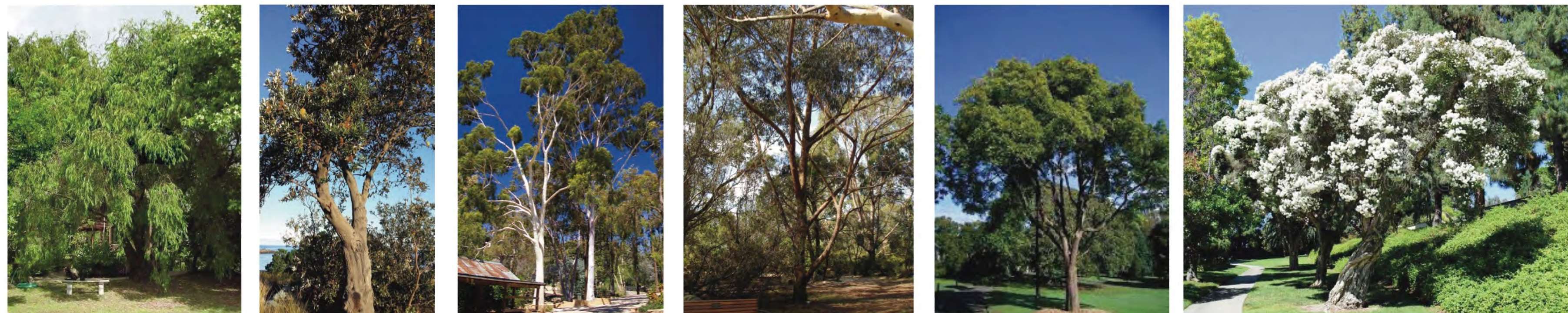


GENERAL NOTES
 ALL DIMENSIONS AND EXISTING CONDITIONS SHALL BE CHECKED AND VERIFIED BY THE CONTRACTOR BEFORE PROCEEDING WITH THE WORK.
 ALL LEVELS RELATIVE TO 'AUSTRALIAN HEIGHT DATUM'.
 DO NOT SCALE DRAWINGS. USE FIGURED DIMENSIONS ONLY.

TREES

Indigenous tree palette (indicative)



Agonis flexuosa *Banksia integrifolia* *Eucalyptus citriodora* *Eucalyptus piperita* *Flindersia australis* *Melealeuca linariifolia*

Exotic tree palette (indicative)



Magnolia grandiflora *Pistacia chinensis* *Ulmus parvifolia*

SHRUBS & GROUNDCOVERS

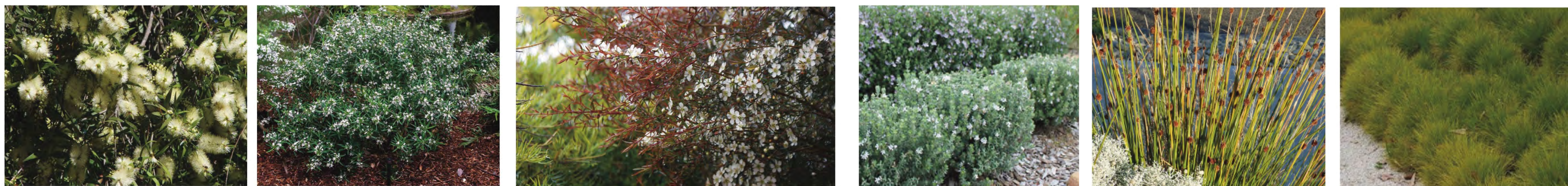


Acacia suaveolens *Brachyscome multifida*

INDICATIVE PLANTING PALETTE

BOTANICAL NAME	COMMON NAME	MATURE HEIGHT (& TREES CANOPY WIDTH)		CONTAINER SIZE
TREES				
<i>Agonis flexuosa</i>	Willow-Myrtle, Weeping Myrtle	10m	6-8m	45L
<i>Banksia integrifolia</i>	Coast Banksia / Coastal Honeysuckle	15m	6-8m	45L
<i>Eucalyptus citriodora</i>	Lemon-Scented Gum	45m	10-12m	45L
<i>Eucalyptus piperita</i>	Sydney Peppermint	12-15m	10-12m	45L
<i>Flindersia australis</i>	Native Teak / Crow's Ash	15-20m	10-12m	45L
<i>Magnolia grandiflora</i>	Bull Bay Magnolia	20m	15m	45L
<i>Pistacia chinensis</i>	Pistacia	10-13m	6-8m	45L
<i>Ulmus parvifolia</i>	Chinese Elm	8-10m	10-12m	45L
<i>Melealeuca linariifolia</i>	Snow in Summer / Narrow-leaved paperbark	7-8m	6m	45L
SHRUBS/GROUNDCOVERS				
<i>Callistemon sp</i>				
<i>Acacia suaveolens</i>	Sweet-Scented Wattle	1-3m		5L
<i>Leptospermum flavescens</i> "Copper Glow"	Tea Tree / Purple Tea Tree	1.5		5L
<i>Eriostemon myoporoides</i> (white)	Wax Flower	1m		5L
NATIVE GRASSES				
<i>Isolepis nodosa</i>	Knobby Club Rush	1m		150mm
<i>Lomandra 'Little Con'</i>	Mat Rush	300mm		150mm
<i>Lomandra longifolia</i> "Tanika"	Basket Grass	600mm		150mm
<i>Lomandra katrinus</i>	Mat Rush	700mm		150mm
<i>Brachyscome multifida</i>	Cut leaf Daisy	400mm		150mm
SENSORY GARDEN				
<i>Actinotis helianthi</i>	Flannel flower	0.3		150mm
<i>Lavandula angustifolia</i>	English Lavender	1m		5L
<i>Stachys byzantina</i>	Lamb's Ear	0.8		150mm
<i>Tulbarghia violacea</i>	Wild Garlic/Society Garlic	0.5		200mm

NATIVE GRASSES



Callistemon sp *Eriostemon myoporoides* *Leptospermum 'Copper Glow'* *Westringia fruticosa* *Isolepis nodosa* *Lomandra 'Little Con'*

SENSORY GARDEN



Lomandra longifolia 'Tanika' *Lomandra katrinus* *Accacia suaveolens* *Lavandula angustifolia* *Stachys byzantina* *Tulbarghia violacea*

04	8/5/20	Schematic Design Submission	CD
03	1/5/20	95% Schematic Design	CD
02	28/4/20	SSDA Submission	CD
01	17/4/20	SSDA Submission	CD
rev	date	name	by chk

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project
Darlington Public School
 Golden Grove Street
 Darlington NSW 2008

title
Landscape Plans
Indicative Planting Palette

scale NTS first issued 17/4/20

project code sheet no. revision

DTPS **8203** **04**

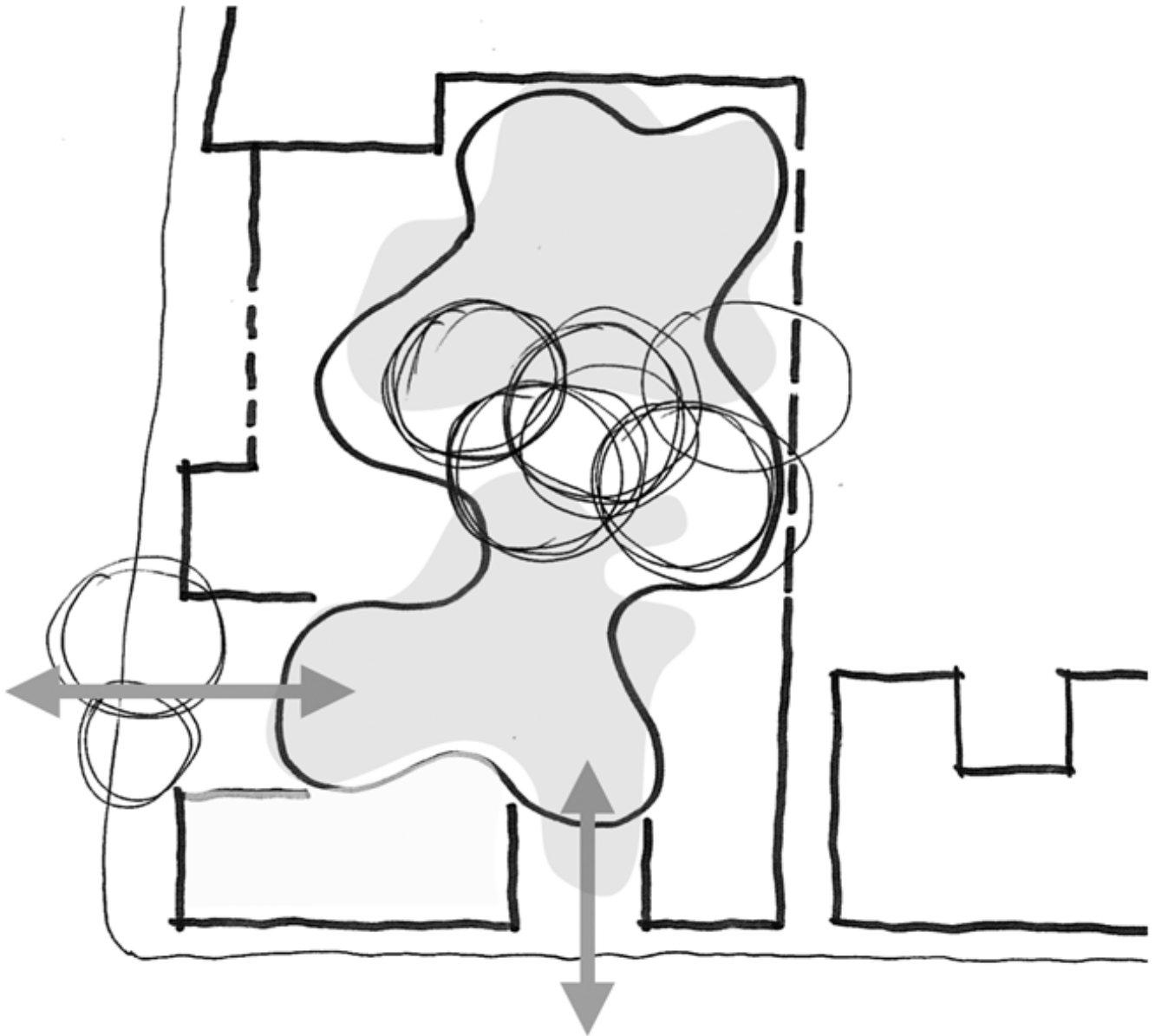
DARLINGTON PUBLIC SCHOOL REDEVELOPMENT

Appendix I — Landscape Report

SSD-9914

Prepared by FJMT

For NSW Department of Education





DARLINGTON PUBLIC SCHOOL
SSD - 9914 LANDSCAPE REPORT

GOLDEN GROVE STREET, DARLINGTON, SYDNEY
Department of Education

Project Name	Darlington Public School		
Project Code	DTPS		
Document Name	SSD-9914 Architectural Design Statement		
Revision	Date	Comment	Approved
01	09.04.20	Preliminary SSD Report	EC
02	17.04.20	SSD Report	EC
03	28.04.20	SSD Report Update	EC

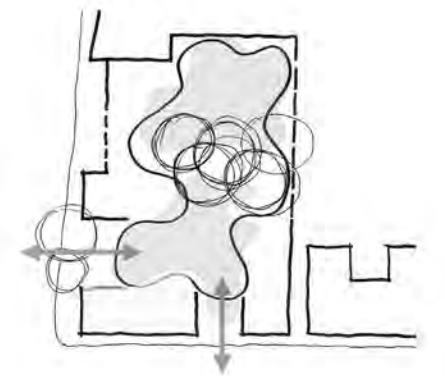
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uk Level , St Aldates, OX1 1BS United Kingdom **t** +44 1865 520 420

w fjmtstudio.com

Francis-Jones Morehen Thorp Pty Ltd ABN 28 101 197 219
Nominated architect Richard Francis-Jones ARBNSW 5301
Registered architect Richard Francis-Jones
Francis-Jones Morehen Thorp Ltd Company no 7384142 ARB 078103G

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DESIGN PRINCIPLES

Guiding Design Principles

Schools have a vital civic role, and form an important part of the community.

Schools' primary role is to deliver educational outcomes, however, they also have opportunities to engage more broadly with their communities.

The design principles included within this section aim to provide a framework for the Master Plan and to direct the development of the design solution.

They offer a high level of aspiration and quality control which will be used to test options to ensure they align with the Master Plan's intent.

The Design Principles have been grouped under the over-arching EFSG and Educational Space Planning Principles as developed by New Learning Environments and the school community.

Relationship to Darlington Public School Education Model

The Design Principles are to be considered in conjunction with the Darlington Educational Model which identifies the spatial implications of specific pedagogical approaches and the over-arching influence of the Reggio Emilia philosophy.

Education SEPP Design Quality Principles

In the new Education SEPP 2017, there are a number of design quality principles included in the legislation to encourage design excellence. Any application under this legislation will be required to provide a design statement that outlines how these principles have been incorporated.

The SEPP Design Quality Principles include:

- Context, built form and landscape
- Sustainability, efficiency and durability
- Accessibility and inclusiveness
- Health and safety
- Amenity
- Whole of life, flexibility and adaptability
- Aesthetics

LANDSCAPE

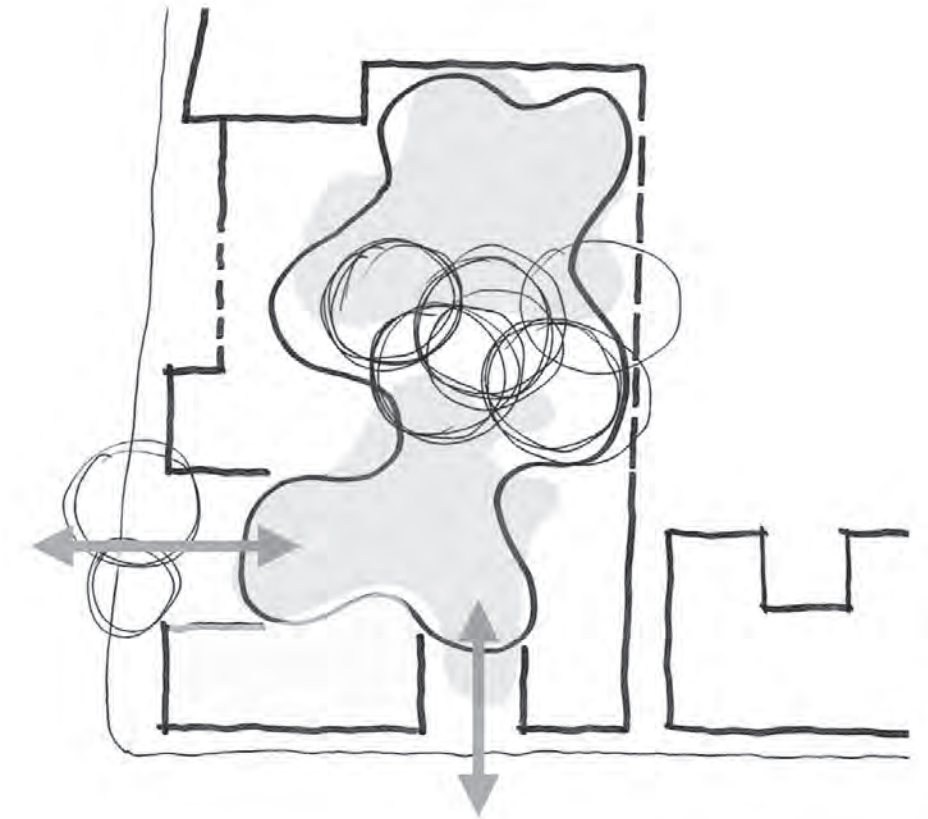
The design philosophy for the Darlington Public School playground centres around providing diverse play spaces with a variety of scales and the maximisation of functionality by providing overlays of potential uses.

The topography and grading of the site creates challenges and opportunities for the landscape design. Pedestrian movement and wheelchair access have been important drivers in creating a series of connected and functional spaces.

The playground embraces opportunities to create learning spaces, outdoor rooms and areas of active, imaginative and quiet play through the use of the connected paths and changing landforms.

Each play space is linked to possible learning games and different learning languages, featuring water, sand, rock, climbing, balls games, lines and decks, pathways and shortcuts.

The design also explores ways to embrace the indigenous culture of Darlington Public School and electorate the rich artistic heritage of the school.



