Arboricultural Risk Assessment letter – Bungendore High School

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Project Name	Bungendore HS - Arboriculture		
Subject	Arboricultural Risk Assessment in relation to planning pathways for Bungendore High School (HS)		

1. Introduction

This Arboricultural Risk Assessment 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). The purpose of this report is to accompany a REF under Part 5 of the EP&A Act.

1.1 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.

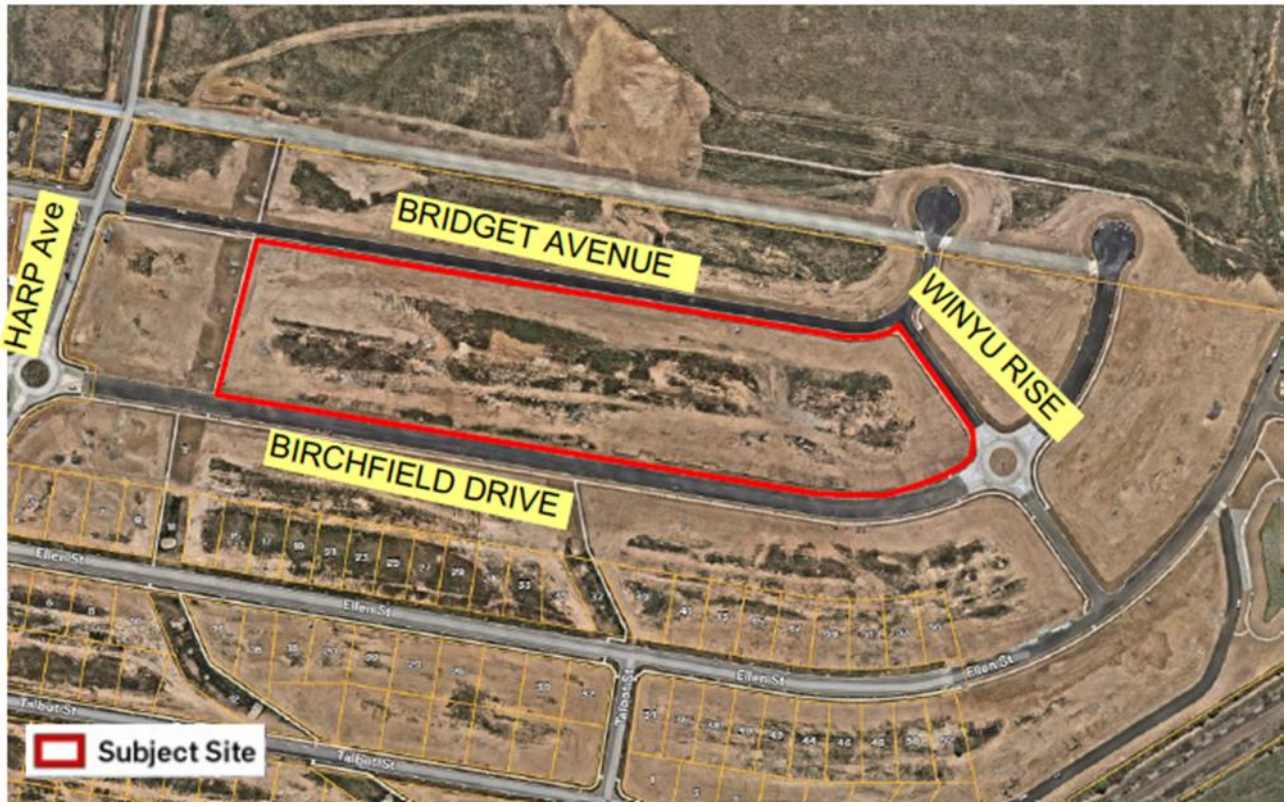

Figure 1.1 Aerial Photograph of the Site (Source: Urbis, 2024).

1.2 Proposed Activity Description

The proposed activity is for the construction and operation of a new high school in Bungendore 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 predominantly 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 with associated paddocks in the far western portion of the site designed for livestock management and hands-on agricultural learning.

Specifically, the proposal involves the following:

- Building A, a three-storey learning hub 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 workshops for food, textile, wood and metal workshops, as well as visual arts studios, science labs and staff areas.
- Building C, a standalone school hall with COLA.
- Building D, a single-storey agricultural block comprising an animal storage space, a COLA and internal 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 a sports courts and sports field.
- 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. The second stage does not form part of this proposal.

