

# Site Water Management Overview

## Pacific Brook Christian School, Muswellbrook

September 2021



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# 1 INTRODUCTION

Kleinfelder Australia Pty Ltd (Kleinfelder) has prepared this report for NBRS Architecture on behalf of Pacific Brook Christian School (the client) in relation to their land at 72-74 Maitland Street, Muswellbrook (the subject site). This report seeks to provide an overview of how water is being managed on the subject site to address the environmental assessment requirements issued by the Water - Knowledge Division of the NSW Department of Planning, Industry and Environment (DPIE), and management measures moving forward for the construction process.

On 26 April 2021 the Secretary of the DPIE issued the environmental assessment requirements (SEARs) for the proposed Pacific Brook Christian School at Muswellbrook. As part of preparing the SEARs the DPIE consulted with the Water-Knowledge Division of DPIE, who identified the following environmental assessment requirements:

- The identification of an adequate and secure water supply for the life of the project. This includes confirmation that water can be sourced from an appropriately authorised and reliable supply. This is also to include an assessment of the current market depth where water entitlement is required to be purchased.
- A detailed and consolidated site water balance.
- Assessment of impacts on surface and ground water sources (both quality and quantity), related infrastructure, adjacent licensed water users, basic landholder rights, watercourses, riparian land, and groundwater dependent ecosystems, and measures proposed to reduce and mitigate these impacts.
- Proposed surface and groundwater monitoring activities and methodologies.
- Consideration of relevant legislation, policies and guidelines, including the NSW Aquifer Interference Policy (2012), the Guidelines for Controlled Activities on Waterfront Land (2018) and the relevant Water Sharing Plans.

This report seeks to address some of these requirements through:

- Review of existing information prepared for the subject site, including an analysis of site groundwater borehole information, site stormwater/surface water management plan and modelling data, remediation action plan (for any water related matters), proposed water management during construction, and water quality testing results and modelling (if available).
- Review of existing water sharing plan for the area to examine any issues that may affect the subject site.
- Discussion of water supply (and sewer services).
- Examination of potential impacts relating to water for the site and any mitigation/management measures required as the project moves forward.

It is noted that a specific site water balance model will be addressed elsewhere in the Environmental Impact Statement (EIS).

## 1.1 SITE OVERVIEW

The site is triangular in shape, with a northwest/southeast alignment and has an area of 2.432 ha. The site is bound by Muswellbrook Golf Course along the north eastern boundary, Maitland Street along the south western boundary and residential properties to the south eastern boundary (see Figure 1).

The site is generally level with a slight slope to a watercourse at the north west boundary. The subject site, 72-74 Maitland Street, was previously used for forestry plantation purposes and is mapped as Muswellbrook State Forest. The site is no longer used for this purpose and currently sits as an empty and underutilised site.

The main vehicular access to the site is from Maitland Street, as well as pedestrian access. Existing vehicular parking on site includes open air at grade parking spaces facing Maitland Street.



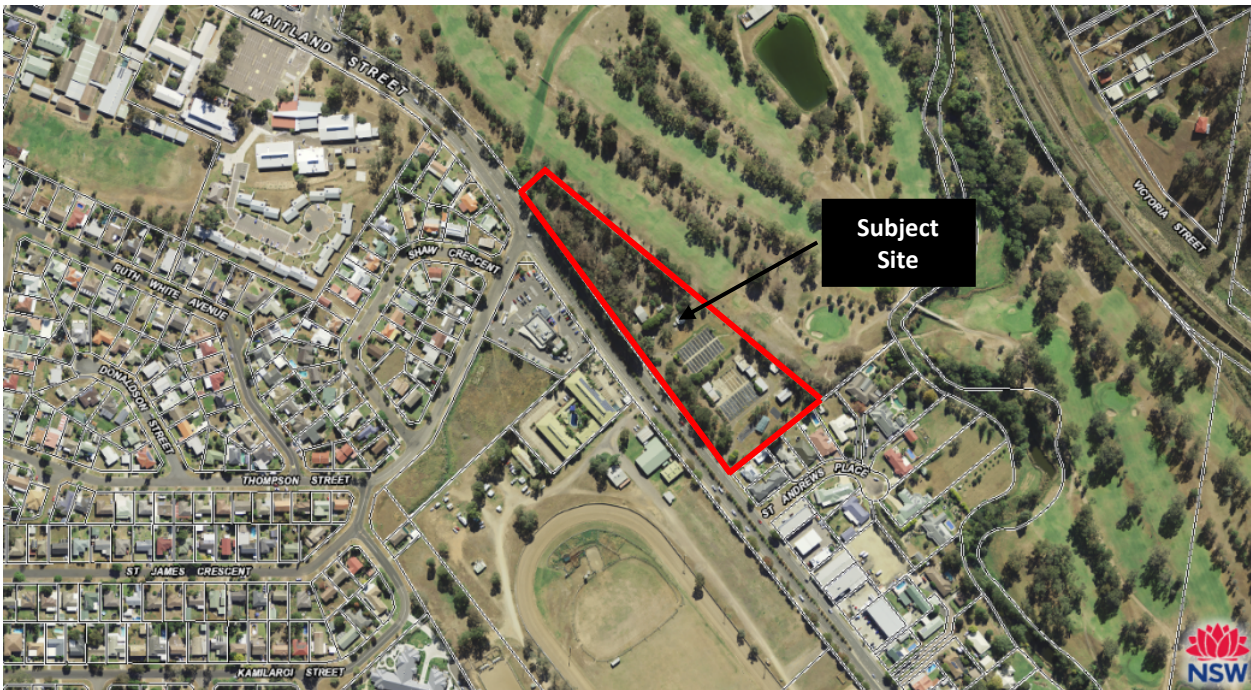
In terms of travel, Muswellbrook is approximately three (3) hours from Sydney, three hours (3) from Dubbo, two (2) hours from Tamworth and 90 minutes from Newcastle.



