

BUNGENDORE HIGH SCHOOL

BIRCHFIELD DRIVE, BUNGENDORE



REVIEW OF ENVIRONMENTAL FACTORS ARCHITECTURAL + LANDSCAPE DESIGN REPORT

LAND-OWNER

On behalf of School Infrastructure NSW for the NSW Department of Education

NBRS & PARTNERS Pty Ltd 4 Glen Street Milsons Point NSW 2061 Australia

Telephone +61 2 9922 2344 ABN: 16 002 247 565

Nominated Architects. Andrew Duffin: Reg No. 5602

This document remains the property of NBRS & PARTNERS Pty Ltd. The document may only be used for the purposes for which it was produced. Unauthorised use of the document in any form whatsoever is prohibited.

DOCUMENT CONTROL

Revision	8
Author	JOHN VASCO
Last revised	14/03/2025
Status	REF
Approved By	MACELLA SALZMANN
Location	

BRS REF Report_SINSW Bungendore High School.docx

CONTENTS

1.0	INTRODUCTION	4	
2.0	PROPOSED ACTIVITY DESCRIPTION	5	
3.0	PROJECT CONTEXT	6	
	3.1 SITE CONTEXT	6	
	3.1.1 EXISTING VEGETATION	9	
	3.1.2 WATERWAYS AND RIPARIAN ZONE	9	
	3.2 SITE ANALYSIS	11	
	3.2.1 SITE CONSTRAINTS	12	
	3.2.1 SITE OPPORTUNITIES	13	
	3.2.2 PLANNING CONTROL & FUTURE PRECINCT-WIDE DEVELOPMENT	14	
	3.2.3 SITE BOUNDARY	15	
	3.2.4 ACOUSTIC CONSIDERATIONS	16	
	3.2.5 SURBOUNDING RESIDENTIAL AND RUBAL/URBAN CONTEXT		
	3.3 TOPOGBAPHY		
	3.4 SITE SERVICES	19	
	3.5 TRAFFIC & ACCESS		
	3.6 GEOTECHNICAL	21	
	3.7 CONTAMINATION	22	
	3.8 HISTORY / HERITAGE	23	
	3.9 ASSET UTILISATION	25	
	3.10 OUTLOOK OPPORTUNITIES	26	
	3.11 ACCESSIBILITY PROVISIONS	27	
4.0	PLANNING PRINCIPLES	28	
	4.1 SCHOOL VISION	28	
	4.2 KEY GUIDING PRINCIPLES (DIRECT FROM GANSW GUIDE / SEPP)	29	
	4.3 EDUCATION PLANNING PRINCIPLES	32	
	4.4 Hub Typologies and Learning modes	34	
	4.4.1 BLOCKING AND STACKING	35	
	4.5 ARCHITECTURAL DESIGN PRINCIPLES	37	
	4.6 CONNECTING WITH COUNTRY	38	
	4.7 SUSTAINABILITY		
5.0	ARCHITECTURAL DESIGN RESPONSE		
	5.1 URBAN DESIGN	40	
	5.1.1 BIODIVERSITY	43	
	5.1.2 BUSHFIRE	43	
	5.1.3 FLOODING	43	
	5.1.4 STREETSCAPE / PUBLIC DOMAIN	43	
	5.1.5 SETBACKS	45	
	5.1.6 ENTRY PLAZA		
	5.2 BUILT FORM AND SCALE		
	5.2.1 Building Arrangement	47	
	5.2.2 HEIGHT		

	5.2.	I CONNECTING WITH COUNTRY	
	5.2.2	2 BUILDING FACADE	49
	5.2.3	3 VIEWS AND VISTAS	52
	5.2.4	4 SUNLIGHT AND OVERSHADOWING	53
	5.2.	5 VISUAL PRIVACY	54
	5.2.0	5 NOISE	
	5.2.	7 NATURAL VENTILATION	
	5.2.8	3 WIND	57
	5.2.9	9 VISUAL IMPACT ASSESSMENT	
	5.3	KEY PERSPECTIVES	62
	5.4	SAFETY AND SECURITY	64
	5.4.	I CPTED STRATEGY	64
	5.4.2	2 CPTED Response	64
	5.4.3	3 SITE SECURITY	66
	5.4.4	4 SAFETY IN DESIGN	67
6.0	ARRIV	AL AND MOVEMENT	68
	61	PEDESTRIAN MOVEMENT	68
	6.2	SITE SECUBITY	
	6.3	VEHICULAR MOVEMENT	70
	6.4	DROP-OFF/PICK UP AND BUS ZONES	71
	6.5	UNIVERSAL ACCESS AND EMERGENCY SERVICES VEHICLE ACCESS	72
	6.6	VEHICLE PARKING	73
	6.7	BIKE AND SCOOTER PARKING	74
	6.8	WASTE MANAGEMENT	75
	6.9	SERVICES LOADING	76
7.0	OUTD	OOR OPEN SPACE AND LANDSCAPE	77
	7.1	LANDSCAPE VISION	77
	7.2	LANDSCAPE PRINCIPLES	78
	7.3	PROPOSED LANDSCAPE DESIGN	79
	7.4	CONNECTING WITH COUNTRY OPPORTUNITIES	80
	7.5	OUTDOOR LEARNING AND PLAY VARIATION	80
	7.6		
	7.7	DIVERSITY OF SPACES: ACTIVE & PASSIVE	
	7.8		
	7.9		5883 م م
	7.10		04 عد
	7.17		
	7.12	WIND	
8.0	SDRP	DESIGN ADVICE LETTER RESPONSE	88
	8.1	Connecting with Country	
	8.2	Site strategy and landscape	
	8.3	Sustainability and climate change	90



9.0

NBRS REF DOCUMENTS.....

A. Architectural REF Drawing Set.....



 	92
 	92
 	92

1.0 INTRODUCTION

Project Name

Bungendore High School

Proponent

The NSW Department of Education (DoE) is the proponent and determining authority pursuant to Section 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

Landowner

The Minister for Education and Early Learning is the landowner. *

*Note: Based on the assumption that DoE will acquire the allotment prior to the lodgement of the REF

Introduction

This Architectural Report has been prepared to support a Review of Environmental Factors (REF) for the NSW Department of Education (DoE) for the construction and operation of the new Bungendore High School (the activity). The purpose of the REF is to assess the potential environmental impacts of the activity prescribed by State Environmental Planning Policy (Transport and Infrastructure) 2021 (T&I SEPP) as "development permitted without consent" on land carried out by or on behalf of a public authority under Part 5 of the Environmental Planning and Assessment Act 1979 (EP&A Act). The activity is to be undertaken pursuant to Chapter 3, Part 3.4, Section 3.37A of the T&I SEPP.

This document has been prepared in accordance with the Guidelines for Division 5.1 assessments (the Guidelines) by the Department of Planning, Housing and Infrastructure (DPHI) as well as the Addendum Division 5.1 guidelines for schools. The purpose of this report is to outline the intent of the proposal. It should be read in conjunction with the architectural and landscape drawings.



Figure 1. Aerial Photograph of the Site. Source Urbis

Site Description

The current street address is part of 18 Harp Avenue, Bungendore, NSW, 2621 (the site), and is legally described as part Lot 125 in Deposited Plan 1297613. As shown at Figure 1, the proposed school site forms part of a larger lot which is the subject of a proposed residential subdivision.

The site is located within the North Bungendore Precinct (Elm Grove Estate) in Bungendore. As a result of precinct wide rezonings, the surrounding locality is currently transitioning from a semi-rural residential area to an urbanised area with new low density residential development.

The site is zoned R2 Low Density Residential, with all adjoining land also zoned R2 Low Density Residential.

The site has three frontages:

- Approx 500m southern frontage to Birchfield Drive.
- Approx 500m northern frontage to Bridget Avenue.
- Approx 100m eastern frontage to Winyu Rise.

The site is currently cleared of all vegetation and consists of grassland, having been prepared for the purposes of future low density residential development.

PROPOSED ACTIVITY DESCRIPTION 2.0

The proposed activity is for the construction and operation of a new high school known as Bungendore High School at part 18 Harp Avenue, Bungendore (the site). The new high school will accommodate 600 students and 68 staff. The school will provide 26 general learning spaces, and three support learning spaces across two buildings. The buildings will be three-storeys in height and will include permanent and support teaching spaces, specialist learning hubs, a library, administrative areas and a staff hub.

Additional core facilities are also proposed including a standalone school hall with covered outdoor learning area (COLA), a car park, a kiss and drop zone along Birchfield Drive, sports courts and a sports field. The new school also features a single storey building within an adjoining plot of land designed for livestock management and hands-on agricultural learning

Specifically, the project involves the following:

- Building A, which is three storeys accommodating general learning spaces, a special education learning unit (SELU), a physical education centre, a performing arts space, and other core facilities including administrative areas, staff hub, library and end of trip facilities.
- Building B, a part three/part four storey learning hub accommodating general learning spaces, specialist ٠ workshops for food, textile, wood and metal workshops, as well as visual arts studios, science labs and staff area
- Building C, which is a standalone school hall with COLA. •
- Building D, a single-storey agricultural block comprising an animal storage space, a COLA and internal ٠ workshop..
- On-site staff car park with 50 spaces with access via Bridget Avenue. •
- Kiss and drop zones and bus bays along Birchfield Drive.
- Open play space including sports courts and a sports field. ٠
- Associated utilities and services including a 1000kv padmount substation

- Main pedestrian entrance to be located off Birchfield Drive.
- Secondary pedestrian access from Bridget Avenue

• Public domain/off-site works including the removal of street trees The design has been masterplanned to allow for an additional future stage. Figure 2 provides an extract of the proposed site plan.

The proposed site access arrangements are as follows:

- Main pedestrian entrance to be located off Birchfield Drive.
- Secondary pedestrian access from Bridget Avenue.
- Pick up and drop off zone proposed along Birchfield Drive.
- Onsite parking access via Bridget Avenue.

The design has been masterplanned to allow for an additional future stage.

Project objectives apply to Bungendore High School:

- To provide a high-quality learning environment
- To create welcoming facilities which prioritise the care and well-being of the school community.
- To ensure the school responds to the historical context of the site and the cultural knowledge of the traditional custodians of the land thus providing spaces and design aspects that reflect the cultural context.
- To create agile and responsive places and use biophilic design principles, be accessible and welcoming, and respond to the local context of the neighbourhood that will be a source of joy and pride to staff, students, and the local community.
- To consider positioning, massing, bulk, and scale of buildings to respond to the local and environmental context.
- Design to enable future expansion.



Figure 2 Site Plan Source: NBRS

3.0 PROJECT CONTEXT



Figure 1. NSW Greater Site Context. Source: NBRS

3.1 SITE CONTEXT

Bungendore is located east of Canberra within the Queanbeyan-Palerang Regional Council (QPRC) Local Government Area (LGA). It is a picturesque town nestled in the Southern Tablelands of New South Wales, Australia.

Known for its historic charm, stunning scenery, and thriving arts community, Bungendore offers a tranquil escape from the hustle and bustle of city life. Bungendore is located near Lake George, a popular recreational area for swimming, fishing, boating and agricultural livestock grazing.

Bungendore is supported by public transport with several regional bus routes and regional train services from Bungendore Station_connecting onto Sydney and Canberra. The town is a short 40km drive from the Australian Capital Territory and its capital, Canberra. It is approximately 275 kilometres from Sydney CBD.

The 2021 Census indicates 4741 people live in Bungendore contrast to 4178 people recorded in the 2016 census. Although not a significant population increase, QPRC finalized the Bungendore Structure Plan in 2020 and has adopted a high-growth scenario for Bungendore to grow to a population of approximately 12,000 residents.

Bungendore High School (BHS) is a new high school, that will initially cater for 600 students. There will be approximately 67 full-time staff (47 teachers and 20 non-teaching staff). The new high school is in the QPRC LGA and will occupy a 4.204 sqm hectare site with in a new sub-division.

The site is surrounded by three recently completed roads, they are Birchfield Drive (south), Winyu Rise (east) and Bridget Avenue (North). The high school site shares its western boundary with a riparian corridor that acts as a drainage reserve. The high school facilities will be based on SINSW's 500 expandable model of standard hub layouts. SINSW has a commitment to achieving 4-star Green Star certification.

The school will deliver facilities consistent with Department of Education EFSG guidelines including administration, hall, general learning spaces, support learning spaces, all specialist facilities for SLU, food + textiles, wood + metal workshops, library, art, science, PE and performing arts. Also included will be additional learning units of a commercial VET kitchen and agricultural plot and a variety of outdoor spaces such as sports fields, courts, COLAs, and outdoor learning areas.

There was another site previously earmarked for the Bungendore High School closer to the station and existing Primary School. Due to local community objections a decision was made not to continue with this site and an alternative site was found. The NSW Government purchased land off the residential developer for Elm Grove Estate, 2km northeast of Bungendore town centre. The new Bungendore High school project is due to open in 2027.

The North Bungendore area has been rezoned from RU1 Primary Production to R2 Low Density Residential. Due to the growth in this area, there has been a need to increase residential dwellings and provide open green spaces and community amenities.

There is currently a temporary Bungendore High School located adjacent to the existing Bungendore Public School on Majara Street, which opened in 2023.



Figure 4. Site Location and Context. Source: NBRS

The proposed high school site is located on Birchfield Drive. The nearby precinct features include parklands, feature ponds, a riparian/drainage reserve to the west, a train station 2km away to the south and a rail corridor 200 metres to the southeast and low-density residential housing.

There are significant views to the southeast towards Mount Gibraltar, Bungendore and the southern highlands beyond.



Figure 5. Panoramic view looking south. Source: NBRS



Figure 6. Historic Bungendore Train station. Source: Visit NSW



Figure 7. Local cool climate wineries. Source: Contentious Character



Figure 8. Lake George aerial looking south. Source: Andrew Jens/Google Maps

3.1.1 EXISTING VEGETATION

Bungendore is a town located in the Southern Tablelands region of New South Wales, Australia. It has a diverse range of vegetation, including native eucalyptus forests, grasslands, woodlands, and wetlands.

Native Vegetation:

- Eucalyptus Forests: The most common type of vegetation in Bungendore is eucalyptus forests. The predominant species include Sydney gum, black gum, grey gum, and box gum. These forests provide habitat for a variety of wildlife, including kangaroos, wallabies, koalas, and birds.
- Grasslands: Grasslands are found in the drier areas of Bungendore, such as the foothills of the Brindabella ٠ Mountains. The common grasses include native grasses, fescue, and bent grass. Grasslands provide habitat for a variety of insects, reptiles, and small mammals.
- Woodlands: Woodlands are found in the more sheltered areas of Bungendore, such as valleys and gullies. The common trees include acacia, cherry blossom, and hawthorn. Woodlands provide habitat for a variety of birds, insects, and small mammals.
- Wetlands: Wetlands are found in the low-lying areas of Bungendore, such as along the banks of the Yass River. The • common plants include reeds, rushes, and sedges. Wetlands provide habitat for a variety of fish, frogs, and waterfowl.

Introduced Vegetation:

• Exotic Plants: Bungendore also has several introduced plant species, which have been introduced either intentionally or accidentally. Some of the common introduced plants include gorse, broom, and blackberry. These plants can be invasive and can outcompete native vegetation.



Figure 2. Local Context existing vegetation. Source: NBRS

The vegetation of Bungendore is an important part of the local ecosystem. It provides habitat for a variety of wildlife, helps to regulate the climate, and contributes to the beauty of the region. The site, already cleared and significantly modified with earthworks and imported fill, now consists of re-established, mostly non-native grasses. While some native vegetation exists in the surrounding area, the site itself is not mapped as such. The current grassland provides limited foraging habitat for

common birds, but due to surrounding development and previous disturbances, it lacks suitable breeding habitat and connectivity for most native fauna and flora.

3.1.2 WATERWAYS AND RIPARIAN ZONE

Bungendore, a village nestled in the Southern Tablelands of New South Wales, is prone to flooding due to its location at the confluence of Turallo Creek and Halfway Creek. During severe storms, these creeks can overflow their banks, inundating the town centre and surrounding areas. These creeks rise in the hills surrounding the village. Bungendore and its immediate environs are located in a belt of the Southern Tablelands that extends north to Lake George, south to the Turallo Range, east to the Great Dividing Range and to the Molonglo Range and the Lake George Range.

Located approximately 6 kilometres from the high school site, Lake George is the major body of water with Turallo Creek being the major waterway that attracts the risk of flooding.

There is a Riparian zone that acts as a drainage reserve to the west of the site. It is a swale with culverts either side of the new roads directing overland water to the detention basin to the southeast of the development.



Figure 10. Riparian corridor and drainage reserve Source: NBRS



Figure 3. Riparian corridor and drainage reserve flowing onto Detention Basin Pond. Source: Ray White Real Estate



Figure 4. Riparian corridor and drainage reserve from Bridget Avenue looking southwest. Source NBRS:



Figure 5. Detention Basin to the southeastern corner of the development with BBQ shelter and view over to Mount Gibraltar. Source: Ray White Real Estate



Figure 6. Bungendore Flood planning Area QPRC Maps. Source: QPRC Council



Figure 7. Watercourses surrounding the site in present day conditions. Source: TTW report-based on aerial imagery

ours (m AHD) n aerial imagery

3.2 SITE ANALYSIS

The site is orientated in an east west direction. Bungendore is in climate zone 7, it enjoys a temperate climate, typical of the Southern Tablelands region of New South Wales with the following climatic features:

- Four distinct seasons: warm summers, mild autumns, cool winters, and pleasant springs.
- **Rainfall:** is generally moderate throughout the year, with slightly higher precipitation during the winter months.
- **Temperature:** Summers are warm, with average temperatures in the mid-20s Celsius. Winters are cool, with average temperatures in the single digits Celsius.
- **Frost:** Frost is possible during the coldest months, especially in the early mornings.
- Winds: The dominant wind direction in winter (June-August) is from the southwest and in summer (December-February) is from southeast.





Figure 8. Site Analysis. Source: NBRS

3.2.1 SITE CONSTRAINTS

The constraints and challenges of the site include:

1. Easement (Private)

There are two electrical pad mount kiosk substations currently existing on the site. The northern kiosk is off Bridget Avenue, while the other kiosk is located to the southwestern corner of the site. Note both of these existing kiosk substations are a significant distance from the proposed new buildings and a new kiosk substation is proposed to be located on Birchfield Drive.

