

Covenant Christian School
212 Forest Way
Belrose NSW 2085

L240129_CovenantChristianSchool_SiteFloodAssessment

29 January 2024

Re: Covenant Christian School Library – Site Flood Assessment

1. BACKGROUND

This site-specific flood assessment is in relation to a Development Application (DA) at Covenant Christian School in Belrose (Lot 101 DP1159742) – the site, as shown in Diagram 1.

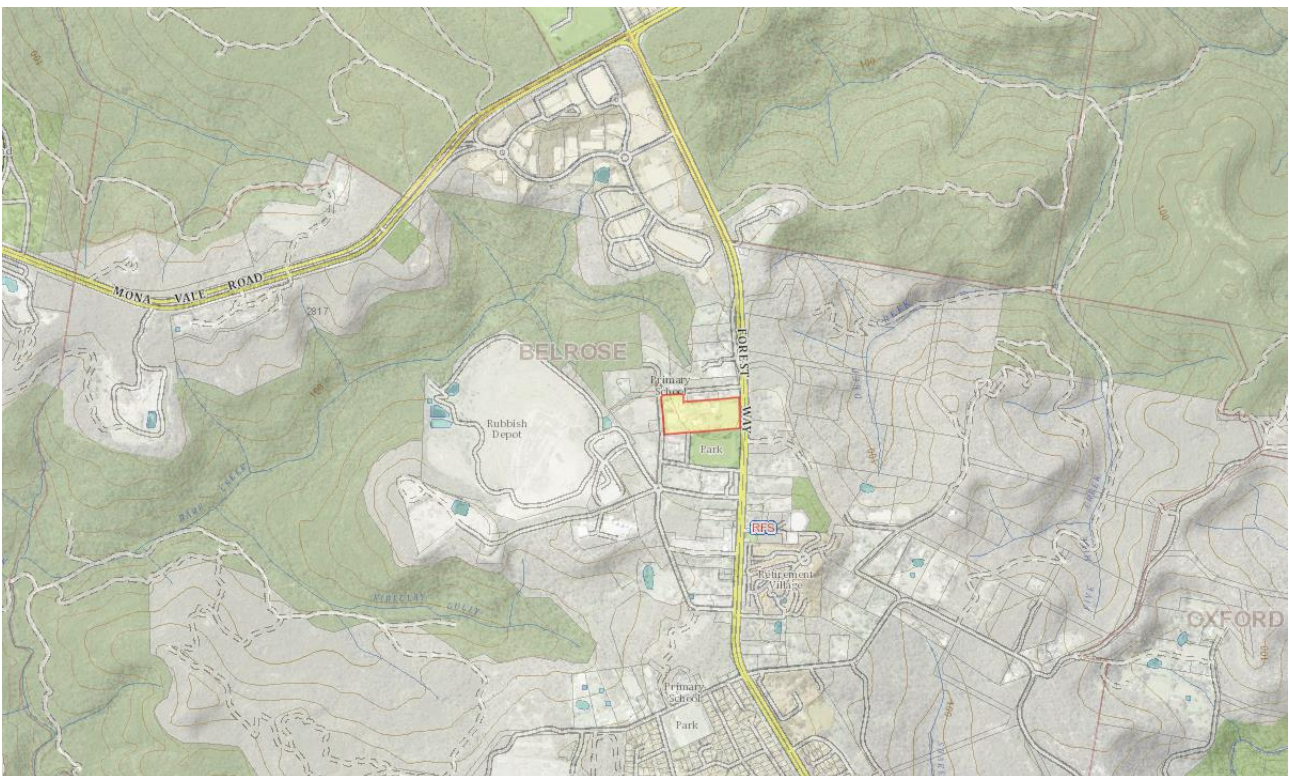


Diagram 1: Site Location (Source: NSW Government SIX Maps)

WMAwater Pty Ltd

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A DA (DA2023/0714) was submitted to Northern Beaches Council (Council) for demolition and construction works around the existing Block D and Staff Building on the site of the school. A new combined Library and Staff Centre is proposed at this location. Council requested further information (RFI) with regard to the DA (provided in Attachment A). Item 3 of Council's letter outlines that the application for a new library is not supported as the land has been identified as being affected by overland flow in a 1/100 AEP storm event and a Flood Management Report was requested.

The site is located within the Bare Creek catchment, which drains to Middle Harbour Creek (and subsequently discharges into Middle Harbour). Design flood behaviour for this area was modelled in the *Middle Harbour Flood Study* (Reference 1). WMAwater is currently completing this study on behalf of Council and it is in a draft form. Although this study has not yet been formally adopted by Council, it presents the latest flood modelling undertaken for the catchment including overland flow affectation of the Covenant Christian School site.

WMAwater has undertaken a site-specific flood assessment for the proposed development based on the flood modelling from Reference 1, with regard to the flood-related development controls applicable through Council's relevant Development Control Plan (DCP). This letter provides site-specific information on flooding, flood planning levels, and assessment of compliance of the proposed development with the relevant planning controls. This flood assessment provides additional information for Council to assess the DA.

1.1. Survey and Proposed Development Plans

This assessment relies on the information in the following plans:

- *Plan showing selected levels and detail to accompany application for proposed works*, Paul A. Lawson, dated 3 March 2023 (Attachment B)
- *Development Application Drawings for New Staff/Library Building for Covenant Christian School* (Attachment C), including:
 - Architectural Drawings DA-00, DA-01, DA-02 and DA-03, Bow Goold Architects, dated 17 May 2023
 - Stormwater Plan DA4.01, Sparks + Partners Consulting Engineers, dated 10 April 2023
 - Building floor level markup, Bow Goold Architects, dated 4 December 2023

1.2. Description of Site and Flood Behaviour

The site is located in the suburb of Belrose and is located off Forest Way, with its main entrance at the end of Dell Street (Figure 1). The site is located fairly high in the catchment, at an elevation of approximately 150 – 160 mAHD. The catchment draining to the school is approximately 26 hectares, extending south to approximately West Parade and bounded to the east by high ground where the water supply tank is located and to the west by Linden Avenue. The site topography and catchment to Bundaleer Street is shown in Figure 2.

Overland flow can enter the site from Forest Way, Dell Street and the Wakehurst Rugby Park. This flow is typically shallow and flows to the north through the site. Due to the nature of the site and the buildings, water can pond on the upstream side of the buildings and cause deeper flooding. Water primarily exits the site through an open grass area between an early learning centre and a residential property onto Bundaleer Street, although water can also flow out to Bundaleer Street via the Bundaleer Street driveway entrance to the school.

The draft flood study results from Reference 1 indicated that there was significant ponding on the site. This was due to the digitisation of buildings on the site. There are numerous buildings on the site connected by covered walkways and narrow pathways. The buildings layer adopted in the flood study (based on aerial imagery) did not distinguish the difference between a covered walkway and building, and as such large, connected buildings were assumed which blocked overland flows and caused significant ponding on the upstream side. The flood modelling was updated as part of this site-specific assessment based on information provided about the existing buildings and pathways which would convey overland flows. This is described in Section 2 below.

2. FLOOD MODELLING

The flood modelling from Reference 1 was updated to include the following information:

- Representation of building outlines on the site. This was required as the flood study buildings layer assumed that many of the individual buildings on site were connected, forming large buildings that obstructed overland flows. In reality, there are covered pathways and corridors between these buildings. The buildings were updated based on the existing building plan as shown in Attachment C (DA-00).
- Ground levels in the vicinity of Block D and the Staff Centre. The LiDAR, although very accurate on exposed hard surfaces, many of the surfaces surrounding Block D are covered walkways. The representation of the ground surface in the LiDAR is also hindered by the multi-level layout of the school, with an elevated grass area and walkway near the site. The topography in the model was updated based on topographic survey as shown in Attachment B.

The same hydrology, including critical durations and temporal patterns, adopted for the flood study were run for the updated model.

The resulting flood behaviour for the 1% annual exceedance probability (AEP) and probable maximum flood (PMF) events is shown in Figure 3 and Figure 4, respectively. A summary of the peak flood depths and levels at the upstream side of Block D (the location of the proposed building) is shown in Table 1.

Table 1: Existing peak flood depths and levels upstream of Block D (the proposed building location)

Event	Peak Flood Depth (m)	Peak Flood Level (mAHD)
1% AEP	0.23	158.58
PMF	0.65	159.02

Water ponds on the upstream side of the existing Block D, before flowing through narrow passageways to the east, toward the staff building and the basketball court, which acts as a flood storage area. Water can also flow down the western side of Block D, between Block C and D, or continue along a pathway in front of Block C toward a courtyard in front of Block B. All of these pathways eventually discharge onto Bundaleer Street. As the flow enters these pathways, the flood depth generally decreases, to approximately 0.1 m depth or less in the 1% AEP event.

The hydraulic hazard for the 1% AEP and PMF events was also determined based on the Australian Institute for Disaster Resilience Guideline (Reference 5, shown graphically in Diagram 2), with the results shown in Figure 5 and Figure 6, respectively. The results indicate that in the 1% AEP event,

the hazard remains H1 – generally safe for people. In the PMF event, the hazard increases to H3 on the upstream side of Block D, which is unsafe for children and the elderly.

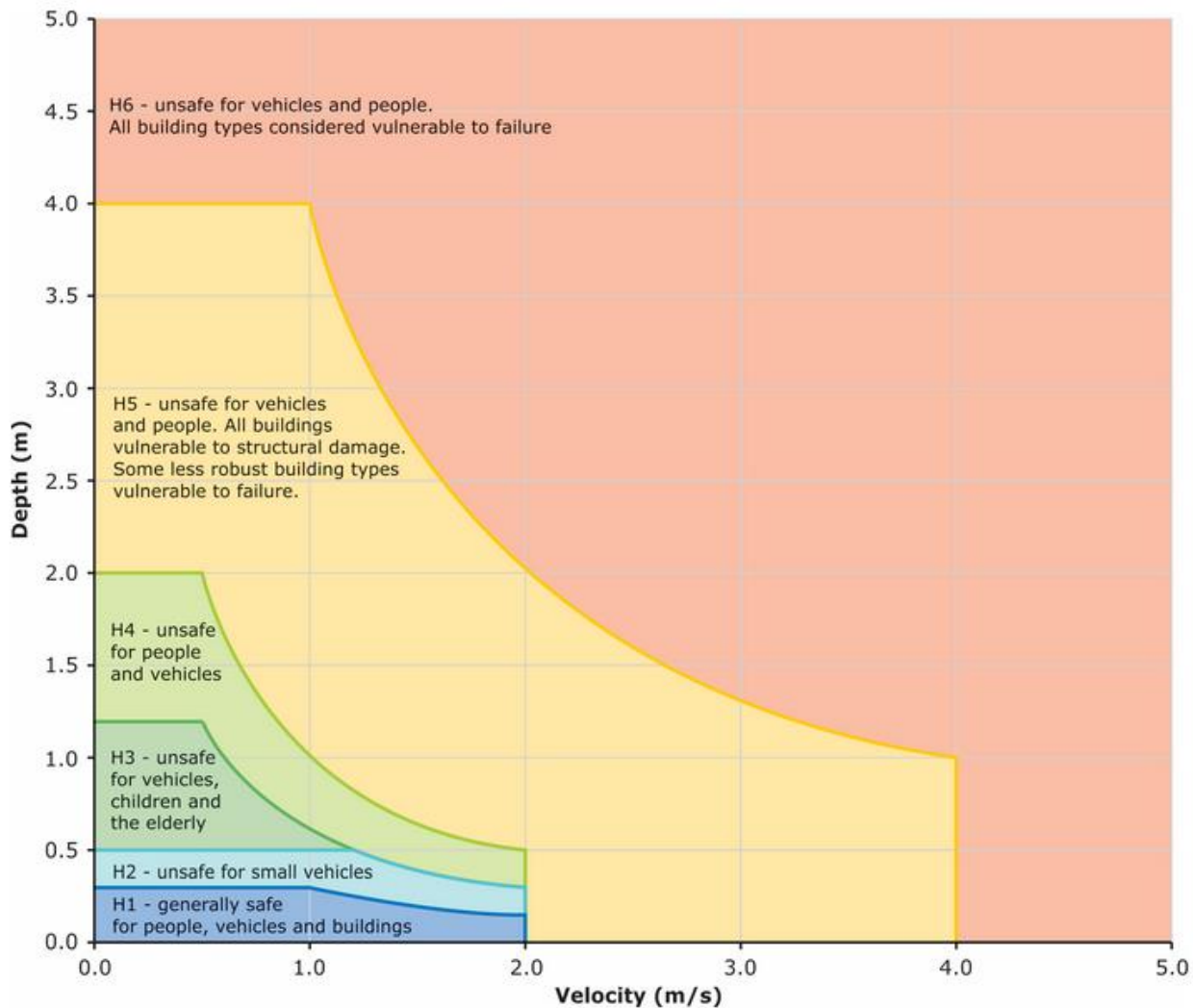


Diagram 2: General flood hazard vulnerability curves (Source: Reference 5)

Based on the results for the 1% AEP event, at the location of the proposed building, the flood risk classification would be a “Medium Flood Risk Precinct” with a “Flood Fringe” function.

