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SL:as

7 Jul 2022

Mirvac

Level 28, 200 George Street
Sydney NSW 2000 Australia

Attn: Theo Zotos

Subject: WSU Milperra – Flood and Stormwater Advice

Dear Theo,

J. Wyndham Prince has been engaged to provide flood and stormwater advice for the re-development of Western Sydney University (WSU) Milperra campus located at 2 Bullecourt Avenue, Milperra. This letter presents an assessment of the flood affectation that will be relevant to the future re-development of the site and addresses the Department of Planning and Environment gateway determination letter (ref: PP-2021-5837) dated 1st June 2022.

1. SITE

The site is located at 2 Bullecourt Avenue, Milperra which is within the City of Canterbury Bankstown Council (CCBC) Local Government Area (LGA). The site is approximately 19.6 ha in size and is currently a university campus with existing buildings, carpark areas, a playing field and other open space areas. An existing school is adjacent to the eastern boundary of the site and the M5 Motorway is located south of the site. The locality of the site is provided in Plate 1-1.

Plate 1-1 Site Locality Plan

2. PROPOSED DEVELOPMENT

The proposed development at 2 Bullecourt Avenue, Milperra will involve the re-development of the site to include low-density residential lots, a commercial centre, retention of the existing childcare centre and public open spaces. The proposed development also includes three (3) combined detention basins and bio-retention raingardens for stormwater management from the site.

The concept plan for the proposed development prepared by Mirvac Design Pty Ltd is provided in Plate 2-1.

Plate 2-2 Proposed Development Concept Plan

3. PREVIOUS STUDIES

3.1. Milperra Flood Study (BMT WBM, 2015)

BMT WBM was commissioned by Canterbury-Bankstown City Council to update the Milperra Flood Study as part of the Floodplain Risk Management Study and Plan for the sub-catchments of the Mid-Georges River in the CCBC LGA in NSW.

A two-dimensional TUFLOW model was established for the catchment to analyse stormwater flood behaviour under existing conditions. The study provided information on the extent of flood inundation, flood depths and flood velocities throughout the catchment for design flood events ranging from relatively frequent to more extreme.

The study defined the flood behaviour throughout the Milperra stormwater catchment for existing catchment conditions including the analysis of:

- Flows within the underground pipe drainage network; and
- Surface runoff across the catchment.

Review of the flood behaviour in the 1% AEP flood event in the subject site indicates that the northern portion of the site is outside the 1% AEP flood affectation extent. It is also noted that the site is situated at the upper reach of the catchment meaning that no upstream exernal catchments drain through the site. The 1% AEP flood depth figure from the 2015 flood study is provided in Plate 3-1.

