ARBORICULTURAL IMPACT ASSESSMENT REPORT

New Primary School in Mulgoa Rise

Address: 1 – 23 Forestwood Drive, Glenmore Park

Prepared for: NBRS Architecture

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CONTENTS

1.0 INTRODUCTION

1.1 Overview

The proposed development involves the construction and operation of a new primary school at Glenmore Park (Mulgoa Rise). The development will initially accommodate 414 students, with the ability to be expanded to 1000 students when demand requires, which would be subject of a separate planning approval process.

Development approval will facilitate a Core 21 school with 18 learning spaces (LS), plus 2 support classes. The development will also include a school hall, library, staff facilities, and administrative areas built to Core 35, allowing capacity for future expansion. A large assembly area, games court, shared sensory play area and playground will also form part of the development.

The new school will provide the surrounding community access to the school's core facilities and will also provide Outside School Hours Care (OSHC) services to assist working families that commute and work extended hours.

The school is proposed to be open for students in January 2023.

The State Significant Development Application for the project seeks consent for the following key components.

- General learning areas.
- Multipurpose communal hall.
- Covered Outdoor Learning Areas (COLA).
- Administration area.
- Staff area including amenities.
- Student amenities.
- Library.
- Canteen.
- Storage.
- Assembly Area.
- Games Court.
- Shared sensory play area.
- Landscaping.
- Pedestrian circulation.
- Pedestrian access points.
- Internal open space.
- Staff car park with access off Forestwood Drive.
- Bike and scooter parking.
- Bus zone and drop off/pick spaces.

- Pedestrian crossings on Forestwood Drive, Darug Avenue, and Deerubbin Drive.
- Waste collection area.
- Connection of site services, including gas, potable water, sewer, power (including a new sub-station), and the NBN.

1.2 Purpose of this Report

Sturt Noble Arboricultural Consulting was engaged by Richard Crookes Constructions on behalf of Colliers to assess the street trees adjacent to the site of the new primary school in Mulgoa Rise, Glenmore Park. We were also engaged to provide an Arboricultural Impact Assessment Report, to assist NBRS Architects in preparing a State Significant Development Application.

The purpose of this report is to address Item 3 of the Secretary's Environmental Assessment Requirements (SEARs). Principally, to:

- To assess the condition of existing trees located adjacent to the development site in order to assess each individual tree's suitability to be retained as a sustainable part of the landscape in the long term. The report shall detail the numbers, locations and condition of trees to be removed and retained, includes detailed justification for each tree to be removed.
- To satisfy the requirements of the consent authority by providing information about the trees their overall health and suitability for retention.
- To provide information to the Architect and other consultants to guide development where possible on the portion of the site outside the Tree Protection Zones.
- To provide information to the Project Manager and Site Manager on appropriate tree protection measures, appropriate setbacks, constraints and tree management procedures during site works.

This report has been carried out as per the Methodology outlined in **Appendix 1**

1.3 Background

The preparation of this report has been prepared in awareness and consideration of the following standards, controls and guidelines:

- Penrith City Council DCP 2014
- Australian Standard AS4970-2009 *Protection of Trees on Development Sites*
- Australian Standard AS4373-2007 *Pruning of Amenity Trees*
- Australian Standard AS2303-2015 *Tree Stock for Landscape Use*

1.4 The Proposal

This impact assessment has been prepared based on the following plans:

- 20415-NBRS-General-DR-A-0101, Site Survey, Rev 3, 04/05/2021 – prepared by NBRS Architecture
- 20415-NBRS -DR-A-X100, Master Plan GF, Rev 3, 27/07/2021 – prepared by NBRS Architecture

Refer to plans in **Appendix 2**

The proposed school development include:

- Construction of four new school buildings
- Construction of new outdoor areas such as a games court and assembly area
- Construction of a new carpark
- Nominated planting areas
- Associated works

1.5 Foreseeable Construction Impacts

Foreseeable impacts noted from the proposed development, construction type and anticipated methodology include:

- Excavations for new footpath and kerb alignments
- Excavations for proposed pedestrian and vehicular crossings
- Excavations and trenching for underground services
- Laying impermeable paving to paths, kerbs and roads
- Movement and storage of plant, equipment & vehicles
- Erection of site sheds
- Storage of building materials, waste and waste receptacles

2.0 PLANNING CONTROLS

2.1 Glenmore Park Stage 2

The Glenmore Park Stage 2 area is currently being developed and constructed. Most of the residential areas have been constructed, forming the principal land use of the site. The residential areas straddle either side of a planned lineal open space network represented as a riparian corridor that is centred on and conserves Surveyors Creek.

The new primary school which is the focus of this report is centrally located and surrounded by higher density housing than the rest of the suburb.

2.2 Council Consent

Prescribed (protected) vegetation is outlined in the Penrith City Council DCP as:

- Any tree or other vegetation having a height of 3m or more or a trunk exceeding 100mm DBH (Diameter at Breast Height measured at approx. 1400mm above ground level)

Penrith City Council's DCP notes the following planning principles that pertain to trees and vegetation:

- To protect and conserve the biodiversity values of trees and other vegetation in the City
- To maintain the diversity and quality of ecosystems and enhance their capacity to adapt to change
- To support conservation and threat abatement action to minimise biodiversity loss and conserve threatened species and ecological communities in nature
- To protect and enhance biodiversity corridors, landscape character and scenic values of the City
- Recognise the importance and function of trees and other vegetation for Cooling our City
- To preserve the amenity of the City through the preservation of trees and other vegetation
- To preserve existing trees and other vegetation where possible during the planning, design, development and construction process
- To firstly avoid or minimise impacts of a proposed development and land use change on biodiversity and if impacts are unavoidable provide appropriate offsets
- To achieve an appropriate balance between the protection of trees and other vegetation and mitigating risks from natural hazards

3.0 THE EXISTING SITE

3.1 The Site

The site is located at 1-23 Forestwood Drive, Glenmore Park on lot 1663 DP 1166869. The site is currently an unoccupied field surrounded by newly constructed housing and other similar fields awaiting development. The block is enclosed by Derubbin Drive to the north, Darug Avenue to the west, Forestwood Drive to the south and a new carpark to the east. Each street is bordered by street trees on either side. The site has a slight fall towards the north east corner.

Tree specimens on site generally receive full sun exposure.

Location Plan

3.2 Soils

The site is made up of shallow to moderately deep hardsetting clay soils over Wianamatta Shale that are common in Western Sydney on the Cumberland Lowlands. These areas tend to be gently undulating with no shale outcrops, unless soils have been removed.

These soils are low to moderately fertile and land uses include intensive residential, horticulture, animal husbandry, light and heavy industry.

3.3 The Trees

Forty six (46) trees located in the road reserve surrounding the development site have been surveyed as part of this assessment. The site is grassed and otherwise devoid of vegetation. The trees consist of two different species of recently planted exotic street trees. Refer to **Appendix 2** for tree locations.

Each of the trees assessed has been allocated a Sustainable Retention Index Value (SRIV) that is based on their health, vigour, structure and age class. The SRIV does not take into account the impact of the proposed development.

A complete and detailed tree assessment schedule was prepared and is included in **Appendix 3**.

4.0 ABORICULTURE IMPACT ASSESSMENT

4.1 Construction Assumptions

It is assumed for this report that excavation for the new primary school and surrounding works will not extend outside of the extent of works boundary; and this limit can be considered to be the extent of disturbance to the root zones with the exception of service lines.

Further detail of site works are required particularly details of excavation extent of services (water, telecoms and electrical) within the TPZ of any trees proposed for retention. This should be provided prior to construction so any additional impacts can be assessed.

4.2 Trees to be removed

The plans show that eleven trees (11) will need to be removed to accommodate the new roadworks on Deerubbin Drive and a new crossover on Forestwood Drive.

Table 1: Trees to be removed

Development footprint critical to the following trees	Other (poor condition, other studies, etc)	Dead / Weed species to be removed (exempt and can be removed without consent)
1A, 1B, 24, 33 – 40		

Consent for the removal of these trees will need to be sought as part of the SSDA.

4.3 Trees to be retained

With implementation of the tree protection measures it should be possible to retain all other trees adjacent to the developed site. The plans show that thirty-five (35) of trees are proposed to be retained on the Council verges.

Table 2: Trees to be retained

Clear of all works	Minor Encroachment	Major Encroachment
1C,1D,1-23, 25-32, 41 - 42		

Proposed site design and Construction of the development and associated infrastructure/ facilities should consider the Tree Protection Zones as discussed in the following sections to minimise any adverse impact.

4.4 Works within Tree Protection Zones

The plans in **Appendix 2** indicate the impacts of the proposed development construction on the existing trees proposed to be retained. Little impact to street trees are envisaged apart from the removal of Tree Nos. 1A, 1B, 24, 33 – 40.

4.5 Pruning works

In addition to Tree Protection Zones, the extent of the canopy (canopy dripline) should also be considered, particularly in relation to construction activities and along access points.

