

By email
24 March 2025

Pymble Ladies College
Avon Road Pymble NSW 2073

Attn: Scott Egelton
c/o Pier Property Corporation
Suite 305, Level 3, 25 Lime Street, King Street Wharf NSW 2000

Our ref 305487-00

Dear Sir/Madam

PLC Secondary Innovation Precinct **Flooding SSDA – Preliminary Report**

1. Introduction

Arup has been commissioned by Pymble Ladies' College (the College) to prepare this *Flooding Assessment* in accordance with the technical requirements of the Secretary's Environmental Assessment Requirements (SEARs) and in support of the preparation of an Environmental Impact Statement (EIS) and State Significant Development Application (SSD- 79146716) to the Department of Planning, Housing and Infrastructure (DPHI).

To support the preparation of an SSDA assessment, Arup have undertaken a review of:

- The flooding conditions at the site
- Available information
- Flood risks associated with the development
- Potential mitigation.

This letter summarises the findings of the desktop flooding review. It is intended to be read in conjunction with the Civil SSDA Stormwater Plan (BG&E, 2025).

2. Project Understanding

The site is located at 20 Avon Road, Pymble, within the Ku-ring-gai Local Government Area (LGA). The site comprises multiple parcels of land and is legally described as:

- Lot 1 Deposited Plan 69541
- Lots 11- 17 Deposited Plan 7131

The site and proposed work areas are identified in Figure 1.

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Figure 1 Site Boundary

The project comprises demolition of several existing buildings and the construction of the Secondary Innovation Precinct (SIP), associated landscaping and Campus Commons at the Pymble Ladies College as outlined in Figure 2. The SIP is a five-storey building that will consolidate STEM based learning opportunities within the college.

As this location is on a local high point, it is not expected to be subject to mainstream flooding associated with the local water courses. The Ku-ring-gai on-line flooding portal confirms that the precinct is not in a documented floodplain (refer Figure 3). However, there may remain a residual flood risk associated with high velocity travelling through the precinct towards the marked watercourses.

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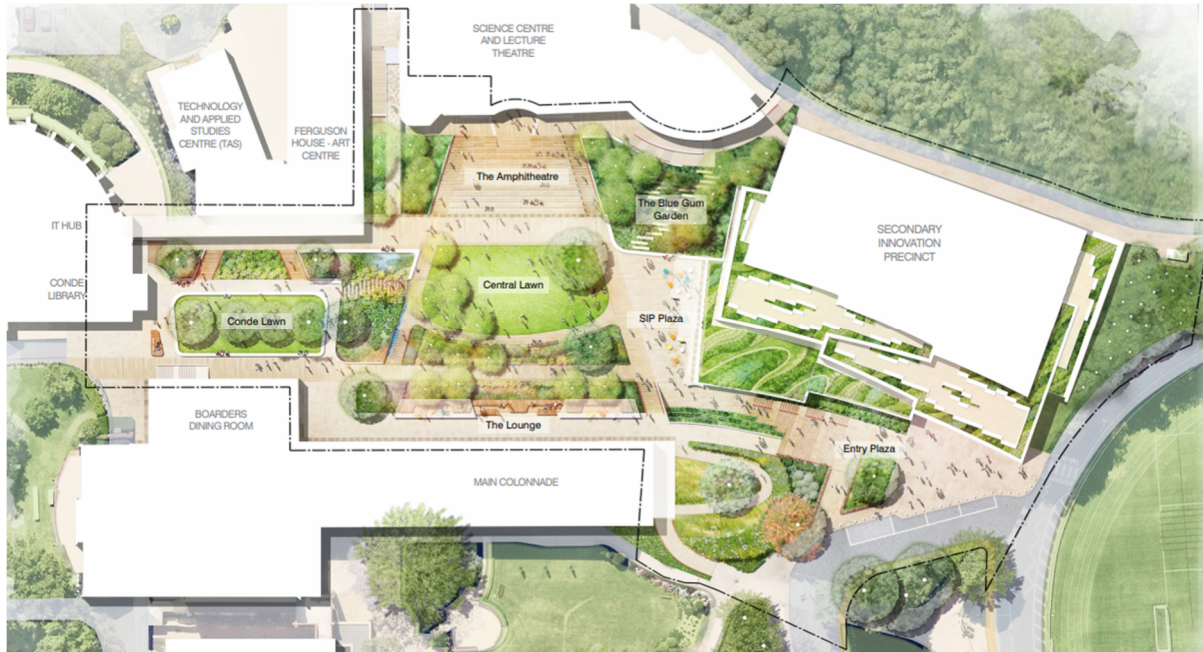


Figure 2 Site Plan (3XN, 2025)



Figure 3 Flood extents from the 2024 Ku-ring-gai online mapping portal.