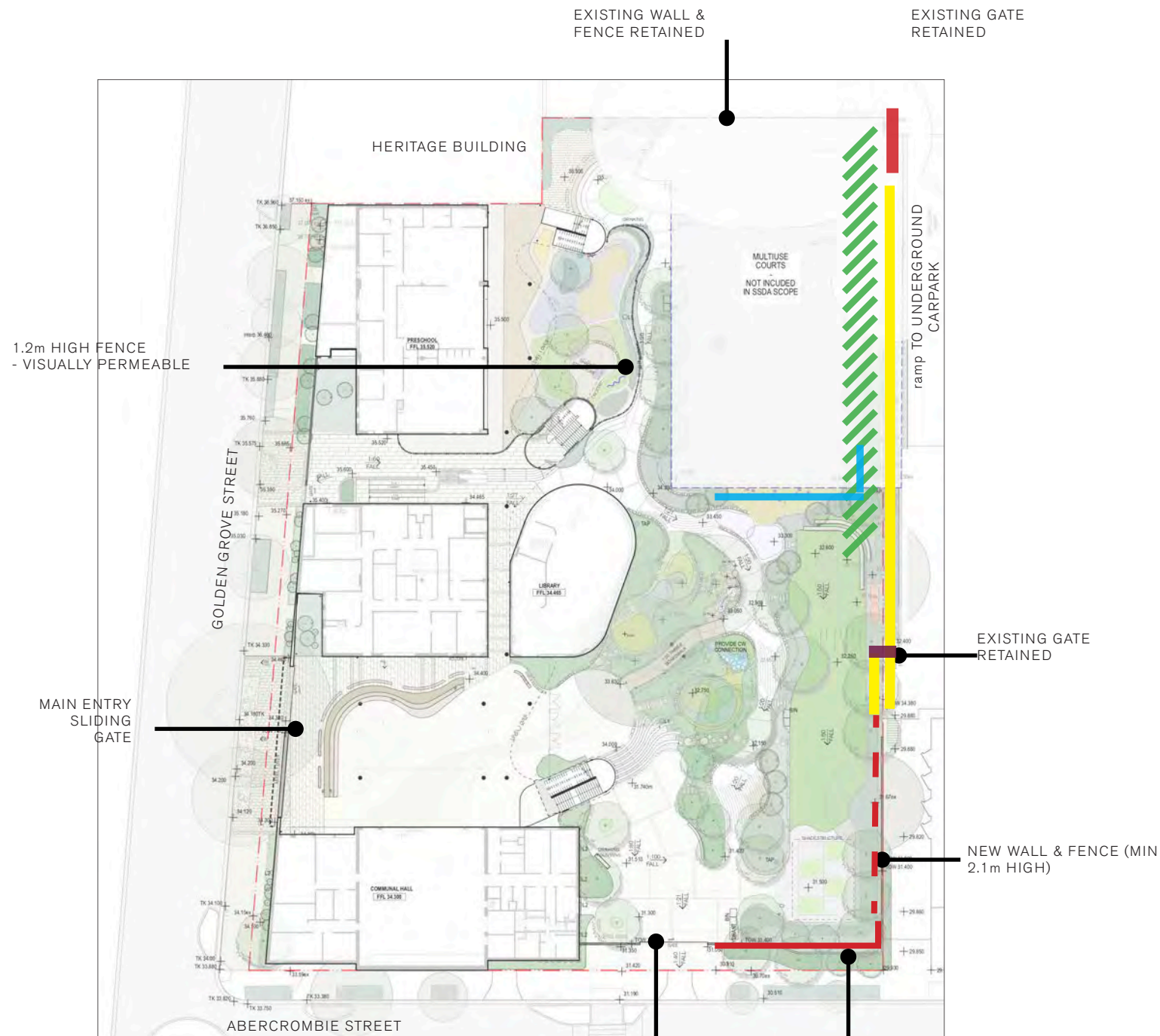
LANDSCAPE CHARACTER ZONES



COMPLETED SCHEME

- 1. COLA / Assembly Area
- 2. Nature Play / Indigenous gardens
- 3. Hardcourt / Multipurpose play
- 4. The Amphitheatre
- 5. Active Play
- 6. Active Play - Ball games
- 7. Linear Garden & Sculptural Fence
- 8. Preschool playground & garden
- 9. Climbing wall

SECURITY & FENCING



LEGEND

- EASTERN GARDEN - RETAIN EXISTING SOFTSCAPE EDGE - SOME REGRADING & REPLANTING MAY BE REQUIRED
- REINSTATE FENCE & GATE - STAGE 2 WORKS
- EXISTING WALL RETAINED

SECONDARY ENTRY SLIDING GATE (VEHICULAR ENTRY)

NEW BOUDANRY WALL

Security Strategy

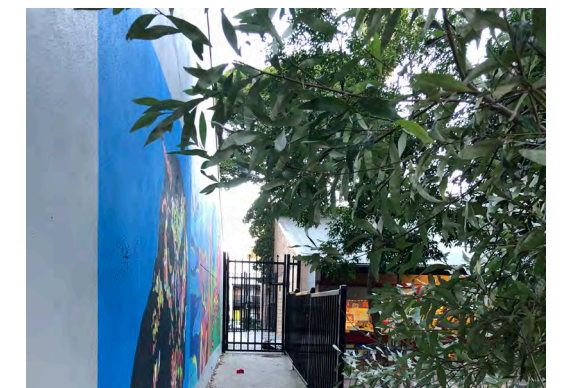
The design of the new school considers the role of the building as a secure perimeter, where possible fences are minimised and the building is used as a secure line.

The new development proposes the retain existing gated access to the eastern boundary and reinstate the existing gated connection between the school and the University of Sydney building.

The new school design includes entry walls and gates to Golden Grove and Abercrombie Streets to complete the security strategy. There are described on the following page.



View to Eastern Boundary - wall to be retained

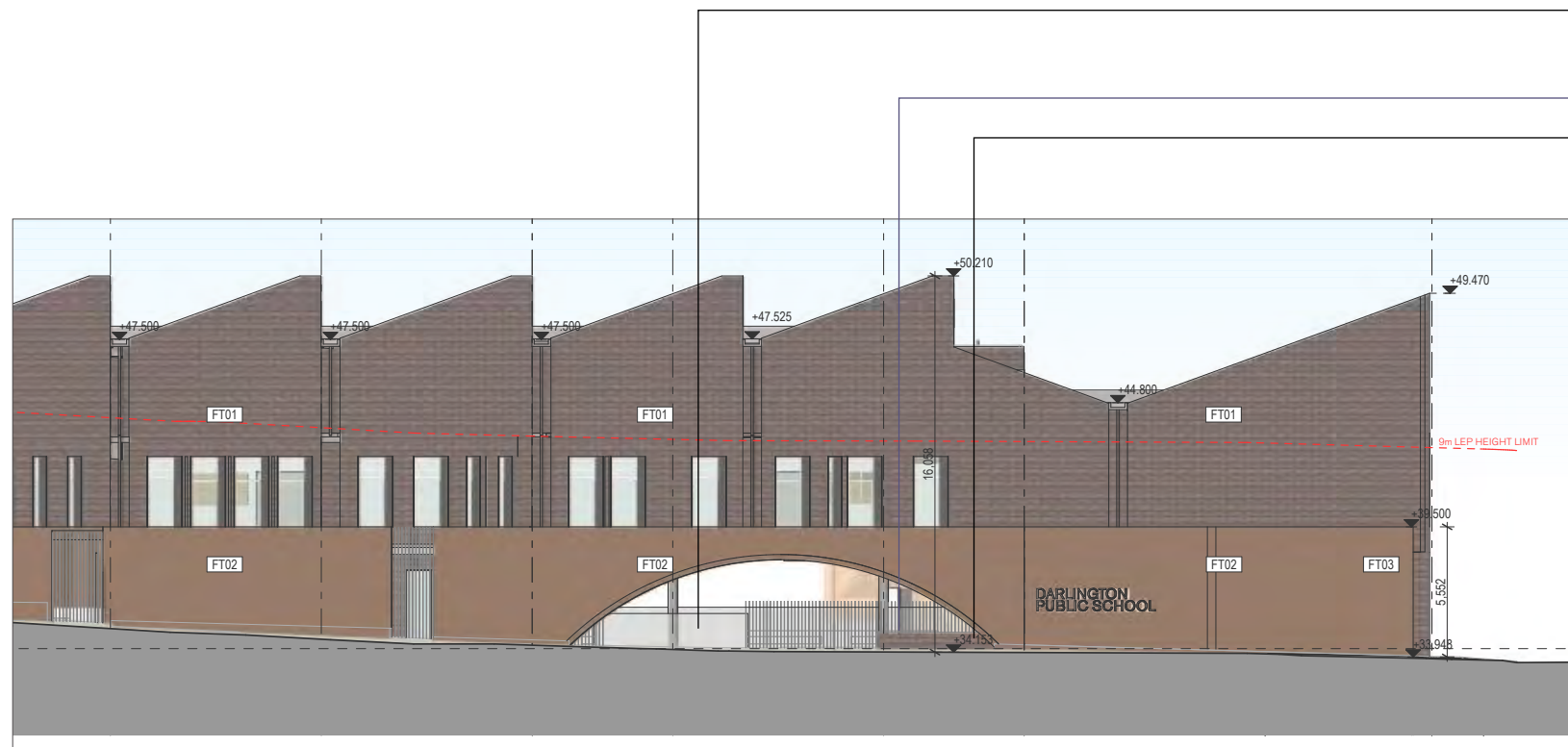


View to existing gate to be retained - eastern boundary-



View to Sydney University Student Accommodation - from Abercrombie Street

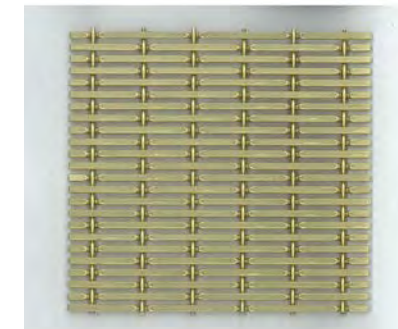
SECURITY & FENCING



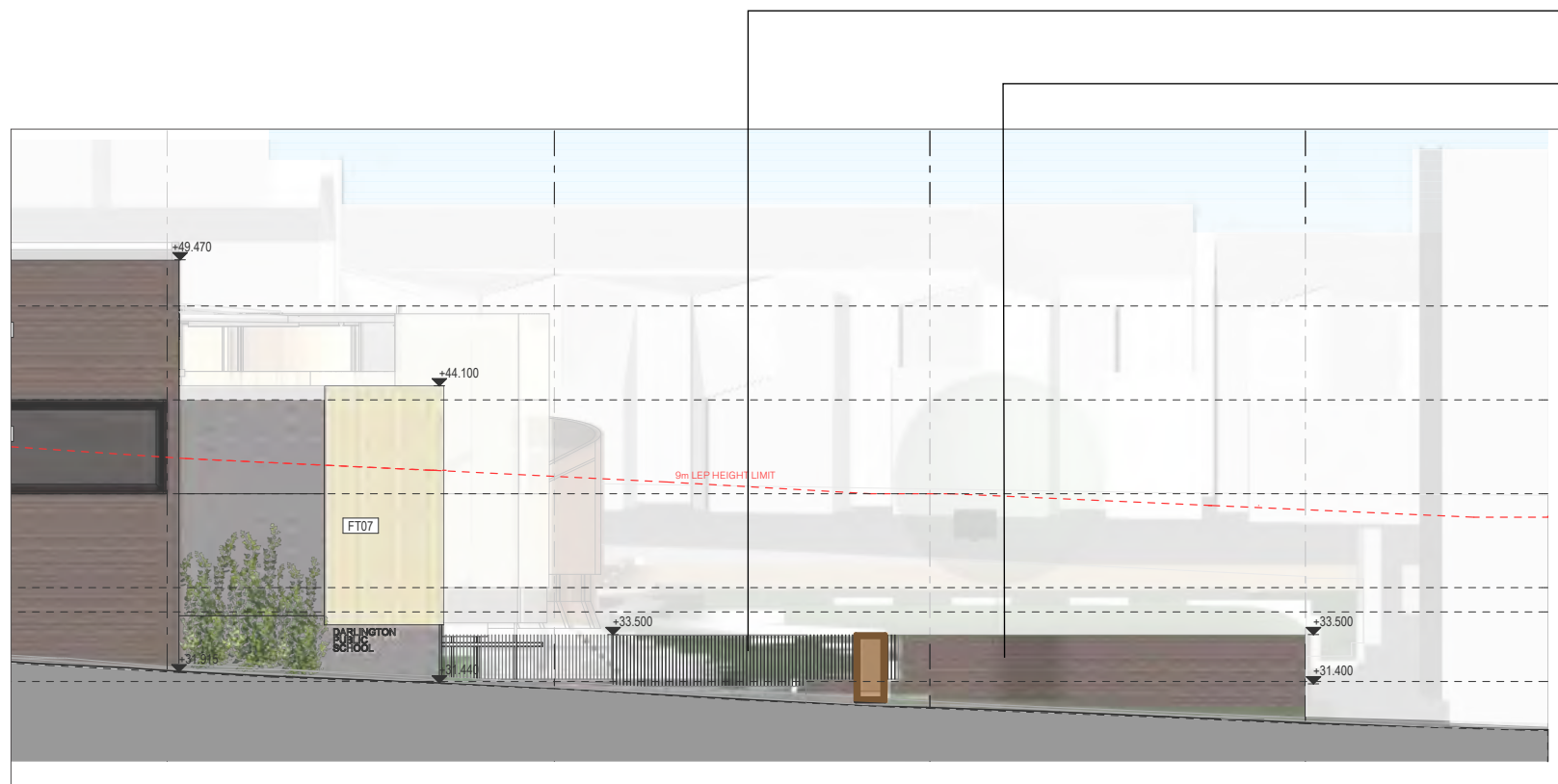
Golden Grove Street - Main Entry - Elevation

Sliding Gates
 Vertical blades - powdercoat bronze to match Architectural
 Entry fencing (atop brick wall)
 Vertical blades - powdercoat dark grey to match Architectural

Brick wall provides protection from flood events - brick selection to match the Architectural finishes



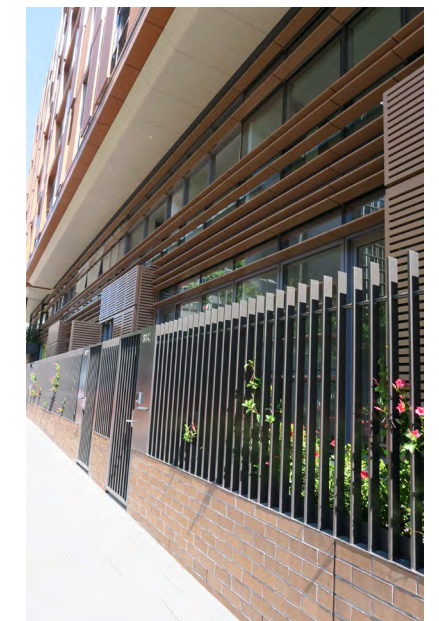
Playground-side - bronze mesh



Abercrombie Street - Secondary Entry

Entry fencing - Vertical blades - powdercoat dark grey to match Architectural finishes

Brick wall provides secure school boundary (min 2.1 high)-
 brick selection to match the Architectural finishes

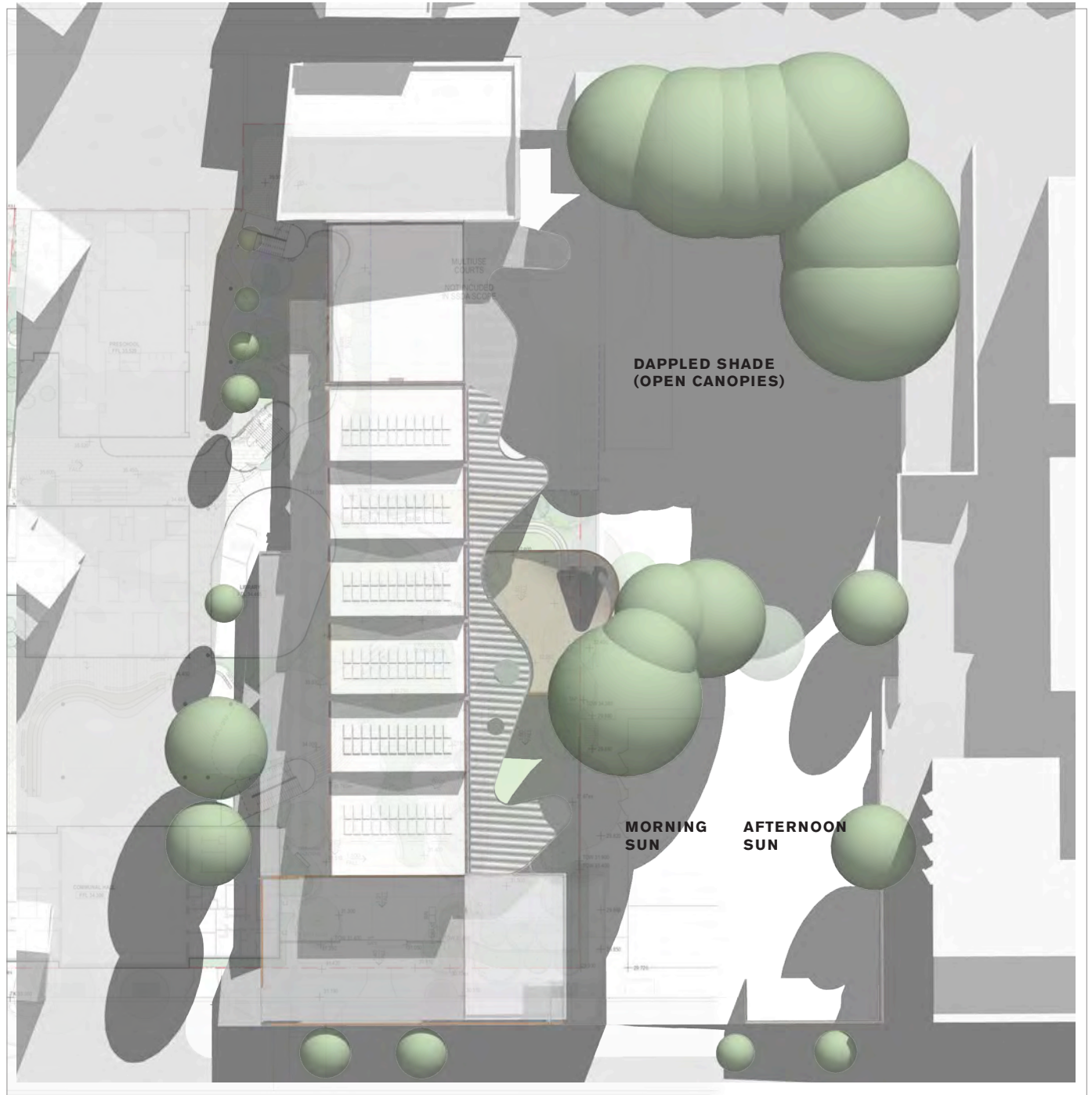


SHADE

Summer



Winter



Sun Study

The results of the study suggest that the following should be considered in the design:

- consider deciduous tree planting adjacent the basketball court to provide additional summer shade whilst maintaining winter sunlight
- select locations for trees on the preschool to provide afternoon summer protection, maintain a winter sun trap
- provide additional semi-permeable shelter to provide additional shade to the soft eastern sports court.