Significant pruning of trees to accommodate digging machinery is generally not acceptable. Trees may not be pruned by more than 10% without consent.

Branches should be temporarily pushed or tied where possible to minimise the amount of pruning works.

4.6 Ongoing management of trees to be retained

Ongoing monitoring and maintenance should be undertaken especially for trees located in areas of high use and activity.

5.0 TREE PROTECTION RECOMMENDATIONS

5.1 Tree Protection Measures

It is recommended that a site specific Tree Protection Plan (TPP) is prepared to guide the construction process to ensure all trees designated for retention remain as a sustainable part of the landscape in the long term.

The plan shall be prepared by a consulting arborist (AQF Level 5) and should at a minimum include a detailed plan of the locations of, and specifications for, tree protection measures.

The TPP shall include a monitoring schedule relating to critical points during the works (hold points) where the Project Arborist is required to visit the site and confirm that works are being undertaken as conditioned by Council/as required.

The following tree protection measures shall be implemented prior to the commencement of any site works, and shall remain in place for the duration of the development.

5.2 Tree Protection Zones

The Tree Protection Zones recommended for all trees within the site are to be retained and shall be equivalent to the Tree Protection Zone as specified in this report. This is a radial distance measured from the centre of the trunk of the subject trees.

The following activities are prohibited within the specified Tree Protection Zones:-

- Excavations and trenching (with exception of the approved foundations and underground services);
- Ripping or cultivation of soil;
- Movement and storage of plant, equipment & vehicles;
- Erection of site sheds;
- Affixing of signage or hoardings to trees;
- Storage of building materials, waste and waste receptacles;
- Disposal of waste materials and chemicals including paint, solvents, cement slurry, fuel, oil and other toxic liquids;
- Other physical damage to the trunk or root system; and
- Any other activity likely to cause damage to the tree.

Place a 50-75mm layer of coarse organic mulch over the entire surface of the TPZ. Where the TPZ is adjacent to construction activities first lay down geotextile fabric beneath the mulch to facilitate easy removal of the mulch at completion and any accidental spillage of construction materials.

Install drip irrigation around the root zone if required by the Project Arborist.

5.3 Tree Protection Fencing

All trees within the extent of works to be retained shall be protected prior to and during construction from all activities that may result in detrimental impact by erecting a suitable protective fence beneath the canopy to the full extent of the Tree Protection Zone (excluding the footprint of the proposed works and areas within adjoining properties).

As a minimum the fence should consist of temporary chain wire panels 1.8 metres in height, supported by steel stakes as required and fastened together and supported to prevent sideways movement. The fence shall be erected prior to the commencement of any work on-site and shall be maintained in good condition for the duration of construction. Where tree protection zones merge together a single fence encompassing the area is deemed to be adequate.

Appropriate signage shall be installed on the fencing to prevent unauthorised movement of plant and equipment or entry to the Tree Protection Zone.

Refer to **Appendix 4** for examples of protective fencing and signage.

5.4 Trunk, Branch & Ground Protection

Where provision of tree protection fencing is in impractical due to its proximity to the proposed building envelope, trunk protection shall be erected around the tree to avoid accidental damage. As a minimum, the trunk protection shall consist of two metre (2m) lengths of hardwood timbers (100 x 50mm) spaced at 100-150mm centres secured together with 2mm galvanised wire. These shall be strapped around the trunk (not fixed in any way) to avoid mechanical injury or damage. Trunk protection should be installed prior to any site works and maintained in good condition for the duration of the construction period.

Pavements should be avoided within the Tree Protection Zone of trees to be retained where possible. Proposed paved areas within the Tree Protection Zone of trees to be retained should be placed above grade to minimise excavations within the root zone and avoid root severance and damage.

Placement of fill material within the Tree Protection Zone of trees to be retained should be avoided where possible. Where placement of fill cannot be avoided, the material should be a coarse, gap-graded material such as 20 – 50mm crushed basalt (Blue Metal) or equivalent to provide some aeration to the root zone. Note that Roadbase or crushed sandstone or other material containing a high percentage of fines is unacceptable for this purpose. The fill material should be consolidated with a non-vibrating roller to minimise compaction of the underlying soil. A permeable geotextile may be used beneath the sub-base to prevent migration of the stone into the sub-grade. No fill material should be placed in direct contact with the trunk.

Refer to **Appendix 4** for examples of trunk, branch and ground protection.

5.5 Demolition Works within Tree Protection Zones

Where demolition of structures and pavements is required within the Tree Protection Zones of trees to be retained it is to be carried out to avoid disturbance to existing soils, damage to existing roots or potential root growth.

Machinery shall work within the footprint of existing pavements where possible to avoid compaction of the adjacent soil and Tree Protection Zones.

When removing hard surfaces it shall be stripped-off in thick layers using a small rubber tracked excavator or alternative approved method to avoid damage to underlying roots and minimise soil disturbance. The final layer of sub-base material shall be removed using hand tools where required to avoid compaction of the underlying soil profile and damage to woody roots.

If any concentrations of roots or roots with diameters equal to or greater than 50mm are encountered they must be retained in an undamaged condition for assessment by the Project Arborist. If the Project Arborist deems surrounding underground elements such as footing and pipes are providing support, these elements shall be left in-situ.

5.6 Excavations within Tree Protection Zones

The excavator shall work within the footprint of existing pavements where possible to avoid compaction of the adjacent soil and Tree Protection Zones.

5.7 Underground Services

All proposed underground services should be located as far away as practicable from existing trees to be retained to avoid excavation within the Tree Protection Zone.

For underground services, where the incursion to the Root Zone is less than 10% of the total TPZ (i.e. beyond the Minimum Setback Distance), a chain trenching device may be used. A backhoe or skid steer loader (bobcat) is unacceptable due to the potential for excessive compaction and root damage. Where large woody roots (greater than 50mm in diameter) are encountered during excavation or trenching, these shall be retained intact wherever possible (eg by sub-surface boring beneath roots or re-routing the service etc).

Excavations required for underground services within the Structural Root Zone of any tree to be retained should only be undertaken by sub-surface boring. The Invert Level of the pipe, plus the pipe diameter, must be lower than the estimated root zone depth as specified at a minimum depth of 600mm. This will depend on the soil conditions at the site. Where this is not practical and root pruning is the only alternative, proposed root pruning should be assessed by the Project Arborist to determine continued health and stability of the subject tree.

5.8 Canopy pruning

Care shall be taken when operating backhoes, excavators and similar equipment near trees to avoid damage to tree canopies (foliage and branches). Under no circumstances shall branches be torn-off by construction equipment. Where there is potential conflict between tree canopy and construction activities, the advice of the Project Arborist must be sought.

All pruning works shall be directed by the Project Arborist and shall be carried out by an AQF Level 3 Arborist. All pruning works shall be in accordance with the Australian Standard *(AS) 4373:2007 Pruning of amenity trees.* This standard outlines appropriate pruning practices and procedures that reduce the risk of damage and injury to trees.

Correct pruning practices respect the natural form and branching habit of a tree and work with the trees natural defence mechanisms against disease to avoid damage and injury to trees.

Pruning should always be limited to the minimum amount necessary to achieve the desired aim. Significant loss of foliage created by excessive pruning may weaken the tree, leading to premature decline or predisposition to branch failure or disease, creating potential hazards.

Council consent will be required prior to commencement of the work. Pruning must be performed in accordance with *Australian Standard (AS) 4373:2007 Pruning of amenity trees* (Standards Australia 2007).

5.9 Root Investigation

Exploratory excavation may be required where the proposed excavation created by the development works exceeds 10% of the Tree Protection Zone of any Prescribed Tree; or service trenches are required within the TPZ; to determine the impact of the development on the tree. The purpose of the investigation is to verify the quantity, size, type, depth and orientation of tree roots along the perimeter of the proposed encroachment in order to make an informed judgement in relation to the potential impact on the tree.

Exploratory excavation shall only be carried out using non-destructive or non-injurious techniques, such as careful digging using hand held implements, using compressed air (Airspade®), water pressure, or suction (vacuum device) or a combination of these techniques, to carefully remove soil without damaging roots. The work shall be undertaken by an arborist with a minimum qualification of AQF Level 3. Once roots are exposed, a visual examination can be carried out with the Project Arborist to evaluate the potential impact of the proposed root loss on the health and stability of the tree.

The results of the root investigation together with the Development Impact Assessment must be documented in the report and submitted together with the DA. The report shall contain information that demonstrates that the trees will remain viable in conjunction with the works.

5.10 Root Pruning

Where root pruning is required, roots shall be severed with sterile, clean, sharp pruning implements resulting in a clean cut. Any excavated root zones shall be retained in a moist condition during the construction phase using Hessian material or mulch where practical. Trees that have roots removed shall have drip irrigation installed around the root zone to ensure they receive an adequate supply of water.