This type of flood risk is typically addressed for new development by ensuring that entry points to buildings and floor levels of development are sufficiently high to mitigate flood damages, and that there is sufficient refuge within the dwelling to mitigate risk to life in extreme events up to and including the Probable Maximum Flood. It is also important to ensure that the development does not divert or displace floodwater onto other properties and exacerbate flood issues elsewhere. The specific Northern Beaches Council flood-related development controls are assessed in Section 2 below.

3. ASSESSMENT OF COUNCIL POLICY COMPLIANCE

3.1. Applicable Policies and Plans

WMAwater understands that the Warringah Local Environmental Plan (LEP) 2000 (Reference 2) applies to the site, and as such, the associated Warringah Development Control Plan (DCP) 2000

(Reference 3) also applies. The Warringah DCP 2000 does not contain any flood-related development controls. The overarching LEP contains flood-related directives (Clause 47), including the following:

Development on flood affected land is to be sited and designed to minimise the impacts of flooding on property and have regard to the existing flood regime.

In particular –

- *Development is not to reduce flood storage area or impact upon the existing flood regime,*
- *Habitable floor areas of buildings are to be at a level of at least 500 mm above the 1% annual exceedance probability flood level, and*
- *Buildings or works affected by flooding are to be constructed of flood compatible building materials.*

For the purposes of this clause, flood affected land means land below the 1 per cent annual exceedance probability flood level.

WMAwater understands that as per Council's RFI (Attachment A), an assessment against the floor level matrix contained in Warringah DCP 2011 (Reference 4) has been requested, although it does not strictly apply to the site. However, it is noted that the general directives of the LEP 2000 are accounted for in the Warringah DCP 2011. This includes consideration of flood impacts (part 'A' controls), building materials (part 'B' controls) and floor levels 500 mm above the 1% AEP flood level (part 'C' controls). Accordingly, the flood assessment has been undertaken applying the Warringah DCP 2011 flood-related development controls. This will cover the directives of the applicable Warringah LEP 2000 and address Council's RFI, including consideration of floor levels C2 of the Warringah DCP 2011's medium flood risk precinct matrix in line with Council's RFI. It is acknowledged that the Warringah DCP 2011 contains additional controls that do not technically apply to the site, including consideration of emergency response (part 'E' controls) and storage of goods (part 'G' controls). These controls have been assessed in this report for completeness.

The Warringah DCP 2011 (Reference 4) specifies the following prescriptive controls for a Medium Flood Risk Precinct:

		Medium Flood Risk Precinct				
		Vulnerable & Critical Use	Residential Use	Business & Industrial Use	Recreational & Environmental Use	Subdivision & Civil Works
A	Flood effects caused by Development	A1 A2	A1 A2	A1 A2	A1 A2	A1 A2
B	Building Components & Structural	B1 B2 B3	B1 B2 B3	B1 B2 B3	B1 B2 B3	
C	Floor Levels	C2 C3	C1 C3 C4 C6	C1 C3 C4 C6 C7	C3	C5
D	Car Parking	D1 D2 D3 D4 D7	D1 D2 D3 D4 D5 D6	D1 D2 D3 D4 D5 D6	D1 D2 D3 D4 D5 D6	D1
E	Emergency Response	E1 E2	E1	E1	E1	E3
F	Fencing	F1	F1	F1	F1	F1
G	Storage of Goods	G1	G1	G1	G1	
H	Pools	H1	H1	H1	H1	H1

The proposed development is classified as a 'Vulnerable and Critical' use, as it is an educational establishment. Each of the applicable categories are addressed in detail in the following sections.

3.2. Flood Effects Caused by Development

The Warringah DCP specifies the following controls for vulnerable or critical facility in a Medium Flood Risk Precinct:

A1	<p>Development shall not be approved unless it can be demonstrated in a Flood Management Report that it has been designed and can be constructed so that in all events up to the 1% AEP event:</p> <ul style="list-style-type: none"> (a) There are no adverse impacts on flood levels or velocities caused by alterations to the flood conveyance; and (b) There are no adverse impacts on surrounding properties; and (c) It is sited to minimise exposure to flood hazard. <p>Major developments and developments likely to have a significant impact on the PMF flood regime will need to demonstrate that there are no adverse impacts in the Probable Maximum Flood.</p>
A2	<p>Development shall not be approved unless it can be demonstrated in a Flood Management Report that in all events up to the 1% AEP event there is no net loss of flood storage.</p> <p>Consideration may be given for exempting the volume of standard piers from flood storage calculations.</p> <p>If Compensatory Works are proposed to balance the loss of flood storage from the development, the Flood Management Report shall include detailed calculations to demonstrate how this is achieved.</p>

The proposed development consists of demolition (or partial demolition) of the existing Block D and Staff centre and construction of a new building. The new building maintains a very similar footprint to the two existing buildings, however, a single building will span the site of the existing two buildings. This means that a minor flow path between the two existing buildings will be cut off, diverting water further to the east, toward the Basketball Court and Block H.

In order to assess the potential flood impacts of the proposed development, the proposed building was added to the model as a solid obstruction to flow (consistent with the representation of existing buildings) and the model was run for the 1% AEP and PMF events. The results are shown in Figure 7 and Figure 8, respectively. The figures indicate that the flow path between the building no longer exists, and there is a slight re-distribution of flows around the new building. The change in peak flood level is minor within the site and there are no adverse off-site impacts.

The assessment undertaken meets the requirements of A1 and A2.

3.3. Building Components and Structural Soundness

The Warringah DCP specifies the following controls for a vulnerable or critical facility in a Medium Flood Risk Precinct:

B1	All buildings shall be designed and constructed with flood compatible materials in accordance with “Reducing Vulnerability of Buildings to Flood Damage: Guidance on Building in Flood Prone Areas”, Hawkesbury-Nepean Floodplain Management Steering Committee (2006).
B2	All new development must be designed and constructed to ensure structural integrity up to the Flood Planning Level, taking into account the forces of floodwater, wave action, flowing water with debris, buoyancy and immersion. Where shelter-in-place refuge is required, the structural integrity for the refuge is to be up to the Probable Maximum Flood level. Structural certification shall be provided confirming the above.
B3	All new electrical equipment, power points, wiring, fuel lines, sewerage systems or any other service pipes and connections must be waterproofed and/or located above the Flood Planning Level. All existing electrical equipment and power points located below the Flood Planning Level within the subject structure must have residual current devices installed that turn off all electricity supply to the property when flood waters are detected.

The new building should be constructed with flood-compatible materials and be able to withstand the forces of floodwater (requirements B1 and B2). All new electrical equipment should be installed above the FPL (159.1 mAHD) or waterproofed (requirement B3). Compliance with building components and structural soundness has not been assessed in this report.

3.4. Floor Level Requirements

The Warringah DCP specifies the following controls for a vulnerable or critical facility in a Medium Flood Risk Precinct:

C2	All floor levels within the development shall be at or above the Probable Maximum Flood level or Flood Planning Level, whichever is higher.
C3	<p>All new development must be designed and constructed so as not to impede the floodway or flood conveyance on the site, as well as ensuring no net loss of flood storage in all events up to the 1% AEP event.</p> <p>For suspended pier/pile footings:</p> <p>(a) The underfloor area of the dwelling below the 1% AEP flood level is to be designed and constructed to allow clear passage of floodwaters, taking into account the potential for small openings to block; and</p>

	<p>(b) At least 50% of the perimeter of the underfloor area is of an open design from the natural ground level up to the 1% AEP flood level; and</p> <p>(c) No solid areas of the perimeter of the underfloor area would be permitted in a floodway</p>
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Minimum floor levels should be at the flood planning level (FPL, 1% AEP flood level + 0.5 m) or the PMF level, whichever is higher, in accordance with requirement C2. The PMF level is 159.02 mAHD and the FPL is 159.08 mAHD on the upstream side of the building (as provided in Table 1). While these levels are very similar, it is the FPL that sets the requirement for minimum floor levels at 159.08 mAHD.

The finished ground floor level of the proposed building is primarily at 158.43 mAHD. This is for the existing floor level at the southern end of the building (that is to be retained), and the new slab that is to be constructed in the central portion of the building. The existing floor level at the northern end of the building is lower, at 156.84 mAHD, and will be retained for the proposed building. These levels do not meet the required minimum levels.

Since the proposed building floor levels do not meet the required minimum floor levels, the following additional information is provided for Council's consideration:

- The proposed floor level for the southern portion of the building is consistent with the existing ground floor level of Block D (158.43 mAHD). The proposed floor level for the northern portion of the building is consistent with the existing ground floor level of Block D (156.84 mAHD). The flood risk at the building would remain the same as the existing conditions. These existing floor levels are shown in the floor level markup (Attachment C).
- The proposed floor level at the centre of the building is a new slab connecting the southern and northern portions of the existing Block D slabs. This new slab also follows through to the eastern portion of the building (existing Staff Centre building). The slab level sits at the same level as the southern portion of the building, at 158.43 mAHD. This is approximately 0.7 m higher than the existing Staff Centre floor level (157.76 mAHD). The flood risk is reduced through the new development, incorporating the staff centre into the new library building. The new floor levels are shown in the floor level markup (Attachment C).
- The proposed ground floor levels are consistent with the surrounding buildings. The adjacent Block C and Block E building floor levels are at 158.42 mAHD, and the proposed library floor is essentially the same at 158.43 mAHD. The proposed floor level provides continuity and consistency with surrounding buildings.
- It is understood that these ground floor levels are also required to provide a first floor level that is consistent with surrounding buildings, since connections to adjacent buildings will be provided for the first floor.
- The proposed floor levels provide accessibility from the existing ground levels and pathways surrounding the building. Raising floor levels by approximately 0.6 m to meet the FPL would be difficult to achieve and introduce accessibility issues.
- The flood risk at the building in a 1% AEP event is considered to be minor, with flood depths being approximately 0.2 m at the upstream (southern) end of the building, and reducing to approximately 0.1 m around the building. An assessment of entry points and potential for flood inundation is as follows (refer Figure 9):
 1. This is the main entry into the library. In general, overland flow that makes its way through the gap between the new building and Block E will generally flow to the east, toward the basketball court. This overland flow path is shown in the stormwater plans (Attachment C), and shown in the 3D visualisation in Diagram 3.



Diagram 3: Overland flow path at the new library entrance (drawing DA-03)

Specific details of the proposed landscaping in this area are not included in the TUFLOW model, however, it still demonstrates this movement of shallow flow toward the basketball court with the existing pathways. The 1% AEP peak flood level for the proposed case near the main library entrance is approximately 158.3 mAHD. The flood level is at least 0.1 m lower than the finished floor level, indicating it is unlikely to be inundated in the 1% AEP event.

2. Entrance 2 is an existing entrance located on the southern side of Block D. It is proposed to remove this entrance. This is important as the primary risk of inundation is from overland flows from the south. The southern side is where overland flows arrive and pond on the upstream side. An opening on this side could potentially allow water to flow directly into the building. The removal of this entrance means that this mechanism of inundation and the associated flood risk is removed with the proposed development.
3. Entrance 3 is on the western side of the building, in a narrow corridor between the proposed building and Block C. Overland flow is present in the 1% AEP event, flowing to the north. While the corridor remains fairly flat, there is still a floor gradient that drives flow to the north. The 1% AEP peak flood level is approximately 0.1 m higher than the ground floor level, indicating that it would likely be inundated. However, given the presence of doors and the floor area of the new building, it is unlikely that this water would inundate the entire floor to a depth of 0.1 m. Due to the flood gradient and momentum of water, it would have a preferential path to continue to the north, rather than flow east and through the proposed doorway. Water is likely to leak around the door frame, but unlikely to cause any sufficient inundation within the building in a 1% AEP event. This is also considering the short duration storm that produces these peak flows and levels (20 minute storm is the adopted design storm duration).