## 2 BACKGROUND

The Pacific Brook Christian School is proposed for construction on Lot 100 DP1261496, 72-74 Maitland Street, Muswellbrook (the subject site). The site has an area of approximately 2.432ha. The subject site is presented in Figure 1 below.

**Figure 1: Location Map**



### 2.1 PROPOSED WORKS

The proposal will be made via a staged concept Development Application (DA) under Section 4.22 of the Environmental Planning and Assessment Act 1979 (EP&A Act). The school will therefore be constructed in a number of stages. Stage 1 will be constructed with demountable and modular buildings which will be removed when required to be replaced with permanent buildings. Stage 1 represents the establishment of the use of the site, with future stages representing the commencement of permanent buildings. The total enrolment at Pacific Brook Christian School is proposed to be 656 students. An EIS is being prepared as the proposal is a State Significant DA (SSDA).

The overall master plan for the development of a new school campus will cater for years K-6 and Middle School years 7 & 8 as presented in Figure 2.

The site preparation work (including remediation) includes the removal of 96 trees (7 within Stage 1), civil works, infrastructure works, landscaping, signage and construction works in stages over the next 10 years.

The masterplan will support high-quality educational outcomes to meet the needs of students within the local community as follows:

- Administration building and Library;
  - One (1) staff and student amenities block.
  
- Junior School facilities;
  - Ten (10) General Learning Areas (GLAs);
  - Two (2) Specialist classroom;



- One (1) Store; and
- Covered Outdoor Learning Area (COLA).
- Middle School facilities;
  - Seven (7) General Learning Areas (GLAs);
  - One (1) Science classroom; and
  - Covered Outdoor Learning Area (COLA).
- Senior School facilities;
  - Eight (8) General Learning Areas (GLAs);
  - One (1) Specialist classroom;
  - Three (3) TAS classrooms;
  - Two (2) Food Tech classrooms;
  - One (1) Art classroom;
  - One (1) Drama classroom;
  - Four (4) amenities block;
  - Three (3) Store; and
  - Covered Outdoor Learning Area (COLA).
- Hope School (special needs) facilities;
  - Four (4) General Learning Areas (GLAs);
  - One (1) Specialist classroom;
  - Four (4) Shared Withdrawal rooms;
  - One (1) Office;
  - One (1) Staff room;
  - One (1) Interview + Therapy room;
  - Three (4) amenities block;
  - Three (3) Store; and
  - Covered Outdoor Learning Area (COLA).
- Multi-Purpose Hall;
- Maximum student capacity of 656;
- Maximum 65 staff;
- Agricultural teaching facility;
- Maintenance and bus area;
- On-site Parking (67 spaces, inclusive of 1 accessible);
- Bike parking x 36;
- Internal pathways;
- Kiss and drop off areas;
- Bus stop;
- Waste Storage and collection area;
- Signage;
- Bush Chapel
- Landscaping (including Bush Chapel);
- Earthworks;
- Secondary emergency vehicle/ large vehicle access;
- Acoustic and safety fence; and
- Widening of existing vehicular access from Maitland Street.

Stage 1 of the masterplan consists of:

- Site remediation;
- Removal of 7 trees;
- Facilities for a maximum of 140 students and 16 staff, including:

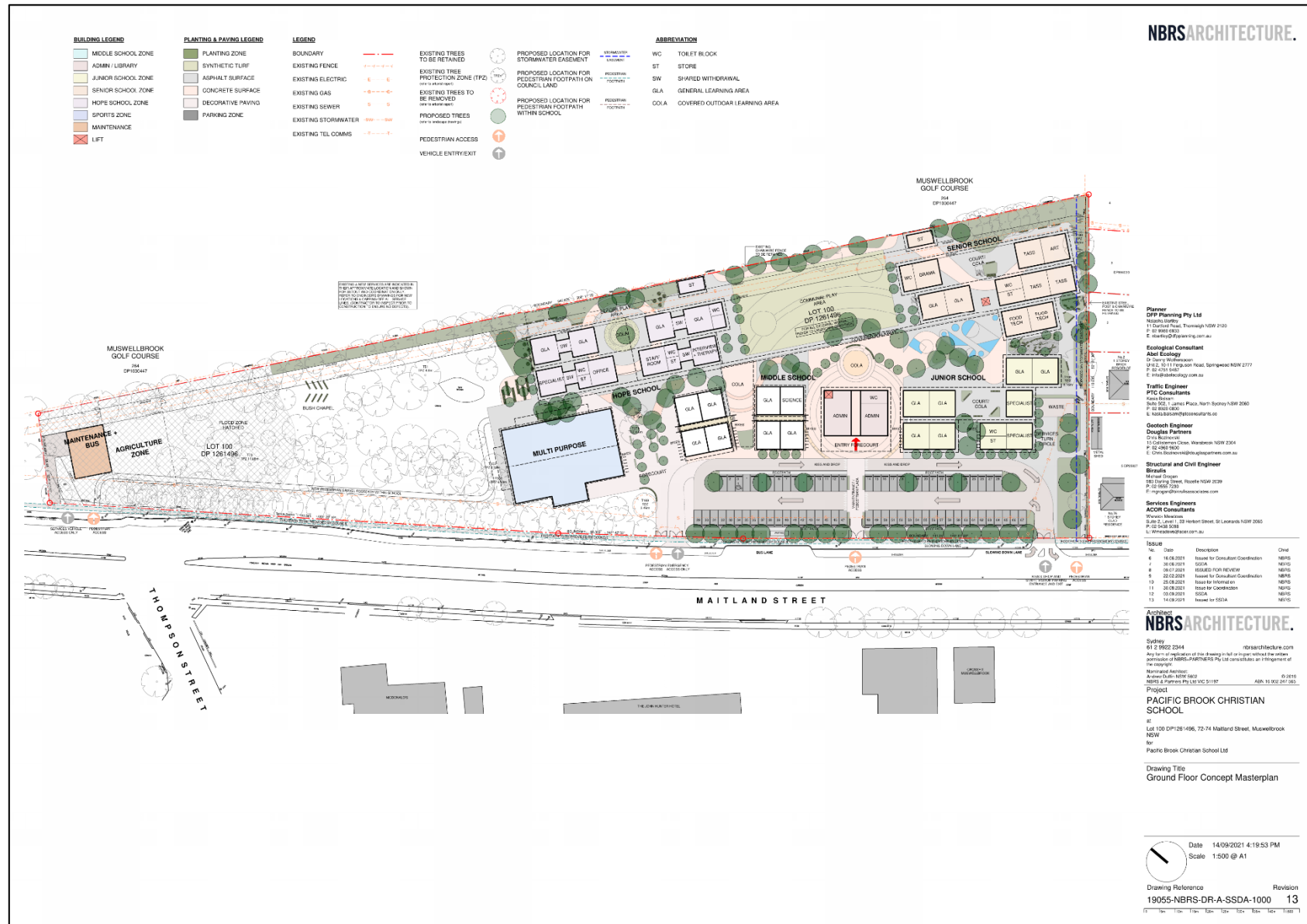


- One (1) administration and staff area;
  - One (1) staff and student amenities block (including one (1) end of trip facility);
  - Five (5) General Learning Areas (GLAs);
  - One (1) Science classroom; and
  - Covered Outdoor Learning Area (COLA).
- 
- Internal pathways;
  - On-site Parking (15 spaces, inclusive of 1 accessible);
  - Bike parking x 6;
  - Kiss and drop off areas;
  - Bus stop;
  - Bin storage and collection area;
  - Signage;
  - Infrastructure works; and
  - Widening of existing vehicular access from Maitland Street.

A master plan of the proposed school is presented in Figure 2 below.



**Figure 2: School Master Plan**  
(source: NBRSS Architecture)





## 2.2 EXISTING STUDIES

A number of existing studies and reports have been reviewed as part of this report. This includes:

- Site Services Infrastructure Report for Master Planning, Pacific Brook Christian School - Muswellbrook Campus, ACOR Consulting, May 2021.
- Draft Interim Audit Advice Letter No 1 - Remediation Action Plan, Proposed School, Maitland Street, Muswellbrook, Ramboll, 11 June 2021.
- Report on Geotechnical Investigation and Preliminary Salinity Assessment, Proposed School, Lot 100 DP 1261496, Maitland Street, Muswellbrook, Douglas Partners, August 2020.
- Sampling, Analysis and Quality Plan Supplementary Contamination Assessment, Lot 100 DP 1261496, Maitland Street, Muswellbrook, Douglas Partners, August 2020.
- Preliminary Contamination Assessment, Proposed New School Development, Lot 100, Maitland Street Muswellbrook, JK Environments, 14 August 2020.
- Revised Remediation Action Plan, Proposed School, Lot 100 DP 1261496 Maitland Street, Muswellbrook, Douglas Partners, January 2021.
- Report on Supplementary Detailed Site Investigation (Contamination), Proposed School, Lot 100 DP 1261496 Maitland Street, Muswellbrook, Douglas Partners, August 2020.
- Report on Detailed Site Investigation (Contamination), Proposed School, Lot 100 DP 1261496 Maitland Street, Muswellbrook, Douglas Partners, August 2020.
- Stormwater Drainage and Civil Works Plan for DA Approval - Stage 0, Birzulis Associates.
- Site Survey, LTS, 2019.
- Flood Information and Levels Memo, Royal Haskoning DHV, June 2020.
- Biodiversity Development Assessment Report, Pacific Brook Christian School, Muswellbrook, Kleinfelder, July 2021.



## 3 SITE DETAILS

The site is located near the town centre of Muswellbrook which is characterised by general residential, public recreation and commercial land uses. The site is bound by Maitland Street to the south - west and Muswellbrook Golf Course to the north and is located approximately 150m to the south of Muscle Creek. Muscle Creek is modified as a significant portion of the creek traverses the golf course.

### 3.1 TOPOGRAPHY

The regional topography is characterised by a relatively flat alluvial floodplain. The site is located towards the mid-slope of a gently sloping, north-facing hillside. Parts along the northern site boundary, adjacent to the golf course, appear to have been levelled to account for the north-ward slope and to accommodate the adjacent golf course.