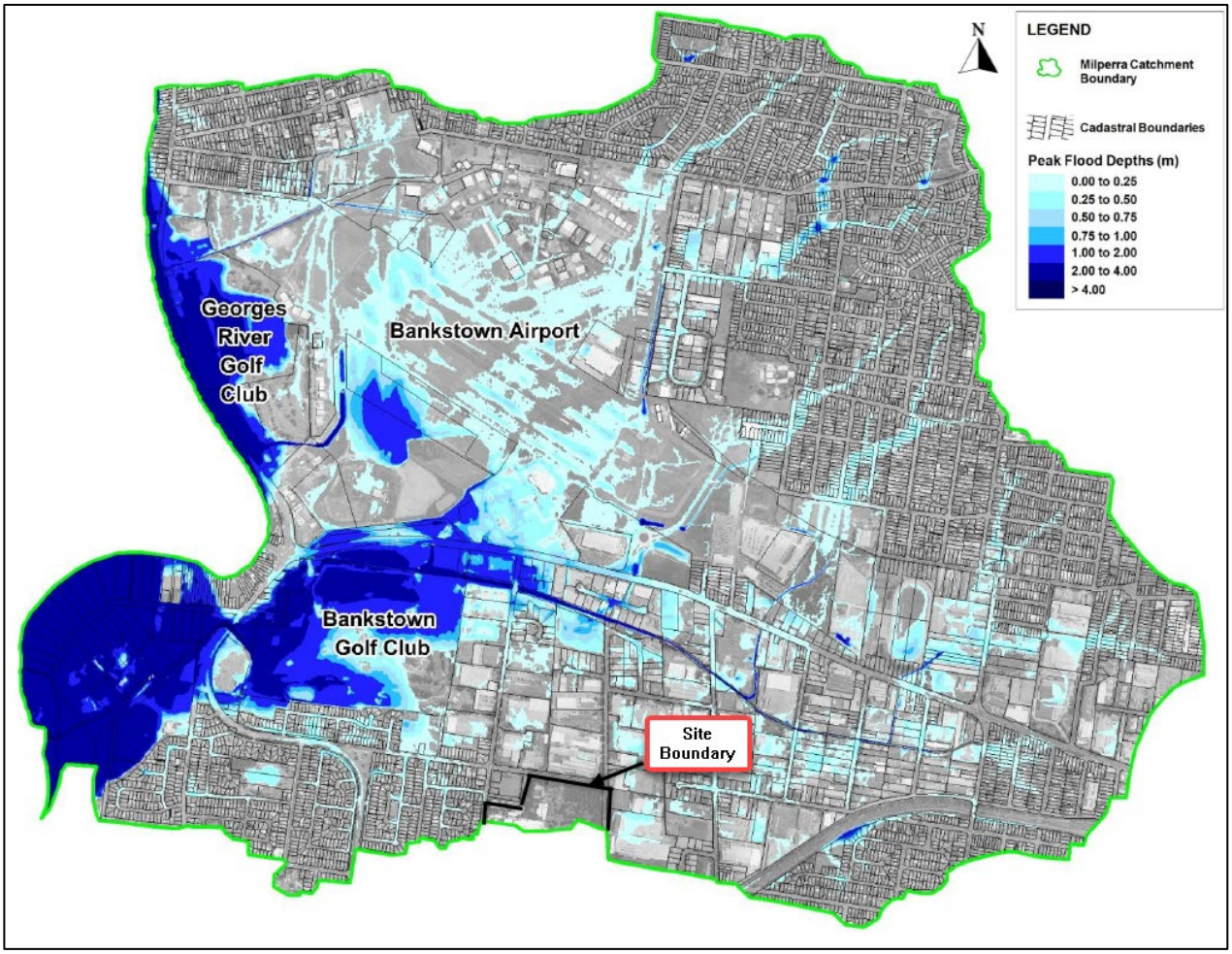

Plate 3-1 Flood Depth Mapping (BMT WBM, 2015)

3.2. Mid Georges River Floodplain Risk Management Study and Plan (BMT WBM, 2017)

BMT WBM prepared the Mid Georges River Floodplain Risk Management Study and Plan (FRMSP, 2017) for the CCBC. The floodplain management study identified the flood problem within the catchment and investigates options to reduce those flooding problems. A plan of recommended actions, works and initiatives for managing the overland flooding was also presented for Council to implement.

The Mid Georges River study area is comprised of seven sub-catchments, namely, Milperra, Kelso Swamp, East Hills, Lucas Road, Picnic Point, Morris Gully and Little Salt Pan Creek. A two-dimensional TUFLOW model was established for the catchment to analyse overland flood behaviour through the sub-catchments of the study area. Floodplain

management focused on managing the risks associated with flooding across the floodplain through the implementation of mitigation measures.

The hydraulic categorisation was one of the tools used to identify flood behaviour and risk in an FRMSP. Outcomes of the categorisation were primarily to inform future land use planning. The 1% AEP hydraulic category mapping for the subject site vicinity is shown in Plate 3-2. It is again noted that the site lies within the upper reach of the Milperra and Kelso Swamp catchment.

The FRMSP suggests that the 1% AEP flood fringe exists within the southern portion of the site. It also states that flood fringe is the areas that are low-velocity backwaters within the floodplain and filling of these areas generally has little consequence to overall flood behaviour.