4. There are three entrances proposed at this location. Water that flows down the corridor on the western side of the proposed building may enter the stairs at the end of the corridor that descend to the level of the northern portion of the proposed building. This would then have the ability to enter the building. It is expected that in the 1% AEP event, it would only be shallow flows along the corridor to the west, and as described for entrance 3, the momentum of the water would be to continue to the north. This would limit the amount of water than may enter the stairway. Once water is on the pathway at the northern side of the building, an existing retaining wall would direct flow to the east. It is in this location that the proposed building floor levels may be inundated, albeit by shallow flows. Beyond this retaining wall, water would continue to the north (downhill). It is expected that any inundation of these floors would be minor.
 5. There are two proposed entrances at this location, however, the landing rises above the ground level at the northern side of the building such that inundation of this area would not be possible from overland flows.
- The flood risk at the building in a PMF event is considered to be moderate, with flood depths being approximately 0.5 m – 0.6 m around the building, triggering H3 hazard. Further discussion of emergency management up to the PMF event is provided in Section 3.5.

For item C3, the proposed building will block a minor flow path on site. It was demonstrated in Section 3.2 that this has a negligible impact on flood behaviour at the site.

3.5. Emergency Management

The Warringah DCP specifies the following controls for a vulnerable or critical facility in a Medium Flood Risk Precinct:

E1	<p>If the property is affected by a Flood Life Hazard Category of H3 or higher, then Control E1 applies and a Flood Emergency Assessment must be included in the Flood Management Report.</p> <p>If the property is affected by a Flood Life Hazard Category of H6, then development is not permitted unless it can be demonstrated to the satisfaction of the consent authority that the risk level on the property is or can be reduced to a level below H6 or its equivalent.</p> <p>If the property is flood affected but the Flood Life Hazard Category has not been mapped by Council, then calculations for its determination must be shown in the Flood Management Report, in accordance with the "Technical Flood Risk Management Guideline: Flood Hazard", Australian Institute for Disaster Resilience (2012).</p> <p>Where flood-free evacuation above the Probable Maximum Flood level is not possible, new development must provide a shelter-in-place refuge where:</p> <ol style="list-style-type: none"> a) The floor level is at or above the Probable Maximum Flood level; and b) The floor space provides at least 2m² per person where the flood duration is long (6 or more hours) in the Probable Maximum Flood event, or 1m² per person for less than 6 hours; c) It is intrinsically accessible to all people on the site, plainly evident, and self-directing, with sufficient capacity of access routes for all occupants without reliance on an elevator; and d) It must contain as a minimum: sufficient clean water for all occupants; portable radio with spare batteries; torch with spare batteries; and a first aid kit <p>Class 10 classified buildings and structures (as defined in the Building Codes of Australia) are excluded from this control.</p> <p>In the case of change of use or internal alterations to an existing building, a variation to this control may be considered if justified appropriately by a suitably qualified professional.</p>
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	Note that in the event of a flood, occupants would be required to evacuate if ordered by Emergency Services personnel regardless of the availability of a shelter-in-place refuge.
E2	If a shelter-in-place refuge is required, it must contain as a minimum: sufficient clean water for all occupants; portable radio with spare batteries; torch with spare batteries; a first aid kit; emergency power; and a practical means of medical evacuation.

The flood hazard around the building just reaches H3 as flood depths are just over 0.5 m deep in the PMF event. This may also be the potential hazard within the building in a PMF event. Given the quick response time of the catchment, it is considered that there may not be enough warning time to evacuate the building. It is likely that evacuation would only be enacted once overland flows begin to enter the ground floor of the building. By this time, the pathways surrounding the building on the ground floor may not be accessible, particularly to the south and west of the building. Paths to the east and north may be accessible as these are subject to H1 hazard only. The following emergency management actions are recommended:

- In the event of a flood, the following evacuation should take place:
 - The ground floor of the main library should be evacuated to the first floor. This will be a flood-free refuge with enough space for all occupants. This is considered an appropriate flood refuge space.
 - For those small rooms on the northern side of the building, the main building ground floor (and hence the first floor as well) may not be accessible (depending on inundation of the ground floor). It is recommended that evacuation away from the building to the north take place, where there are only shallow overland flows (H1 hazard). From here other buildings are accessible and flood-free ground.
- The first floor of the building is considered a suitable flood refuge, given the likely short duration of flooding. If evacuation from the building is required (for example a medical emergency), a raised walkway from the first floor to the main carpark is available. The carpark is subject to H1 hazard. High velocities on Dell Street trigger H5 hazard and may limit the trafficability of the road, however, pedestrian access to other areas from the carpark is likely, including flood-free land on the western side of the site. It is noted that building C and E are also accessible on the upper levels, providing additional options for refuge and escape.
- A Flood Emergency Management Plan should be produced and incorporated into the school's wider emergency management protocols.

This meets the requirements of E1. It is envisaged that requirement E2 would readily be satisfied.

3.6. Storage of Goods

The Warringah DCP specifies the following controls for a vulnerable or critical facility in a Medium Flood Risk Precinct:

G1	Hazardous or potentially polluting materials shall not be stored below the Flood Planning Level unless adequately protected from floodwaters in accordance with industry standards.
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There should be no storage of hazardous or potentially polluting materials below the FPL (159.1 mAHD). Given the proposed use as a library and staff centre, it is anticipated that there would not be any hazardous or potentially polluting materials in the facility. If there are any materials of that nature, they should be stored above the FPL (159.1 mAHD).

4. SUMMARY AND CONCLUSIONS

A flood assessment for the proposed new library building on the Covenant Christian School site was undertaken. The development consists partial demolition of the existing Block D building and Staff building, and the construction of a new building. The site is subject to overland flooding from Dell Street.

The proposed building will occupy a very similar footprint to the existing buildings, except there will be no overland flow path where the existing path between Block D and the Staff building currently is. This has no adverse impact on flood behaviour.

The proposed building will have a ground floor level consistent with the Block D building floor level (since the slab will be partially retained). This does not meet the minimal floor level requirements. However, the proposed floor level is considered reasonable given the existing building floor level, the surrounding building floor levels and the need to maintain connectivity and accessibility. It is understood, however, that there will be a residual flood risk to the ground floor. This is proposed to be mitigated by providing evacuation access to flood free areas (to the north of the building or upper levels).

The proposal was assessed against the flood-related development requirements from the Warringah Development Control Plan 2011. A summary of the assessment is provided in Table 2.

Table 2: Summary of DCP compliance

	Compliance		
	N/A	Yes	No
A) Flood effects caused by Development		✓	
B) Building Components & Structural Soundness		✓ (1)	
C) Floor Levels			✓ (2)
D) Car parking	✓		
E) Emergency Management		✓ (3)	
F) Fencing	✓		
G) Storage of Goods		✓ (4)	
H) Pools	✓		

1. It will be necessary to construct the portion of the development below the FPL (159.1 mAHD) using flood compatible materials (as per requirement B1), and with no electrical equipment below this level.
2. The proposed ground floor level allows for consistency and accessibility with surrounding buildings. It is proposed to manage the residual flood risk through adequate emergency management.
3. This can be achieved in principle. It is recommended that a Flood Emergency Management Plan be produced to ensure that a practical and reasonable plan is enacted in the event of flooding. This should be consistent with, and incorporated into the school's existing emergency management plans.
4. It will be necessary to ensure that no hazardous or potentially polluting materials be stored below the FPL (159.1 mAHD).

WMAwater considers that the proposal is compliant with the relevant flood-related development controls, with the exception of the proposed ground floor level. It is not considered practical to raise the ground floor to the FPL, given the existing surrounding development. It is considered that the residual risk can be managed with an appropriate emergency management plan.

5. REFERENCES

1. WMAwater
Middle Harbour Flood Study – Draft Stage 3 Report
Northern Beaches Council, July 2023.
2. Northern Beaches Council
Warringah Local Environmental Plan 2000
3. Northern Beaches Council
Warringah Development Control Plan 2000
Amendment 4, Effective 1 December 2019.
4. Northern Beaches Council
Warringah Development Control Plan 2011
<https://eservices.northernbeaches.nsw.gov.au/ePlanning/live/pages/plan/book.aspx?exhibit=DCP>
Accessed online, December 2023.
5. Australian Institute for Disaster Resilience
Guideline 7-3 Flood Hazard
Supporting document for Handbook 7 Managing the Floodplain: A Guide to Best Practice in Flood Risk Management in Australia
Australian Government, 2017

Please do not hesitate to contact the undersigned for clarification of this assessment.

Yours Sincerely,

WMAwater

A handwritten signature in black ink, appearing to read "Reeves".

Michael Reeves

Principal

Figures

Figure 1: Site Location

Figure 2: Site Topography

Figure 3: Peak Flood Depths and Levels – Existing Conditions 1% AEP Event

Figure 4: Peak Flood Depths and Levels – Existing Conditions PMF Event

Figure 5: Peak Flood Hazard – Existing Conditions 1% AEP Event

Figure 6: Peak Flood Hazard – Existing Conditions PMF Event

Figure 7: Flood Impact – Proposed Conditions 1% AEP Event

Figure 8: Flood Impact – Proposed Conditions PMF Event

Figure 9: Entry points analysis

Attachments

Attachment A: Council Request for Information for DA2023/0714 (25 September 2023)

Attachment B: Existing site survey for Block D (3 March 2023)

Attachment C: Proposed development plans for Library Building (site analysis, site works, demolition plans and ground floor plan)