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Available Data

Blackbutt Creek Flood Risk Management Study and Plan

Flooding in the southern portion of the PLC site is covered in the Blackbutt Creek Flood Risk Management Study and Plan prepared for Council in 2016 (GHD). This study considered the flood risk associated with the creeks and tributaries that flow in the Blackbutt Creek catchment; however this study did not cover the catchment of the SIP.

The hydrology for this study was prepared using a DRAINS model, which established inflows to a 2D TUFLOW hydraulic model. This hydraulic model is used to calculate flood levels, depths and hazard conditions across the study area.

LiDAR

LiDAR data providing site wide topographic information is available from the NSW Division of the Department of Finance, Services and Innovation: Spatial Services. This data was collected by Airborne Laser Scanning (ALS) in May 2011, and has a notational accuracy of +/- 0.3 m vertically, and +/-0.8 m horizontally.

Civil Drainage Plan

A drainage plan has been prepared for the site by the project civil engineers BG&E (Figure 4). This plan outlines how the local stormwater will be directed around the site, including the catchment areas within the site, catchment areas external to the site but draining into the site, overland flows and associated overland flow hazards.

In the case of rainfall falling directly on the precinct, the grading plan is intended to direct runoff away from building entrances, and towards the stormwater drainage pits and pipes. These measures are demonstrated by BG&E to be sufficient to manage the stormwater flows crossing the site.

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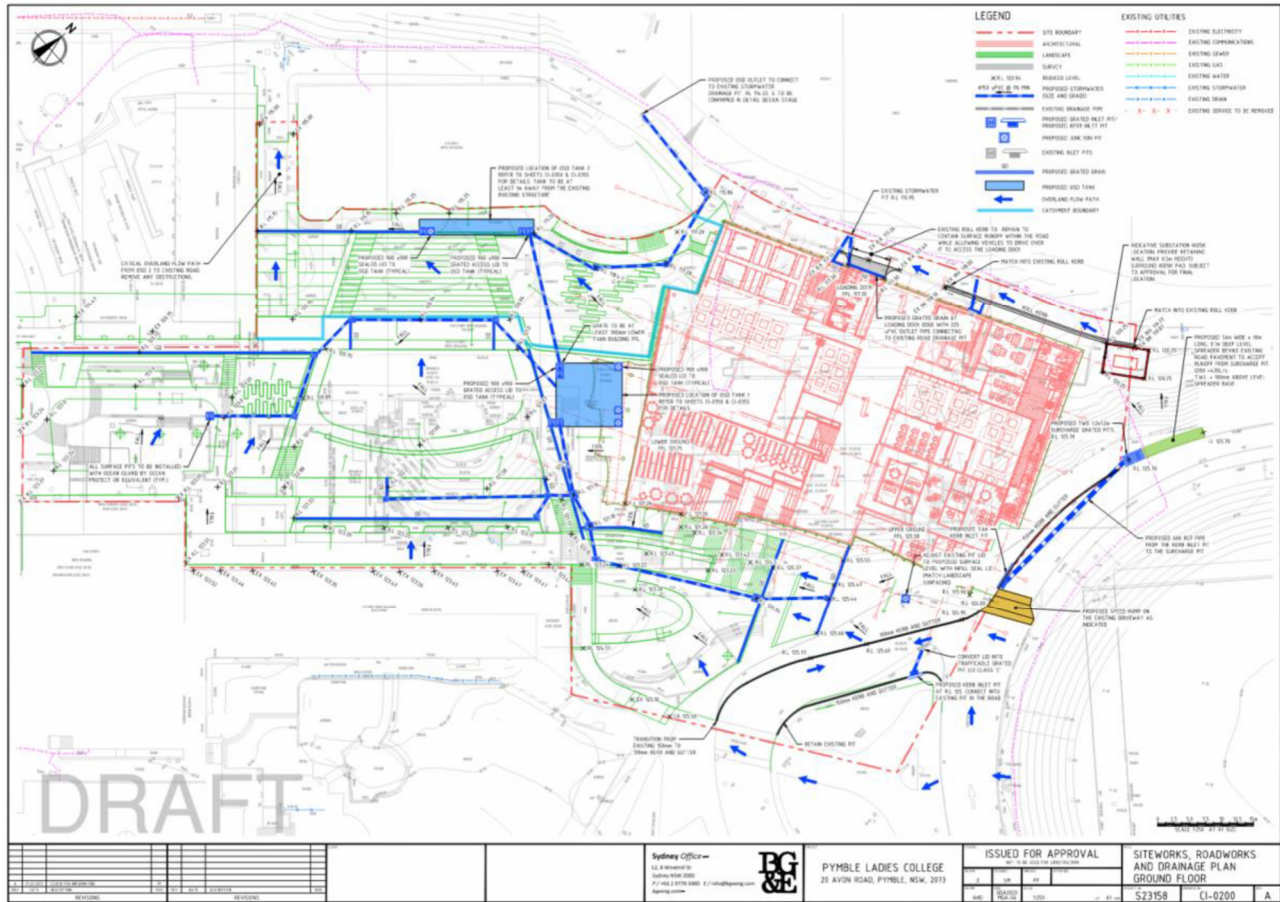