TOPOGRAPHY

Levels



Accessible circulations



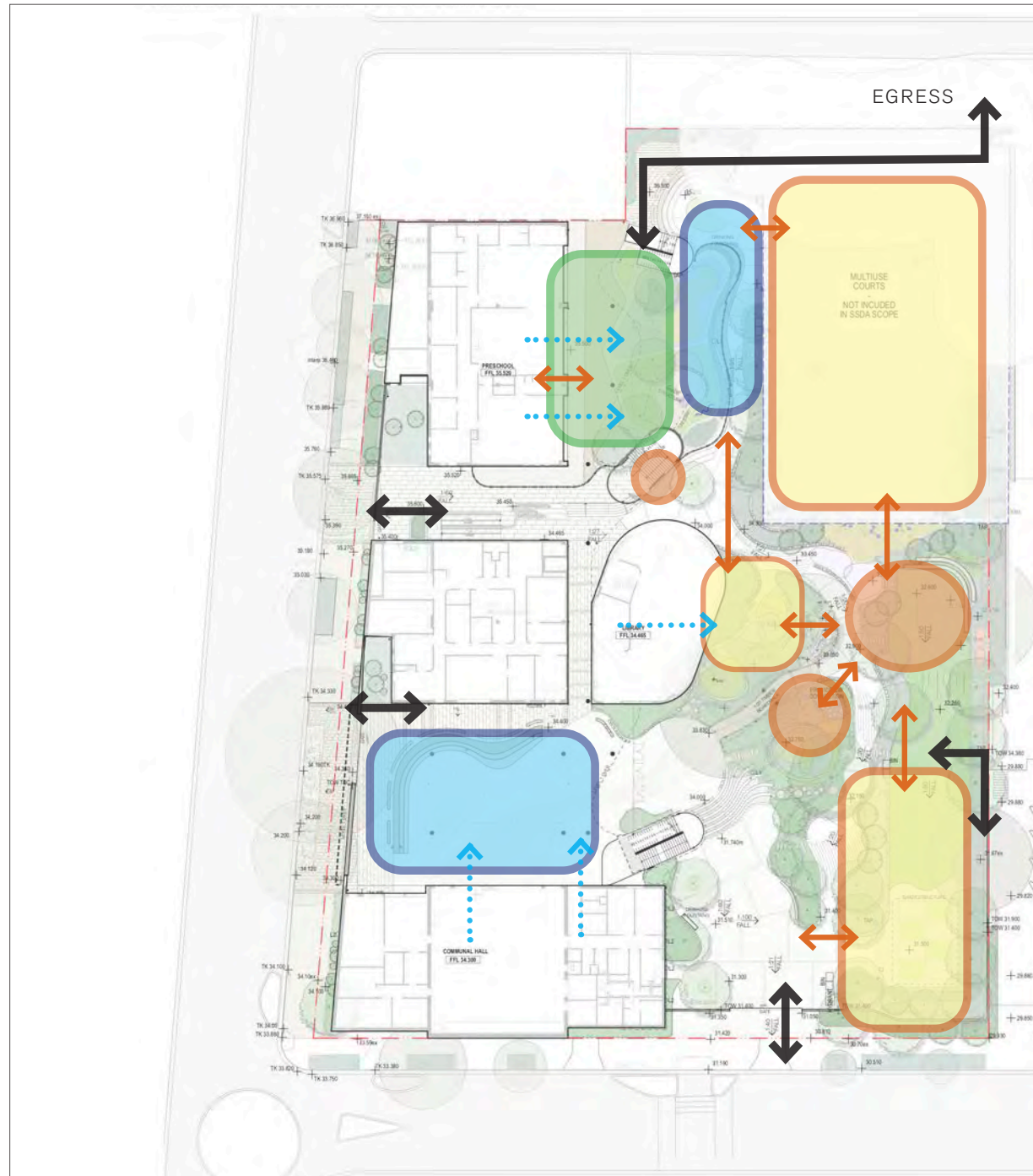
LEGEND

- +30.80ex** EXISTING LEVEL
- FFL33.650** BUILDING FINISH FLOOR LEVEL
- +30.80** DESIGN RL

LEGEND

- WHEELCHAIR CONNECTIONS
- STEPPED/ STAIRWAY CONNECTIONS
- SCHOOL ENTRANCE
- BUILDING ENTRANCE

Areas and Connections



LEGEND

- ACCESS TO PLAY
- VIEWS
- PEDESTRIAN MOVEMENT

Indigenous Overlay and Artwork



LEGEND

- ARTWORK MOUNTED TO EXISTING WALLS
- ARTWORK MOUNTED TO / OR INTEGRATED WITH NEW WALLS
- WALL ART RELAID INTO THE FACE OF NEW TERRACE SEATS
- ART & / OR INDIGENOUS INTERPRETATION:
 - SET INTO THE UNDERCROFT OF THE ROOF ABOVE
 - INLAID INTO THE NEW PAVED COLA AREA
 - LOCATED IN THE NATURE LEARNING PLAYGROUND OR SCULPTURE GARDEN
 - INTEGRATED WITH THE SCULPTURAL FENCE

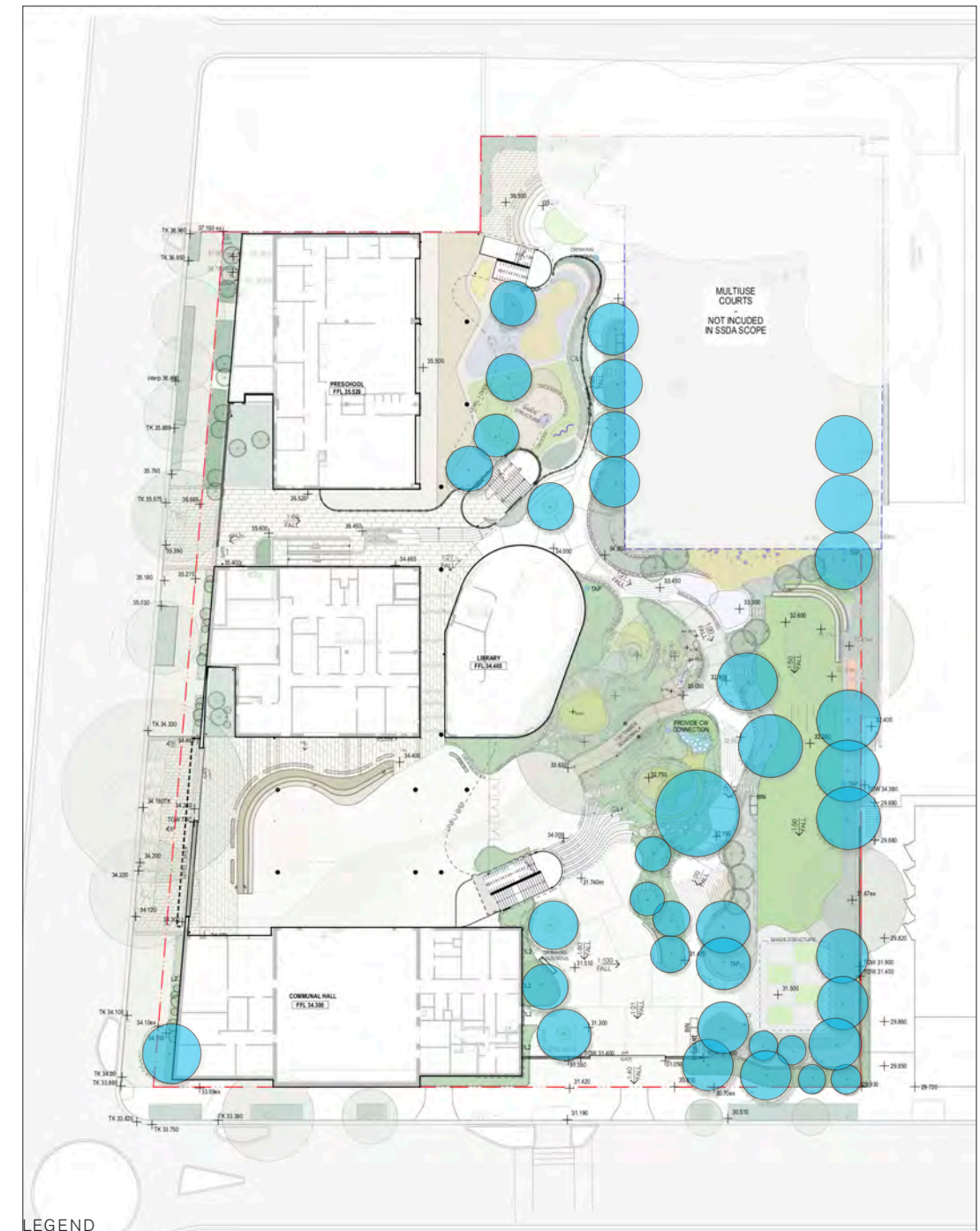
A number of opportunities for Art and Indigenous Interpretation are present in the Landscape. Existing artistic works could be salvaged and relaid / mounted into new landscape elements. New artworks could also be incorporated in the outdoor spaces.

EXISTING VEGETATION

Tree management plan



PROPOSED TREES



- EXISTING TREE TO BE RETAINED
- EXISTING TREE TO BE RETAINED SUBJECT TO FINAL LEVEL CONFIRMATION
- EXISTING STREET TREE TO BE RETAINED SUBJECT TO FOOT-PATH LEVELS / ARBORIST ADVICE
- EXISTING TREE TO BE REMOVED

TOTAL TREE TO BE RETAINED: 19 TREES

TOTAL TREE TO BE REMOVED: 27 TREES

TOTAL TREE PRE-DEVELOPMENT: 46 TREES

RETAINED TREES:
6 (WITHIN SITE BOUNDARY)
13 (STREET TREES)

PROPOSED TREES: 38
TOTAL TREE POST-DEVELOPMENT: 57 TREES







- PROPOSED TREE

ESD & WSUD

Ecological Sustainable Development & Water Sensitive Urban Design



LEGEND

-  ON SITE DETENTION & RAINWATER TANKS
-  GAMES COURT SHED WATER TO RAINGARDENS FOR WATER QUALITY TREATMENT
-  VEGGIE PATCH AND WORM FARM - ECOLOGICAL LEARNING
-  PASSIVE IRRIGATION TO GARDENS ADJACENT PATHS
-  IRRIGATION TO LANDSCAPE TURF & GARDEN AREAS
-  STORMWATER OVERLAND FLOW

Ecological principles are integrated into the landscape design with the primary focus on water. Principles such as water sensitive urban design (WSUD), plant selection process and site micro climatic analysis inform the layout, materials selection and environmental response.

The primary landscape ESD initiatives include:
 Fall paving to facilitate surface water recharge to mass planting beds to reduce potable water usage
 Provide an appropriate area of planting to improve air quality and reduce the urban heat island effect;
 and select hardy, low water use, indigenous plant species where possible suited to the harsh urban environment.

Water is a key sustainable focus in the Australian landscape. Although many of the plant species to be selected will have low water requirements (and therefore are inherently water conserving), water-efficient subsoil drip irrigation systems are proposed to ensure that the landscape is maintained to the high standard required.



STREETSCAPES & CONNECTIONS

A number of policy and strategy documents were reviewed in relation to the project - to confirm surrounding bicycle and pedestrian connections, planned connections and their relation to the Darling School streetscapes. The review confirmed that Golden Grove, as the main entrance to the school, is a significant link between priority pedestrian and bicycle networks. A summary of the review is provided below.

Streetscapes Codes

The Code indicates that inset concrete pavement is a suitable treatment for Local Area footpaths.

- the proposed streetscape works includes upgrades to the existing concrete footpath (to match existin and the extension of internal unit pavers to a section of the footpath to emphasize the school address to Golden Grove Street.

- the concrete footpath to Abercrombie Street will be retained / made good as required.

Street Tree Planting

A review of the City's Street Tree Masterplan indicates that:

Golden Grove - Eucalyptus microcorys

Abercrombie - Lophostemon confertus

Street trees will be retained along both streets - resin bonded gravel is proposed to the tree surrounds for the Main Entrance and the entrance to the Preschool - this treatment is proposed to maintain oxygen and moisture to the tree whilst protecting it from high pedestrian traffic.

Any future tree planting should consider the recommendations of the Street Tree Masterplan.

CONSULTATION

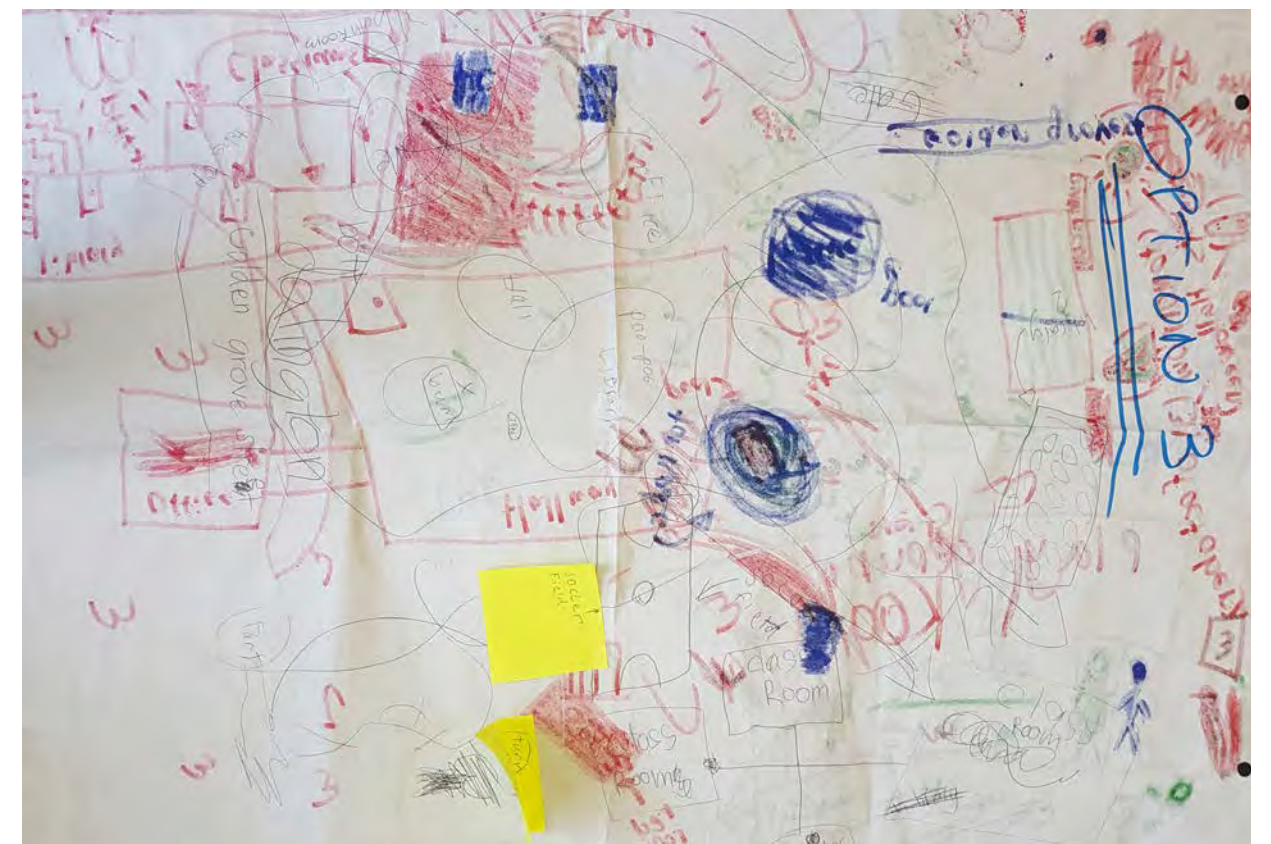
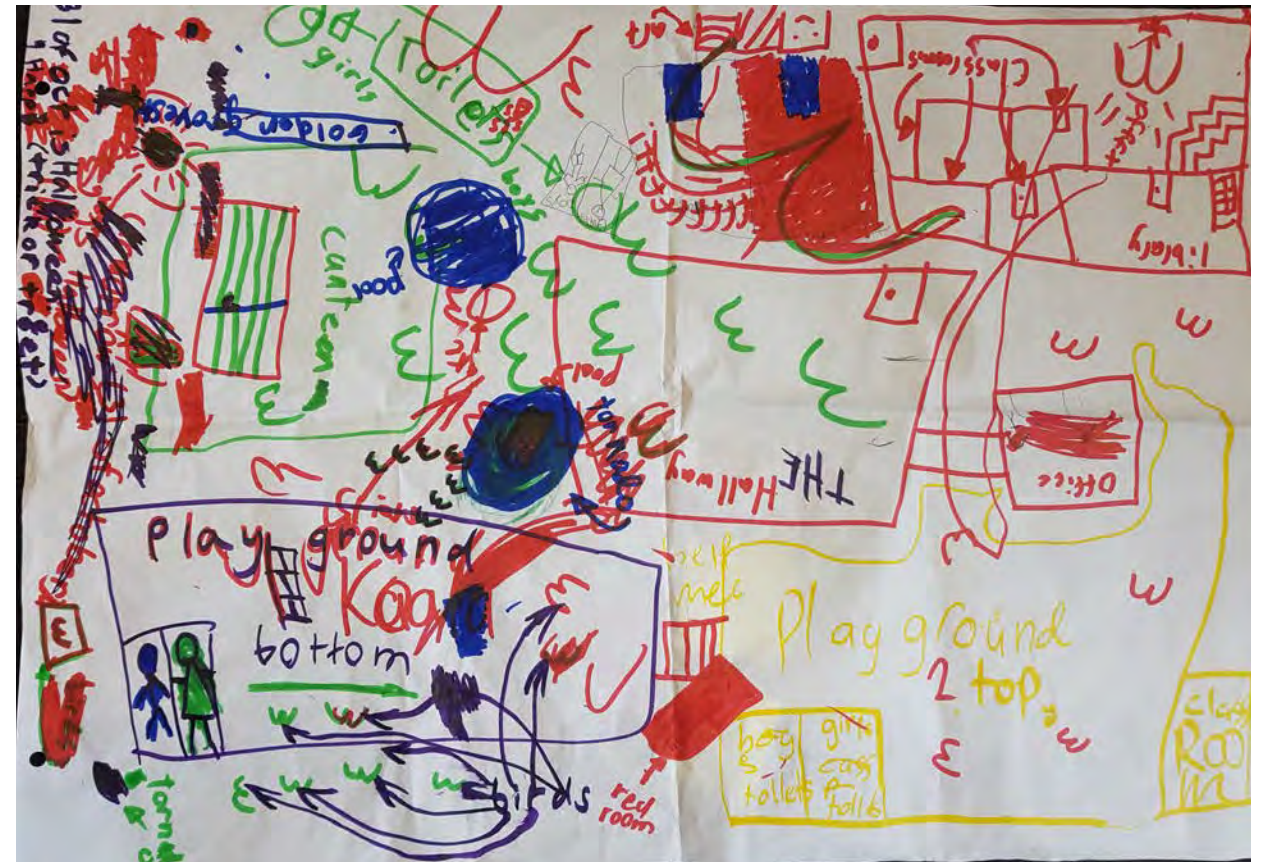
The development of the design for the proposed school included several meetings with Darlington Public School Staff & the community