5.11 Tree Damage/ Decline

If trees show signs of stress or deterioration, remedial action shall be taken to improve the health and vigour of the subject tree(s) in accordance with best practice arboricultural principles. Advice must be sought from the Project Arborist.

In the event of any tree becoming damaged for any reason during the construction period the Project Arborist must be engaged to inspect and provide advice on any

remedial action to minimise any adverse impact. Such remedial action shall be implemented as soon as practicable and certified by the arborist.

6.0 CONCLUSION

46 trees have been considered on the site and within the Council footpaths that surround the site as part of this assessment and their locations are shown in **Appendix 2**. These trees are juvenile street trees all of which are exotic species.

The proposed development is a new primary school.

The plans show that eleven trees (11) will need to be removed to accommodate the new roadworks on Deerubbin Drive and a new crossover on Forestwood Drive.(Trees 1A, 1B, 24, 33 – 40)

Consent for the removal of these trees is sought as part of the SSDA.

With implementation of the tree protection measures it should be possible to retain all other trees adjacent to the developed site. The plans show that other thirty-five (35) trees on Councils verge are proposed to be retained and protected.

Trees on/adjacent to site that are to be retained as part of the approved development must be protected from potential damage caused by construction activities. Refer to Section 5.0 for tree protection recommendations.

Further detail of site works is required particularly details of site services within the TPZ of trees proposed for retention. This should be provided prior to construction so any additional impacts can be assessed.

Where recommended work processes and tree protection measures cannot be adhered to further advice should be sought from the Project Arborist.

7.0 DISCLAIMER

The author and Sturt Noble Arboricultural Consulting take no responsibility for actions taken and their consequences, contrary to those expert and professional instructions given as recommendations.

This is not a hazard assessment report and it should be noted that trees are always inherently dangerous. This assessment was carried out from the ground, and covers what was reasonably able to be assessed and available to the assessor at the time of inspection. No aerial or subterranean inspections were carried out and structural weakness may exist within roots, trunk or branches.

Any protection or preservation methods recommended are not a guarantee of tree survival or safety but are designed to improve vigour and reduce risk. Timely inspections and reports are necessary to monitor the trees' condition. No responsibility is accepted for damage or injury caused by the trees and no responsibility is accepted if the recommendations in this report are not followed.

Limitations on the use of this report: Trees are dynamic living structures, growing and adapting to conditions around them. Tree condition will change and vary over time depending on weather, environmental factors and mechanical or human interaction.

This report is to be utilised in its entirety only. Any written or verbal submission, report or presentation that includes statements taken from the findings, discussions, conclusions or recommendations made in this report, may only be used where the whole of the original report (or a copy) is referenced in, and directly attached to that submission, report or presentation.

Assumptions: Care has been taken to obtain information from reliable resources. All data have been verified insofar as possible; however, Sturt Noble Arboricultural Consulting can neither guarantee nor be responsible for the accuracy of information provided by others.

Unless stated otherwise: Information contained in this report covers only the trees that were examined and reflects the condition of the trees at the time of inspection.

Assessment is limited to the conditions at the time of the inspection and only trees discussed in the report have been assessed.

Where access to the base of the tree is limited, such as difficult site access due to site conditions, only general comments can be made. Assessment of tree health and structure is limited to that visible from the site of proposed works and may not reflect the true condition of the tree. Assessment of tree health and structure is limited to that visible from the site of proposed works and may not reflect the true condition of the tree.

Plans used to assess likely impact are those appended/ referenced.

Ongoing monitoring of all trees is advised and where significant changes are observed, further advice should be requested. Unusual developments or sudden changes in a tree's condition should be addressed immediately.

8.0 REFERENCES

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IACA, 2010, Sustainable Retention Index Value Matrix (SRIV) Version 4, A visual method of objectively rating the viability of urban trees for development sites and management, based on general tree and landscape assessment criteria, Institute of Australian Consulting Arborculturists, Australia, www.iaca.org.au.

Googlemaps ©. Viewed 15th March 2021

Standards Australia (2007) Australian Standard AS4373-2007 *Pruning of Amenity Trees,* Pub. Standards Australia, Sydney.

Standards Australia (2009) Australian Standard AS4970-2009 *Protection of Trees on Development Sites*, Pub. Standards Australia, Sydney.

APPENDIX 1: METHODOLOGY

A1.1 Site Inspection

This report, its comments and recommendations have been prepared based on the information gathered during a detailed site inspection carried out on the on the 10th March 2021. This assessment is summarised in **Appendix 1**.

A1.2 Tree Locations

The location of the subject trees are based on the site survey, 20415-NBRS-General-DR-A-0101, Rev 1, 09/03/2021 prepared by NBRS Architecture. Additional trees found on site that are not represented on the survey, have been shown in approximate locations only.

A1.3 Visual Tree Assessment

The trees were assessed from the ground by the Visual Tree Assessment (VTA) method as described in Mattheck & Breloer (1994), using non-invasive tools such as binoculars and acoustic mallet. No digging or exposing of the root zones occurred in this inspection and no aerial inspection by climbing was performed. No aerial inspection or diagnostic testing was undertaken as part of this assessment.

The following data was collected for each tree:

- Botanical and common name.
- Tree dimensions (approximate only).
- Canopy density (approximate only).
- Overall health and vitality, including epicormic growth, deadwood and predation by pests and diseases.
- Structural condition including evident faults such as Bark Inclusions or poor branch attachments, decay, cavities and mechanical or biological damage.
- Stability of the tree including excessive trunk lean, stability of the soil, soil cracking, soil heaving, exposed roots and root damage.

A1.4 Retention Value

Each tree has been given a Sustainable Retention Index Value (SRIV) according to the rating system set out in the Sustainable Retention Index Value Matrix (refer to the table in section A1.8). The SRIV for each tree is based on its health, vigour, structure and age class as established in the Visual Tree Assessment. The SRIV does not take into account the impact of the proposed development.

A1.5 Landscape Significance Assessment

Landscape Significance is an essential criterion to establish the importance that a particular tree may have on a site. Each tree has been given a Tree Significance in landscape rating based on the 'IACA Significance of a Tree, Assessment Rating

System'. A tree is to have a minimum of three criteria in a category to be applicable for that rating.

Tree Significance in the landscape ratings:

High	**Medium**	**Low**
▪ The tree is in good condition and good vigour; ▪ The tree has a form typical for the species; ▪ The tree is a remnant or is a planted locally indigenous specimen and/or is rare or uncommon in the local area or of botanical interest or of substantial age; ▪ The tree is listed as a Heritage Item, Threatened Species or part of an Endangered ecological community or listed on Councils significant Tree Register; ▪ The tree is visually prominent and visible from a considerable distance when viewed from most directions within the landscape due to its size and scale and makes a positive contribution to the local amenity; ▪ The tree supports social and cultural sentiments or spiritual associations, reflected by the broader population or community group or has commemorative values; ▪ The tree's growth is unrestricted by above and below ground influences, supporting its ability to reach dimensions typical for the taxa in situ - tree is appropriate to the site conditions.	▪ The tree is in fair-good condition and good or low vigour; ▪ The tree has form typical or atypical of the species; ▪ The tree is a planted locally indigenous or a common species with its taxa commonly planted in the local area ▪ The tree is visible from surrounding properties, although not visually prominent as partially obstructed by other vegetation or buildings when viewed from the street, ▪ The tree provides a fair contribution to the visual character and amenity of the local area, ▪ The tree's growth is moderately restricted by above or below ground influences, reducing its ability to reach dimensions typical for the taxa in situ.	▪ The tree is in fair-poor condition and good or low vigour; ▪ The tree has form atypical of the species; ▪ The tree is not visible or is partly visible from surrounding properties as obstructed by other vegetation or buildings, ▪ The tree provides a minor contribution or has a negative impact on the visual character and amenity of the local area, ▪ The tree is a young specimen which may or may not have reached dimension to be protected by local Tree Preservation orders or similar protection mechanisms and can easily be replaced with a suitable specimen, ▪ The tree's growth is severely restricted by above or below ground influences, unlikely to reach dimensions typical for the taxa in situ - tree is inappropriate to the site conditions, ▪ The tree is listed as exempt under the provisions of the local Council Tree Preservation Order or similar protection mechanisms, ▪ The tree has a wound or defect that has potential to become structurally unsound. ▪ Environmental Pest / Noxious Weed Species ▪ The tree is an Environmental Pest Species due to its invasiveness or poisonous/ allergenic properties, ▪ The tree is a declared noxious weed by legislation. ▪ Hazardous/Irreversible Decline ▪ The tree is structurally unsound and/or unstable and is considered potentially dangerous, - The tree is dead, or is in irreversible decline, or has the potential to fail or collapse in full or part in the immediate to short term.

A1.6 Tree Protection Zones (TPZ) and Structural Root Zones (SRZ)

The intention of the TPZ is to ensure protection of the root system and canopy from the potential damage from construction works and ensure the long-term health and stability of each tree to be retained.