2. Rail corridor

A railway corridor exists to the southeast of the site and forms a boundary to the residential estate. The impact of the existing regional train traffic noise on the high school development is minimal as the school site is located more than 200m away from the rail corridor.

3. Topography + Lot shape

The Lot is 4.204 hectares and is long and narrow. The proportion of the site limits the connections to and the scale of the outdoor learning environments. The natural undulating topography of the site varies from a 27m -15m sloping diagonally from Bridget Ave to the southern corners of the site, while the fall is across the width of the site towards Birchfield Drive is 18m. A study of the site's typography has heavily influenced the building siting.



Figure 9. Site Constraints. Source: NBRS

A technical memorandum has been provided by GHD stating "the subject site (bound by Harp Avenue, Bridget Avenue, Winyu Rise and Birchfield Drive Bungendore NSW 2621) is depicted on Queanbeyan-Palerang Regional Council's BFPL map as not BFPL. Therefore, requirements for bushfire as outlined in Planning for Bushfire Protection 2019 are not triggered by BFPL mapping for this development."

5. Height Limit

The TI SEPP states;

(2) A building resulting from development carried out on land under this section must not have a height of more than the greater of -

(a) the maximum height permitted for a building under an environmental planning instrument applying to the land, and (b) 4 storeys.

Our proposal is therefore compliant as it does not exceed 4 storeys. However, the QPRC LEP has a height restriction of 8.5m. The buildings have been sighted in terms of location, setback and relative levels to ensure they have minimal impact on the surrounding neighbours. As described above there is no overshadowing or overlooking to private open spaces.

6. Setback

There are no relevant setback controls for schools under the TI SEPP. Residential dwellings however are required to be setback 6m for single storey dwellings and 7.5m for two or more storeys. The BHS proposal has a minimum setback of 10m, and buildings A and the hall are rotated to increase this setback. Within the setback it is proposed to provide a heavily landscaped street frontage to soften the mass of the buildings and minimise overshadowing and overlooking impacts

7. Roads

Roads and civil works have been completed by the developer. The traffic engineer Stantec has confirmed the existing roads are suitable for a High School however upgrades to the public domain will be required. Road indentation for kiss and drop, bus bays and disabled parking are proposed along with two wombat crossings. One on Birchfield Drive near the main entry and another on Bridget Avenue.

8. Traffic

Due to the width of Birchfield Drive and the ability for a bus service to access this road and navigate the existing roundabout to exit the area, all kiss and drop, and bus bays have been located on Birchfield Drive. Due to the topography of the site and to ensure student safety the staff carpark and loading vehicles are proposed to enter the site from Bridget Ave. Details of these zones have been coordinated with the traffic engineer Stantec

SITE OPPORTUNITIES 3.2.1

The site is zoned 'R2 Residential' which permits a range of land uses, including educational establishments. The BHS is neighbouring a residential development, separated by a western boundary and roads to the other 3 sides. The high school site has good access to nearby public amenities, parklands & bushland. The site offers several opportunities in the master planning of the new high school.

1. Connection with nature and riparian zone

The site adjoins a riparian drainage corridor to the west of the boundary. NBRS see opportunities to create design references to the riparian zone and the seasonal creek running within. The masterplan design aims to establish a visual connection to the riparian corridor from the school courtyards and buildings. The agriculture building is strategically positioned on the western side of the site to serve as a buffer between the school and the residential dwellings to the west. This placement also allows for the creation of terraced landscaping, which will help to transition the slope from the higher playing field.

2. Active area to the West

The western portion of the site is flatter and is best suited to locate the sports field and play courts. This active precinct to the BHS site will increase the green landscaped zone with the agriculture building to the west being the first area the community sees as they approach the site from Birchfield Drive.

3. Access to the site

The site is accessible from the three abutting streets. Birchfield Drive will be established as the main access to the high school whilst Bridget Avenue will provide secondary access. Winyu Rise is relatively short and on a downhill slope towards the roundabout and does not provide a level access point into the site. The high school is a 2km from Bungendore train station. The school has an opportunity and demand to establish a public bus connection to the site from the wider Birchfield Drive.

4. Opportunity to optimise northerly orientated buildings & courtyards and shelter from the winds

The site has long east west boundaries the buildings have been sited along the southern boundary to maximise the playground courtyards, take advantage of the northerly aspect and maximise solar access. There will be deep excavation of the northern area to allow for the upper courtyard, this natural retaining wall along with the southern buildings will shelter the courtyard from the harsh winter winds.

5. Opportunity to design the landscape and buildings in response to the natural topography of the site.

The site has approximately a 27m slope diagonally from the Northern centre of the site to the southwest corner and 15m to the southeast corner. Providing an opportunity to integrate the landscape and the architecture to create a unique design that responds to the natural topography of the site. An important contour of RL 736.000 for the lower Hall + Building A will act as the main entry level from Birchfield Drive. The upper RL of 739.750 will be the upper-level courtyard accessible from Bridget Avenue and serve level access to Building B.

6. Create distinct identity for the New High School

The building entry has been located on Birchfield Drive with an entry canopy and forecourt. This space will promote a sense of identity and belonging. It shall be culturally safe and welcoming engaging a number of connections with country initiatives.

The main courtyard spaces shall feature an exposed rock escarpment, the intention being to provide a live learning opportunity for the students in geology, water management and botany, whilst also being

an important aspect of the connection with country initiatives. The escarpment will be a feature of the design and provide a sense of identity for BHS

7. Maximise the surrounding district views.

The site enjoys the benefit of significant district views. The proposed courtyard spaces, upper levels of the buildings and elevated entry forecourt shall take advantage of these views to further solidify the school sense of place.



Figure 18. Site Opportunities Diagram. Source: NBRS

3.2.2 PLANNING CONTROL & FUTURE PRECINCT-WIDE DEVELOPMENT

- 1. The proposed school site is part of Lot 1 DP 1297613 and is located within the Queanbeyan-Pelarang Regional Council LGA.
- 2. The local Aboriginal Land Council is Ngambri. However, the Ngunnawal, Ngambri, Ngarigo and Waljumba People are the traditional custodians of the lands of the Bungendore area
- 3. The main street address is Birchfield Drive (South)
- 4. Secondary streets are Winyu Rise (East) and Bridget Avenue (North)
- The total site area is 4.204 hectares. 5.
- The land is zone R2 Low Density Residential Zone. Previously the site was zoned RU1 Primary Production. 6.
- The maximum height of the buildings is 8.5 meters (under the QPRC LEP 2022). 7.
- 8. The Minimum lot size in the area is- 850m2 (under the QPRC LEP 2022).
- 9. There is no floor space ratio prescribed for the site or heritage conservation.
- 10. There are no specific setback controls for schools, however we have considered the minimum setback requirements for the low-density residential dwellings which is 7.5m for two or more storeys in height.



Figure 19.Bungendore Structure Plan 2018-2048 Source: QPRC council



Figure 20. LEP Land Use Zoning Diagram – Site is zoned R2 Low Density Residential. Source: QPRC council



Figure 21. LEP Building Height Diagram 8.5m. Source: QPRC council

3.2.3 SITE BOUNDARY

The site boundary is surrounded on three sides by roads,

- Bridget Avenue to the north
- Winyu Rise to the east that intersects Birchfield Drive via a roundabout.
- Birchfield Drive to the south, this is the wider road where buses and school drop off will occur.

Beyond the western boundary is an existing footpath and Drainage reserve to divert overland flow. Along the boundaries and in the middle of the site running east – west, lies an existing sewer and stormwater drainage with no easement . Refer also to the Hydraulic and Fire and Services report for detailed information.

There are 2 easements for Essential Energy padmount substations to the North east off Bridget Avenue and to the south west corner of the site off Birchfield drive.

Figure 22. High School Site Electrical Easement E2 Source NBRS

Figure 24. High School Site Boundary from Survey. Source: NBRS

Figure 23. High School Site Electrical Easement E1 Source NBRS

3.2.4 ACOUSTIC CONSIDERATIONS

Rail Link and Train Station

The proposed school sits close to an existing zoned SP2 rail corridor. Zone SP2 is a 'special purpose' zone used to provide infrastructure and related uses. This corridor is approx. 200m away from the eastern corner of the site. Bungendore Train station is located 2km from the school site.

Acoustic Considerations

As stated in the current acoustic report a rail noise assessment was undertaken by SLR in 2020 for the Elmsea Estate. The report indicates that rail noise will have a minimal impact on the site. The school site is located to the northern end of the estate site, more than 200 m away from the rail corridor. Based on measured levels in the SLR report and distance of the school to the rail corridor, rail noise intrusion into outdoor or indoor areas of the school is not expected to be an issue.

Based on the measured noise levels and the State Environmental Planning Policy (Transport and Infrastructure) 2021 internal criteria specific acoustic controls would not be required for the design of future dwellings at the development to control rail noise intrusion.

The operational assessment has considered noise emissions from school operations including building services, outdoor play areas, gymnasium use, outdoor workshop areas and car parks. Road traffic noise increase associated with operation of the school has also been assessed along with noise intrusion into the development site. Various recommendations have been made to mitigate noise sources and enhance the building envelope where feasible and reasonable to demonstrate compliance with target criteria.

The extent and nature of potential impacts are considered low and not expected to have significant impact on the locality, community and/or the environment. Potential impacts can be appropriately mitigated or managed to ensure that there is minimal impact on the locality, community and/or the environment.

Refer to the Arup Acoustic Noise and Vibration Assessment report for current advice on glazing design, ventilation, rain noise, The cumulative contribution of road traffic noise intrusion and building services noise.

3.2.5 SURROUNDING RESIDENTIAL AND RURAL/URBAN CONTEXT

The BHS site is located within the Elm Grove Estate which is in a new subdivision community located in North Bungendore, New South Wales, Australia. It's designed to offer a peaceful and family-friendly living environment, with a focus on spacious lots and affordable housing options. The surrounding area is under construction and will be predominantly low density residential.

The estate may include shared amenities such as parks, reserves, riparian corridor, seasonal creeks. playgrounds, and walking trails

Figure 25. View towards southwest looking towards Bungendore. Source: Ray White Real Estate

Figure 26. View towards North Bungendore Elmslea estate Source: Ray White Real Estate

Figure 27. Bungendore town centre. Source: Aussie Towns

The immediate surrounding context to the high school site includes the following:

- Recently completed Road, Kerbs, Roundabouts and civil works
- Sydney to Canberra rail corridor approx. 200m East
- Riparian drainage reserve along the Western boundary
- Vacant zoned for low density housing
- Pond that acts as a detention basin and is located to the Southeast of the residential development. There is a covered BBQ shelter nearby.
- Future extension of footpaths to support future housing developments and the proposed high school.

Figure 28. Corner of Birchfield Drive and Harp Avenue. Source: NBRS

Figure 29. View of Mount Gibraltar and Substation. Source: NBRS

Figure 30. View from the roundabout looking west along Birchfield Drive. Source: NBRS

Figure 31. View to east looking along Bridget Ave. Source: NBRS

Figure 32. View from the centre of the site looking west. Source: NBRS

Figure 33. View towards roundabout looking south along Winyu Rise. Source: $\ensuremath{\mathsf{NBRS}}$

Figure 34. View from the roundabout looking North along Winyu Rise. Source: $\ensuremath{\mathsf{NBRS}}$

Figure 35. View to western boundary and riparian zone looking south. Source: NBRS

TOPOGRAPHY 3.3

Figure 36. Site Topography. Source: NBRS

The site has an undulating terrain with the highest level of RL 748.000 occurring on Bridget Avenue and falling down approximately 18m towards Birchfield Drive, 27m towards the southwestern corner and 15m towards the southeastern corner of the site.

Natural overland flow drains to a drainage reserve with culverts located along the western boundary. The site has been substantially cleared of the natural vegetation and the developer has installed the roads, kerbs + gutters. The above image illustrates the site topography at the time of the feature survey in September 2024.

The latest survey does show existing retaining walls that would indicate that there has been some excavation along the southern side to level the public domain area.

The image below is an aerial image of the Elms Grove Estate under construction. The site rises from the west and slopes back down towards the East. With significant views towards Mount Gibraltar to the South-East.

Figure 37. Site Aerial image with site boundary. Source: Ray White

Figure 38. View from the centre of the site looking west along Birchfield Drive. Source: NBRS

Figure 39. View from the centre of the site looking East along Birchfield Drive, With Mount Gibraltar in the distance. Source: NBRS

Figure 40. View from the centre of the site looking Northwest along Birchfield Drive, towards the new retaining wall. Source: NBRS

3.4 SITE SERVICES

The following site services exist on the proposed school site:

Water, Sewer and Drainage Mains

In order to serve the former subdivided residential lots, there is an existing sewer main located around the perimeter of the site and along the centre of the site running East-West. The central drainage line will be removed during excavation for the BHS courtyards.

A Water Compliance Certificate application will be required.

Gas Mains

Gas Mains are not shown on the Survey, SINSW has previously instructed the consultant to avoid Gas mains to the site. Vet Kitchens will have a 50/50 split between gas and electric and other canteens and food tech will be all electric. Where gas is required for Bunsen burners in science rooms then LPG gas bottles can be located nearby and plumbed to the required specialist teaching spaces.

Power Supply

The Dial Before You Dig (DBYD) results indicate that Essential Energy has high voltage services located along the perimeter of the site. There are 2 new Pad mount Kiosk substations located to the North of the site off Bridget Avenue (Section 3.5 - Image 2) and to the southwestern corner of the site off Birchfield Drive.

Figure 41. Existing northern kiosk substation. Source: NBRS

Figure 42. Existing Southwestern kiosk substation. Source: NBRS

NBN Connection

The DBYD results indicate an underground NBN Co network around the perimeter site to the 3 road frontages. An application for a connection to the existing infrastructure will be lodged by SINSW at a later phase in the design. SINSW prefer to use Telstra instead of NBN. Pillars may need to be relocated if they clash with vehicular entries.

Figure 43. Existing Comms pillars and NBN pits. Source: NBRS

Telstra

The DBYD results indicate that there is no Telstra network in the vicinity. Telstra is not the network provider for this Development area.

Lighting

The pole-mounted street lighting has been installed. Some poles may need to be relocated along Bridget Avenue, especially the streetlight near the proposed vehicular entry.

Figure 44. Bridget Avenue Light poles. Source: NBRS

Light poles are located along the southern side of Birchfield Drive, the consultant is to confirm if this will provide sufficient light to the school.

Figure 45. Birchfield Drive Light poles. Source: NBRS

For further information refer to Building services Appendices

3.5 TRAFFIC & ACCESS

Bungendore's local road systems has been considered in the design of traffic and parking strategies to minimise impacts on local traffic and provide safe conditions for drop off and pick up of students by private vehicles, public transport, pedestrian and bicycle travel. Staff on-site parking for 50 cars is proposed including 3 accessible parking spaces for staff, visitors & students including support unit students. Bicycle parking for 34 bikes (30 student and 4 staff) and end of trip facilities are included in the design to promote green travel by students and staff. Traffic studies have been undertaken to inform the impacts of the proposed activity.

Figure 46. Intake catchment and projected student location Source: Stantec Traffic assessment.

3.6 GEOTECHNICAL

The site is situated within an undulating topography comprising low-relief hills. Surface levels across the site appear to generally follow the natural hillslopes, which grade down towards shallow gully

JK have done a thorough investigation of the site on the 14^{th of} October. Planned boreholes investigation will be carried out on location as shown in the below image.

The following information was provided by the Geotechnical report. As there is significant excavation it is crucial to determine the level of the Rock shelf.

- 1. General subsurface conditions
- 2. The groundwater level is anticipated to be at depths of about 6m.
- 3. Site preparation
- 4. Excavation and retention
- 5. Site classification
- 6. Foundations

The subsurface conditions encountered within the site are as follows:

- Bedrock, primarily assessed as comprising sandstone with layers of mudstone and quartzite bands, was encountered at depths ranging from 1.5m to 3m below existing surface levels within the site. Bedrock generally increased in strength relatively quickly with depth to medium or high strength.
- Following excavation to the design surface levels it appears that bedrock will be exposed at surface over the northern portions of Buildings A and B and the north-western portion of Building C. Towards the western and south-western sides residual clay and possibly some extremely weathered sandstone will be present in areas of cut. On the southern sides of Buildings A, B and C it appears that the materials at surface will comprise either fill or residual clay. As bedrock will be partially exposed at BEL for most, if not all the buildings, then all footings should be uniformly founded within bedrock. Where bedrock is exposed at BEL then high-level pad and/or strip footings may be feasible, pending advice from the structural engineer, and where at greater depths piles will likely be more economical.
- Along the northern boundary where up to 6m of excavation is proposed to achieve levels for the proposed terraced platform the profile comprises residual clay grading to extremely weathered sandstone with sandstone bedrock encountered a 1.5m to 2m. The bedrock is steeply bedded, likely due to proximity to a geological fault to the north-east of the site. Based on the results an in-situ retention system will be required to facilitate the excavation through the soil and steeply bedded sandstone profile. Excavation of the sandstone will likely require 'hard rock' excavation techniques such as rock hammers, ripping hooks on large dozers or rock grinders etc.
- No groundwater was encountered during drilling. Monitoring wells have been installed should longer-term monitoring of groundwater levels and groundwater quality testing be required.

Figure 10. Bungendore School Draft Plan. Source: NBRS

Figure 11. Geotechnical Borehole Summary A-A. Source: JK Geotechnics

Figure 12. Geotechnical Borehole Summary B-B. Source: JK Geotechnics

3.7 CONTAMINATION

JK Environments (JKE) will carry out a preliminary contamination assessment on the High School site based on the existing site information, historical information and site inspection to determine the following potential contamination sources/AEC:

- Fill material unknown origin.
- Stockpiled materials unknown origin
- Potential historical agricultural land uses primarily grazing.

The PSI included a review of site history information, a site inspection and soil sampling from 35 boreholes. The following potential contamination sources were identified: fill material and historic agricultural (grazing) land use.