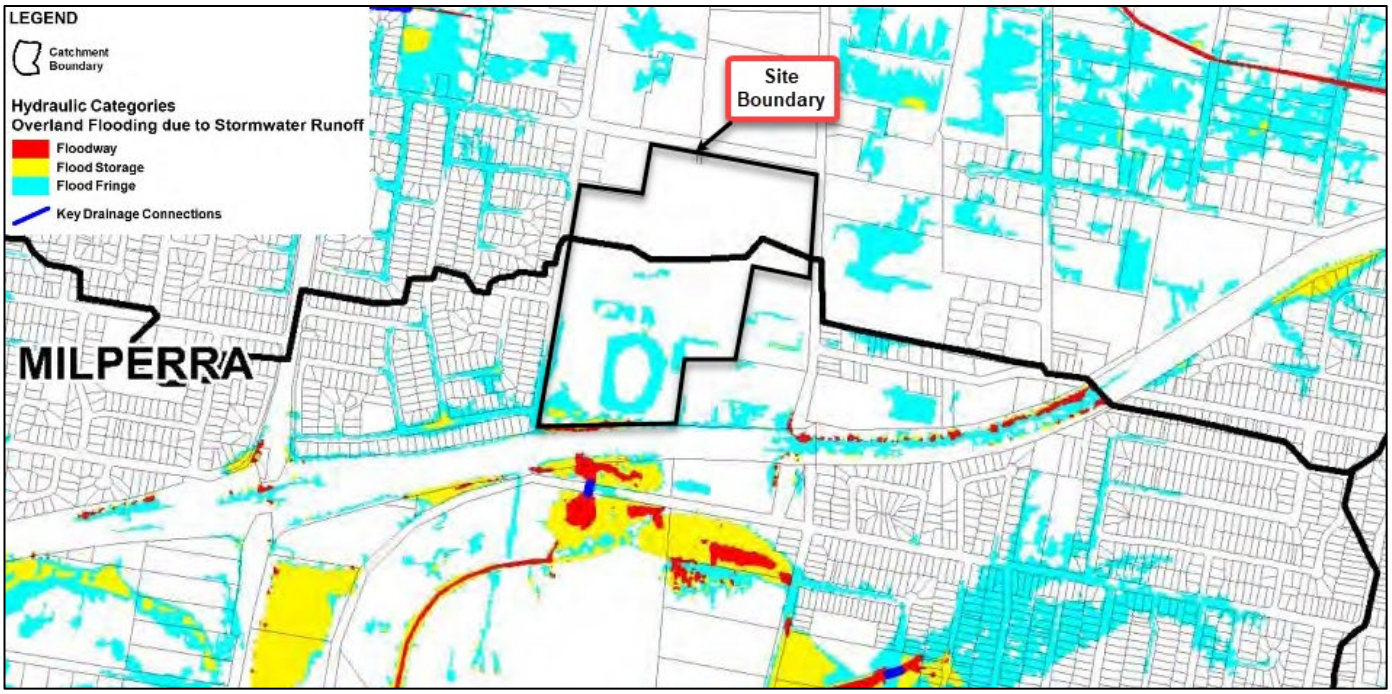

Plate 3-2 1% AEP Hydraulic Categories Mapping (BMT WBM, 2017)

The FRMSP also recognised that different parts of the floodplain are subject to different degrees of flood risk. The following flood risk precincts have been adopted for the study area:

- High Flood Risk. Land below the 100 year ARI flood level that is either located within floodway area, subject to a high hydraulic hazard (as defined in Figure L2 of the Floodplain Development Manual (DIPNR, 2005) or where there are significant evacuation difficulties.
- Medium Flood Risk. Land below the 100 year ARI flood level that is not subject to high hydraulic hazard and where there are no significant evacuation difficulties.
- Low Flood Risk. All land within the floodplain (i.e. within the PMF extent) but not identified as either in a High or Medium Flood Risk Precinct.
- Overland Flow Risk. Areas of shallow overland flow, typically less than 0.25m in depth in a 1% AEP flood event and distant from a recognised watercourse or major drainage system. A subset of the Medium Risk Precinct

The extract of the flood risk map of FRMSP, 2017 surrounding the subject site can be seen in Plate 3-3. Generally, it appears most of the subject site is within the low flood risk category. There is minimal area that is within the medium flood risk category, which is around the existing sports field.