The Structural Root Zone (SRZ) is located within the TPZ around the base of a tree and provides the bulk of mechanical support and anchorage for a tree.

The Tree Protection Zones (TPZ) and Structural Root Zones (SRZ) have been arrived at using methods as detailed in Australian Standard AS 4970– 2009. Specific site factors are also considered that may influence the location of the TPZ and/or structural tree roots.

A1.7 Encroachment and Development Impacts

Encroachments and development impacts to tree TPZ's and SRZ's include;

- Excavation
- Filling
- Changes to existing soil levels
- Placing items and elements within the zones even if only temporarily
- Soil disturbance
- Any other physical damage to the trunk or root system or any other activity likely to cause damage to the tree.

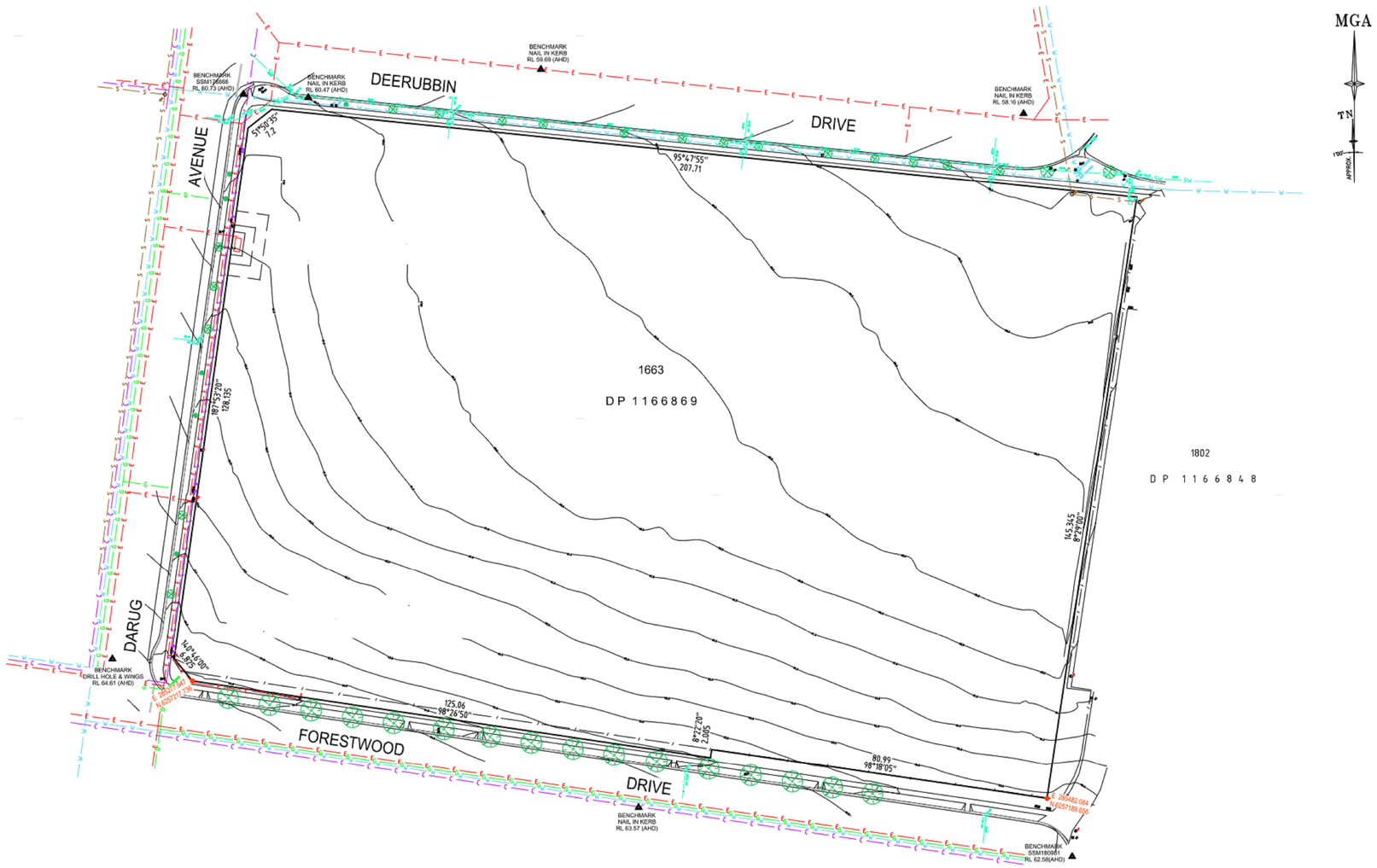
Under *AS 4970:2009 Protection of trees on development sites*, a major encroachment is greater than 10% of the area of the TPZ and the Project Arborist must determine and demonstrate that the tree would remain viable. More detailed investigations, such as exploratory excavations and root investigation to enable an informed evaluation of the potential impact of the proposed works may be required.

Encroachments into the SRZ are not likely to be supported unless the Project Arborist has undertaken exploratory investigation and can demonstrate that there will be minimal impact to the tree.

A1.8 SRIV Table

	Vigour Class and Condition Class					
Age Class	Good Vigour & Good Condition (GVG)	Good Vigour & Fair Condition (GVF)	Good Vigour & Poor Condition (GVP)	Low Vigour & Good Condition (LVG)	Low Vigour & Fair Condition (LVF)	Low Vigour & Poor Condition (LVP)
	Able to be retained if sufficient space available above and below ground for future growth. No remedial work or improvement to growing environment required. May be subject to high vigour. Retention potential - Medium - Long Term.	Able to be retained if sufficient space available above and below ground for future growth. Remedial work may be required or improvement to growing environment may assist. Retention potential - Medium Term. Potential for longer with remediation or favourable environmental conditions	Able to be retained if sufficient space available above and below ground for future growth. Remedial work unlikely to assist condition, improvement to growing environment may assist. Retention potential - Short Term. Potential for longer with remediation or favourable environmental conditions.	May be able to be retained if sufficient space available above and below ground for future growth. No remedial work required, but improvement to growing environment may assist vigour. Retention potential - Short Term. Potential for longer with remediation or favourable environmental conditions.	May be able to be retained if sufficient space available above and below ground for future growth. Remedial work or improvement to growing environment may assist condition and vigour. Retention potential - Short Term. Potential for longer with remediation or favourable environmental conditions.	Unlikely to be able to be retained if sufficient space available above and below ground for future growth. Remedial work or improvement to growing environment unlikely to assist condition or vigour. Retention potential - Likely to be removed immediately or retained for Short Term. Potential for longer with remediation or favourable environmental conditions
Young (Y)	**YGVG - 9** Index Value 9 Retention potential - Long Term. Likely to provide minimal contribution to local amenity if height Retain, move or replace	**YGVF - 8** Index Value 8 Retention potential - Short - Medium Term. Potential for longer with improved growing conditions. Likely to provide minimal contribution to local amenity if height Medium-high potential for future growth and adaptability. Retain, move or replace.	**YGVP - 5** Index Value 5 Retention potential - Short Term. Potential for longer with improved growing conditions. Likely to provide minimal contribution to local amenity if height Low-medium potential for future growth and adaptability. Retain, move or replace	**YLVG - 4** Index Value 4 Retention potential - Short Term. Potential for longer with improved growing conditions. Likely to provide minimal contribution to local amenity if height Medium potential for future growth and adaptability. Retain, move or replace	**YLVF - 3** Index Value 3 Retention potential - Short Term. Potential for longer with improved growing conditions. Likely to provide minimal contribution to local amenity if height <5m. Low-medium potential for future growth and adaptability. Retain, move or replace	**YLVP - 1** Index Value 1 Retention potential - Likely to be removed immediately or retained for Short Term. Likely to provide minimal contribution to local amenity if height
Mature (M)	**MGVG - 10** Index Value 10 Retention potential - Medium - Long Term	**MGVF - 9** Index Value 9 Retention potential - Medium Term. Potential for longer with improved growing conditions.	**MGVP - 6** Index Value 6 Retention potential - Short Term. Potential for longer with improved growing conditions	**MLVG - 5** Index Value 5 Retention potential - Short Term. Potential for longer with improved growing conditions	**MLVF - 4** Index Value 4 Retention potential - Short Term. Potential for longer with improved growing conditions	**MLVP - 2** Index Value 2 Retention potential - Likely to be removed immediately or retained for Short Term.
Over-mature (O)	**OGVG - 6** Index Value 6 Retention potential - Medium - Long Term.	**OGVF - 5** Index Value 5 Retention potential - Medium Term.	**OGVP - 4** Index Value 4 Retention potential - Short Term.	**OLVG - 3** Index Value 3 Retention potential - Short Term. Potential for longer with improved growing conditions.	**OLVF - 2** Index Value 2 Retention potential - Short Term.	**OLVP - 0** Index Value 0 Retention potential - Likely to be removed immediately or retained for Short Term