The boreholes generally encountered natural soils from the surface of the site underlain by sandstone, siltstone, and mudstone bedrock. Fill material was encountered in four locations only and extended to depths of approximately 0.2m below ground level (BGL) to 1.4mBGL. The fill contained inclusions of ironstone and quartz gravels, ash and root fibres. A selection of soil samples was analysed for the CoPC identified in the CSM. Elevated concentrations of the CoPC were not encountered above the adopted SAC.

Based on the Tier 1 risk assessment, JKE are of the opinion that potential risks associated with the CoPC at the site are low and the data collected during the investigation suggests that significant and widespread contamination issues are unlikely to be encountered.

Further investigation and/or remediation is not considered to be required, and the site is considered to be suitable for the proposed activity from a contamination viewpoint. To compensate for the low sampling density completed for the PSI, we recommend that a robust unexpected finds protocol be prepared by a suitably qualified environmental consultant and that this protocol be implemented during the development/construction phase of the project.

The stockpile materials are excess spoil from the Residential subdivision and will be remediated to be distributed on-site.

Preliminary waste classifications are discussed in Section 9. In JKE's opinion, all fills will classify as 'General Solid Waste (non-putrescible)'. Confirmatory waste classification assessment is required.

The site is not located in an ASS risk area according to the risk maps prepared by the Department of Land and Water Conservation.

Figure 13. Sample Location Plan. Source: JK Environments

HISTORY / HERITAGE 3.8

Below is a brief historical summary of the Bungendore precinct:

Figure 14. Historical Summary of Bungendore. Source: NBRS

Pre-European Settlement:

• The Bungendore area was originally inhabited by the Ngunnawal, Ngambri, Ngarigo and Waljumba people.

European Arrival and Settlement:

- In 1820, European settlers arrived in the area while searching for the Murrumbidgee River.
- The town of Bungendore was officially proclaimed in 1837.
- Bungendore guickly became an important crossroads connecting surrounding towns like Goulburn, Braidwood, Queanbeyan, and Cooma.

Growth and Development:

- The town experienced significant growth in the late 19th century, especially with the arrival of the railway in 1885.
- The discovery of gold at Bywong in 1894 further boosted the local economy.

20th Century and Beyond:

- In the latter half of the 20th century, Bungendore experienced a cultural renaissance.
- The establishment of Canberra as the nation's capital led to an influx of visitors and new businesses. •
- The town became known for its arts and crafts scene, antique shops, cafes, and wineries.

Today:

- Bungendore continues to be a popular destination for visitors seeking a charming country atmosphere.
- Its historic buildings, beautiful scenery, and vibrant arts scene make it a beloved part of the Australian countryside
- Bungendore remains renowned for its arts, antiques, and cool climate wineries.

Aboriginal History

The Bungendore region was historically inhabited by the Ngunawal and Ngarigo people. They are a First Nations group with their own distinct language, also known as Ngarigo. The Ngarigo language belongs to the Southern Myall language family, which is part of the **Pama-Nyungan** language family. This is one of the largest language families in Australia, encompassing a wide range of languages spoken across the continent.

The Bungendore area and the wider Canberra region have connection and association with several Aboriginal language and Nation groups. The ACT Government recognises the Ngunnawal people as the traditional owners of the Canberra region extending east to Bungonia. Queanbeyan-Palerang Council recognise the Ngunnawal and Waljumba peoples as the Traditional Custodians of the Queanbeyan-Palerang region. The Ngambri Local Aboriginal Land Council are the body responsible for the Bungendore area under the Aboriginal Land Rights Act 1983. As well as Ngunnawal and Ngambri, Ngarigu (Ngarigo)people have expressed their ongoing connection to the region through Native Title claims and are represented through community spokespeople and organisations. The Aboriginal Cultural Heritage Assessment Report (Biosis 2016) for the wider subdivision project notes the connection of Ngunnawal and Ngarigo people to the Bungendore region based on ethnographic and academic research.

It's important to note that due to the impact of European settlement and forced assimilation policies, many Indigenous languages, including Ngarigo, have faced significant decline. However, there are ongoing efforts to revitalize and preserve these languages through initiatives such as language programs, documentation, and cultural education.

Traditional Ngarigo Territory:

- The Bungendore region was traditionally the land of the Ngarigo people, a First Nations group with a deep connection to the local landscape.
- The Ngarigo people had lived in the area for thousands of years, developing a rich cultural heritage and understanding of the land's resources.

Aboriginal Heritage Assessment

Past Traces Heritage Consults previously prepared an Aboriginal Cultural Heritage Assessment in August 2021 for the Elm Grove residential subdivision including a full consultation process with registered Aboriginal stakeholders, for Aland and after that Aboriginal Objects Due Diligence Assessment from Urbis February 2025 for SINSW. The reports identified that the results of the Archaeological assessment show two Aboriginal sites present within the project area which will be impacted by the development. However, they are not within the proposed BHS site.

Subsequently The findings of the Urbis Due Diligence report include the following:

- The study area was found to be highly disturbed as a result of past land use activities, flooding events
- The proposed activity is not a 'low impact activity' and will disturb the ground surface.
- There are no known Aboriginal objects or Aboriginal places within the BHS site.
- Past reports indicate the area surrounding the present subject area has potential to retain archaeological remains; however, the present subject area itself is considered unlikely to contain such remains.
- The subject area is located within 200 m of natural water which are considered as sensitive landscape features indicative of past Aboriginal land use.
- The entire subject area has been subjected to ground disturbance that has changed the land's surface, and which remains clear and observable.
- In accordance with the due diligence process described in the Due Diligence Code, the above assessment has determined that no further investigation is required for the subject area. Based on the above conclusions, Urbis recommends the following:
 - Recommendation 1 Record Keeping

- Recommendation 2 No Further Investigation
- Recommendation 3 Unexpected Archaeological Finds Procedure 0

Impact of European Settlement:

- The arrival of European settlers in the 19th century had a profound impact on the Ngarigo people. ٠
- Many traditional lands were taken, and the Ngarigo were forced to adapt to a new way of life. ٠
- The traditional hunting and gathering practices of the Ngarigo were disrupted, leading to significant changes in their cultural and social structures.

Resistance and Resilience:

- Despite the challenges they faced, the Ngarigo people have shown remarkable resilience. •
- They have fought for their rights and worked to preserve their cultural heritage.
- In recent decades, there has been a growing recognition of the importance of Indigenous history and culture, ٠ and the Ngarigo people have played a significant role in advocating for their rights and traditions.

Reconciliation and Cultural Preservation:

- Today, the Ngarigo people continue to work towards reconciliation with the broader Australian community. •
- They are actively involved in cultural preservation initiatives, such as language revitalization and traditional • knowledge sharing.
- Bungendore has become a place where the Ngarigo people can celebrate their heritage and connect with their • community.

The 1800s - 1997: Early settlement

The early settlement of Bungendore in the 1800s was closely linked to the exploration and expansion of European settlement in Australia. Here's a brief overview:

1820: European explorers arrived in the Bungendore region while searching for the Murrumbidgee River. This marked the beginning of European contact with the area.

1837: The town of Bungendore was officially proclaimed. It quickly became an important crossroads connecting surrounding towns like Goulburn, Braidwood, Queanbeyan, and Cooma.

1885: The arrival of the railway significantly boosted Bungendore's growth and development. It provided a convenient means of transportation for goods and people, connecting the town to larger urban centres.

1894: The discovery of gold at Bywong near Bungendore attracted a wave of prospectors and led to a temporary population boom.

Early settlers: The early settlers of Bungendore were primarily European, including British colonists, convicts, and free settlers. They came to the region seeking land, opportunities, and a new life. Many of these settlers were involved in agriculture, livestock farming, and other rural pursuits.

Challenges: The early settlers faced numerous challenges, including harsh weather conditions, isolation, and the need to adapt to a new environment. They also had to navigate their relationship with the Indigenous Ngarigo people, who had lived in the area for thousands of years

Suburb name

The name "Bungendore" is believed to be derived from the Aboriginal word for Big Hill on A Plain.

The exact pronunciation of "Boondara" may have varied among different Ngarigo clans, but it is generally pronounced with a long "o" sound. Over time, the name evolved into "Bungendore," likely due to European settlers' difficulty in pronouncing the original Aboriginal word.

2005 - Present: Rezoning and urban development

The Northwest region of Bungendore is being rezoned from RU1 Primary Production to R2 Low Density Residential, R5 Large Lot Residential, RE1 Public Recreation. The purpose is to create over 300 residential lots with minimum lot sizes of 850m2 to preserve Bungendore's rural character.

Specific Site History

Figure 15. Excerpt from 1888 Currandooly parish map showing ownership of study area and surrounding land. Source: NSW Land Registry

Figure 16. Aerial photograph from 1960. Source: NSW Planning Portal

ASSET UTILISATION 3.9

This diagram illustrates this 4.204 Hectares that the site can accommodate. The high school facilities consisting of:

- o Building A
- o Building B
- o Hall/Canteen/COLA
- Agricultural Building D and plot
- approximately 15,915 m² unencumbered play space.
- Sports Field 70x50m -
- -Staff carpark – 50 car spaces and Future Expansion - 80 car spaces.

A typical large high school attracts a typical unencumbered play space based on 10 m² per student calculation.

ENTRY

SELU ACI

-)

 \leftrightarrow

Figure 17. Open play space plan. Source: NBRS

Figure 18. Functional Area Diagram. Source: NBRS

3.10 OUTLOOK OPPORTUNITIES

The site enjoys views of the rolling Hills, Mount Gibraltar, Bungendore town, Lake George and the Wind farms in the distance.

Figure 19. View looking Southeast to Mount Gibraltar looking south to the rail corridor and reserve. Source: NBRS

Figure 20. View looking Southwest towards Bungendore. Source: NBRS

Figure 21. View looking North towards the Windfarms. Source: NBRS

3.11 ACCESSIBILITY PROVISIONS

The site has a steep crossfall within a short moderate distance. The masterplan aims to locate buildings at 2 levels, Building A and C (Hall) at the lower level and Building B on a full storey above. There are 1:20 walkways to eliminate excessive use of stairs & ramps to accommodate level changes in the horizontal traveling direction. It is expected that the school buildings are vertically connected via stairs and lifts. The design of stairs, ramps & walkways shall comply with the requirements of NCC 2022 and AS 1428.1 – 2009.

There will be 1 lift located centrally to the site and close to an entry which will serve all

There will be an accessible walkway from the lower terrace level to the Building D - Agriculture building.

On grade ambulance access will be provided for access in the Sports field.

Figure 22A. Universal Access across the site Source: NBRS

PLANNING PRINCIPLES 4.0

SCHOOL VISION 4.1

The proposed Bungendore High School is located in Bungendore. The catchment will draw students from Bungendore, Gundaroo, Sutton, Wamboin and Hoskingstown.

The proposed BHS will be 2km away from the centre of town and the current temporary High School and Primary school. The Primary school caters for 500 students and caters for Defence force families and the local community.

Figure 59. School catchment diagram. Source: https://schoolfinder.education.nsw.gov.au/index

4.2 KEY GUIDING PRINCIPLES (DIRECT FROM GANSW GUIDE / SEPP)

The following principles in schools have been adopted from the *State Environmental Planning Policy (Transport and Infrastructure)* 2021 Chapter 3 Schedule 8- Design quality principles in schools (Amendment No2 2024). These relatively similar principles have also been referenced within the Government Architect NSW Design Guide for Schools. These design principles have informed the design. The summary below includes wording of each respective principle and a project specific response to each. Refer to section 5 of this report for detailed design descriptions.

SEPP Design Principles

Principle 1 - Responsive to context

Schools should be designed to respond to and enhance the positive qualities of their surroundings.

In designing built forms and landscapes, consideration should be given to a Country-centred approach and respond to site conditions such as orientation, topography, natural systems, Aboriginal and European cultural heritage and the impacts of climate change.

Landscapes should be integrated into the overall design to improve amenity and to help mitigate negative impacts on the streetscape and neighbouring sites.

Design Response:

The school's design aims to respect the natural surroundings and create a hub within the new residential community. The design considers the site's topography by creating terraced platforms that connect Birchfield Drive and Bridget Avenue. The buildings are rotated to follow the gradients of the site, with a minimum of 10m setbacks to reduce impacts on neighbouring residences.

The landscape design draws inspiration from the natural features of the surrounding woodlands, grasslands, hills, and creeks.

Principle 2 – Sustainable, efficient and resilient

Good school design combines positive environmental, social and economic outcomes and should align with the principles of caring for Country.

Schools should be designed to be durable and resilient in an evolving climate.

Schools and their grounds should be designed to minimise the consumption of energy, water and other natural resources and reduce waste.

Design Response:

The design incorporates passive design strategies, such as east-west building orientation and shading devices, to ensure thermal comfort. The design also includes a focus on water management, with rain gardens and bio-retention areas to manage stormwater runoff.

The school design proposes the use of durable, low-maintenance materials to ensure longevity and minimize environmental impacts. The school aims to minimize energy consumption by using electric systems where possible and using bottled gas for some teaching spaces.

Principle 3 – Accessible and inclusive

School buildings and grounds should be welcoming, easy to navigate and accessible and inclusive for people with differing needs and abilities.

Schools should be designed to respond to the needs of children of different ages and developmental stages, foster a sense of belonging and seek to reflect the cultural diversity of the student body and community.

Schools should be designed to enable sharing of facilities with the community and to cater for activities outside of school hours.

Design Response:

The school includes a variety of outdoor learning spaces and play areas to promote well-being for students' diverse needs. The school design features a main entry plaza off Birchfield Drive, designed to be welcoming and accessible to

all. It will feature a Connecting with Country artwork to promote inclusion of all community members and provide a sense of belonging. The design provides accessible pathways and connections between different levels of the site. The design includes spaces which have the opportunity for community use out of hours.

Principle 4 - Healthy and safe

Good school design should support wellbeing by creating healthy internal and external environments. The design should ensure safety and security within the school boundaries, while maintaining a welcoming address and accessible environment.

In designing schools, consideration should be given to connections, transport networks and safe routes for travel to and from school.

Design Response:

The school includes a variety of outdoor learning spaces and play areas to promote well-being for students' diverse needs. The school has open circulation paths that overlook learning and gathering areas to ensure activation and passive surveillance across the site.

The design uses Crime Prevention Through Environmental Design (CPTED) principles to maximize passive surveillance and create a safe environment.

The design addresses safety risks such as snakes through snake-proof fencing.

Principle 5 - Functional and comfortable

Schools should have comfortable and engaging spaces that are accessible for a wide range of formal and informal educational and community activities.

In designing schools, consideration should be given to the amenity of adjacent development, access to sunlight, natural ventilation, proximity to vegetation and landscape, outlook and visual and acoustic privacy. Schools should include appropriate indoor and outdoor learning and play spaces, access to services and adequate storage.

Design Response:

The school provides a range of spaces to support various activities and group sizes, such as active recreation, sports field, passive play spaces, social interaction, learning and teaching spaces, play and landscaped areas. The building arrangement creates a protected courtyard, which provides visual and acoustic privacy for staff and students. The school utilizes SINSW standardised hub typologies to provide consistent and flexible learning environments together with adequate natural light and ventilation.

Principle 6 – Flexible and adaptable

In designing schools, consideration should be given to future needs and take a long-term approach that is informed by site-wide strategic and spatial planning.

Good design for schools should deliver high environmental performance and ease of adaptation, and maximise multiuse facilities.

Schools should be adaptable to evolving teaching methods, future growth and changes in climate, and should minimise the environmental impact of the school across its life cycle.

Design Response:

The school has been master planned to allow for an additional future stage. The design includes modular grid systems to allow spaces to be reconfigured for different school uses and expanded as needed. It includes adaptable, multi-use learning hubs.

Principle 7 - Visual appeal

School buildings and their landscape settings should be aesthetically pleasing by achieving good proportions and a balanced composition of built and natural elements.

Schools should be designed to respond to and have a positive impact on streetscape amenity and the quality and character of the neighbourhood.

The identity and street presence of schools should respond to the existing or desired future character of their locations.

The design of schools should reflect the school's civic role and community significance.

Design Response:

The school buildings and landscape setting are designed to be aesthetically pleasing, with good proportions and a balanced composition. The three-story learning hubs are separated by shorter, setback circulation and service cores, breaking up the main facades and providing opportunities for variation and landscaping. The school's design respects the residential properties across the bounding roads and has adopted a 10m setback along Birchfield Drive. The buildings are set back even more along Bridget Ave and Winyu Rise. The building setbacks also allow for a landscaped softer edge along the street frontage on Birchfield Drive and reduces visual impact. The entry plaza is designed to be welcoming and to express the school's identity. It will incorporate planting, casual seating, patterned pavements, signage, and artwork to create a pleasant space.

The school buildings form an identifiable façade, providing a distinct presence for the school in the streetscape. The design incorporates solar shading and patterning to reduce the visual impact of the buildings by breaking up their height into a ground floor masonry base, with defined upper floors further broken up with a grid of coloured elements. The materials and colour palette were developed in alignment with a concept celebrating the natural features of the area, mainly the mountain ranges, geological references and flora. The natural colours selected in the material palette aim to reduce stress, glare, and overstimulation in staff and students occupying the buildings.

The landscape design is an integral part of the visual appeal, drawing inspiration from the natural setting of the region, celebrating cultural identity, and supporting educational functions. The design uses native and endemic plant species to strengthen connections to the local flora and fauna, while supporting biodiversity and ecological resilience. The use of stone and permeable paving in the landscape provides robust and long lasting materials that complement the building materials.

GANSW Design Guide for Schools

Principle 1-Context, built form and landscape

Schools should be designed to respond to and enhance the positive qualities of their setting, landscape and heritage, including Aboriginal cultural heritage.

The design and spatial organisation of buildings and the spaces between them should be informed by site conditions such as topography, orientation and climate.

Landscape should be integrated into the design of school developments to enhance on-site amenity, contribute to the streetscape and mitigate negative impacts on neighbouring sites.

School buildings and their grounds on land that is identified in or under a local environmental plan as a scenic protection area should be designed to recognise and protect the special visual qualities and natural environment of the area and located and designed to minimise the development's visual impact on those qualities and that natural environment.