A summary of consultation with the School principal and the staff representative is provided below:

- Can the design include as much kick-about area as possible, increase the size of the open area create more kick about area
- The seating and multifunctionality of the outdoor amphitheatre is good
- Preference not to retain the She Oak trees as they drop too many needles and cause slippery surfaces
- Include power outlet connections to the upper basketball court - this area is used for performances and events

The following points were raised several time as important to the students, the community and staff:

- Allow for good access, links for bikes, scooters, provide accessible connections, more than 1 entry/ exit
- Native planting, tree retention, indigenous gardens
- More kick about area, less hard paving
- More play equipment
- Good sight lines



DARLINGTON INFORMATION SESSION // FEEDBACK

Feedback summarised into reoccurring categories found in the feedback forms from Sessions 1 & 2						
STAKEHOLDERS	ACCESS	MATERIALS	LANDSCAPE	EDUCATION	PLAY	EXTRAS
COMMUNITY MEMBER / PARENT #1	Pram access throughout the site. Top to bottom access as some parents drop of at pre-school and then need to send other kids to class at bottom of campus	Brick, slatted timber	Bush garden, Integrate landscaping + play spaces	Convey indigenous culture; local indigenous kids to present to school community plants etc + how used in indigenous culture.	Open play that integrate landscaping.	Undercover bike / scooter storage
#2		Solar panels; In the detailed design phase, looking forward to learning more about solar panel installations given the location	Tree retention, but also the use of native species in the redesign & landscaping			
#3						More specific & informative. Like session on classroom design. Very positive at design level and it is evolving. Very happy to have more than the info boards and capture our feedback.
#4						Satisfied, no further comments
#5	Accessibility from hall for hire/ passive income			Indigenous/food gardens for business purposes passive income		Looking at business opportunities
#6			Community garden with indigenous foods / bush tucker	Workable kitchen for extra curricular activities. Allows children to watch their fruit/vegetables grow, then prepare them in a kitchen (cooking class)	Agriculture learning experience via community garden	
#7			Rooftop garden / ground maintenance considered based on tree type and removal of branches	Composting	Casual play area for kids when parents busy at school (P&C etc)	Passive income via the garden
#8		Retain the red doors	Casuarina trees analysed, keep the tawny frog mouths and birds satisfied	Community room for elders to educate		Would like GML consultation to be used, was very happy with the GML consultation process
STUDENTS	Toilets are too far away, would like more / Separate exit and entrance for bike storage	Retain the red doors	Community veggie garden, hardscape for play. Grassy spots for games, free play and sports	Chalkboards, outdoor learning.	Tip, soccer, handball, monkey bars, more play equipment, integrated play [like the pre-school] climbing web, tree house, play equipment, tunnels and rock climbing. Sand play,	Searching for pokemon, don't like stones or hard surfaces, more grass.
COMMUNITY CONSULTANTS	80% ride / walk to school. Casual play area near the drop/pick up zones. ASC occupies hall every afternoon meaning that no one else can use it, can we create an alternative space? Agriculture learning experience via community garden. Why is the ASC not located with the Pre-school? Will the corner building at the roundabout be recessed in? She Oak trees creating maintenance issues. Seating in the middle as you can see both gates.					
Summary of Stakeholder's notes and key points to consider as these were re-iterated throughout the feedback.						
OVERVIEW	ACCESS	MATERIALS	LANDSCAPE	EDUCATION	PLAY	EXTRAS
KEY POINTS:	Access from the top to the bottom of the site which is pram friendly. Access near the hall to allow events to occur / making it easy to hire out. Access to toilets throughout the playground helpful for the children. Shortcuts that children would potential take to be considered when creating access and selecting materials.	Retain the iconic red doors at the front of the school. A modern aesthetic which isn't too 'clinical'. Suggested use of solar panels due to the schools location.	Community garden with indigenous plants which can be presented by the elders of the community. Food preparation to be incorporated into L&D. Natives, tree retention preferred, ongoing ground maintenance to be considered.	Convey indigenous culture; local indigenous kids to present to school community plants etc + how used in indigenous culture. Open the library to an outdoor area. Outdoor educational areas.	Open play that integrate landscaping. Open grass areas for sport and hardscape for other games such as handball. Play equipment is locked up in the pre-school, kids wish to continue having access to it.	Creating passive income / business opportunities.
	Bike Storage	View Points				
FURTHER DETAILS TO CONSIDER:	Undercover, to be able to ride in to the parking area and have more than one entry/exit.	The middle of the site, both gates can be viewed, good sight-lines for supervision.				

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20151 IA2_RAP Endorsement 21Aug2020 final.docx

21 August 2020

Daniel Iuliano
Project Manager
Mace Australia Pty Ltd
Level 17, 44 Market Street
Sydney NSW 2000

Via email: Daniel.Iuliano@macegroup.com

Dear Daniel,

Re: Interim Advice 2 (IA2) – Endorsement of Remediation Action Plan for Proposed Upgrade Works, Darlington Public School, 417 Abercrombie Street, Darlington, NSW.

1 Introduction

Mace Australia Pty Ltd (Mace), on behalf of NSW Department of Education School Infrastructure (SINSW), has engaged Rebeka Hall of Zoic Environmental Pty Ltd (Zoic), a NSW EPA Auditor accredited (No. 0802) under the Contaminated Land Management (CLM) Act 1997, to conduct an Audit of the property located at 417 Abercrombie Street, Darlington, NSW (“the site”).

The site is legally identified as Lot 592 in DP 752049 and Lot 100 in DP 623500, occupies an area of approximately 7,200m² and is currently used as Darlington Public primary school.

A State Significant Development (SSD) application for the Darlington Public School Redevelopment (No. SSD-9914) is currently under assessment with Department of Planning, Industry and Environment. The proposed development comprises the construction of a multi-storey school building, new administration and staff facilities, library, special programs rooms, hall, canteen facilities, preschool classrooms and associated landscaping and playgrounds.

The Audit is currently non statutory in nature. The Auditor has been engaged to review available environmental investigation reports, comment on the nature and extent of contamination and whether the proposed remedial strategy is appropriate for the contamination identified and future use, and what further works (if any) are required.

The Audit is being conducted in accordance with the NSW EPA (2017) Contaminated Land Management Guidelines for the NSW Site Auditor Scheme (3rd edition).



2 Scope of Audit and Nature of Interim Advice

NSW EPA (2017) describes the site assessment and audit process as:

1. *Consultant is commissioned to assess contamination.* The contaminated site consultant designs and undertakes the site assessment and, where required, all remediation and validation activities to achieve the objectives specified by the owner or developer; and
2. *Site auditor reviews the consultant's work.* The site owner or developer commissions the Auditor to review the consultant's work. The Auditor then prepares a SAR and SAS at the conclusion of the review, which are given to the owner or developer.

Therefore, the contaminated land consultant and other relevant parties should be satisfied that the work to be conducted conforms to all appropriate regulations, standards and guidelines and is suitable based on the site history and the proposed land use.

3 Current Interim Advice

During the course of the Audit, the Auditor issued Interim Advice No.1 (IA1) (31 July 2020) which provided comment on the investigation findings and remedial strategy documented in the following reports:

- Douglas Partners (April 2018) Hazardous Building Materials Assessment, Darlington Public School Upgrade, 417 Abercrombie Street Darlington Public School 92277.01;
- Douglas Partners (April 2018) Preliminary Site Investigation (PSI), Darlington Public School Upgrade, 417 Abercrombie Street Darlington Public School 92277.00
- Douglas Partners (February 2019) Detailed Site Investigation (DSI) for Contamination, Proposed Upgrade Works, 417 Abercrombie Street, Darlington, NSW 92277.01;
- Douglas Partners (May 2020) Soil Vapour Assessment (SVA), Proposed Upgrade Works, 417 Abercrombie Street, Darlington, NSW 92277.02;
- Douglas Partners (4 June 2020) Remediation Action Plan (RAP), Proposed Upgrade Works, 417 Abercrombie Street, Darlington, NSW, 92277.02. R001.Rev2

Douglas Partners (DP) provided a response to IA1 and a revised Remediation Action Plan.

The purpose of the current Interim Advice is to provide the Auditor's opinion on whether the site is capable of being made suitable for the proposed development by endorsing the remedial approach as outlined in the following report:

- Douglas Partners (DP) (19 August 2020) Remediation Action Plan (RAP), Proposed Upgrade Works, 417 Abercrombie Street, Darlington, NSW, 92277.02.R.001.Rev4.

The remediation action plan (RAP) has been evaluated against the requirements outlined in NSW EPA (2017) Contaminated Sites: Guidelines for the NSW Site Auditor Scheme (third edition) and other guidelines made or endorsed by NSW EPA.

4 Summary of Contamination Status of the Site

Investigations to date have confirmed the presence of fill material impacted with PAH (including BaP TEQ and naphthalene), isolated asbestos and lead above human health criteria (NEPM 2013, HIL-A); and TRH, BaP and zinc above ecological criteria (NEPM 2013; EILs/ESLs). Majority of the contaminants exceeded 250% of adopted assessment criteria (in particular BaP TEQ, total PAH and lead greater than respective HIL-A). The leachability of the fill material has not been fully assessed.



Preliminary (and limited) waste classification has indicated that the fill material could be classed as General Solid Waste; Restricted Solid Waste and possibly Special Waste (subject to confirmation of asbestos presence). However, further waste classification is proposed as part of remedial works.

Due to site access restrictions environmental investigations have only been via hand auger, and therefore vertical characterisation of contaminant conditions for the fill profile has not been completed. A review of environmental and geotechnical borehole logs indicate that fill occurs across the entire site, varying in thickness between 0.5m and 2.4m. The fill was described as grey mottled silty clay with slag, charcoal type gravel, and coal wash with widespread presence of crushed bricks, ceramics and concrete. The underlying natural soil comprised stiff, silty clay followed by weathered shale, and interbedded siltstone and sandstone at depth. No groundwater was encountered during the PSI, DSI or geotechnical investigations conducted by DP.

An asbestos management plan (AMP) exists for the northern portion of the site, where historically Asbestos Containing Material (ACM) fragments were observed on the surface of the playground. The AMP requires periodic inspections in the management of asbestos. Although only one sample collected during DP's DSI confirmed the presence of asbestos in a fragment the limitations associated with the collection of samples from hand augers and absence of fill penetration during the completion of the PSI and DSI works, the presence of asbestos (in forms) cannot be discounted for the site.

Groundwater was not investigated as DP considered that there was an incomplete pathway between impacted fill and groundwater, as concentrations of contaminants did not exceed adopted criteria in natural samples analysed. The Auditor notes that based on the environmental investigations reviewed, site history and environmental setting, groundwater occurs at depths greater than 10m and the potential impact to the groundwater from past and present land uses onsite is considered to be low.

5 Overview of the Proposed Remedial Strategy

Remediation will be conducted in a staged manner comprising Early Works (completion of upper games court and partial demolition of Block C); Stage 1 construction of new buildings in the northwest; and Stage 2 completion of a new build in the southern portion of site and demolition of Block A, B and remainder of C.

As outlined in the DP (19 August 2020) Remediation Action Plan (RAP) the proposed remedial strategy can be summarised as follows:

- Onsite retention of contaminated material by excavating and creating engineered containment cells followed by the installation of a capping layer over the impacted material. The proposed minimum thickness of the cap is 0.3m of clean fill (increased to 0.5m in soft landscaping areas), with a high visibility marker layer on top of the contaminated material. Final ground cover will be dependent on the development however can comprise asphalt, concrete or 'soft fall' material. This strategy provides a physical barrier and minimises the exposure to contaminated material. Where a concrete slab is retained, is in good condition and will not be disturbed, it is considered as a sufficient barrier.
- Excavation, waste classification and offsite disposal of any material not suitable to remain onsite (for example material that is highly leachable) or surplus to the development; and



- Preparation and implementation of a long-term Environmental Management Plan (EMP) at the completion of remediation outlining ongoing management and maintenance obligations for the residual, capped contamination.

6 Auditor Comments

The Auditor considers that the proposed remediation strategy, as documented in the DP (19 August 2020) RAP, is sufficiently robust for the contamination known for the site and the proposed staged development (outlined in Appendix D of RAP), with appropriate contingencies should contamination be greater than initially identified or the material found to leach at unacceptable concentrations.

The Auditor concludes that the site is capable of being made suitable for the proposed development provided that the DP (19 August 2020) RAP is implemented, and the following conditions are met:

1. A remedial work plan (RWP) (or specification) must be prepared once civil plans, development layout and ground cover have been finalised. The RWP must provide detail on the proposed capping systems for the site and design specification for the proposed containment cells including the location and depth of construction, and with due consideration any underground services to be installed within remediation areas. Suitable capping within Tree Protection Zones (TPZ) must provide a suitable barrier for site users as well as safeguarding tree health. The RWP must be reviewed and endorsed by the Site Auditor prior to its implementation.
2. As part of remediation sampling, further characterisation of retained fill including testing of fill under buildings once demolished; confirmation on whether asbestos (in any form) is present; and the leachability of retained fill must be undertaken.
3. In addition to human health validation criteria, relevant ecological investigation, and screening levels (EIL/ESL) must be considered as part of validation.
4. Following the completion of remediation works, a validation report (or reports if staged sign-off by Site Auditor is required) must be prepared in accordance with NSW EPA (2020) Guidelines for Consultants Reporting on Contaminated Sites (second edition) and requirements as outlined in the POEO (Waste) Regulation 2014 for waste classification, disposal and documentation. The validation report(s) must be provided to the Site Auditor for review.
5. As the remedial strategy is cap and containment of contaminated material onsite, a long-term Environmental Management Plan (EMP) will be required. The EMP must be appropriate for the contamination remaining and site activities/operation as a school, must outline how it will be legally enforceable, and will require public notification and acceptance by the landowner. The EMP must be reviewed and endorsed by the Site Auditor. The EMP will be attached to any Site Audit Statement (and Report) prepared for the site.
6. At the completion of remediation works, a Site Audit Statement(s) and Report(s) should be prepared, by the Site Auditor, confirming that the site is suitable for the proposed development.



This interim advice does not constitute a SAS or a SAR, but rather is provided to assist the Client in the assessment and management of contamination issues at the site. The information provided herein should not be considered pre-emptive of the final Audit conclusions. It represents the Auditor's opinion based on the review of currently available information.

Should you have any queries or wish to discuss any points, please do not hesitate to contact the undersigned.

Yours sincerely,

A handwritten signature in cursive script, appearing to read 'RHall'.

Rebeka Hall
NSW EPA Accredited Site Auditor
Zoic Environmental Pty Ltd

Date: 30 July 2020

Our ref: 20SYD-15191

School Infrastructure NSW
c/- Mace Australia
Level 17, 44
Markey Street, Sydney 2000

Attention: Daniel Luliano

Dear Daniel,

Response to biodiversity comments on Darlington Public School

Eco Logical Australia Pty Ltd (ELA) prepared a Biodiversity Development Assessment Report (BDAR) for School Infrastructure NSW (SINSW) for the redevelopment of Darlington Public School. The proposed redevelopment has been submitted as part of a State Significant Development (SSD) (application SSD19-9914). Mace Australia on behalf of SINSW have requested ELA to respond to comments made on the BDAR from the consent authority and members of the general public. ELA has provided a table of the comments and our response below.

If you should require additional information, please do not hesitate to contact me on (02) 9259 3707.