The site is generally level with a slight slope to the north - west boundary. Surface water flows northeast into the adjoining golf course and on to Muscle Creek via a series of dams on the golf course. Muscle Creek flows west into the Hunter River which at its closest is 1.3 km north-west of the site. Stormwater management currently on site is pit and pipe and overland flow.

### 3.2 GEOLOGY AND SOILS

Douglas Partners (2020) identifies that the majority of the site is underlain by Quaternary alluvium deposits which typically comprise gravel, sand, silt and clay and the north - western portion is underlain by the Branxton Formation typically comprising conglomerate, sandstone, siltstone.

The regional groundwater flow regime is believed to be to the north and north-west towards Muscle Creek (located approximately 100 m north - east of the site). It should be noted that groundwater levels are affected by climatic conditions and soil permeability and will therefore vary with time.

Reference to the 1:250,000 Singleton Soil Landscapes Sheet indicates that the site is underlain by alluvial soils of the Hunter soil landscape, and close to a boundary (at the north-western tip of the site) with an area underlain by residual soils of Roxburgh soil landscape.

The acid sulfate soils maps in Council's Local Environmental Plan (LEP) do not identify any acid sulfate soils. The Office of Environment and Heritage (now Department of Planning, Industry and Environment) acid sulphate soil risk map, also indicates the site is not mapped within an area known to comprise acid sulfate soils.

### 3.3 WATER SHARING PLAN

The purpose of a water sharing plan is to:

- Provide water users with a clear picture of when and how water will be available for extraction
- Protect the fundamental environmental health of the water source
- Ensure the water source is sustainable in the long-term.

Water sharing plans set rules for sharing water between water users and the environment and bring water users into a single licensing system managed under the Water Management Act 2000. The plans clearly define shares in the available water for licence holders. They also provide irrigators and farmers with continuing or 'perpetual' licences, which have a title separate from the land, enabling better water trading opportunities.

Towns have a higher priority for access to water than commercial licences. Water sharing plans recognise this priority by ensuring that a full share of water is allocated for annual town water supplies, except where exceptional drought conditions prevent this. The annual share for every town water supply is specified on the town's licence. This share is based on either existing volumes or an assessment of reasonable use. Towns are permitted to sell part of their annual account of water to other towns but, unlike commercial users, are not able to sell their licence outright. Towns will not need to change their existing licensing arrangements unless their current infrastructure (e.g. a dam) is unable to meet their water needs and requires upgrading. In this case, town water utilities will need



to meet conditions specified in the plans to ensure that there is enough water flowing to protect the environment. They will also need to demonstrate that the Best Practice Management of Water Supply and Sewerage Guidelines are being implemented.

Muswellbrook Shire Council is the water and wastewater authority in the area. Muswellbrook Council have relevant licences for the supply of the township which includes the subject site. The Muswellbrook LGA is covered by several Water Sharing Plans including the North Coast Fractured and Porous Rock Groundwater Sources 2016 and the Hunter Unregulated and Alluvial Water Sources 2009.



# 4 WATER MANAGEMENT

## 4.1 GROUNDWATER

A review of data in the Australian Groundwater Explorer and held by Water NSW identified eighteen registered groundwater bores within approximately 1km of the site. An overview of the boreholes is presented in Table 1 below.

**Table 1: Registered Groundwater Bore Data**

ID	DRILL DATE	BORE DEPTH (M)	PURPOSE	STANDING WATER LEVEL OR WATER BEARING ZONE (M)
GW032825	1976	6	Waste	Not Identified
GW028514	1965	7.3	Waste	7.3
GW044696	1975	7.3	Domestic	Not Identified
GW032743	1968	5.7	Waste	Not Identified
GW043852	1967	6	Waste	Not Identified
GW022229	1963	10.1	Waste	10.1
GW022230	1965	6.7	Waste	6.7
GW035339	1972	9.1	Waste	Not Identified
GW024568	1965	6.1	Waste	Not Identified
GW034580	1974	9.1	Waste	Not Identified
GW022531	1965	6.1	Unknown	Not Identified
GW029528	1967	6.4	Waste	Not Identified
GW022043	1964	6.1	Waste	Not Identified
GW028513	1965	7.6	Waste	7.3
GW034088	1971	7.3	Waste	6.7
GW023484	1965	7.6	Waste	Not Identified
GW026568	1967	7.6	Waste	Not Identified
GW035928	1973	8.1	Waste	Not Identified

In August 2020, Douglas Partners prepared a Detailed Site Investigation (Contamination) (DSI) for the subject site. It is noted that this August 2020 DSI is a revised/updated investigation originally conducted in 2019. The works included:

- Drilling of two boreholes to depths of 7 m to 10 m
- Excavation of 16 test pits to depths of 0.4 m to 1.5 m
- Logging of the subsurface profile
- Screening of soil samples for volatile organic impact with a photo-ionisation detector (PID)
- Installation, development, purging and sampling of two groundwater wells for contamination testing purposes.

The two groundwater wells were constructed along the south - eastern boundary of the site by Douglas Partners. A 3m to 6m machine-slotted PVC screen with an end cap was installed at approximately from 4m to below ground level to the termination depth (7m to 10m). Groundwater was not encountered during drilling of the two boreholes (2020 report). It should be noted that groundwater levels are affected by factors such as climatic conditions, soil permeability and tidal influences and will therefore vary with time.