It is noted that the direct rainfall-on-grid approach was utilised for this study whereby rainfall is applied to every cell within the modelled catchment. Rainfall on-grid modelling has many advantages, including the ability to automatically determine local overland flow paths. However, due to the nature of the model input, the entire study area is shown to be inundated, and ponding of isolated pockets occurs once the depth filter is applied to map inundation at cells with a flood depth greater than 0.05 m. This has resulted in the trapped flood waters within the playing field within the site as the FRMSP model does not include an internal site drainage network which is evident in reality.

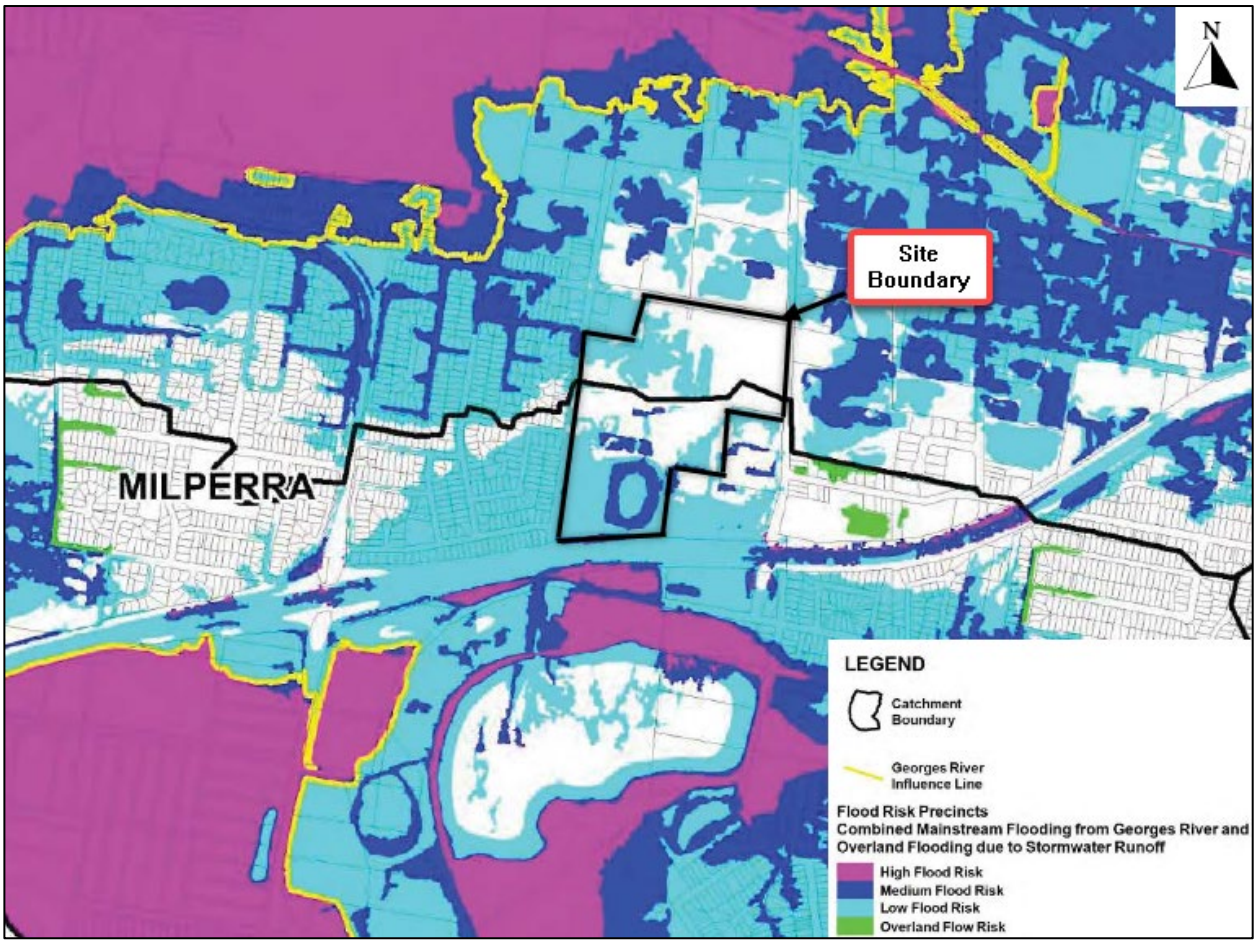

Plate 3-3 Flood Risk Mapping (BMT WBM, 2017)