FIGURE 1
COVENANT CHRISTIAN SCHOOL
SITE LOCATION



FIGURE 2
COVENANT CHRISTIAN SCHOOL
TOPOGRAPHY

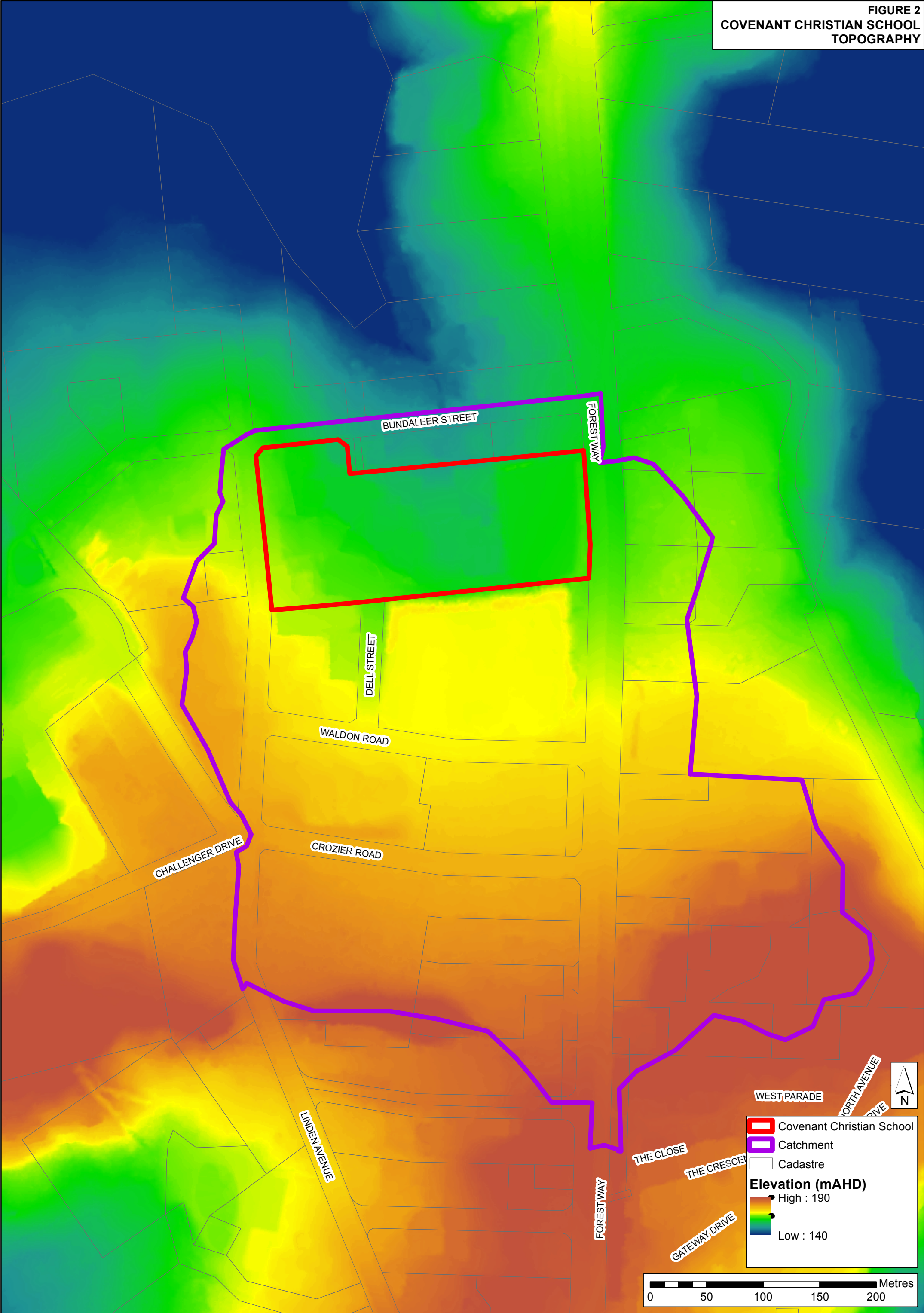


FIGURE 3
COVENANT CHRISTIAN SCHOOL
PEAK FLOOD DEPTH AND LEVEL CONTOURS
1% AEP EVENT EXISTING CONDITIONS

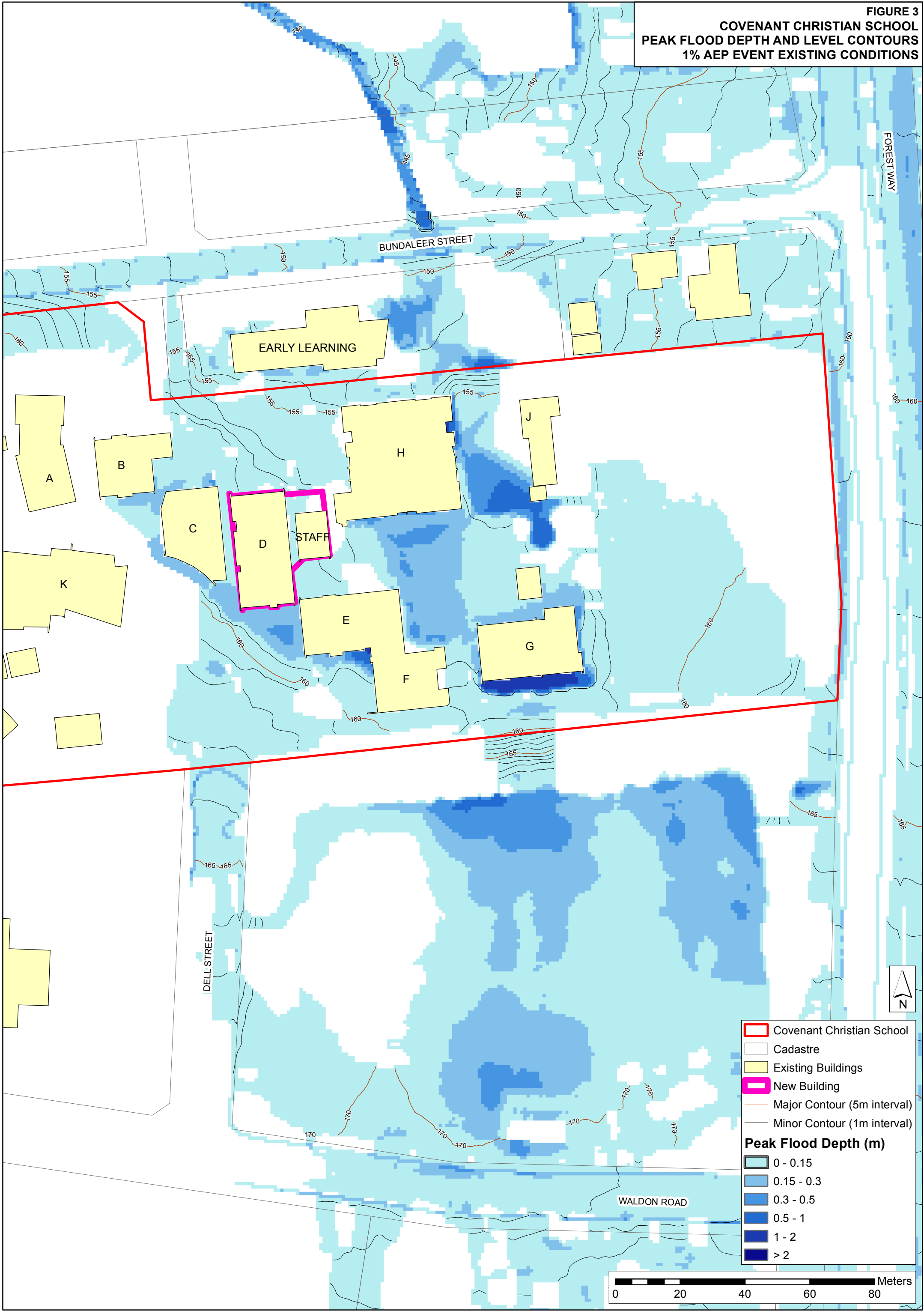


FIGURE 4
COVENANT CHRISTIAN SCHOOL
PEAK FLOOD DEPTH AND LEVEL CONTOURS
PMF EVENT EXISTING CONDITIONS

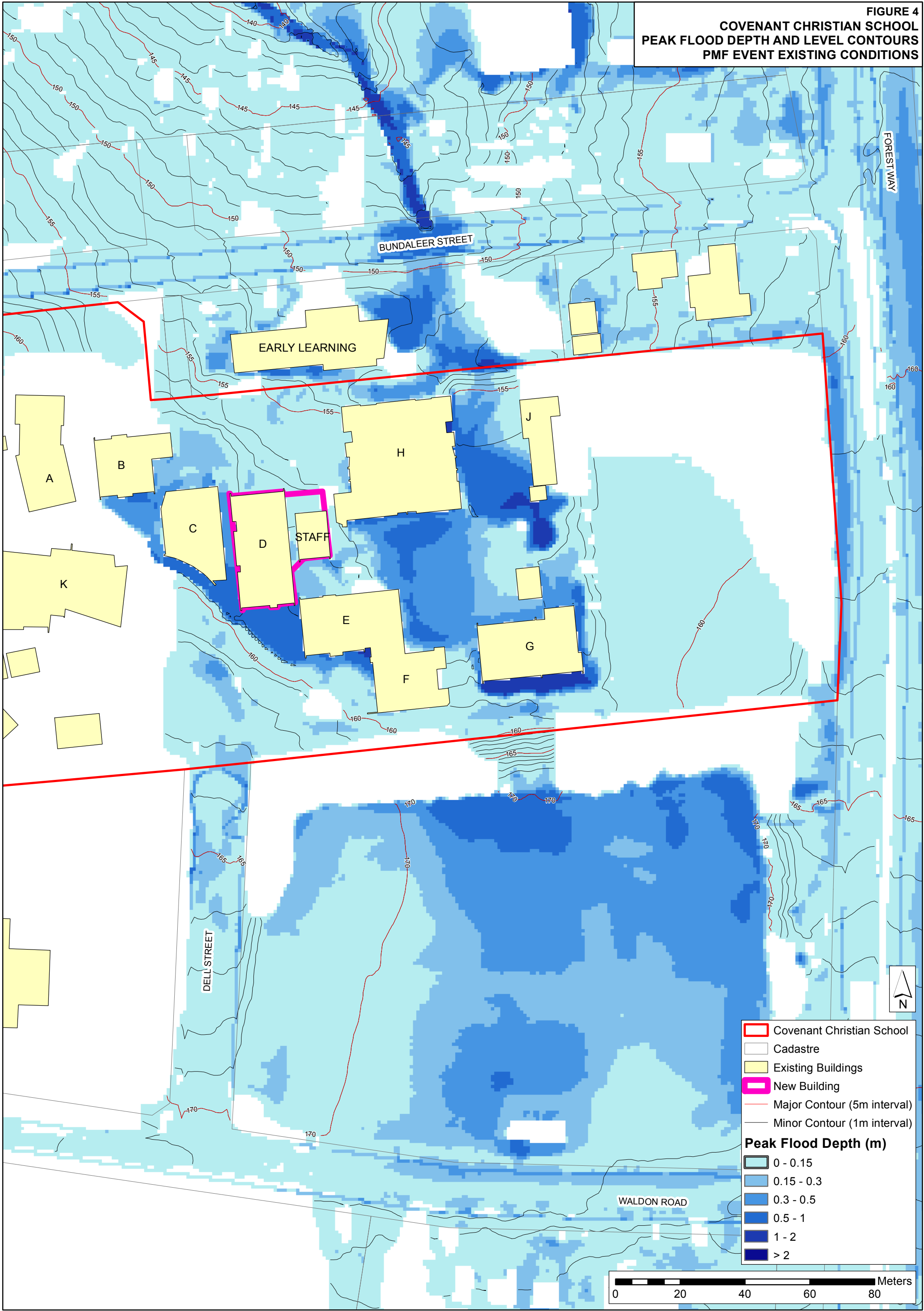


FIGURE 5
COVENANT CHRISTIAN SCHOOL
PEAK HYDRAULIC HAZARD