APPENDIX 2: PLANS



LEGEND

BENCH MARK	▲
TELSTRA PILLAR	⊠ TP
COMMS PIT	▬ COM
TELSTRA PIT	▬ TEL
ELECTRIC LIGHT POLE	◐ ELP
ELECTRIC LIGHT BOLLARD	◐ LB
ELECTRICITY PIT	⊠ EPIT
ELECTRICITY BOX	⊠ EL
POWER POLE	● PP
SERVICE PIT	□ PIT
PIT WITH CONCRETE LID	□ CLID
PIT WITH METAL LID	□ MLID
STREET SIGN	⊠ SS
GRATED INLET PIT	▤ GIP
KERB INLET PIT	KIP
SEWER INSPECTION POINT	○ SIP
SEWER VENT	⦿ SEV
SEWER MANHOLE	◯ SMH
STOP VALVE	⊠ SV
HYDRANT	◧ HYD
WATER METER	⋈ WM
WATER TAP	⊠ TAP
WATER VALVE	◆ WV
GAS VALVE	⊠ GAS
VEHICLE CROSSING	(VC)
PRAM CROSSING	(PC)
GAS (DBYD)	G
COMMUNICATIONS (DBYD)	C
WATER (DBYD)	W
SEWER (DBYD)	S
ELECTRICITY (U/GROUND) (DBYD)	E
STORMWATER	SW

NOTES

1. THE BOUNDARIES HAVE NOT BEEN MARKED ON GROUND
2. ALL AREAS AND DIMENSIONS HAVE BEEN COMPILED FROM PLANS MADE AVAILABLE BY NSW LAND REGISTRY SERVICES AND ARE SUBJECT TO FINAL SURVEY
3. ORIGIN OF LEVELS ON A.H.D. IS TAKEN FROM SSM105591 R.L. 64.225 (A.H.D.) IN RIDGETOP DRIVE
4. CONTOUR INTERVAL 0.5 m
5. CONTOURS ARE INDICATIVE ONLY. ONLY SPOT LEVELS SHOULD BE USED FOR CALCULATIONS OF QUANTITIES WITH CAUTION
6. ONLY SPOT LEVELS SHOULD BE USED FOR CALCULATIONS OF QUANTITIES WITH CAUTION
7. KERB LEVELS ARE TO THE TOP OF KERB UNLESS SHOWN OTHERWISE
8. NO INVESTIGATION OF UNDERGROUND SERVICES HAS BEEN MADE. SERVICES HAVE BEEN PLOTTED FROM RELEVANT AUTHORITIES INFORMATION AND HAVE NOT BEEN SURVEYED. ALL RELEVANT AUTHORITIES SHOULD BE NOTIFIED PRIOR TO ANY EXCAVATION ON OR NEAR THE SITE
9. 8/.4/7 DENOTES TREE SPREAD OF 8m, TRUNK DIAMETER OF 0.4m & APPROX HEIGHT OF 7m
10. SHOWS APPROXIMATE POSITION OF ROAD LINEMARKING AND IS INDICATIVE ONLY
11. BEARINGS SHOWN ARE MGA (MAP GRID OF AUSTRALIA) ADD APPROX. 1°00' FOR TRUE NORTH

(E3) EASEMENT FOR PADMOUNT SUBSTATION 2.75 WIDE (DP1161693)
(R1) RESTRICTION ON THE USE OF LAND (DP1161693) (9)
(R2) RESTRICTION ON THE USE OF LAND (DP1161693) (10)

(X) RESTRICTION ON THE USE OF LAND (DP1109846)
RESTRICTION ON THE USE OF LAND (3)&(4) (DP1153497)
BENEFITED BY:
EASEMENT FOR RETAINING WALL SUPPORT 0.5 WIDE (DP1153498)
EASEMENT FOR RETAINING WALL SUPPORT 0.5 WIDE (DP1153449)

DIAL BEFORE YOU DIG www.1100.com.au

GDA2020

0 10 20 30 40 50
SCALE 1:500 @ A1

Revision	Date	Description	Reference
H	00/00/00	-	00
G	00/00/00	-	00
F	00/00/00	-	00
E	00/00/00	-	00
D	00/00/00	-	00
C	00/00/00	-	00
B	00/00/00	-	00
A	26/11/20	ELECTRICAL DBYD UPDATED, 3D CONTOURS & BDY COORDINATES ADDED	51025 001

LTS CONFIDENCE TOGETHER
www.lts.com.au | P 1300 587 000

THIS IS THE PLAN REFERRED TO IN MY LETTER DATED:

Registered Surveyor NSW

Client NSW DEPARTMENT OF EDUCATION

Drawing title
PLAN OF DETAIL AND LEVELS OVER LOT 1663 IN DP1166869
KNOWN AS 1-23 FORESTWOOD DRIVE, GLENMORE PARK

datum	AHD
site Area	3.001 ha
LGA	PENRITH
reference number	51025 001DT
scale	1:500 @A1
date of survey	14/05/2020
SHEET	1 OF 5

Issue

No.	Date	Description	Chkd
1	12/04/2021	ISSUE FOR COORDINATION	
2	23/04/2021	ISSUE FOR COORDINATION	
3	04/05/2021	SSDA ISSUE	

SSDA ISSUE

RICHARD CROOKES CONSTRUCTIONS

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TOWN PLANNER
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CIVIL AND STRUCTURAL ENGINEERING
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PROJECT MANAGER
COLLIERS
ANTHONY MAUGHAN-WRIGHT
0424 189 883
anthony.maughan-wright@colliers.com

Drawing Title
SITE SURVEY

Project
NEW PRIMARY SCHOOL IN MULGOA RISE
at
1-23 Forestwood drive, Glenmore Park, NSW 2745, Australia

for
SINSW

Architect
NBRS ARCHITECTURE.
Sydney
61 2 9922 2344 nbrsarchitecture.com

Nominated Architect:
Andrew Duffin NSW 5602
NBRS & Partners Pty Ltd VIC 51197

ABN 16 002 247 565

Date 4/05/2021 6:05:42 PM
Scale 1 : 600 @ A1

Drawing Reference
20415-NBRS-DR-A-SSDA-0101

Revision
3

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Issue

No.	Date	Description	Chkd
1	16/04/2021	UPDATED MASTER PLAN	
2	02/06/2021	Updated Mater Plan	
3	27/07/2021	Updated Mater Plan	

UPDATED MASTER PLAN

Drawing Title
MASTER PLAN GF

Project
NEW PRIMARY SCHOOL IN MULGOA RISE
at
1-23 Forestwood drive, Glenmore Park, NSW 2745, Australia

for
SINSW

Architect
NBRS ARCHITECTURE.
Sydney
61 2 9922 2344 nbrsarchitecture.com

Nominated Architect:
Andrew Duffin NSW 5602
NBRS & Partners Pty Ltd VIC 51197

ABN 16 002 247 565

Date 27/07/2021 11:45:19 AM
Scale 1 : 500 @ A1

Drawing Reference
20415-NBRS-DR-A-X100

Revision
3

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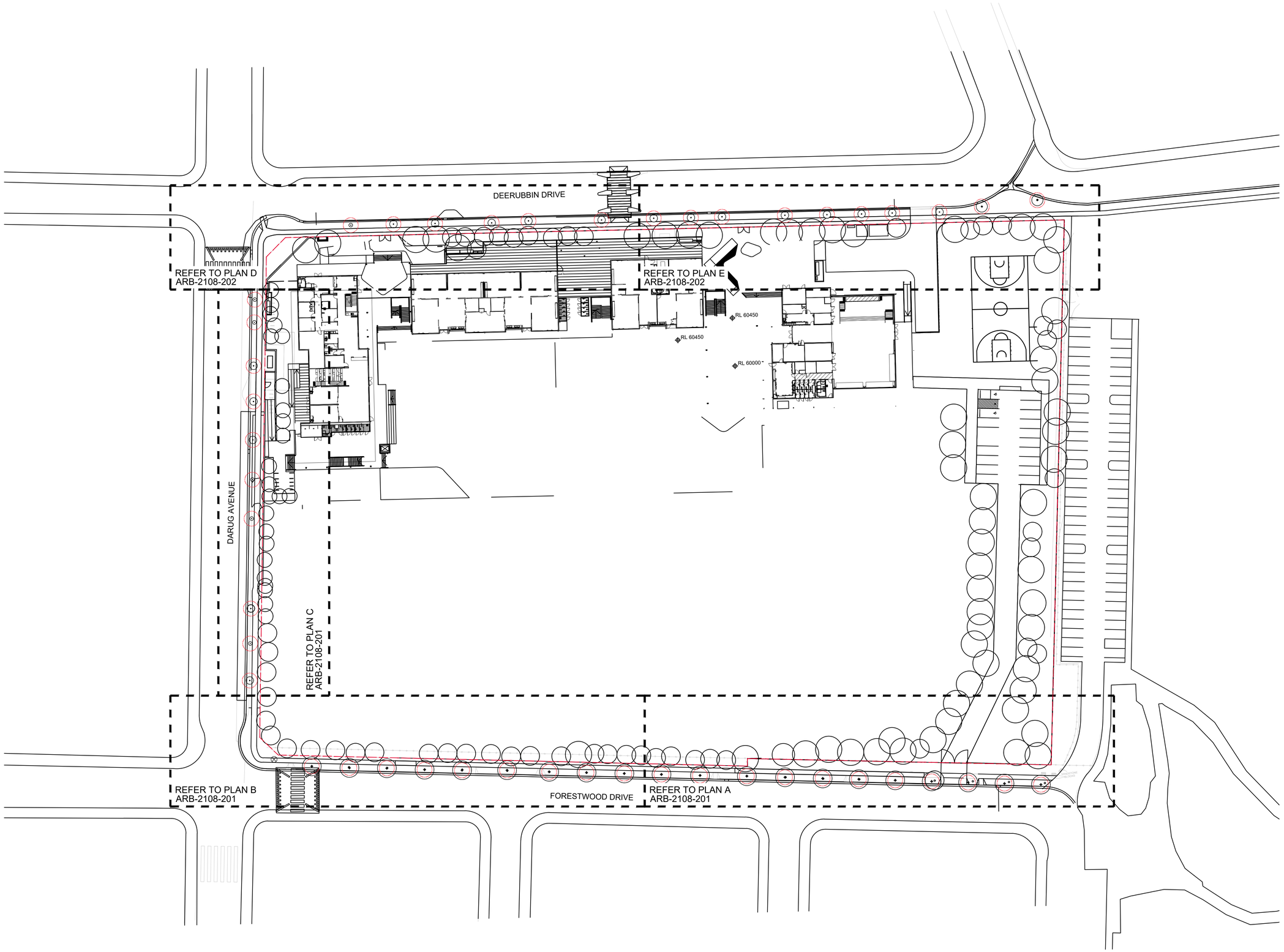