Figure 4 Civil Drainage Plan (BG&E, 2025)

Flood Planning Requirements

The development assessment requirements are set out in the project SEARs. Specific flood planning requirements applicable to the site are outlined in the Ku-ring-gai Local Environment Plan 2015 (the LEP), and the associated Development Control Plan (DCP).

Project SEARs

The Secretaries Environmental Assessment Requirements with respect to flooding are outlined in Table 1 Project SEAR SSD 79146716 for flooding. This letter has been prepared to address these SEARs requirements by outlining the flood risk, and presenting any measures relevant to managing flooding to this site or other surrounding properties.

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Table 1 Project SEAR SSD 79146716 for flooding

Requirements	Where addressed
- Identify the flood planning level as set out in the relevant council LEP or SEPP and identify any: - flood risks on site having regard to adopted flood studies - the potential effects of climate change, and - any relevant provisions of the NSW Flood Risk Management Manual. - Where the development is occurring on flood prone land a flood impact and risk assessment (FIRA) must be prepared having regard to the Flood Impact and Risk Assessment Guideline - LU01 (FIRA guide). When determining the scope and category of the FIRA the requirements outlined in the FIRA guide must be considered. - Detail any flood risk management measures that are to be incorporated as part of the development having regard to relevant guidelines (including any design solutions, flood modification measures, property modification measures, operational procedures or Flood Emergency Response Plan).	- Guidance in the DCP: is used to inform the flood risk and applicable flood planning levels (below). - Management measures are documented in the civil design (BG&E)

Local Environment Plan

The Ku-ring-gai Local Environmental Plan 2015 (LEP) is the Council's principal planning document that typically applies to development within the local government area (LGA). The LEP requires that the following objectives be satisfied:

- to minimise the flood risk to life and property associated with the use of land,*
- to allow development on land that is compatible with the flood function and behaviour on the land, taking into account projected changes as a result of climate change,*
- to avoid adverse or cumulative impacts on flood behaviour and the environment,*
- to enable the safe occupation and efficient evacuation of people in the event of a flood.*

These requirements are documented in Section 5.21 of the LEP.

Ku-ring-gai Development Control Plan

The Ku-ring-gai Development Control Plan (DCP) outlines the controls and outcomes typically applied to developments within the plans applicable scope. This document serves to assist in the application of the LEP.

Water management, including flooding and stormwater, are documented in Part C Section 24. The requirements with respect to flooding, as well as the response applied to this site, are outlined in Table 2 (Section 24D.2: Flood Studies and The Design Flood Standard), and (Section 24D.3: Development Over or Adjacent to a Natural Waterbody, Open Channel or Drainage Depression). Other controls, including the stormwater controls, are addressed in the civil design report (BG&E, 2025).