1% AEP EVENT EXISTING CONDITIONS

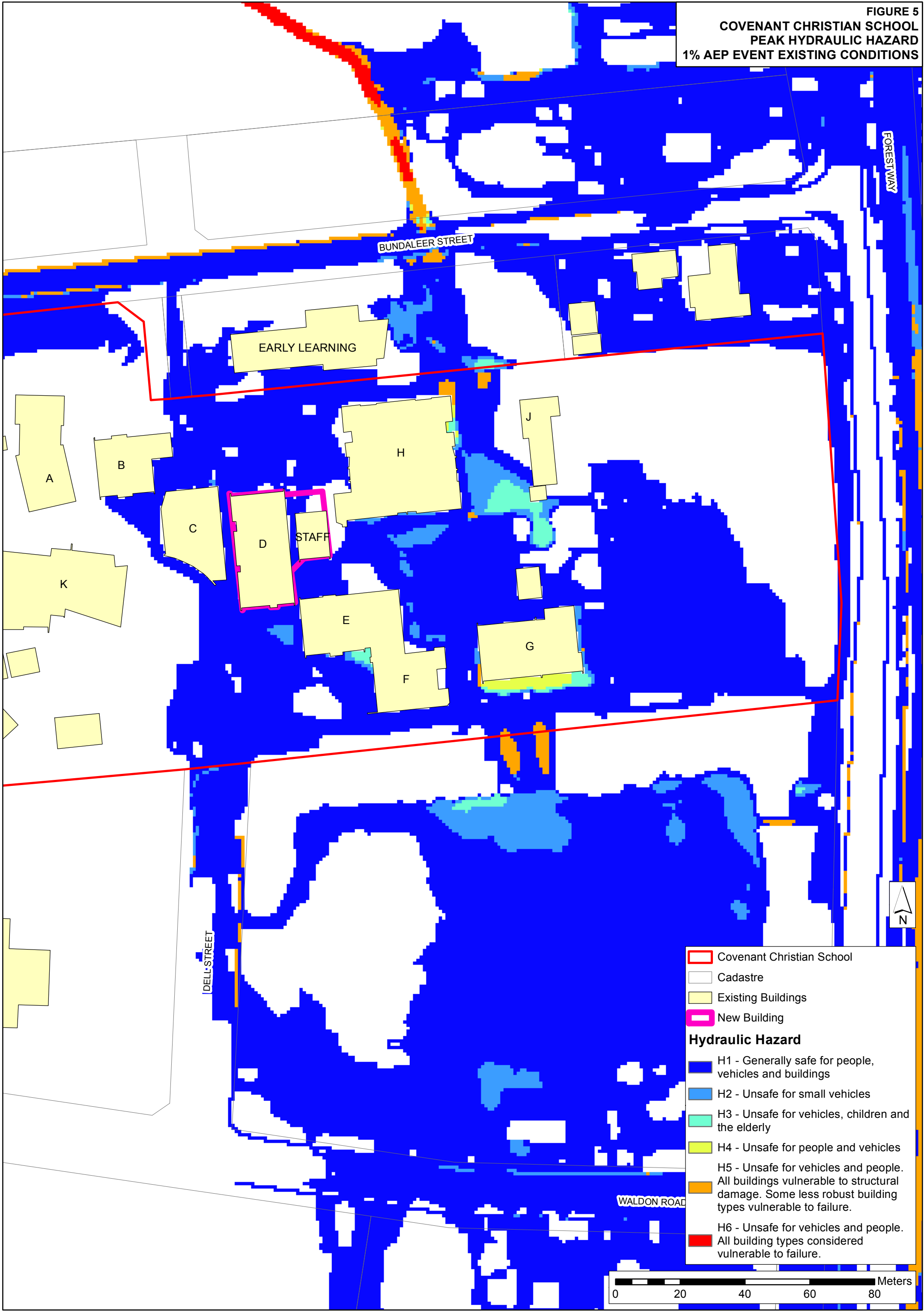


FIGURE 6
COVENANT CHRISTIAN SCHOOL
PEAK HYDRAULIC HAZARD
PMF EVENT EXISTING CONDITIONS

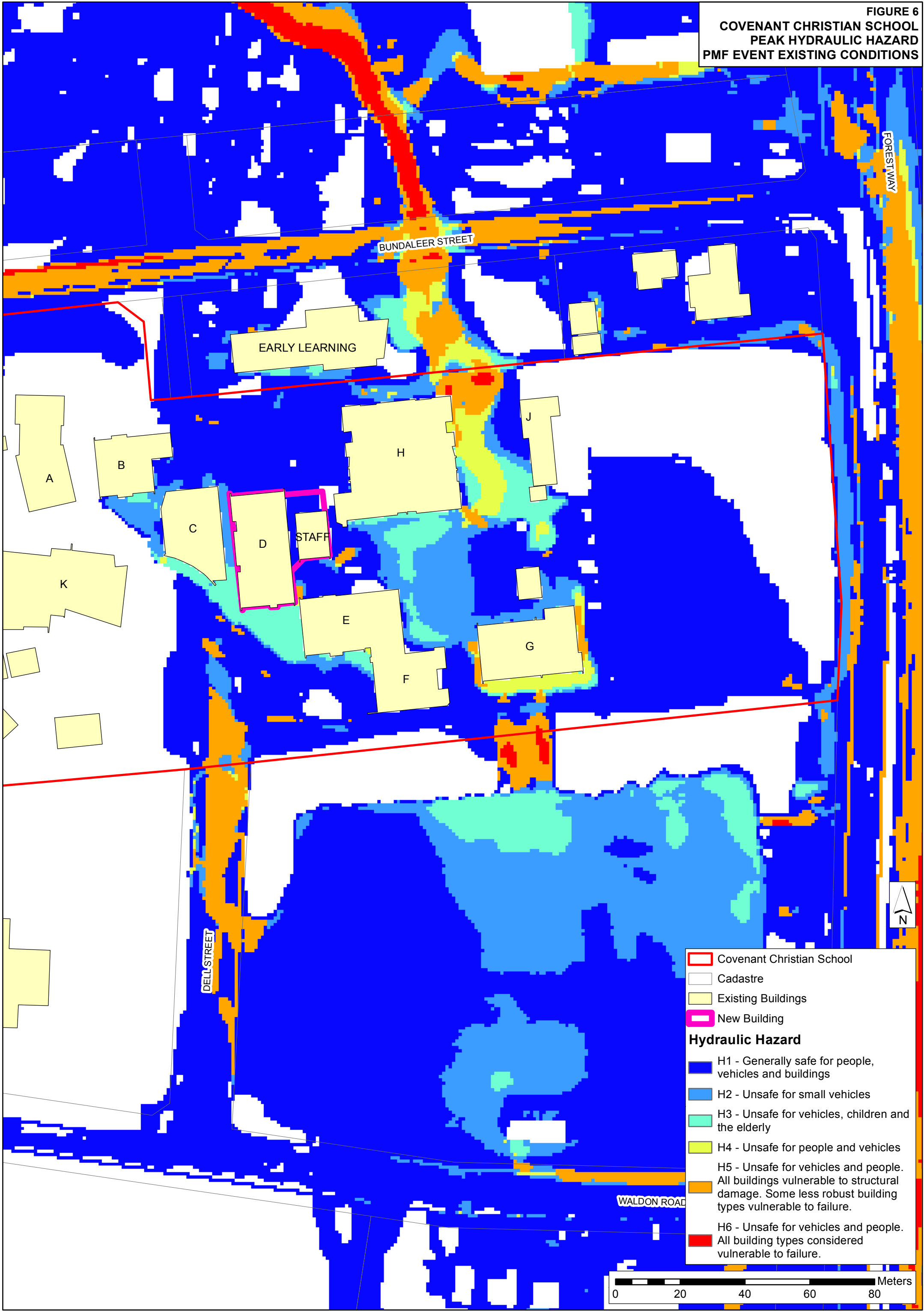


FIGURE 7
COVENANT CHRISTIAN SCHOOL
CHANGE IN PEAK FLOOD LEVEL
1% AEP EVENT

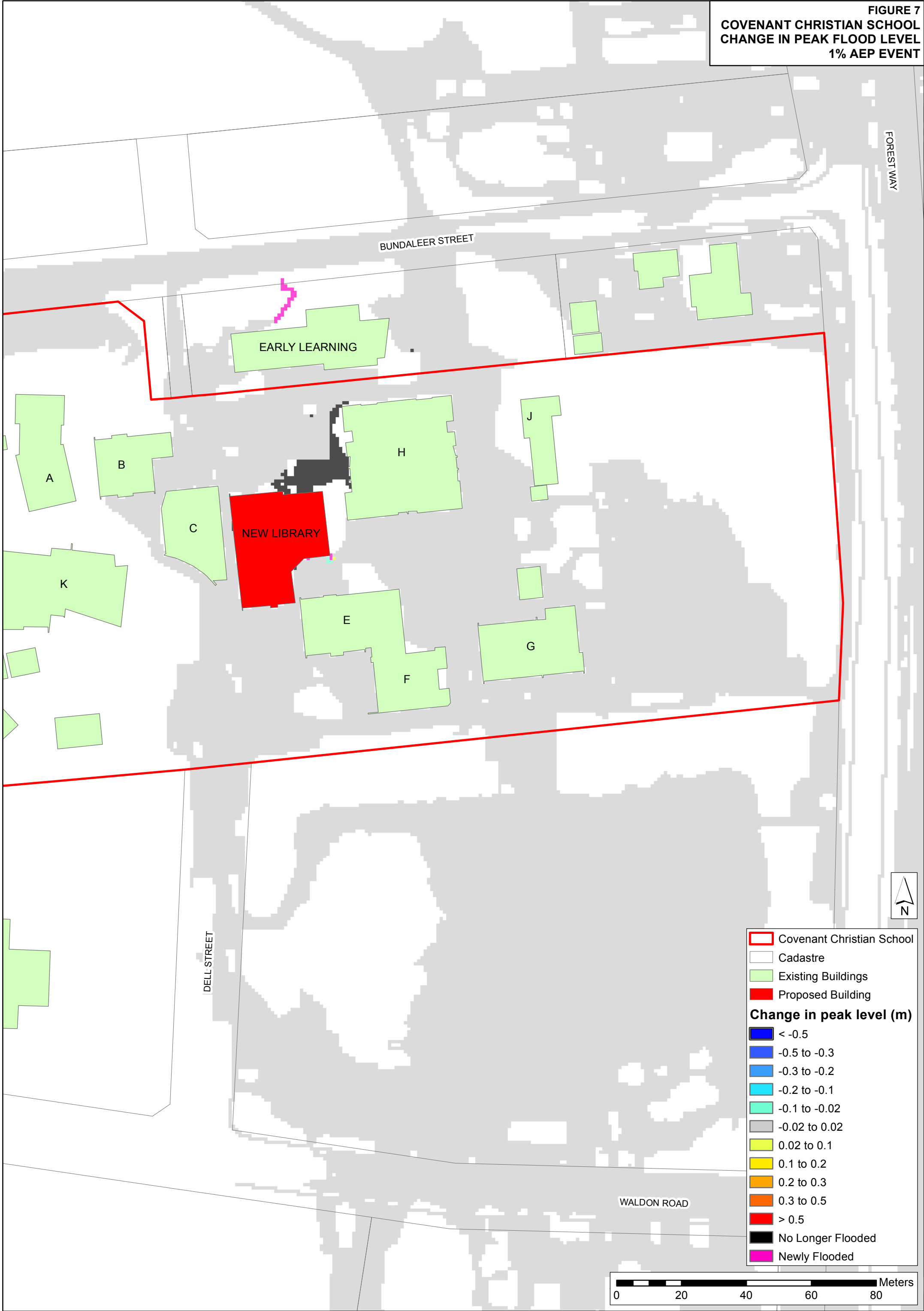


FIGURE 8
COVENANT CHRISTIAN SCHOOL
CHANGE IN PEAK FLOOD LEVEL
PMF EVENT

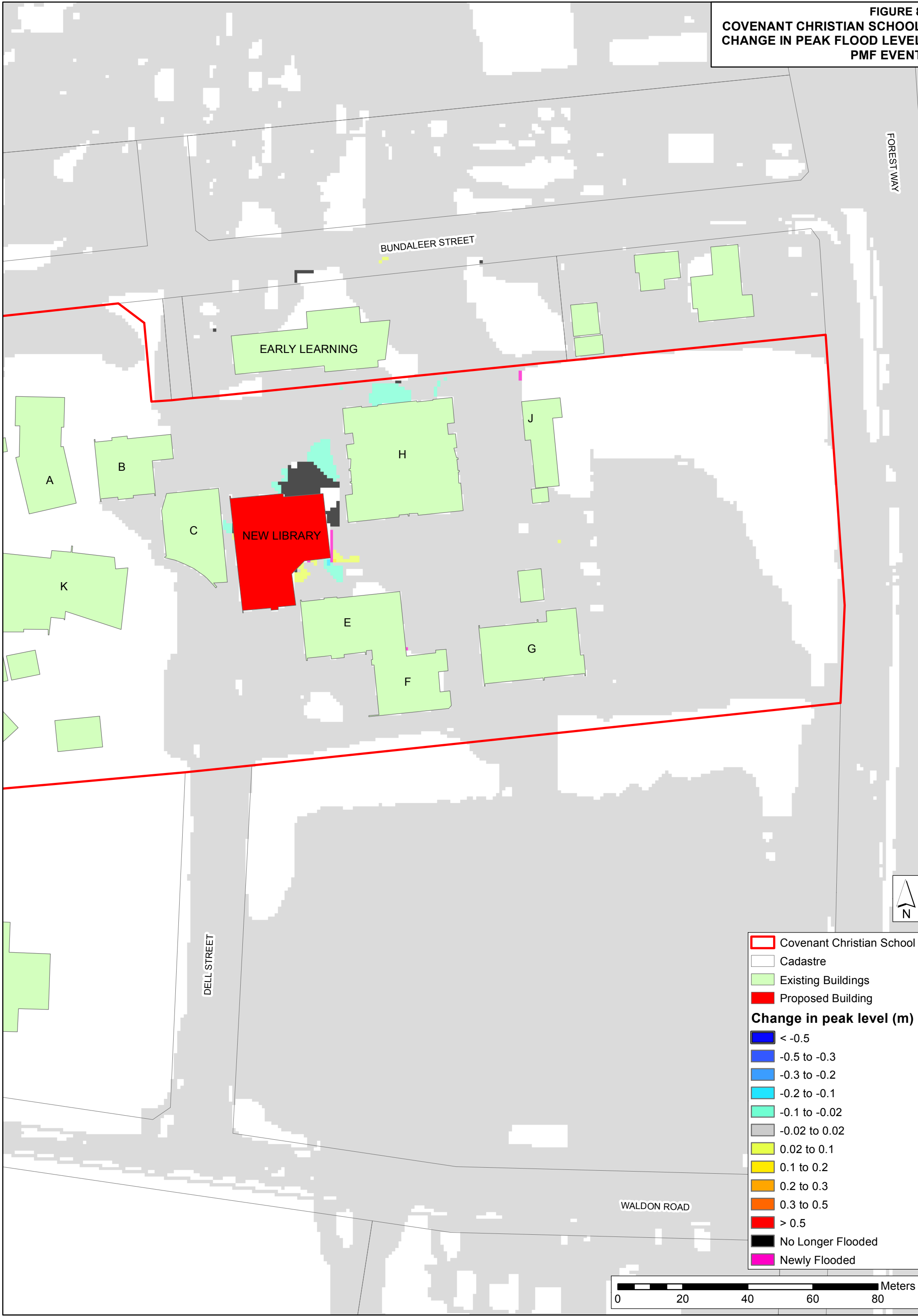
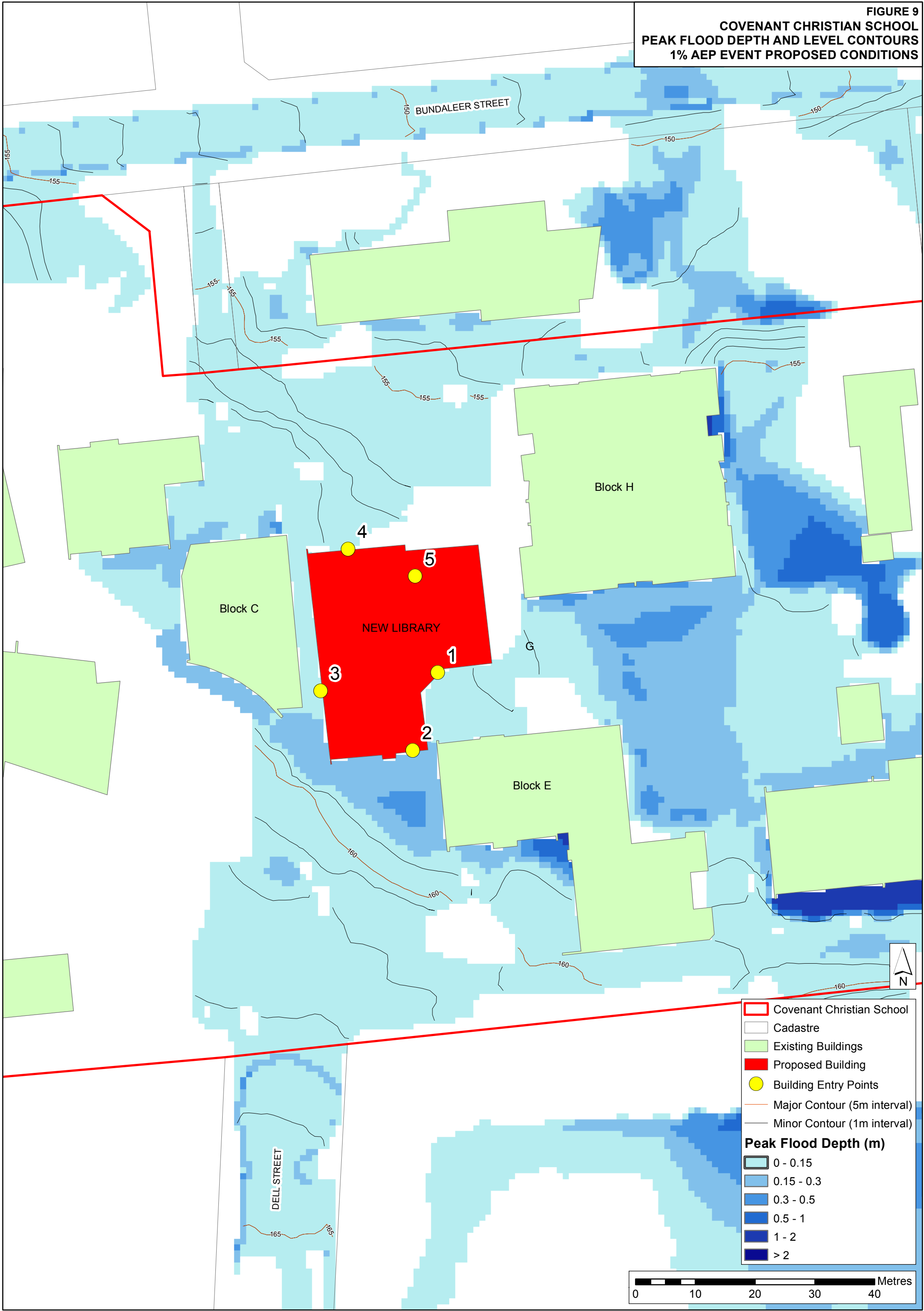