Regards,



Belinda Failes
Ecologist / Accredited BAM assessor (BAAS 18159)

Table 1: ELAs response to comments

Name	Issue	ELAs response
Department of Planning, Industry and Environment (DPIE)	Address comments made in the public submissions regarding the need to consider cumulative impacts of tree removal on fauna and the application of the precautionary principle.	ELA has addressed comments regarding the cumulative impacts, removal of trees in the paragraph 3 below.
Environment, Energy and Science Group – Biodiversity and Conservation (EES)	<p>Biodiversity</p> <p>Plant community types and threatened ecological communities EES supports the assessment by Eco Logical Australia that the vegetation on the development site has been planted sometime since 1943, and most probably since 1975 when the site was cleared of previous buildings to construct the school. EES notes that, in line with guidance in the Biodiversity Assessment Method Operational Manual Stage 1 (OEH May 2018) relating to treatment of planted ‘native vegetation’, a ‘best matching’ plant community type (PCT) has been selected for this vegetation, being PCT 1281 ‘Turpentine Grey Ironbark open forest on shale in the lower Blue Mountains, Sydney Basin Bioregion’.</p> <p>It is not clear as to why PCT 1647 ‘Red Bloodwood–Smooth-barked Apple heathy woodland on the Central and lower North Coast south-east’ was included as one of the four candidates for ‘best matching’ PCTs. Section 1.4.2.1 of the BDAR cites the Office of Environment and Heritage’s 2013 publication of The Native Vegetation of the Sydney Metropolitan Area (OEH 2013) as mapping this PCT 3.5km to the south-east of the development site. However, this PCT was not mapped or documented as occurring anywhere within the Sydney metropolitan study area by OEH 2013.</p> <p>EES notes that in section 1.4.2.2 of the BDAR it is stated that “The BioNet Vegetation Classification lists PCT 1281 as a component of Sydney Turpentine Ironbark Forest which is listed as a critically endangered ecological community (CEEC) under the BC Act and EPBC Act.” This statement is only correct with respect to the listing of this CEEC under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act). With respect to its listing under the NSW Biodiversity Conservation Act 2016 (BC Act), the BioNet</p>	<p>ELA has provided a map (Figure 1) which shows the location of nearest PCT recorded to the development site. A patch of PCT 1647 <i>Red Bloodwood – Smooth-barked Apple Heathy woodland on coastal sands of the Central and lower North Coast</i> was the closest PCT recorded to the development site.</p> <p>PCT 1647 was mapped by OEH 2013 and is approximately 3.5 km south-east of the development site. This was the closest mapped PCT to the development site and as such this was included in the list of candidate PCTs when considering the ‘best-fit’ PCT for the development site. This PCT was not considered a suitable candidate for the development site as it did not represent the suitable soil landscape or topography.</p> <p>ELA understands that EES have confirmed that the appropriate PCT for the development site is PCT 1281. No additional response is required from ELA regarding this matter.</p>

Name	Issue	ELAs response
	<p>Vegetation Classification states that PCT 1281 is equivalent to the CEEC 'Sydney Turpentine-Ironbark Forest in the Sydney Basin Bioregion' as determined under the BC Act.</p> <p>EES accepts that the assessment that the vegetation within the development site does not form part of the 'Sydney Turpentine Ironbark Forest' CEEC as determined under either the BC Act or EPBC Act because the vegetation present in the development site has been established through plantings.</p> <p>The vegetation exists as a mix of planted eucalypt and exotic canopy species and horticultural varieties of native ground cover or shrubs; there is no evidence of remnant vegetation within the development site or surrounding lands; and the soil profile has been substantially modified and does not represent original profile.</p>	
	<p>Microbat habitat and prescribed impacts assessment. EES notes that Section 2.1.3 Prescribed biodiversity impacts of the BDAR records that visual surveys of the existing buildings within the development site did not identify any small gaps which may contain potential roost sites for microbats. The BDAR also states that most of the buildings are multi-storey with a corrugated iron flat roof which are not particularly suitable for microbats.</p> <p>However, section 2.2.4 Prescribed biodiversity impacts assesses that there remains a level of uncertainty about whether the buildings contain suitable gaps in the roof cavity, such that the presence of roof-roosting microbats within the development footprint cannot be completely disregarded. There is potential that the removal of the buildings may impact upon roosting resources for microbats, such as the two bent-winged bat species, migrating to breeding or non-breeding habitats.</p>	<p>ELA has provided additional text in Table 2 below to support the BDAR and mitigation measures (Table 21) regarding microbats.</p>

Name	Issue	ELAs response
	<p>Given that, the measures in Table 21 Measures proposed to mitigate and manage impacts should be revised to consider the possibility that microbats might be encountered. EES recommends that measures such as inclusion of pre-clearing surveys, daily surveys and staged clearing, and the presence of a trained ecological or licensed microbat wildlife handler during clearing events, should apply to demolition of existing structures, not just to clearing of trees, as is currently proposed.</p>	
Public	<p>Further consider the impact on native species and ESD, in particular:</p> <ul style="list-style-type: none"> • Consider cumulative impact of surrounding tree removal (feed trees) relating to the grey headed flying fox, a vulnerable species, determined there would be no significant impact due to the loss of their feed trees. • Consider the cumulative impact of removing hollow bearing trees at the site and elsewhere within the surrounding area. • The BDAR concludes that the precautionary principle does not apply. However, the loss of habitat for species such as the flying fox may occur. The precautionary principle should apply in this case. <p>Consider cumulative number of trees being removed in calculating the biodiversity credits.</p>	<p><u>Point 1</u></p> <p>ELA has assessed the loss of potential foraging habitat for Grey-headed Flying-fox through the preparation of Assessment of Significance under the EPBC Act. The assessment takes into consideration the cumulative impacts of the removal of vegetation within the development site and within the locality of the development site.</p> <p>The removal of 0.12 ha of native vegetation within the development site may result in the contributing to a minor cumulative impact on this species. The EPBC Act Assessment of Significance has determined that the removal of 0.12 ha of potential foraging habitat is unlikely to result in a significant impact upon this species given this species may disperse more than 50 km per night to forage.</p> <p><u>Point 1 and 2</u></p> <p>ELA has conducted a review of the current development applications lodged with the City of Sydney and register of Major Projects within the last 12 months to identify relevant projects which may require assessment of the accumulative impacts. Of which only minor modifications to existing buildings were identified in the City of Sydney DA tracker. Only one State Significant Development which is currently responding to submissions will likely contribute to the cumulative impacts in the locality of the site. SSD7539 proposes to remove 38 planted trees and retain 57 trees and provide replacement of 36 trees. The removal of these trees has potential to result in the loss of foraging habitat for Grey-headed Flying-fox and potentially for hollow-dependent fauna species. Additionally, Darlington Public School has a separate DA to remove 0.045 ha of planted native vegetation which also provides potential foraging habitat for this species. One hollow-bearing tree will be retained in the Darlington Public School and will not be impacted by the proposed works.</p> <p>According to OEH 2016 vegetation maps there is an additional 70 ha of native vegetation mapped in the assessment area which provides potential habitat for this species. To date,</p>



Name	Issue	ELAs response
		<p>there is no available data regarding the ability to assess the accumulative impacts of the removal of two hollow-bearing trees within the development site. An additional hollow-bearing tree will be retained in the development site and supplementary nest boxes will also be installed as part of the SSD.</p> <p><u>Point 3</u></p> <p>In the application of the precautionary principle, public and private decisions should be guided by: (i) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and (ii) an assessment of the risk-weighted consequences of various options.</p> <p>The development design has avoided where possible, serious and irreversible damage to the environment by retaining a small amount of native vegetation within the development site. The two mature <i>Eucalyptus saligna</i> (Sydney Blue Gum) are located in the centre portion of the development site will be removed due to the size of their tree protection zone, impacts to these trees was unavoidable. Measures to minimise the impacts include retaining a small amount of native vegetation within the development site. Additionally, mitigation measures to re-establish the loss of canopy species has been considered through landscaping designs.</p> <p>In accordance with the <i>Guidance to assist a decision-maker to determine a serious and irreversible impact (SAII)</i> Table 1, State Significant Developments are only required to take SAII into consideration and determine if there are any additional and appropriate measures that will minimise the impact if consent authority or approval is granted.</p> <p>In this situation, Grey-headed Flying-fox was not considered a candidate for SAII as they do not satisfy the listing for the four principles of a SAII entity.</p> <p>To justify this, ELA has assessed the impacts of the removal of 0.12 ha of planted native vegetation which has been identified as potential foraging habitat for the Grey-headed Flying-fox. ELA acknowledges that the removal of planted native vegetation will result in a loss of potential foraging habitat for this species. However, the impacts are considered negligible when compared with the extent of potential foraging habitat within the assessment area. A preliminary desktop assessment has identified 70 ha of mapped native vegetation mapped by OEH (2016) within the 1,500 m assessment area. This species is known to traverse up to 50 km to forage each night, as such potential foraging is present outside of the assessment area. This species will respond to flowering events across NSW (beyond 50 km radius), so the extent of potential foraging for this species may consider a</p>

Name	Issue	ELAs response
		<p>greater area. For the purpose of this matter, only the assessment area was considered as potential habitat. Additionally, this species is also known to utilise exotic species such as palms and figs which are not mapped as part of the 70 ha of potential foraging habitat in the assessment area. The removal of 0.12 ha represents 0.17% of potential mapped foraging habitat in the assessment area which may be impacted by the proposed works.</p> <p>Furthermore, the impacts of the development will be offset. Two ecosystem credits are required to offset the impact to planted native vegetation. Species credit species were not applied to Grey-headed Flying-fox as this is a dual species and only breeding habitat is considered a candidate for species credit species.</p> <p>In summary, the precautionary principle does not apply to Grey-headed Flying-fox as the proposed development is likely to have negligible impacts on this species. Therefore, this principle should not be considered as the determining factor in the approval of this development.</p> <p><u>Point 4</u></p> <p>There are no provisions to consider including additional trees outside of the development footprint as part of cumulative impacts. The BDAR has calculated the impacts of 0.12 ha of planted native vegetation which will require 2 ecosystem credits. The BDAR has assessed the removal of exotic vegetation under Prescribed Biodiversity Impacts. Outside of the development site the proponent can not be held responsible for cumulative impacts of other developments. Other developments will likewise be subject to offsets to ecosystem or credit species credits. Therefore, the impacts of the proposed development have been assessed and an offset calculated accordingly.</p>

Previously Mapped Vegetation



Legend

-  Study Area
-  Subject Site

0 170 340 680
Metres

Datum/Projection:
GDA 1994 MGA Zone 56

 **eco**
logical
AUSTRALIA
A TETRA TECH COMPANY
Prepared by: KS Date: 28/07/2020

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Figure 1: Location of PCT 1647 (in yellow) mapped by OEH 2013 approximately 3.5 km south-east of the development site

Table 2: Mitigation measures for microbats

Measure	Risk before mitigation	Risk after mitigation	Action	Outcome	Timing	Responsibility
Staff training and site briefing to communicate environmental features to be protected and measures to be implemented	Minor	Negligible	Construction staff to be briefed prior to work commencing to be made aware of sensitive biodiversity values present and environmental procedures such as: <ul style="list-style-type: none"> Potential presence of threatened microbats within tree hollows or within cavities of buildings. Identification of vegetation to be retained and 'No Go' areas. Stop works if fauna present and contact project ecologist for recommendations. 	All staff entering the Development Site are fully aware of all the ecological values present within the Lot and environmental aspects relating to the development and know what to do in case of any environmental emergencies	To occur for all staff entering/working at the development site. Site briefings should be updated based on phase of the work and when environmental issues become apparent.	Project Manager
Installing artificial habitat for fauna in adjacent vegetation to be retained or human made structures to replace the habitat resources lost and encourage animals to relocate from impacted site (i.e. hanging bat boxes)	Minor	Negligible	Compensatory hanging bat boxes (recommended up to two) should be installed under the supervision of an ecologist prior to removal of vegetation and buildings. These should be located within the development site.	Replacement of habitat features removed.	Prior to and during clearing works	Project Manager / Ecologist
Protection of local resident fauna	Minor	Negligible	Project ecologist or a qualified wildlife handler should be appointed prior to the demolition of any buildings and/or vegetation. The project ecologist must also hold a Biodiversity Licence and Animal Care and Ethics Committee approval as well as current Australian Bat Lyssavirus (ABLV) vaccination.	Relocation of fauna in a sensitive manner	Prior to and during clearing works	Project Manager / Ecologist

Measure	Risk before mitigation	Risk after mitigation	Action	Outcome	Timing	Responsibility
Instigating clearing protocols including preclearing surveys, daily surveys and staged clearing, the presence of a trained ecological or licensed wildlife handler during clearing events	Moderate	Minor	<p>Staged clearing should be conducted to allow microbat species to self-relocate (if required) during the stage of the project.</p> <p>Staged clearing should include limits on the amount of clearing of buildings each day and or vegetation. Recommended staging includes clearing of one building per day.</p> <p>Daily pre-clearance surveys are to be conducted by the project ecologist / qualified wildlife handler within the vegetation and buildings prior to removal.</p> <p>Inspections should include use of a bright torch to inspect the tree hollows using an elevated platform and within the building and its cavity before removal. If access into the roof cavity is not feasible then stag watching at dusk or dawn with thermal imagery sensor or the use of an ultrasonic device (anabat) left overnight may be required to monitor the use of the buildings for microbat activity prior to demolition. If microbats are located utilising the building, the project ecologist is to advise on the best method. This may include use of exclusion structures if an entrance location can be found or additional nocturnal surveys prior to demolition works.</p>	Relocation of fauna in a sensitive manner	Prior to and during clearing works	Project Manager / Ecologist

Moore Trees
Arboricultural Services

ABN 90887347745

Arboricultural Development Assessment Report

Darlington Public School
Chippendale NSW 2008
August 2020

FINAL



Member 2020



Prepared for: SINSW - Darlington Public School
c/o Mace Australia Pty Ltd

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Summary

This report has been compiled for SINSW c/o Mace Australia Pty Ltd, Suite 17.03, Level 17, 44 Market Street, Sydney, NSW . The report concerns a proposed Development Application for Darlington Public School. This Arborist Report refers to twenty three (23) trees.

This report contains the following information required in City of Sydney Council Development guidelines:-

- 1) All trees were assessed for Safe Useful Life Expectancy (SULE).
- 2) Genus and species of each tree.
- 3) Impact of the proposed development on each tree.
- 4) Impact of retaining tree on the proposed development.
- 5) The Tree Protection Zone (TPZ) for each tree to be retained.
- 6) Any root barriers necessary, type and location.
- 7) Any branch or root pruning that may be required for trees.

Based on the plans provided, it appears possible to retain trees numbered as 33, 35-39, 44-46. Trees 20-25, 34, 40-43, 49, 50 and 51 are proposed to be removed. Trees 20-25 are located within the sports court footprint and Trees 49, 50 and 51 are located within an area required to be resumed for the levelling of the sports court area. Trees 34, 40-43 are smaller suppressed specimens that will never reach their full potential. Provided the existing steps along Trees 33, 35-39, and the small wall along Trees 44-46, can be retained or at least no excavations beyond these trees then these trees could be successfully be retained. As seen in the Tree Protection Plan the TPZ distances are within the Sports court works area however the roots from these trees will have been restricted in radial growth due to these steps and footings currently present. Any roots under the sports court area should be reasonably deep and provided the existing finished levels can be maintained impacts to these trees will be minimal.

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VERSION CONTROL

Date of Issue	Details
21 April 2020	Draft 1 issued
22 May 2020	Draft 2 issued
22 May 2020	Final issued
1 September 2020	Final issued (updated for T34 removal)

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1 INTRODUCTION

1.1 This report has been conducted to assess the health and condition of twenty three (23) trees located at Darlington Public School, Golden Grove St, Chippendale NSW 2008. This report has been prepared for SINSW c/o Mace Australia Pty Limited on behalf of Darlington Public School as required for a Development Application at this site. The tree numbering is based on an existing tree numbering system for the site and as such is not consecutive. For the purpose of this report trees included are numbered as 20-25, 33-46, and 49-51. The proposed works entail the construction of a large sports court in the location of an existing outdoor play area associated with the school grounds.

The purpose of this report is to collect the appropriate tree related data on the subject trees and to provide advice and recommendations to the design and possible construction alternatives to aid against any adverse impacts on the subject trees' health where required.

The subject trees were assessed for their health and condition. Also included in this report are tree protection measures that will help retain and ensure that the long term health of the trees to be retained are not adversely affected by the proposed development in the future.

The following data was collected for each tree:

- 1) A site plan locating all trees over three (3) metres in height.
- 2) All trees were assessed for Safe Useful Life Expectancy (SULE), health and amenity value.
- 3) Genus and species identification of each tree.
- 4) Impact of the proposed development on each tree.
- 5) The Tree Protection Zone (TPZ) and Structural Root Zone (SRZ) calculated for each tree.

Also noted for the purpose of this report were:

- Health and Vigour; using foliage colour and size, extension growth, presence of deadwood, dieback and epicormic growth throughout the tree.
- Structural condition using visible evidence of bulges, cracks, leans and previous pruning.

- Age rating; Over-mature (>80% life expectancy), Mature (20-80% life expectancy), Young, Sapling (<20% life expectancy).

1.2 Documents and information provided: For this Arborist Report I have been provided with the Architectural Masterplan Report by Fjmt Studio for SSDA; and Tree Management Plan by Fjmt Studio, reference sheet #8200 Rev 02 dated 21/5/2020. The plans show the buildings and existing trees on the site and proposed development works.

1.3 Location: The site is located at Darlington Public School, known as Lot 592 in DP 752049 and Lot 100 in DP 623500. The proposed works are from herein will be referred to as "the Site". The study area of the school assessed for this report can also be seen in the Tree Protection Plan (Appendix 1).