3.3. Western Sydney University, Milperra Rezoning Stormwater Concept Plan (Calibre, 2020)

Calibre prepared the Stormwater Management Strategy (SWMS) for the Western Sydney University, Milperra site for Mirvac to support the rezoning application.

The stormwater strategy provided detention basins to attenuate peak storm flows up to the 1% AEP event to existing condition peak flows rates and and provided bioretention raingardens to reduce the pollutant runoff from the site to standards set by the Botany Bay & Catchment Water Quality Improvement Plan. The stormwater strategy proposes three (3) detention basins with co-located bio-retention raingarden within the site. The proposed stormwater management devices are shown in Plate 3-4.

A total of 6,100 m^3 of storage and bio-retention areas of 1,150m^2 are required to manage the stormwater quality and quantity from the proposed development.

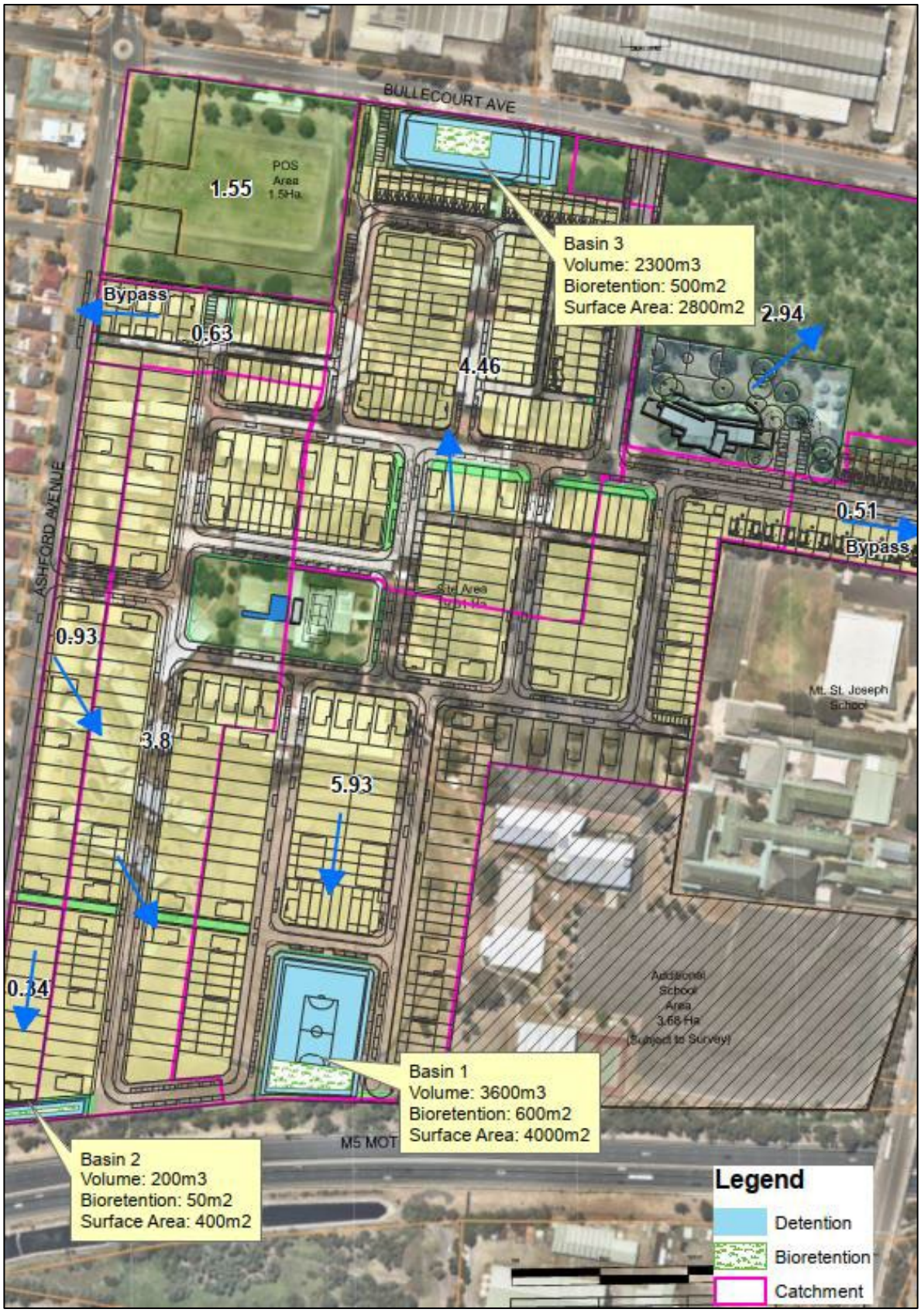

Plate 3-4 Proposed Stormwater Management Devices (Calibre, 2020)

4. FLOOD ANALYSIS

The review of the Flood Study (2015), the FRMSP (2017) and the SWMS 2020, as discussed in Section 3, shows that the site is located at the upper reach of Milperra and Kelso Swamp catchment, as shown in Plate 3-2. Thus, overland flooding is not an issue for the proposed development which has no upstream external catchment that drains through the site and hence flood impact assessment is not deemed necessary.

As discussed in Section 3.3, the SWMS (2020) ensured that the three (3) detention basins with co-located bio-retention raingarden within the site will restrict the peak storm flows up to the 1% AEP event to existing condition peak flows rates downstream of the site and will reduce the pollutant runoff from the site to meet the water quality standard as set out in Council guidelines. This will aid in ensuring that no increase in flow will arrive at each discharge location from the development site.