Design Response:

The design is responsive to its setting, landscape, and heritage. The school's design respects the natural surroundings and aims to integrate it within the new residential community. Buildings are arranged to follow the site's gradients, and setbacks of at least 10m are implemented to lessen the impact on neighbouring residences. The landscape design is inspired by the natural features of the surrounding environment, including woodlands, grasslands, hills, and creeks. Terraced platforms connect Birchfield Drive and Bridget Avenue, addressing the site's topography.

Principle 2-Sustainable, efficient and durable

Good design combines positive environmental, social and economic outcomes.

Schools and school buildings should be designed to minimise the consumption of energy, water and natural resources and reduce waste and encourage recycling.

Schools should be designed to be durable, resilient and adaptable, enabling them to evolve over time to meet future requirements.

Design Response:

The design combines positive environmental, social, and economic outcomes. The school uses durable, lowmaintenance materials to ensure longevity and reduce environmental impact. Passive design strategies, such as eastwest building orientation and shading devices, are used to ensure thermal comfort. The design promotes water management through rain gardens and bio-retention areas to manage stormwater runoff. The school aims to minimize energy consumption by using electric systems where possible, with bottled gas for some teaching spaces.

Principle 3–Accessible and inclusive

School buildings and their grounds should provide good wayfinding and be welcoming, accessible and inclusive to people with differing needs and capabilities.

Note— Wayfinding refers to information systems that guide people through a physical environment and enhance their understanding and experience of space.

Schools should actively seek opportunities for their facilities to be shared with the community and cater for activities outside of school hours.

Design Response:

School buildings and grounds provide good wayfinding and are welcoming, accessible and inclusive to people with differing needs and capabilities. The design incorporates accessible pathways and connections across the site. A main entry plaza is located off Birchfield Drive, designed to be welcoming and accessible. The design incorporates shared use opportunities between the community and the school.

Principle 4–Health and Safety

Good school development optimises health, safety and security within its boundaries and the surrounding public domain, and balances this with the need to create a welcoming and accessible environment.

Design Response:

The school design optimizes health, safety and security within its boundaries and the surrounding public domain, and balances this with the need to create a welcoming and accessible environment. The school includes outdoor learning spaces and play areas to promote well-being. Crime Prevention Through Environmental Design (CPTED) principles are applied to maximize passive surveillance and create a safe environment. Open circulation paths overlook learning and gathering areas for passive surveillance. The design addresses safety risks, such as snakes, through snake-proof fencing.

Principle 5–Amenity

Schools should provide pleasant and engaging spaces that are accessible for a wide range of educational, informal and community activities, while also considering the amenity of adjacent development and the local neighbourhood. Schools located near busy roads or near rail corridors should incorporate appropriate noise mitigation measures to ensure a high level of amenity for occupants.

Schools should include appropriate, efficient, stage and age appropriate indoor and outdoor learning and play spaces, access to sunlight, natural ventilation, outlook, visual and acoustic privacy, storage and service areas.

Design Response:

The school has a variety of indoor and outdoor learning and play spaces, including sports fields, multi-purpose courts, natural play areas, and passive zones. Buildings are designed with adequate natural light and ventilation. The design ensures visual and acoustic privacy, incorporating storage and service areas. SINSW standardized hub typologies are used to provide consistent and flexible learning environments.

Principle 6—whole of life, flexible and adaptive

School design should consider future needs and take a whole-of-life-cycle approach underpinned by site wide strategic and spatial planning. Good design for schools should deliver high environmental performance, ease of adaptation and maximise multi-use facilities.

Design Response:

The design includes modular grid systems that allow spaces to be reconfigured and expanded. Adaptable, multi-use learning hubs are incorporated.

Principle 7—Aesthetics

School buildings and their landscape setting should be aesthetically pleasing by achieving a built form that has good proportions and a balanced composition of elements. Schools should respond to positive elements from the site and surrounding neighbourhood and have a positive impact on the quality and character of a neighbourhood. The built form should respond to the existing or desired future context, particularly, positive elements from the site and surrounding neighbourhood, and have a positive impact on the quality and sense of identity of the neighbourhood.

Design Response:

Buildings are designed to create an identifiable façade and identity. Screens, balustrades, solar shading, and patterns are used to reduce the visual impact of the buildings. The landscape complements the architecture through native plantings, rain gardens, and bio-retention areas. The school's design is influenced by the colours and materials of the local landscape, especially rock escarpments.

EDUCATION PLANNING PRINCIPLES 4.3

The NSW Department of Education is committed to ensuring our infrastructure meets the needs of a growing population and enables future-focused learning and teaching to support outcomes for students.

In line with this vision, the Place Creation Handbook for Public Schools aims to create learning environments which support children's ability to thrive academically, socially and emotionally and feel a sense of belonging to their learning community.

The following Education Principles have underpinned the design of all of the learning environments:

Education Principle 1

First and foremost, focus on the needs of learners and learning.

School Planning Considerations:

Development of the Child: The public school system caters for children ranging from 3-4 years old (preschool*), all the way through to 17-18 years (seniors). Recognizing that the development needs of children vary significantly as they grow, school environments must be designed with a deep understanding of the age and particular needs of their student cohort. This includes consideration for how the environment meets the physical, cognitive, emotional, and developmental needs of children, including the following:

- <u>Physical Development:</u> The physical environment of the school should be designed to encourage physical activity and motor skill development. Provide spaces for playing, running, climbing, and playing sports appropriate to the children's age. Additionally, environments should encourage children's healthy physical growth by ensuring access to natural daylight, fresh air and thermal comfort.
- Cognitive Development: Create environments that stimulate curiosity, exploration, and learning. This might involve incorporating age-appropriate interactive displays, and spaces that encourage discovery and problemsolving.
- Social Development: Designing spaces that foster social interaction, collaboration, and empathy. This includes creating areas for group activities, team projects, and peer interaction, as well as quieter spaces for solitary activities or reflection.
- Emotional Development: Ensuring that environments promote a sense of security, belonging, and emotional well-being. This can be achieved through the use of comforting colors, textures, and lighting, as well as providing areas for relaxation or emotional support.

Education Principle 2

Foster community and identity by cultivating a culture of welcome, inclusion, and belonging that celebrates and reflects the diversity of the school community.

School Planning Considerations:

2

Connecting with Country: With over 70 different Aboriginal Nations in NSW, all with different natural and cultural systems, each school site is unique. As such, there is no universal design for Connecting with Country. How the site relates to its context - its community, natural environment, built environment, and cultural setting - should inform the project. Responding to the specific character and identity of a location will allow the school site to compliment and care for Country and allow for deeper connection between Country and people. Additionally, incorporating elements of Aboriginal knowledge throughout the school environment by displaying artworks and symbols that reflect local stories, will promote a sense of pride and shared belonging. For more information refer to the Connecting with Country Framework.

Inclusive Design: School environments should be designed to ensure that the physical space is inclusive and accessible to students, staff, and visitors. Where possible, this includes accessible entrances, pathways, and facilities that accommodate individuals with disabilities or different needs. Outdoor areas should consider children with special needs and create spaces which allow children of different abilities to take part in play and learning activities. A comprehensive approach to Inclusive Design fosters a welcoming and supportive educational environment for everyone. For more information refer to the Inclusive Design Framework.

Shared Community Use: Public schools are central to all communities across the state and local schools play an important role in shaping the culture, environment and economy of each local area. By creating shared use opportunities between community groups and the school, we maximize resources, enhance access to facilities, and foster stronger community connections, benefiting both educational and local development. For more information refer to the Shared Use information page.

Education Principle 3

3 Provide built environments which are aesthetically pleasing, engaging and safe, designed to inspire joy, learning, and a sense of wonder.

School Planning Considerations:

Scale of the Child: The physical design of the school must recognise that children are physically smaller, have different capabilities and sensitivities compared to adults, and require spaces and designs that cater to their unique requirements. Spaces should be appropriately scaled for the size of the child, ensuring that children are not overwhelmed by vast open areas and spaces and objects are physical dimensions for the comfort and ergonomics of the child.

Elements of Play and Delight: Incorporate features that spark joy, creativity, fun and engagement for children, including whimsical shapes, colours, and interactive components that invite exploration and discovery. Incorporating sensory experiences, such as varied textures, sounds, and lighting effects, can also enhance delight. By integrating these elements, spaces become more dynamic and enjoyable, fostering a sense of curiosity, happiness and learning. For more information refer to the Landscape Design Framework.

Safety Needs: School environments should be places where children feel emotionally and physically secure and supported. This involves designing spaces that are welcoming and nurturing. Additionally, children's physical safety should be front and centre in the design of a school, with design measures implemented to minimize risks of injury or accidents. A well-designed physical environment which promotes supervision of children will also ensure that educators feel supported in their duty to keep children safe. For more information refer to the Safety in Design Framework.

Education Principle 4

Provide contemporary, sustainable learning environments, which promote children's understanding and appreciation of the natural world.

School Planning Considerations:

4

5

Environmental Stewardship: Incorporate sustainable design principles that demonstrate stewardship of the environment and promote responsible citizenship. This can include green spaces such as community gardens, outdoor classrooms and nature discovery areas to provide environmental education. Making environmental efforts visible to students through, for example rain gardens, recycling stations and energy monitoring devices can also enhance environmental stewardship. For more information refer to the **Sustainability Framework** and the **Environmental Design in Schools Guide**.

Sustainable Buildings and Environments: By creating ecologically sensitive outdoor spaces and energy-efficient buildings, schools can foster healthy learning environments. Schools should utilise renewable energy sources, incorporate water-saving fixtures and rainwater harvesting systems, and use sustainable, non-toxic building materials. Sustainable transportation options, such as biking and carpooling, are encouraged, along with active community involvement in sustainability initiatives. By implementing these principles, schools not only reduce their environmental footprint but also educate and inspire students to be responsible stewards of the planet. For more information refer to the **Sustainability Framework** and the **Environmental Design in Schools Guide**.

Education Principle 5

Embed the potential for re-configurability, both in the present for multi-purpose use and over time for changing needs.

School Planning Considerations:

Sense of Ownership: Provide opportunities for students, teachers, and staff to personalize and contribute to the school environment. This could involve designated spaces for student artwork, collaborative projects, or community gardens that promote a sense of ownership and pride.

Future-Proofed Layouts: Schools must be designed with flexibility and adaptability in mind to accommodate evolving educational needs and changing demographics. Using a modular grid system, spaces can be easily reconfigured for different school uses over time, and expanded as needs grow. Advanced technological infrastructure is integrated to support digital learning tools and seamless connectivity. By anticipating future trends and needs, future-proofed school layouts ensure that educational facilities remain relevant, efficient, and conducive to student success for years to come. For more information refer to the **Standardised Approach Framework**.

BRS REF Report_SINSW Bungendore High School.docx

4.4 HUB TYPOLOGIES AND LEARNING MODES

Bungendore High School will utilize SINSW standardized hub typologies. The DoE has a pedagogical vision and objective to provide consistent, equitable, affordable, sustainable, and flexible learning environments across the whole state of NSW.

The hub typologies are a standardized and repeatable approach based on an established planning grid, (9mx7.5m) which gives SINSW a consistently high-quality learning environment whilst still providing a flexible space that can be used in many teaching & learning modes. This planning grid ensures the school can be adaptable and evolve to meet future needs.

Figure 61. SINSW Learning Modes. Source: SINSW:

Figure 62. Typical hub layout uses a standardised and repeatable approach based on an established planning grid, (9mx7.5m) Source: SINSW Pattern book September 2024

HS500 INITAL CAPACITY

Figure 63. Expandable 500 3 Storey building layout uses a standardised and repeatable approach based on an established planning grid, (9mx7.5m). Source: SINSW The Expanding High School Rev-06

INDICATIVE SITE PLAN

SITE ASSUMPTIONS: - FLAT SITE (NO RETAINING, ONLY CAP AND CONTAIN). - MIN 1 STREET FRONTAGE WITH 10M SETBACK. - NO DISPOSAL OF MATERIALS. - BAL (IE BUSHFIRE ALLOWANCES) ARE NOT CONSIDERED AND ARE SITE SPECIFIC.

SITE AREAS BASED ON: - 10SQM/ STUDENT OPE/

- 10SQM/ STUDENT OPEN SPACE.
- ALLOWANCE FOR CIRCULATION, CAR + BICYCLE PARKING, LOADING + TURNING, WASTE STORAGE.
- ABOVE GROUND PLANT AND SERVICES PROVISIONS ARE NOT CONSIDERED AND SITE SPECIFIC.

Figure 64. Indicative Site Plan. Source: SINSW The Expanding High School Rev 06

BLOCKING AND STACKING 4.4.1

The functional planning of learning areas considers the relationship between various learning hubs and the potential environmental noise generated by the school. Here are some of the key learning hubs planning considerations:

- The Support Education Learning Units (SELU) are located on the ground floor of Building A where level access from the street to SELU's achievable at a flatter ground gradient.
- -The Performing Arts & Physical Education Hubs are close to the Gym to create a Performing Art Zone
- The Wood & Metal Hub is located on the ground floor of South building B with access to the Carpark level for deliveries
- Other arts learning areas such as food, textile & visual arts are located _ above the Wood & Metal Hub to create equal travel distance from the adjacent General Learning Hubs.
- The Science Learning Area & Food Studios are located on the top floor of the Southern buildings to allow for direct discharge of the mechanical services through the roof.

5 AG BUILDING - GF REF

Figure 23. Figure 65 24. Stacking Plans. Source: NBRS

Figure 66. Stacking Diagrams. Source: NBRS

4.5 ARCHITECTURAL DESIGN PRINCIPLES

NBRS has recently undertaken the design and documentation of various high schools of a similar nature and scale, Rydalmere Education Campus, and Marsden Park New High School. Our experience in applying SINSW standard hub layouts, SINSW The Expandable High School+ Model and SINSW Pattern book informs the design of Bungendore High School.

PRECEDENTS

SINSW PATTERN BOOK

Recessed frame design Window arrangement tailored to functional need behind

Expressed window design Window arrangement varied to adapt to different ceiling height in GLS and Learning Common



Figure 67. Building facade design. Source: SINSW Vol 2 Pattern book Sept 2024



Figure 68. Building facade design and Main entry. Source: SINSW Vol 2 Pattern book Sept 2024

Following our experience on the Rydalmere Education Campus and Marsden Park New High School and the requirement to achieve 5-star Greenstar rating, we will adopt the following key architectural design parameters: Adopt a maximum 3.75m floor to floor height.

Adopt NCC2022 construction requirements.

Ensure sufficient daylight ingress by providing approximately 40% of the glazed area in the building façades. Providing natural ventilation of approximately 6.25% of the floor area.

Consider terracing of landscape and built form in responding to steep level changes across the site.



Figure 69. Rydalmere education campus street elevations. Source: NSW Gov

Marrickville Library Courtyard

Inspired by the following image of the courtyard of Marrickville Library in NSW, we see the opportunity to create a functional outdoor learning area including sensory gardens between the east boundary and the East Block.



Figure 70. Marrickville Library courtyard. Source: BVN

4.6 CONNECTING WITH COUNTRY

The objective is to recognise the material and spiritual connection of Aboriginal people to the land, water and sky of Country. By committing to a process of equitable and meaningful co-design with Aboriginal cultural knowledge holders, school environments which include culturally safe spaces for Aboriginal people will be developed. Aboriginal cultural knowledge and truth telling will be embedded in these environments.

In consultation with Aboriginal culture knowledge holders embed elements of Aboriginal culture within the design. In addition to physical design elements, explore opportunities for the incorporation of intangible cultural elements into the design, inculding signage, naming, way findings, artworks, etc.

Key Green Star/EFSG/Sustainable Buildings SEPP targeted design components:



Figure 71. Green Star/EFSG/Sustainable Buildings Sepp Targeted design components. Source: Arup + NBRS



Climate Change Risk and Adaptation

Address all extreme and high risks



Indigenous Inclusion

Inclusion of Indigenous Design



Inclusive Design

Equal access, diverse wayfinding, inclusive spaces





Waste Separation

Collection of waste streams & appropriate waste storage

ARCHITECTURAL DESIGN RESPONSE 5.0

URBAN DESIGN 5.1

The overarching masterplan concept is to create a high school that respects the natural surroundings, creates a hub within its new residential community, and has appropriate civil and architectural responses in the context of the surrounding development. The benefits of the masterplan layout in the context of the school site are:

- The location of the various functional building hubs follows EFSG guidelines and the new SINSW Pattern book for site relationships to optimize wayfinding, operations, accessibility, and safety across the site.
- The built forms are intended to be designed as close as possible to the planning setbacks to optimize the play areas. Although the Planning setbacks are not confirmed for the new residential development the buildings will be offset a minimum of 10m from the southern boundaries to minimize the overshadowing onto the future residential properties.
- The wider Birchfield Drive will be the primary bus route therefore the main entry should be centrally located off Birchfield Dr, between the Hall and Building A that accommodates the admin/reception on the ground floor. This entry forecourt aims to create a sense of welcome and a meeting place for students and the community.
- The secondary entry points are located between Building A+B for an accessible entry to the SELU. to the ٠ south of Building A.
- Vehicular Entry to the northeastern corner to access the carpark. ٠
- There are 2 other Pedestrian access gates along the Northern boundary off Bridget Ave. No direct access off Winyu rise due to slope and embankment and there is an access point to the Northwest corner to access the Agricultural building.
- The buildings are orientated to align with the contours of the site which follow Birchfield Drive and Winyu • Rise, forming an L shape building layout where Building E will bookend the school as part of future expansion. This also means the buildings provide shelter from the harsh southerly winds to the northern playground spaces.
- A carpark is located towards the eastern boundary and provides access for deliveries and waste removal as well as 50 car spaces.
- Along the north there will be a landscaped escarpment from Bridget Avenue down to the upper-level terrace to ٠ access building B at RL's 739.750. This shall also provide shelter from the winter winds.
- The courtyard spaces between the buildings and Bridget Ave will be designed as outdoor learning spaces with sensory gardens, passive and active play activities which are accessible from the ground floor's general learning spaces & supported education learning areas. The courtyards are terraced to align with the step in the buildings, orientation towards a northly solar aspect and protected from the winds by the building masses and the escarpment to the north of the site. The two terraced courtyards are connected via a 1:20 walkway to provide easy access between the spaces
- An opportunity to create a 'green buffer' along the western boundary of the site where the drainage reserve ٠ meets the agricultural plot, this design references a seasonal creak & the nearby riparian zone. The terraced embankment between the agriculture plot and the sports field will also provide active agricultural terraced farming principals to educate the students.
- West of the hall are active areas such as the basketball courts, sports field and cricket nets. They will have • direct connection to the COLA/hall, sports storage rooms and amenities.
- The southeastern Building B is a setback from the site boundary with sufficient space to accommodate the staff car park, waste, and delivery zone.