In 2020, JK Environments also constructed twenty boreholes as part of a preliminary contamination assessment. One of the boreholes identified seepage at approximately 0.8m, while the other nineteen boreholes (up to 3.8m



in depth) did not identify and groundwater. JK Environments concluded that this seepage may be due to leaking infrastructure rather than actual groundwater due to the lack of groundwater in the other nineteen boreholes.

The site auditor from Ramboll (2021) provides further clarification that the standing water level (SWL) in the wells constructed by Douglas Partners was measured in July 2019 at approximately 7.0 metres below ground level (mbgl) in both wells. Another report prepared by Douglas Partners notes that in 2019 groundwater was encountered in both the groundwater wells at 6.3m and 6.4m, respectively.

#### **4.1.1 Groundwater Dependent Ecosystems**

A review of ecological reports prepared for the proposed development identify that there are no groundwater dependent ecosystems on the subject site.

## **4.2 SEWER**

The site survey carried out over the subject site identifies reticulated water and sewer in Maitland Street at the front of the property, or within the site itself. Muswellbrook Shire Council is the water and sewer/wastewater authority for the subject site. Council has also identified an existing authority sewer drainage asset reticulates within the site, along the western boundary. The size and material of this asset is unknown. Data has been requested and from Muswellbrook Shire Council to confirm the size, material, and condition of the pipeline.

It is envisaged that the authority sewer drainage asset has capacity to cater for the proposed schools peak daily demand, however, it is likely that the site's existing connection to the main will require augmentation.

A formal Section 68 application under the Local Government Act will be required to be submitted to council to seek approval for any new connections made to the authority asset.

Advice provided by Acor Engineering Consultants (Acor) identifies the proposed school will have a single connection to the existing authority within the site's boundary. It is envisaged a boundary trap will be required to aerially disconnect the school from the authority main. Sanitary drainage shall reticulate throughout the school as required to serve all fixtures and fittings in accordance with AS3500 and Council requirements. It is envisaged that gravity drainage is achievable to all areas of the school, and that pump out stations should not be required.

## **4.3 WATER SUPPLY**

The site survey carried out over the subject site identifies reticulated water and sewer in Maitland Street at the front of the property, or within the site itself. Council has confirmed an existing Council water main asset reticulates within Maitland Street. It is understood the main is DN100mm and of PVC material. The existing site potable supply will likely require augmentation, in line with the increase in expected peak daily demand. Storage tanks and booster pumps will also be required to cater for the required flow and pressure for fire fighting purposes.

A formal Section 68 application will be required to be submitted to council to seek approval for any new connections made to the authority asset.

Advice provided by Acor identifies that the proposed school will have a single reticulated water connection to the existing authority asset within Maitland St complete with an authority water meter and backflow prevention device. Pressure and flow advice received from council confirms that the residual pressure in the main is adequate and that no booster pump is envisaged to be required for the school's potable supply. The flow capacity in the main also appears to be adequate for the proposed site's increased flow rates. Potable supply will reticulate throughout the school as required to serve all fixtures and fittings. Where deemed necessary, backflow prevention devices shall be installed for high risks areas, such as laboratories and art classrooms.

## **4.4 NON-POTABLE WATER**

Consideration shall be given to the capture and harvesting of rainwater from non-trafficable roofs, as part of the design process. Captured rainwater shall be stored in above ground tanks and shall serve irrigation and toilet flushing. A water balance exercise (identified elsewhere in the EIS) will determine the minimum size of the storage tanks, to ensure the tank is adequately sized to cater for the site's peak demand, whilst taking into account the average monthly rainfall for the area.



#### 4.5 TRADE WASTE DRAINAGE

Trade waste provisions will be made for the following applications:

- A grease arrestor for the canteen
- A grease arrestor for the food tech classrooms
- A plaster arrestor for the visual arts classrooms
- Trade waste provisions as required for any specialist classrooms.

All trade waste provisions shall be to the standards and approval of Muswellbrook Shire Council.

#### 4.6 FIRE HYDRANTS

Fire Hydrants are required to serve all buildings with a fire compartment over 500m<sup>2</sup>. It is understood that the proposed floor areas of the school will trigger the requirement of 2 x hydrants to flow simultaneously, which equates to a 20L/s flow rate. Acor (following consultation with Council) advise that the pressure and flow results confirm that the town main is not capable of delivering this flow rate, and as such, storage tanks will be required to cover the shortfall. The inclusion of storage tanks triggers the requirement of booster pumps and a fire brigade booster assembly. All hydrant infrastructure is to be located in a strategic location and must be in sight of the main entry for the school, for the brigade to access in accordance with AS2419.

#### 4.7 WATER QUALITY

The NSW Government has adopted the National Water Quality Management Strategy (NWQMS) as its policy to manage the quality of waterways in New South Wales and protect water resources. It includes guidelines to support state and local governments, water authorities and industry to maintain and improve water quality according to local community environmental values and uses as outlined in the NSW Water Quality Objectives.

The Australian and New Zealand Guidelines for Fresh and Marine Water Quality is the central technical reference document for the NWQMS. The Guidelines provide a framework, recommendations and scientific criteria to help planners, regulators and researchers manage and improve water quality and waterway health.