In addition, the 1% AEP hydraulic category mapping at the subject site vicinity shown in Plate 3-2 suggests that the 1% AEP flood fringe exists within the southern portion of the site. It is noted from the FRMSP, 2017 that flood fringe is the areas that are low-velocity backwaters within the floodplain and the filling of these areas generally has little consequence to overall flood behaviour.

Also, the extract of the flood risk map of FRMSP, 2017 surrounding the subject site presented in Plate 3-3 suggests that majority of the subject site is within the low flood risk category except for the playing field area that is within the medium flood risk category. It is noted that the FRMSP, 2017 has been developed at a broad scale for the purpose of developing the floodplain risk management study and plan and does not have site-specific localised flow controls such as internal site drainage. This has resulted in the mapping of the medium flood risk category within the playing field area, where in reality it drains through a drainage network that surrounds the sports field.

Therefore, the proposed development within the low flood risk precinct and 1% AEP flood fringe would not result in change in flood behaviour and impact external to the site, given that the developed condition flows are managed within the site by restricting the peak flow rate to existing condition flows up to 1% AEP storm events.

5. FLOOD PLANNING LEVELS

The flood planning levels and extents outlined in FRMSP (2017) for the 1% AEP flood event have been derived based on the methodology of adding 0.5m to the 1% AEP flood event peak water surface level. The flood planning levels in the vicinity of the subject site is provided in Plate 5-1.