FIGURE 9
COVENANT CHRISTIAN SCHOOL
PEAK FLOOD DEPTH AND LEVEL CONTOURS
1% AEP EVENT PROPOSED CONDITIONS





25 September 2023



Covenant Christian School Association Ltd
13/67 Albert Street
CHATSWOOD NSW 2067

Attention: Isaac Clayton – iclayton@epmprojects.com.au

Dear Sir,

Development Application No: DA2023/0714 for Demolition works and alterations and additions to the Covenant Christian School at 212 Forest Way BELROSE.

I refer to your development application (DA) which is under assessment by Council.

The assessment of your application has revealed issues, which prevent Council from supporting the proposal in its current form.

The following is a list of the issues identified:

1. Warringah LEP 2000

The proposal is a Category 3 development and will be subject to an "Independent Hearing" pursuant to *Warringah Local Environmental Plan 2000* (LEP 2000). The LEP requires that Category 3 uses specifically address Schedule 15 clauses 1 to 8, in being part of the Belrose North Locality. These details may be submitted as a supplement to the current SEE.

Also, information requirements for the Architectural Plans including additional dimensions to precisely identify the exceedance to the wall height and maximum building height (annotated on the sections / elevations) should be shown. The major setback dimensions should also be shown on the site plans to the outer boundaries of the site.

2. Landscape Details

The attrition of landscaping is a concern being a Category 3 use on such a large site and the SEE should provide an accurate calculation of the remaining landscape space. The use of textile material is understood for high traffic areas of a school so opportunities to use appropriately placed or suitable trees species in other areas of the site to enhance or compensate for the loss of natural landscaping. Opportunities should be pursued on site to increase the overall landscape component as part of the works. This may include new canopy trees (spaced to comply with *Planning for Bushfire Protection*), as per the *NSW Rural Fire Service* referral response dated 13.7.2023. The Landscape plan should also overlay the IPA/OPA details.

3. Overland flow study

The application for a new library building is not supported as the land has been identified as being affected by overland flow in a 1 /100 AEP storm event.



A flood/overland study prepared by a NER qualified hydraulic /civil engineer to identify the flood extents up to the PMF event. The flood/overland study is to be prepared using a 2D hydraulic like 'Rafts' or 'Tu Flow' to identify the flood extents, heights and velocities. Parameters in determining the flood extents, heights and velocities are to be detailed in the flood report. Councils existing stormwater drainage system within the site is to be modelled accordingly and pit blockage factors used as prescribed in Councils *Auspec* one design document.

The report is to be prepared in accordance with "A Guide to Flood estimation of Australian Rainfall and Runoff 2019.

A *Flood Management report* is to be prepared addressing Clause 76 of Warringah LEP. The report is to determine the flood risk level and address the requirements of the matrix in particular Floor Levels C1 and C2 and flood effects caused by the development.

Council is providing you with three options to progress the handling of your application:

1. Prepare and submit further supporting information/amendments to the assessing officer directly addressing the issues by 16 October 2023 (21 days). If the amended information is deemed acceptable and satisfactorily addresses all the issues raised, you must then upload all documentation via the *NSW planning portal*; or
2. Request that the current proposal proceed to determination in its current form, which may result in refusal of the application; or
3. Withdraw the application from Council, which may include the refund of a portion of the application fees. Please note, that should this be your preferred option, Council will require additional information and will request this under separate cover.

Should you choose to amend your application, we ask that you contact the assessment officer to discuss resolution of the above issues and submission requirements. This is to ensure any amendments satisfactorily address the assessment issues, prior to further expenses and resources being spent on the application.

Should you choose to amend your plans to address the concerns above, you may also need to update your supporting documentation (eg: BASIX certificate, Bushfire Report, Geotechnical Report, etc). Please discuss this with the assessment officer to ensure the right documentation is updated.

To ensure the timely and efficient processing of your application, it is recommended that a genuine attempt is made to address these issues in their entirety as only **one** opportunity for amendments will be provided.

As per the requirements of section 36 of the *Environmental Planning and Assessment Regulation 2021* you are advised that this application was accepted on 9 June 2023.

Please advise of your selected option by responding to this letter by **3 October 2023** at council@northernbeaches.nsw.gov.au and marked to the attention of the assessment



officer. Should Council not receive your response and selected option by this date, Council will assume that you are not withdrawing this application and it will be determined in its current form.

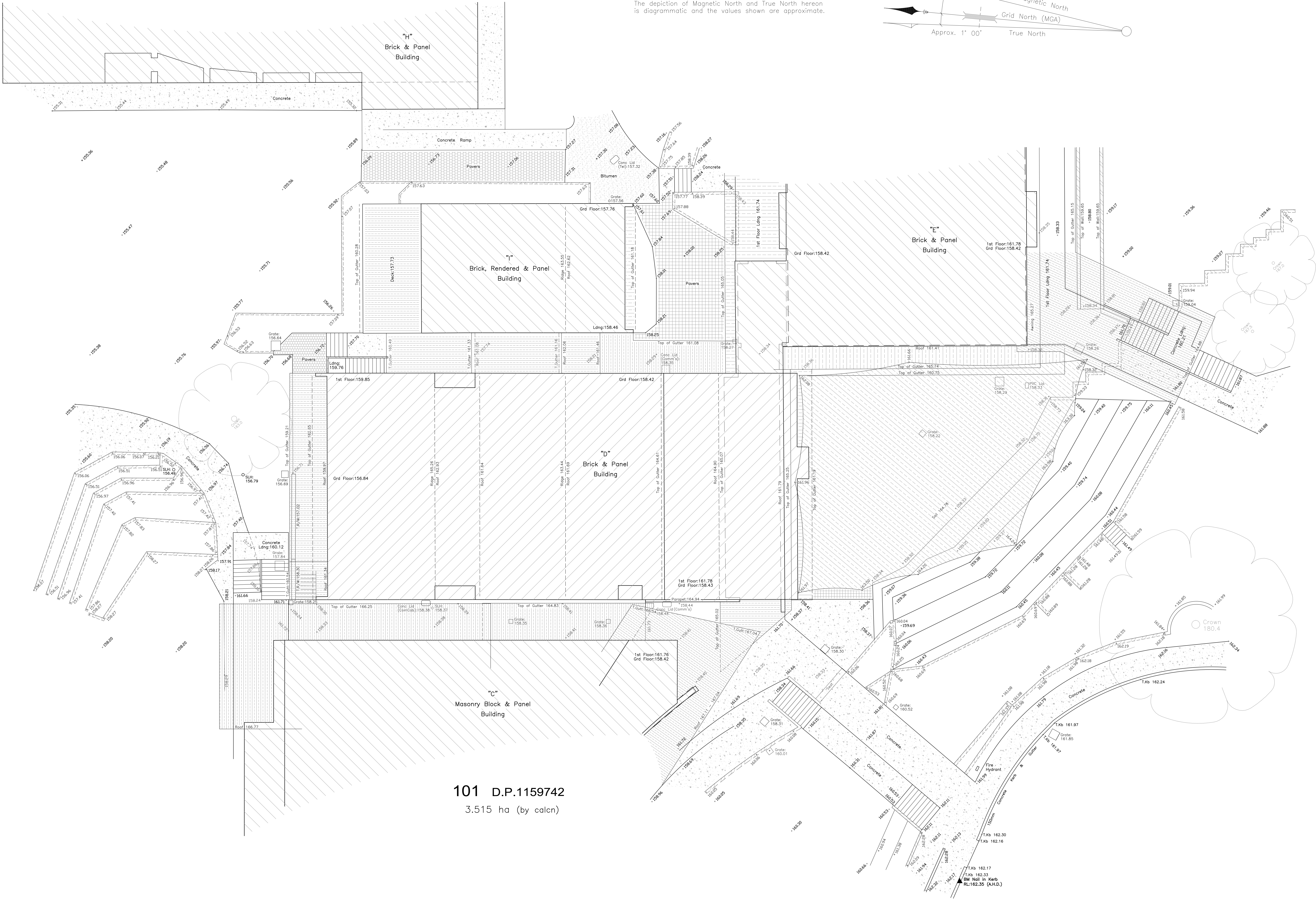
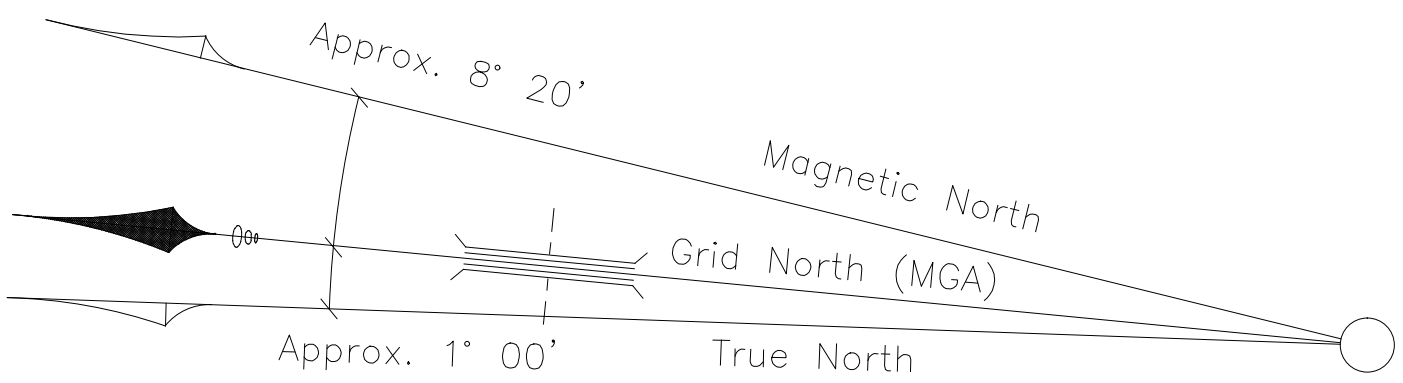
Should you wish to discuss any issues raised in this letter, please contact Alex Keller on 1300 434 434 during business hours Monday to Friday.