Figure 2 provides an extract of the proposed site plan.

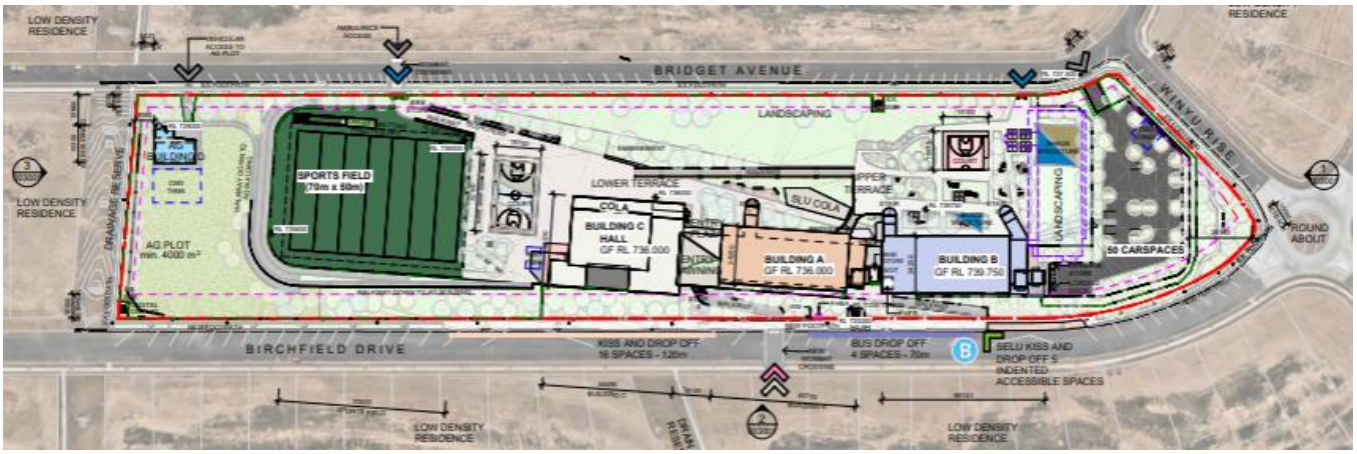

Figure 1.2 Site Plan (NBRS, 2025)

1.3 Scope and limitations

This report: has been prepared by GHD for DoE and may only be used and relied on by DoE for the purpose agreed between GHD and DoE as set out in section 1 of this report. GHD otherwise disclaims responsibility to any person other than DoE arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report. The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

If this report is required to be accessible in any other format, this can be provided by GHD upon request and at an additional cost if necessary.

2. Arboricultural Assessment

Trees are afforded protection measures prior to, during and post construction as according to the Australian Standard AS4970-2009 Protection of Trees on Development Sites (AS4970-2009). The measures for tree protection detail what is required to avoid any long-term damage to both the structural integrity and the functional implications of retained trees throughout the term of development. AS4970-2009 provides guidance for:

– A balanced approach on deciding which trees are appropriate for retention.
– Effects of trees on design considerations.
– Methods for the protection and monitoring of retained trees during development.

According to AS4970-2009, a “tree” is described as “…*a long lived woody perennial plant greater than (or usually greater than) 3 m in height with one or relatively few main stems or trunks (or as defined by the determining authority)*…”.

2.1 Background

The Project area exists as a highly modified parcel of land with re-established predominantly exotic grassland. Numerous juvenile trees have been planted along Birchfield Drive and Bridget Avenue when these roads were constructed (see Figures 2.1 and 2.2). These planting are all less than 3 m in height so do not meet the definition of a tree as described under AS4970-2009. Thirteen of these plantings along Birchfield Drive and Bridget Avenue adjacent to the school frontage will require removal as part of the Activity. These plantings require removal to allow for site access and works along Birchfield Drive including kiss and drop zones and bus bays. However, some will be retained and those plantings along Birchfield Drive and Bridget Avenue to the west of the drainage reserve will also be retained and protected.

Figure 2.1 View west along Birchfield Drive showing the plantings along the verge.

Figure 2.2 View west along Birchfield Drive from near Winyu Rise showing plantings along the verge.