The Risk-based Framework for Considering Waterway Health Outcomes in Strategic Land-use Planning Decisions was developed as a five- step process to capture the principles and strategies of the NWQMS. It is a process to assess if land and water management is contributing towards the achievement of the community environmental values and uses, and the Guidelines.

At the local level, Muswellbrook Council's Development Control Plan (DCP) Section 25 on stormwater management aims to:

- Ensure stormwater is controlled in a way that minimises nuisances and damage to the adjoining properties
- Manage natural drainage lines and water bodies to sustainably protect the health of the receiving waterway
- Mitigate pollutants from entering waterways
- Ensure appropriate easements are provided over existing drainage systems on private property
- Assist in the efficient use of water.

For non-residential development relevant development controls include:

- Stormwater drainage complies with AS 3500.3
- Development proposals for this type of development are to demonstrate compliance with AUSPEC D5 and the Muswellbrook Shire Council Drainage Design Criteria



- Development applications comply with BASIX where it applies
- Gutters and down pipes are installed to collect roof water
- Pits are installed to collect water from the low points in yards
- Down pipes and pits are to be connected to the 'discharge controls' for the site
- The site discharge indicator for the development is at least 0.5 determined under Water Smart Practice Note No. 11 - Site Discharge Indicator, and preliminary storm water design details demonstrating ability to comply with this requirement are to be submitted with the development application
- Soil and erosion control plans are to be submitted in accordance with the provisions of section 20 of the Muswellbrook DCP
- For non-residential development incorporating facilities to accommodate or employ more than 50 staff, or that involve the use of more than 1 hectare of land for commercial, industrial or special use purposes, a comprehensive water cycle strategy plan that responds to relevant issues and opportunities for achieving sustainable water cycle outcomes is required to be submitted with the development application
- Soil and water management plans are required to be submitted with the development application for all non-residential development where site disturbance is greater than 1,000m<sup>2</sup>.

Pollution reduction devices must be installed for the transportation of potential contaminants/polluting substances where at-grade car parking areas are exposed to rainfall events.

The event mean concentration of specific pollutants is not to exceed that in the following table on allotments greater than 2,000m<sup>2</sup> where the impervious area exceeds 50% of the area of the site<sup>1</sup>.

POLLUTANT	MAXIMUM EVENT MEAN CONCENTRATION
Sediment	100 mg/L
Hydrocarbons	500 ug/L
Total Nitrogen	1000 ug/L
Ammonia	15 ug/L
Phosphorus	100 ug/L

#### 4.8 SURFACE WATER QUANTITY

Development has the potential to increase the impermeable area of the site and this has an impact on the quantity, quality and frequency of stormwater flowing from the site. The rapid, concentrated collection and increased volume and discharge of stormwater can contribute to nuisance localised flooding, increased soil erosion, sedimentation of water ways and destruction of aquatic ecosystems. Appropriate stormwater management is essential for maintaining the amenity of urban areas and health of the environment.

Muswellbrook Council requires:

- All impervious areas be designed so that overflows do not adversely affect neighbouring properties by way of intensification, concentration or inappropriate disposal across property boundaries
- Where the site falls away from the street and an interallotment drainage line exists, overflows are to be directed to that interallotment drainage line. Otherwise, the overflow may be directed to a dispersion

<sup>1</sup> It is noted that this requirement is identified as applying to commercial developments in the DCP but the control also applies to car parks



trench subject to favourable geotechnical conditions. Design details for dispersion trenches shall be obtained from an appropriately qualified civil engineer and submitted with applications for approval

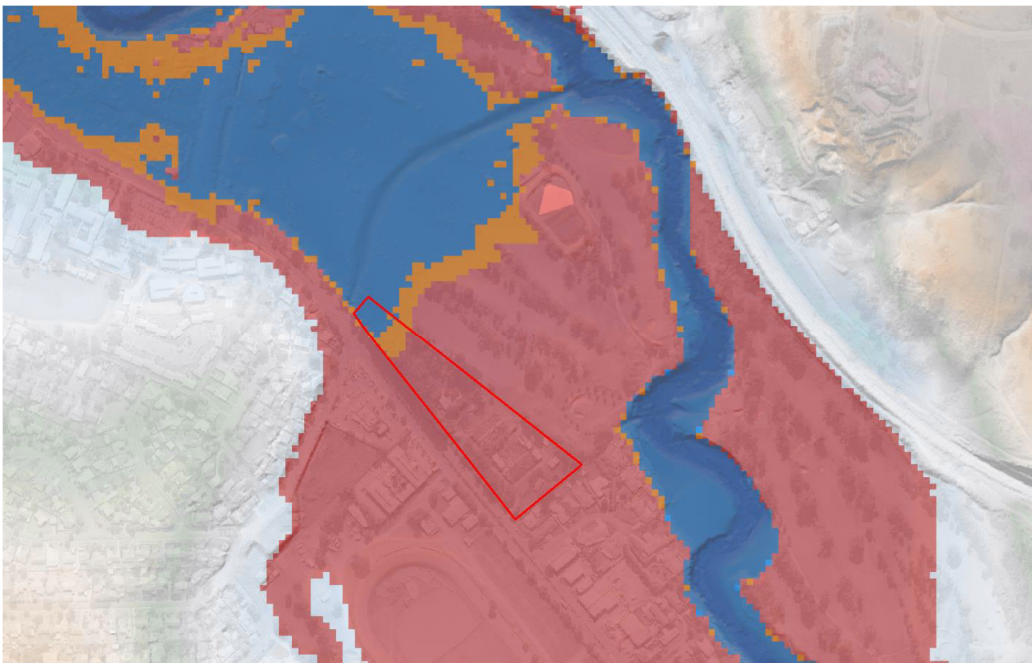
- Overflows from paved areas adjacent to the property boundary must be redirected by a kerb or formed gutter or table drain to drain into an approved piped system or away from neighbouring properties in a manner that will not cause a nuisance.