Yours faithfully

Alex Keller
Principal Planner



NOTE: Bearings on this plan refer to MGA Grid North and have been adopted from plans on public record with Department of Lands NSW. The depiction of Magnetic North and True North hereon is diagrammatic and the values shown are approximate.



282.51 (Title)
282.62 (Survey)
282.62 (Survey)
282.51 (Title)

DELL STREET

PLAN SHOWING SELECTED LEVELS AND DETAIL TO ACCOMPANY APPLICATION FOR PROPOSED WORKS
COVENANT CHRISTIAN SCHOOL
212 FOREST WAY, BELROSE
LOT 1 D.P.1159742
L.S.A. : WARRINGAH
Prepared for Covenant Christian School

Scale 1:100 (A0) Datum : Australian Height Datum (A.H.D.) Source : SSM 26805 (RL:158.876) S.C.I.M.S.

PAUL A. LAWSON
SURVEYOR REGISTERED UNDER THE SURVEYING AND SPATIAL INFORMATION ACT 2002
ABN : 11 717 015 476

A : 4 Loch Lamond Crescent Burraneer NSW 2230 P : 9501 5800 M : 0418 214 051 E : paul@paulalawson.com.au

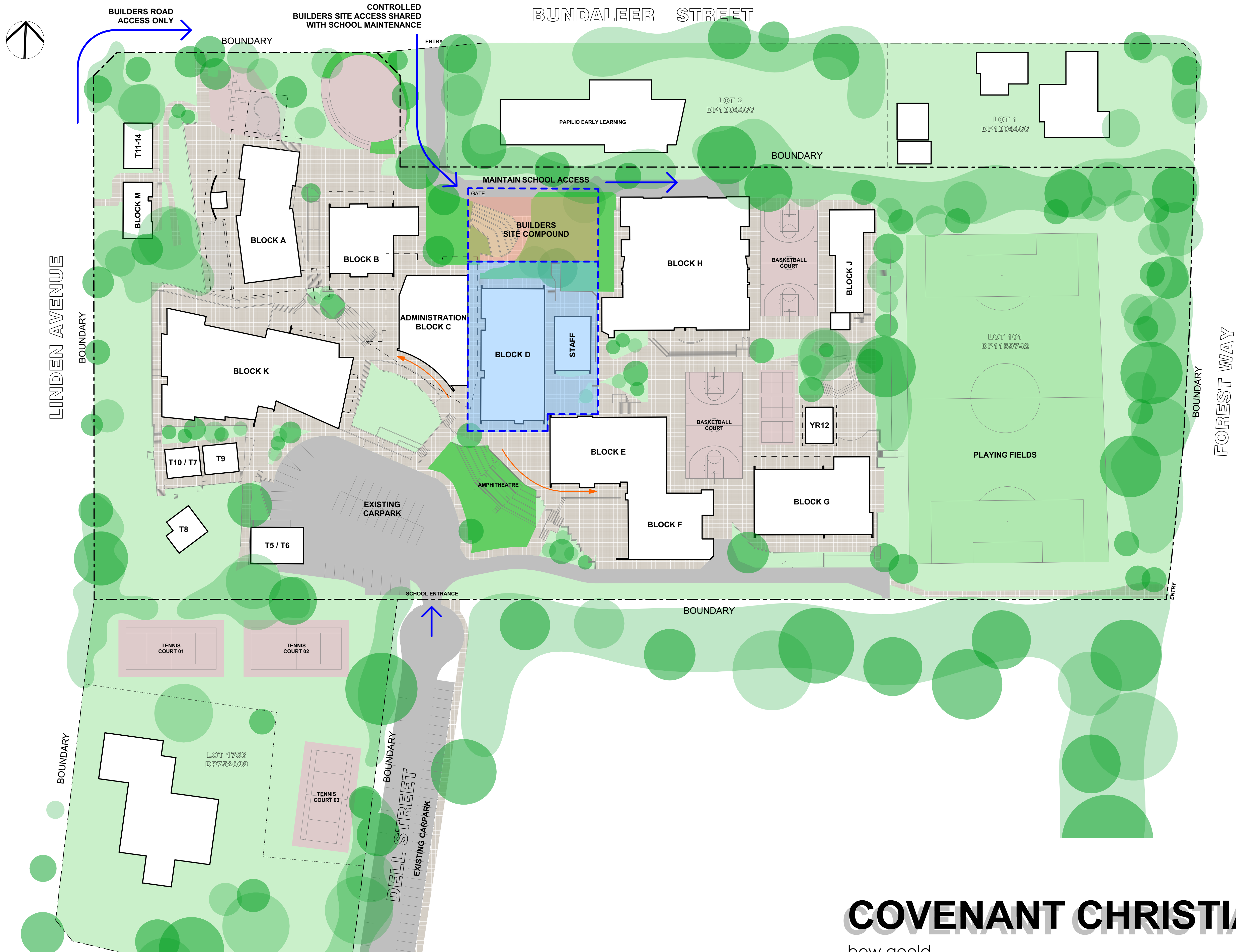
Ref : 10981/3461-23 Date : 3 March, 2023

NOTE : If it is intended to build on or near the boundaries of the property further survey should be made to mark the boundaries concerned. The boundaries of the property have been surveyed. Setbacks are shown to selected features and often to accessible portions only. Where close to boundaries caution should be taken to confirm a feature's verticality. Detail shown is diagrammatic and should not be used to determine setbacks from boundaries.

Full details of all services should be obtained from the relevant authorities prior to any demolition, excavation or construction. All distances are in metres. We warrant only the original CAD survey data as retained by this practice. Copies of this data may be corrupted through transfers or interference by others for which we take no responsibility.







- KEY**
- CONSTRUCTION SITE
 - BUILDERS SITE COMPOUND
 - CONSTRUCTION FENCE
 - SCHOOL ACCESS

FOR DA 17 MAY 2023
NOTE: ALL DRAWINGS TO BE PRINTED IN COLOUR

COVENANT CHRISTIAN SCHOOL

bow goold
architects

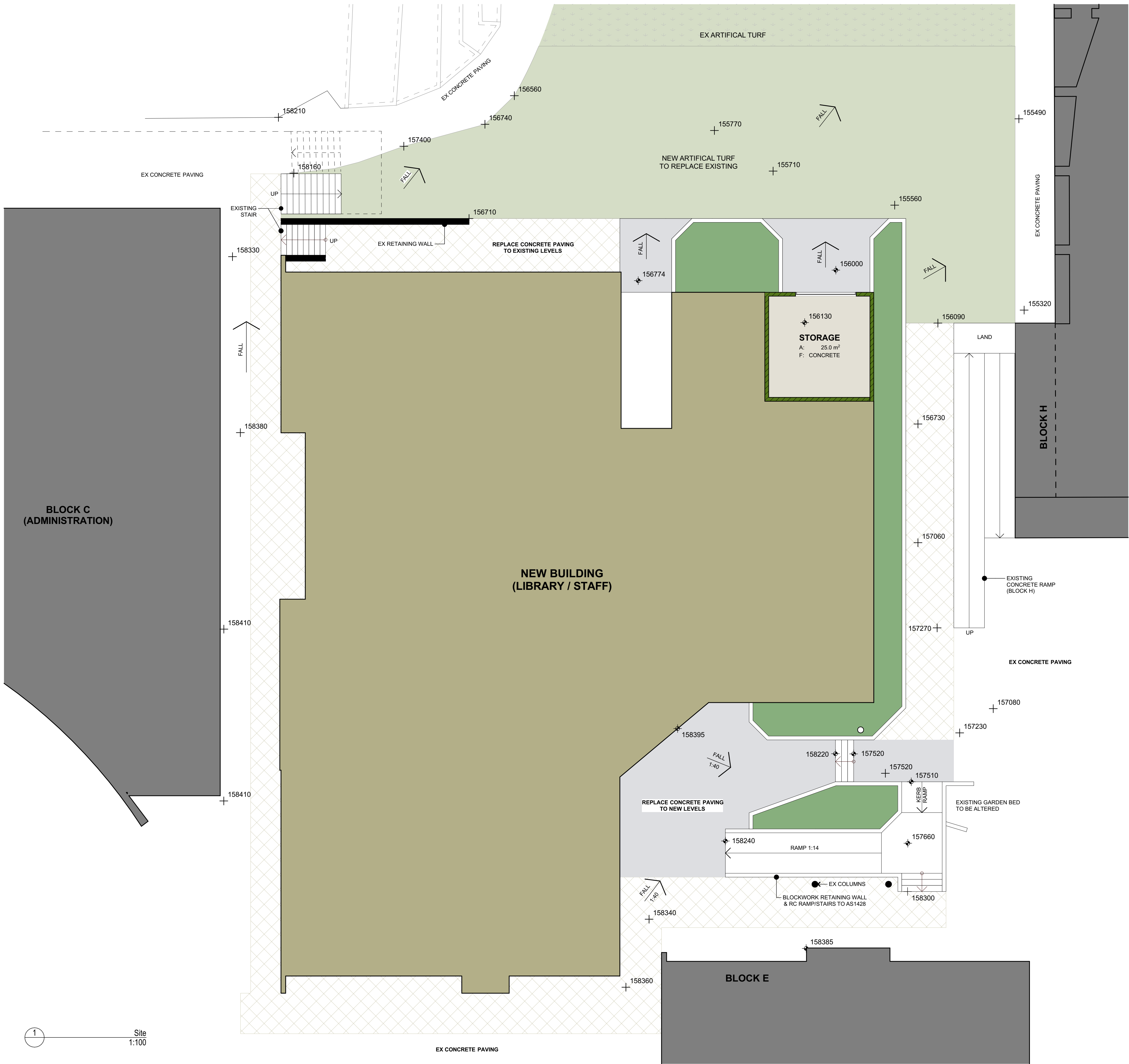
Bow Goold Pty Ltd architects
ACN 117541830
bowgoold.com.au

107 Smith Street, Summer Hill NSW 2130
p 02 9798 4492 | e simon@bowgoold.com.au

COVER PAGE DA00 - Rev A

SITE ANALYSIS

& CONSTRUCTION TRAFFIC MANAGEMENT PLAN (CTMP)



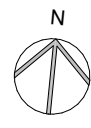
KEY

- EXISTING LEVEL
- PROPOSED LEVEL
- EXISTING BUILDING
- NEW BUILDING WORKS
- NEW CONCRETE PAVING TO NEW LEVELS
- NEW CONCRETE PAVING TO EXISTING LEVELS
- NEW LANDSCAPING & BLOCKWORK RETAINING WALL
- ARTIFICIAL TURF

NOTE
The Builder shall check all dimensions and levels on site prior to construction. Notify any errors, discrepancies or omissions to the architect. Refer to written dimensions only. Do not scale drawings. Drawings shall not be used for construction purposes until issued for construction. This drawing reflects a design by Bow Gould Pty. architects and is to be used only for work when authorised in writing by Bow Gould Pty. architects.
All boundaries and contours are subject to survey drawing W-01. All levels to Australian Height Data. It is the contractors responsibility to confirm all measurements on site and locations of any services prior to work on site.
All documents here within are subject to Australian Copyright Laws.