The proposed Bungendore High School consists of the expandable 500 buildings, consisting of the following: • Proposed works

- Building A, which is three storeys, accommodating general learning hubs, SELU, PE, Performing arts, administration / staff hub and library.
- Building B, which is four storeys, accommodating general learning hubs, Specialist Tech teaching for food, textile, wood + Metal workshops, Visual Arts and Science Labs and staff areas. EOT and Fire Booster pump room is on the lower ground level aligned with the Building A ground plane.
- Building C, which is a standalone school hall with adjoining COLA.

- Building D, which is an agricultural block with a building to the North western portion of the site...
- Staff Carpark with 50 spaces.
- Open play space including 1.5 sports courts and a sports field measuring 70x50m, 1 cricket batting practice nets.

The proposed site access arrangements are as follows:

- Main pedestrian entrance to be located off Birchfield Drive.
- Secondary pedestrian access from Bridget Avenue.
- Pick up and drop off zone proposed along Birchfield Drive.
- Onsite parking access Landscaping

• Future Expansion – (Note this does not form part of the REF submission) Building **E** GLS 80 Car spaces



Figure 71a. Masterplan. Source: NBRS





Figure 71c. 3D Site Perspective from the North looking south Source NBRS

BIODIVERSITY 5.1.1

An ecological assessment has been provided by GHD which states The site is in very poor condition with low biodiversity value due to the previous broad scale clearing, lack of intact native vegetation and dominance of exotic grass species. The clearing of this non-native vegetation would remove negligible habitat resources for native fauna species. The proposal is unlikely to result in impacts to threatened flora and fauna or threatened ecological communities and their habitats.

5.1.2 BUSHFIRE

A technical memorandum has been provided by GHD stating "the subject site (bound by Harp Avenue, Bridget Avenue, Winyu Rise and Birchfield Drive Bungendore NSW 2621) is depicted on Queanbeyan-Palerang Regional Council's BFPL map as not BFPL. Therefore, requirements for bushfire as outlined in Planning for Bushfire Protection 2019 are not triggered by BFPL mapping for this development."

5.1.3 FLOODING

The BHS site sits outside the flood risk zones. TTW Flood consultant have undertaken flood modelling in the Flood Impact assessment and Flood emergency response plan, which found given the significant change to the typography of the proposal there would be a clear impact on the routing of the overland flows across the site which can be managed with more detailed stormwater management on site.

5.1.4 STREETSCAPE / PUBLIC DOMAIN

The building mass has been setback a minium of 10m and rotated slightly to enable a landscaped frontage to Birchfield Drive. This significant landscaped zone will enhance the streetscape and assist in breaking down the height between street level and the entry plazas and ground floor of the building masses. Pathways and circulation stairs have been included fronting the streetscape to encourage movement and activity within this area of the site.

The balustrading materiality is perforated screening which will provide interest to the facdes. While the entry plaza consists of artwork, feature bouldards and welcome to country signage to ientify the space and create a sense of identity. Artworks is also proposed to the western end of building B which shall also enhance the streetscape.



Figure 72. Flood map 1% AEP event. Source: TTW Flood Report



Figure 73. Birchfield Drive perspective Source NBRS

In terms of public domain works the proposed works includes

New footpath is proposed along Birchfield Drive between the kerb and school boundary.

- This will include SELU access and an indented SELU Kiss and drop off (4 spaces)
- Concrete pavement between boundary and kerb along the full extent of the Drop off areas
- Bus drop off is centrally located accomodating 4 bus spaces.
- West of the bus drop off is the Kiss and Drop off that can accommodate 20 spaces.

New Wombat crossings will be located just north of Birchfield Drive Bus stop and on Bridget Avenue to the west of the crest in the driveway.

The traffic consultants has also recommended there be a refuge island at the pedestrian crossing to the northern end of Winyu Rise and at Birchfield Drive near the round about.

Vehicular crossings will occur on Bridget Avenue for ambulance access to the west and staff parking, deliveries and waste pickup to the east. The Agriculture Building will also require vehicular access currently shown from the south western corner of the site.

All of these measures will improve the usability of this public infrastructure and ensure student and public safety.

As part of these works along Birchfield Drive, several street trees need to be removed to ensure compliance with accessibility standards, ensure pedestrian movement, and support the functional requirements of the streetscape. To maintain and enhance the landscape character, significant new plantings have been incorporated along the school frontage. These plantings will contribute to the overall streetscape quality, providing shade, greenery, and a cohesive visual connection between the school and its surroundings.



Figure 74. Proposed building 3D perspective. Source: NBRS

5.1.5 SETBACKS

There are no relevant setback controls for schools under the TI SEPP. Residential dwellings however are required to be setback 6m for single storey dwellings and 7.5m for two or more storeys. The BHS proposal has a minimum setback of 10m, and buildings A and the hall are rotated to increase this setback. Within the setback it is proposed to provide a heavily landscaped street frontage to soften the mass of the buildings negate overshadowing and overlooking impacts and soften the height difference between the street and ground floor of building A + B.



Figure 75. Setbacks Plan. Source: NBRS

5.1.6 ENTRY PLAZA

The main entry is located on the central southern boundary of the site, off Birchfield Drive. It is located between the Hall and Building A which contains the Admin block. To mitigate the difference between the public domain and the lower terrace a stair angled tp direct students to the wombat crossing.

The Main entry canopy is accessible via a walkway east of the wombat crossing.

This large entry canopy between the Hall and building A. has a soffit that will provide an opportuniity for a Connecting with Country artist to provide artwork .

A sliding gate is located under the canopy at the top tof the stairs to restrict access to the school after hours.

Inside the gates the canopy opens into a large lower terrace space that leads students to the western portion of the site, the upper terrace via a walkway to the more private and sheltered SELU COLA.



Figure 76. Entry plaza plan. Source: NBRS



Figure 77. Proposed building main entrance. 3D perspective. Source: NBRS



Figure 78. Proposed building main entrance 3D perspective. Source: NBRS

BUILT FORM AND SCALE 5.2

The built form and scale of Bungendore High School responds to the local context, and the typography of the site. Buildings have been rotated to follow the gradients of the site and a minimum of 10m setbacks provided to reduce impacts on adjoining residential buildings. The buildings form an identifiable facade and identity for the school with the three to four storey volumes. The building volumes are separated by shorter, setback circulation and service cores which break up the main facades. The buildings have solar shading and patterning to reduce the visual impacts by breaking up the height of the building into a ground floor masonry base, with defined upper floors, further broken up with the grid of sun shading. The form is unified through use of screens and balustrades connecting upper floors, set back from the main facades.

BUILDING ARRANGEMENT 5.2.1

The architectural design, based on the School Infrastructure NSW Expandable School standardized design model, is for three storey learning hub buildings (Blocks A, B) and a single storey gathering space (Block C), arranged around terraced outdoor courtyards. The buildings are set in landscaped outdoor learning and play areas, with perimeter entry plaza, staff & visitor parking, and service and emergency access. The SINSW standardized buildings are utilized for the new Bungendore High School. The standardised buildings are intended to provide efficient and equitable buildings for all NSW public schools. The standardised buildings accommodate learning hubs set out within a standardized construction grid, in three four storey arrangements. Open verandah circulation is provided on the inner side of each building at all floors with vertical circulation and amenities accessed at each end of walkways. The specific arrangement of learning hubs and walkways around the terraced outdoor courtyards encouraging a strong sense of community, safety, and activated shared space. Each of the terraces is activated and has a different identity. The entry plaza between the hall and building A welcomes students, staff and visitors. The student reception connects here also for students to access assistance. The to the east of administration, the support learning hub opens to an outdoor covered area, providing all weather learning opportunities and encouraging inclusion in the broader school by providing an area designed specifically for support unit needs, without separating it from the main school community space. To the west, the gymnasium is provided with large doors allowing for school gatherings in the hall to spill into the lower terrace area and sporting precinct. The canteen is located adjacent to the hall, activating the area with casual seating and the comfort of nourishment and social opportunities. The northern edge of the terraces is open to the rock escarpment allowing a connection back to the geology of the site and providing protection to the winter winds. In addition to enhancing a sense of community, the terraces provide for passive overlooking for student safety, efficient movement between learning spaces, and ease of navigation for students and visitors. Playing courts have been located on the lower terrace adjacent to the hall taking in views over the playing field and agricultural facility and the Bungendore town centre and mountain range.

5.2.2 HEIGHT

With regards to height the TI SEPP states;

(2) A building resulting from development carried out on land under this section must not have a height of more than the greater of-

(a) the maximum height permitted for a building under an environmental planning instrument applying to the land, and

(b) 4 storeys.

Our proposal is therefore compliant as it does not exceed 4 storeys. However, the QPRC LEP has a height restriction of 8.5m. The buildings have been sited in terms of location, setback and relative levels to ensure they have minimal impact on the surrounding neighbours.

The following key height, overshadowing and planning considerations include:

- The height of buildings A and B are 3-4 storeys in height and exceed the 8.5m height plane by 2.4m for Building A and 3.3m for Building B and 3.4m for Building C. Considering the setback and minimal overshadowing and overlooking this is a considered an acceptable proposal.

- A three-storey construction with a 3750mm floor to floor height is lower than an effective height of 25m thus it does not trigger the sprinkler protection requirement.

- The proposed buildings form a buffer along Birchfield Drive, providing acoustic separation between the residential properties and the outdoor play areas within the terrace courtyards. High level open walkways are located on the northern facade on the internal side of the buildings, to minimise noise impacts from the school on adjoining properties and ensure efficient circulation for reduced travel between learning hubs for students and staff.

- Buildings are set back from property boundaries to reduce overlooking and overshadowing of adjacent properties.

- The scale of the three storey buildings is considered appropriate in the context of residential area, however due to the topography of the site these buildings are further elevation above the street level. Significant setbacks and heavily landscaped street frontage buildings and engaging the facades with artwork shall ensure an appropriate street frontage

- The bulk and scale of the new school façade is broken with considered location of sun shading elements, openings & changes in facade materials.



Figure 79. Building Section. Source: NBRS

CONNECTING WITH COUNTRY 5.2.1

The traditional custodians of the Bungendore area is home to the Ngunnawal, Ngambri, Ngarigo and Waljumba People.

Yerrabingin are the Connecting with Country consultants who are facilitating engagement with the various First Nations groups who have cultural connections to the Country where Bungendore High School sits.



Expressing Deep Country

This opportunity looks to Deep Country, and what can be revealed in the design to reflect Country. Opportunities include revealing and celebrating the rock faces on site and integrating the colours of Deep Country within the design. The design can also incorporate re-used rock materials on site for gabion walls and seating boulders. Bungendore High School can also utilise the areas of natural pooling and collecting of water, reminding students and teachers of their contextual location close to Turallo Creek.



Guided by Non-Human Kin

This opportunity encourages human kin of the site to view Non-Human Kin as equals, peers and fellows in Country. This ensures eco-centric perspectives, rather than egocentric. Opportunities include incorporating materials and palettes which compliment Country as well as minimising the design's impact on Non-Human Kin. The re-use of felled trees could provide new habitat for Non-Human Kin. Lastly, the exploration of First Nations art, design and patternation that reflect the fauna of this Country.



Country is Our Teacher

This opportunity grounds education experiences in Country through facilitating moments for active and passive learning. Opportunities include highlighting the relationship between flora, fauna and the everchanging seasons of Country. Gathering areas could also be surrounded by planting species with cultural uses for users to learn. The colours of Sky Country and the unique horizon forms could be reflected in the design. Lastly, softening the edge of the built form allows Country to welcome and invite users into the school.

Fauna patterns expressed with Perforated Aluminum







The undulating form of the Bungendore Horizon is expressed through the interplay of the earthier brickwork and the lighter metal cladding, which evokes the contrast between the earth country and sky.

Exposing Country with Brickwork. Depicting the sedimentary lavering



5.2.2 BUILDING FACADE

The Building Façade has been influenced by the Connecting with country workshops along with the pattern book



INSULATED DOOR BEHIND Figure 81. Example of proposed panels. Source: SINSW Vol 2 Pattern book Sept 2024

NATURAL

VENTILATION

LOUVRE WITH

FIRE RATED

SPANDREL PANEL

Figure 26. Proposed building 3D perspective - Block A walkway. Source: NBRS

SHADING

-ROOF FASCIA -

LOUVRE

RAIN

PROTECTION

METAL CLAD HORIZONTAL BRACE

.∖€

Ы





Example for street facing facades - Colours of the Landscape concept

Figure 27. Proposed building 3D perspective. Building A, Building B. Source: NBRS

Figure 84. Street Facade Typical Elevation. Source: SINSW Vol 2 Pattern book Sept 2024

The southern street facing facades have coloured CFC panels and Sun hoods that relate to the colours of country found at Bungendore that have influenced the school logo. Such as the green tones of the surrounding hills and mountains, the golden yellow grasslands on the perforated screens,

For ease of wayfinding the colours relating to building A+B will allow students, staff and visitors to navigate around the site. The outer stairwells have a blue perforated screen that references back to the blue of Lake George.

Building A being lower in elevation has the red tone that represents the earth

Building B is high in elevation and therefore has the green tones that represent the Mount Gibraltar and the Great Dividing Range to the west.



Figure 85. Proposed building 3D perspective. Source: NBRS







Figure 87. Proposed façade colour images and sources of inspiration. Source: NBRS







Page 50 of 92

Expressing country concept – Colours and contrast of the Landscape

The architectural concept aims to embody the essence of the deep country and the layered nature of the undulating terrain. A blend of bricks, mirroring the site's geology and the colorful mineral veins of local Quartz rocks, will be used to evoke the cross-sectional profile of the undulating landscape and distant mountains.

The lighter coloured metal standing seam profile provides contrast to the brickwork. The Metal cladding matches the Roof Colorbond colour, and also serves to reduce the scale and overall height of the brick wall.



Figure 88. Diagram indicating the undulating landscape. Source: NBRS



Figure 89. Main Entrance – undulating landscape expressed on façade- 3D perspective. Source: NBRS





Figure 90. Images of colours and materials found in the local landscape. Source: NBRS

5.2.3 VIEWS AND VISTAS

The elevated undulating topography provides an opportunity for views to the south looking out to Mount Gibraltar to the east, Bungendore to the south and the Great dividing range to the west.

Buildings A+B are orientated east west to follow the contours, this also provides all classrooms to have access to southerly views of the sweeping panorama of Bungendore.



Figure 91. Site Image. Source: NBRS

The northerly views from the walkways will be uphill with glimpses to the Windfarms to the east of Lake George.



Figure 92. Site Image. Source: Localist Bungendore

5.2.4 SUNLIGHT AND OVERSHADOWING

The following sun diagrams illustrate the ability to substantially fill the school courtyard with ample natural light at various times of the year.

The only neighbouring properties potential affected by overshadowing generated from the BHS proposal are 6 future residential lots on the southern side of Birchfield Drive. Overshadowing does not occur to any private open spaces. It does affect the front setbacks of these neighbouring properties but for a period of less than 3 hours









Figure 93. Sun diagrams. Source: NBRS







KEY PLAN



5.2.5 VISUAL PRIVACY

Low density residential dwellings are proposed to Winyu Rise, Bridget Ave and Birchfield Drive. Due to the topography of the area and the massing of our buildings visual privacy will not be a concern for the property's upslope on the northern side of Bridget Ave.



Figure 94. Site Plan. Source: NBRS

Any properties on Winyu Rise shall be opposite the on grade carparking facility and shall not be subject to overlooking.

The ag facility is only single storey, adjacent the drainage reserve and downslope to any future low density residential dwelling on the northern side of Bridget Street and there shall be no overlooking impact. A row of trees has also been proposed to the western boundary

The hall building does not have any fenestration to the southern elevation and there shall be no overlooking impact to any future low density residential dwelling on the southern side of Birchfield Drive.

Buildings A + B however shall be located on the northern side of Birchfield Drive upslope from the future low density residential zoning on the southern side of Birchfield Drive. These buildings have been setback a minimum of 10m to ensure any overlooking concerns are restricted to the front yard only. Below are sections through Birchfied Drive indicating sightlines from the upper levels of Buildings A, B + C. Visual privacy to the private open space of these residential dwellings shall be maintained.



Figure 95. Site Plan. Source: NBRS

1:500

5.2.6 NOISE

As mentioned in the previous acoustic considerations section, the school will be in close proximity othe Rail corridor. However this is a regional railway corridor and is more than 200m away to the east and is away from the zone of influence.

The buildings located to the south will shield the school noise from the playground spaces to the surrounding residences to the south.

The northern residences will be partially shielded from the playground noise by the escarpment

The noise from the BHS site will be typical of a high school facility.





Figure 96. Site Analysis. Source: NBRS

Figure 96A – Bungendore traffic emissions Source: ARUP

			A3
structure NSW	Project Norre Bungendore High School Stage 1 Destrip Tate Traffic Emissions	Scale 265 1:1250 Rob == Basiship == Peref Number - - - - - - - - - - - - -	

5.2.7 NATURAL VENTILATION

The daylight assessment in the SINSW Patternbook indicates that the minimum glazed area of 8.2 m2 per classroom is required for daylight purposes.

The Natural ventilation requirement Is a minimum louvre area of 4.3 m2 per classroom for natural ventilation purposes.

Natural ventilation is the principle of introducing air change between the ambient and internal, thereby diluting any internal sources of pollution such as odour, carbon dioxide, volatile organic compounds (VOCs) etc. The use of effective natural ventilation can typically be expected to improve the indoor air quality (IAQ) and reduce the use of mechanical ventilation and air-conditioning and associated energy usage. This combination is often referred to as mixed-mode ventilation.