LEGEND

- PROPERTY BOUNDARY
- TX — EXISTING TREE Refer to Tree Impact Assessment Schedule
- TREE PROTECTION ZONE

ISSUE	DESCRIPTION	DATE
C	REVISED TO CLIENT'S DIRECTION	21.07.2021
B	REVISED IMPACT ASSESSMENT REPORT	29.04.2021
A	IMPACT ASSESSMENT REPORT	18.03.2021

Sturt Noble Arboriculture
Suite 91, L5, 330 Wattle St
Ultimo NSW 2007
T. 02 9211 3744
W. www.sturtnoble.com.au
landscape architecture
environmental & urban design

PROJECT
NEW PRIMARY SCHOOL IN MULGOA RISE

CLIENT
NBRS ARCHITECTURE

DRAWING
TREE LOCATION PLAN

DRAWING NUMBER
ARB-2108-101

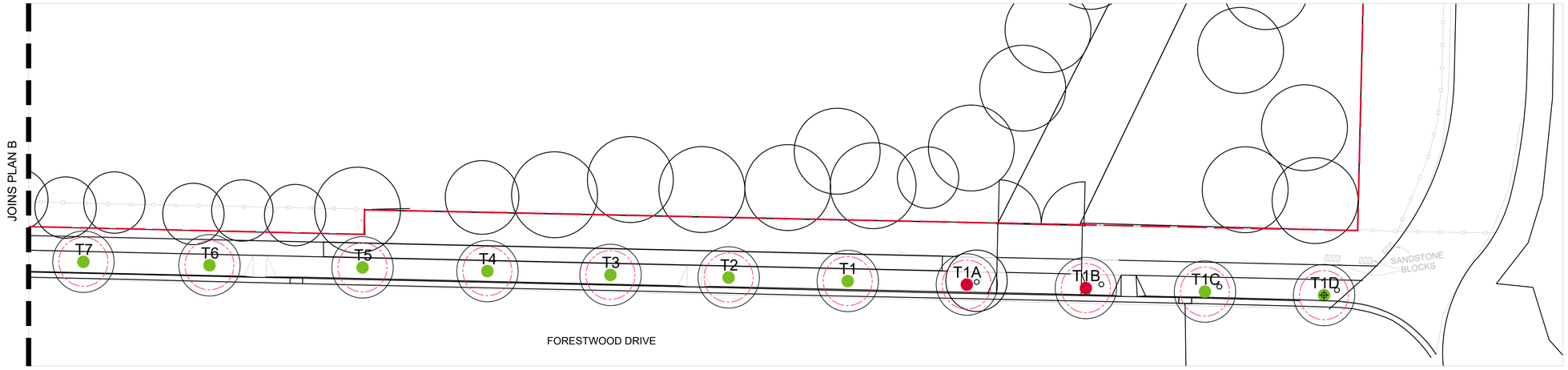
ISSUE
C

SCALE
1:500 @ A1
1:1000 @ A3

DRAWN gh | CHECKED gs | DIRECTOR gs

0 5 10 25 m

ACN: 164 245 514 ABN: 99 164 245 514

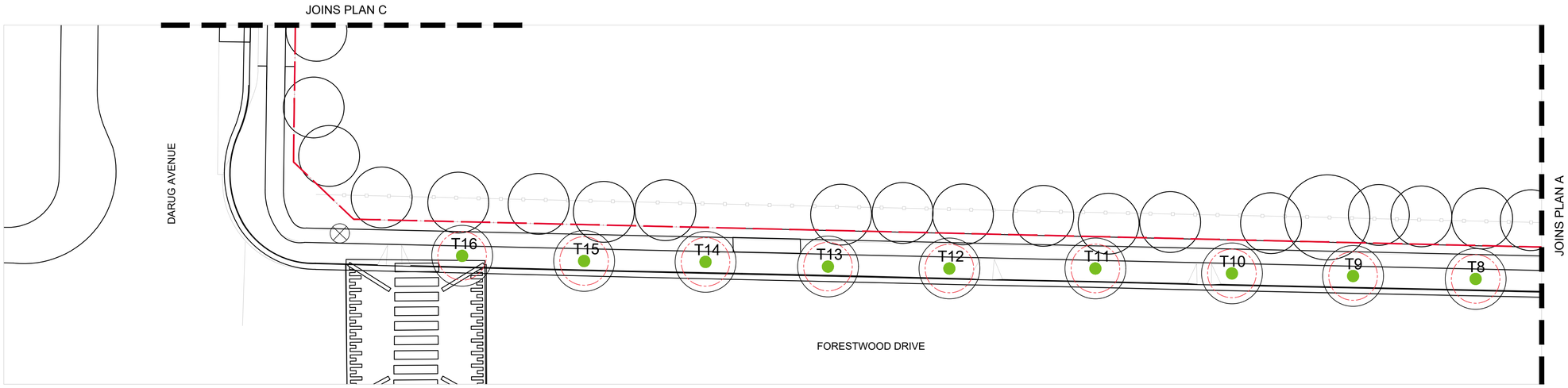


PLAN A

SCALE 1:200 @ A1

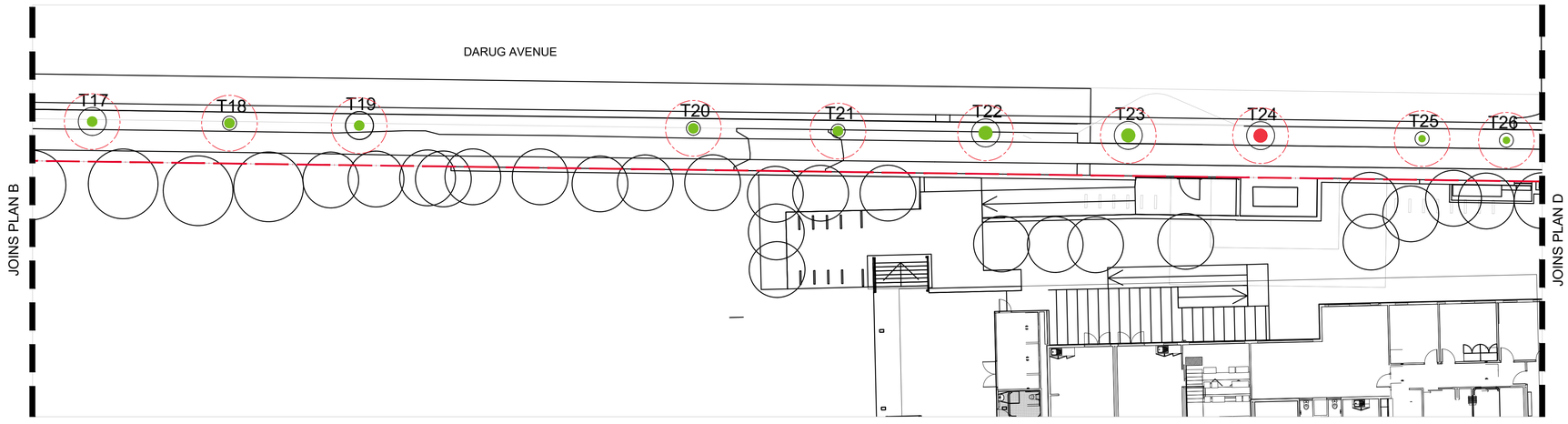
LEGEND

- PROPERTY BOUNDARY
- TX — EXISTING TREE Refer to Tree Impact Assessment Schedule
- TREES TO BE RETAINED Refer to Tree Impact Assessment Schedule
- TREES TO BE REMOVED Refer to Tree Impact Assessment Schedule
- TREE PROTECTION ZONE