2.2 Impact Assessment

Although the retained plantings do not meet the definition of a tree as per AS4970-2009, it is important to effectively protect and manage them to ensure they grow into mature trees. Maintaining the long-term health and vigour of retained trees on development sites requires an understanding of how susceptible trees are to direct and indirect impacts. In general, the following should be noted:

- Older trees are generally more at risk than younger trees and less able to withstand changes to landscape and soil conditions or pruning.
- The root system of most mature trees spread beyond the canopy drip-line with most roots typically found in the top 100 cm of the soil profile.
- Alteration to the soil levels within the tree protection zone (TPZ) will normally result in damage or death to root systems resulting in a decline in the condition of the tree.
- Compaction of the soil profile through the operation of vehicles and machinery within the TPZ destroys the natural soil structure and porosity resulting in decreased aeration and loss of water absorption resulting in root death.
- Spillage of chemicals, fuels or cement within the TPZ will cause root death leading to a decline in the condition of the tree.

Tree protection measures need to be in place to ensure that those juvenile trees recommended for retention are incorporated into the general landscape and continue to provide ecological services once development of the site is completed. Recommended tree protection measures are detailed within the tree protection plan (Section 3) and summarised in the mitigation measures (Section 4). Any street planting removals will be amply compensated with landscape plantings within the Project area during the landscaping phase.

Following the tree protection plan (Section 3) and mitigation measures (Section 4) from this report will ensure the extent and nature of potential impacts associated with the Activity will not have a significant impact on the locality, community and/or the environment.

Any potential impacts can be appropriately mitigated or managed to ensure that there is minimal impact on the locality, community and/or the environment.

3. Tree Protection Plan

All of the trees proposed to be retained during the Activity require exclusion of construction works within their delineated protection zones, in particular those that occur close to the construction footprint. This Tree Protection Plan identifies methods that should be implemented in order to retain the trees within the Project area in accordance with AS4970-2009.

Impacts on trees during development and construction can be direct or indirect. Direct damage includes mechanical injury to the trunk, severing of roots or alterations of the soil environment in the immediate vicinity of tree roots (i.e. compaction or loss of organic matter). Indirect effects of development are usually related to changes to exposure or soil hydrology. This includes alterations to soil moisture content, changes to the level of the water table and drainage patterns (Coder 1996). Fencing and other tree protection measures during construction will be required to ensure ongoing health and stability of retained trees on the site.

3.1 Tree protection in the construction phase

Prior to the commencement of any construction works at the Project area, a suitably qualified consulting arborist shall be appointed to supervise all tree protection procedures detailed in this report. The consulting arborist shall have a minimum level 5 AQF qualification in arboriculture and will undertake all appropriate arboricultural measures to ensure the survival and long-term health of retained trees. They will also liaise directly with construction personnel and be responsible for completing certification of tree and root protection measures throughout the various stages of construction.

3.1.1 Establishing the TPZ

The TPZ assists with the protection of retained trees from mechanical injury to the trunk, severing of roots, or alterations of the soil environment in the immediate vicinity of tree roots (i.e., compaction or loss of organic matter). The TPZ is defined in AS4970-2009 as the principal means of protecting trees on development sites. The TPZ is the combination of crown and root area requiring protection. It is an area isolated from direct construction disturbances so that the tree remains viable in the long term. AS4970-2009 defines the structural root zone (SRZ) as the area required for ongoing stability of the tree. However, an area larger than the SRZ is required to maintain a viable tree. The SRZ is only required to be calculated when greater than 10% encroachment into the TPZ is proposed. No disturbance is to take place within the SRZ. The juvenile life stage of all retained plantings would require the minimum 2 m TPZ radius as defined in AS4970-2009.

In certain situations, it is possible to encroach into or make variations to the calculated TPZ. Encroachment may include but is not limited to excavation, compacted fill and machine trenching. The encroachment into the TPZ can be classed as either minor (i.e., less than 10%) or major (i.e., greater than 10%). If the proposed encroachment into the defined TPZ is determined to be minor and is outside of the SRZ then detailed root investigations are usually not required. The area lost to encroachment can be offset elsewhere and be contiguous with the TPZ. If encroachment into the TPZ is determined to be major or is inside the SRZ then the consulting arborist must demonstrate that the impacted trees would remain viable. The area lost to encroachment can be offset elsewhere and be contiguous with the TPZ. There may also be a requirement for root investigation by non-destructive methods and consideration of the relevant factors listed in AS4970-2009.