In all newer schools delivered by DoE the natural ventilation is supported by a mechanical ventilation system to ensure the IAQ levels are maintained at all times, even under 'no wind' scenarios, or during periods where use of natural ventilation would result in extremely cold or hot indoor air temperatures

Cross ventilation is encouaraged via natural ventilation fixed louvres that are located on the northern walkway façade and the southern street façade. The louvre should be distributed across the façade to provide the best possible air distribution across the entire occupied area



Figure 97. Solar and ventilation diagram in section. Source: NBRS





* APPROXIMATE, MAY VARIES BASED ON WHOLE PROJECT SECTION J MODELLING

Panel Type 1



1. Cladding 2. Natural ventilation fixed louvre

3. Fixed glazing

4. Mechanical fixed louvre

Figure 98.Fixed Glazing and Natural Ventilation Diagram. Source SINSW Patternbook

5.2.8 WIND

The existing site is currently located in a fairly open area with farmland further afield and low density residential blocks of land, still to be developed, immediately surrounding the site. The local wind climate is reasonably windy, particularly with winds from the north west. The varied typography further influences the local wind climate. ARUP have been engaged to provide a wind assessment. The findings of this report have concluded;

- Strong Prevailing wind are from the northwest and southwest
- Locating buildings on southern side (on downslope side) is ideal to create calmer areas on the north ٠
- Most ground-level locations will be suitable for walking and standing, increasing to walking/objective walking ٠ around some building corners.
- Leeward areas will be calmer, suitable for sitting. However, some seated areas (upper terrace, south of the ٠ main entry, and near the sports field) will require wind mitigation measures like vertical barriers.
- All areas are expected to be safe for pedestrians. ٠
- Future expansion is anticipated to improve wind comfort, especially on the upper terrace, by ideally ٠ connecting with Building B to avoid accelerated wind flow

The seatings areas nominated for mitigation measures shall either be relocated to more sheltered areas such as the lower terrace or to the base of the escarpment or landscape features such as more densely planted ground cover or hedges shall be implemented to protect these zones.



Figure 99a. 3D render of glazed balustrade . Source NBRS



BRS REF Report_SINSW Bungendore High School.docx







Figure 99c mitigation measures to seating areas Source ARUP Wind Report

5.2.9 VISUAL IMPACT ASSESSMENT

The visual impact of the proposed Bungendore High School has been provided below.

The new school will be located within a new residential subdivision,

Currently there are no houses on the surrounding blocks., indicative houses have been modelled on the opposite side of the road to provide context.

The visual impact assessment demonstrates the proposed high school development is in keeping with the

surrounding context as there will be landscaping around the southern perimeter of the site.



View 1. View of South western corner looking east along Birchfield Drive

View 2. View looking south along Winyu Rise



Existing View



Proposed View



Existing View



Figure 100. Visual Impact Assessment diagrams with site images and proposed 3D perspectives. Source: NBRS





View 3. View from the south eastern Roundabout looking at the carpark

View 4. View from the Upper Terrace looking west



Existing View





Figure 101. Visual Impact Assessment diagrams with site images and proposed 3D perspectives. Source: NBRS



Existing View



Proposed View





View 5. View from the Lower Terrace looking towards the Hall

View 6. View of the North western corner looking east along Bridget Ave



Existing View



Proposed View

View 6.





Figure 102. Visual Impact Assessment diagrams with site images and proposed 3D perspectives. Source: NBRS





View 7. View of Main entry looking East along Birchfield Drive



Existing View



Proposed View

Figure 103. Visual Impact Assessment diagrams with site images and proposed 3D perspectives. Source: NBRS

5.3 KEY PERSPECTIVES



Lower terrace view towards Building A + SELU Cola



Upper terrace view towards Building B



Birchfield Drive view towards entry canopy Building A + Hall



Southern Elevation of Building B



View of upper terrace looking west



View of main entry



View of Sports field looking east



View of upper terrace looking west

Figure 104. Building Perspectives

BRS REF Report_SINSW Bungendore High School.docx

SAFETY AND SECURITY 5.4

5.4.1 CPTED STRATEGY

Crime Prevention through Environmental Design (CPTED) is a crime prevention strategy that focuses on the planning, design and structure of cities and neighbourhoods. It reduces opportunities for crime by using design and place management principles that reduce the likelihood of essential crime ingredients (law, offender, victim or target, opportunity) from intersecting in time and space.

Predatory offenders often make risk-benefit assessments of potential victims and locations before committing crime. CPTED aims to create the reality (or perception) that the risks of committing crime are greater than the likely benefits. This is achieved by creating environmental and social conditions that:

Maximise risk to offenders (increasing the likelihood of detection, challenge, and apprehension).

• Maximise the effort required to commit crime (increasing the time, energy and resources required to commit crime). · Minimise the actual and perceived benefits of crime (removing, minimising or concealing crime attractors and

rewards); and

• Minimise excuse making opportunities (removing conditions that encourage / facilitate rationalization of inappropriate behaviour).

CPTED employs four key strategies. These are territorial re-enforcement, surveillance, access control and space/activity management. All CPTED strategies aim to create the perception or reality of capable guardianship. Further, CPTED can also make people, particularly vulnerable people, more comfortable in public spaces and create a sense of safety.

5.4.2 CPTED Response

The design of Bungendore High School employs several strategies to prevent crime through Environmental Design.

Territorial Re-Enforcement

Places that feel owned and cared for are likely to be used, enjoyed, and revisited. People who have guardianship or ownership of areas are more likely to provide effective supervision and to intervene in crime than passing strangers. Furthermore, criminals rarely commit crime in areas where the risk of detection and challenge are high. Effective guardians are often ordinary people who are spatially 'connected' to a place and feel an association with, or responsibility for it. Territorial Re-enforcement uses actual and symbolic boundary markers, spatial legibility, and environmental cues to 'connect' people with space, to encourage communal responsibility for public areas and facilities, and to communicate to people where they should/not be and what activities are appropriate.

The design of Bungendore High School has taken into consideration the following to achieve territorial reenforcement:

•Being a Department of Education facility creating a positive image is a priority. Within the department the Asset Management Unit are responsible for the prompt repair and cleaning of damaged or vandalised property, and swiftly address graffiti.

• To maintain the aesthetic appeal of the school buildings and landscape, it is essential to use materials that minimise opportunities for damage and vandalism. Bungendore High School, has been designed with a range of robust building materials such as face brick with an anti graffiti coating to the ground level, CFC and sheet metal which can withstand moderate impact to the upper levels, powder coated aluminium windows and galvanised steel balustrades will maintain there finish and not peel or flake.

• The Bungendore High School design has considered how to foster community pride and provide a sense of place particularly in the entry space and across the facades. The design has been carefully workshopped with the school and local indigenous community through the connection with country framework. We understand the importance of these elements in maintaining the longevity of the design, which encourages people to identify and report issues and illegitimate behaviour. Details for contacting the school are available for members of the public to seek assistance and report maintenance or vandalism issues.

Surveillance

Public spaces are perceived as safe by individuals when they can observe and engage with others, particularly those who are closely associated with that environment, like store owners or neighbouring residents. Criminals are often discouraged from engaging in unlawful activities in areas that are well-monitored. Natural Surveillance is established when regular users of a space can both observe and be observed by others. This emphasises the significance of a well-considered built environment in its design, layout, orientation, location of buildings, landscaping, and lighting to enable natural surveillance to occur.

• Passive surveillance is maximized in the design of Bungendore High School. All teaching and learning spaces

have good passive surveillance of either the internal gathering space or the other setbacks to deter inappropriate behaviour.

• The site has been master planned with habitable rooms and movement verandahs to have a clear line of sight to the basketball courts, playing fields, the upper and lower terrace play spaces, and the car park to ensure natural surveillance

• The hall has been located adjacent to the administration building to ensure passive surveillance of this communal facility, whilst it is also visible from both Bridget Ave and Birchfield Drive for after hours use. Communal spaces and utilities such as student toilets and waste areas are easily visible.

- Stairwells are open and transparent and doorway free.
- Stairwells are accessed from the movement verandahs which are active and visible from the building entry
- Seating has been strategically located in active use areas.
- The circulation paths around the school are open and overlook learning spaces and outdoor gathering areas to ensure activation and passive surveillance across the site.
- Within the buildings, glazed walls allow for passive surveillance between teaching spaces

increasing accountability of both staff and students.

• The design of student amenities includes good passive surveillance of circulation and common areas and employs the SINSW amenities strategy to ensure minimization of bullying, self harm and general student safety

• The administration block which is staffed during hours of operation overlooks the entry plaza and will monitor comings and goings to ensure perceived safety and accountability of people entering the school via the plaza.

· CCTV shall be provided to monitor isolated and high-risk areas.

• Consideration has been given to natural surveillance when designing the landscape and lighting to ensure a safe and secure environment. The site entries and exits, service areas, pathways, and car park will be well lit when in use during the evening and night.

• The design of pathways, walkways and circulation verandahs are direct and the buildings and carpark has been located to avoid blind corners.

• All barriers, including landscaping and fencing, are permeable for visibility.

• The main entry has been strategically placed in prominent position, making it easily recognisable and accessible. Although elevated it has been setback to ensure a visual connection before entering the space. It is visible from the street and includes a series of security measures which enhances natural surveillance from the street and ensures the school community can enter the space with confidence and ease.

• In terms of the carpark design at Bungendore High School it has been located for easy access for the staff but secured from the students. It is observable from neighbouring residential properties and a clear line of sight throughout the car parking area ensures natural surveillance.

• The positioning of the new buildings along the Birchfield Drive street frontage shall maintain a high level of surveillance outside the school grounds.

Access Control

Access control treatments restrict, channel, and encourage people and vehicles into, out of and around the development. Wayfinding, desire-lines, and formal/informal routes are important crime prevention considerations. Effective access control can be achieved by using physical and symbolic barriers that channel and group pedestrians into areas, therefore increasing the time and effort required for criminals to commit crime. Technical/Mechanical access control includes the employment of security hardware.

A fencing strategy for Bungendore High School has been developed which conveys a sense of ownership and reduces unauthorised use or entry. The fence line defines a clear boundary which helps people recognise private property and informs passers-by when someone is trespassing or using the premises unlawfully. Corromesh fencing has been specified which is transparent and maximises natural surveillance from the street to the building and vice versa, while concurrently minimising areas where intrudes may be hiding.
Wayfinding and signage is proposed which provides clear building identification and serves to prevent unintended access and aids individuals, including emergency vehicles, when locating specific buildings especially in urgent situations.

Space / Activity Management

Space/Activity Management strategies are an important way to develop and maintain natural community control. Space management involves the formal supervision, control, and care of the development. All space, even well planned and well-designed areas, need to be effectively used and maintained to maximise community safety. Places that are infrequently used are commonly abused. There is a high correlation between urban decay, fear of crime and avoidance behaviour.

• As discussed above a surveillance strategy has been implemented which prioritise the creation of spaces with clear sightlines, visible entrances, and permeable security elements.

• The design response includes the use of transparent fencing, visible entrances, and effective lighting, collectively enhance natural and mechanical surveillance, deterring potential criminal activities.

• CCTV monitoring is to be implement in the build and the landscape design considers the placement of vegetation and the choice of low shrubs, which minimising hiding opportunities and enhancing overall safety.

The design responses for Bungendore High School effectively integrate CPTED principles, creating a secure, welcoming, and community-oriented environment. The school aims to provide a safe place for students and extends its role as a community hub, fostering positive interactions and shared responsibility.

5.4.3 SITE SECURITY

In line with SINSW Asset Management Unit (AMU) site security strategy the perimeter site security is as follows:

- Using the building edge as a security barrier instead of fencing is restricted to the Public interface of the Hall and building A+B on southern portion.
- The southern building facades contain a brick plinth and will be act as a secure solid boundary
- Western and southern fencing is proposed to be offset by a minimum of 1m from the site boundary to create a soft landscape buffer to soften the appearance of a fenced-off property.
- Sliding gates with access control and remote activation to provide access to the staff carpark. Remote activation and access controls will allow for vehicle entry to the carpark
- The BHS site will not be open to the public after hours.
- The elongated site will contain a secure perimeter fence •
- As the site is prone to to snakes, to reduce the risk of vermin entry there will be Corromesh or equivalent fencing to the perimeter.



Figure 29. Proposed building 3D perspective along Birchfield Drive facing East. Source: NBRS



Figure 30 Proposed building 3D perspective indicating site security. Source: NBRS

5.4.4 SAFETY IN DESIGN

Safety in Design (SID) workshops have been carried out to identify the potential project risks from inception to completion. The SID assessment result in a list of potential project risks and the mitigation strategy. Project risks will be mitigated, designed out or managed throughout the subsequent stages of the project.

SLOPE, AND LEVEL CHANGE DESIGN RESPONSE

Key site level challenges include:

Long and undulating site with a considerable fall from the central Northern portion to the south, southeast and west.
 Mitigate through site levelling for the Upper tand lower terraces and providing adequate drainage and detention
 Accessible paths of travel and providing compliant access between existing site levels and proposed buildings, and between buildings at different levels.

ROADS AND FOOTPATH

All Kerbs and Gutters have been provided by the subdivision developer, however this was designed for a residential sub division not a High School. Mitigated through inclusion of public domain works providing an indented carspaces for SELU accessible carparking, Wombat crossings and proposed drop off pick up arrangements for the new facility. Mitigation of road safety risks through inclusion of womabt crossings to both Bridget Avenue to the North and Brichfield Drive to the South,

BUSHFIRE NCC AND PLANNING FOR BUSHFIRE PROTECTION REQUIREMENTS The site is outside the Bushfire prone land.

FLOOD

Flood consultant TTW has advised the risk of flooding is quite low as ithe proposal is towards the top of a hill, however surrounding roads and intersections are subject to flooding in major storm events. Further analysis has been undertaken in the way of flood modelling in the Flood Impact assessment and Flood emergency response plan, which found given the significant change to the typography of the proposal there would be a clear impact on the routing of the overland flows across the site TTW advised this can be managed with more detailed stormwater management on site.

FAUNA RISKS

Locals have advised that snakes, including venomous species have been sighted on the subject site. Part of the safety in design response is proposed snake proof fences to minimise opportunities for snakes to enter outdoor play areas. Weather seals are to be included on all doors, sealed waste areas to minimise attraction for rodents, which would in turn attract snakes, and ongoing maintenance to ensure grass and pathways are kept clear for visibility. These measures are designed to minimise risks to occupants and will be further developed in future stages of the design.

CONTAMINATION OR HAZARDOUS MATERIALS DESIGN RESPONSE

Risk of in ground contamination or presence of hazardous materials is low as the site was previously reserved for Pastoral grazing. Mitigated through Preliminary Site Investigation including boreholes, water wells, and specialist review of site samples from these investigations. Preliminary investigations revealed no contamination in samples. Ongoing vigilance during construction will mitigate further risks.

6.0 ARRIVAL AND MOVEMENT

6.1 PEDESTRIAN MOVEMENT

ACCESS

The primary access to the site is via the southern entry on Birchfield Drive where there will be an accessible entry near the SELU Kiss & Drop off and a main stair adjacent to the proposed school bus bay aligned with the Wombat crossing. Bridget Avenue will have 2 secondary pedestrian entrances and the vehicular carpark and deliveries entry. The Wombat crossing will be located on the western side of Bridget Avenue to align with the Sports field. The combination of the traffic of the future housing estate and the anticipated high school traffic will increase congestion along Birchfield Drive. The Traffic consultant along with Council and SINSW Traffic stakeholder have confirmed that onstreet parking lane are acceptable for the Kiss and Drop off and Bus Drop off.

However, the existing kerb will need to be amended for indented on-street parking for the SELU Kiss and Drop off parking. There will also need to be at least 1 Accessible on-street parking spot in this location. The Public domain will require amending and formalised refuge crossings with barrier kerb will be required.

Access to the staff carpark & Workshop deliveries via Bridget Avenue, the proximity to Winyu Rose has been confirmed to be acceptable by the Traffic consultant.

Below is a table summarizing the on-street Bus zones and Kiss and Drop off lengths

	EXP 500	
Bus Zone	4 standard buses = 69.5m	
Kiss and Drop Zone	20 spaces	
Accessible spaces	4 spaces	
Bicycle parking	34 Bicycle spaces	



Figure 31. Site plan with vehicular and pedestrian access. Source NBRS

SITE SECURITY 6.2

In line with SINSW Asset Management Unit (AMU) site security strategy the perimeter site security is as follows:

- Security fencing is located along the perimeter of the site.
- The southern portion of the site, from Building C to the eastern corner of building B does not have security fencing as there is an embankment and high masonry walls that will act as a secure barrier. Landscaping will soften the southern walls that also have balustrade fencing on top.
- There will be a secure pedestrian double sliding gate in between Building C Hall and Building A Admin. -
- The Staff carparking will have a secure fence to prevent students from entering the staff only carparking. -
- Due to the level difference from the eastern staff parking to Winyu Rise there will be a crash barrier fence. -
- The Substations will also have a Perimeter fence -
- The Ag Building and the Staff parking will have the perimeter fence return into the site with a secure gate with intercom bollard. This is so that a vehicle can park wholly within the site boundary and not impede the pedestrian footpath. -CCTV will be compliant with SINSW guidelines.

SINSW Technical Stakeholder Groups will need to review the security layout for approval in Schematic Design Phase



Figure 328. Site Fencing strategy. Source: NBRS

		BOUNDARY
	FENCES	
		2.1M SECURITY FENCE
- //		1.2M BALUASTARDE
1		4M BALL CATCH NETS
1.1.1		2.1M CHAINLINK FENCE
The second		1.2M 900MM PIPE RAILING
		CRASH BARRIER WIRE FENCE
and the se		2.1M PERFORATED SCREEN
		BIN SCREEN WALL
	GATES	
	DD	2.1M SECURITY SINGLE/ DOUBLE SWING GATE
		2.1M SLIDING SECURITY GATE

6.3 VEHICULAR MOVEMENT



Vehicular movement to the site is achieved from Birchfield Drive that head west to connect onto Tarago Road.

Figure 109. Subdivision Plan indicating vehicular movement and direction. Source: Elm Grove Estate

Vehicular access to the school is provided at the corner of Bridget Avenue and Winyu Rise to access the Staff car parking, waste and deliveries. There will also be a vehicle crossing at Bridget Avenue for the agricultural plot to the west and the sports field for emergency vehicles only. The traffic consultants have confirmed that a bus can fit and maneuver around Birchfield Drive.