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Table 2 Ku-ring-gai DCP section 24D.2: Flood Studies and The Design Flood Standard

Clause number	Requirements	Response required for proposal
1	Where a Catchment Flood Study has been completed and the site is identified on the Flood Planning Area map any development proposal is to demonstrate: i) Development is confined to a part of the site which is flood free; or ii) All dwellings are set at or above the specified freeboard; and iii) Development will not exacerbate flooding depth, extent or flow velocities on adjoining properties; and iv) Any part of the dwelling house or any ancillary development that is erected at or below the flood planning level is to be constructed of flood compatible material, and able to withstand the forces exerted during a flood by water, debris and buoyancy up to the flood planning level. Note: Absence of Flood Planning Area or Probable Maximum Flood mapping on a property does not mean the site is free from overland flows during major rainfall events – all development is to carefully consider potential flow paths and incorporate good drainage design to minimise potential impacts during major rainfall events.	No catchment flood study has been completed for this site. Flooding information is available for adjoining watercourses in the <i>Blackbutt Creek Flood Risk Management Study and Plan</i>. This study indicates that due to the position of the school site on a local high-point, and as such, is not subject to flooding as identified in Council flood studies (this being flooding having escaped the confines of a defined of identifiable watercourse). Notwithstanding, the site may be subject to overland flows generated either as a result of runoff within the site area directly, or the immediately upstream catchment area.
2	Where a Catchment Flood Study has not been completed or Council considers that a development proposal, associated with a nearby drainage system, may: i) be subject to inundation from overland flows causing damage to property or belongings; and/or ii) be subject to structural damage from overland flows or debris associated with the overland flows; and/or iii) impede the passage of stormwater associated with the design flood standard to cause a rise (afflux) in the flood level upstream greater than 50mm; and/or iv) divert overland flows onto or into surrounding properties; and/or v) increase the downstream velocities of flow for the design flood standard. Council reserves the right to request that a flood study be undertaken and prepared in accordance with 24R.3 of this Part.	As above, this site is outside the extent of an applicable catchment flood study prepared by Council. Flooding information is available for adjoining watercourses in the <i>Blackbutt Creek Flood Risk Management Study and Plan</i>. This study indicates that due to the position of the school site on a local high-point, and as such, is not subject to flooding as identified in Council flood studies (this being flooding having escaped the confines of a defined of identifiable watercourse). A review of the local topography has been undertaken to review the potential for changes in site hydrology and potential for this to impact surrounding properties.

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Clause number	Requirements	Response required for proposal
3	The design flood standard is to be calculated based on either: i) the overland flow associated with the 1% AEP storm event with any above-ground channels and underground pipes / culverts operating at a maximum of 50% capacity; or ii) the overland flow associated with the 20% AEP storm event with any above-ground channel or underground pipes / culverts fully blocked; iii) whichever is the greater	This design flood standard will be reviewed in the civil and stormwater design. The grading plan and stormwater design will be revised in order to achieve this required stormwater design standard.
4	For sensitive and hazardous development Council may require the adoption of events between the 1% AEP and Probable Maximum Flood (PMF) as the design flood event where it is considered that the proposed works pose a greater than usual risk to persons and/ or property. i) Sensitive and hazardous development includes: a. Early education and care facilities. b. Educational establishments. c. Emergency services facilities. d. Group homes. e. Hospitals. f. Respite day care centres. g. Seniors housing. h. Hazardous storage establishments.	As the development is an educational institution, it would be classified as a sensitive development.

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Table 3 Ku-ring-gai DCP section 24D.3: Development Over or Adjacent to a Natural Waterbody, Open Channel or Drainage Depression

Clause Number	Requirements	Response required for the proposal
1	Where works are proposed to be undertaken adjacent to the design flood standard conveyance zone associated with a watercourse, open channel or drainage depression, and Council considers it to be necessary, a flood study is to be prepared in accordance with 24R.3 of this Part to demonstrate that the development will not: i) be subject to inundation from flows associated with the watercourse causing damage to property or belongings; and /or ii) be subject to structural damage from flows associated with the watercourse or debris associated with the flows; and/or iii) impede the passage of stormwater associated with the watercourse to cause a rise (afflux) in the flood level upstream greater than 50mm; and/or iv) divert flows associated with the watercourse onto or into adjacent properties; and/or v) increase the downstream velocities of flow for the design flood standard	While there is a watercourse or drainage depression on the PLC campus to the north-east of the site does not include works that would encroach on this watercourse or depression. As such, this clause is not applicable to this proposal.
2	Bridges may be considered, where: i) the underside of any bridge structure, including any attached utility services, is not less than 300mm above the level of the design flood standard; ii) the existing velocity of water in the watercourse would not be affected; iii) not more than one bridge is established per property; and iv) the watercourse and banks beneath the bridge are stabilised by rock lining or equivalent to prevent erosion that would otherwise result from reduced plant growth due to restricted solar access. Note: Lower level bridges may be considered subject to demonstration that they are structurally adequate, will not impact upon stormwater flows (including backwater affecting upstream property) and will enable dry access during storm events up to the 5% AEP.	This proposal does not include any bridges or watercourse crossings. As such, this clause is not applicable to this proposal.