Characteristics of individual trees, particularly irregular canopies and root spread may allow for modification of calculated TPZs (Figure 3.1). Guidance on the potential to modify protection zones of retained trees should be sought from the consulting arborist.

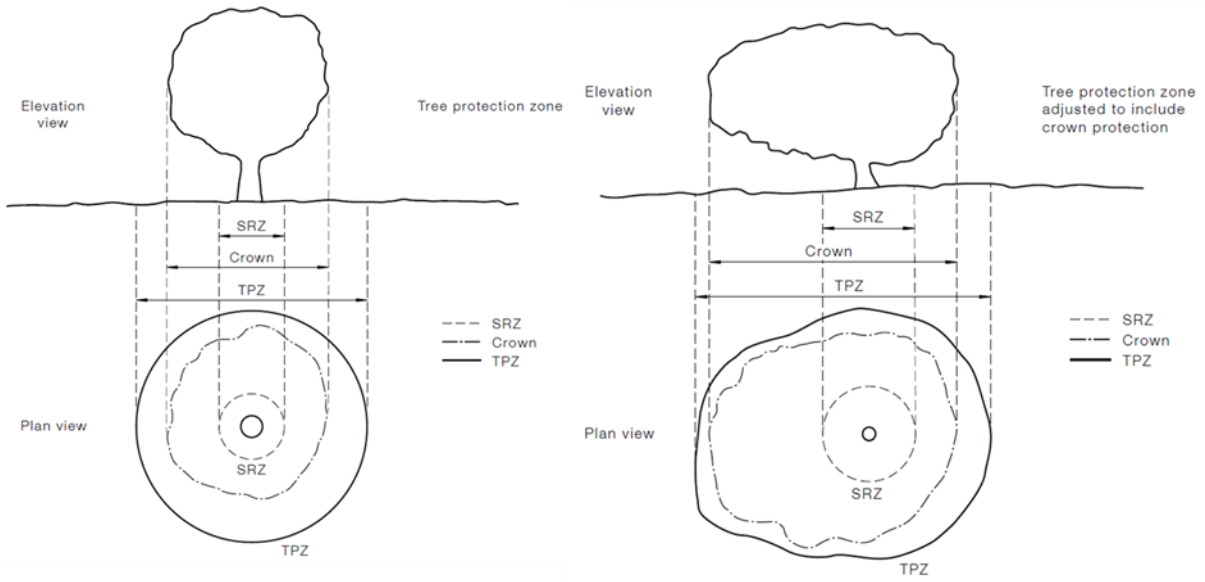

Figure 3.1 Indicative TPZs for regular and irregular canopies (Source: AS4970-2009)

All tree protection measures must conform to AS4970-2009. TPZ guidelines need to apply to all stages of the design and construction process. The following procedures will be followed:

- Temporary fencing will be erected around the edge of the determined TPZs prior to any works on the subject lot including demolition, site preparation and construction (Figure).
- At a minimum TPZ fencing should be rigid (chain link or mesh), no less than 1.8 m in height, and be robust enough to provide sufficient protection for the duration of the project for the trees nominated for retention. Fencing should be firmly attached to a removable concrete or similar base.
- Signs labelled “Tree Protection Zone – Keep Out”, or similar, must be placed at regular intervals along the TPZ fence prior to construction and be visible from all sides (Figure).
- The TPZ fencing must be maintained in good condition and remain in place at all times for the duration of the construction phase.
- TPZ fencing will not be repositioned or interfered with during the construction phase unless approved by the consulting arborist.
- TPZ fencing will only be removed once the construction phase has been completed.
- Where approved works encroach within TPZs, the fence must be repositioned as close to the works as is practically possible.
- The TPZ area should be mulched to a depth of 100 mm with suitable composted mulch. The depth of mulch should be maintained for the duration of the construction phase and the mulched area kept weed free.
- No filling or excavation is to occur within TPZs except as approved by the responsible authority. Any roots encountered when excavating must be cut cleanly with a pruning saw.
- The existing ground level and soil profile will be maintained within the designated TPZ.
- TPZ fencing must not restrict wildlife access to or from the retained tree.
- Unavoidable excavation within the TPZ will be undertaken via hydro excavation to minimise root damage. The consulting arborist must supervise any unavoidable excavation or construction works within TPZs. Where any structural roots (roots with a diameter of greater than >20 mm) are encountered by excavation, these are to be pruned. Clean, sharp pruning tools are to be used for pruning of structural roots and undertaken in consultation with the consulting arborist.