Emergency vehicles can also navigate around the perimeter of the site.

Site requirement – school bus bay



Figure 110. Bus Swept Paths. Source: Stantec

6.4 DROP-OFF/PICK UP AND BUS ZONES

Since the wider road is Birchfield Drive, the main school frontage is on the south portion of the site where the land tends to be flatter, compared to Bridget Ave

The flattest portion of Birchfield Drive is reserved for the SELU drop off area. This has been indented into the public domain and accessible car spaces have been provided. This will lead into a level walkway to the SELU teaching area entry on the south side of building A.

Further west there is a Wombat crossing, with a raised speed hump to reduce the traffic speed.

The Bus drop off allows for 4 bus spaces and is centrally located to align with the main entry

The main drop off area is further west of the Bus drop off is 120 m long (20 car spaces) and allows the driver to see the student entering and exiting the school grounds.

If increased students need to be accommodated in the future expansion the drop off spaces can continue further west.

Bridget Avenue to the north is not as wide as Birchfield Drive and dedicated drop off areas are not provided here. Winyu Rise has a steep incline and drop off paring is not recommended here.



Figure 111. Proposed building 3D perspective. Source: NBRS



Figure 112. Pick up/Drop off plan. Source: NBRS

UNIVERSAL ACCESS AND EMERGENCY SERVICES VEHICLE ACCESS 6.5

Considering the typography of the site an important design objective was to provide universal access across the entire site. The diagram below outlines how this has been achieved. Emergency access has been planned to accommodate ambulance and fire brigade services as close to the site boundary as possible, with the following provisions:

- Access to the service area next to the playing field and courts.
- A hardstand area will be provided at the drop-off zones at the base of the main entry forecourt for ambulance and fire brigade access. The fire brigade will have access to the fire booster assembly centrally located off Birchfield Drive.
- The SELU kiss-and-ride zone on the south east side can also be used by emergency vehicles.
- A hardstand at the entrance of the upper terrace will be available for emergency use as well.



Figure 33. Emergency Services Vehicle Access Plan. Source: NBRS



Figure 113. Universal Access and Emergency Services Vehicle Access Detailed Plan. Source: NBRS
6.6 VEHICLE PARKING

Dedicated staff only parking is to be located to the eastern portion of the site. There is an allowance for 50 carspaces The singular entry will need to be accessed via a card reader and to exit ainduction loop inside the gate line is to be implemented.



Figure 34. Rendered Vehicle Plan. Source: NBRS



Figure 35. Vehicle Plan. Source: NBRS

6.7 BIKE AND SCOOTER PARKING

Bike and scooter parking will be located within the school fence line. The is a preference to locate the parking near the entries to the school.



Figure 36. Bike rack locations. Source: NBRS



Figure 37. Proposed bike rack design

6.8 WASTE MANAGEMENT

A waste storage area and collection arrangements have been designed for recyclable and general waste to be stored on site, collected on a regular basis and removed for recycling where possible. The waste collection vehicle will collect stored waste from the service area of the carpark. waste collection is to be scheduled outside of operational hours to ensure minimal disruption to the school.

Deliveries to the site will be either via the carpark service area, with intercom communication to staff in the administration hub, or via the front reception.

Planning of the school considered canteen, food tech and wood and metal deliveries and located these in proximity to the carpark service area for efficient materials deliveries.

The waste collection area for the school is located to the southern western corner of the proposed Carpark. The Traffic and Waste consultants have confirmed that the Waste vehicles can enter and exit via the singular access gate off Bridget Avenue.

The waste enclosue is close proximity to the Covered outdoor workshiop area.



Figure 118. Waste Management Plan. Source: NBRS



Figure 119. Waste Vehicle Swept Paths. Source: Stantec Traffic consultants



Figure 120. Building B Eastern Perspective. Source: NBRS

6.9 SERVICES LOADING

The loading area for the school is located to the southeastern corner of Building B with access to the the proposed Carpark. The traffic consultants have confirmed that the Loading vehicle can enter and exit via the singular access gate off Bridget Avenue. The loading dock is close proximity to the Covered outdoor workshiop area





Figure 121. Services Loading. Source: NBRS

Figure 39. Services Vehicle Swept Paths. Source: Stantec

7.0 OUTDOOR OPEN SPACE AND LANDSCAPE

LANDSCAPE VISION 7.1

The landscape and open space design objective is to provide a proposal that embraces the site's topography challenges and borrows from the natural features of the surrounding landscape, the woodlands and grasslands, the hills and the creeks that shaped those. The landscape design looks at the opportunity to introduce terraced platforms that are both, levelled with the building for easy access and considered a contour line that connects both Bridget Avenue and Birchfield Drive. The aim is to maximise open plan and

facilitate easy transition between these levels. To achieve this, significant earthworks are required but we see this an opportunity to make a feature out of these spaces.



Figure 123. Inspirations taken from the natural features of the surrounding landscapes and design ideas. Source: NBRS

LANDSCAPE PRINCIPLES 7.2





Figure 124. Topography plan. Source: NBRS

Design in response to the site topography

- Celebrate the site conditions by exposing the rock or using it crushed in gabion walls
- Use the level difference for seating opportunities and interesting spaces that engaged having different levels.
- The design optimises the terraced landscape as ٠ physical separation to create smaller and more intimate courtyards catering to a combination of target play spaces, outdoor learning areas, sensory gardens, seasonal gardens, and outdoor breakout spaces.
- Incorporating soft landscape in between walkways, stairs, and ramps.





Take reference from the natural surroundings.

- Use of rock where possible as seating, elements, paving and in the gabion walls.
- The school site sits on top of the hill so the design will reference those characteristic creeks of the area with some graphics interpretation.
- Allow for canopy & understory planting that consists of endemic and local native species that would typically be found in the neighbouring natural reserves to further strengthen the connection to the natural habitat.
- Planting of native species will have lower maintenance & water usage requirements. It will also provide improvements to biodiversity and ecology.
- Colours and patterns of the outdoor space to reflect the Colours of Country

Increase Green Presence in all spaces.

• Create as much green footprint as possible and increase the canopy cover of paved areas lowering the heat island effect across all the areas of the open space.









Variety of Spaces

- The design incorporates targeted play areas suitable for different age groups.
- Provide an adequate combination of social & play spaces, assembly areas, outdoor learning areas, gardens and sporting/ recreational areas.





Connecting with Country

We will look for opportunities to incorporate the following Connecting with country elements in the landscape design to respect the history of the land







Figure 125. Landscape Precedents. Source NBRS



Figure 126. Image of local wildlife.

7.3 PROPOSED LANDSCAPE DESIGN









Turf







Pavement Colour

Concrete paving

Compacted gravel paving

Sports court

Retaining Walls

Bleacher's seating







Outdoor Furniture



2	
l	
i	
1	
1	100.000
1	
i	
l	
i	
1	
i	
R	
1	
	PLAT UPOE 5
į	PORTURES
	•••
	•••
	••••••••••••••••••••••••••••••••••••••
	● ● ■ ■ ■ ■ 0

PAV01 - COLOUR CONCRTE a
PAV02 - COLOUR CONCRTE b
PAV03 - COLOUR CONCRTE ¢
PAV04 - COLOUR CONCRTE (standard)
PAV05 - COMPACTED GRAVEL
PAV06 - PLEXI PAVE (MULTI COLOUR)
ASPHALT
WA01 - GABION WALL
WA02 - EXPOSED STONE
WA03 - 900w x 350h BLEACHER WALL
WA04 - FEATURE BRICK WALL
WA05 - BRICK BIN SCREEN
WARE - NOREOLK RLOCK WALL
WAUG - NORFOLK BLOCK WALL
WA07 - SLEEPER WALL
WA07 - SLEEPER WALL
WAD - NURPER BLOCK WALL WAD7 - SLEEPER WALL FX01 - STOOL
WA07 - SLEEPER WALL FX01 - STOOL FX02 - TABLE
WA07 - SLEEPER WALL FX01 - STOOL FX02 - TABLE FX03 - PLATFORM BENCH
WA07 - SLEEPER WALL FX01 - STOOL FX02 - TABLE FX03 - PLATFORM BENCH FX04 - BENCH SEAT
WA07 - SLEEPER WALL FX01 - STOOL FX02 - TABLE FX03 - PLATFORM BENCH FX04 - BENCH SEAT FX05 - SINGLE SEAT
WA07 - SLEEPER WALL FX01 - STOOL FX02 - TABLE FX03 - PLATFORM BENCH FX04 - BENCH SEAT FX05 - SINGLE SEAT FX06 - CONCRETE BENCH
WA07 - SLEEPER WALL FX01 - STOOL FX02 - TABLE FX03 - PLATFORM BENCH FX04 - BENCH SEAT FX05 - SINGLE SEAT FX06 - CONCRETE BENCH FX07 - SHADE SAILS
WA07 - SLEEPER WALL FX01 - STOOL FX02 - TABLE FX03 - PLATFORM BENCH FX04 - BENCH SEAT FX05 - SINGLE SEAT FX06 - CONCRETE BENCH FX07 - SHADE SAILS FX08 - BASKET/NETBALL HOOPS
WA07 - SLEEPER WALL FX01 - STOOL FX02 - TABLE FX03 - PLATFORM BENCH FX04 - BENCH SEAT FX05 - SINGLE SEAT FX06 - CONCRETE BENCH FX07 - SHADE SAILS FX08 - BASKET/NETBALL HOOPS FX09 - BIKE RACKS
WA07 - SLEEPER WALL FX01 - STOOL FX02 - TABLE FX03 - PLATFORM BENCH FX04 - BENCH SEAT FX05 - SINGLE SEAT FX06 - CONCRETE BENCH FX07 - SHADE SAILS FX08 - BASKET/NETBALL HOOPS FX09 - BIKE RACKS FX10 - FEATURE BOULDER/ROCK

7.4 CONNECTING WITH COUNTRY OPPORTUNITIES

Connecting with Country has been at the forefront of the landscape architectural design since the Masterplan stage through to the current proposed design. From research and consultation conducted by NBRS, CWC consultants and representatives, several key CWC themes have been emerged and form a strong framework for incorporating Connecting with Country elements within the design. The following site plan features the extent of Connecting with Country themes that have been integrated in landscape design.

7.5 OUTDOOR LEARNING AND PLAY VARIATION

A mix of outdoor learning and variety of play spaces will be incorporated into the landscape design, A variety of play areas provide options for individual and team sport e.g. footy field and multipurpose courts, natural play, and passive play zones e.g. benches and rock benches. Multiple outdoor areas such as shaded colas, seating nooks, agricultural land and lawn areas provide options of large or small group teaching spaces, as well as indigenous garden areas.



Figure 127. Connecting with Country Plan.. Source: NBRS

OPEN PLAY AREA 7.6

Unencumbered play area typically refers to a designated space or area that is free from obstacles, obstructions, or hazards, where children can engage in unstructured and spontaneous play. The current outdoor design, as shown in the Figure above, provides 15,915 sqm which equals to 15.91 m2 per student in a future extension.

OPEN PLAY SPACE*



PASSIVE PLAY	9175m ²
ACTIVE PLAY	6321m ²
COLA	203m ²
SELU COLA	216m ²

Total play space = 15,915 m2

M2 per student (1000 student) = 15,91 m2

Figure 128. Open Play Space. Source: NBRS



7.7 **DIVERSITY OF SPACES:** ACTIVE & PASSIVE

The landscape design incorporates a mix of outdoor learning spaces and a variety of play areas to create a dynamic and inclusive environment. A diverse range of play spaces will provide options for both individual and team sports, including the sports field and multi-purpose courts for activities like basketball and netball. Natural play areas and passive play zones with benches and rock seating that will offer quiet spaces for relaxation and social interaction. Outdoor learning will be supported through multiple designated areas. Shaded COLA (Covered Outdoor Learning Areas) will provide flexible spaces for large group teaching, events, and collaborative learning activities. Seating nooks will offer smaller, more intimate settings for group or individual study. Agricultural land will be included to facilitate hands-on learning about sustainability and food production, and expansive lawn areas will accommodate informal teaching sessions and recreational use.

Additionally, Indigenous garden areas will celebrate cultural heritage by integrating native plants, bush tucker species, and storytelling spaces, offering opportunities for cultural education. These gardens will connect students to the local environment and Indigenous history while enriching the outdoor experience.



Figure 43 Active play space. Source: NBRS



Figure 129. Passive play space. Source: NBRS

BRS REF Report_SINSW Bungendore High School.docx





TREE CANOPY 7.8

When designing a high school site, it's essential to achieve a balance between various needs, including buildings, outdoor play areas, sports facilities, and services areas. We have optimised for design features that maximize tree canopy coverage while also considering the aesthetics and functionality of the space.

Considering the total area of the site (42,040 m2), the proposed designed tree canopy cover is 9,540 m2, which equals 22.7% of the total site. NOTE: These calculations have considered an average canopy size of 3.5 m diameter for medium size and 6 m for large size.



Figure 130. Tree Canopy Cover. Source: NBRS

7.9 PUBLIC DOMAIN STREET PLANTING

As mentioned before, as part of the school works, 13 juvenile street trees need to be removed to accommodate the infraesture required along Birchfield Drive, which includes the new bus drop off, accessible parking bays, and a widened footpath. These adjustments are required to ensure compliance with accessibility standards, enhance pedestrian movement, and support the functional requirements of the streetscape. The aborist has advised "Numerous juvenile trees have been planted along Birchfield Drive and Bridget Avenue when these roads were constructed. These plantings are less than 3 m tall and do not meet the definition of a "tree" under AS4970-2009." However to maintain and enhance the landscape character, significant new plantings have been incorporated along the school frontage, within the site boundary. These plantings will contribute to the overall streetscape guality, providing shade, greenery,

and a cohesive visual connection between the school and its surroundings.





COLA	419m²
SHADE SAILS	376m ²
PROPOSED TREE CANOPY	8000m ²
COVERED WALKWAY	744m ²



Total shade = 22.7% site

7.10 HEAT ISLAND EFFECT

To mitigate the heat island effect, the design incorporates the following strategies:

Increased shaded coverage:

As describe in the section above, tree canopy, extensive planting of medium to large canopy trees will provide significant shade, particularly in areas of high pedestrian activity. Also, installation of shade structures in key zones, such as seating areas, walkways, and outdoor learning spaces, to enhance thermal comfort.

Suitable surface materials:

The use of low-glare concrete and floor finishes with minimal anti-glare properties, will reduce visual discomfort while maintaining functionality. These finishes will adhere to the EFSG approved color palette, ensuring compliance and a cohesive aesthetic. These choices in colours and finishes will have a low-SRI (Solar Reflectance Index) pavement and hardscape colors, such as light beige and sandstone, to reflect solar heat and reduce heat absorption.

CANOPY COVERAGE*

Total site area = 42,040 m2



Figure 131. Canopy coverage. Source: NBRS

Pavement colours





Figure 132. Shade sail example. Source: NBRS

Figure 133 . Tree coverage example – artistic impression. Source: NBRS

PLANTING DESIGN 7.11

The planting selection for this project is based on the dry sclerophyll forests (shrubby sub-formation), and the tablelands' dry tussock grassland. This palette has been distributed across the site to adapt to shade, wind and sunlight. Their growth habits, colours, and textures have been also considered to create a visually pleasing and cohesive landscape as well as responding to some of the Connecting with Country themes.



LEGEND	
BOUNDARIES	
- · - FENCE LINE	
- BOUNDARY	
— — — SETBACK	
PLANTED ZONES	
PL01 - MIXED PLANTING (GRASS BASE)	4702m ²
PL02 - MIXED PLANTING (COURTYARD)	2395m ²
PL03 - MIXED PLANTING (EMBANKED)	5689m ²
PL04 - INDIGENOUS PLANTING	625m ²
PL05a - AGRICULTURAL LAND	4920m ²
PL05b - AGRICULTURAL TERRACES	1117m ²
PL06 - SPORTS TURF	5376m ²
PL07 - TURF ROLLS	808m ²

PL01: MIXED PLANTING (GRASS BASE)

Species

Brachyscome bracteata Brachyscome multilida Conostylis candicans Correa 'Canberra Bell' Chrystocephalum semipu Correa alba Hardenbergia violacea Lomandra tanika Microlaena stipoides Poa labillardieri Poa sieberiana Thornoda triandra Wahlenbergia stricta Bursaria spinosa

PL02: MIXED PLANTING (COURTYARD)

Species

Hibbertia scandens Cymbopogon refractus Lomandra tanika Goodenia ovata Melaleuca thymilolia Grevillea rosmarinifolia Gravillaa saricaa Chrysocephalum apiculatum Bursaria spinosa Westringia 'Flat & Fluffy' Solarum lacinatum Cymbopogon refractus Casuarina glauca prostrate Cou Banksia canei Banksia paludosa Melaleuca linariifolia 'Claret Top

PL03: MIXED PLANTING (EMBANKED)

Species

Hibbertia scandens Cymbopogon refractus Lomandra tanika Goodenia ovata Melaleuca thymifolia Grevillea sericea Chrysocephalum apiculatum Buraaria apinosa Westringia Flat & Fluffy Austrodanthonia caespitosa Casuarina glauca prostrate 'Cousi Banksia canei Banksia palutosa Melaleuca linariitolia 'Claret Tops' Cheiranthera linearis Blechnum gibbum Doodia aspera

PL04: INDIGENOUS PLANTING

Species

Laurus nobilis Thymus citriodorus Citrus australasica Bulbino bulbosa Kunzea pomilera Rhagodia spinenscens Tetragonia tetragonicidea Eostrephus latifolius Lomandra coriacea Lepidium hyssopifoliu Rutidosis leiolepis Rutidosis leptorhynchoides Swainsona recta Swainsona sericea Thesium australe Pelargonium sp. Striatellum Zieria citriodora

Figure 134. Understorey Planting Plan. Source: NBRS

rachyscome bracteata	Erachyscome multilida	Conostylis candicans	Correa Canberra Bell"	Chrysocephalum	Correa alba	Kurzea pomifera	Lomandra confertilolia	
aurus nobilis	Thymus citriodorus	Citrus australaeica	Bulbine bulbose	Goodenia ovata	Eymbopogon refractus	Lomandra tanika	Melaleuca Thymitolia	