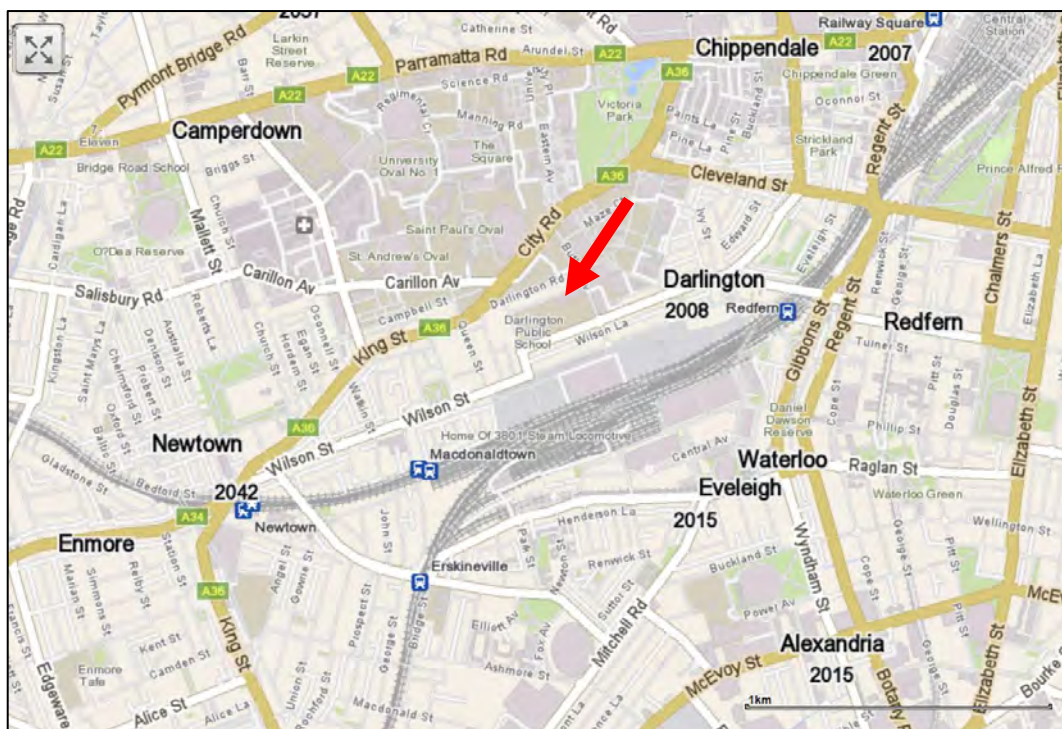


Diagram 1: Location of subject site, Darlington Public School (Red arrow) (whereis.com.au, 2020)

2 METHODOLOGY

- 2.1 To record the health and condition of the trees, an initial Visual Tree Assessment (VTA) was undertaken on the subject trees on 15th October 2018. This method of tree evaluation is adapted from Matheny and Clark, 1994 and is recognised by The International Society of Arboriculture. Individual tree assessments are listed in Appendix 2 of this report. All inspections were undertaken from the ground. No diagnostic devices were used on these trees.
- 2.2 **Height:** The heights and distances within this report have been measured with a Bosch DLE 50 laser measure.
- 2.3 **Tree Protection Zones (TPZ):** The TPZ is the principal means of protecting trees on development sites. The TPZ is a combination of the root area and crown area requiring protection. It is an area isolated from construction disturbance, so that the tree remains viable. TPZ's have been calculated for each tree. The TPZ calculation is based on the Australian Standard *Protection of trees on development sites*, AS 4970, 2009.
- 2.4 **Structural Root Zone (SRZ):** The SRZ is a specified distance measured from the trunk that is set aside for the protection of tree roots, both structural and fibrous. The woody root growth and soil cohesion in this area are necessary to hold the tree upright. The TPZ and SRZ are measured as a radial measurement from the trunk. No roots should be severed within this area. A detailed methodology on the TPZ and SRZ calculations can be found in Appendix 5. The TPZ and SRZ distances are listed in the Tree Schedule (Appendix 2).
- 2.5 **Safe Useful Life Expectancy (SULE):** The subject trees were assessed for a Safe Useful Life Expectancy (SULE). The SULE rating for each tree can be seen the Tree Assessment Schedule (Appendix 2). A detailed explanation of SULE can be found in Appendix 3.

2.6 Tree Significance & Retention Value: The Tree Significance & Retention Value used in this report is known as the Significance of a Tree, Assessment Rating System or STARS© system created by the Australian Institute of Consulting Arboriculturists (IACA). This system allows a rating system utilising structured qualitative criteria to assist in determining the retention value for a tree. To assist this process all definitions for terms used in the *Tree Significance - Assessment Criteria* and *Tree Retention Value - Priority Matrix*, are taken from the IACA Dictionary for Managing Trees in Urban Environments (Draper and Richards 2009). The system uses a scale of *High, Medium and Low significance* in the landscape. Once the landscape significance of an individual tree has been defined, the retention value can be determined. The Retention Value is selected between *High, Medium, Low and Priority for removal*. The Matrix can be seen in Appendix 4.

2.7 Tree Retention Value Plans: All trees have been allocated a Tree Retention Value. These values have been applied to the colour coded plans in Appendix 1. No trees assessed for this project were allocated the value of *Priority for removal*.

2.8 Impact Assessment: An impact assessment was conducted on the site trees. This was conducted by assessing the site survey and plans provided by Mace Australia. The plans provided were assessed for the following:

- Reduced Level (R.L.) at base of tree.
- Incursions into the Tree Protection Zone (TPZ).
- Assessment of the likely impact of the works.

3 RELEVANT BACKGROUND INFORMATION

3.1 Darlington Public School is located in Chippendale in Sydney. Darlington Public School is an inner city school servicing the suburbs of Chippendale, Darlington, Redfern and Waterloo. The school was built in the 1970s (Diagram 2) however the school's trees are well established, with some being almost twenty (20) metres in height and spread.



Diagram 2: The site as seen in 1943, devoid of trees (RTA From the skies, 2007).

3.2 Environmental Significance: Tree Management Controls in City of Sydney's Development Control Plan (DCP) provide the legislative tool for the protection of all trees located within the City of Sydney.

As outlined in Sydney Development Control Plan 2012, Section 3 – General Provisions this applies to trees that:

- (a) have a height of five (5) metres or more; or
- (b) have a canopy spread of over five (5) metres; or
- (c) have a trunk diameter of more than three hundred (300) millimetres, measured at ground level; or
- (d) is listed in the Register of Significant Trees.

It should be noted that the Local Environmental Plan 2012, Part 5 Clause 5.9 Preservation of trees or vegetation has now been repealed.

3.3 Illegal tree removal: Damaging or removing trees can result in heavy fines. Local Government does have the authority to issue on the spot fines known as penalty infringement notices (PINS) starting from \$3,000 or can elect to have a potential tree damaging incident addressed in the Local Court. Recent cases, for example, include two (2) mature trees removed for development (Sutherland Shire Council (SSC) v Palamara, 2008) costing \$4,500 in fines and \$5,000 in court costs. SSC v El-Hage, 2010 concerning illegal tree removal of a single tree costing \$31,500 in fines and \$5,000 in costs. Poisoning trees can also incur substantial fines (SSC v Hill) resulted in a single tree fine that totalled \$14,000 plus a \$10,000 bond for a replacement tree. All of the above cases resulted in a criminal conviction for the guilty parties.

- 3.4 The Site Trees:** The site was inspected on 15th October 2018. Each tree has been given a unique number for this site and can be viewed on the Tree Location Plan (Appendix 1). All site trees have been tagged to correspond with the Tree Location Plan.
- 3.5** The larger site, being a school, consists of several buildings connected by covered walkways. Playground areas are located throughout the site. The study area of this report is located around an existing asphalted play area. For the purpose of this report the trees included are numbered as Trees 20-25, 33-46, and 49-51. The proposed works entail the construction of a large sports court in the location of an existing outdoor play area associated with the school grounds.
- 3.6** Trees 20 and 21 are some of the larger trees on site being some twenty (20) metres in height (Plate 1). The majority of the root zone of these trees is covered with hard surface. These trees have some previous failures which is to be expected from trees of this size and age. These trees were assessed as being in good health and condition. The main trunks, first and second order branches are free of any cracks, splits or fruiting bodies. New extension growth was noted. The basal area and woody root zones were free of any ground heaving, or lifting. Ideally an aerial inspection should occur to fully determine the condition of the main branch unions if they were to be retained.



Plate 1: Image showing Trees 21, 20. P. Vezgoff

- 3.7** Trees 32-43 are growing along the northern boundary fence (Plate 2). These are a mixed group of large mature *Eucalyptus* specimens but competing with some exotic specimens that have been planted between and under the large *Eucalyptus* specimens. These trees are also tightly grouped specimens that have a restricted root space and are covered with asphalt and playground rubberised matting up to the trunks. Varied levels are present as these trees have been planted on a stepped area (Plate 3).
- 3.8** Under these larger more dominant specimens are Trees 40-43 that are Liquidambar (*Liquidambar styraciflua*) and a single *Cupresses* specimen. These trees can be seen in Plate 3. Now suppressed, these trees will not reach maturity and as such are not long term viable specimens.



Plate 2: Image showing Trees 32-43. P. Vezgoff



Plate 3: Image showing surface condition of Trees 32-43. P. Vezgoff



Plate 4: Image showing Trees 44-46. P. Vezgoff

3.9 Trees 44-46 (Plate 4) are growing along the eastern boundary fence. These trees are younger specimens in excellent health and condition and provide a good screen between two properties. The majority of the root zones of these trees is covered with hard surface.

3.10 Although this part of Sydney may be high in sand content that would normally encourage deeper root systems, the site has an uncertain history. Based on Diagram 2, it appears that prior to the school being built, there were rows of terrace houses and warehouse structures, so subsoil conditions will be far from natural and would be highly disturbed. This will mean that old footings or foundations that may be subsurface will deflect woody roots keeping them close to the surface such as near Tree 20 (Plate 5).



Plate 5: Image showing surface roots from Tree 20. P. Vezgoff

3.11 Safe Useful Life Expectancy (SULE) is a method of evaluating individual trees. The evaluation is a subjective assessment, not an absolute judgement, because the nature of trees and opinions on trees can vary greatly. SULE assessments are made only by those who are experienced and knowledgeable in tree management. SULE is generally accepted and used world-wide as a method of evaluating trees. Each category has a number of sub-categories. These sub-categories should always be recorded to help future users of the information appreciate the reason for each allocation decision. It is normal to have instances where trees will not fit neatly into a single SULE category. The assessment of the site trees can be seen in Graph 1. In general, the trees were mostly assessed as being in good health. The list of SULE assessments for each tree can be seen in Appendix 2 (Tree Schedule)

3.12 The trees were assessed as below for the Significance of a Tree, Assessment Rating System or STARS©. The STARS© Matrix can be seen in Appendix 4. This rating can be seen in Plan form in Appendix 1.

Significance Scale	1 (High)	2 (Medium)	3 (Low)
Tree No.	20, 21, 22, 24, 33-39, 44-46.	25, 49, 50, 51.	23, 40-43.

3.13 Impacts: Based on the plans, it appears possible to retain trees numbered as 33, 35-39, 44-46. Trees 20-25, 34, 40-43, 49, 50 and 51 are proposed to be removed. Trees 20-25 are located within the sports court footprint and Trees 49, 50 and 51 are located within an area required to be resumed for the levelling of the sports court area. Trees 34, 40-43 are smaller suppressed specimens that will never reach their full potential. Provided the existing steps along Trees 33, 35-39, and the small wall along Trees 44-46, can be retained or at least no excavations beyond these trees, then these trees could be successfully retained. As seen in the Tree Protection Plan the TPZ distances are within the sports court works area however the roots from these trees will have been restricted in radial growth due to these steps and footings currently present. Any roots under the sports court area should be reasonably deep and provided the existing finished levels can be maintained impacts to these trees will be minimal.

4 RECOMMENDATIONS

- 4.1** A Project Arborist should be appointed to oversee the arboricultural related works for the project. The Project Arborist should be used for arboricultural certification services and also used as a point of contact should any questions arise during design process for this project. As specified in AS 4970, 2009, a Project Arborist is a person with a minimum Australian Qualification Framework (AQF) level 5 Diploma of Arboriculture or Horticulture qualification.
- 4.2** Trees 33, 35-39 and 44-46 will require tree protection fencing as specified in Section 5.2 of this report. This fencing will be located at the Tree Protection Zones (TPZ) listed in the Tree Schedule (Appendix 2). The specifications for a TPZ are in Section 5.3 of this report. This fencing is to stay in place until all works are completed.
- 4.3** A flat bucket excavator is to be used for the removal of hard surfaces and excavations below Trees 33, 35-39 and 44-46. Any roots damaged that are smaller than fifty (50) millimetres in diameter to be cleanly cut with a pruning saw. Any roots with a diameter of greater than fifty (50) millimetres to be assessed by the project Arborist with minimum 48 hours' notice.
- 4.4** This report should be included in any tender documentation so that the contractor is aware of the importance of the managing and protecting the trees on this project.

5 TREE PROTECTION

5.1 Trees to be protected: 33, 35-39 and 44-46 will be required to be fenced for protection. All fencing shall be installed as specified in Section 5.2 (Tree Protection – Implementation of Tree Protection Zone). Indicative locations of the fencing are shown in the Tree Protection Plan (Appendix 1).

5.2 Implementation of Tree Protection Zone: All tree protection works should be carried out before the start of demolition or building work. It is recommended that chain mesh fencing with a minimum height of 1.8 metres be erected as shown in the Tree Protection Plan (Appendix 1). Specifications for this fencing are shown in Tree Protection Fencing Specifications (Appendix 6). Typically the fencing is set at the TPZ measurement (Table 1) however for this project the top area of the steps in front of trees 33, 35-39 and the wall along Trees 44-46 shall have to be used to locate the fences to allow the works to proceed.

5.3 The Tree Protection Zone (TPZ) and Structural Root Zone (SRZ): The TPZ is implemented to ensure the protection of the trunk and branches of the subject tree. The TPZ is based on the Diameter at Breast Height (DBH) of the tree. The SRZ is also a radial measurement from the trunk used to protect and restrict damage to the roots of the tree.

The Tree Protection Zone (TPZ) and Structural Root Zone (SRZ) have been measured from the centre of the trunk. TPZ and SRZ distances are all listed in the Tree Schedule (Appendix 2). The following activities shall be avoided within the TPZ and SRZ of the trees to be retained;

- Erecting site sheds or portable toilets.
- Trenching, ripping or cultivation of soil (with the exception of approved foundations and underground services).
- Soil level changes or fill material (pier and beam or suspended slab construction are acceptable).
- Storage of building materials.
- Disposal of waste materials, solid or liquid.

- 5.4 Tree Damage:** If the retained trees are damaged a qualified Arborist should be contacted as soon as possible. The Arborist will recommend remedial action so as to reduce any long term adverse effect on the tree's health.
- 5.5 Signage:** It is recommended that signage is attached to the tree protection fencing. A sample sign has been attached in Appendix 7. This sign may be copied and laminated then attached to any TPZ fencing.
- 5.6 Soil compaction:** Mulch has been recommended to be placed within the TPZ areas. This is to help reduce soil compaction and moisture retention for the trees that are to be retained. The area for mulch can be seen in the Tree Protection Plan (Appendix 1). Mulch is to be no thicker than 100mm in depth and spread evenly across the TPZ area.
- 5.7 Arborist Certification:** It is recommended that the contractor that undertakes these works supply Council or the Principal Certifying Authority with certification from the Project Arborist three (3) times during the construction phase of the development in order to verify that retained trees have been correctly retained and protected as per the conditions of consent and Arborist's recommendations. The certification is to be conducted by a Qualified Consulting Arborist with AQF level 5 qualifications that has current membership with either Arboriculture Australia (AA) or Institute of Australian Consulting Arboriculturists (IACA). Arborist certification is recommended:
- (1) Before the commencement of demolition or construction to confirm the fencing has been installed;
 - (2) At mid point of the construction phase;
 - (3) At completion of the construction phase.

If you have any questions in relation to this report please contact me.



Paul Vezgoff, Consulting Arborist
Dip Arb (Dist), Arb III, Hort cert, AA, ISA

20th April 2020
Updated 1 September 2020

Appendix 1

Plan 1

Tree Location Plan
&
Retention Values

Plan 2

Tree Protection Plan



Tree Retention Values

MOORE TREES

Moore Trees

Plan 1



High

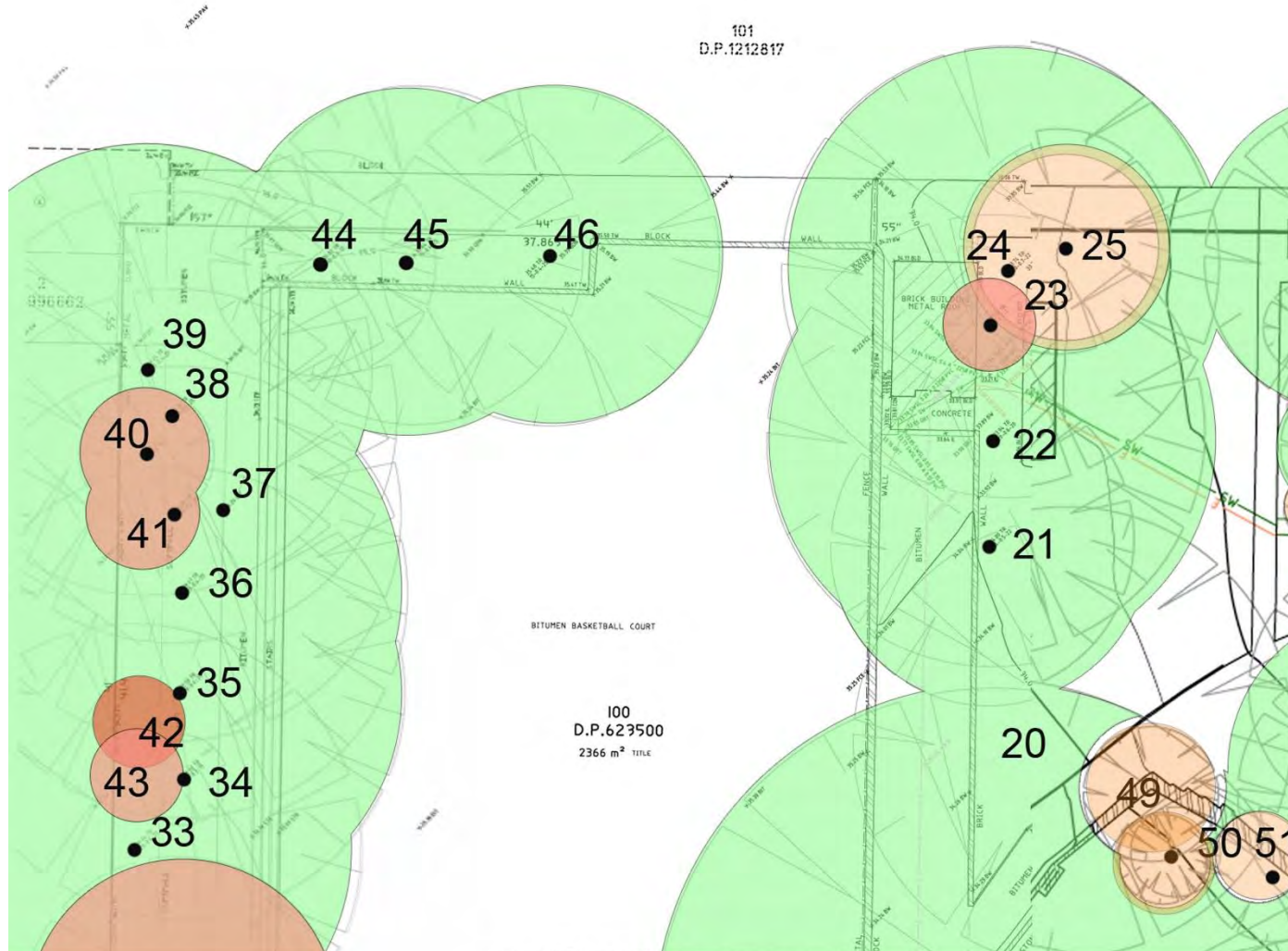


Medium



Low

Note: The tree condition plan is separate to the SULE categories that have been allocated to the site trees.



