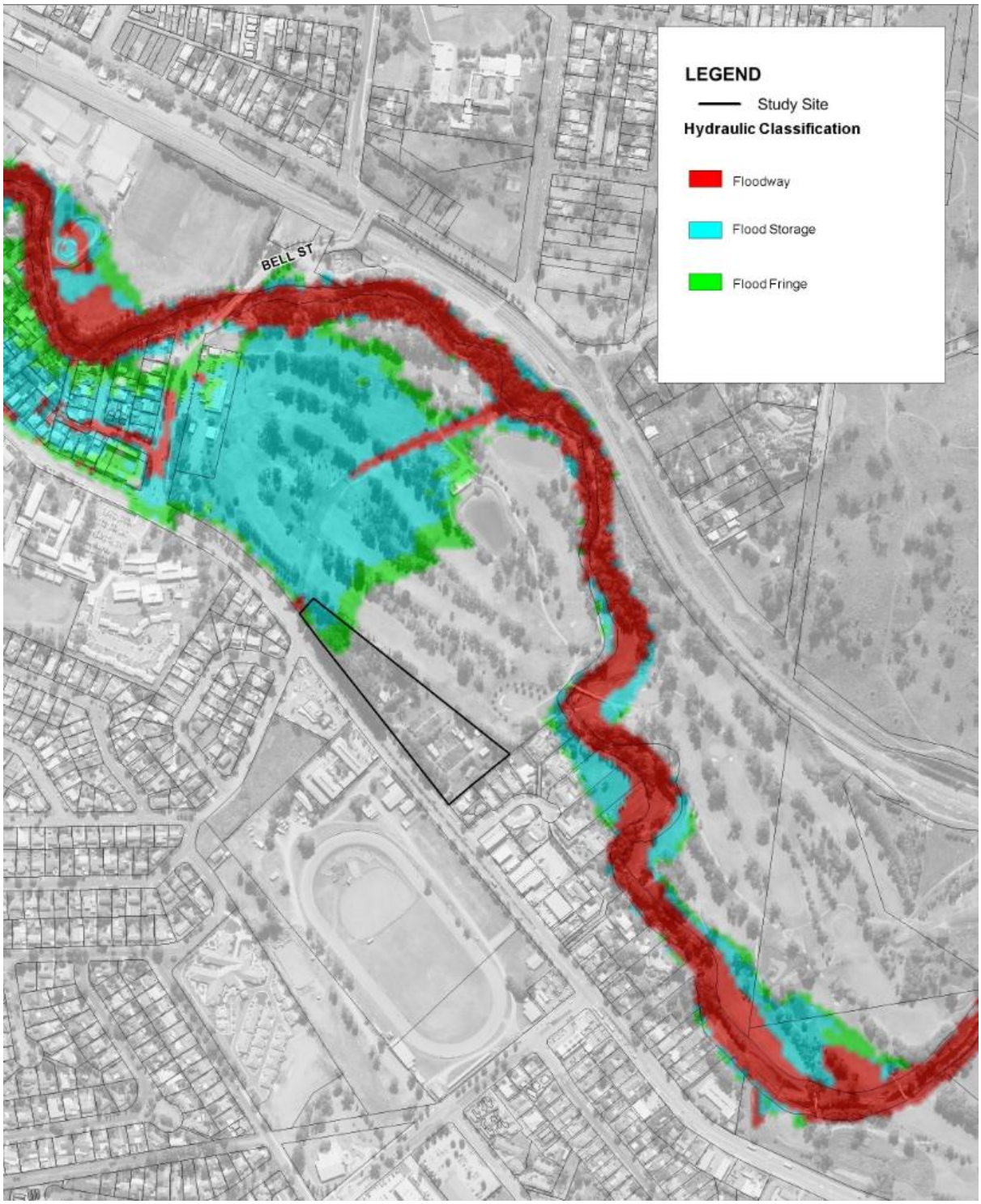

***Figure 3**: Hydraulic Categorisation (1% AEP) 2019 FRMS&P*

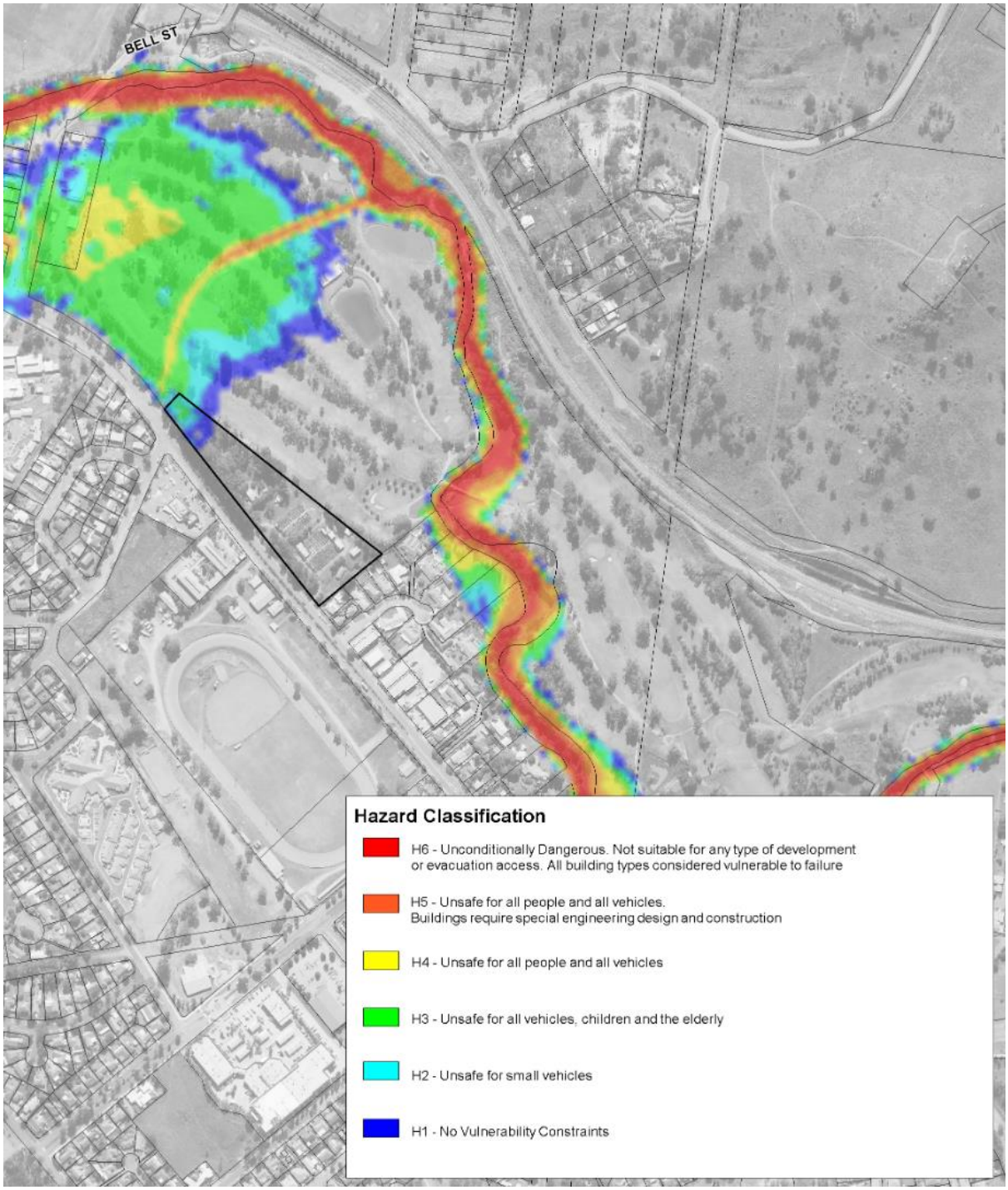

***Figure 4**: Hazard Categorisation (1% AEP) 2019 FRMS&P*

3 CONCLUSIONS

This memo provides initial flood advice for the proposed development located at **Lot 100 DP1261496, Maitland Street, Muswellbrook NSW**. The document is intended to provide information regarding the existing FRMS&P flood planning levels (currently adopted by Council).

Based on the existing flood planning levels (RHDHV, 2019) the minimum site floor levels is 148.11 m AHD (i.e. 1% AEP design level with 0.5m freeboard).

This investigation shows that the majority of the site is flood free in the 1% AEP design flood. While the PMF flood event is shown to completely inundate the site by more than 2m depth, flood free higher ground is located within 20mm to the west.

Provided the development does not fill in the flooded area, it is unlikely the site will require any further flood specific considerations.

Should you have any queries regarding this memo, please do not hesitate to contact Rohan Hudson on 4926 9506.

Yours faithfully

HASKONING AUSTRALIA

Rohan Hudson, Principal Water Resources Engineer

REFERENCES

Royal HaskoningDHV (2017), **Muscle Creek Flood Study**, Prepared by Royal HaskoningDHV on behalf Muswellbrook Shire Council, January 2017

Royal HaskoningDHV (2019), **Muswellbrook FRMS&P**, Prepared by Royal HaskoningDHV on behalf Muswellbrook Shire Council, 8th April 2019