Hibbertia scandens

Figure 135. Planting List. Source: NBRS



Grevillea rosmarinifolia

Westringia 'Flat & Fluffy'

Bursaria spinosa



Austrodanthonia caespitosa Casuarina glauca prostrate Banksia canei







a
0.6m
1.2m
0.5m
1m
lm
1m
3.5m
0.65m
0.3m
lm
0.6m
0.5m
0.4m
4m

	Common name	Mature height	Mature Spread
	Snake vine	10m	4m
	Barbed wire grass	1m	0.5m
	Lomandra	0.6m	0.65m
	Hop Goodenia	2m	2m
	Thyme honey myrtle	1.5m	3m
	Rosemary Grevillea	1.8m	1.2m
	Pink Spider Flower	2m	1m
	yellow buttons	0.6m	0.9m
	Sweet Bursaria	10m	4m
	Prostrate westringia	0.5m	1.5m
	Kangaroo Apple	4m	5m
	Barbed wire grass	1m	0.5m
nsia it	Cousin it	0.5m	1.5m
	Mountain Banksia	3m	4m
	Marsh banksia	5m	2m
ar'	Claret Tops	1.5m	1m

	Common name	Mature height	Mature Spread
	Snake vine	10m	4m
	Barbed wire grass	1m	0.5m
	Lomandra	0.6m	0.65m
	Hop Goodenia	2m	2m
	Thyme honey myrtle	1.5m	1.2m
	Pink Spider Flower	2m	1m
	Yellow buttons	0.6m	0.9m
	Sweet Bursaria	10m	4m
	Prostrate westringia	0.5m	1.5m
	Wallaby grass	0.9m	0.12m
na'	Cousin it	0.5m	1.5m
1.1.1	Mountain Banksia	3m	4m
	Marsh banksia	5m	2m
e .	Claret Tops	1.5m	1m
	Finger Flower	1m	3m
	Silver lady fern	1.2m	1m
	Prickly Rasp fern	0.4m	0.6m

Common name	Mature height	Mature Spread
Bay Laurel	8m	8m
Lemon thyme	0.3m	0.6m
Fingerlime	7m	5m
Bulbine Lity	0.7m	0.4m
Muntries	0.3m	3m
Creeping Saltbush	0.5m	1m
Warrigal Greens	0.5m	2m
Wombat Berry	6m	6m
Wattle Mat-rush	0.6m	0.6m
Aromatic Peppercress	1m	1.5m
Monaro Golden Daisy	0.1m	0.3m
Button Wrinklewort	0.3m	0.15m
Small Purple-pea	5m	4m
Silky Swainson-pea	0.3m	0.3m
Austral Toadflax	0.4m	0.4m
Omeo Storksbill	0.15m	0.9m
Lemon Zieria	0.15m	1m

TREE SPECIES 7.12

The project will feature a total of 309 new 200L trees, to ensure robust planting and a visually impactful landscape from day one. Contract-grown trees will be utilized, allowing for the installation of larger-than-standard specimens, contributing to an immediate and mature appearance. The design emphasizes the use of medium to large canopy trees to achieve the targeted canopy coverage requirements effectively. Trees will be strategically planted in clusters, creating significant shaded areas and enhancing the visual cohesion of the landscape while promoting biodiversity and environmental benefits.



Planting Schedule								
Code	Code Botanical name Common name Mature height Mature width Pot size Q							
ACAimp	Acacia implexa	Hickory Wattle	5-15	2-6	200L	5		
ACApyc	Acacia pycnantha	Golden Wattle	4-10	2-5	200L	8		
BACcit	Backhousia citriodora	Lemon Myrtle	6-15	3-5	200L	4		
BANmar	Banksia marginata	Silver Banksia	3-10	2-4	200L	5		
BRApop	Brachychiton populneus	Kurrajong	10-20	5-10	200L	16		
CYAcoo	Cyathea cooperi	Hard Tree Fern	10-15	2-4	2m Trunk	7		
EUCbla	Eucalyptus blakelyi	Blakely's Red Gum	15-20	3.5-6	200L	43		
EUCmel	Eucalyptus mellidora	Yellow Box	over 30m	6-10	200L	26		
EUCpau	Eucalyptus pauciflora	Snow gun	3-5	3.5-6	200L	63		
EUCpul	Eucalyptus pulverulenta	Florist Silver dollar	15-20	6-10	200L	62		
EXOcup	Exocarpos cupressiformis	Native Cherry	1-20	2-4	200L	10		
LAGind	Lagerstroemia indica	Crepe Myrtle	3-8m	3-6	200L	9		
LEPlae	Leptospermum laevigatum	Coastal Tea Tree	10-15	3.5-6	200L	4		
MELlin	Melaleuca linariifolia	Snow in summer	5-10	2-3.5	200L	21		
MELsty	Melaleuca stypheliodes	Prickly paperbark	10-20	5-10	200L	10		
XANjoh	Xanthorrhoea johnsonii	Grass Tree	3-5m	1.5	0.6m Trunk	16		
Grand total: 309 *Note: XANjoh included in tree counts due to time needed for procurment and nature of the plant								





Figure 136: Tree Planting Plan

7.13 WIND

As identified before in this report, the existing site is situated in an open area, surrounded by farmland and low-density residential land that is yet to be developed. The local wind climate is relatively windy, particularly with prevailing winds from the northwest. Part of ARUP's assessment, some key findings have been identified in relation with the open space:

- Strong Prevailing wind are from the northwest and southwest
- Some seated areas on the upper terrace, south of the main entry, and near the sports field will require wind mitigation measures like vertical barriers or planting hedging.

The seating areas requiring wind mitigation will be relocated to more sheltered locations, such as the lower terrace or the base of the escarpment. To further enhance comfort, strategic planting will be implemented, incorporating dense hedging and evergreen species like *Callistemon spp., Syzygium australe* (Lilly Pilly), and *Westringia fruticosa*. These plantings will create a continuous wind barrier, providing effective protection while enhancing the overall outdoor environment.



8.0 SDRP DESIGN ADVICE LETTER RESPONSE

The Masterplan phase of the Bungendore High School project was presented to the State Design Review Panel (SDRP) on the 11^{th of} December 2024. Below is a response to the advice letter received on the 19^{th of} December 2024.

Generally, the NSW SDRP Panel members were supportive of the design presentation and commended the design team for a thorough presentation and navigating a steep and difficult site.

The following elements of the masterplan are supported:

- The high-level site strategy
- The consideration of Country
- The character and approach to the landscape strategy
- Material pallet and character of architecture.
- Fencing strategy and the removal of fencing at the front entry of the school.
- Protecting the architecture and landscape budgets from the civil works and any cost increases associated with the difficult site.

The following commentary provides advice and recommendations for the project (shown in Blue) along with the NBRS Design team response.

8.1 CONNECTING WITH COUNTRY

1. Continue to engage with Indigenous Knowledge Holders to provide advice and direction to the development of the site strategy, landscape, architecture, and cultural impact.

Note: Yerrabingin, a specialist Aboriginal cultural heritage consultant, has been engaged on the project since inception, to facilitate the connection with country. During the masterplan and concept design a number of community consultation workshops, an ideation workshop and a walk on country have been conducted. Further consultation shall continue through the schematic design, detailed documentation and construction phases.

- Ensure all elements that engage with the Country are high quality and sufficiently resourced. It is preferable to do fewer things well than attempt too many smaller moves.
 Note: As described in item 1, the connection with country consultation is ongoing.
- Refer to the Connecting with Country Framework and case studies on the GANSW website for more information and guidance. Noted:

8.2 SITE STRATEGY AND LANDSCAPE

The site strategy is generally supported, but five key areas need further development and refinement, addressed in turn below: working with the topography, visual dominance of the sports field, more shade and tree canopy, diversity of spaces for students, and a more public entry.

Topography – During the masterplan and concept design phases NBRS spent considerable time studying the site's topography. Although the site is complex, the layout of the buildings in the current proposal considers accessibility across the entire site, the need to provide direct access from the classrooms to the terrace play space, the quality and scale of the play space to the upper and lower terraces, access from Birchfield Drive and the massing along Birchfield Drive. Since the SRDP presentation further geotechnical information has been provided and a detailed cut and fill assessment has been undertaken. Taking all of these factors into consideration we are of the opinion that the proposal layout best responds to the site's typography

Visual Dominance of the sports field – Due to the nature of the site's typography locating a playing field was a key consideration when developing the masterplan. Ensuring the adjacency between the hall and the playing field and providing a sporting precinct is an important element. We acknowledge the sports field will be visually dominating from Birchfield Drive and have set the field back from the Birchfield Drive boundary and twisted the orientation of the field not only to align better with the site gradients but also to provide an opportunity for a landscaped buffer. A path has been designed to traverse the embankment and provide accessibility to the ag facility building. This pathway will also ensure the streetscape is engaged with student and staff movement.



Figure 138 View of south west approach t the site from Birchfield Drive Source NBRS



Figure 139 Site plan of playing field to the western boundary Source NBRS

More shade and tree canopy – In response to the SDRP comments NBRS landscape team have reviewed the tree locations, particularly with regards to providing shade and deep soil options. The proposed designed tree canopy cover is 9,540 m2, which equals **22.7%** of the total site. Refer section 7.8 of this report for further details. Beyond tree coverage sunshade sails and covered outdoor learning areas (COLA's) have also been provided to both the upper and lower terraces.

Diversity of spaces for the students – In response to the SDRP comments NBRS landscape team have incorporated a mix of outdoor learning spaces and a variety of play areas to create a dynamic and inclusive environment.Refer section 7.7 of this report for further details

A more public entry -

4. Refine the location and orientation of buildings to align more closely with the natural topography of the site and to reduce cut and fill.

Consider:

a. Shifting the three main buildings further down the site, so they sit lower on the site. A small shift might mean Building B can shift one story lower on the site.

NBRS have considered shifting the buildings westward to reduce the mass of building B. The implications of this are.

- Due to the typography the building would have to move significantly westward to lower Building B a whole storey and achieve a better cut and fill result.
- Direct access from building B at ground level to the upper terrace would be lost.
- Birchfield Drive does not follow the same typography as the site and the difference between the ground floor of building B and Birchfield Drive is currently 3.75 – 5,25m whilst the difference between the ground floor of Building A and the hall to Birchfield Drive is approximately 6m.

We are of the opinion that the current location and the relative level of building B is an appropriate siting response

b. Rotating Building B and Building C so they are in line with the topography. This would reduce their impact on elevation and create more defined play spaces. Test rotating the buildings to align with the lower court.

In response to the SDRP comments NBRS have tested the building's rotation and have aligned the playing field and lower terrace basketball court with building A and the hall. Since the SDRP further geotechnical investigations have been conducted across the site and the extent of the escarpment landscaped zone to the north has increased. This space will provide a strong connection with the country and learning opportunities. However, it is not level and has encroached slightly on the available passive play space. Any further rotation of the hall and Building B would have a significant impact on the available terrace area and play space. It is our opinion the proposed siting of the buildings has balanced maximizing the available play space both passive to the north and active to the west, providing an appropriate setback to Birchfield Drive which shall enable a landscaped zone to soften the massing to the streetscape and minimized the cut and fill.

c. Increasing the separation between buildings, so they are read less as a single mass.

There is 16m separation between building C and building A, which is linked with an entry canopy, Due to the different building forms we are of the opinion this is a sufficient separation to break down the mass.

The zone between building A and building B is approximately 15m and includes circulation and services. This zone has been stepped in from the facades of building A and building B and is lower in height to provide some articulation and ensure the buildings do not read as a single mass. The separation between the buildings has been kept to a minimum to ensure compliance with travel distance to exits.

d. Consider splitting the lower basketball court as this may create more space to enable better sitting of the buildings.

The lower basketball court is the only full-sized external basketball court on the site, and it has a good adjacency to the hall and the playing fields. It is central to the active or sporting precinct. Also, being a relatively flat open area adjacent to the hall it is suitable for school assemblies. It is our opinion the buildings are appropriate and splitting the basketball court area would not provide a better outcome for the school

5. The sports field will be visually dominant when approaching the school. In the current design it will be substantially taller than the buildings.

a. Consider planting the berm or using different forms of earthwork to reduce the 8-metre-high elevation of the sports field.

As discussed above we acknowledge the sports field will be visually dominating from Birchfield Drive and in response to the SDRP comments have set the field back from the Birchfield Drive boundary and twisted the orientation of the field not only to align better with the site gradients but also to provide an opportunity for a landscaped buffer. A path has been designed to traverse the embankment and provide accessibility to the ag facility building. This pathway will break down the embankment and will also ensure the streetscape is engaged with student and staff movement. The embankment will be a mixture of treatments such as Terramesh, gabions infilled with rocks, planting and grasses.

6. Providing abundant opportunities for shade in the summer months is critical for student amenity and safety. This is especially important on this site where canopy may not grow easily as hoped. a. Further develop the planting strategy and landscape design to increase canopy cover to 40% in

key student areas.

As discussed in section 7.8 the proposed designed tree canopy cover is 9,540 m2, which equals 22.7% of the total site. We believe this is an appropriate percentage considering the scale of the site compared to the student population b. Target areas with hard surfaces and activities such as bleachers. Refer section 7.3 of this report for further details c. Consider the installation of temporary shading while the tree canopy is growing. Early procurement of trees shall occur on this project ensuring there is tree canopy shade from opening day

d. Introduce a mid-terrace on the ramp with shade. Introducing an additional mid-level terrace will not increase the opportunities for shade, will negatively impact on the available space of the lower terrace particularly in front of building A and will add cost to the project due to the extra retaining walls and balustrading required. We are of the opinion this is not an appropriate design response but have proposed a COLA in front of building A which shall provide additional shade e. Work with the council to improve street tree and understory planting. In response to the SDRP comments intensive planting has been included in the landscape design to all street frontages.

7. The main entry is promising but needs further development. a. Ensure high quality planting design and materials at the entrance are sustained through value engineering processes. In response to the SRDP comments the landscape design at the main entry has been documented to include high guality planting and materials. This has since gone to tender

b. Enhance the character and role of the key community or public space directly from the entrance. In response to the SDRP comments the design of the main entry shall feature a number of connections with country initiatives; The graphic image to the underside of the canopy, the reuse of the excavated boulders within the landscape and the referencing of the mountain range skyline in the material treatment of the façade. The space shall feel culturally welcoming. Being elevated above Birchfield Drive key community and public areas at the main entrance shall also enjoy the benefit of district views giving it a sense of importance and clear orientation

8. Consider gender and spatial equality in the outdoor spaces to ensure all students have space to feel comfortable at school.

c. Specify half basketball courts on upper or lower sections to create more diversity and flexibility in spatial use. In response to the SDRP comments NBRS landscape team have incorporated

a mix of outdoor learning spaces and a variety of play areas to create a dynamic and inclusive environment.Refer section 7.7 of this report for further details

d. Further explore how the escarpment can be used by students.

The development of the escarpment shall require close consideration during the construction phases as the rock faces are uncovered. The intention is to provide a live learning opportunity for the students in geology, water management and botany, whilst also being an important aspect of the connection with country initiatives. The escarpment will be a feature of the design and collaboration with all stakeholders is ongoing to ensure it is implemented safely and effectively.

8.3 SUSTAINABILITY AND CLIMATE CHANGE

11. Work with Sydney Water and the council to develop the riparian area into a green spine – this is an opportunity for teaching and engagement with nature.

Being beyond the site any works to the riparian zone would be the responsibility of the council and is beyond our scope.

10. Four stars Green Star Rating is not sufficiently ambitious, and the project is encouraged to pursue a stronger approach to sustainability and climate change.

The Education Facilities Standards and Guidelines (EFSG) mandates a 4-star Greenstar registration for regional projects. Since the SDRP presentation the EDS consultant has further developed the appropriate ESD initiatives for Bungendore HS to meet this mandated requirement and the needs of the school.

11. Illustrate how the project will contribute to NSW's Net Zero emissions goal by 2050. Refer to 'NSW, DPIE, Net Zero Plan, Stage 1: 2020-2030' for further information.

In line with the SINSW commitment to sustainability goals for 2030 (net zero emissions in operations) and the Sustainable Buildings SEPP requirements (fossil fuel free by 2035), all mechanical and hydraulic hot water heating services will be fully electric, with only gas use being bottled gas for science experiments and 50% of VET kitchens.

The projects will be using bottled gas connection to future proof the building and allow future transition away from gas.

9.0 CONCLUSION

The architectural and landscape design for the new high school in Bungendore, responds to the site's unique characteristics and opportunities. The design prioritizes student well-being, community integration, and environmental responsibility.

A key aspect of the design is the sensitive response to the site's undulating topography. The terraced levels not only minimize cut and fill but also create a dynamic and engaging learning environment. The buildings are strategically placed to work with the existing slope, reducing the need for extensive earthworks and preserving the natural beauty of the site.

The design also addresses the challenges of Bungendore's climate. Passive design strategies, such as east-west building orientation and shading devices, are employed to ensure thermal comfort throughout the year. The selection of durable, low-maintenance materials ensures the longevity of the school and minimizes its environmental impact. Furthermore, the design prioritizes privacy and security for both students and staff. Landscaping and building design are thoughtfully integrated to create privacy from surrounding properties and roads, while still allowing natural light into the school. A variety of versatile outdoor spaces provide comfortable areas for students to learn and play throughout the year.

The school's connection to the surrounding community is another important aspect of the design. Pedestrian friendly access to the residential surrounds. The three street frontages are optimized for different purposes, enhancing safety and contributing positively to the streetscape.

The landscape design complements the architectural design by restoring the connection to the endemic flora and fauna of the region. Native plantings, rain gardens, and bioretention areas enhance biodiversity, manage stormwater runoff, and provide opportunities for environmental education.

Subject to the implementing the recommendations / mitigation measures set out in Section 8.0 of this report, the conclusion of this assessment is that the proposed Activity is not likely to significantly affect the environment in relation to Architectural and Landscape Design matters. The design for the new high school in Bungendore is a thoughtful and comprehensive response to the site's unique context and the needs of the school community.

LIST OF APPENDICES

NBRS REF DOCUMENTS

- A. Architectural REF Drawing Set
- B. Landscape REF Drawings Set