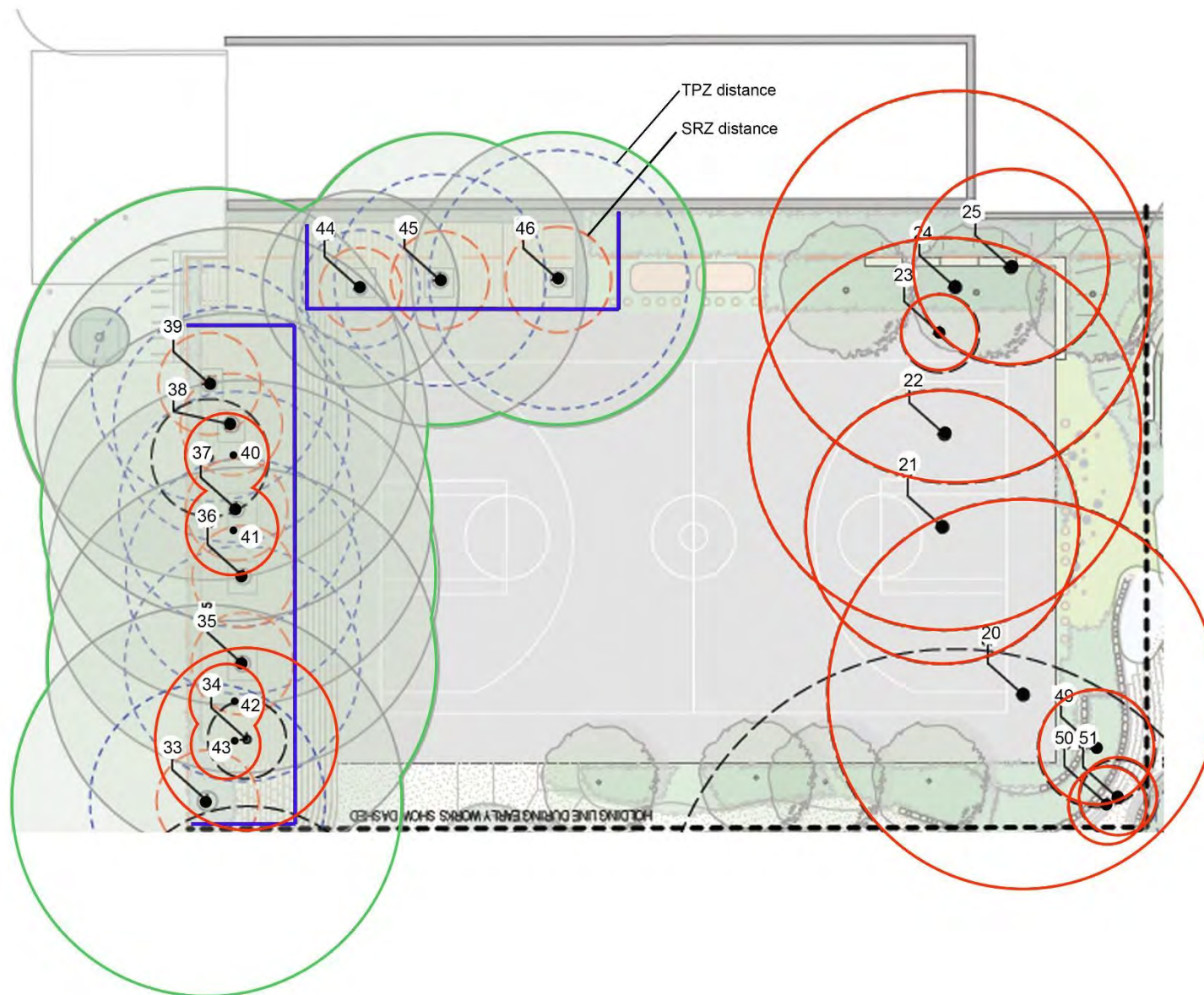
Date: 19.04.2020
Drawn: P.Vezgoff
Site Address: Darlington Public School
Darlington NSW



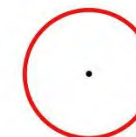
Tree protection plan

Moore Trees

Plan 2



Tree to be retained



Tree to be removed
20-25, 34, 40, 41, 42, 43, 49, 50, 51



Fence. Implementation of tree protection zone (TPZ). All tree protection works should be carried out before the start of demolition or building works. It is recommended that chain mesh fencing with a minimum height of 1.8 metres be erected



Date:	31.08.2020
Drawn:	P.Vezgoff
Site Address:	Darlington Public School Darlington NSW

Appendix 2

Tree health & condition
assessment schedule

TREE HEALTH AND CONDITION ASSESSMENT SCHEDULE – Darlington Public School Tree Data

Tree	Species	Height (m)	Spread (m)	DBH (m)	Live canopy %	Defects	SULE	Condition	Age	Comments	TPZ (m)	SRZ (m)
20	Lemon-scented gum tree (Corymbia citriodora)	20	8	0.6	95	Dead wood >50mm	2a May only live for 15-40 years	Good	Mature	Old storm damage noted. Section of dead wood	7.2	2.6
21	Sydney blue gum (Eucalyptus saligna)	20	8	0.6	95	No visual defects	2a May only live for 15-40 years	Good	Mature		7.2	2.8
22	Sydney blue gum (Eucalyptus saligna)	20	8	0.6	95	No visual defects	2a May only live for 15-40 years	Good	Mature		7.2	2.8
23	No Value	5	1	0.2	70	Root damage	2c removed for more suitable planting	Poor	Mature	Lopped for shed roof	2.4	1.6
24	Spotted gum (Corymbia maculata)	21	8	0.8	95	No visual defects	2a May only live for 15-40 years	Good	Mature		9.6	3.1
25	Lone Pine (Pinus brutia)	9	5	0.5	70	No visual defects	2a May only live for 15-40 years	Fair	Mature		6	2.6
33	Sydney blue gum (Eucalyptus saligna)	21	10	0.5	95	No visual defects	2a May only live for 15-40 years	Good	Mature	Soft fall over root zone	6	2.6
34	Sydney blue gum (Eucalyptus saligna)	8	5	0.2	80	No visual defects	2c removed for more suitable planting	Fair	Mature	Asymmetrical canopy to the south suppressed specimen	2.4	1.9
35	Sydney blue gum (Eucalyptus saligna)	21	10	0.5	95	No visual defects	2a May only live for 15-40 years	Good	Mature	Soft fall over root zone	6	2.6
36	Sydney blue gum (Eucalyptus saligna)	21	10	0.5	95	No visual defects	2a May only live for 15-40 years	Good	Mature	Soft fall over root zone	6	2.6
37	Sydney blue gum (Eucalyptus saligna)	21	10	0.5	95	No visual defects	2a May only live for 15-40 years	Good	Mature	Soft fall over root zone	6	2.6
38	Sydney blue gum (Eucalyptus saligna)	21	10	0.5	95	No visual defects	2a May only live for 15-40 years	Good	Mature	Soft fall over root zone	6	2.6
39	Sydney blue gum (Eucalyptus saligna)	21	10	0.5	95	No visual defects	2a May only live for 15-40 years	Good	Mature	Soft fall over root zone	6	2.6

Tree	Species	Height (m)	Spread (m)	DBH (m)	Live canopy %	Defects	SULE	Condition	Age	Comments	TPZ (m)	SRZ (m)
40	Liquidambar (Liquidambar styraciflua)	9	3	0.18	108	No visual defects	2a May only live for 15-40 years	Good	Mature	Suppressed by larger trees	2.2	1.6
41	Liquidambar (Liquidambar styraciflua)	9	3	0.18	108	No visual defects	2a May only live for 15-40 years	Good	Mature	Suppressed by larger trees	2.2	1.6
42	Liquidambar (Liquidambar styraciflua)	9	3	0.2	108	No visual defects	2a May only live for 15-40 years	Good	Mature	Suppressed by larger trees	2.4	1.9
43	Cupresses sp.	7	0.5	0.15	100	No visual defects	2a May only live for 15-40 years	Good	Mature	Suppressed by larger trees	1.8	1.6
44	Sydney blue gum (Eucalyptus saligna)	11	5	0.25	95	No visual defects	2a May only live for 15-40 years	Excellent	Mature	Soft fall over root zone	3	2.1
45	Sydney blue gum (Eucalyptus saligna)	18	8	0.45	95	Dead wood >50mm	2a May only live for 15-40 years	Excellent	Mature	Soft fall over root zone. Sections of dead wood	5.4	2.5
46	Spotted gum (Corymbia maculata)	19	8	0.55	95	No visual defects	2a May only live for 15-40 years	Excellent	Mature		6.6	2.7
49	Broad leaved paperbark (Melaleuca quinquenervia)	8	2.5	0.25	90	No visual defects	1a >40 years	Good	Mature	Group of three stems	3	2.1
50	Illawarra flame tree (Brachychiton acerifolius)	7	4	0.2	95	No visual defects	2a May only live for 15-40 years	Good	Mature		2.4	1.9
51	Hymenosporum flavum	5	2	0.1	100	No visual defects	5a Small tree <5 m in height.	Good	Mature		1.2	1.3

KEY

Tree No: Relates to the number allocated to each tree for the Tree Protection Plan.

Height: Height of the tree to the nearest metre.

Spread: The average spread of the canopy measured from the trunk.

DBH: Diameter at breast height. An industry standard for measuring trees at 1.4 metres above ground level, this measurement is used to help calculate Tree Protection Zones.

Live Crown Ratio: Percentage of foliage cover for a particular species.

Age Class: Young:	Recently planted tree	Semi-mature:< 20% of life expectancy
Mature:	20-90% of life expectancy	Over-mature:>90% of life expectancy

SULE: See SULE methodology in the Appendix 3

Tree Protection Zone (TPZ): The minimum area set aside for the protection of the trees trunk, canopy and root system throughout the construction process. Breaches of the TPZ will be specified in the recommendations section of the report.

Structural Root Zone (SRZ): The SRZ is a specified distance measured from the trunk that is set aside for the protection of the trees roots both structural and fibrous.

Appendix 3

SULE categories (after Barrell, 2001)¹

SULE Category	Description
<i>Long</i>	<i>Trees that appeared to be retainable at the time of assessment for more than 40 years with an acceptable level of risk.</i>
1a	Structurally sound trees located in positions that can accommodate for future growth
1b	Trees that could be made suitable for retention in the long term by remedial tree care.
1c	Trees of special significance that would warrant extraordinary efforts to secure their long term retention.
<i>Medium</i>	<i>Trees that appeared to be retainable at the time of assessment for 15-40 years with an acceptable level of risk.</i>
2a	Trees that may only live for 15-40 years
2b	Trees that could live for more than 40 years but may be removed for safety or nuisance reasons
2c	Trees that could live for more than 40 years but may be removed to prevent interference with more suitable individuals or to provide for new planting.
2d	Trees that could be made suitable for retention in the medium term by remedial tree care.
<i>Short</i>	<i>Trees that appeared to be retainable at the time of assessment for 5-15 years with an acceptable level of risk.</i>
3a	Trees that may only live for another 5-15 years
3b	Trees that could live for more than 15 years but may be removed for safety or nuisance reasons.
3c	Trees that could live for more than 15 years but may be removed to prevent interference with more suitable individuals or to provide for a new planting.
3d	Trees that require substantial remedial tree care and are only suitable for retention in the short term.
<i>Remove</i>	<i>Trees that should be removed within the next five years.</i>
4a	Dead, dying, suppressed or declining trees because of disease or inhospitable conditions.
4b	Dangerous trees because of instability or loss of adjacent trees
4c	Dangerous trees because of structural defects including cavities, decay, included bark, wounds or poor form.
4d	Damaged trees that are clearly not safe to retain.
4e	Trees that could live for more than 5 years but may be removed to prevent interference with more suitable individuals or to provide for a new planting.
4f	Trees that are damaging or may cause damage to existing structures within 5 years.
4g	Trees that will become dangerous after removal of other trees for the reasons given in (a) to (f).
4h	Trees in categories (a) to (g) that have a high wildlife habitat value and, with appropriate treatment, could be retained subject to regular review.
<i>Small</i>	<i>Small or young trees that can be reliably moved or replaced.</i>
5a	Small trees less than 5m in height.
5b	Young trees less than 15 years old but over 5m in height.
5c	Formal hedges and trees intended for regular pruning to artificially control growth.

updated 01/04/01)

1 (Barrell, J. (2001) "SULE: Its use and status into the new millennium" in *Management of mature trees*, Proceedings of the 4th NAAA Tree Management Seminar, NAAA, Sydney.

Appendix 4

Tree Significance - Assessment Criteria

1. High Significance in landscape

- 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.

2. Medium Significance in landscape

- 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.

3. Low Significance in landscape

- 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.

The tree is to have a minimum of three (3) criteria in a category to be classified in that group.

		Significance				
		1. High	2. Medium	3. Low		
		Significance in Landscape	Significance in Landscape	Significance in Landscape	Environmental Pest / Noxious Weed Species	Hazardous / Irreversible Decline
Estimated Life Expectancy	1. Long >40 years					
	2. Medium 15-40 Years					
	3. Short <1-15 Years					
	Dead					
<p>Legend for Matrix Assessment</p> 						
	<p>Priority for Retention (High) - These trees are considered important for retention and should be retained and protected. Design modification or re-location of building/s should be considered to accommodate the setbacks as prescribed by the Australian Standard AS4970 <i>Protection of trees on development sites</i>. Tree sensitive construction measures must be implemented e.g. pier and beam etc. if works are to proceed within the Tree Protection Zone.</p>					
	<p>Consider for Retention (Medium) - These trees may be retained and protected. These are considered less critical, however their retention should remain priority with removal considered only if adversely affecting the proposed building/works and all other alternatives have been considered and exhausted.</p>					
	<p>Consider for Removal (Low) - These trees are not considered important for retention, nor require special works or design modification to be implemented for their retention.</p>					
	<p>Priority for Removal - These trees are considered hazardous, or in irreversible decline, or weeds and should be removed irrespective of development.</p>					

Legend for Matrix Assessment.

IACA, 2010, IACA Significance of a Tree, Assessment Rating System (STARS), Institute of Australian Consulting Arboriculturists, Australia, www.iaca.org.au

Appendix 5

TPZ and SRZ methodology

Determining the Tree Protection Zone (TPZ)

The radius of the TPZ is calculated for each tree by multiplying its DBH x 12.

$$\text{TPZ} = \text{DBH} \times 12$$

Where

DBH = trunk diameter measured at 1.4 metres above ground

Radius is measured from the centre of the stem at ground level.

A TPZ should not be less than 2 metres no greater than 15 metres (except where crown protection is required.). Some instances may require variations to the TPZ.

The TPZ of palms, other monocots, cycads and tree ferns should not be less than 1 metre outside the crown projection.

Determining the Structural Root Zone (SRZ)

The SRZ is the area required for tree stability. A larger area is required to maintain a viable tree.

The SRZ only needs to be calculated when major encroachment into a TPZ is proposed.