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Clause Number	Requirements	Response required for the proposal
3	Where the design flood standard is less than 20m³/s, or identified as overland flow on the Flood Planning Area Map* the minimum floor level of all enclosed areas and structures, including all habitable floor areas, is to be either: i) 300mm above the design flood standard level; or ii) 300mm above the highest existing ground level along the associated overland flow path; or iii) whichever is the greater, except in the case of garages, where the minimum height is to be 150mm instead of 300mm, and in-ground swimming pools, which is to be designed in accordance with the provisions of 24D.7 (4) of this Part *where a flood study has been completed.	The runoff from the catchment upstream of the site is documented by BG&E 2025). The peak flow rate in the 1% AEP is less than 20m³/s. As such, this clause is not applicable to this proposal.
4	Where the design flood standard exceeds 20m³/s, or as identified as mainstream flow on the Flood Planning Area Map* the minimum floor level for all enclosed areas, including all habitable floor areas, are to be 500mm above the design flood standard level, except in the case of garages, where the minimum height is to be 300mm, and in- ground swimming pools, which is to be designed in accordance with the provisions of 24D.7 (3,4,5) of this Part. *where a flood study has been completed. Note: Council may require, as a condition of consent, that the following burdens be placed on the title of the subject property over the following areas of the property: i) a restriction-on-use over the determined design flood standard conveyance zone for an overland flow path associated with a natural waterbody, open channel or drainage depression, the terms of which do not permit the placement of any structures within that zone which may impede the design flood standard; and/or ii) a drainage easement to the benefit of Council and/or upstream properties as applicable.	The runoff from the catchment upstream of the site is documented by BG&E 2025). The peak flow rate in the 1% AEP is less than 20m³/s. As such, this clause is not applicable to this proposal.
5	Safety fencing that is required to reduce hazard to persons to acceptable limits may be installed in any areas that are subject to overland flow. Safety fencing is to be able to withstand a velocity x depth ratio of 0.4m²/s, not impede flows or debris, and meet the minimum requirements of AS1926.1-1993: Fencing for Swimming Pools or any standard that replaces it. If fencing is not feasible, other suitable measures may be provided to restrict access to areas which exceed this limit	Overland flow hazards to be reviewed in the civil design (BG&E, 2025).

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Clause Number	Requirements	Response required for the proposal
6	Parking areas are not to be established in areas where vehicles would become buoyant in an overland flow zone, and hence unstable. A maximum velocity x depth ratio of 0.6m²/s to 0.7 m²/s applies in these instances in accordance with Australian Rainfall and Runoff. Note: Australian Rainfall and Runoff is published by Engineers Australia www.eabooks.com.au. Information on updates to Australian Rainfall and Runoff can be found at www.arr.org.au	Parking areas will not be subject to flows greater than the applicable safety criteria. This is reviewed in the drainage assessment (BG&E, 2025).

Ku-ring-gai Council Technical Guideline for Water Management

Ku-ring-gai Council have published this technical guideline to support development in the Local Government Area. This guideline covers technical aspect of stormwater management, including the design and specification of stormwater networks, bioretention and water sensitive urban design measure, as well as On-site Stormwater Detention (OSD). This document does not address flooding, and as such these requirements are considered in the drainage design prepared by BG&E.

Topographic Assessment

Using the topographic information, an assessment of the site topography has been undertaken for the site and the area surrounding (Figure 5). A review of this broad scale topography indicates that in most circumstances, rainfall-runoff will be directed to the drainage depression north of the site. While this runoff may be intercepted by structures such as road kerbs, these will still act to direct runoff to this depression.

The proposed drainage plan retains many of the features of the existing site drainage, and as such does not divert flows associated with the watercourse onto or into adjacent properties.