#### 4.9 FLOODING

A search of the SES web site identifies limited information on flooding for the subject site. Recent studies are confined to the township to the west and Denman. An earlier storm event in 2007 identifies that part of the subject site may have been slightly inundated at the 0.2% AEP event. For the purposes of the 1% AEP event only the north - western portion of the site is flood prone. The eastern part of the site is flood free in a 1 in 100 year event, although the Predicted maximum Flood (PMF) covers the site. Royal Haskoning DHV also provided relevant design levels for flood planning purposes.

**Figure 3: Extract from Muscle Creek Flood Study**

(source: Royal Haskoning DHV)



**Notes:** Blue (20 year), Orange (100 year), Pink (PMF)



# 5 IMPACTS AND MANAGEMENT

## 5.1 WATER SUPPLY

The subject site has access to reticulated water and sewer maintained and managed by Muswellbrook Shire Council. Some augmentation will be required. Nonetheless, there is no requirement for groundwater/bore water on the site. Consultation with Council in June 2021 has identified that up until 2016 a plant nursery was located on the subject site which used reticulated water on site. Council identify that the nursery used around 4,800 Kl/year which would be available to the school. According to the Council this should be sufficient supply for the school.

## 5.2 GROUNDWATER IMPACTS

No detailed plans for the entire school development have been identified at the time of writing, however, based existing information the proposed works are unlikely to intercept with groundwater. Concept designs for the first stage of the school were prepared by Birzulis Associates and note that footings to the modular buildings to be 450 square and 600mm deep and founded 1000mm minimum below finished surface level. Alternatively, bored piers can be used up to 1m deep. As such an approval under the Water management act would not be required. The construction contractor should include an unexpected finds protocol in their Construction Environmental Management Plan (CEMP) in the unlikely event groundwater is encountered.

## 5.3 SURFACE WATER IMPACTS

Concept designs for the first stage of the school were prepared by Birzulis Associates which identify the development of a surface water system which includes pits and pipes, Onsite Stormwater Detention device (OSD) and rainwater tanks.

It is identified that the current impervious area on site is 1589 square metres (of a total site area of 2.432 ha) which will increase to 2237 square metres post-development. Birzulis Associates note on their plans that a Drains Model was prepared although no other information is presented. Of this 2237 square metres 1,812 square metres will go to an OSD and 425 square metres will bypass the OSD. The total OSD volume that is required is 12.1 cubic metres, while 17.1 cubic metres is being provided. A summary is provided in Table 2 below. Birzulis Associates identify that the requirements of the Muswellbrook DCP are met.

**Table 2: Pre and Post Development Flows Summary**

(source: Birzulis Associates)

PRE AND POST DEVELOPMENT FLOWS SUMMARY				
Average Recurrence Interval (ARI)	5 Year	10 Year	20 Year	100 Year
Pre-Development Flow (ls)	171	235	328	522
Post - Development Flow (l/s)	168	234	324	515
Storage Required (m <sup>3</sup> )	5.4	6.7	8.2	12.1



## 5.4 WATER QUALITY

Birzulis Associates conducted MUSIC modelling for the initial stage of the proposed development which identified the following water quality treatment outcomes, which is identified as a Table in their civil plans (refer to Table 3). Birzulis Associates identify that the water quality outcomes meet the requirements of the Muswellbrook DCP.

**Table 3: Water Quality Treatment Effectiveness Summary**

TREATMENT EFFECTIVENESS SUMMARY				
	Sources	Residual Load	% Reduction	% Target
Total Suspended Solids (kg/yr)	226	36	83.2	80
Total Phosphorus (kg/yr)	0.402	0.158	60.6	45
Total Nitrogen (kg/yr)	2.05	1.1	46.1	45
Gross Pollutants (kg/yr)	28.5	1.72	94	70

## 5.5 FLOODING

Royal Haskoning DHV have provided relevant flood design levels for the site. Based on the existing flood planning levels the minimum site floor levels is 148.11 m AHD (i.e. 1% AEP design level with 0.5m freeboard). This floor level can be implemented for the site.

## 5.6 SITE WATER BALANCE

At the time of writing the site water balance is being addressed elsewhere in the EIS.

## 5.7 ONGOING MANAGEMENT MEASURES

### 5.7.1 Construction

During construction works the construction contractor will be required to use water on the site. This will be from the reticulated supply or a water tanker. Water at the site during construction will be used for dust suppression, watering down vehicles, landscaping, and potentially site sheds (if not on a tank system). The construction works will require the preparation of a CEMP which include the following management measures (Table 4). The CEMP should also include an unexpected finds protocol if groundwater is encountered.