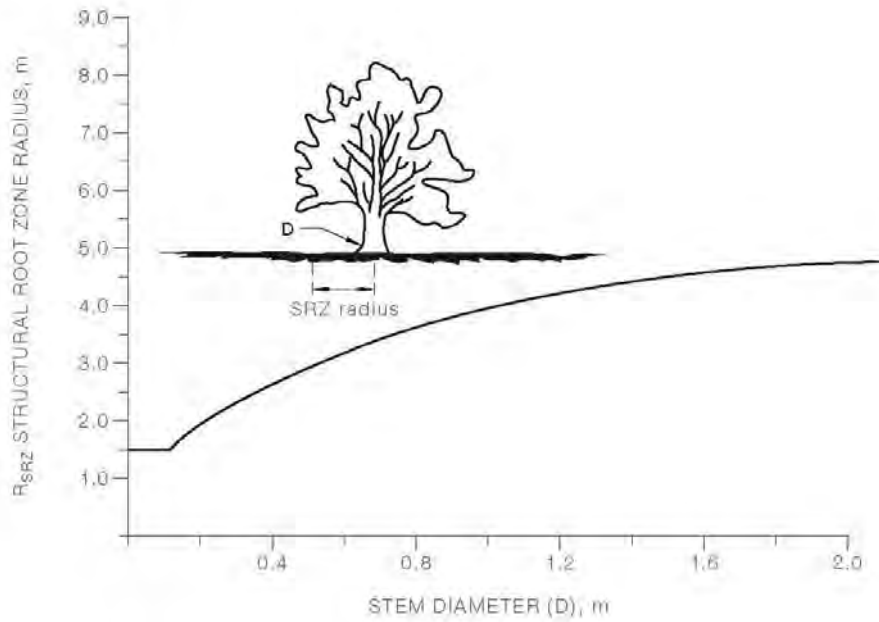
There are many factors that affect the size of the SRZ (e.g. tree height, crown area, soil type, soil moisture). The SRZ may also be influenced by natural or built structures, such as rocks and footings. An indicative SRZ radius can be determined from the trunk diameter measured immediately above the root buttress using the following formula or Figure 1. Root investigation may provide more information on the extent of these roots.

$$\text{SRZ radius} = (D \times 50)^{0.42} \times 0.64$$

Where

D = trunk diameter, in m, measured above the root buttress

NOTE: The SRZ for trees with trunk diameters less than 0.15m will be 1.5m (see Figure 1).



The curve can be expressed by the following formula:
 $R_{SRZ} = (D \times 50)^{0.42} \times 0.64$

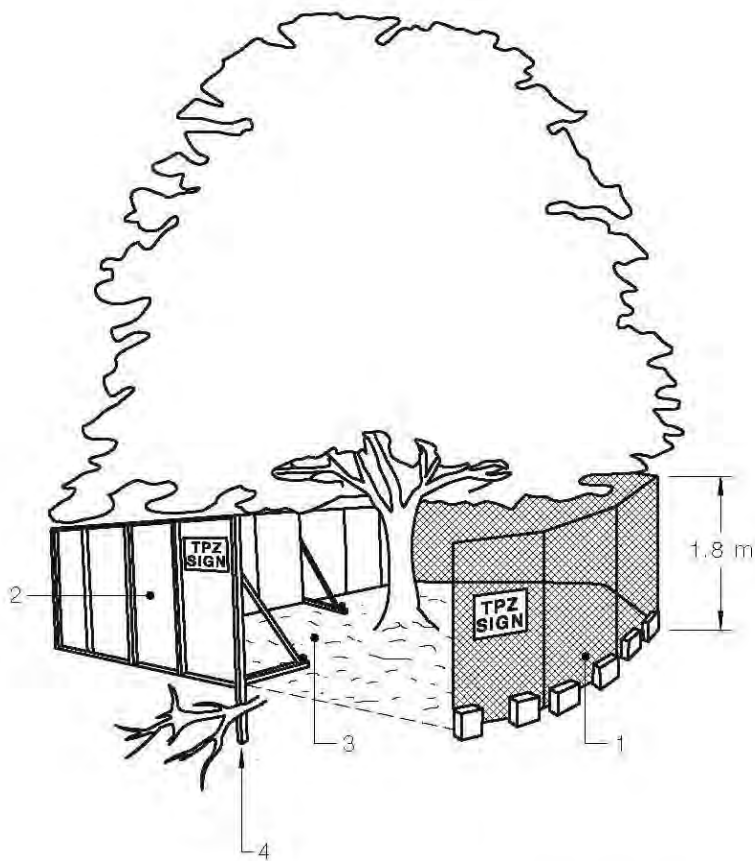
FIGURE 1 - STRUCTURAL ROOT ZONE

Notes:

- 1 R_{SRZ} is the structural root zone radius.
- 2 D is the stem diameter measured immediately above root buttress.
- 3 The SRZ for trees less than 0.15 metres diameter is 1.5 metres.
- 4 The SRZ formula and graph do not apply to palms, other monocots, cycads and tree ferns.
- 5 This does not apply to trees with an asymmetrical root plate.

Appendix 6

Tree protection fencing
specifications



LEGEND:

- 1 Chain wire mesh panels with shade cloth (if required) attached, held in place with concrete feet.
- 2 Alternative plywood or wooden paling fence panels. This fencing material also prevents building materials or soil entering the TPZ.
- 3 Mulch installation across surface of TPZ (at the discretion of the project arborist). No excavation, construction activity, grade changes, surface treatment or storage of materials of any kind is permitted within the TPZ.
- 4 Bracing is permissible within the TPZ. Installation of supports should avoid damaging roots.

Figure 1: Protective fencing as specified in AS 4970, 2009.

Appendix 7

Tree protection sign
sign sample

Tree Protection Zone

Fence not to be moved without approval from Arborist

Within this fence there is to be

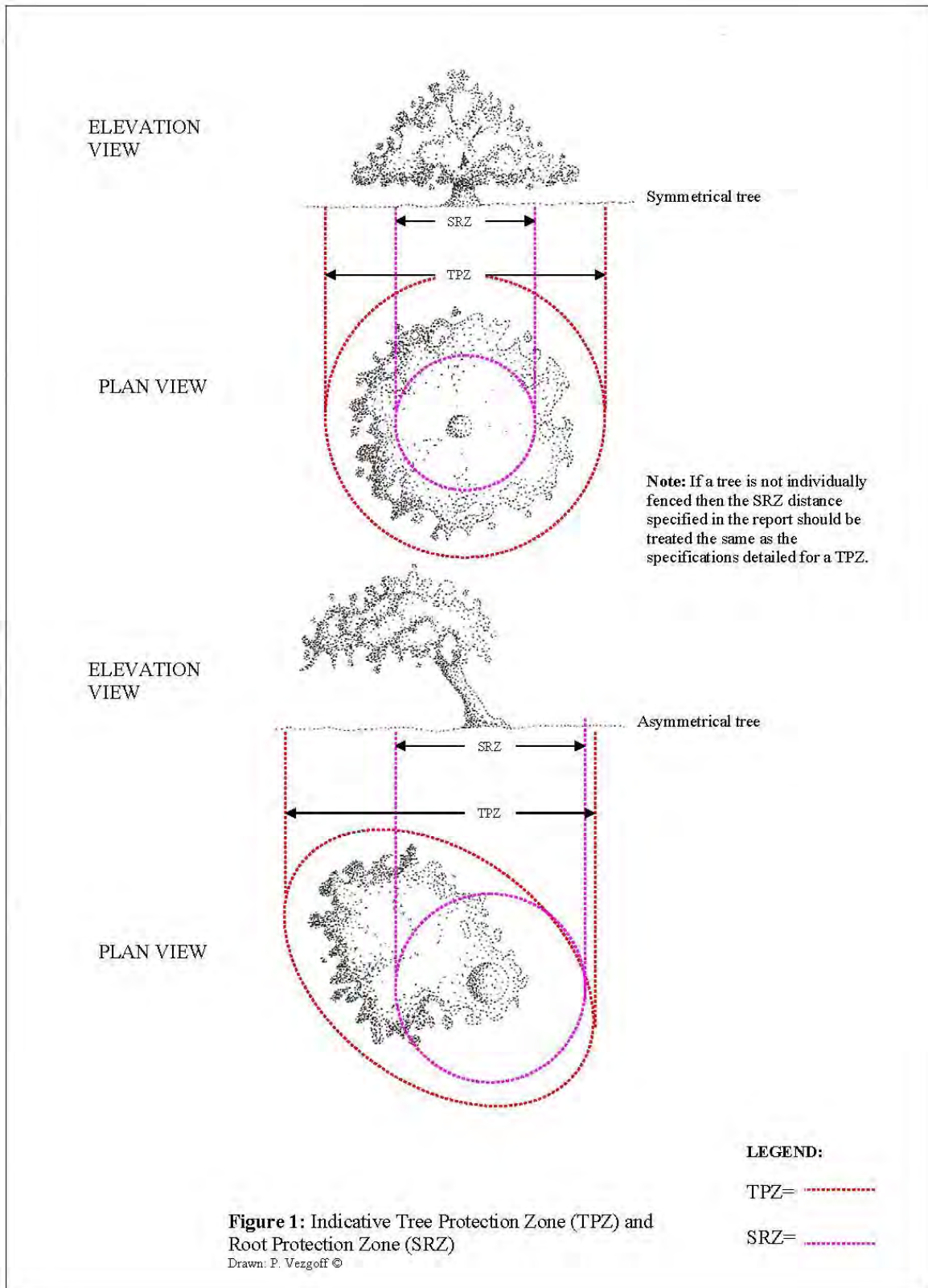
NO

Storage of materials

Trenching or excavation

Washing of tools or equipment

Appendix 8



Appendix 9

Tree structure information diagram

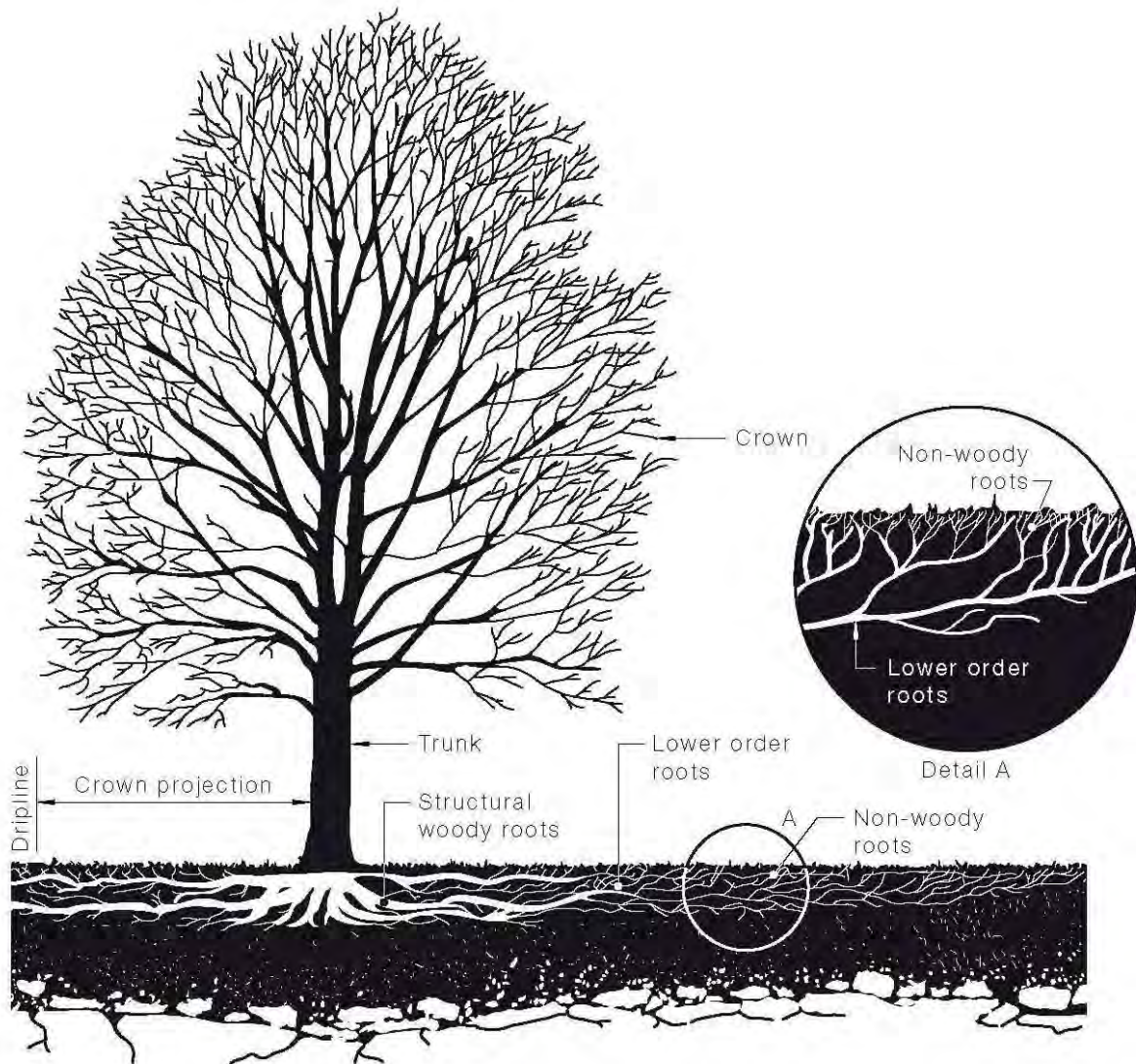


Figure 2: Structure of a tree in a normal growing environment (AS 4970, 2009.).

Appendix 10

Explanatory Notes

- **Mathematical abbreviations:** > = Greater than; < = Less than.
- **Measurements/estimates:** All dimensions are estimates unless otherwise indicated. Less reliable estimated dimensions are indicated with a '?'.
- **Species:** The species identification is based on visual observations and the common English name of what the tree appeared to be is listed first, with the botanical name after in brackets. In some instances, it may be difficult to quickly and accurately identify a particular tree without further detailed investigations. Where there is some doubt of the precise species of tree, it is indicated with a '?' after the name in order to avoid delay in the production of the report. The botanical name is followed by the abbreviation sp if only the genus is known. The species listed for groups and hedges represent the main component and there may be other minor species not listed.
- **Height:** Height is estimated to the nearest metre.
- **Spread:** The maximum crown spread is visually estimated to the nearest metre from the centre of the trunk to the tips of the live lateral branches.
- **Diameter:** These figures relate to 1.4m above ground level and are recorded in centimetres. If appropriate, diameter is measure with a diameter tape. 'M' indicates trees or shrubs with multiple stems.
- **Estimated Age:** Age is estimated from visual indicators and it should only be taken as a provisional guide. Age estimates often need to be modified based on further information such as historical records or local knowledge.
- **Distance to Structures:** This is estimated to the nearest metre and intended as an indication rather than a precise measurement.

Appendix 11

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Curriculum Vitae

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EDUCATION and QUALIFICATIONS

- 2013 – ISA TRAQ qualification
- 2007 – Diploma of Arboriculture (AQF Cert V) Ryde TAFE. (Distinction)
- 1997 – Completed Certificate in Crane and Plant Electrical Safety
- 1996 – Attained Tree Surgeon Certificate (AQF Cert II) at Ryde TAFE
- 1990 – Completed two month intensive course on garden design at the Inchbald School of Design, London, United Kingdom
- 1990 – Completed patio, window box and balcony garden design course at Brighton College of Technology, United Kingdom
- 1989 – Awarded the Big Brother Movement Award for Horticulture (a grant by Lady Peggy Pagan to enable horticulture training in the United Kingdom)
- 1989 – Attained Certificate of Horticulture (AQF Cert IV) at Wollongong TAFE

INDUSTRY EXPERIENCE

Moore Trees Arboricultural Services

January 2006 to date

Tree Consultancy and tree ultrasound. Tree hazard and risk assessment, Arborist development application reports
Tree management plans.

Woollahra Municipal Council

Oct 1995 to February 2008

ARBORICULTURE TECHNICAL OFFICER

August 2005 – February 2008

ACTING COORDINATOR OF TREES MAINTENANCE

June – July 2005, 2006

TEAM LEADER

January 2003 – June 2005

TEAM LEADER

September 2000 – January 2003

HORTICULTURALIST

October 1995 – September 2000

Northern Landscape Services

July to Oct 1995

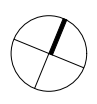
Tradesman for Landscape Construction business

Paul Vezgoff Garden Maintenance (London, UK)

Sept 1991 to April 1995

CONFERENCES AND WORKSHOPS ATTENDED

- International Society of Arboriculture Conference (Canberra May 2017)
- QTRA Conference, Sydney Australia (November 2016)
- TRAQ Conference, (October 2013/2018)
- International Society of Arboriculture Conference (Brisbane 2008)
- Tree related hazards: recognition and assessment by Dr David Lonsdale (Brisbane 2008)
- Tree risk management: requirements for a defensible system by Dr David Lonsdale (Brisbane 2008)
- Tree dynamics and wind forces by Ken James (Brisbane 2008)
- Wood decay and fungal strategies by Dr F.W.M.R. Schwarze (Brisbane 2008)
- Tree Disputes in the Land & Environment Court – The Law Society (Sydney 2007)
- Barrell Tree Care Workshop- Trees on construction sites (Sydney 2005).
- Tree Logic Seminar- Urban tree risk management (Sydney 2005)
- Tree Pathology and Wood Decay Seminar presented by Dr F.W.M.R. Schwarze (Sydney 2004)
- Inaugural National Arborist Association of Australia (NAAA) tree management workshop- Assessing hazardous trees and their Safe Useful Life Expectancy (SULE) (Sydney 1997).



GENERAL NOTES
ALL DIMENSIONS AND EXISTING CONDITIONS
SHALL BE CHECKED AND VERIFIED BY THE
CONTRACTOR BEFORE PROCEEDING WITH THE WORK.
ALL LEVELS RELATIVE TO AUSTRALIAN HEIGHT DATUM.
DO NOT SCALE DRAWINGS.
USE FIGURED DIMENSIONS ONLY.

legend

DARLINGTON PUBLIC SCHOOL

TREE CANOPY COMPARISON



1 PLAN TREES PRE-DEVELOPMENT

AREA OF TREE CANOPY PRE-DEVELOPMENT : 4440m²



2 PLAN TREES POST-DEVELOPMENT

AREA OF TREE CANOPY POST-DEVELOPMENT : 4500m²

rev date name by chk

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project
Darlington Public School
Golden Grove Street
Darlington NSW 2008

title
Tree Canopy - Comparison

scale Not to Scale first issued DD/MM/YYYY

project code sheet no. revision

DTPS X-80000