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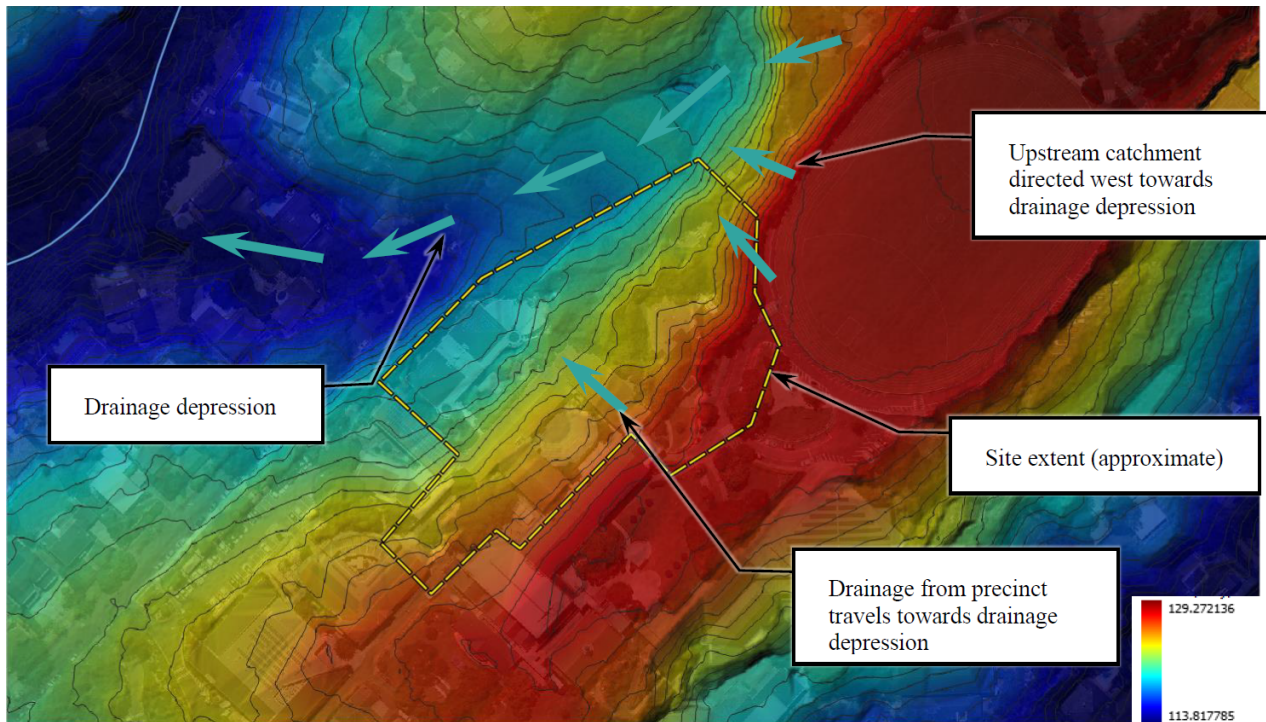


Figure 5 Local site topography

Flood Hazard

As the catchment area is small, being limited to the immediate precinct, the potential flood hazards are also correspondingly small. Overland flow hazards are documented in the stormwater design report (BG&E, 2025). Under the provisions of the DCP, as well as the standard established by other nearby flood studies, this site is not located on flood prone land, and is subject to stormwater management requirements only.

Flood and Overland Flow Mitigations

Based on a review of the existing flood studies, and the at-site topography, the site is not subject to flooding (either overland or mainstream), but rather is subject to shallow depth rainfall-runoff that is generated in from within the precinct or the area immediate upstream. Based on the stormwater drainage plan (BG&E, 2025), this is able to be managed by grading the pavements away from building entrances (e.g. at the southern entrance and at the loading dock). The required measures are documented in the civil design (BG&E, 2025).

The drainage plan prepared by BG&E also includes an On-site Stormwater Detention tank to manage stormwater runoff from the site. This will minimise the potential for increasing the downstream velocities of flow.

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Conclusion

Based on a review of the site topography and the existing drainage plan, as well as the nearby flood study (Blackbutt Creek Flood Risk Management Study and Plan), the site is only subject to locally generated rainfall runoff. Under the provisions of the DCP, as well as the standard established by other nearby flood studies, this site is not located on flood prone land.

Any rainfall-runoff is expected to be relatively shallow in depth, and able to be managed safely through the grading plan and the pit and pipe drainage (BG&E 2025), and the design and assessment of this plan is documented in the civil design report. Off-site flows will be managed through the provided OSD tank, which acts to limit the peak discharge relate to the drainage depression north of the site, noting that drainage for the site is currently directed to this depression.

As such, the development has a minimal flood risk that falls outside the scope of the flooding controls identified in Part C Section 24 of the Ku-ring-gai Development Control Plan.



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