RevID	Description	Date
A	ISSUE FOR DA	17.05.2023

bow gould
architects
Bow Gould Pty Ltd architects
ACN 117541830 | bowgould.com.au
107 Smith Street, Summer Hill NSW 2130
p 02 9798 4462 | e aaron@bowgould.com.au

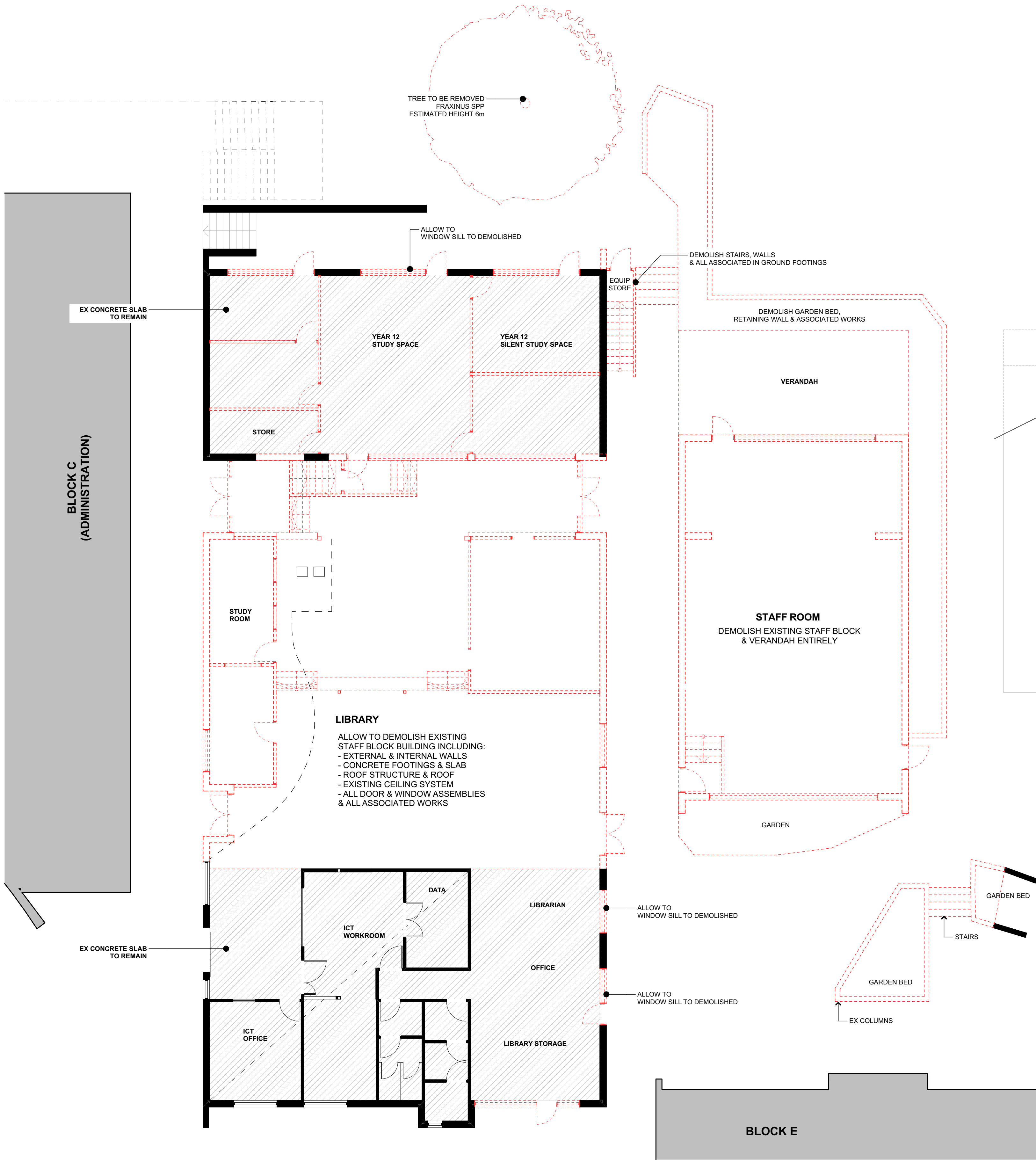


Drawn | Checked VL - SG
Plot Date: 17/05/2023
Project NO: 2222
Project Status: DA
Client: Covenant Christian School
Site: 212 Forest Way, Belrose NSW 2085

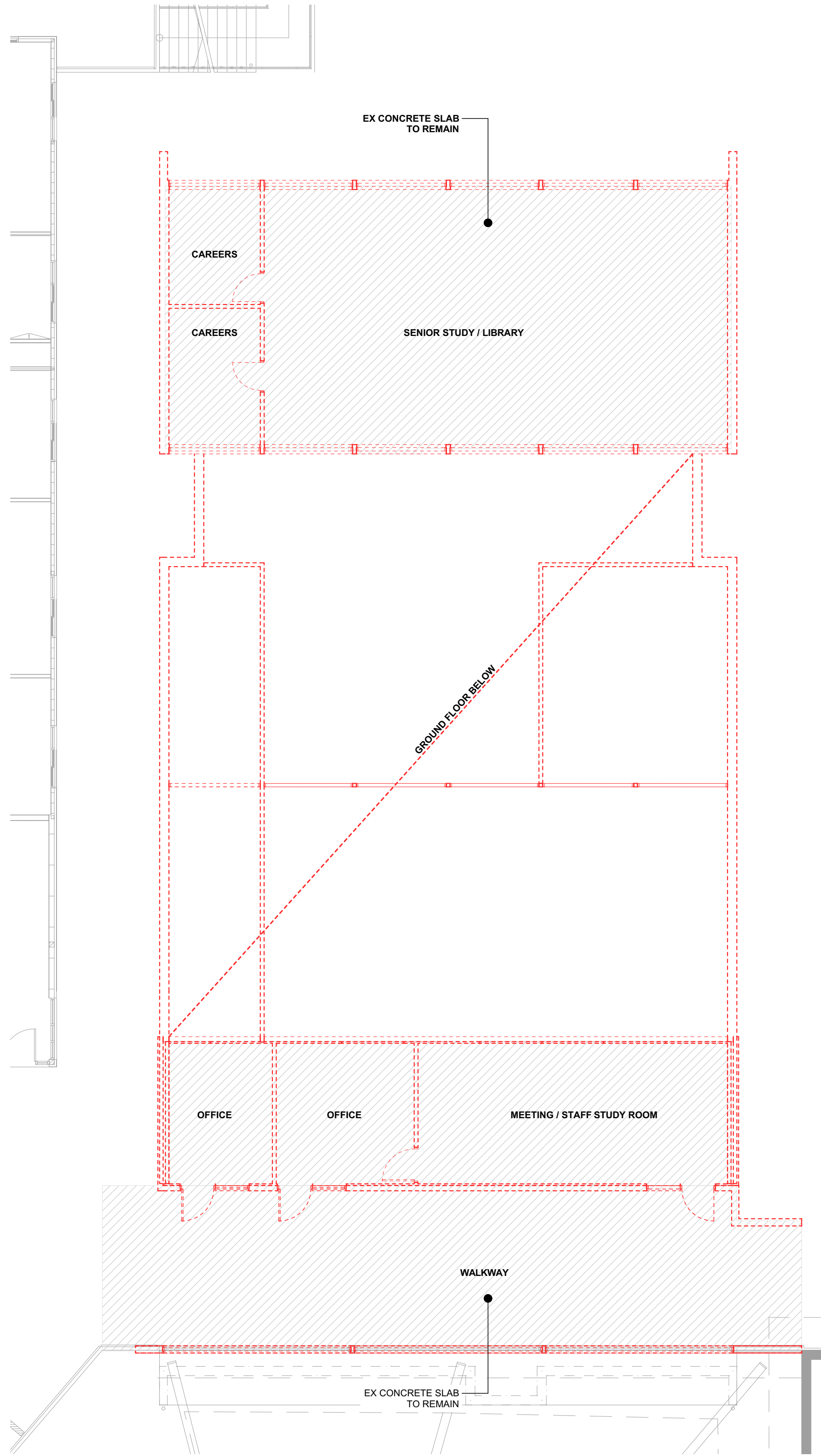
DRAWING TITLE :
**DEVELOPMENT APPLICATION
Site Works**
PROJECT NAME :
Covenant Christian School

REVISION NO.
A
DRAWING NO.
DA-01

FOR DA 17 MAY 2023
NOTE: ALL DRAWINGS TO BE PRINTED IN COLOUR



1 Ground Floor - Demolition
1:100



2 First Floor - Demolition
1:100

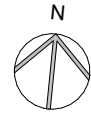
KEY

- EXISTING STRUCTURE
- EXISTING STRUCTURE TO BE DEMOLISHED
- TREE TO BE REMOVED

NOTE
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A	ISSUE FOR DA	17.05.2023

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Bow Gould Pty Ltd architects
ACN 117541830 | bowgould.com.au
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Drawn | Checked VL - SG
Plot Date: 17/05/2023
Project NO: 2222
Project Status: DA
Client: Covenant Christian School
Site: 212 Forest Way, Belrose NSW 2085

DRAWING TITLE :
**DEVELOPMENT APPLICATION
Demolition Plans**
PROJECT NAME :
Covenant Christian School

REVISION NO.
A
DRAWING NO.
DA-02

FOR DA 17 MAY 2023
NOTE: ALL DRAWINGS TO BE PRINTED IN COLOUR



- KEY
- EXISTING STRUCTURE
 - EXISTING BRICK WALL TO RECEIVE 9mm CFC SHEETING / TOP HATS
 - REINFORCED CONCRETE SLAB
 - RAISED FLOOR - TIMBER STRUCTURE
 - REINFORCED CONCRETE BLOCKWORK
 - EXTERNAL - 9mm CFC SHEETING / TOP HATS, INTERNAL - 150mm STEEL STUD & PLASTERBOARD
 - EXTERNAL - 9mm CFC SHEETING / TOP HATS, 2 HOURS FIRE RATED PLASTERBOARD, INTERNAL - 150mm STEEL STUD, 2 HOURS FIRE RATED PLASTERBOARD & MAXIPANEL CLADDING
 - STEEL FRAME ROOF/ PURLINS SPANDEK METAL DECK ROOF
 - 92mm STEEL STUD & PLASTERBOARD
 - 150mm STEEL STUD & PLASTERBOARD
 - ALUMINIUM FRAMED WINDOWS
 - CONCRETE COLUMN



2 Perspective



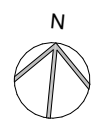
3 Perspective

FOR DA 17 MAY 2023
NOTE: ALL DRAWINGS TO BE PRINTED IN COLOUR

NOTE
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A	ISSUE FOR DA	17.05.2023

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107 Smith Street, Summer Hill NSW 2130
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Drawn | Checked VL - SG
Plot Date: 17/05/2023
Project NO: 2222
Project Status: DA
Client: Covenant Christian School
Site: 212 Forest Way, Belrose NSW 2085

DRAWING TITLE :
**DEVELOPMENT APPLICATION
Ground Floor**
PROJECT NAME :
Covenant Christian School

REVISION NO.
A
DRAWING NO.
DA-03

1. PROPOSED TOTAL RAINWATER TANK REUSE VOLUME HAS BEEN DETERMINED BASED ON WATER SENSITIVE URBAN DESIGN - MUSIC MODEL.
2. 6KL RAINWATER TANK HAS BEEN DESIGNED AND PROVIDED TO SATISFY THE TOTAL RAINWATER REUSE REQUIREMENTS OF THE ABOVE MENTIONED SPECIFICATIONS. RAINWATER SHALL BE RESUED FOR IRRIGATION PURPOSE ONLY.

eSWP 450X450
TO REMAIN
eRL: 158.30

eSWP 450X450
TO REMAIN
eRL: 158.36

NEW FIRST FLUSH SYSTEM WITH SCREW CAP CONNECTING TO STORMWATER PIT FOR MAINTENANCE PURPOSE ONLY. 2 X FIRST FLUSH DEVICE - MODEL: WDIG01 WITH MINIMUM CAPACITY OF 250L AND A FLUSH CHAMBER OF 300mm DIAMETER AT 3.4m LENGTH

NEW ACO K100 KLASSIK DRAIN WITH
CLASS B GRATE HEEL PROOF OR
APPROVED EQUIVALENT

CONTRACTOR TO INVESTIGATE,
LOCATE AND MAKE NEW CONNECTION
FROM NEW INGROUND DRAINAGE
PIPEWORK TO EXISTING. CONDITION OF
PIPELINE SHALL BE VERIFIED AND
CONFIRM ITS ADEQUACY FOR REUSE
PRIOR TO COMMENCING ANY WORKS.

— PROPOSED RAINWATER PIPEWORK TO RUN
HARD UP AGAINST SIDEWALL OF STORAGE
AREA AT HIGH LEVEL.

— DENOTES OVERLAND
FLOW PATH

— NEW ACO K100 KLASSIK DRAIN WITH
CLASS B GRATE HEEL PROOF OR
APPROVED EQUIVALENT

NEW SWP
450X450
RL: 158.01
IL: 157.66

[illegible]

STRUCTURAL	
MECHANICAL	
ELECTRICAL	
CIVIL	

BUILDER

ARCHITE

Bow Gould PL, architects
107 Smith Street
Summerhill, NSW 2130
bow gould
architects



SPARKS+PARTNERS

CONSULTING ENGINEERS
HYDRAULIC | CIVIL | FIRE

Suites 6 & 7, 2-6 Hunter Street | PO Box 979 | Parramatta | NSW
2150
P 02 9891 5333 | E admin@sparksandpartners.com.au
<https://sparksandpartners.com.au>







DATE 10.04.23	CRAWN T.D	DESIGNED N.H	CHECKED N.H
PROJECT No 23076	SCALE 1:100	SIZE A1	REVISION 1
DRAWING No DA4.01			