PLAN B

SCALE 1:200 @ A1



PLAN C

SCALE 1:200 @ A1

ISSUE	DESCRIPTION	DATE
D	REVISED TO CLIENT'S DIRECTION	18.08.2021
C	REVISED TO CLIENT'S DIRECTION	21.07.2021
B	REVISED IMPACT ASSESSMENT REPORT	29.04.2021
A	IMPACT ASSESSMENT REPORT	18.03.2021

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PROJECT

NEW PRIMARY SCHOOL IN MULGOA RISE

CLIENT

NBRS ARCHITECTURE

DRAWING

TREE REMOVAL PLAN 01

DRAWING NUMBER: ARB-2108-201

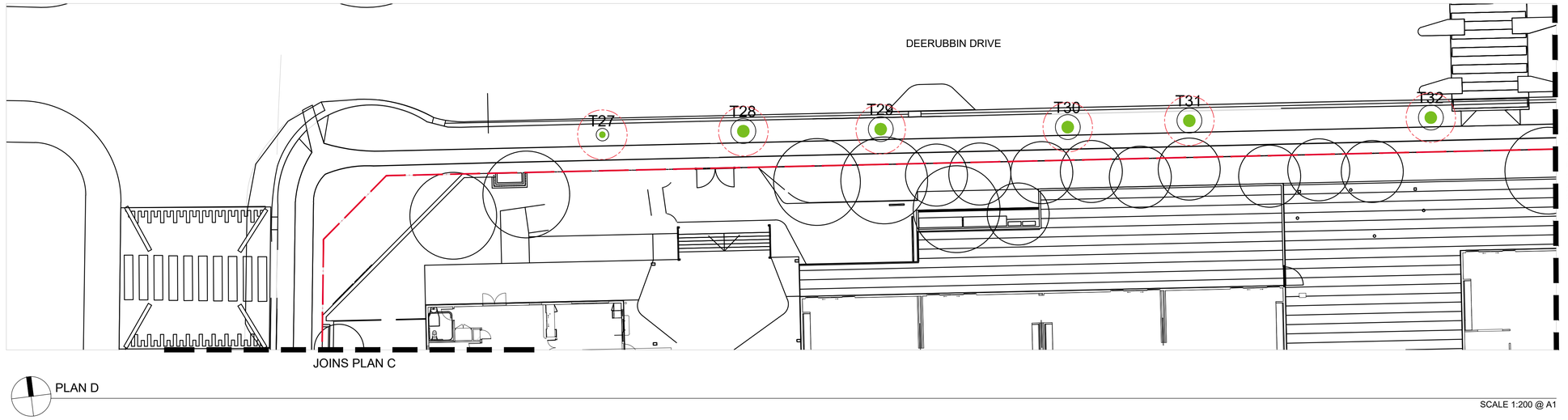
ISSUE: D

SCALE: 1:200 @ A1, 1:400 @ A3

DRAWN: gh | CHECKED: gs | DIRECTOR: gs

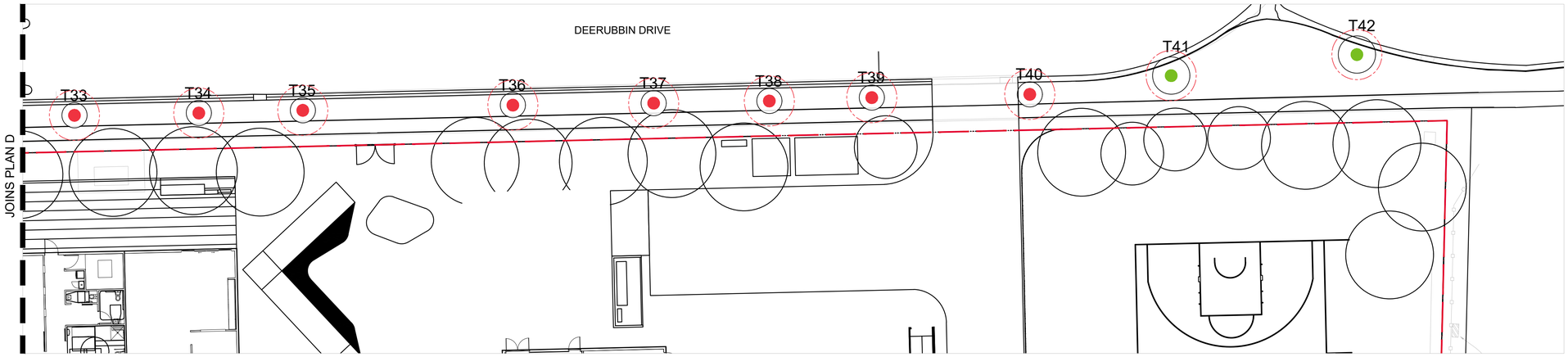
0 2 4 10 m

ACN: 164 245 514 ABN: 99 164 245 514



PLAN D

SCALE 1:200 @ A1



PLAN E

SCALE 1:200 @ A1

LEGEND

- PROPERTY BOUNDARY
- TX — EXISTING TREE. Refer to Tree Impact Assessment Schedule
- TREES TO BE RETAINED. Refer to Tree Impact Assessment Schedule
- TREES TO BE REMOVED. Refer to Tree Impact Assessment Schedule
- TREE PROTECTION ZONE

ISSUE	DESCRIPTION	DATE
C	REVISED TO CLIENT'S DIRECTION	21.07.2021
B	REVISED IMPACT ASSESSMENT REPORT	29.04.2021
A	IMPACT ASSESSMENT REPORT	18.03.2021