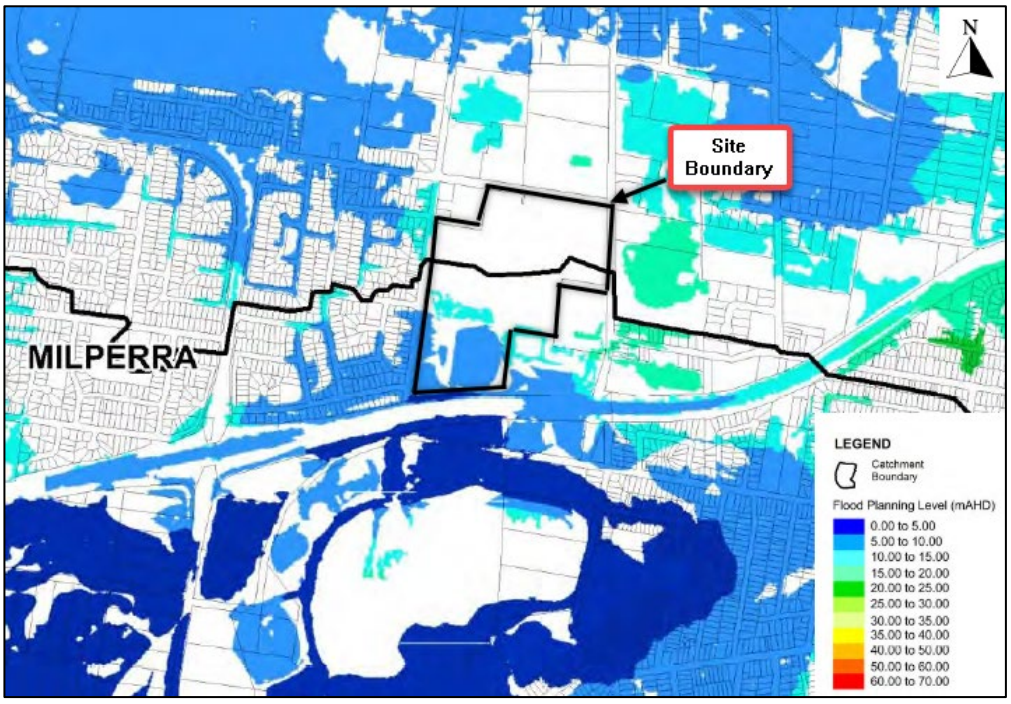

Plate 5-1 Flood Planning Levels (BMT WBM, 2017)

As depicted in Plate 5-1 above, the flood planning levels along Ashford Road range between 5m to 15m AHD. The flood planning levels and flood extents within the site will ultimately change due to the proposed land uses that are proposed as part of the development. Additional drainage infrastructure and stormwater management devices are proposed which will ensure that the flood planning levels of habitable floors are 1% AEP plus 0.5 m freeboard.

6. FLOOD EVACUATION PLAN

The safe evacuation of people from flood-affected areas during a PMF event is a vital consideration for the planning of the proposed development. The proposed development must allow residents to be able to leave their homes during the Probable Maximum Flood (PMF) event and travel safely to higher ground. The flood evacuation routes must follow a continuous rising grade to a level above the PMF event for all residents. The proposed flood evacuation routes have been determined using the low flood risk precinct extent from the FRMSP (2017) which represents PMF extents as shown in Plate 3-3 in Section 3.2. The FRMSP (2017) result suggests that Bullecourt Avenue and Horsley Road are flood-free in PMF events and can be flood evacuation access points for the proposed development if required. The flood evacuation routes identified for the proposed development can be seen in Plate 6-1.

Plate 6-1 Flood Evacuation Plan

7. CONCLUSION

It is concluded that the site is located at the upper reach of the catchment and overland flooding is not an issue for the proposed development. The three (3) detention basins with a total storage capacity of 6,100 m^3 and with co-located bio-retention raingardens of area 1,150 m^2 within the development site as per the SWMS (2020) report have ensured stormwater management from the site. Hence flood impact assessment is not deemed necessary

Also, the proposed development within the low flood risk precinct and 1% AEP flood fringe would not result in a change in flood behaviour and impact external to the site, given that the developed condition peak discharge are managed within the site by restricting the flow rate to existing condition flows up to 1% AEP storm events.

The flood evacuation plan shows that the continuous rising grade is achievable within the development to a level above the PMF event for all residents is available during the need for evacuation. Thus, no residents will be isolated in the event of an extreme flood event.

Should you have any queries regarding this matter please do not hesitate to contact me.

Yours faithfully

SABINA LOHANI

Acting Manager – Stormwater & Environment