**Table 4: Construction Management Measures**

IMPACT	MANAGEMENT MEASURE
Soil and Water	A Soil and Water Management Plan (SWMP) would be prepared and implemented as part of the CEMP. The SWMP would identify all reasonably foreseeable risks relating to soil erosion and water pollution and describe how these risks would be addressed during construction. The mitigation measures would be prepared and implemented in accordance with The Blue Book - Managing Urban Stormwater: Soils and Construction (Landcom 2004).



IMPACT	MANAGEMENT MEASURE
Soil and Water	A site specific Erosion and Sediment Control Plan/s would be prepared and implemented as part of the SWMP. The SWMP would include arrangements for managing wet weather events, including monitoring of potential high risk events (such as storms) and specific controls and follow-up measures to be applied in the event of wet weather.
Groundwater	<p>An unexpected finds protocol is to be implemented as part of the CEMP. Where groundwater is intercepted during construction works, it will be managed to minimise potential adverse impacts. These may include, but not necessarily be limited to:</p> <ul style="list-style-type: none"> <li>• options to collect and store groundwater to enable recharge of the water table (such as via grassed swales)</li> <li>• where recharge is not appropriate or feasible, discharging groundwater to the surface water drainage system following</li> <li>• appropriate treatment to ensure discharged water is of sufficient quality.</li> </ul> <p>Any approvals required must first be obtained from the appropriate authority.</p>

### 5.7.2 Operations

During the operations of the school water will be utilised for amenities, which includes toilet flushing, hand basins and kitchenette, cleaning, landscaping and maintenance, for example. It is assumed these uses have been considered in the site water balance model which is presented elsewhere in the EIS. Acor Consulting Engineers have raised the idea of utilizing proposed rainwater tanks on site for some operational requirements (e.g. toilet flushing). Operational management measures are identified below (Table 5).

**Table 5: Potential Operational Management Measures**

IMPACT	MANAGEMENT MEASURE
Soil and Water	Limit the use of pesticides in the project footprint where possible to avoid potential contamination of nearby watercourses/wetland areas.
Soil and Water	Local native plant species should be considered in landscaping areas.



# 6 SUMMARY

## 6.1 SUMMARY

This report has presented an overview of site water management for the proposed Staged Concept Plan SSDA for Pacific Brook Christian School at Maitland Road, Muswellbrook. The report collates information for existing studies on the site to provide an overview of surface and groundwater impacts for the proposed development. The report then goes on to identify potential management measures as part of the construction works.

## 6.2 ADDRESSING THE ENVIRONMENTAL ASSESSMENT REQUIREMENTS

As previously noted the Water - Knowledge Division of the NSW Department of Planning, Industry and Environment (DPIE) identified environmental assessment requirements for the preparation of the EIS. These matters are considered in Table 6 below.

**Table 6: Addressing Selected Environmental Assessment Requirements**

ASSESSMENT REQUIREMENT	COMMENTS
The identification of an adequate and secure water supply for the life of the project. This includes confirmation that water can be sourced from an appropriately authorised and reliable supply. This is also to include an assessment of the current market depth where water entitlement is required to be purchased.	The subject has access to reticulated water (and sewer) maintained by Muswellbrook Shire Council.
A detailed and consolidated site water balance.	Site water balance will be addressed elsewhere in the EIS.
Assessment of impacts on surface and ground water sources (both quality and quantity), related infrastructure, adjacent licensed water users, basic landholder rights, watercourses, riparian land, and groundwater dependent ecosystems, and measures proposed to reduce and mitigate these impacts.	<p>Based on existing studies and civil plans it is considered unlikely that groundwater will be intercepted as part of the works. Engineers have prepared designs based on meeting water quality targets (as identified in Council DCP) and post-development surface flows will not exceed pre-development flows according to engineering plans prepared for the SSDA.</p> <p>No groundwater is proposed to be extracted for the construction works. No groundwater dependent ecosystems have been identified on the site. Once the school is operational reticulated water and sewer will be provided to the site.</p> <p>Muscle Creek is to the north of the site (over 100m). Impacts on the Creek from the works are considered to be very low. Appropriate management measures during the construction phase (i.e. preparation of a CEMP) will ensure impacts are negligible.</p> <p>Engineering plans prepared for the works have identified onsite stormwater detention devices (e.g. rainwater tanks) improve water quality and flows from the development.</p>



ASSESSMENT REQUIREMENT	COMMENTS
<p>Proposed surface and groundwater monitoring activities and methodologies.</p>	<p>The construction contractor will need to ensure that the construction environmental management plan (CEMP) contains a soil and water management plan to manage any potential impacts during works. An unexpected finds protocol should be developed for groundwater as part of the CEMP in the event that groundwater is intercepted.</p>
<p>Consideration of relevant legislation, policies and guidelines, including the NSW Aquifer Interference Policy (2012), the Guidelines for Controlled Activities on Waterfront Land (2018) and the relevant Water Sharing Plans.</p>	<p>The site is not within 40m of a water course and a controlled activity approval is not required for the works.</p> <p>Based on current civil plans and existing groundwater studies it is not expected that any groundwater will be intercepted as part of the works. No aquifer interference approval is likely required.</p> <p>Notwithstanding, the construction contractor should ensure an unexpected finds protocol is included in the CEMP in case any groundwater is encountered during the works.</p> <p>In relation to the Water Sharing Plan that applies to the subject site, consultation with Council has identified sufficient existing capacity within the current allocation(s) for the proposed development.</p>