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PROJECT

NEW PRIMARY SCHOOL IN MULGOA RISE

CLIENT

NBRS ARCHITECTURE

DRAWING

TREE REMOVAL PLAN 02

DRAWING NUMBER: ARB-2108-202

ISSUE: C

SCALE: 1:200 @ A1, 1:400 @ A3

DRAWN: gh | CHECKED: gs | DIRECTOR: gs

0 2 4 10 m

ACN: 164 245 514 ABN: 99 164 245 514

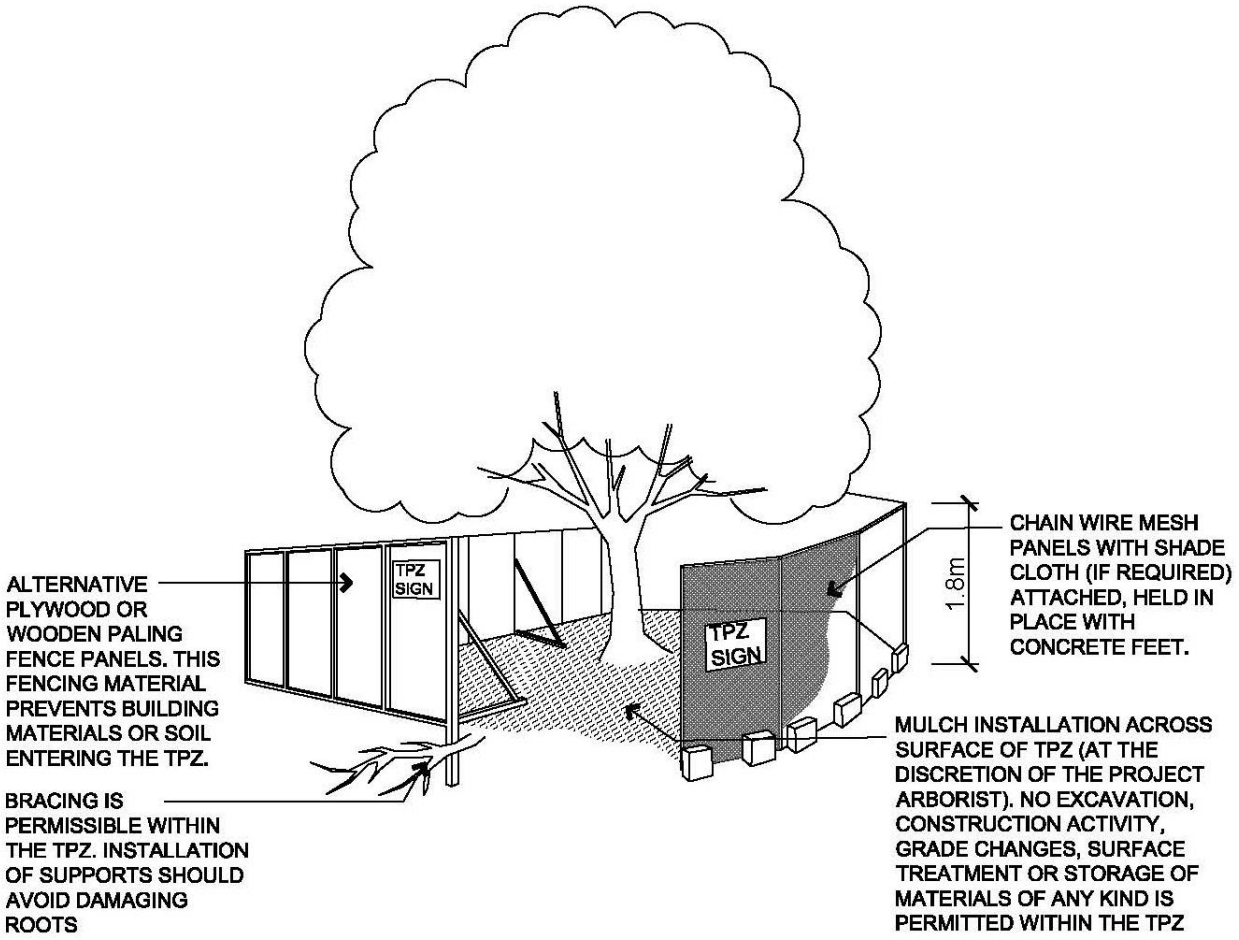
APPENDIX 3: TREE ASSESSMENT SCHEDULE

Tree Assessment Sheet

Location:	New Primary School in Mulgoa Rise
Client:	NBRS Architecture
Date:	18.08.2021

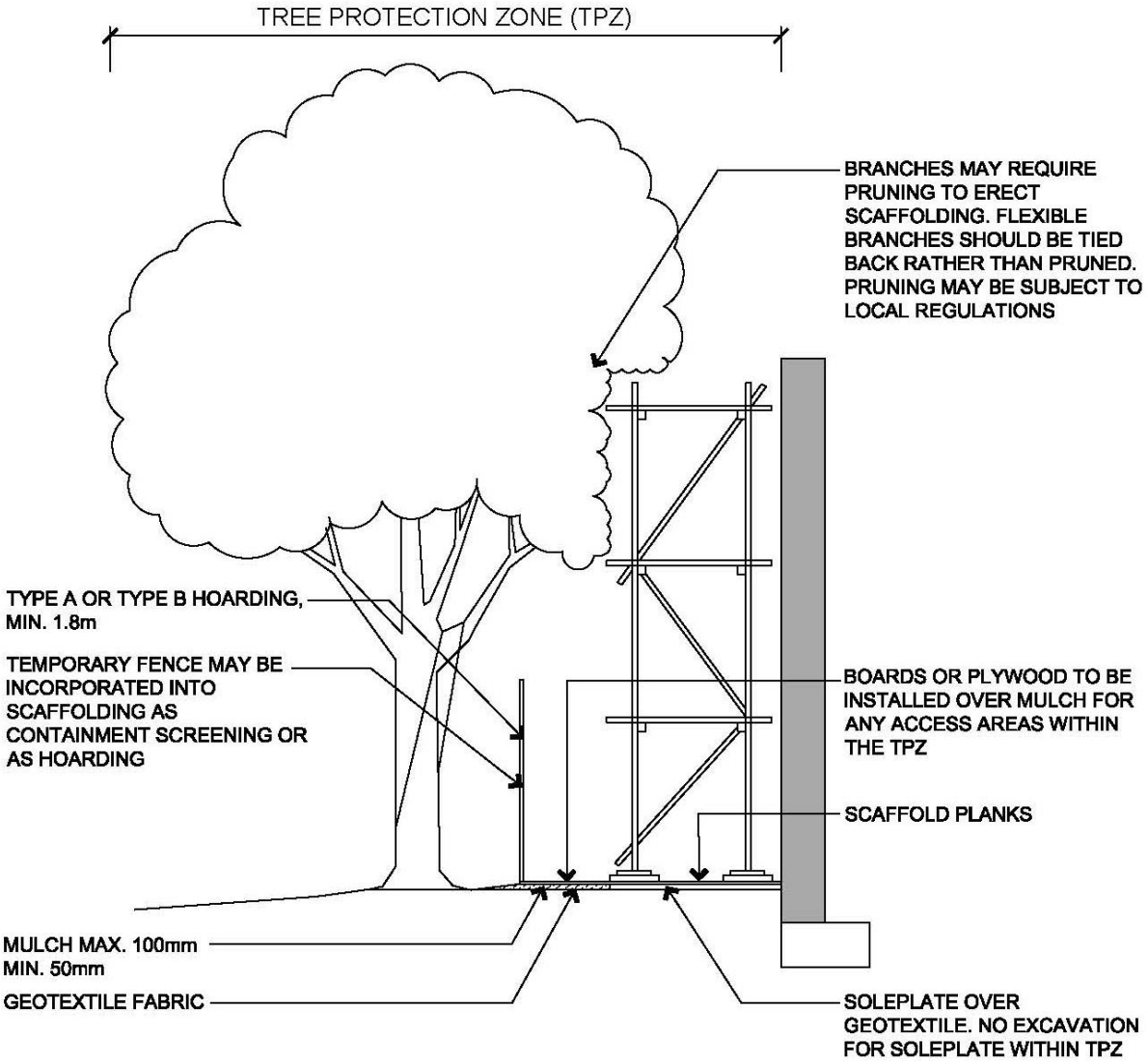
Tree No.	Botanical Name / **Common Name**	Dimensions							Health				Vigour				Structure					Age Class					**Landscape Significance**	**Retention Value SRIV**	Comments
		TPZ radius (m)	**SRZ** radius (m)	DBH (mm)	DAB (mm)	Height (m)	Spread EW (m)	Spread NS (m)	Deadwood	Dieback	Pests	Diseases	Canopy density %	Foliage size	Foliage colour	Extension growth	Inclusions	Fractures	Wounds	Cavities	Decay	Senescent	Mature	Semi Mature	Young	New planting			
1 - 16	*Ulmus parvifolia* **Chinese Elm**	2.00	1.50	120-130	140-160	7	5	5	-	-	-	-	100	G	G	Y	-	-	-	-	-				Y		L	**YGVG9**	Retain
1A	*Ulmus parvifolia* **Chinese Elm**	2.00	1.50	120-130	140-160	7	5	5	-	-	-	-	100	G	G	Y	-	-	-	-	-				Y		L	**YGVG9**	Remove
1B	*Ulmus parvifolia* **Chinese Elm**	2.00	1.50	120-130	140-160	7	5	5	-	-	-	-	100	G	G	Y	-	-	-	-	-				Y		L	**YGVG9**	Remove
17-23	*Ulmus parvifolia* **Chinese Elm**	2.00	1.50	120-130	140-160	7	5	5	-	-	-	-	100	G	G	Y	-	-	-	-	-				Y		L	**YGVG9**	Retain
24	*Ulmus parvifolia* **Chinese Elm**	2.00	1.50	120-130	140-160	7	5	5	-	-	-	-	100	G	G	Y	-	-	-	-	-				Y		L	**YGVG9**	Remove
25-26	*Ulmus parvifolia* **Chinese Elm**	2.00	1.50	120-130	140-160	7	5	5	-	-	-	-	100	G	G	Y	-	-	-	-	-				Y		L	**YGVG9**	Retain
27 - 31	*Pyrus ussuriensis 'hybrid'* **Manchurian Pear**	2.00	1.50	95-100	130-150	4	2	2	-	-	-	-	100	G	G	Y	-	-	-	-	-				Y		L	**YGVG9**	Retain
32	*Pyrus ussuriensis 'hybrid'* **Manchurian Pear**	2.00	1.50	95-100	130-150	4	2	2	-	-	-	-	100	G	G	Y	-	-	-	-	-				Y		L	**YGVG9**	Retain
33 - 40	*Pyrus ussuriensis 'hybrid'* **Manchurian Pear**	2.00	1.50	95-100	130-150	4	2	2	-	-	-	-	100	G	G	Y	-	-	-	-	-				Y		L	**YGVG9**	Remove
41 - 42	*Ulmus parvifolia* **Chinese Elm**	2.00	1.50	120-130	140-160	7	5	5	-	-	-	-	100	G	G	Y	-	-	-	-	-				Y		L	**YGVG9**	Retain

APPENDIX 4: TYPICAL TREE PROTECTION DETAILS



PROTECTIVE FENCING

Based on AS4970-2009 NOT TO SCALE



NOTE: Excavation required for the insertion of support posts for tree protection fencing should not involve the severance of any roots greater than 20mm in diameter, without the prior approval of the project arborist.

INDICATIVE SCAFFOLDING WITHIN A TPZ

Based on AS4970-2009 NOT TO SCALE

TREE PROTECTION ZONE SIGN

Based on AS4970-2009 NOT TO SCALE