Figure 3 Example of appropriate TPZ fencing

Figure 4 Example of a tree protection sign (Source: AS4970-2009)

3.1.2 Excluded activities within the TPZ

Careful adherence to the following excluded activities within the TPZ will maintain the long-term condition of retained trees. In general, any activity that may impact on the tree, roots or natural environment of the soil will be excluded from the delineated TPZ.

- Construction activities that may have a detrimental impact on the retained tree are to be avoided, if possible, within the fenced TPZ.
- No soil disturbance to occur within the TPZ if possible. This includes compaction, stripping or grade changes.
- Materials and machinery are not to be stored in TPZs.
- Waste materials are not to be dumped within the TPZ. No residual herbicides are to be used within the TPZs.
- Underground utilities should be located outside of TPZs. However, if utilities must pass through these zones, then exploratory excavation works by a suitability qualified arborist may be required to verify root spread and determine the level of impact that could occur on the retained tree. Mechanical trenching within the TPZ should be avoided with trenching undertaken by hand or by vacuum excavation.
- No pedestrian access through and no parking of vehicles within the TPZ.
- All landscaping within TPZs must be on the existing soil grade and with minimal impervious surfaces.
- Where encroachments into a designated TPZ are unavoidable, further discussion with a consultant arborist will be required. This may include any measures that need to be implemented to mitigate any possible negative impacts on the retained tree.

3.1.3 Tree removal

The removal of nominated trees from the Project area should be undertaken in such a way that retained trees are protected during tree removal and site clean-up works. Tree removals/clearing works are to be undertaken in such a way as to prevent damage to above and below ground parts of any retained trees.

3.2 Tree protection in the post-construction phase

At completion of construction work, the consulting arborist will carry out an assessment of all trees retained and/or affected by the works. This assessment is to document condition of retained trees and any on-going remedial care required to ensure viable retention of trees affected. It is recommended that retained trees be assessed by a suitably qualified arborist immediately after completion of the project and then again 18 months after completion.

4. Mitigation measures

The measures outlined in Table are to be implemented to avoid or minimise potential impacts

Table 1 Mitigation measures for the Activity

Mitigation number/name	Aspect/section	Mitigation measure	Reason for mitigation measure
Tree protection	Construction	Installation of tree protection fencing to exclude construction from the TPZ of retained trees. TPZ fencing will be installed as per Section 3.1.1.	Exclude construction measures impacting retained trees.
Tree removal	Construction	Stump and root material from a tree elected for removal that is growing in close association with a tree nominated for retention are to be cut to ground level or by other means deemed appropriate. Tree removals are to be undertaken by a suitably qualified and experienced arborist.	Protection of retained trees during tree removal and site clean-up.
Excavation within TPZ	Construction	Any unavoidable excavation within the demarked TPZ will be undertaken by hydro excavation. Any exposed roots >20 mm in diameter will be assessed by the appointed consulting arborist to determine if they require pruning.	Protect roots within TPZ by preventing root damage during unavoidable excavation.

5. Conclusion

The Project area is highly modified and supports predominantly exotic grassland. Numerous juvenile trees have been planted along Birchfield Drive and Bridget Avenue when these roads were constructed. These plantings are less than 3 m in height and do not meet the definition of a “tree” under AS4970-2009. Thirteen of those plantings along Birchfield Drive and Bridget Avenue adjacent to the school frontage will require removal as part of the Activity. These plantings required removal to allow for site access and works along Birchfield Drive including kiss and drop zones and bus bays. However, some will be retained and those plantings along Birchfield Drive and Bridget Avenue to the west of the drainage reserve will also be retained and protected.

Tree protection measures need to be in place to ensure that those trees recommended for retention are incorporated into the general landscape and continue to provide ecological services once the Activity is completed. Following the recommended tree protection measures and mitigation measures from this report will ensure the Activity will not have a significant impact on the environment surrounding the retained trees.

6. References

Coder, K.D., 1996. Construction Damage Assessments: Trees and Sites, The University of Georgia, South Carolina, USA.